Canadian Society of Hospital Pharmacists | Société canadienne des pharmaciens d'hôpitaux

Hospital Pharmacy in Canada Survey Report 2020/21

HOSPITAL PHARMACY IN CANADA SURVEY BOARD

2020/21 Hospital Pharmacy in Canada Survey

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Canadian Society of Hospital Pharmacists

Société canadienne des pharmaciens d'hôpitaux

Published by the Canadian Society of Hospital Pharmacists (CSHP), Ottawa, Ontario. 2022

Suggested citation:
Hospital Pharmacy in Canada Survey Board. Hospital Pharmacy in Canada Survey Report 2020/21. Ottawa, ON: Canadian Society of Hospital Pharmacists; 2022. ISSN 2816-9573

Previous editions of the Hospital Pharmacy in Canada Survey Report can be accessed here:
https://cshp.ca/HPCSreports

Other publications of the Canadian Society of Hospital Pharmacists (CSHP) can be obtained from:
30 Concourse Gate, Unit 27
Ottawa ON K2E 7V7
Telephone: 613.736.9733
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The CSHP Hospital Pharmacy in Canada Survey is conducted at approximately 2-year intervals. Suggestions for the next iteration of the survey are welcome.

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Hospital Pharmacy in Canada Survey Report 2020/21

The Hospital Pharmacy in Canada Survey Board
is an affiliated board of the Canadian Society of Hospital Pharmacists.

The Survey Board wishes to acknowledge and thank the team supporting the Hospital Pharmacy in Canada Survey Report 2020/21.

Managing Editor

Carolyn Dittmar, Cameron, Ontario

Online Survey Provider

Institute of Social Research, York University, Toronto, Ontario

Research Analyst Services

- **Institute of Social Research,** York University, Toronto, Ontario,
- **Cynthia Tanguay and Jean-François Bussières,** the Pharmaceutical Practice Research Unit (URPP, Centre hospitalier universitaire Sainte-Justine, Montréal, Québec)

Copy Editor

Peggy Robinson, Ottawa, ON

Graphic Design

Design Tandem, St. Catharines, ON
designtandem.com

Photos

COVER: This photo illustrates the contribution of the pharmacy team to the direct care provided to patients at CHU Sainte-Justine, Montréal, Québec. From left to right, we find a nurse, a pharmacist, a pharmacy technician, a specialist in clinical activities and a pediatric intensive care physician. The photo shows three members of the pharmacy team. The pharmacist provides pharmaceutical care, the pharmacy technician sees to drug supply, and the specialist in clinical activities (holder of a bachelor's degree in biopharmaceutical sciences) is considering the need for a saliva sample for a pharmacogenetic test. **Photo credit:** Véronique Lavoie, CHUSJ, 2022

CHAPTER H, PAGE 180: Photo credit: North York General Hospital, Ontario.

Translation services

Megalexis, Gatineau, Québec, QC
megalexis.com

Special thanks

The HPC Survey Board would also like to thank:

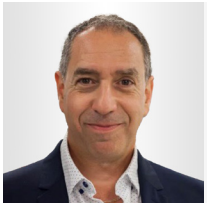
- the staff of hospital pharmacy departments across Canada who provided data from their respective facilities and committed the time to complete the survey
- the new 150 respondents to the inaugural small hospital survey included in this report
- the Canadian Society of Hospital Pharmacists, its Board, and its staff for their support of this survey.

CSHP and the HPC Survey Board are grateful for the generous support of our corporate sponsors, Pfizer Canada, Pharmascience/ Pendopharm and Baxter Canada. Their funding supports such technical production as survey programming, French translation, publication, and copy editing. As always, organization-specific data are not disclosed in the survey report, nor made available to CSHP, sponsors, or any other party. **The editorial direction, content, survey design, analysis and interpretation are the sole responsibility of the HPC Survey Board, an expert group of respected pharmacy leaders, which is affiliated with CSHP.**

Hospital Pharmacy in Canada Survey Board

EXECUTIVE EDITOR
Richard Jones, BSc, BSP, RPh, ACPR, FACHE
Director, Pharmacy Services, Retired
Vancouver Island Health Authority,
Vancouver, BC

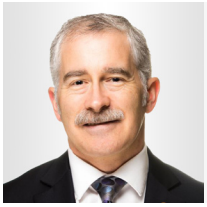
MANAGING EDITOR
Carolyn Dittmar, BScPhm, RPh, BCGP, ACPR, FCSHP
Geriatric Assessment and Intervention Network (GAIN) Clinic, Kawartha Lakes, ON



André Bonnici, BPharm, MSc
Chef du département de pharmacie
Centre Universitaire de Santé McGill,
Montréal, QC

Jean-François Bussières, BPharm, MSc, MBA, FCSHP, FOPQ
Chef du département de pharmacie
Centre hospitalier universitaire Sainte-Justine Montréal, QC

Bal Dhillon, MBA, BSc, RPEBC-PT
Director, Inventory & Order Management
Provincial Health Services Authority
Langley, BC



Douglas Doucette, BSc(Pharm), PharmD, FCSHP
Regional Director, Pharmacy Services
Horizon Health Network,
Moncton, NB

Kyle MacNair, BScPharm, ACPR
Executive Implementation Lead
Southern Health-Santé Sud,
Morden, MB

Debra Merrill, BScPharm, PharmD
Director of Pharmacy, Retired
Royal Victoria Regional Health Centre,
Barrie, ON

Allan Mills, BScPhm, PharmD, MBA, FCSHP
Director of Pharmacy
Trillium Health Partners,
Mississauga, ON

Régis Vaillancourt, BScPhm, PharmD, FCSHP
Director of Pharmacy, Retired
CHEO (Children's Hospital of Eastern Ontario),
Ottawa, ON

CSHP LIAISON
Jody Ciufo, MBA
Chief Executive Officer
Canadian Society of Hospital Pharmacists
Ottawa ON

The HPC Survey Board would to acknowledge and thank our recently appointed new Board members, Shannan Neubauer from Saskatchewan, Edith Rolko from Ontario and Spencer Tuttle from British Columbia for their review of the draft chapters of this survey report.

Forewords

Jody Ciufo, MBA
Chief Executive Officer
Canadian Society of Hospital Pharmacists

Canadian Society of Hospital Pharmacists

Société canadienne des pharmaciens d'hôpitaux

The Canadian Society of Hospital Pharmacists is proud to publish the Hospital Pharmacy in Canada Survey Report 2020/21, the 22nd Edition of this monumental resource and only the second edition published under the auspices of CSHP.

Monumental certainly describes the level of effort, resources and volunteer time dedicated to publishing this report. It also reflects the obstacles in putting this together, most particularly the COVID-19 pandemic, which the hospital pharmacy community and the Hospital Pharmacy in Canada Survey Board overcame to make this happen. Still not behind us at the end of 2022, the pandemic was responsible for the four-year gap in publishing instead of the normal two-year timeframe. For the first year of the pandemic, asking Canadian hospital pharmacies to shift their focus from managing this unprecedented crisis to completing a complex survey, no matter how important the work, was simply unthinkable.

Fifteen months into the pandemic, hospital pharmacies found ways to negotiate the crisis and several managed to complete the survey despite surging and receding COVID-19 waves. We are extremely grateful to the many hospital pharmacy teams for their commitment to providing the information that underpins the immense longitudinal value of the survey. And because they participated in the midst of the crisis, professional pharmacy staff captured real time data that provides the solid evidence documented in this report and that hospitals and healthcare systems will rely upon as we navigate the next pandemic.

Beyond the hospital pharmacy teams, CSHP is indebted to each of the Hospital Pharmacy in Canada Survey Board members whose volunteer commitment made this massive report possible, in spite of the demands of the pandemic on their professional and personal obligations. Sincere thanks are due to the steady leadership of Executive Editor Richard Jones in this, his third and final, edition of the Survey Report and to the organizational mastery of the Managing Editor, Carolyn Dittmar.

The importance of our sponsors cannot be understated. The resources of Pfizer, Pharmascience/Pendopharm and Baxter made this Survey and Report possible. Primary research is expensive, despite the hundreds of thousands of total volunteer hours. The complex survey programming, scientific editing, translation and publishing were possible because of this generous external funding. As always, editorial direction from our corporate partners was neither sought nor offered. We simply share the dedication to the overriding quality of the Survey and its findings.

The Hospital Pharmacy in Canada Survey Report is a permanent record of the status of hospital pharmacy in Canada's healthcare systems. Advocacy is one of CSHP's main pillars and, while serving the profession, is ultimately targeted to improving patient outcomes in a systemic way. Advances to systems can only be made with expertise and evidence. This Report doesn't advocate in and of itself, but it puts the reported data into many hands in many organizations: hospitals, universities, colleges, other health care professions, patient groups, industry, legislators, regulators and government agencies.

This Report, realized through the collective work of pharmacy teams, volunteers and supporters, gives us the means to create optimal outcomes for our patients, to support excellence in the profession and to achieve meaningful, lasting change in Canada's healthcare systems.

Forewords

Ranjita Banerjee
Commercial Director, Promoted Brands
Pfizer Canada

Pfizer Canada is pleased to continue supporting the Hospital Pharmacy in Canada Survey Report. This is an important tool for Canadian hospital pharmacy leaders to understand, identify, and to share information on clinical and administrative practices within their institutions. By doing so, the hospital pharmacy profession can continue to flourish through advancements and best practices. The extensive participation from the hospital pharmacy departments across Canada, that responded to the 2021-22 Hospital Pharmacy in Canada Survey, is a testimony to the quality and value of this initiative.

Pfizer Canada is delighted to continue to have the opportunity to contribute to this valuable national effort, that truly brings hospital pharmacist leaders together to achieve a common goal: putting patients first.

Forewords

Martin Laperrière
National Sales Director
Pendopharm/Pharmascience Canada Inc.

Pharmascience Canada is pleased to support this 22nd edition of the Hospital Pharmacy in Canada Survey Report. This report is important for pharmacy leaders to share information on clinical and administrative practices within their institutions. This sharing helps to promote the progression of the hospital pharmacy profession through identification and promotion of best practices.

Thank you to everyone that has contributed to this important document. A special congratulation to the CSHP Hospital Pharmacy in Canada Survey Board on the great work done in these special pandemic years.

Pharmascience Canada is pleased to contribute to this valuable national project.

Forewords

Neil Da Silva
Business Unit Director,
Pharmaceuticals
Baxter Canada

Baxter is grateful to have the opportunity to support this latest edition of the CSHP Hospital Pharmacy in Canada Survey Report.

This report can only happen because of the tremendous engagement of the pharmacy community in Canada, allowing pharmacists to better understand practice and share information across the country. These learnings enable the betterment of pharmacy practice, industry participation and patient outcomes.

We are excited to witness the continued growth of pharmacy departments and organizations nationally.

Baxter

Introduction

Richard Jones

This edition of the *CSHP Hospital Pharmacy in Canada Survey Report* represents some significant milestones in the history of the survey. Not only does this edition mark the first time the survey has ever been conducted during a global pandemic, it also concludes the transition of the survey from being a singularly funded, independent survey to one that has multiple sponsors and is conducted within the not-for-profit sector. To this end, the Hospital Pharmacy in Canada Survey Board is now officially an affiliated board of the Canadian Society of Hospital Pharmacists (CSHP).

The transition to becoming a CSHP-affiliated board was originally intended to take two 3-year cycles of the survey and was planned to include the retirement of many of the historical support structures on which the survey has relied, including data collection and analytics resources and administrative support. Following the retirement of the data collection and analytics resources, the Institute for Social Research (ISR) at York University, Toronto, Ontario, was contracted to undertake the creation of a new online survey tool and subsequent data collection by experts who were not familiar with hospital pharmacy practice. This process involved a significant learning curve for the survey board and for the CSHP and ISR teams. In addition, the transition period became overshadowed by the COVID-19 pandemic, which began in March 2020 and demanded much more, both personally and professionally, from everyone in the hospital pharmacy arena than anything previously experienced by those in practice today. As a result of both COVID-19 and the many operational changes, it has taken a total of 7 years to complete the two transitional cycles.

Beyond its immediate effect on the CSHP Hospital Pharmacy in Canada Survey, COVID-19 has had a profound impact on hospital pharmacy services across Canada. In providing feedback, many survey respondents raised questions about the timing of this iteration of the survey and the associated report. Yet from the perspective of the board, the importance of making an updated report available, at what is now four years since the 2016/17 report, was compelling, despite the many demands of COVID-19 that continue to affect hospital pharmacy leaders.

While COVID-19 was actively consuming the capacity of Canadian hospital services, many organizations were already committed to major upgrade projects, such as migration to a completely new electronic health record (EHR) system, including statistical reporting capabilities. Others have continued to expand their current EHR systems to non–acute care services, including long-term care and primary care, or to work toward achieving Healthcare Information and Management Systems Society (HIMSS) Stage 5 or 6 status in acute care operations. The impact of such work meant that Alberta, a province with a single health authority, was unable to participate in the 2020/21 survey because of provincial implementation of a standardized clinical information system. If Alberta had participated, this in-progress implementation would have provided data from two independent systems, possibly reducing the quality and reliability of the combined data set. Alberta is looking forward to participating in the next survey.

As a result, it will not be valid to compare Prairies data in the 2020/21 report with data from the same region appearing in previous reports. Future reports are expected to present Alberta data as a distinct region, such that trending analysis for the Prairies grouping of Saskatchewan and Manitoba will be valid against the current report.

Chapter A, Demographics, outlines the demographic characteristics of the responding institutions and provides important denominators and references for the rest of the report.

Chapter B, Clinical Pharmacy Practice, by Debra Merrill and Jean-François Bussières, shows growth in clinical practice across Canada and now includes a much-expanded roster of clinical practices compared with prior reports. The COVID-19 pandemic has been a catalyst here as well. Many hospital pharmacists have taken on a wide variety of professional activities typically offered by other health care professionals, including administering COVID-19 vaccinations and contributing to therapeutic policy on treatments. The continuing drug shortage, amplified by the pandemic, saw more pharmacy professional involvement

to ensure a safe medication service. Notwithstanding COVID-19 and drug shortages, healthcare human resources continue to affect clinical services; however, clinical pharmacy practice on clinical care teams and in other professional aspects of care has been expanded despite these challenges.

Chapter C, Drug Distribution Systems, by Allan Mills continues to be a very robust chapter, with descriptions of the many options being deployed both operationally and technologically in various drug distribution systems across the country. The COVID-19 pandemic has triggered many process changes, including more extensive deployment of technologies to refine workflow processes. The National Association of Pharmacy Regulatory Authorities (NAPRA), in its standards for drug preparation and distribution, has set out many demands on the drug distribution system. Of note are the standards for preparation of sterile hazardous and non-hazardous drugs. This chapter includes an expanded section on the application of these new standards.

As reported in multiple media sources and as known within the hospital systems themselves, Canadian healthcare is experiencing an acute shortage of physicians and nurses. While this is indeed a serious concern, Chapter D, Human Resources, by André Bonnici, illustrates that suitably skilled pharmacists and both regulated pharmacy technicians and non-regulated pharmacy assistants are in acute short supply as well. The delivery of medication-based care services depends on many professionals—physicians, nurses, pharmacists, regulated pharmacy technicians and non-regulated pharmacy assistants—to achieve a high-quality, safe service for patients. A shortage of human resources in any one of these groups has a significant impact on the ability of the medication service to achieve its full potential of quality, safety and efficacy. Some provinces and territories have regulated pharmacy technicians, and others have trained non-regulated pharmacy assistants who perform similar functions; as such, when interpreting the report, please refer to the Definitions (Appendix IV) to understand terminology related to these groups.

Chapter E, Benchmarking, by Jean-François Bussières and Douglas Doucette, presents the most current set of benchmarking references, which will enable readers to make some comparisons with the 2016/17 report to better understand how the benchmarks are evolving over time. This section provides some important ratios relevant to the administration of pharmacy services.

For the first time, the survey board includes a regulated pharmacy technician leader, Bal Dhillon, who has written Chapter F, Pharmacy Technician Practice. The 2020/21 survey included several new questions exploring the activities and roles that regulated pharmacy technicians and non-regulated pharmacy assistants are providing in hospital pharmacy services. For many years, it was proposed that if pharmacy technical staff were trained to perform many of the drug distribution–related duties of a pharmacy, pharmacists would be available to provide a more robust clinical service within the interprofessional care team. This report reveals the growing extent of duties performed by pharmacy technical staff, previously performed or supervised by pharmacists, and describes how the role of regulated pharmacy technicians and non-regulated pharmacy assistants is evolving. The regulation of pharmacy technicians in most provinces has opened a range of new opportunities for pharmacy technicians and pharmacists alike. In the province of Québec, deployment of non-regulated pharmacy assistants is the universal practice, whereas regulated pharmacy technicians fulfil this role in other provinces. Unique to these individuals is a standardized training program to prepare them for their work in pharmacies across Québec, despite not being licensed or regulated by a health regulatory college.

Chapter G, Technology, by Douglas Doucette, highlights the important changes in technology implementation since the last report, which has been somewhat accelerated by the deployment of EHR systems and the COVID-19 pandemic. Technology is also affected by the adoption of the new NAPRA standards for production and dispensing services. These standards favour deployment of several technologies to ensure compliance.

The COVID-19 pandemic has affected pharmacy services and the broader medication services provided in Canadian hospitals in numerous ways. Some of the key adaptive initiatives are reported in Chapter H, The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services, by Régis Vaillancourt. These include changes in the scope of practice for pharmacists, regulated pharmacy technicians and non-regulated pharmacy assistants; implementation of remote and virtual work; expansion of technology to levels never seen before; planning, oversight and participation in mass COVID-19 vaccination clinics; and increased training in the professional skills of pharmacy staff in various settings such as critical care, where they can uniquely offer important value in the delivery of care. Responses to three qualitative questions with respect to the COVID-19 pandemic—what was most challenging, what went well and what could be done differently—reveal some interesting lessons learned for future pandemic planning. Each of the chapters

highlight the changes that COVID-19 has facilitated, and the authors comment on what the survey findings reveal and what they anticipate may be permanent changes in how medication services are provided in hospital settings.

For the first time in its history, the 2020/21 CSHP Hospital Pharmacy in Canada Survey accepted responses from hospitals with fewer than 50 acute care beds. Here, we refer to this part of the survey as the Small Hospital Survey (SHS), reflecting the smaller number of acute care beds in these facilities relative to the traditional survey, now referred to as the Large Hospital Survey (LHS), completed by respondents from facilities with 50 or more acute care beds. The SHS, Chapter I, by Kyle MacNair, reveals some important observations on the nature, quality and safety of the types of medication services provided to patients in smaller Canadian hospitals. This information will be used as the initial reference or baseline for future iterations of the SHS, thereby enabling discussion and prioritization on the quality and safety of medication services in these facilities when compared with Accreditation Canada or other professional standards in Canada.

As a consequence of governance consolidation in some provinces (e.g., Québec), data for small hospitals that operate under the governance structure of a large hospital are included in the aggregate data for large hospitals, given that these organizations follow the same policy and operational standards as the rest of the corporation. Data from these same small hospitals are also included in the separate SHS to allow them to be highlighted distinctly from the larger corporate organization. Because the SHS and LHS reports are separate, there is no conflict in representing the small hospitals in this manner; rather, this approach allows greater clarity now and in the future concerning the distinctive aspects of small hospital services in relation to the operational governance system of which they are part.

This report, along with previous survey reports, can now be found on the CSHP website, available at: **https://cshp.ca/HPCSreports**

In conclusion, I would like to recognize the contributions of those survey board members who will be retiring from the board in 2022. Debra Merrill joined the board in 2015 and coauthored the Clinical Pharmacy Practice chapter with Jean-François Bussières for both the 2016/17 and 2020/21 reports. She recently retired from her position as Director of Pharmacy at the Royal Victoria Regional Health Centre in Barrie, Ontario. We are grateful for Debra's practical and innovative suggestions during her tenure. Régis Vaillancourt joined the board in 2019 and has crafted an outstanding overview of the impact of COVID-19 on hospital pharmacy services across the country. Régis has also recently retired from his role as Director of Pharmacy at the CHEO (Children's Hospital of Eastern Ontario) in Ottawa, Ontario. Kyle MacNair joined the board in 2010. Kyle's tenure is matched by that of Douglas Doucette and surpassed only by that of Jean-François Bussières. Kyle has made innumerable contributions to several reports over the years, and his insights have continued to play a major role in shaping the survey, in addition to representing the small hospital perspective. Kyle recently transitioned out of the pharmacy to a more senior leadership role within his organization, and we wish him well as his career continues to grow and evolve. Finally, for myself, I will be retiring as executive editor of the board and representative for British Columbia (BC) and Yukon, as I have recently retired from my role as Director of Pharmacy at Island Health in BC.

I am proud to announce the three new editors who are joining the survey board. Edith Rolko, Director of Pharmacy at North York General Hospital, will be replacing Debra Merrill; Shannan Neubauer, from Saskatchewan, a respected pharmacy leader in small hospitals, will be replacing Kyle MacNair; and Spencer Tuttle, Executive Director of Lower Mainland Pharmacy Services in BC, will be replacing me as the representative for BC and Yukon. The new editors have participated in board meetings since January 2022, and the value of their leadership and experience is already being realized as we complete this report. The new Executive Editor will be Douglas Doucette, who is Regional Director of Pharmacy Services with Horizon Health Network in Moncton, New Brunswick. The board is committed to adding two more members, one each from Alberta and the Atlantic provinces. The planned addition of these new board members reflects the changing landscape of publicly funded healthcare in Canada and will better enable the board to capture these important dynamics in future reports.

Congratulations to all continuing and new members of the CSHP Hospital Pharmacy in Canada Survey Board. My sincerest gratitude to the entire board and to CSHP leadership, with whom I have had the honour and delight to serve as executive editor since 2015.

Richard Jones
Executive Editor
CSHP Hospital Pharmacy in Canada Survey Board

METHODOLOGY (Data Collection and Analysis)

Jean-François Bussières and Carolyn Dittmar

The CSHP Hospital Pharmacy in Canada Survey is a descriptive cross-sectional survey. The objective of the current survey iteration was to establish a profile of hospital pharmacy practice in Canada for the year April 1, 2020, to March 31, 2021. Participation was voluntary, and the data collected were treated confidentially by the data analysts. Furthermore, members of the CSHP Hospital Pharmacy in Canada Survey Board did not have access to individual responses.

Design of Questionnaire and Online Survey

This iteration of the CSHP Hospital Pharmacy in Canada Survey had two components, based on the respondent's number of acute care beds. The Large Hospital Survey (LHS) targeted the pharmacies of Canadian facilities with at least 50 acute care beds. In addition, for the first time, small hospitals (those with fewer than 50 acute care beds) were invited to complete a small number of questions designed to generate baseline data (the Small Hospital Survey, SHS). The survey was originally set to launch in spring 2020, but it was temporarily put on hold because of the COVID-19 pandemic, declared in March 2020. Plans to launch the survey one year later, in spring 2021 (despite the ongoing pandemic), were brought to fruition with the launch of a new online survey tool in July 2021.

The survey board held several meetings in 2019 and 2020 to confirm the questions that would appear in each of the two surveys (LHS and SHS). To avoid survey fatigue, some topics are covered only in every second iteration of the survey. Question development takes into account the wording used in previous surveys to allow analysis of trends in the results; however, some questions were modified for simplification or clarity, and several new sections or questions were added to the 2020/21 survey. The survey questions and pertinent definitions (see Appendix IV, Definitions and Appendix V, Survey Questions) were reviewed and approved by the survey board, copyedited and translated into French.

The LHS survey consisted of nine sections with a total of 83 questions, as follows:

- Section A: Hospital Information (6 questions)
- Section B: Clinical Pharmacy Practice (12 questions)
- Section C: Drug Distribution Systems (18 questions)
- Section D: Pharmacy Human Resources (5 questions)
- Section E: Benchmarking (2 questions)
- Section F: Pharmacy Technician Practice (10 questions)
- Section G: Technology (11 questions)
- Section H: The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services (19 questions)
- Section J: Respondent's Statement of Completion and Information (including authorization to use their data)

The SHS (Section I: Small Hospitals [11 questions]) was completed by those respondents who indicated, in Section A of the LHS, that their organization had fewer than 50 acute care beds.

Each question could include one or more sub-questions. Each survey was preceded by detailed instructions, and definitions of terms used in each survey were provided. Each section of the survey ended with the option for respondents to provide comments or feedback.

The online survey tool used for the 2020/21 survey was programmed by the Institute for Social Research (ISR), York University, Toronto, Ontario. The LHS and SHS were developed using the Qualtrics tool (**https://www.qualtrics.com/about/**). The email communications and questionnaires were available in both English and French. A respondent could view the questionnaires in either language to confirm their understanding of the question and definitions. Respondents to the LHS whose organizations had multiple sites or facilities had the opportunity to answer a single questionnaire for their entire organization or one for each individual site. In the latter situation, an additional unique hyperlink was provided, upon request, for each facility. Conversely, some respondents received multiple invitations (one for each of their component facilities), but they completed the survey just once, providing data for all facilities.

The survey was programmed to require each respondent to answer all questions in Section A. Respondents reporting fewer than 50 acute care beds were directed to Section I (the SHS) and were subsequently not permitted to access the remainder of Section A or the rest of the LHS. Respondents whose organizations had 50 or more acute care beds could navigate among the various sections of the LHS but could not return to section A to modify their responses. Respondents were able to leave the online questionnaire and return to it multiple times in order to complete their responses before the survey deadline of September 26, 2021 (extended from the original deadline of September 21, 2021). To simplify data collection, a period (“.”)was used to represent the decimal character, although in French a comma is normally used for this purpose. Respondents were invited and encouraged to download a PDF version of their completed survey for future reference, before final submission of their completed questionnaire.

The online survey was initially programmed with several “mandatory” fields. This created a lot of confusion and frustration for respondents when they were not able to “go back” to correct or change a response, in addition to being prevented from navigating within a section of the survey. As such, mandatory programming was removed from all fields within two to three weeks after launch.

Survey Population

Members of the CSHP Hospital Pharmacy in Canada Survey Board (**listed on page 6**) reviewed the list of Canadian healthcare facilities that had been invited to participate in the 2016/17 survey, along with contact information for their respective pharmacy departments and CEOs. Each survey board member reviewed the list for their particular region to ensure accuracy in terms of facility names, pharmacy contact names and email addresses, and the names and email addresses of CEOs. The final list consisted of 240 potential large hospital respondents (including 12 in Alberta). However, the Alberta respondents indicated, just before launch of the online survey, that they would be unable to participate in the survey because of the recent province-wide implementation of a standardized clinical information system which would have brought into question the validity of data provided by the old and new systems for the 2020/21 fiscal year. As such, the number of potential large hospital respondents was 228 excluding those in Alberta.

A list of Canadian facilities with fewer than 50 acute care beds was obtained from the Canadian Institute for Health Information’s document entitled “Hospital Beds Staffed and in Operation 2018-2019”.[1] All healthcare facilities with fewer than 50 acute care beds were eligible for this survey, even if they were part of a larger healthcare organization (e.g., in Québec, where every small hospital is also part of a larger healthcare facility). Pharmacy contact information was obtained (with the assistance of some provincial pharmacy leaders overseeing small hospitals) for 254 potential respondents/facilities that met the criteria for small hospitals; this number did not include any facilities in Alberta, for the same reason as outlined above.

Recruitment

An email message was sent to all potential LHS and SHS respondents on June 19, 2021, informing them that the 2020/21 survey would be launched in July 2021. A second email was sent on June 24, 2021, with details about data in the survey that respondents might have to obtain from other hospital departments, so they could prepare to complete the online survey. On July 19, 2021, an email was sent to the CEOs of the large hospital respondents (those with 50 or more acute care beds) informing them of the national survey and its value and encouraging their facilities' participation. On July 29, 2021, an email was sent to all potential respondents providing their unique hyperlink to the online survey.

Respondents were first asked to indicate the number of acute care beds in their facility. Based on their response, as described above, they were directed to either the LHS or SHS. In September 2021, before the survey deadline, two email reminders were sent to all potential respondents who had not yet submitted their data. The deadline for completing the survey was September 26, 2021. During the survey, the survey board members made themselves available to answer questions from respondents. In addition, some individual follow-ups were undertaken by board members for clarification or expansion of some of the responses submitted.

Data Analysis

Data were analyzed for 144 respondents to the LHS and 150 respondents to the SHS. Respondents were excluded from the analysis if they completed less than 10% of the questions.

All authors of chapters of this report are survey board members. The authors were asked to submit a list of the tables and figures needed to write their respective chapters. To create these elements, personnel with the ISR first exported the data collected with the survey tool to statistical analysis software (IBM SPSS Statistics for Windows, version 27.0 [released 2020], IBM Corp., Armonk, NY; Q Research Software, Q Research, University of Oxford, Oxford, UK). Second, frequency tables produced for each section of the survey were shared with the authors to help identify possible outliers. Preliminary data tables were then produced for each section to allow external validation of the data by the team from the Pharmaceutical Practice Research Unit of CHU Sainte-Justine, Montréal, Québec. The data presentation took into account institutional teaching status (i.e., teaching, non-teaching, pediatric); hospital size, based on the total number of beds (i.e., 50–200, 201–500, >500); and geographic region (i.e., British Columbia/Yukon [BC/YT], Prairie provinces [Manitoba, MB; Saskatchewan, SK], Ontario, Québec, Atlantic provinces [Nova Scotia, NS; New Brunswick, NB; Prince Edward Island, PE; Newfoundland and Labrador, NL]. Although all of the pediatric hospitals are teaching hospitals, their data are presented separately from the data designated as "teaching hospitals" (such that the latter term thus refers to adult teaching hospitals). As explained above, Alberta did not participate in the 2020/21 survey.

The authors reviewed all of the respondents' comments in their respective sections of the survey to confirm the validity of the data shared. As a result of this review, some data were either eliminated or corrected. Only descriptive statistics were calculated (i.e., frequencies, percentages, means and standard deviations, medians, percentiles, minimums, maximums). Each variable was calculated using the applicable numeric base. When the standard deviation of the mean (average) was equal to or greater than the mean, the median was preferred for reporting purposes. Ratios were calculated wherever possible. Where the number of respondents was considered small for a given variable (e.g., number of respondents below 10), only the absolute data are presented, without percentages. Some chapters of this 2020/21 survey report have just one author, whereas others have multiple authors, reflecting the expertise and interest of individual survey board members in the particular chapter topics. All chapter drafts were shared and discussed with the entire survey board to solicit comments and feedback, to ensure that any questions were addressed and to ensure clarity of presentation.

Publication

All texts, tables and figures were proofread by the managing editor, Carolyn Dittmar, to ensure accuracy and compliance with editorial guidelines. In addition, all chapters of this report, including tables and figures, were copyedited (in English) by Peggy Robinson. The final survey report was translated from English to French by Mégalexis, Montréal, Québec, and the translated documents were reviewed by French-speaking members of the survey board. The English and French versions of the report are available online here: **https://cshp.ca/HPCSreports**

1. Hospital beds staffed and in operation, 2018–2019 [Excel spreadsheet]. Ottawa, ON: Canadian Institute for Health Information; 2020 [cited 2022 May 15]. Available from: https://www.cihi.ca/en/search?query=hospital%20beds

A - Demographics

Richard Jones

For fiscal year 2019/20, the Canadian Institute for Health Information (CIHI)1 listed 228 hospitals with 50 or more staffed acute care beds (excluding Alberta [AB]), of which 144 responded to the 2020/21 CSHP Hospital Pharmacy in Canada Survey, yielding a response rate of 63%. By comparison, the 2016/17 survey had a response rate of 83% (184/223). The decrease is due in part to the demands of the COVID-19 pandemic, as well as the inability of AB to contribute to this report and a major restructuring in the province of Québec (QC) in 2015, which resulted in fewer respondents from that province, although representing similar numbers of facilities/beds. To interpret QC participation in the 2020/21 survey, we note that 85% (23/27) of directors of pharmacy departments in that province provided data for at least one of their facilities. Thus, the data collected represent 77% (56/73) of facilities with at least 50 acute care beds. In addition, no facilities in Yukon (YT) submitted data for this iteration of the survey. In the past, data for YT have been combined with data from British Columbia (BC); therefore, for trending purposes across surveys from different years, the label "BC/YT" has been retained in this report, but representing data solely from BC. With the impact of COVID-19 affecting demands on all hospitals across Canada, 63% is considered a good response rate and of ample strength to support the findings as being representative of the state of Canadian hospital pharmacy services in 2020/21. This survey saw a welcome increase in the number of respondents from Newfoundland and Labrador (NL) to six, up from only three in 2016/17. In this report "Atlantic Canada" consists of the four eastern provinces, specifically New Brunswick (NB), Nova Scotia (NS), Prince Edward Island (PE) and NL. In contrast to previous reports, the "Prairies" grouping consists of only two provinces, specifically Saskatchewan (SK) and Manitoba (MB); as explained in the Methodology chapter, AB did not contribute to the 2020/21 survey.

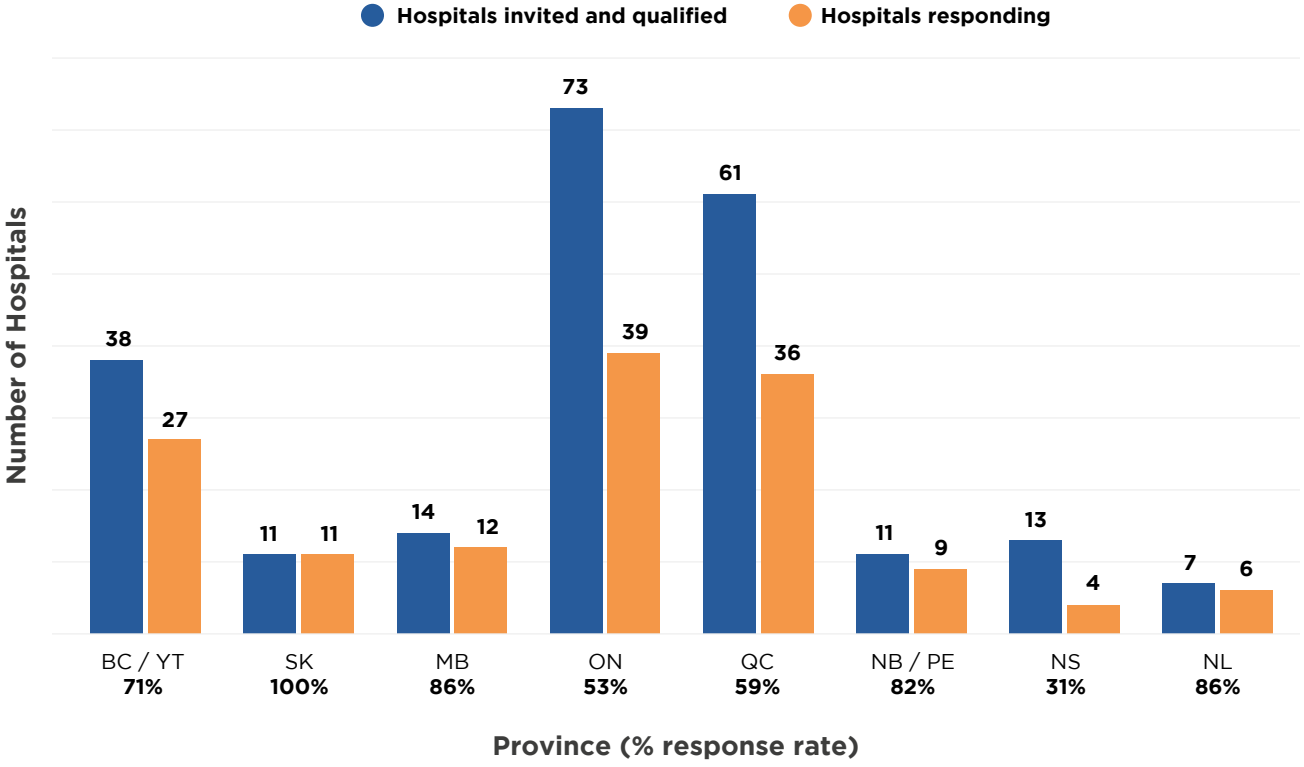
COVID-19 and province-wide technology deployment in Alberta contributed to a reduction in the overall survey response rate to 63%, from 83% in the 2016/17 survey.

Response rates by province were generally lower for this survey than for the 2016/17 survey (Figure A-1), probably because of issues arising from the demands of COVID-19 on organizations and their ability to respond to the survey. Increases were seen for SK, with 100% response (11/11) vs. 88% (7/8) in 2016/17, and for NL, with 86% response (6/7) vs. 50% (3/6) in 2016/17. Among provinces with a drop in response rate, the largest occurred in Nova Scotia, from 100% (9/9) in 2016/17 to 31% (4/13) in 2020/21. Other provinces' response rates were similar to those of the last survey. MB had one fewer responding facility in this survey; however, that province also had one more facility eligible to respond. As a result, the response rate dropped from 100% (13/13) for 2016/17 to 86% (12/14) in this survey. Similarly, NB and PE combined had one additional eligible hospital in this survey iteration, but the same number of responding hospitals as for the last survey, resulting in a decrease in response rate from 90% (9/10) for 2016/17 to 82% (9/11) in this survey.

Changes in hospital governance in Québec have reduced the number of responses, but the total number of beds for that province is similar to 2016/17

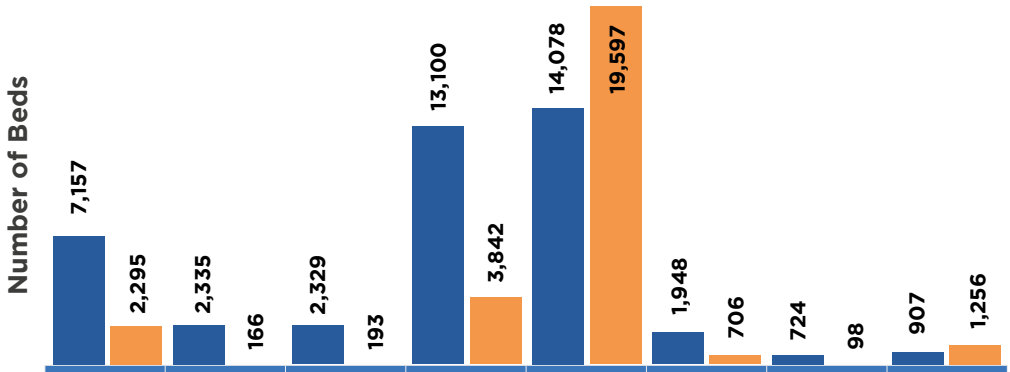
Although the total number of responses from QC was lower than for the 2016/17 survey (36 vs. 43), the total reported number of acute care beds was very similar (14,078 vs. 14,188). As mentioned above, the change in response rate probably reflects the re-organization of facilities in that province. In the Prairies grouping, the total number of respondents was 38/41 for the 2016/17 survey, compared with 23/25for the 2020/21 survey. This difference is due primarily to the absence of respondents from AB, as explained in the Methodology chapter. The total bed count for the Prairies grouping was 12,205 in 2016/17 (AB, SK and MB) vs. 5,023 beds in 2020/21 (SK and MB only). Similarly, the acute care bed count for the Prairies grouping was 11,293 in 2016/17 (AB, SK and MB) vs. 4,664 in 2020/21 (SK and MB only). Clearly, analysis of between-survey trending for the Prairies grouping was challenging for this report.

Figure A-1. Response to the Survey by Province, 2020/21



Note: Total number of respondents (including 5 pediatric hospitals) = 144 (63%, 144/228)

Figure A-2. Respondents' Number of Acute Care and Non-Acute Care Beds by Province, 2020/21



	BC	SK	MB	ON	QC	NB / PE	NS	NL
Acute Care Beds	7,157	2,335	2,329	13,100	14,078	1,948	724	907
Non-acute Care Beds	2,295	166	193	3842	19597	706	98	1,256
Acute care beds % of Province	76%	93%	92%	77%	42%	73%	88%	42%
Non-acute care beds % of Province	24%	7%	8%	23%	58%	27%	12%	58%
Acute care beds % of Total	17%	5%	5%	31%	33%	5%	2%	2%
Non-acute care beds % of Total	8%	1%	1%	14%	70%	3%	0%	4%
TOTAL BEDS	9,452	2,501	2,522	16,942	33,675	2,654	822	2,163

Province

Note: Data in this chart include beds in pediatric facilities

The share of acute care beds varied by region across the country (Figure A-2), suggesting differences in deployment of publicly funded health care services in the hospital sector. The average regional share of acute care beds, relative to total beds, was 76% (7,157/9,452) for BC/YT, 93% (4,664/5,023) for the Prairies (SK/MB), 77% (13,100/16,942) for Ontario (ON), 42% (14,078/33,675) for QC and 67% (3,579/5,369) for Atlantic Canada. Similarly, the proportion of acute care beds, relative to total beds, varied by hospital type; more specifically, this ratio was higher for teaching hospitals (78%, 15,467/19,437) than for non-teaching hospitals (52%, 25,736/49,878); for pediatric hospitals, the ratio was 97% (1,375/1,416).

In some cases, multiple hospital pharmacies operated under one pharmacy service and a single set of policies and practices. As a result, some respondents reported their data as a combined entity, rather than submitting a separate survey response for each facility. The option to choose this approach was first made available in the 2016/17 survey, to recognize the changing landscape of hospital governance in Canada, specifically in terms of the delivery of pharmacy services. In these cases, total bed count accurately represents the combined number of beds for all facilities included in the survey response, and the number of facilities included in a particular statistic is factored into the counts, even though multiple facilities were reported as a single organization. Table A-1 provides details on this consolidated reporting across the country.

Table A-1. Respondents Reporting for More than One Facility, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(144)	(41)	(58)	(45)	(33)	(106)	(5)	(27)	(23)	(39)	(36)	(19)
Yes	29%	17%	16%	58%	33%	29%	0%	15%	22%	28%	44%	32%
	42	7	9	26	11	31	0	4	5	11	16	6
No	71%	83%	84%	42%	67%	71%	100%	85%	78%	72%	56%	68%
	102	34	49	19	22	75	5	23	18	28	20	13

Base: All respondents to this question, n = 144

In terms of hospital size, 41 respondents reported a total bed count of 50-200, 58 respondents reported a total bed count of 201-500, and 45 respondents reported a total bed count of more than 500. Only 33 respondents held academic teaching status, according to CIHI,[1] with 106 holding non-teaching status. Although pediatric hospitals function as teaching hospitals, the 5 pediatric hospital respondents are categorized separately from the teaching hospitals in this report.

Table A-2. Hospital Demographic Data – Acute Care and Non-Acute Care Beds, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Hospitals (n=)	**(144)**	(41)	(58)	(45)	(33)	(106)	(5)	(27)	(23)	(39)	(36)	(19)
Totals												
Beds – acute care	**42,578**	**4,677**	**14,859**	**23,042**	**15,467**	**25,736**	**1,375**	**7,157**	**4,664**	**13,100**	**14,078**	**3,579**
Beds - non-acute care	**28,153**	**914**	**4,820**	**22,419**	**3,970**	**24,142**	**41**	**2,295**	**359**	**3,842**	**19,597**	**2,060**
Averages												
Beds – acute care	**296**	**114**	**256**	**512**	**469**	**243**	**275**	**265**	**203**	**336**	**391**	**188**
Beds - non-acute care*	**196**	**22**	**83**	**498**	**120**	**228**	**8**	**85**	**16**	**99**	**544**	**108**
Beds – non-acute care**	**279**	**40**	**121**	**590**	**265**	**287**	**21**	**143**	**36**	**124**	**676**	**137**
*The average non-acute beds calculated using all hospitals (including those with 0 non-acute beds), n=144 **The average for non-acute care beds calculated for only those hospitals that reported having non-acute care beds, n=101												
Occupancy Rate (acute) * **	**(142)**	(39)	(58)	(45)	(33)	(104)	(5)	(27)	(22)	(39)	(36)	(18)
	81%	**76%**	**85%**	**81%**	**81%**	**82%**	**69%**	**87%**	**80%**	**81%**	**74%**	**90%**
***Base: Respondents who provided patient days												
Occupancy Rate (non-acute) ** **	**(87)**	(16)	(38)	(33)	(11)	(74)	(2)	(13)	(7)	(28)	(28)	(11)
	79%	**64%**	**79%**	**88%**	**78%**	**80%**	**80%**	**85%**	**56%**	**82%**	**82%**	**73%**
****Base: Respondents with 20 or more non-acute beds who provided patient days												
Average length of inpatient	**(138)**	(38)	(57)	(43)	(33)	(100)	(5)	(27)	(23)	(39)	(32)	(17)
stay - acute care (days)	**6.9**	**6.4**	**7.2**	**7.0**	**7.1**	**6.9**	**5.2**	**6.9**	**7.2**	**5.9**	**7.2**	**8.3**

The average number of acute care beds per respondent was unchanged since the 2016/17 survey, at 296 (Table A-2). The average number of non-acute care beds was 149 in the 2016/17 survey and 196 in the 2020/21 survey. However, when the average number of non-acute care beds was calculated in relation to only those hospitals that reported having non-acute care beds, it increased to 279. The average count of non-acute care beds will be calculated this way in future surveys, making subsequent trending with previous reports inadvisable.

The average occupancy rate of acute care beds for the three hospital bed size categories ranged from 76% for hospitals with 50-200 beds to 85% for hospitals with 201-500 beds, the latter being higher than the national average occupancy rate of 81% for acute care beds. Teaching and non-teaching hospitals had very similar occupancy rates for acute care beds (81% and 82%, respectively). Regional average occupancy rate for acute care beds was highest in Atlantic Canada (90%), followed by BC/YT (87%) and then ON (81%), the Prairies (SK/MB; 80%) and QC (74%).

The average occupancy rate for non-acute care beds (among respondents with at least 20 non-acute care beds) ranged from 64% in hospitals with 50-200 beds to 88% in hospitals with more than 500 beds. Teaching and non-teaching hospitals had similar occupancy rates for non-acute care beds, at 78% and

80%, respectively. The pattern of regional average occupancy rates for non-acute care beds was somewhat different than that for acute care beds: BC/YT had the highest occupancy rate (85%) and the Prairies (SK/MB) had the lowest (56%).

The average length of stay (ALOS) for acute care services, calculated for the 138 respondents who provided pertinent data, was 6.9 days, lower than the overall ALOS of 7.2 days documented in the 2016/17 survey. In terms of hospital size, the highest ALOS was 7.2 days for hospitals with 201-500 beds. The ALOS for teaching hospitals was 7.1 days, compared with 6.9 days for non-teaching hospitals. Regionally, the ALOS for acute care beds was lowest in ON (5.9 days) and highest in Atlantic Canada (8.3 days).

The overall demographic markers are within reasonable bounds of those presented in the 2016/17 report. Notable differences have arisen largely because of changes in reporting by region, with the Prairies region encompassing only SK and MB (with no data from AB for the 2020/21 report) and Atlantic Canada having increased representation from NL, which increased the region's average count for acute care beds. The total acute care bed count for QC remained similar to the 2016/17 number, despite governance reorganization resulting in fewer respondents to the 2020/21 survey. Average acute care bed counts for BC/YT and ON were up modestly from those in the 2016/17 report.

The overall acute occupancy rate is down in this report at 81% compared with the 2016/17 report at 91%. This report will delve further into the impact of these occupancy rates on hospital pharmacy services. In particular, Chapter H, covering the impact of COVID-19 on hospital pharmacy services, presents specific demographic data for fiscal year 2020/21, the period following the establishment of initial quarantine policies for the public and the initial round of vaccinations for hospital staff and selected members of the public.

Pediatric hospitals were represented by five respondents in this survey, compared with seven in the 2016/17 survey. The total number of pediatric acute care beds reported in this survey was 1,375, compared with 1,515 in the 2016/17 report. The average acute care bed count per respondent increased from 216 in 2016/17 to 275 in 2020/21, and the average occupancy rate of acute care beds dropped from 82% to 69%. In pediatric hospitals, the ALOS in acute care beds was 5.2 days, the same as in 2016/17.

New Questions – Emergency Department (ED) Visits, Ambulatory Care Visits and Hospital-Owned and Operated Pharmacies

Recognizing that hospital organizations are starting to embrace more ambulatory and primary care services, we asked three new questions relating to this area of care. The new questions focused on emergency department (ED) visits, ambulatory clinic visits and whether hospitals owned and operated any community/retail pharmacies within their respective organizations.

Table A-3. Average Annual Patient Visits to Emergency Department (ED), 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(141)	(39)	(57)	(45)	(33)	(103)	(5)	(27)	(22)	(39)	(35)	(18)
Average	**50,787**	**24,193**	**46,274**	**79,552**	**62,218**	**48,023**	**32,283**	**49,148**	**30,316**	**68,667**	**53,387**	**34,473**
Standard deviation (SD)	38,215	11,373	20,805	49,847	44,355	36,206	15,678	27,442	19,575	43,206	47,031	15,150

Base: All respondents who reported ED visits, n = 141

Across all organizations, the average number of annual ED visits was 50,787 (Table A-3). As expected, larger hospitals (> 500 beds) had notably higher average ED visits (79,552) than the national average, and smaller hospitals (50-200 beds) had approximately half of the national average number of visits (24,193). Teaching hospitals had 30% more ED visits than non-teaching hospitals (62,218 vs. 48,023). Regionally, the average number of ED visits was highest in ON (68,667), followed by QC (53,387) and then BC/YT (49,148). Visits to the ED per acute care bed were 6.9 (49,148/7,157) for BC/YT, 6.5 (30,316/4,664) for the Prairies (SK/MB), 5.2 (68,667/13,100) for ON, 3.8 (53,387/14,078) for QC and 9.6 (34,473/3,579) for the Atlantic region.

Table A-4. Average Annual Patient Visits for All Ambulatory Clinics Combined, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(130)	(36)	(53)	(41)	(28)	(97)	(5)	(24)	(19)	(36)	(34)	(17)
Average	**151,384**	**44,452**	**145,890**	**252,378**	**309,147**	**106,377**	**141,054**	**115,510**	**63,944**	**239,809**	**162,890**	**89,492**
Standard deviation (SD)	182,276	55,723	165,441	219,235	255,935	128,658	92,707	107,618	94,418	246,712	175,660	107,017

Base: All respondents who reported ambulatory clinic visits, n = 130

The numbers of combined ambulatory clinic visits were much higher than the numbers of ED visits; however, a trend similar to that for ED visits was seen for ambulatory clinic visits in terms of the respondent groupings. Specifically, larger hospitals (> 500 beds) and teaching hospitals had notably larger average numbers of ambulatory visits than smaller hospitals (50-200 beds) and non-teaching hospitals (Table A-4). This observation suggests that the larger hospitals and the teaching hospitals were offering a broader range of clinical services and were providing a greater range of post-discharge patient supports as ambulatory services. The average numbers of ambulatory visits per acute care bed were 16.1 (115,510/7,157) in BC/YT, 13.7 (63,944/4,664) in the Prairies (SK/MB), 18.3 (239,809/13,100) in ON, 11.6 (162,890/14,078) in QC and 25.0 (89,492/3,579) in the Atlantic region. Future surveys will be required to better understand the importance of these differences, whether they are indicative of regional healthcare policies and how they are evolving. Government investment in ambulatory care services has been a topic of much discussion and debate in recent years.

Table A-5. Respondents Owning and Operating Retail Pharmacies within Their Organizations, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	144	41	58	45	33	106	5	27	23	39	36	19
Yes	**15%**	**5%**	**19%**	**18%**	**27%**	**9%**	**40%**	**11%**	**9%**	**41%**	**0%**	**0%**
	21	2	11	8	9	10	2	3	2	16	0	0

Base: All respondents, n = 144
Where the n value is less than 10, percentages were not calculated, to avoid potentially misleading comparisons.

The proportion of respondents who reported owning and operating a community/retail pharmacy was 15% (21/143) (Table A-5). In this respect, ON stands out, at 41% (16/39), along with teaching hospitals, at 27% (9/33). Considering the high number of ambulatory clinic visits where patients would have access to a retail pharmacy afterward, the presence of a pharmacy within the hospital may align well with and better support a patient's care during hospital-to-home transitions.

Pediatric hospitals had higher emergency department and ambulatory visits per acute care bed than teaching hospitals.

Pediatric hospitals had a much higher average number of ED visits per acute care bed, with 23.5 (32,283/1,375), than teaching hospitals, with 4.0 (62,218/15,467). Ambulatory clinic visits were 102.6 (141,054/1,375) per acute care pediatric bed, compared with 20.0 (309,147/15,467) per acute care bed in teaching hospitals and 4.1 (106,377/25,736) per acute care bed in non-teaching hospitals. The prevalence of community/retail pharmacies within the hospital was also higher for pediatric respondents (2 out of 5 respondents).

1. Hospital beds staffed and in operation, 2018–2019 [Excel spreadsheet]. Ottawa, ON: Canadian Institute for Health Information; 2020 [cited 2022 May 15]. Available from: https://www.cihi.ca/en/search?query=hospital%20beds

B - Clinical Pharmacy Practice

Jean-François Bussières and Debra Merrill

As mentioned in the Introduction to this report, the COVID-19 pandemic had a major impact on the results of the 2020/21 CSHP Hospital Pharmacy in Canada Survey. The pandemic has highlighted the pivotal role of the pharmacist and other pharmacy professionals in society.[1,2] Pharmacists across the country are now allowed to administer vaccines, including COVID-19 vaccines.[3] In addition, Health Canada has issued an exemption from the Controlled Drugs and Substances Act to allow pharmacists to prescribe, extend, adjust and transfer prescriptions for controlled substances within the prescribed authorization and entitlements for pharmacists under provincial or territorial legislation.[4,5]

Despite the risks associated with exposure to the SARS-CoV-2 virus, Canadian pharmacists have remained accessible and available, keeping their pharmacies open to treat the population, even as other groups of professionals have downsized or migrated to telecare or other remote modalities for assessment and treatment. We must acknowledge and commend the professionalism, competence, versatility, courage and commitment of pharmacists, pharmacy technicians and pharmacy support staff across the country during this pandemic.

In hospitals, pharmacists have taken up the challenge of treating inpatients with COVID-19, primarily in medicine wards and critical care units. With the rapid evolution of knowledge and the emergence of new therapies for COVID-19, hospital pharmacists have been at the heart of safe and effective medication management, including the augmentation of various therapies (e.g., dexamethasone, sedation support for intubated patients, monoclonal antibodies). In addition, hospital pharmacy departments have often been pivotal in immunization programs both within and outside the hospital setting.

Given the critical nature of drug supplies and ongoing drug shortages, hospital pharmacists have played an important role in access to care by ensuring that all hospital patients have access to the drugs required to treat their condition.[6] The pandemic has underscored the importance of pharmacy, which links services, care, education, research and management. Clinical pharmacy is inseparable from the other four axes of hospital pharmacy practice (i.e., drug distribution, teaching and experiential learning, research and management).[7]

Since the last CSHP Hospital Pharmacy in Canada Report (2016/17), pharmacy practice has continued to advance across Canada, with more provincial legislation in place allowing pharmacists to prescribe, modify and extend prescriptions for drugs. Healthcare has both federal and provincial oversight, with scopes of practice for all healthcare professionals being set out in provincial legislation. The result has been asymmetrical changes to the controlled acts that pharmacists are authorized to perform across the country, leading to disparities from one province or territory to another.

Fortunately, over time, these disparities are diminishing, and the pharmacist's scope of practice is becoming more standardized across Canada, as depicted in the latest summary table from the Canadian Pharmacists Association.[3] The National Association of Pharmacy Regulatory Authorities (NAPRA) provides similar scope of practice tables for pharmacists and pharmacy technicians.[8,9] Many colleges of pharmacy are using these NAPRA standards as the framework for evaluating pharmacy professionals. Using a national standard will lead to an increase in equitable access by Canadians to pharmacist practice in hospitals.

There have been several developments and publications since the last survey report that are relevant to the current survey data. In particular, the effect of the pandemic on provision of services while dealing with the required concepts of isolation,

The pandemic has highlighted, more than ever, the pivotal role of the pharmacist and pharmacy professionals in society.

"lockdowns" and other mandated practices has also left its imprint on hospital pharmacy services (see also Chapter H – The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services).

The American College of Clinical Pharmacy (ACCP) has been a major source of white papers, position statements and other key resources on the management of COVID-19, including articles published in its two journals (Journal of the American College of Clinical Pharmacy and Pharmacotherapy). The ACCP draws on the expertise and experience of pharmacy clinicians from more than 60 countries.

The following three important papers were all published in JACCP. Bondi et al. commented on the benefits and challenges associated with providing remote pharmaceutical care during the pandemic, considering in particular administration, technology and equipment.[10] They also discussed equitable patient care and how to provide such care remotely. Danelich et al. reported on remote provision of clinical services in critical care, highlighting swift transformational change and the unexpected benefits for staffing when clinicians were able to work from home rather than taking leaves of absence to care for children during school lockdowns.[11] The ACCP's Clinical Practice Affairs Committee established a framework that led to the development of 31 foundational quality measures associated with the provision of direct inpatient/acute care.[12]

The ACCP also provided input to the National Priorities for Health proposed by the Patient-Centered Outcomes Research Institute (US), which will inform that organization's future research agenda. The proposed National Priorities for Health are five broad, ambitious goals that include comparative effective research focused on outcomes that are important to patients[13]: increase evidence for existing interventions and emerging innovations in health; enhance infrastructure to accelerate patient-centred outcomes research; advance the science of dissemination, implementation and health communication; achieve health equity; and accelerate progress toward an integrated learning health system. Although this is a US initiative, it can readily be extrapolated to Canadian healthcare, and Canadian hospital pharmacists should be guided by these priorities.

In 2018, the ACCP released a position statement concerning the training and certification of technical personnel.[14] Boyce et al. also reflected on the challenges of providing leadership for internships and experiential learning in clinical pharmacy.[15]

In the literature more generally, there has been sustained growth of evaluative research concerning the roles and impacts of pharmacists. Searches of the National Library of Medicine PubMed database using the term "impact of pharmacists" yielded about 500 articles in 2017 but about double that number (more than 1000) in 2021. Counting just systematic reviews on the topic, 170 articles were published between January 2018 and April 2022, most of them related to community pharmacy practice. However, there was a selection of the principal systematic reviews relating to the impact of hospital pharmacists' interventions on the following topics: medication reconciliation, transitions at different points of care, telepharmacy, critical care, diabetes management, oncology, immunology, cardiology, transplantation, pediatrics, psychiatry, neurology, emergency medicine, bone marrow transplant, antimicrobial stewardship, hospital discharge, long-term care, ambulatory care, and disaster preparedness and pandemics.[16-40] Other studies looked at the economic impact of pharmaceutical care in terms of hospitalizations and the pharmacist's impact on readmissions, medication errors, digital pharmaceutical interventions and the prioritization of pharmaceutical care in the hospital setting.[41-46]

Practice leaders interested in the development of pharmaceutical care must ensure regular scientific monitoring of these and similar publications. The Impact Pharmacie platform (http://impactpharmacie.org), which has been collecting evidence on the roles and impacts of the pharmacist since 2012, launched a new bilingual blog in November 2021 (http://impactpharmacie.net). The blog provides an opportunity for contributors to identify best evidence (i.e., "high-quality publications demonstrating the impact of pharmacists on health outcomes"), benefiting from the use of artificial intelligence for the coding of relevant articles selected for inclusion.

In Canada, a few initiatives supporting the development of pharmaceutical care should be highlighted. Since the last survey report, the Canadian Society of Hospital Pharmacists has produced a video about the value of hospital pharmacists, adopted two position statements (on team-based primary care pharmacists and cannabis for the hospitalized patient) and three medication optimization briefings (antimicrobial stewardship, safe transitions of care for patients taking opioids and cannabis for medical purposes).[47-52]

In Québec (QC), the Association des pharmaciens des établissements de santé du Québec (A.P.E.S.) has published a practice guide on pharmaceutical care ("Axe 1"), three pharmaceutical care guides (in oncology, nephrology and infectiology) and other tools to support the delivery of pharmaceutical care.[7,53-56]

In this chapter we analyze the progression of clinical pharmacy practice in hospitals: how far we have come since the last survey report and where we still need to go. As discussed in Chapter A – Demographics, the 2020/21 survey had fewer respondents (144 in 2020/21 vs. 184 in 2016/17). Thus, the changes observed in terms of proportions (2020/21 vs. previous surveys) should be interpreted with caution. In some cases, the data may represent a real change, whereas in others, the observed difference might be attributable to the more limited survey participation. The reader is urged to consider not only the reported proportions, but also the absolute number of respondents for a specific item, especially when considering regional data.

The province of Alberta's (AB's) single health authority was unable to participate in the 2020/21 survey because the provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region are limited to Manitoba (MB) and Saskatchewan (SK). In addition, for trending purposes over the long-term, regional data for British Columbia and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon during this iteration of the survey.

Structured Patient Care Programs

Since the 2007/08 iteration, the CSHP Hospital Pharmacy in Canada Survey has defined a patient care program as "healthcare delivery that is formally structured around a group of patients with similar healthcare needs (e.g., child health program, mental health program, critical care program). A formal patient care program will usually have a physician and/or nurse leader or director."

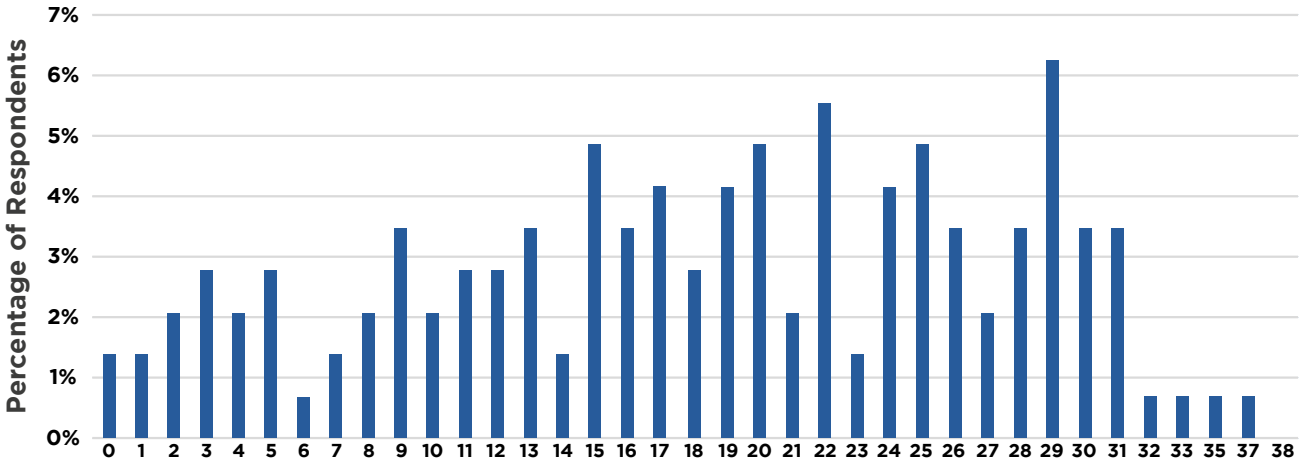
Out of a total of 38 patient care programs, the national facility average was 18 programs (SD 9, range 0-38).

Respondents to the 2020/21 survey were asked if their facility had, or did not have, a formal patient care program for each of several patient groupings. In the previous survey, respondents were asked about only 19 programs; however, to better describe the extent of pharmaceutical care coverage across the country, especially as smaller academic and larger community facilities expand their program offerings, the 2020/21 survey listed double the number of programs (n = 38). It should be remembered that the absence of a formal program does not necessarily mean that patients of this type were not seen in or admitted to a given hospital. Respondents from all types of facilities were asked to provide detailed information about these patient care programs.

- Respondents were asked to indicate which formal patient care programs existed in their hospital (Figure B-1). Out of the total of 38 programs, the national facility average was 18 programs (standard deviation [SD] 9; range 0-38). Comparisons with previous reports should be done with caution, given the difference in total number of care programs listed in the survey. Although some programs were offered by only a small number of facilities, we think it useful to present the complete distribution without grouping programs into larger categories. There has been a considerable change since 2016/17 in the range of programs to which a pharmacist is assigned. In addition, since the previous survey, Accreditation Canada has expanded its Required Organizational Practices (ROPs) to incorporate a heavy emphasis on medications; as such, it has become apparent to most hospitals that pharmacy is pivotal in achieving accreditation. Examples of ROPs that emphasize medications include antimicrobial stewardship, medication reconciliation at care transitions and, to a lesser extent, ROPs related to auditing of narcotics, concentrated electrolytes and heparin.

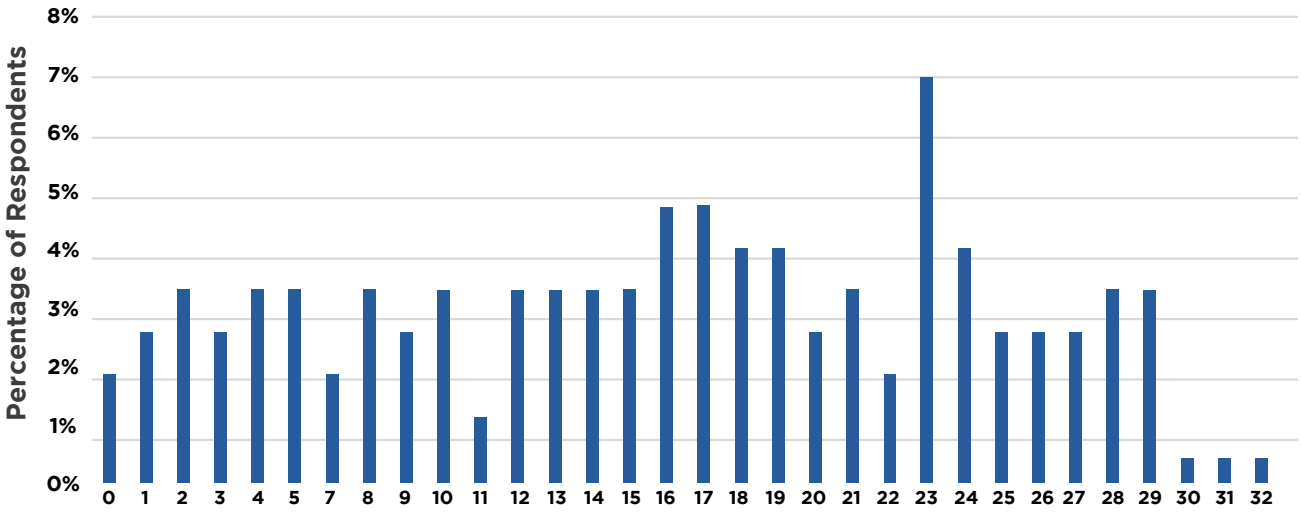
- Figure B-2 and Figure B-3 summarize the distribution of respondents offering formal patient care programs in 2020/21 (whether or not a pharmacist was assigned to the program). Of the 144 survey respondents, 141 provided data about their patient care programs. All but two of these respondents had adult care programs (Figure B-2: 139/141). In contrast, only 107 respondents had child/pediatric care programs (Figure B-3: 107/141). Pharmacist assignments to these programs are discussed in detail in the following sections concerning outpatient and inpatient clinical pharmacy services. Having a designated pharmacist was defined as a minimum of 0.2 full-time equivalent (FTE) pharmacist (whether it be one day per week or two half-days per week). Formal assignment of a pharmacist to a patient care program is a good indicator of a reasonable level of clinical pharmacy support to that patient care program.

Figure B-1. Respondents Providing Formal Patient Care Programs, 2020/21



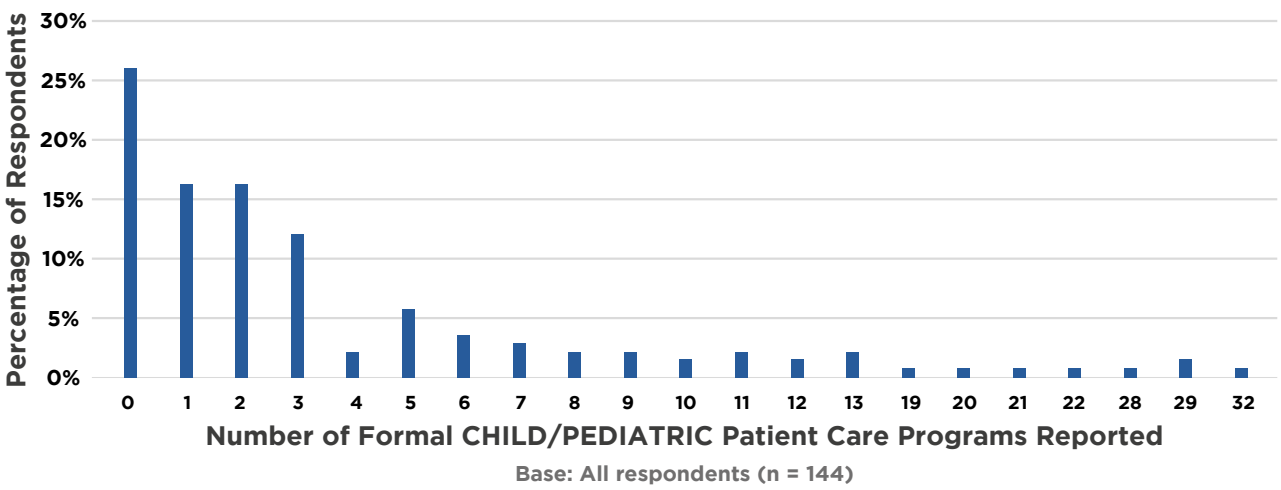
Base: All respondents (n = 144)

Figure B-2. Respondents Providing Formal ADULT Patient Care Programs, 2020/21



Base: All respondents (n = 144)

Figure B-3. Respondents Providing Formal CHILD/PEDIATRIC Patient Care Programs, 2020/21



Base: All respondents (n = 144)

Profile of Outpatient Clinical Pharmacy Services

- In the 2020/21 survey, 84% (121/144) of respondents reported assignment of a pharmacist to at least one of the 38 outpatient patient care programs listed (Figure B-4). This value is similar to the 83% (153/184) who reported assignment of a pharmacist to at least one of potentially 11 outpatient programs in the 2016/17 survey.

- The average number of outpatient patient care programs with an assigned pharmacist was 3.4 (SD 3.2, range 0-15) nationally, 2.0 (SD 2.9) in BC/YT, 2.2 (SD 3.2) in the Prairies (SK/MB), 4.1 (SD 3.4) in Ontario (ON), 4.7 (SD 3.3) in QC and 2.6 (SD 2.9) in the Atlantic provinces (New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador).

- The median number of programs was two, which seems logical, given that most hospitals are likely to have both an emergency department and an oncology outpatient program and each of these will have at least one pharmacist assigned. For example, in ON, specific funding is allocated to hire pharmacists or pharmacy technicians for oncology clinics.

- The proportion of respondents who reported assignment of a pharmacist to particular outpatient programs ranged from 1% (1/99) for operating rooms to 78% (87/112) for oncology. By comparison, in 2016/17, the range was from 5% (6/126) for gynecology and/or obstetrics to 83% (99/119) for hematology-oncology (note: the operating room was not specified as an outpatient clinic in the 2016/17 survey).

- For only four patient care programs did more than 50% of respondents report assignment of a pharmacist: HIV/AIDS (62%, 18/29), nephrology/renal care/dialysis (70%, 60/86), solid organ transplantation (71%, 12/17) and oncology (78%, 87/112).

- The proportion of facilities across the country with a pharmacist assigned to the emergency department was only 38% (46/120), despite this location being the critical entry point for most patients admitted to hospital. Surprisingly, assignment of pharmacists to some outpatient programs was higher in non-teaching vs. teaching hospitals (e.g., for oncology, 80% [66/83] vs. 67% [16/24]; for hematology/anticoagulation, 49% [18/37] vs. 33% [7/21]). Funding and the rationale for determining the assignment

of pharmacists to clinical areas can be influenced by many factors, of which status as a teaching hospital is only one. For example, teaching hospitals have medical students, interns and residents on site, but non-teaching hospitals lack these human resources and hence have greater need for a pharmacist's expertise.

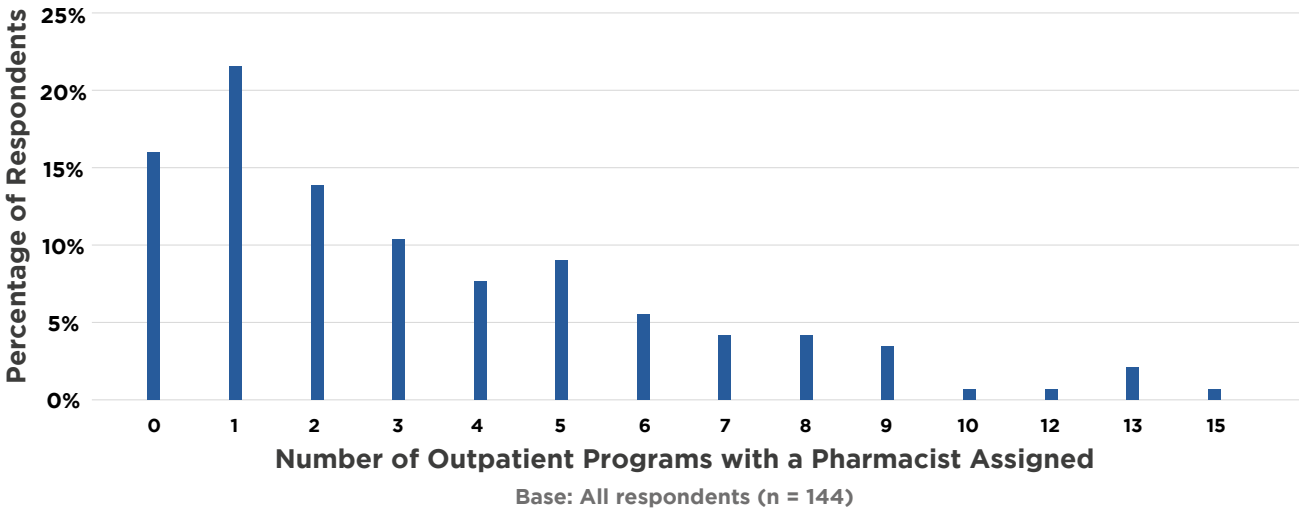
- The proportion of respondents who reported assignment of a pharmacist to an outpatient patient care program was usually higher for larger facilities (e.g., those with > 500 beds vs. those with 50-200 beds). This was particularly true for the following outpatient programs: oncology (83% [35/42] vs. 72% [18/25]), solid organ transplantation (7/8 vs. 0/1), nephrology/renal care/dialysis care (75% [27/36] vs. 62% [8/13]), HIV/AIDS (73% [8/11] vs. 0/1), bone marrow transplantation (4/7 vs. 0/1), emergency (45% [18/40] vs. 14% [4/28]) and family practice (42% [10/24] vs. 1/8).

- Regional differences were also noted for assignment of pharmacists to outpatient programs, for example, for oncology, 97% (33/34) in QC and 42% (5/12) in the Prairies (SK/MB); for cardiology 3/5 in the Prairies (SK/MB) and 25% (7/28) in ON; and for hematology/anticoagulation 3/5 in the Atlantic provinces and 0/6 in BC/YT. Such differences and the heterogeneity in the distribution of clinical pharmacy programs emphasize the absence of a plan for offering standardized pharmaceutical care across the country.

- All pediatric hospitals that responded to the survey continued to have a pharmacist assigned to outpatient oncology services (7/7 in 2016/17 vs. 5/5 in 2020/21).

Assignment of pharmacists to some outpatient programs was higher in non-teaching vs. teaching hospitals

Figure B-4. Respondents Providing Outpatient Clinical Pharmacy Services with a Pharmacist Assigned, 2020/21



Base: All respondents (n = 144)

Table B-1 summarizes the profile of pharmacist assignment to outpatient care programs in 2020/21. The data in the column headed "All" are presented in descending order of pharmacist assignment for the entire country (i.e., all respondents). *Please note that because of limitations in how the electronic survey could collect data, some respondents provided data for "emergency" as an outpatient program, some as an inpatient program and some as both.*

Table B-1. Profile of Pharmacist Assignment to Outpatient Programs, 2020/21

Outpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Oncology	program exists (n=)	(112)	(25)	(45)	(42)	(24)	(83)	(5)	(19)	(12)	(31)	(34)	(16)
	pharmacist assigned	87	18	34	35	16	66	5	11	26	33	5	12
		78%	**72%**	**76%**	**83%**	**67%**	**80%**	**100%**	**58%**	**84%**	**97%**	**42%**	**75%**
Solid organ transplantation	program exists (n=)	(17)	(1)	(8)	(8)	(14)	(0)	(3)	(2)	(4)	(4)	(6)	(1)
	pharmacist assigned	12	0	5	7	10	0	2	2	2	4	4	0
		71%				**71%**							
Nephrology/ renal care/ dialysis care	program exists (n=)	(86)	(13)	(37)	(36)	(23)	(58)	(5)	(11)	(11)	(22)	(29)	(13)
	pharmacist assigned	60	8	25	27	18	38	4	10	6	18	18	8
		70%	**62%**	**68%**	**75%**	**78%**	**66%**		**91%**	**55%**	**82%**	**62%**	**62%**
HIV/AIDS	program exists (n=)	(29)	(1)	(17)	(11)	(16)	(9)	(4)	(5)	(4)	(10)	(5)	(5)
	pharmacist assigned	18	0	10	8	10	5	3	3	3	4	5	3
		62%		**59%**	**73%**	**63%**					**40%**		
Bone marrow transplantation	program exists (n=)	(14)	(1)	(6)	(7)	(8)	(2)	(4)	(1)	(2)	(3)	(5)	(3)
	pharmacist assigned	6	0	2	4	3	1	2	0	0	1	4	1
		43%											
Hematology/ anticoagulation	program exists (n=)	(60)	(4)	(26)	(30)	(21)	(37)	(2)	(6)	(6)	(22)	(21)	(5)
	pharmacist assigned	25	2	8	15	7	18	0	0	3	8	11	3
		42%		**31%**	**50%**	**33%**	**49%**				**36%**	**52%**	
Clinical research	program exists (n=)	(60)	(6)	(29)	(25)	(22)	(35)	(3)	(9)	(6)	(22)	(18)	(5)
	pharmacist assigned	25	2	11	12	12	11	2	2	2	9	10	2
		42%		**38%**	**48%**	**55%**	**31%**				**41%**	**56%**	
Emergency	program exists (n=)	(120)	(28)	(52)	(40)	(33)	(82)	(5)	(23)	(16)	(34)	(33)	(14)
	pharmacist assigned	46	4	24	18	11	34	1	3	6	14	17	6
		38%	**14%**	**46%**	**45%**	**33%**	**41%**		**13%**	**38%**	**41%**	**52%**	**43%**
Cardiology	program exists (n=)	(78)	(9)	(35)	(34)	(26)	(48)	(4)	(12)	(5)	(28)	(23)	(10)
	pharmacist assigned	28	2	15	11	13	13	2	4	3	7	10	4
		36%		**43%**	**32%**	**50%**	**27%**		**33%**		**25%**	**43%**	**40%**
Family practice	program exists (n=)	(56)	(8)	(24)	(24)	(14)	(42)	(0)	(5)	(5)	(16)	(24)	(6)
	pharmacist assigned	16	1	5	10	5	11	0	0	1	4	11	0
		29%		**21%**	**42%**	**36%**	**26%**				**25%**	**46%**	

Table B-1 (continued). Profile of Pharmacist Assignment to Outpatient Programs, 2020/21

Outpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Clinical pharmacology and toxicology service	program exists (n=)	(8)	(1)	(3)	(4)	(3)	(3)	(2)	(0)	(1)	(1)	(5)	(1)
	pharmacist assigned	2	0	1	1	0	1	1	0	0	0	1	1
Genetics/rare disease care	program exists (n=)	(72)	(9)	(30)	(33)	(16)	(56)	(0)	(11)	(6)	(22)	(27)	(6)
	pharmacist assigned	13	2	4	7	4	9	0	0	3	6	3	1
		20%											
Infectious diseases	program exists (n=)	(94)	(15)	(44)	(35)	(30)	(61)	(3)	(15)	(7)	(33)	(29)	(10)
	pharmacist assigned	18	4	10	4	6	11	1	4	1	3	8	2
		19%	**27%**	**23%**	**11%**	**20%**	**18%**		**27%**		**9%**	**28%**	**20%**
Geriatrics	program exists (n=)	(72)	(9)	(30)	(33)	(16)	(56)	(0)	(11)	(6)	(22)	(27)	(6)
	pharmacist assigned	13	2	4	7	4	9	0	0	3	6	3	1
		18%		**13%**	**21%**	**25%**	**16%**		**0%**		**27%**	**11%**	
Diabetes/ endocrinology	program exists (n=)	(67)	(7)	(32)	(28)	(20)	(43)	(4)	(8)	(7)	(23)	(23)	(6)
	pharmacist assigned	12	1	5	6	4	6	2	0	2	5	3	2
		18%		**16%**	**21%**	**20%**	**14%**				**22%**	**13%**	
Surgery, pre-admission	program exists (n=)	(106)	(24)	(45)	(37)	(28)	(74)	(4)	(19)	(14)	(33)	(28)	(12)
	pharmacist assigned	19	3	10	6	8	10	1	1	1	13	2	2
		18%	**13%**	**22%**	**16%**	**29%**	**14%**		**5%**	**7%**	**39%**	**7%**	**17%**
Other patient care areas	program exists (n=)	(35)	(3)	(17)	(15)	(12)	(22)	(1)	(9)	(3)	(14)	(9)	(0)
	pharmacist assigned	6	0	4	2	3	2	1	1	2	2	1	0
		17%		**24%**	**13%**	**25%**	**9%**				**14%**		
Home care	program exists (n=)	(51)	(11)	(17)	(23)	(6)	(43)	(2)	(13)	(7)	(5)	(25)	(1)
	pharmacist assigned	8	1	4	3	1	6	1	4	1	0	3	0
		16%	**9%**	**24%**	**13%**		**14%**		**31%**			**12%**	
Mental health	program exists (n=)	(102)	(17)	(44)	(41)	(24)	(74)	(4)	(20)	(9)	(31)	(31)	(11)
	pharmacist assigned	15	2	6	7	3	11	1	0	1	10	3	1
		15%	**12%**	**14%**	**17%**	**13%**	**15%**		**0%**		**32%**	**10%**	**9%**
Respirology	program exists (n=)	(60)	(8)	(25)	(27)	(22)	(34)	(4)	(7)	(5)	(23)	(18)	(7)
	pharmacist assigned	8	1	4	3	5	1	2	2	2	2	2	0
		13%		**16%**	**11%**	**23%**	**3%**				**9%**	**11%**	
Chronic or complex continuing care	program exists (n=)	(46)	(8)	(20)	(18)	(11)	(31)	(4)	(5)	(4)	(20)	(13)	(4)
	pharmacist assigned	5	1	3	1	1	1	3	1	2	1	1	0
		11%		**15%**	**6%**	**9%**	**3%**				**5%**	**8%**	
Pain service	program exists (n=)	(61)	(8)	(29)	(24)	(20)	(38)	(3)	(7)	(7)	(25)	(15)	(7)
	pharmacist assigned	7	1	1	5	4	2	1	0	1	3	3	0
		11%		**3%**	**21%**	**20%**	**5%**				**12%**	**20%**	
Palliative care	program exists (n=)	(84)	(11)	(37)	(36)	(21)	(60)	(3)	(14)	(8)	(25)	(29)	(8)
	pharmacist assigned	7	1	3	3	2	5	0	1	0	0	5	1
		8%	**9%**	**8%**	**8%**	**10%**	**8%**		**7%**		**0%**	**17%**	

Table B-1 (continued). Profile of Pharmacist Assignment to Outpatient Programs, 2020/21

Outpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
General medicine	program exists (n=)	(131)	(35)	(53)	(43)	(31)	(97)	(3)	(26)	(21)	(36)	(33)	(15)
	pharmacist assigned	8	0	3	5	2	6	0	1	0	5	2	0
		6%	**0%**	**6%**	**12%**	**6%**	**6%**		**4%**	**0%**	**14%**	**6%**	**0%**
Pediatric and/or newborn care	program exists (n=)	(84)	(16)	(37)	(31)	(16)	(63)	(5)	(17)	(8)	(29)	(22)	(8)
	pharmacist assigned	5	0	2	3	2	3	0	1	0	3	0	1
		6%	**0%**	**5%**	**10%**	**13%**	**5%**		**6%**		**10%**	**0%**	
Cardiac/vascular surgery	program exists (n=)	(48)	(5)	(17)	(26)	(25)	(21)	(2)	(8)	(5)	(16)	(14)	(5)
	pharmacist assigned	2	0	0	2	1	1	0	0	0	2	0	0
		4%		**0%**	**8%**	**4%**	**5%**				**13%**	**0%**	
Orthopedic surgery	program exists (n=)	(104)	(18)	(45)	(41)	(25)	(74)	(5)	(22)	(9)	(33)	(29)	(11)
	pharmacist assigned	4	1	2	1	1	3	0	1	0	3	0	0
		4%	**6%**	**4%**	**2%**	**4%**	**4%**		**5%**		**9%**	**0%**	**0%**
Long-term care	program exists (n=)	(56)	(8)	(21)	(27)	(7)	(48)	(1)	(13)	(6)	(7)	(26)	(4)
	pharmacist assigned	2	0	0	2	1	1	0	0	0	0	2	0
		4%		**0%**	**7%**		**2%**		**0%**			**8%**	
Gastroenter-ology	program exists (n=)	(61)	(7)	(24)	(30)	(17)	(39)	(5)	(6)	(6)	(20)	(23)	(6)
	pharmacist assigned	2	1	1	0	0	0	2	0	1	0	1	0
		3%		**4%**	**0%**	**0%**	**0%**				**0%**	**4%**	
Neurosurgery	program exists (n=)	(30)	(3)	(12)	(15)	(17)	(8)	(5)	(6)	(5)	(8)	(7)	(4)
	pharmacist assigned	1	0	0	1	1	0	0	0	0	1	0	0
		3%		**0%**	**7%**	**6%**							
Obstetrics and/or gynecology and/or women's healthcare	program exists (n=)	(93)	(19)	(38)	(36)	(20)	(69)	(4)	(17)	(11)	(28)	(28)	(9)
	pharmacist assigned	3	0	2	1	0	2	1	0	0	2	1	0
		3%	**0%**	**5%**	**3%**	**0%**	**3%**		**0%**	**0%**	**7%**	**4%**	
Rehabilitation	program exists (n=)	(59)	(8)	(26)	(25)	(11)	(45)	(3)	(12)	(6)	(23)	(13)	(5)
	pharmacist assigned	2	0	0	2	0	2	0	0	0	0	2	0
		3%		**0%**	**8%**	**0%**	**4%**		**0%**		**0%**	**15%**	
General surgery	program exists (n=)	(120)	(27)	(51)	(42)	(30)	(86)	(4)	(23)	(15)	(35)	(33)	(14)
	pharmacist assigned	3	1	2	0	0	2	1	1	0	1	1	0
		3%	**4%**	**4%**	**0%**	**0%**	**2%**		**4%**	**0%**	**3%**	**3%**	**0%**
Other surgeries	program exists (n=)	(81)	(16)	(38)	(27)	(27)	(51)	(3)	(18)	(10)	(32)	(15)	(6)
	pharmacist assigned	2	0	0	2	2	0	0	0	0	1	1	0
		2%	**0%**	**0%**	**7%**	**7%**	**0%**		**0%**	**0%**	**3%**	**7%**	
Neurology	program exists (n=)	(53)	(5)	(21)	(27)	(18)	(30)	(5)	(11)	(4)	(17)	(16)	(5)
	pharmacist assigned	1	1	0	0	0	0	1	0	1	0	0	0
		2%		**0%**	**0%**	**0%**	**0%**		**0%**		**0%**	**0%**	
Critical care (medical, surgical or cardiac)	program exists (n=)	(123)	(27)	(53)	(43)	(32)	(89)	(2)	(24)	(11)	(38)	(33)	(17)
	pharmacist assigned	2	0	1	1	1	1	0	0	0	1	1	0
		2%	**0%**	**2%**	**2%**	**3%**	**1%**		**0%**	**0%**	**3%**	**3%**	**0%**

Table B-1 (continued). Profile of Pharmacist Assignment to Outpatient Programs, 2020/21

Outpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Operating room	program exists (n=)	(99)	(24)	(41)	(34)	(23)	(73)	(3)	(18)	(14)	(28)	(30)	(9)
	pharmacist assigned	1	1	0	0	0	1	0	0	0	1	0	0
		1%	**4%**	**0%**	**0%**	**0%**	**1%**		**0%**	**0%**	**4%**	**0%**	

Base: Respondents who answered question about outpatient services
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Profile of Inpatient Clinical Pharmacy Services

- In the 2020/21 survey, 95% (137/144) of respondents reported assignment of a pharmacist to at least one of the 38 inpatient patient care programs listed (Figure B-5). This value is comparable to 2016/17, when 97% (178/184) of respondents reported assignment of a pharmacist to at least one of the 18 inpatient programs listed. The increased choice of programs offered in the survey gave respondents more specific options for describing the programs with pharmacist involvement. Notwithstanding the lower number of participants in the 2020/21 survey, it is reasonable to think that any decreases in pharmacist coverage were also linked to a dilution effect (e.g., 10 pharmacists reported for a given program in 2016/17 may now be divided over three more precisely defined programs). By changing the base of the number of programs, we have limited the ability to make comparisons with previous surveys, but there is still a basis for observing changes in pharmacist assignments as hospital pharmacy services continue to evolve.

- The average number of inpatient care programs with an assigned pharmacist was 9.8 (SD 6.8, range 0-30) nationally, with regional averages of 10.6 (SD 6.8) in BC/YT, 5.7 (SD 4.8) in the Prairies (SK/MB), 14.0 (SD 6.4) in ON, 8.8 (SD 6.4) in QC and 6.9 (SD 6.2) in the Atlantic provinces.

The average number of inpatient care programs with a pharmacist assigned was 9.8 (SD 6.8, range 0-30) nationally.

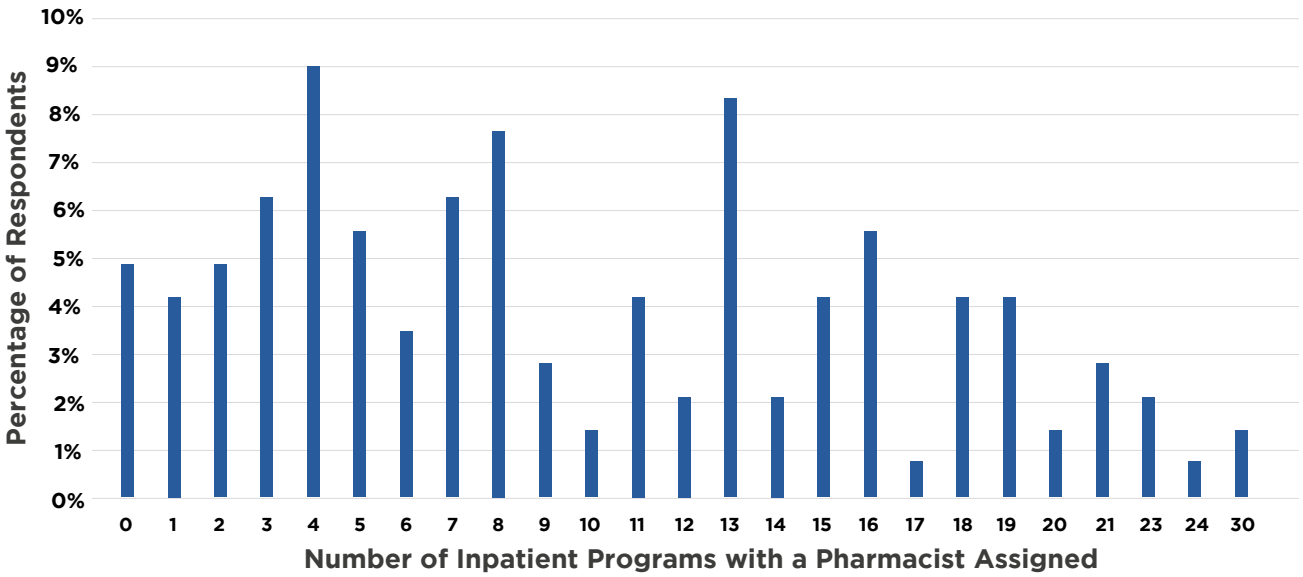
- The proportion of respondents who reported assignment of a pharmacist to a particular inpatient program ranged from 11% (7/61) for pain service to 88% (108/123) for critical care (services with fewer respondents appeared to be for surgery-preadmission, home care services and day surgeries).

- As noted above, more programs were listed in the survey in 2020/21 than in 2016/17 (38 vs. 18). For programs listed in both surveys, the distribution of inpatient programs with an assigned pharmacist was similar, with the following exceptions:
  - decreases for geriatrics, 76% (76/100) in 2016/17 vs. 69% (50/72) in 2020/21; pediatric and/or neonatal intensive care, 78% (70/90) vs. 69% (36/52); and neurology, 64% (55/86) vs. 51% (27/53)
  - increases for hematology/anticoagulation, 25% (17/69) in 2016/17 vs. 45% (27/60); and respirology, 17% (6/36) vs. 43% (26/60)

- Among the respondents who reported assignment of pharmacists to particular inpatient care programs, the proportions offering this service were generally higher for teaching hospitals than for non-teaching hospitals in critical care units, solid organ transplantation and cardiac/vascular surgery. In contrast, the proportion of programs with pharmacist support was higher among non-teaching hospitals than teaching hospitals for bone marrow transplantation programs; this may reflect the shift of oncology treatment and care from large specialized hospitals to smaller community hospitals closer to patients' homes.

- Also among the respondents who reported assignment of pharmacists to particular inpatient care programs, the proportion offering this service was usually higher for larger facilities (e.g., those with > 500 beds vs. those with 50-200 beds), especially for the following clinical pharmacy services: solid organ transplantation (7/8 vs. 0/1) hematology/anticoagulation (47% [14/30] vs. 1/4) and nephrology/renal care/dialysis care (64% [23/36] vs. 15% [2/13]).
- Regionally, BC/YT continued to lead in the assignment of pharmacists to inpatient programs, with very few exceptions.
- There were regional differences in the proportions of respondents who reported assignment of pharmacists to certain inpatient programs: infectious diseases, 4/7 in the Prairies (SK/MB) vs. 82% (77/94) nationally; cardiology, 48% (11/23) in QC and 92% (11/12) in BC/YT vs. 74% (58/78) nationally; general surgery, 94% (33/35) in ON vs. 73% (87/120) nationally; rehabilitation, 46% (6/13) in QC and 87% (20/23) in ON vs. 64% (38/59) nationally; neurosurgery, 2/7 in QC and 5/6 in BC/YT vs. 63% (19/30) nationally; and nephrology/renal care/dialysis care, 36% (4/11) in the Prairies (SK/MB) and 82% (9/11) in BC/YT vs. 53% (46/86) nationally.

Figure B-5. Respondents Providing Inpatient Clinical Pharmacy Services with a Pharmacist Assigned, 2020/21



Base: All respondents (n = 144)

Table B-2 summarizes the profile of pharmacist assignment to inpatient care programs in 2020/21, in descending order of pharmacist assignment for the whole country.

Table B-2. Profile of Pharmacist Assignment to Inpatient Programs, 2020/21

Inpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Critical care (medical, surgical or cardiac	program exists (n=)	(123)	(27)	(53)	(43)	(32)	(89)	(2)	(24)	(11)	(38)	(33)	(17)
	pharmacist assigned	108	22	50	36	32	74	2	24	9	34	25	16
		88%	**81%**	**94%**	**84%**	**100%**	**83%**		**100%**	**82%**	**89%**	**76%**	**94%**
General medicine	program exists (n=)	(131)	(35)	(53)	(43)	(31)	(97)	(3)	(26)	(21)	(36)	(33)	(15)
	pharmacist assigned	113	27	49	37	28	82	3	25	20	34	22	12
		86%	**77%**	**92%**	**86%**	**90%**	**85%**		**96%**	**95%**	**94%**	**67%**	**80%**
Bone marrow transplantation	program exists (n=)	(14)	(1)	(6)	(7)	(8)	(2)	(4)	(1)	(2)	(3)	(5)	(3)
	pharmacist assigned	12	0	5	7	7	2	3	1	2	2	5	2
		86%											
Solid organ transplantation	program exists (n=)	(17)	(1)	(8)	(8)	(14)	(0)	(3)	(2)	(4)	(4)	(6)	(1)
	pharmacist assigned	14	0	7	7	11	0	3	2	2	4	5	1
		82%				**79%**							
Infectious diseases	program exists (n=)	(94)	(15)	(44)	(35)	(30)	(61)	(3)	(15)	(7)	(33)	(29)	(10)
	pharmacist assigned	77	10	38	29	25	50	2	13	4	29	22	9
		82%	**67%**	**86%**	**83%**	**83%**	**82%**		**87%**		**88%**	**76%**	**90%**
Long-term care	program exists (n=)	(56)	(8)	(21)	(27)	(7)	(48)	(1)	(13)	(6)	(7)	(26)	(4)
	pharmacist assigned	44	4	16	24	4	39	1	13	3	5	22	1
		79%		**76%**	**89%**		**81%**		**100%**			**85%**	
Cardiac/ vascular surgery	program exists (n=)	(48)	(5)	(17)	(26)	(25)	(21)	(2)	(8)	(5)	(16)	(14)	(5)
	pharmacist assigned	36	3	13	20	22	13	1	7	5	13	8	3
		75%		**76%**	**77%**	**88%**	**62%**				**81%**	**57%**	
Cardiology	program exists (n=)	(78)	(9)	(35)	(34)	(26)	(48)	(4)	(12)	(5)	(28)	(23)	(10)
	pharmacist assigned	58	4	29	25	23	32	3	11	4	25	11	7
		74%		**83%**	**74%**	**88%**	**67%**		**92%**		**89%**	**48%**	**70%**
General surgery	program exists (n=)	(120)	(27)	(51)	(42)	(30)	(86)	(4)	(23)	(15)	(35)	(33)	(14)
	pharmacist assigned	87	12	44	31	27	58	2	19	10	33	16	9
		73%	**44%**	**86%**	**74%**	**90%**	**67%**		**83%**	**67%**	**94%**	**48%**	**64%**
Orthopedic surgery	program exists (n=)	(104)	(18)	(45)	(41)	(25)	(74)	(5)	(22)	(9)	(33)	(29)	(11)
	pharmacist assigned	73	7	38	28	18	52	3	19	3	31	13	7
		70%	**39%**	**84%**	**68%**	**72%**	**70%**		**86%**		**94%**	**45%**	**64%**
Geriatrics	program exists (n=)	(72)	(9)	(30)	(33)	(16)	(56)	(0)	(11)	(6)	(22)	(27)	(6)
	pharmacist assigned	50	3	18	29	11	39	0	8	2	16	22	2
		69%		**60%**	**88%**	**69%**	**70%**		**73%**		**73%**	**81%**	

Table B-2 (continued). Profile of Pharmacist Assignment to Inpatient Programs, 2020/21

Inpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pediatric and/or neonatal intensive care	program exists (n=)	(52)	(4)	(23)	(25)	(17)	(30)	(5)	(10)	(5)	(22)	(9)	(6)
	pharmacist assigned	36	2	20	14	14	18	4	8	4	14	5	5
		69%		**87%**	**56%**	**82%**	**60%**		**80%**		**64%**		
Rehabilitation	program exists (n=)	(59)	(8)	(26)	(25)	(11)	(45)	(3)	(12)	(6)	(23)	(13)	(5)
	pharmacist assigned	38	3	18	17	8	28	2	7	3	20	6	2
		64%		**69%**	**68%**	**73%**	**62%**		**58%**		**87%**	**46%**	
Mental health	program exists (n=)	(102)	(17)	(44)	(41)	(24)	(74)	(4)	(20)	(9)	(31)	(31)	(11)
	pharmacist assigned	65	8	29	28	18	43	4	10	4	29	14	8
		64%	**47%**	**66%**	**68%**	**75%**	**58%**		**50%**		**94%**	**45%**	**73%**
Neurosurgery	program exists (n=)	(30)	(3)	(12)	(15)	(17)	(8)	(5)	(6)	(5)	(8)	(7)	(4)
	pharmacist assigned	19	0	10	9	12	4	3	5	2	7	2	3
		63%		**83%**	**60%**	**71%**							
Oncology	program exists (n=)	(112)	(25)	(45)	(42)	(24)	(83)	(5)	(19)	(12)	(31)	(34)	(16)
	pharmacist assigned	62	9	26	27	21	36	5	10	7	23	14	8
		55%	**36%**	**58%**	**64%**	**88%**	**43%**		**53%**	**58%**	**74%**	**41%**	**50%**
Chronic or complex continuing care	program exists (n=)	(46)	(8)	(20)	(18)	(11)	(31)	(4)	(5)	(4)	(20)	(13)	(4)
	pharmacist assigned	25	5	12	8	6	17	2	1	3	17	3	1
		54%		**60%**	**44%**	**55%**	**55%**				**85%**	**23%**	
Pediatric and/or newborn care	program exists (n=)	(84)	(16)	(37)	(31)	(16)	(63)	(5)	(17)	(8)	(29)	(22)	(8)
	pharmacist assigned	45	5	21	19	12	28	5	10	3	24	5	3
		54%	**31%**	**57%**	**61%**	**75%**	**44%**		**59%**		**83%**	**23%**	
Nephrology/renal care/dialysis care	program exists (n=)	(86)	(13)	(37)	(36)	(23)	(58)	(5)	(11)	(11)	(22)	(29)	(13)
	pharmacist assigned	46	2	21	23	18	24	4	9	4	15	13	5
		53%	**15%**	**57%**	**64%**	**78%**	**41%**		**82%**	**36%**	**68%**	**45%**	**38%**
Clinical research	program exists (n=)	(60)	(6)	(29)	(25)	(22)	(35)	(3)	(9)	(6)	(22)	(18)	(5)
	pharmacist assigned	32	1	17	14	14	16	2	8	3	11	9	1
		53%		**59%**	**56%**	**64%**	**46%**				**50%**	**50%**	
Palliative care	program exists (n=)	(84)	(11)	(37)	(36)	(21)	(60)	(3)	(14)	(8)	(25)	(29)	(8)
	pharmacist assigned	43	3	21	19	10	31	2	8	3	16	13	3
		51%	**27%**	**57%**	**53%**	**48%**	**52%**		**57%**		**64%**	**45%**	
Neurology	program exists (n=)	(53)	(5)	(21)	(27)	(18)	(30)	(5)	(11)	(4)	(17)	(16)	(5)
	pharmacist assigned	27	1	13	13	12	11	4	6	3	11	4	3
		51%		**62%**	**48%**	**67%**	**37%**		**55%**		**65%**	**25%**	
Emergency	program exists (n=)	(120)	(28)	(52)	(40)	(33)	(82)	(5)	(23)	(16)	(34)	(33)	(14)
	pharmacist assigned	55	7	28	20	15	39	1	17	7	19	7	5
		46%	**25%**	**54%**	**50%**	**45%**	**48%**		**74%**	**44%**	**56%**	**21%**	**36%**
Hematology/anticoagulation	program exists (n=)	(60)	(4)	(26)	(30)	(21)	(37)	(2)	(6)	(6)	(22)	(21)	(5)
	pharmacist assigned	27	1	12	14	11	15	1	3	2	9	11	2
		45%		**46%**	**47%**	**52%**	**41%**				**41%**	**52%**	

Table B-2 (continued). Profile of Pharmacist Assignment to Inpatient Programs, 2020/21

Inpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Respirology	program exists (n=)	(60)	(8)	(25)	(27)	(22)	(34)	(4)	(7)	(5)	(23)	(18)	(7)
	pharmacist assigned	26	1	14	11	9	14	3	4	1	15	5	1
		43%		**56%**	**41%**	**41%**	**41%**				**65%**	**28%**	
Other patient care areas	program exists (n=)	(35)	(3)	(17)	(15)	(12)	(22)	(1)	(9)	(3)	(14)	(9)	(0)
	pharmacist assigned	14	0	8	6	6	7	1	4	1	8	1	0
		40%		**47%**	**40%**	**50%**	**32%**				**57%**		
Obstetrics and/or gynecology and/or women's healthcare	program exists (n=)	(93)	(19)	(38)	(36)	(20)	(69)	(4)	(17)	(11)	(28)	(28)	(9)
	pharmacist assigned	37	6	18	13	10	24	3	7	4	22	2	2
		40%	**32%**	**47%**	**36%**	**50%**	**35%**		**41%**	**36%**	**79%**	**7%**	
Family practice	program exists (n=)	(56)	(8)	(24)	(24)	(14)	(42)	(0)	(5)	(5)	(16)	(24)	(6)
	pharmacist assigned	21	3	11	7	7	14	0	4	3	4	6	4
		38%		**46%**	**29%**	**50%**	**33%**				**25%**	**25%**	
HIV/AIDS	program exists (n=)	(29)	(1)	(17)	(11)	(16)	(9)	(4)	(5)	(4)	(10)	(5)	(5)
	pharmacist assigned	10	0	6	4	5	3	2	3	1	2	3	1
		34%		**35%**	**36%**	**31%**					**20%**		
Gastroenter-ology	program exists (n=)	(61)	(7)	(24)	(30)	(17)	(39)	(5)	(6)	(6)	(20)	(23)	(6)
	pharmacist assigned	16	1	8	7	5	7	4	2	1	8	4	1
		26%		**33%**	**23%**	**29%**	**18%**				**40%**	**17%**	
Clinical pharmacology and toxicology service	program exists (n=)	(8)	(1)	(3)	(4)	(3)	(3)	(2)	(0)	(1)	(1)	(5)	(1)
	pharmacist assigned	2	0	1	1	1	0	1	0	0	0	2	0
Diabetes/ endocrinology	program exists (n=)	(67)	(7)	(32)	(28)	(20)	(43)	(4)	(8)	(7)	(23)	(23)	(6)
	pharmacist assigned	9	1	4	4	0	6	3	1	1	4	2	1
		13%		**13%**	**14%**	**0%**	**14%**				**17%**	**9%**	
Genetics/rare disease care	program exists (n=)	(15)	(3)	(5)	(7)	(9)	(3)	(3)	(1)	(3)	(5)	(5)	(1)
	pharmacist assigned	2	0	1	1	0	1	1	1	0	0	1	0
		13%											
Operating room	program exists (n=)	(99)	(24)	(41)	(34)	(23)	(73)	(3)	(18)	(14)	(28)	(30)	(9)
	pharmacist assigned	13	2	6	5	4	9	0	1	1	10	1	0
		13%	**8%**	**15%**	**15%**	**17%**	**12%**		**6%**	**7%**	**36%**	**3%**	
Pain service	program exists (n=)	(61)	(8)	(29)	(24)	(20)	(38)	(3)	(7)	(7)	(25)	(15)	(7)
	pharmacist assigned	7	1	4	2	1	3	3	2	0	3	1	1
		11%		**14%**	**8%**	**5%**	**8%**				**12%**	**7%**	
Surgery, pre-admission	program exists (n=)	(106)	(24)	(45)	(37)	(28)	(74)	(4)	(19)	(14)	(33)	(28)	(12)
	pharmacist assigned	11	1	4	6	4	7	0	3	0	7	0	1
		10%	**4%**	**9%**	**16%**	**14%**	**9%**		**16%**	**0%**	**21%**	**0%**	**8%**
Home care	program exists (n=)	(51)	(11)	(17)	(23)	(6)	(43)	(2)	(13)	(7)	(5)	(25)	(1)
	pharmacist assigned	2	0	1	1	1	0	1	0	0	0	2	0
		4%	**0%**	**6%**	**4%**		**0%**		**0%**			**8%**	

Table B-2 (continued). Profile of Pharmacist Assignment to Inpatient Programs, 2020/21

Inpatient services		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Other surgeries	program exists (n=)	(81)	(16)	(38)	(27)	(27)	(51)	(3)	(18)	(10)	(32)	(15)	(6)
	pharmacist assigned	2	0	0	2	2	0	0	0	0	1	1	0
		2%	**0%**	**0%**	**7%**	**7%**	**0%**		**0%**	**0%**	**3%**	**7%**	

Base: Respondents who answered question about inpatient services
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

As was the case for the 2016/17 survey, these data reflect the wide decentralization of pharmacist services in most outpatient clinics, as well as their provision at the bedside in inpatient programs across Canada. We believe that all patients and clients should benefit from the decentralization of pharmacist services.

Pharmacy Practice Models

The pharmacy practice models within a hospital or other healthcare organization are the methods by which pharmacy department resources are used to provide patient care services. The practice model type will dictate resource utilization and will affect patient outcomes, because it defines the roles played by pharmacists, pharmacy technicians (regulated and non-regulated pharmacy assistants), students, information technologies and automation technologies.

The American Society of Health-Systems Pharmacists (ASHP) supports a professional development approach for pharmaceutical practice in healthcare establishments that is known as the Practice Advancement Initiative (PAI) 2030.[57] The initiative began in 2010 with the goal of driving pharmacy practice change at the local level, according to the following six themes for practice change: optimize care via pharmacist-provided comprehensive medication management; integrate pharmacy enterprise for convenient and cost-effective care; harness data to improve patient health; adopt personalized targeted therapies; increase public health opportunities in social determinants, chronic illness and addiction; and advance pharmacy technician roles.

The PAI 2030 Self-Assessment Initiative identified 59 recommendations for optimal, safe and effective medication use. Canadian hospital pharmacists should be encouraged to consult the 59 recommendations and benchmark their own practice through the various PAI 2030 self-assessment tools.[58,59] Pharmacists who are interested in this approach should also consult the focused initiatives, case studies, advancement reports and student resources within the PAI.[60]

Given the practice model definitions developed by the ACCP and ASHP, the CSHP Hospital Pharmacy in Canada Survey Board has been revising the practice model descriptions outlined in successive iterations of the survey. More specifically, four practice models were defined in the 2016/17 survey, and five were defined in the 2020/21 survey.

One factor affecting the available practice models is the increase in number of provinces and territories that have regulated pharmacy technicians with licensed scopes of practice. As such, there is a trend toward increasing the role of the pharmacist by expanding their scope of practice as it pertains to clinical activities while utilizing pharmacy technicians for the more technical functions. This shift increases human resource efficiencies, ensuring that the right healthcare providers are working to their full scopes of practice in various hospital settings.

- For the 2016/17 survey, the following models were defined: clinical generalist model (with no or limited role differentiation), comprehensive model (where pharmacists had a variety of roles, including generalist, distributive and specialist roles), mostly distributive with some clinical, and separate clinical specialist and distributive roles. For the 2020/21 survey, the model definitions had increased clarity:

only distributive, mostly distributive with some clinical, similar amounts of clinical and distributive, mostly clinical with some distributive, and only clinical activities.

- In terms of results from the 2016/17 survey, the two dominant models were the clinical generalist model, with limited differentiation of roles (45%, 83/183), and the comprehensive model, with pharmacists in distributive, generalist and specialist roles (43%, 78/183). In 2020/21, 73% (103/142) of respondents had pharmacists working in "mostly clinical activities with limited distributive activities"; the second most common practice model (54%, 77/142) had pharmacists working in "similar amounts of distributive and decentralized clinical activities"; and only 38% (54/142) of respondents reported employing pharmacists in "only distributive activities". Notably, most respondents had pharmacists working in multiple models. An example of an organization needing more than one pharmacy practice model would be a hospital with one pharmacist in the antimicrobial stewardship role and other pharmacists sharing decentralized clinical and distributive activities.
- The practice model in which pharmacists had "only distributive activities" was most common in BC/YT (59%, 16/27), followed by the Atlantic provinces (53%, 9/17). Interestingly, facilities with 201-500 beds employed more pharmacists under this model than facilities with 50-200 beds (42% [24/57] vs. 37% [15/41]), and the same was true for teaching hospitals relative to non-teaching hospitals (42% [14/33] vs. 35% [36/104]). The latter result could be due to a larger number of teaching hospitals being open continuously (i.e., 24 hours a day, seven days a week). Also, the rate of the "only clinical activities" model was higher for teaching hospitals than for non-teaching hospitals (64% [21/33] vs. 33% [34/104]).
- In both BC/YT and the Atlantic provinces, most pharmacists were employed in either the "only distributive activities" model (59% [16/27] and 53% [9/17], respectively) or the "mostly clinical activities with limited distributive activities" (74% [20/27] and 59% [10/17], respectively).
- Respondents from the Prairies (SK/MB) and ON mainly reported "similar amounts of distributive and decentralized clinical activities" (61% [14/23] and 49% [19/39], respectively) and "mostly clinical activities with limited distributive activities" (65% [15/23] and 69% [27/39], respectively).
- Respondents from QC primarily reported the model of "mostly clinical activities with limited distributive activities" (86%, 31/36).
- Pediatric hospitals reported three distinct models: "only distributive activities" (n = 4), "mostly clinical activities with limited distributive activities" (n = 4) and "only clinical activities" (n = 4).
- Only 38% (54/142) of respondents reported the model of "only distributive activities", whereas 73% (103/142) had pharmacists working in "mostly clinical activities with limited distributive activities"

The practice model in which pharmacists had "only distributive activities" was most common in BC/YT (59%, 16/27) followed by the Atlantic provinces (53%, 9/17).

Table B-3 summarizes the data for clinical pharmacy practice models. In addition to showing the proportions of respondents reporting each practice model, the table includes the average proportion of pharmacists represented by each model. For example, 54% (77/142) of respondents reported the model "similar amounts of distributive and decentralized clinical activities" and among these respondents, an average of 52.5% (SD 30.7%) of pharmacists were assigned to this model.

Table B-3. Pharmacy Practice Models, 2020/21

Practice model (best description of the deployment of pharmacists)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Only distributive activities	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		54	15	24	15	14	36	4	16	4	11	14	9
		38%	**37%**	**42%**	**34%**	**42%**	**35%**		**59%**	**17%**	**28%**	**39%**	**53%**
	Average	**20.5**	**31.7**	**17.3**	**14.4**	**10.3**	**26.0**	**6.3**	**20.1**	**15.3**	**18.1**	**22.6**	**22.9**
	(SD)	18.4	16.6	18.9	15.1	7.3	19.9	4.3	16.5	9.0	21.3	23.2	15.1
Mostly distributive activities with limited clinical activities		67	18	30	19	17	50	0	21	9	16	11	10
		47%	**44%**	**53%**	**43%**	**52%**	**48%**		**78%**	**39%**	**41%**	**31%**	**59%**
	Average	**25.5**	**51.7**	**15.0**	**17.4**	**10.7**	**30.6**		**19.0**	**51.6**	**16.1**	**15.1**	**42.4**
	(SD)	27.5	35.1	16.8	15.0	7.7	30.0		11.6	40.9	23.6	16.8	33.8
Similar amounts of distributive and decentralized clinical activities		77	20	31	26	19	55	3	17	14	19	18	9
		54%	**49%**	**54%**	**59%**	**58%**	**53%**		**63%**	**61%**	**49%**	**50%**	**53%**
	Average	**52.5**	**57.6**	**57.5**	**42.6**	**47.5**	**53.6**	**63.3**	**50.0**	**70.1**	**67.7**	**31.0**	**40.8**
	(SD)	30.7	29.8	30.3	30.5	24.8	33.0	20.2	20.3	24.8	34.0	26.4	27.2
Mostly clinical activities with limited distributive activities		103	23	41	39	27	72	4	20	15	27	31	10
		73%	**56%**	**72%**	**89%**	**82%**	**69%**		**74%**	**65%**	**69%**	**86%**	**59%**
	Average	**60.6**	**65.1**	**56.0**	**62.8**	**62.8**	**60.3**	**51.6**	**37.0**	**43.5**	**69.1**	**77.6**	**57.6**
	(SD)	34.4	37.7	32.2	34.9	32.3	34.9	46.7	26.5	38.1	33.3	27.3	32.0
Only clinical activities		59	4	33	22	21	34	4	19	6	15	11	8
		42%	**10%**	**58%**	**50%**	**64%**	**33%**		**70%**	**26%**	**38%**	**31%**	**47%**
	Average	**18.7**	**11.6**	**22.9**	**13.5**	**17.9**	**19.0**	**19.6**	**20.4**	**23.4**	**19.4**	**14.0**	**15.9**
	(SD)	18.7	4.7	22.2	11.9	18.7	19.2	19.6	11.2	17.5	30.5	16.1	7.5

Base: Respondents to the question about pharmacy practice models, n = 142
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Profile of Clinical Pharmacy Activities

In the 2016/17 survey, respondents were asked questions about 20 clinical activities and the extent to which they had been implemented in their respective organizations. The same 20 clinical activities were included in the 2020/21 survey, with the addition of three questions to reflect activities relevant to the Accreditation Canada ROPs involving medication management standards, as well as provincial and territorial legislation changing pharmacists' scope of practice: pharmacist participation in a formal antimicrobial stewardship program; pharmacist participation in a formal controlled substance stewardship program; and ability of inpatient pharmacists to work to their full scope of practice, as defined by legislation in the respective province or territory.

The last of these questions was important because scope of practice is an area of accountability at the provincial/territorial level in Canada. More specifically, provinces and territories have legislation pertaining to hospitals and their operations (e.g., the Public Hospitals Act in Ontario) which trumps each jurisdiction's more general legislation; hence, many pharmacists working in hospitals are limited in their ability to practise to their full scope. Additionally, one existing question in this section was better defined in the 2020/21 survey, following federal enactment of Vanessa's Law (Protecting Canadians from Unsafe Drugs Act).[61]

Comparison of data from 2020/21 with data from the previous survey yielded the following key observations:

- It appears that more pharmacists were performing the various specified activities in most or all areas in 2016/17 than was the case in 2020/21. For example, in 2016/17, 91% (167/184) of respondents reported that pharmacists were involved in identifying, developing, reviewing or approving new medication order sets in all or most areas; this proportion had declined to 81% (116/143) in the 2020/21 survey. It is difficult to determine a potential root cause for this change, given the many variables at play, such as the COVID-19 pandemic and the trend toward implementation of electronic health records (EHRs) with integrated order sets. Oversight of the latter may be delegated to a sub-committee with involvement of only a limited number of pharmacists.
- With the increased implementation of EHRs, some required hospital activities traditionally performed by pharmacists have become less critical. A prime example is the adoption of standardized order sets by clusters of hospitals using the same EHR system. In this context, one team (including one or more pharmacists) can now oversee the development of order sets for multiple hospitals. This reduces the duplication of work and increases standardization from a patient access perspective.
- The following activities were widely implemented (i.e., reported for "all areas" or "most areas" by a total of at least 70% of respondents), in descending order:
  - 81% (116/143) of respondents reported that pharmacists were involved in identifying, developing, reviewing or approving new medication order sets, down from 91% (167/184) in 2016/17.
  - 78% (111/143) of respondents reported that pharmacists reviewed medication orders before the first dose is administered, up from 75% (137/183) in 2016/17.
  - 76% (108/143) of respondents reported that the pharmacy department at their facility had identified drug therapy management as a service that should be provided consistently by pharmacists, down from 82% (150/183) in 2016/17.
  - 74% (106/143) of respondents reported that drug therapy management services were prioritized for inpatients according to the complexity of patients' medication therapy, consistent with the 2016/17 survey (73%; 134/183).
- Other results of interest included the following:
  - 25% (36/143) of respondents reported some level of pharmacist participation on rapid response teams, and 24% (35/143) reported some level of participation on cardiopulmonary resuscitation teams. In other words, for 75% and 76% of respondents, respectively, pharmacists were not involved with these teams. Comparable proportions in the 2016/17 survey were 78% (126/161) and 75% (128/170), respectively.
    - The value of pharmacists in these contexts have been documented, but it is difficult to offer these activities 24 hours a day, seven days a week.
  - 66% (94/143) of respondents reported that when a patient's genetic characteristics were known, pharmacists did not have a role in adjusting dosages or changing therapy for select medications (e.g., through results of genetic tests for variants of the CYP2C9 and VKORC1 genes for patients receiving warfarin therapy). This proportion is up from 54% (84/156) in the 2016/17 survey.
    - This emerging area of care should be integrated in any pharmaceutical care plan, despite the apparently decreasing role of pharmacists.
  - 38% (54/143) of respondents reported that their outpatient pharmacists were not authorized by policy or protocol to write medication orders and/or prescriptions as part of their scope of practice; this is comparable to the result in 2016/17 (36%, 59/164).

- 16% (23/143) of respondents reported that their inpatient pharmacists were not authorized by policy or protocol to write medication orders as part of their scope of practice; this represents a decline since 2016/17 (22%, 40/182).
  - In most provinces, pharmacists have been given the right to adapt or manage drug therapy, as well as the right to prescribe independently and in collaboration with other prescribers. The result is a decreased requirement for authorization by policy or protocol. Of note, as of 2022, Yukon has begun to amend pharmacists' scope of practice, although the territories as a whole have not made many advancements.
- The decrease in respondents reporting that this activity does not exist represents a promising trend as hospitals try to align with legislative changes that pertain to scope of practice as mentioned previously.
- 56% (80/142) of respondents reported that pharmacists were involved in developing patient care plans in all or most areas.
  - Even so, there was a considerable drop for teaching hospitals, from 20% (8/41) in 2016/17 to 9% (3/33) in 2020/21.
  - Regional proportions were mostly steady, although ON showed an increase from 15% (8/52) in 2016/17 to 21% (8/39) in 2020/21.
- 62% (89/143) of respondents reported that inpatient pharmacists in most or all areas could work to their full scope of practice, as defined by legislation in the relevant province or territory.
  - Only 10% (14/143) of respondents indicated that working to full scope did not exist in their facility; of these 14 facilities, five each were from the Prairies (SK/MB) and ON, two were from the Atlantic region, and one each was from BC/YT and QC.
- 67% (96/143) of respondents reported that pharmacists participated in a formal antimicrobial stewardship program in all or most areas of the facility.
  - Only 11% (16/143) of respondents indicated that no pharmacists were participating in antimicrobial stewardship; nine of these facilities were in the Prairies (SK/MB).
- 16% (23/143) of respondents reported that pharmacists participated in a formal controlled substance stewardship program in all or most areas.
  - Controlled substance stewardship is an emerging activity, and it is likely that most respondents do not yet have a formal program.

Almost two-thirds of respondents (62%, 89/143) reported that inpatient pharmacists could work to their full scope of practice, as defined by legislation in their province or territory.

Table B-4 summarizes the profile of clinical pharmacy activities for 2020/21, with data shown in the same order as options were presented in the survey itself.

Table B-4. Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pharmacists are involved in identifying, developing, reviewing or approving new medication order sets	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		63	14	24	25	19	42	2	7	4	24	19	9
		44%	**34%**	**41%**	**57%**	**58%**	**40%**		**26%**	**17%**	**62%**	**53%**	**50%**
Exists in most areas/situations (50%-99%)		53	12	26	15	12	38	3	9	14	13	11	6
		37%	**29%**	**45%**	**34%**	**36%**	**36%**		**33%**	**61%**	**33%**	**31%**	**33%**
Exists only in some areas/situations (1%-49%)		24	13	7	4	2	22	0	8	5	2	6	3
		17%	32%	12%	9%	6%	21%		30%	22%	5%	17%	17%
Does not exist (0%)		3	2	1	0	0	3	0	3	0	0	0	0
		2%	5%	2%	0%	0%	3%		11%	0%	0%	0%	0%
Pharmacists are involved in monitoring and reporting potential and actual adverse drug events (ADEs) or in mandatory reporting (in compliance with Vanessa's Law)	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		35	10	14	11	9	24	2	6	4	17	3	5
		24%	**24%**	**24%**	**25%**	**27%**	**23%**		**22%**	**17%**	**44%**	**8%**	**28%**
Exists in most areas/situations (50%-99%)		61	15	28	18	20	38	3	12	14	17	11	7
		43%	**37%**	**48%**	**41%**	**61%**	**36%**		**44%**	**61%**	**44%**	**31%**	**39%**
Exists only in some areas/situations (1%-49%)		46	16	16	14	4	42	0	9	5	5	21	6
		32%	39%	28%	32%	12%	40%		33%	22%	13%	58%	33%
Does not exist (0%)		1	0	0	1	0	1	0	0	0	0	1	0
		1%	0%	0%	2%	0%	1%		0%	0%	0%	3%	0%
Pharmacists facilitate medication-related continuity of care when patients experience transitions of care	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		11	1	6	4	4	5	2	0	0	8	2	1
		8%	**2%**	**10%**	**9%**	**12%**	**5%**		**0%**	**0%**	**21%**	**6%**	**6%**
Exists in most areas/situations (50%-99%)		62	10	28	24	19	41	2	15	9	15	18	5
		43%	**24%**	**48%**	**55%**	**58%**	**39%**		**56%**	**39%**	**38%**	**50%**	**28%**
Exists only in some areas/situations (1%-49%)		65	28	22	15	10	54	1	11	14	15	14	11
		45%	68%	38%	34%	30%	51%		41%	61%	38%	39%	61%
Does not exist (0%)		5	2	2	1	0	5	0	1	0	1	2	1
		3%	5%	3%	2%	0%	5%		4%	0%	3%	6%	6%
Your facility has processes to ensure medication-related continuity of care for discharged patients	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		14	4	6	4	5	8	1	2	3	8	0	1
		10%	**10%**	**10%**	**9%**	**15%**	**8%**		**7%**	**13%**	**21%**	**0%**	**6%**

Table B-4 (continued). Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Exists in most areas/situations (50%-99%)		61	13	26	22	19	39	3	9	12	18	17	5
		43%	**32%**	**45%**	**50%**	**58%**	**37%**		**33%**	**52%**	**46%**	**47%**	**28%**
Exists only in some areas/situations (1%-49%)		51	15	22	14	8	42	1	13	3	12	12	11
		36%	37%	38%	32%	24%	40%		48%	13%	31%	33%	61%
Does not exist (0%)		17	9	4	4	1	16	0	3	5	1	7	1
		12%	22%	7%	9%	3%	15%		11%	22%	3%	19%	6%
The pharmacy department at your facility has identified drug therapy management as a service that should be provided consistently by pharmacists	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		33	6	16	11	8	23	2	6	2	17	7	1
		23%	**15%**	**28%**	**25%**	**24%**	**22%**		**22%**	**9%**	**44%**	**19%**	**6%**
Exists in most areas/situations (50%-99%)		75	16	29	30	22	50	3	16	15	20	18	6
		52%	**39%**	**50%**	**68%**	**67%**	**48%**		**59%**	**65%**	**51%**	**50%**	**33%**
Exists only in some areas/situations (1%-49%)		29	14	13	2	3	26	0	5	3	1	10	10
		20%	34%	22%	5%	9%	25%		19%	13%	3%	28%	56%
Does not exist (0%)		6	5	0	1	0	6	0	0	3	1	1	1
		4%	12%	0%	2%	0%	6%		0%	13%	3%	3%	6%
Pharmacists are involved in developing patient care plans	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(35)	(18)
Exists in all areas/situations (100%)		10	2	3	5	3	6	1	0	0	8	2	0
		7%	**5%**	**5%**	**11%**	**9%**	**6%**		**0%**	**0%**	**21%**	**6%**	**0%**
Exists in most areas/situations (50%-99%)		70	10	38	22	23	43	4	15	13	23	13	6
		49%	**24%**	**67%**	**50%**	**70%**	**41%**		**56%**	**57%**	**59%**	**37%**	**33%**
Exists only in some areas/situations (1%-49%)		54	25	14	15	7	47	0	11	8	7	19	9
		38%	61%	25%	34%	21%	45%		41%	35%	18%	54%	50%
Does not exist (0%)		8	4	2	2	0	8	0	1	2	1	1	3
		6%	10%	4%	5%	0%	8%		4%	9%	3%	3%	17%
Pharmacists review medication orders before the first dose is administered	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		3	0	2	1	2	1	0	0	0	3	0	0
		2%	**0%**	**3%**	**2%**	**6%**	**1%**		**0%**	**0%**	**8%**	**0%**	**0%**
Exists in most areas/situations (50%-99%)		108	25	44	39	28	76	4	19	12	31	32	14
		76%	**61%**	**76%**	**89%**	**85%**	**72%**		**70%**	**52%**	**79%**	**89%**	**78%**
Exists only in some areas/situations (1%-49%)		26	12	11	3	2	23	1	6	8	5	3	4
		18%	29%	19%	7%	6%	22%		22%	35%	13%	8%	22%
Does not exist (0%)		6	4	1	1	1	5	0	2	3	0	1	0
		4%	10%	2%	2%	3%	5%		7%	13%	0%	3%	0%

Table B-4 (continued). Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
All patients' medication profiles are reviewed for appropriateness at least once daily by a pharmacist	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		8	2	3	3	1	6	1	0	1	4	1	2
		6%	**5%**	**5%**	**7%**	**3%**	**6%**		**0%**	**4%**	**10%**	**3%**	**11%**
Exists in most areas/situations (50%-99%)		63	12	29	22	16	44	3	11	9	24	14	5
		44%	**29%**	**50%**	**50%**	**48%**	**42%**		**41%**	**39%**	**62%**	**39%**	**28%**
Exists only in some areas/situations (1%-49%)		52	18	20	14	15	36	1	14	10	9	12	7
		36%	44%	34%	32%	45%	34%		52%	43%	23%	33%	39%
Does not exist (0%)		20	9	6	5	1	19	0	2	3	2	9	4
		14%	22%	10%	11%	3%	18%		7%	13%	5%	25%	22%
Pharmacists monitor patients' responses to medication therapy	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		7	1	1	5	1	5	1	0	0	5	2	0
		5%	**2%**	**2%**	**11%**	**3%**	**5%**		**0%**	**0%**	**13%**	**6%**	**0%**
Exists in most areas/situations (50%-99%)		76	13	38	25	25	47	4	16	15	25	14	6
		53%	**32%**	**66%**	**57%**	**76%**	**45%**		**59%**	**65%**	**64%**	**39%**	**33%**
Exists only in some areas/situations (1%-49%)		57	25	18	14	7	50	0	11	7	9	18	12
		40%	61%	31%	32%	21%	48%		41%	30%	23%	50%	67%
Does not exist (0%)		3	2	1	0	0	3	0	0	1	0	2	0
		2%	5%	2%	0%	0%	3%		0%	4%	0%	6%	0%
When a patient's genetic characteristics are known, pharmacists have a role in adjusting the dosage or changing the therapy for select medications	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		3	0	1	2	0	3	0	0	0	1	2	0
		2%	**0%**	**2%**	**5%**	**0%**	**3%**		**0%**	**0%**	**3%**	**6%**	**0%**
Exists in most areas/situations (50%-99%)		16	3	7	6	2	10	4	4	2	6	3	1
		11%	**7%**	**12%**	**14%**	**6%**	**10%**		**15%**	**9%**	**15%**	**8%**	**6%**
Exists only in some areas/situations (1%-49%)		30	5	10	15	9	21	0	0	3	9	15	3
		21%	12%	17%	34%	27%	20%		0%	13%	23%	42%	17%
Does not exist (0%)		94	33	40	21	22	71	1	23	18	23	16	14
		66%	80%	69%	48%	67%	68%		85%	78%	59%	44%	78%
Medication reconciliation is performed by pharmacy staff at your facility at any transition of care	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		9	2	5	2	2	7	0	1	1	5	2	0
		6%	**5%**	**9%**	**5%**	**6%**	**7%**		**4%**	**4%**	**13%**	**6%**	**0%**
Exists in most areas/situations (50%-99%)		58	8	23	27	15	41	2	6	4	25	17	6
		41%	**20%**	**40%**	**61%**	**45%**	**39%**		**22%**	**17%**	**64%**	**47%**	**33%**
Exists only in some areas/situations (1%-49%)		62	23	25	14	16	44	2	16	14	8	14	10
		43%	56%	43%	32%	48%	42%		59%	61%	21%	39%	56%

Table B-4 (continued). Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Does not exist (0%)		14	8	5	1	0	13	1	4	4	1	3	2
		10%	20%	9%	2%	0%	12%		15%	17%	3%	8%	11%
Pharmacists provide discharge education to patients in your facility	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		1	0	0	1	1	0	0	0	0	1	0	0
		1%	**0%**	**0%**	**2%**	**3%**	**0%**		**0%**	**0%**	**3%**	**0%**	**0%**
Exists in most areas/situations (50%-99%)		24	4	9	11	8	14	2	2	3	10	6	3
		17%	**10%**	**16%**	**25%**	**24%**	**13%**		**7%**	**13%**	**26%**	**17%**	**17%**
Exists only in some areas/situations (1%-49%)		101	27	46	28	23	75	3	24	16	25	25	11
		71%	66%	79%	64%	70%	71%		89%	70%	64%	69%	61%
Does not exist (0%)		17	10	3	4	1	16	0	1	4	3	5	4
		12%	24%	5%	9%	3%	15%		4%	17%	8%	14%	22%
Pharmacists participate on your facility's rapid response teams	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		1	0	0	1	1	0	0	0	0	0	1	0
		1%	**0%**	**0%**	**2%**	**3%**	**0%**		**0%**	**0%**	**0%**	**3%**	**0%**
Exists in most areas/situations (50%-99%)		10	0	3	7	3	6	1	0	0	2	8	0
		7%	**0%**	**5%**	**16%**	**9%**	**6%**		**0%**	**0%**	**5%**	**22%**	**0%**
Exists only in some areas/situations (1%-49%)		25	2	12	11	7	18	0	5	1	7	11	1
		17%	5%	21%	25%	21%	17%		19%	4%	18%	31%	6%
Does not exist (0%)		107	39	43	25	22	81	4	22	22	30	16	17
		75%	95%	74%	57%	67%	77%		81%	96%	77%	44%	94%
Pharmacists participate on your facility's cardiopulmonary resuscitation teams (e.g., Code Blue teams	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		4	0	2	2	2	2	0	0	0	2	2	0
		3%	**0%**	**3%**	**5%**	**6%**	**2%**		**0%**	**0%**	**5%**	**6%**	**0%**
Exists in most areas/situations (50%-99%)		5	1	1	3	2	2	1	0	0	2	3	0
		3%	**2%**	**2%**	**7%**	**6%**	**2%**		**0%**	**0%**	**5%**	**8%**	**0%**
Exists only in some areas/situations (1%-49%)		26	2	13	11	8	17	1	8	1	5	9	3
		18%	5%	22%	25%	24%	16%		30%	4%	13%	25%	17%
Does not exist (0%)		108	38	42	28	21	84	3	19	22	30	22	15
		76%	93%	72%	64%	64%	80%		70%	96%	77%	61%	83%
Drug therapy management services by pharmacists are prioritized for inpatients according to the complexity of patients' medication therapy	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		29	5	12	12	11	16	2	5	5	10	9	0
		20%	**12%**	**21%**	**27%**	**33%**	**15%**		**19%**	**22%**	**26%**	**25%**	**0%**
Exists in most areas/situations (50%-99%)		77	16	35	26	18	56	3	16	11	22	19	9
		54%	**39%**	**60%**	**59%**	**55%**	**53%**		**59%**	**48%**	**56%**	**53%**	**50%**

Table B-4 (continued). Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Exists only in some areas/situations (1%-49%)		28	17	6	5	3	25	0	6	5	7	7	3
		20%	41%	10%	11%	9%	24%		22%	22%	18%	19%	17%
Does not exist (0%)		9	3	5	1	1	8	0	0	2	0	1	6
		6%	7%	9%	2%	3%	8%		0%	9%	0%	3%	33%
Drug therapy management services by pharmacists are prioritized for outpatients according to the complexity of patients' medication therapy	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		11	0	5	6	4	7	0	1	0	3	7	0
		8%	**0%**	**9%**	**14%**	**12%**	**7%**		**4%**	**0%**	**8%**	**19%**	**0%**
Exists in most areas/situations (50%-99%)		38	7	17	14	11	23	4	7	7	11	12	1
		27%	**17%**	**29%**	**32%**	**33%**	**22%**		**26%**	**30%**	**28%**	**33%**	**6%**
Exists only in some areas/situations (1%-49%)		57	12	23	22	14	42	1	13	7	17	12	8
		40%	29%	40%	50%	42%	40%		48%	30%	44%	33%	44%
Does not exist (0%)		37	22	13	2	4	33	0	6	9	8	5	9
		26%	54%	22%	5%	12%	31%		22%	39%	21%	14%	50%
Pharmacists independently adjust the dosages of medications on the basis of the patient's response or pharmacokinetic characteristics	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		20	4	11	5	7	13	0	7	3	5	3	2
		14%	**10%**	**19%**	**11%**	**21%**	**12%**		**26%**	**13%**	**13%**	**8%**	**11%**
Exists in most areas/situations (50%-99%)		38	8	15	15	11	25	2	7	4	15	9	3
		27%	**20%**	**26%**	**34%**	**33%**	**24%**		**26%**	**17%**	**38%**	**25%**	**17%**
Exists only in some areas/situations (1%-49%)		68	21	24	23	14	51	3	10	15	13	20	10
		48%	51%	41%	52%	42%	49%		37%	65%	33%	56%	56%
Does not exist (0%)		17	8	8	1	1	16	0	3	1	6	4	3
		12%	20%	14%	2%	3%	15%		11%	4%	15%	11%	17%
Inpatient pharmacists are authorized by policy or protocol (e.g., through medical directives) to write medication orders as part of their scope of practice	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		37	7	18	12	11	26	0	8	3	11	6	9
		26%	**17%**	**31%**	**27%**	**33%**	**25%**		**30%**	**13%**	**28%**	**17%**	**50%**
Exists in most areas/situations (50%-99%)		38	11	12	15	11	23	4	5	6	9	14	4
		27%	**27%**	**21%**	**34%**	**33%**	**22%**		**19%**	**26%**	**23%**	**39%**	**22%**
Exists only in some areas/situations (1%-49%)		45	12	19	14	10	35	0	9	10	12	11	3
		31%	29%	33%	32%	30%	33%		33%	43%	31%	31%	17%
Does not exist (0%)		23	11	9	3	1	21	1	5	4	7	5	2
		16%	27%	16%	7%	3%	20%		19%	17%	18%	14%	11%

Table B-4 (continued). Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Outpatient pharmacists are authorized by policy or protocol (e.g., through medical directives) to write medication orders and/or prescriptions as part of their scope of practice	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		27	6	13	8	5	21	1	2	2	5	13	5
		19%	**15%**	**22%**	**18%**	**15%**	**20%**		**7%**	**9%**	**13%**	**36%**	**28%**
Exists in most areas/situations (50%-99%)		24	5	7	12	9	13	2	3	5	4	10	2
		17%	**12%**	**12%**	**27%**	**27%**	**12%**		**11%**	**22%**	**10%**	**28%**	**11%**
Exists only in some areas/situations (1%-49%)		38	7	15	16	12	25	1	10	5	7	11	5
		27%	17%	26%	36%	36%	24%		37%	22%	18%	31%	28%
Does not exist (0%)		54	23	23	8	7	46	1	12	11	23	2	6
		38%	56%	40%	18%	21%	44%		44%	48%	59%	6%	33%
Pharmacists routinely document recommendations and assess progress and achievement of therapeutic goals in patients' medical records	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		17	3	7	7	4	12	1	3	2	9	2	1
		12%	**7%**	**12%**	**16%**	**12%**	**11%**		**11%**	**9%**	**23%**	**6%**	**6%**
Exists in most areas/situations (50%-99%)		62	15	26	21	15	43	4	15	11	16	14	6
		43%	**37%**	**45%**	**48%**	**45%**	**41%**		**56%**	**48%**	**41%**	**39%**	**33%**
Exists only in some areas/situations (1%-49%)		63	22	25	16	14	49	0	9	9	14	20	11
		44%	54%	43%	36%	42%	47%		33%	39%	36%	56%	61%
Does not exist (0%)		1	1	0	0	0	1	0	0	1	0	0	0
		1%	2%	0%	0%	0%	1%		0%	4%	0%	0%	0%
Inpatient pharmacists can work to their full scope of practice as defined by legislation in your province or territory	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		44	9	20	15	15	27	2	10	1	17	7	9
		31%	**22%**	**34%**	**34%**	**45%**	**26%**		**37%**	**4%**	**44%**	**19%**	**50%**
Exists in most areas/situations (50%-99%)		45	10	18	17	14	29	2	10	9	10	12	4
		31%	**24%**	**31%**	**39%**	**42%**	**28%**		**37%**	**39%**	**26%**	**33%**	**22%**
Exists only in some areas/situations (1%-49%)		40	16	14	10	3	37	0	6	8	7	16	3
		28%	39%	24%	23%	9%	35%		22%	35%	18%	44%	17%
Does not exist (0%)		14	6	6	2	1	12	1	1	5	5	1	2
		10%	15%	10%	5%	3%	11%		4%	22%	13%	3%	11%
Pharmacists participate in a formal antimicrobial stewardship program	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)		63	12	31	20	15	44	4	9	5	24	14	11
		44%	**29%**	**53%**	**45%**	**45%**	**42%**		**33%**	**22%**	**62%**	**39%**	**61%**
Exists in most areas/situations (50%-99%)		33	11	11	11	9	24	0	7	5	9	8	4
		23%	**27%**	**19%**	**25%**	**27%**	**23%**		**26%**	**22%**	**23%**	**22%**	**22%**

Table B-4 (continued). Profile of Clinical Pharmacy Activities, 2020/21

Clinical pharmacy activities	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Exists only in some areas/situations (1%-49%)	31	8	11	12	5	26	0	7	4	6	13	1
	22%	20%	19%	27%	15%	25%		26%	17%	15%	36%	6%
Does not exist (0%)	16	10	5	1	4	11	1	4	9	0	1	2
	11%	24%	9%	2%	12%	10%		15%	39%	0%	3%	11%
Pharmacists participate in a formal controlled substance stewardship program (n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
Exists in all areas/situations (100%)	11	1	4	6	4	6	1	1	1	5	4	0
	8%	**2%**	**7%**	**14%**	**12%**	**6%**		**4%**	**4%**	**13%**	**11%**	**0%**
Exists in most areas/situations (50%-99%)	12	3	4	5	3	8	1	2	2	2	4	2
	8%	**7%**	**7%**	**11%**	**9%**	**8%**		**7%**	**9%**	**5%**	**11%**	**11%**
Exists only in some areas/situations (1%-49%)	18	2	6	10	4	14	0	3	2	7	6	0
	13%	5%	10%	23%	12%	13%		11%	9%	18%	17%	0%
Does not exist (0%)	102	35	44	23	22	77	3	21	18	25	22	16
	71%	85%	76%	52%	67%	73%		78%	78%	64%	61%	89%

Base: Respondents to the question about clinical pharmacy activities, n = 143
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Profile of Key Performance Indicators

Key performance indicators (KPIs) are quantifiable measures of quality that reflect the critical success factors of an organization. They are used to track the organization's progress with specific and essential processes of care. More specifically, clinical pharmacy KPIs (cpKPIs) are evidence-based clinical pharmacy processes of care associated with a meaningful impact on patient outcomes, such as reduced hospital readmissions. They can be used to both guide and evaluate hospital pharmacists.

A set of hospital cpKPIs was developed using a systematic, pan-Canadian consensus-building (modified Delphi) process.[62,63] The KPIs identified during the modified Delphi process were grouped into eight evidence-informed activity areas that were deemed essential, representing hospital pharmacists' best practices with demonstrated improvements in meaningful patient outcomes. Each cpKPI was defined by five characteristics: it reflects a desired quality practice; it is a metric that can be linked to direct patient care; it is associated with evidence of impact on meaningful patient outcomes; it is a pharmacist-sensitive metric; and it is feasible to measure.

The Canadian cpKPI Collaborative developed a core set of eight hospital cpKPIs: performing admission medication reconciliation (including best possible medication history); participating in inter-professional patient care rounds; completing pharmaceutical care plans; resolving drug therapy problems; providing in-person disease and medication education to patients; providing discharge patient medication education; performing discharge medication reconciliation; and providing bundled, proactive direct patient care activities.

The 2016/17 survey was the first survey iteration to seek information about implementation of cpKPIs in Canadian hospitals, creating the baseline for comparisons with data collected in subsequent surveys.

With the availability of 2020/21 survey results, preliminary trends can now be identified. Although it was anticipated that increased uptake of EHRs and improvements in technology would lead to continued integration of cpKPIs into clinical pharmacy practice, the survey data do not support these predictions.

Given the challenges associated with unpredictable events such as the COVID-19 pandemic and the increased emphasis of Accreditation Canada ROPs on medication management, the impact of the cpKPIs on performance expectations of hospital pharmacists seems to have diminished.

The wording used to describe the cpKPIs in the 2020/21 survey differed somewhat from the wording used in the 2016/17 survey, to better reflect activities as they are performed by pharmacy professionals. These wording adjustments may limit the ability to interpret trends in the data. In particular, few changes in cpKPI implementation are evident since the 2016/17 survey. Implementation of cpKPIs that align with Accreditation Canada ROPs appears to be improving, whereas implementation of those that are either indirectly associated with the ROPs or that can be performed by healthcare professionals outside of pharmacy has shown little improvement or has even declined. For example, data collection on the proportion of patients who received documented medication reconciliation at discharge was 38% (68/180) in 2016/17 vs. 47% (67/143) in 2020/21.

Responses of interest for seven of the eight cpKPIs are as follows:

- Medication reconciliation on admission: Proportion of patients who received documented medication reconciliation on admission (as well as resolution of identified discrepancies) performed by a pharmacist:
  - The cpKPI description was modified from the description used in the 2016/17 survey with the addition of the following term: "(as well as resolution of identified discrepancies) performed by a pharmacist".
  - In 2020/21, 65% (93/143) of respondents provided data for this cpKPI, with 40% (37/92) reporting implementation for 76%-100% of patients, compared with 57% (105/183) providing data in the 2016/17 survey, and 40% (42/105) of these implementing this cpKPI for 76%-100% of patients.
  - The Prairies (SK/MB) showed the greatest improvement, from only 11% (4/38) collecting data for this cpKPI in 2016/17 to 70% (16/23) in 2020/21; however, of these, 38% (6/16) were implementing this cpKPI for only 1%-25% of admitted patients.
  - Implementation of this cpKPI in QC dropped from 72% (31/43) in 2016/17 to 56% (20/36) in 2020/21.
  - Conversely, implementation increased in ON, from 81% (42/52) to 87% (34/39), with the majority (65%, 22/34) implementing this cpKPI for 76%-100% of patients.
- Pharmaceutical care plan: Proportion of patients for whom pharmacists have developed and initiated a pharmaceutical care plan:
  - The cpKPI description was modified by the addition of "and initiated".
  - Implementation of this cpKPI dropped from 29% (52/180) in 2016/17 to 24% (35/143) in 2020/21; however, of those reporting this cpKPI, implementation for 76%-100% of patients increased from 6% (3/53) in 2016/17 to 14% (5/35) in 2020/21. Although the change in proportion may seem important, it reflects an increase of only two organizations, as the n value (denominator) decreased substantially, from 53 to 35.
  - Pediatric hospitals continued to out-perform other types of hospitals for this indicator. Four of the five pediatric hospitals tracked this cpKPI, compared with only 24% (35/143) of all hospitals in 2020/21; this result was up considerably from 2016/17, when only two of seven pediatric hospitals tracked this cpKPI.
- Resolution of drug therapy problems: Number of drug therapy problems resolved by a pharmacist per admission:
  - There was no change to the description of this cpKPI.
  - There was little change in implementation of this cpKPI, from 31% (57/182) of respondents in 2016/17 to 36% (52/143) in 2020/21.
  - The proportion of respondents who implemented this cpKPI for 76%-100% of patients in their organization increased from 29% (16/56) in 2016/17 to 37% (19/52) in 2020/21, but again, the absolute increase was only three additional organizations nationwide.

- Inter-professional patient care rounds: Proportion of patients for whom a pharmacist participated in inter-professional patient care rounds to improve medication management:
  - The cpKPI description was modified by the addition of "to improve medication management".
  - There was a substantial drop in implementation of this cpKPI, from 38% (69/182) of respondents in 2016/17 to 29% (41/143) in 2020/21. While the decrease could potentially be related to the absence of AB data in the 2020/21 survey, only 3 of 37 respondents from the Prairies (SK/MB only) collected data for this cpKPI in 2016/17, whereas 7 of 23 respondents from the same two provinces did so in 2020/21.
- Provision of education: Proportion of patients who received education from a pharmacist about their disease(s) and medications(s) during their hospital stay:
  - The cpKPI description was modified by the addition of "during their hospital stay".
  - Results for this cpKPI were virtually unchanged from 2016/17 to 2020/21.
- Medication reconciliation at discharge: Proportion of patients who received documented medication reconciliation at discharge (as well as resolution of identified discrepancies), performed by a pharmacist:
  - The cpKPI description was modified by the addition of the following term: "(as well as resolution of identified discrepancies), performed by a pharmacist".
  - This cpKPI showed improvement, from 38% (68/180) of respondents collecting relevant data in 2016/17 to 47% (67/143) in 2020/21. Here, although the absolute number of respondents remained virtually unchanged, 11 of 23 respondents from the Prairies (SK/MB only) collected data for this cpKPI in 2020/21, whereas only 1 of 37 respondents from all three Prairie provinces (including AB) did so in 2016/17.
- Comprehensive direct patient care: Proportion of patients who received comprehensive direct patient care from a pharmacist working in collaboration with the healthcare team:
  - The cpKPI description was modified by the addition of "in collaboration with the healthcare team".
  - In 2016/17, 35% (62/179) of respondents reported implementing this cpKPI. By 2020/21, this proportion had dropped to 18% (26/143). The greatest decline occurred in BC/YT, where only 22% (6/27) of respondents were implementing this cpKPI in 2020/21, compared with 55% (16/29) in 2016/17. In the Prairies (SK/MB), only 13% (3/23) of respondents reported collecting relevant data, compared with 49% (18/37) in 2016/17; this decline may, in part, reflect the absence of data from AB.
  - In addition, whereas only 7% (4/58) of respondents in 2016/17 had implementation of this cpKPI for 76%-100% of patients, no respondents had this level of implementation in 2020/21.

The majority of respondents planned to continue collecting cpKPI data after 2021

The majority of respondents planned to continue collecting cpKPI data after 2021; for individual cpKPIs, 39% to 76% of respondents had such plans, compared with 43% to 66% of respondents who committed to continuing implementation of cpKPIs in the 2016/17 survey. Of importance in interpreting Table B-5 is that the computerized design of the survey allowed respondents to omit responses to some questions while answering others. As a result, there may be apparent discrepancies in the numbers of responses in the regional breakdown. However, a thorough review of the raw data gives us confidence in the values reported within the table.

Table B-5. Use and Extent of Implementation of Clinical Pharmacy Key Performance Indicators (cpKPIs), 2020/21

cpKPI		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Medication reconciliation on admission: Proportion of patients who received documented medication reconciliation on admission (as well as resolution of identified discrepancies) performed by a pharmacist	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		93	19	47	27	28	60	5	13	16	34	20	10
Data collected in 2020/21		**65%**	**46%**	**81%**	**61%**	**85%**	**57%**		**48%**	**70%**	**87%**	**56%**	**56%**
Extent of implementing cpKPI 76%-100%	(n=)	(92)	(19)	(46)	(27)	(28)	(59)	(5)	(13)	(16)	(34)	(20)	(9)
		37	8	21	8	8	28	1	2	1	22	7	5
		40%	**42%**	**46%**	**30%**	**29%**	**47%**		**15%**	**6%**	**65%**	**35%**	
51%-75%		20	4	8	8	7	13	0	3	5	8	4	0
		22%	21%	17%	30%	25%	22%	0%	23%	31%	24%	20%	0%
26%-50%		19	4	9	6	5	11	3	1	4	3	8	3
		17%	16%	17%	19%	29%	12%	20%	54%	25%	3%	5%	11%
1%-25%		16	3	8	5	8	7	1	7	6	1	1	1
		21%	21%	20%	22%	18%	19%	60%	8%	38%	9%	40%	33%
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		108	28	45	35	31	72	5	16	19	37	26	10
		76%	68%	79%	80%	94%	69%	100%	59%	83%	95%	72%	59%
Pharmaceutical care plan: Proportion of patients for whom pharmacists have developed and initiated a pharmaceutical care plan	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		35	5	25	5	14	17	4	9	4	12	4	6
Data collected in 2020/21		**24%**	**12%**	**43%**	**11%**	**42%**	**16%**		**33%**	**17%**	**31%**	**11%**	**33%**
Extent of implementing cpKPI 76%-100%	(n=)	(35)	(5)	(25)	(5)	(14)	(17)	(4)	(10)	(4)	(12)	(4)	(5)
		5	1	4	0	2	1	2	2	0	3	0	0
		14%		**16%**		**14%**	**6%**		**20%**		**25%**		
51%-75%		14	2	9	3	5	7	2	1	3	5	3	2
		40%		36%		36%	41%		10%		42%		
26%-50%		6	1	4	1	3	3	0	1	0	3	1	1
		17%		16%		21%	18%		10%		25%		
1%-25%		10	1	8	1	4	6	0	6	1	1	0	2
		29%		32%		29%	35%		60%		8%		
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		71	16	36	19	24	42	5	19	9	23	12	8
		50%	39%	63%	43%	73%	40%		70%	39%	59%	33%	47%

Table B-5 (continued). Use and Extent of Implementation of Clinical Pharmacy Key Performance Indicators (cpKPIs), 2020/21

cpKPI		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Resolved drug therapy problems: Number of drug therapy problems resolved by a pharmacist per admission	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		52	14	31	7	13	34	5	15	14	13	1	9
Data collected in 2020/21		36%	34%	53%	16%	39%	32%		56%	61%	33%	3%	50%
Extent of implementing cpKPI 76%-100%	(n=)	(52)	(14)	(31)	(7)	(13)	(34)	(5)	16	14	13	1	8
		19	6	10	3	4	13	2	5	7	6	0	1
		37%	**43%**	**32%**		**31%**	**38%**		**31%**	**50%**	**46%**	**0%**	13%
51%-75%		15	1	11	3	3	11	1	3	2	6	1	3
		29%	7%	35%		23%	32%		19%	14%	46%	100%	38%
26%-50%		7	3	4	0	2	3	2	1	4	1	0	1
		13%	21%	13%		15%	9%		6%	29%	8%	0%	13%
1%-25%		11	4	6	1	4	7	0	7	1	0	0	3
		21%	29%	19%		31%	21%		44%	7%	0%	0%	38%
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		80	22	39	19	24	51	5	18	17	24	10	11
		56%	54%	68%	43%	73%	49%		67%	74%	62%	28%	65%
Proportion of patients for whom a pharmacist participated in interprofessional patient care rounds to improve medication management	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		41	7	28	6	13	23	5	11	7	13	1	9
Data collected in 2020/21		**29%**	**17%**	**48%**	**14%**	**39%**	**22%**		**41%**	**30%**	**33%**	**3%**	**50%**
Extent of implementing cpKPI 76%-100%	(n=)	(41)	(7)	(28)	(6)	(13)	(23)	(5)	(12)	(7)	(13)	(1)	(8)
		5	1	3	1	0	4	1	1	1	3	0	0
		12%		**11%**		**0%**	**17%**		**8%**		**23%**		
51%-75%		15	3	10	2	5	7	3	2	2	6	0	5
		37%		36%		38%	30%		17%		46%		
26%-50%		9	1	7	1	4	4	1	2	3	3	1	0
		22%		25%		31%	17%		17%		23%		
1%-25%		12	2	8	2	4	8	0	7	1	1	0	3
		29%		29%		31%	35%		58%		8%		
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		64	19	33	12	21	38	5	17	13	23	1	10
		45%	46%	58%	27%	64%	37%		63%	57%	59%	3%	59%
Proportion of patients who received education from a pharmacist about their disease(s) and medication(s) during their hospital stay	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		42	7	28	7	16	21	5	10	11	13	1	7
Data collected in 2020/21		**29%**	**17%**	**48%**	**16%**	**48%**	**20%**		**37%**	**48%**	**33%**	**3%**	**39%**

Table B-5 (continued). Use and Extent of Implementation of Clinical Pharmacy Key Performance Indicators (cpKPIs), 2020/21

cpKPI		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Extent of implementing cpKPI 76%-100%	(n=)	(42)	(7)	(28)	(7)	(16)	(21)	(5)	(11)	(11)	(13)	(1)	(6)
		0	0	0	0	0	0	0	0	0	0	0	0
		0%		**0%**		**0%**	**0%**		**0%**	**0%**	**0%**		
51%-75%		8	2	4	2	1	5	2	0	0	6	0	2
		19%		14%		6%	24%		0%	0%	46%		
26%-50%		10	2	8	0	1	6	3	5	2	2	1	0
		24%		29%		6%	29%		45%	18%	15%		
1%-25%		24	3	16	5	14	10	0	6	9	5	0	4
		57%		57%		88%	48%		55%	82%	38%		
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		73	20	37	16	23	45	5	17	17	23	6	10
		51%	49%	65%	36%	70%	43%		63%	74%	59%	17%	59%
Proportion of patients who received medication education from a pharmacist at discharge	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		40	6	27	7	15	20	5	10	9	13	1	7
Data collected in 2020/21		**28%**	**15%**	**47%**	**16%**	**45%**	**19%**		**37%**	**39%**	**33%**	**3%**	**39%**
Extent of implementing cpKPI 76%-100%	(n=)	(39)	(6)	(26)	(7)	(15)	(19)	(5)	(10)	(9)	(13)	(1)	(6)
		0	0	0	0	0	0	0	0	0	0	0	0
		0%		**0%**		**0%**	**0%**		**0%**		**0%**		
51%-75%		9	2	5	2	1	6	2	0	0	7	0	2
		23%		19%		7%	32%		0%		54%		
26%-50%		10	2	8	0	3	4	3	4	2	3	1	0
		26%		31%		20%	21%		40%		23%		
1%-25%		20	2	13	5	11	9	0	6	7	3	0	4
		51%		50%		73%	47%		60%		23%		
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		72	18	35	19	24	43	5	16	14	26	7	9
		51%	44%	61%	43%	73%	41%		59%	61%	67%	19%	53%
Proportion of patients who received documented medication reconciliation at discharge (as well as resolution of identified discrepancies), performed by a pharmacist	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		67	12	37	18	20	42	5	10	11	25	14	7
Data collected in 2020/21		**47%**	**29%**	**64%**	**41%**	**61%**	**40%**		**37%**	**48%**	**64%**	**39%**	**39%**
Extent of implementing cpKPI 76%-100%	(n=)	(65)	(11)	(36)	(18)	(20)	(40)	(5)	(10)	(11)	(25)	(14)	(5)
		9	2	6	1	2	7	0	0	0	8	0	1
		14%	**18%**	**17%**	**6%**	**10%**	**18%**		**0%**	**0%**	**32%**	**0%**	
51%-75%		10	1	3	6	3	5	2	0	0	3	6	1
		15%	9%	8%	33%	15%	13%		0%	0%	12%	43%	

Table B-5 (continued). Use and Extent of Implementation of Clinical Pharmacy Key Performance Indicators (cpKPIs), 2020/21

cpKPI		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
26%-50%		18	4	9	5	4	12	2	2	1	6	7	2
		28%	36%	25%	28%	20%	30%		20%	9%	24%	50%	
1%-25%		28	4	18	6	11	16	1	8	10	8	1	1
		43%	36%	50%	33%	55%	40%		80%	91%	32%	7%	
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		95	21	41	33	29	61	5	15	16	33	21	10
		67%	51%	72%	75%	88%	59%		56%	70%	85%	58%	59%
Proportion of patients who received comprehensive direct patient care from a pharmacist working in collaboration with the healthcare team	(n=)	(143)	(41)	(58)	(44)	(33)	(105)	(5)	(27)	(23)	(39)	(36)	(18)
		26	6	16	4	6	16	4	6	3	7	2	8
Data collected in 2020/21		**18%**	**15%**	**28%**	**9%**	**18%**	**15%**		**22%**	**13%**	**18%**	**6%**	**44%**
Extent of implementing cpKPI 76%-100%	(n=)	(26)	(6)	(16)	(4)	(6)	(16)	(4)	(7)	(3)	(7)	(2)	(7)
		0	0	0	0	0	0	0	0	0	0	0	0
		0%		**0%**			**0%**						
51%-75%		9	1	6	2	1	5	3	2	1	3	2	1
		35%		38%			31%						
26%-50%		5	3	2	0	0	4	1	2	1	1	0	1
		19%		13%			25%						
1%-25%		12	2	8	2	5	7	0	3	1	3	0	5
		46%		50%			44%						
Plans to collect data for this cpKPI in the 2021/22 fiscal year or sometime thereafter	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		56	11	29	16	19	33	4	13	4	20	8	11
		39%	27%	51%	36%	58%	32%		48%	17%	51%	22%	65%

Base: Respondents, n = 143
Base for extent of implementation: facilities with data collection
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Evaluation of Clinical Pharmacy Services

The 2020/21 survey was the third to investigate evaluation of clinical pharmacy services, making it possible to begin identifying trends over time. The 2013/14 survey was the first to ask questions about evaluation, so we are approaching 10 years of information on evaluation practices across Canada. The development of cpKPIs continues to be important for the profession of hospital pharmacy, as these indicators are specific, measurable, achievable and relevant. As such, they have been pivotal to the advancement of clinical pharmacy practice across Canada.

In the 2013/14 survey, only 27% (44/161) of respondents provided input to this section. In the 2016/17 survey, the response rate increased to 97% (179/184), and in the 2020/21 survey, 100% (142/142) of respondents answered questions in this section to some extent

Mandatory evaluation of pharmacists and regulated pharmacy technicians will further influence the types and predominance of clinical pharmacy activities

We are seeing some very positive trends. Of significance is that 57% (81/142) of respondents indicated that their province or territory had legislation requiring the evaluation of pharmacists (Table B-6). As this requirement expands to more provinces and territories, the following positive trends can be expected to increase:

- More than three-quarters of respondents (77%, 109/142) to the 2020/21 survey reported having a structured approach to define and prioritize the specific activities on which pharmacists were expected to focus their efforts, whereas this proportion was only 63% (115/182) for 2016/17 and 50% (81/161) for 2013/14. The greatest increases were seen for facilities with more than 200 beds. In 2020/21, 79% (45/57) of respondents with 201-500 beds and 89% (39/44) of respondents with more than 500 beds had a structured approach, compared with 62% (50/81) and 65% (34/52), respectively, in 2016/17. BC/YT saw the greatest improvement since the previous survey, from 77% (23/30) in 2016/17 to 96% (26/27) in 2020/21.
- An improvement from the 2016/17 survey was observed for the evaluation of provision of direct patient care pharmacy services. In the 2016/17 survey, 36% (66/182) of respondents reported that they were evaluating the provision of direct patient care. In the 2020/21 survey, this proportion increased to 46% (66/142). Again, BC/YT was a leading region, with 78% (21/27) of respondents reporting the evaluation of this aspect of pharmacy services, compared with 41% (12/29) in 2016/17.
- In terms of methods used for evaluating the provision of direct patient care, there was a trend away from self-evaluation by individual pharmacists, from 76% (50/66) in 2016/17 to 61% (40/66) in 2020/21. Instead, peer-review evaluation has been increasing steadily, from just 27% (12/44) in 2013/14 to 38% (25/66) in 2016/17 and then to 50% (33/66) in 2020/21.
- Knowledge and competence testing increased from 8% (5/66) in 2016/17 to 20% (13/66) in 2020/21.

Improvement is still needed in the following key areas of clinical practice evaluation:

- There was a decrease in evaluating the conformity of documentation with clinical practice, from 90% (55/61) in 2016/17 to 77% (51/66) in 2020/21. Expansion of the use of EHRs and associated standardization of documentation may make this method of evaluation irrelevant, but survey results cannot be used to validate this assumption. The other aspects of clinical practice evaluation (i.e., development of an individualized pharmaceutical care plan, including its monitoring; medication counselling and evaluation of adherence; and answers to drug information questions) remain relatively unchanged from the 2016/17 survey.
- The use of established mechanisms to measure patients' medication-related outcomes continues to lag. In 2016/17, only 14% (26/181) of respondents had established mechanisms for this purpose, and in 2020/21 the proportion had increased only slightly, to 18% (25/142). BC/YT and the Prairies (SK/MB) both had moderate increases, from 0% (0/28) and 5% (2/37), respectively, in 2016/17 to 11% (3/27) and 22% (5/23), respectively, in 2020/21. Conversely, QC saw a drop from 12% (5/43) in 2016/17 to 6% (2/36) in 2020/21.
- Only 16% (4/25) of respondents reported evaluating pharmacists' performance using the established mechanisms for measuring patients' medication-related outcomes.

Table B-6. Evaluation of Clinical Pharmacy Services, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
A structured approach has been used to define and prioritize the specific activities upon which pharmacists are expected to focus their efforts (e.g., pharmacy practice expectations)	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		109	25	45	39	31	74	4	26	18	27	27	11
		77%	**61%**	**79%**	**89%**	**94%**	**71%**		**96%**	**78%**	**69%**	**75%**	**65%**
Other clinical pharmacy performance indicators (not cpKPIs) are being collected in your department	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		53	11	23	19	16	32	5	6	10	15	19	3
		37%	**27%**	**40%**	**43%**	**48%**	**31%**		**22%**	**43%**	**38%**	**53%**	**18%**
The provision of direct patient care pharmacy services is being evaluated	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		66	13	34	19	18	44	4	21	7	23	11	4
		46%	**32%**	**60%**	**43%**	**55%**	**42%**		**78%**	**30%**	**59%**	**31%**	**24%**
Base: All respondents, n = 142													
Methods used for evaluating the provision of direct patient care pharmacy services	(n=)	(66)	(13)	(34)	(19)	(18)	(44)	(4)	(21)	(7)	(23)	(11)	(4)
Self-evaluation by pharmacist		40	10	20	10	12	26	2	14	6	17	2	1
		61%	**77%**	**59%**	**53%**	**67%**	**59%**		**67%**		**74%**	**18%**	
Retrospective chart review		41	5	23	13	10	28	3	12	3	14	9	3
		62%	**38%**	**68%**	**68%**	**56%**	**64%**		**57%**		**61%**	**82%**	
Direct observation		33	8	18	7	10	21	2	9	6	17	0	1
		50%	**62%**	**53%**	**37%**	**56%**	**48%**		**43%**		**74%**	**0%**	
Peer-review evaluation		33	3	20	10	10	20	3	7	3	10	10	3
		50%	**23%**	**59%**	**53%**	**56%**	**45%**		**33%**		**43%**	**91%**	
Other		14	3	5	6	2	11	1	5	2	4	2	1
		21%	**23%**	**15%**	**32%**	**11%**	**25%**		**24%**		**17%**	**18%**	
Knowledge and competence testing		13	2	5	6	5	7	1	0	5	6	2	0
		20%	**15%**	**15%**	**32%**	**28%**	**16%**		**0%**		**26%**	**18%**	
Base: Facilities where the provision of direct patient care pharmacy services is being evaluated, n = 66 Note: Multiple methods permitted													
Aspects of clinical practice evaluated:	(n=)	(66)	(13)	(34)	(19)	(18)	(44)	(4)	(21)	(7)	(23)	(11)	(4)
Conformity of documentation with clinical practice		51	7	29	15	17	30	4	14	5	19	9	4
		36%	**54%**	**85%**	**79%**	**94%**	**68%**		**67%**		**83%**	**82%**	
Development of an individualized pharmaceutical care plan, including its monitoring		43	9	22	12	13	26	4	15	6	16	5	1
		65%	**69%**	**65%**	**63%**	**72%**	**59%**		**71%**		**70%**	**45%**	
Medication counselling and evaluation of adherence		16	4	8	4	5	9	2	5	2	9	0	0
		24%	**31%**	**24%**	**21%**	**28%**	**20%**		**24%**		**39%**	**0%**	
Answers to drug information questions		13	5	4	4	1	11	1	3	1	6	2	1
		20%	**38%**	**12%**	**21%**	**6%**	**25%**		**14%**		**26%**	**18%**	
Base: Facilities where these aspects of clinical practice are being evaluated, n = 66 Note: Multiple options permitted													

Table B-6 (continued). Evaluation of Clinical Pharmacy Services, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Mechanisms have been established to measure patients' medication-related outcomes	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		25	7	13	5	8	15	2	3	5	14	2	1
		18%	**17%**	**23%**	**11%**	**24%**	**14%**		**11%**	**22%**	**36%**	**6%**	**6%**
Base: All respondents, n = 142													
Those outcomes are used to evaluate the performance of pharmacists	(n=)	(25)	(7)	(13)	(5)	(8)	(15)	(2)	(3)	(5)	(14)	(2)	(1)
		4	0	3	1	2	2	0	0	0	4	0	0
Proportion of pharmacists evaluated using patients' medication-related outcomes in the 2020/21 fiscal year	(n=)	(4)	(0)	(3)	(1)	(2)	(2)	(0)	(0)	(0)	(4)	(0)	(0)
All pharmacists (100%)		0	0	0	0	0	0	0	0	0	0	0	0
Most pharmacists (50%-99%)		1	0	1	0	0	1	0	0	0	1	0	0
Some pharmacists (1%-49%)		3	0	2	1	2	1	0	0	0	3	0	0
None (0%)		0	0	0	0	0	0	0	0	0	0	0	0
Does your province or territory have legislation requiring the evaluation of pharmacists?	(n=)	(142)	(41)	(57)	(44)	(33)	(104)	(5)	(27)	(23)	(39)	(36)	(17)
		81	16	34	31	15	64	2	21	2	34	21	3
		57%	**39%**	**60%**	**70%**	**45%**	**62%**		**78%**	**9%**	**87%**	**58%**	**18%**
Base: Facilities with mechanisms to measure patients' medication-relatedoutcomes, n = 25 Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.													

Conclusions

- Hospital pharmacy practice is more challenging and also more demanding than ever.
- There is a widespread presence of pharmacists in outpatient and inpatient programs across the country. Although this coverage is extensive, it remains heterogeneous, and the profession must continue to ensure sufficient staffing so that all patients benefit from the same standards of care.
- With respect to pharmacy practice models, each pharmacy department relies on the contributions of pharmacists who may not all be working within the same practice model. The data show an increase in the time that pharmacists spend at patients' bedsides and a reduction in time spent on drug distributive activities.
- The extent of clinical care provided by hospital pharmacists continues to grow, according to the list of 23 activities surveyed. In addition, increases in provincial and territorial legislation affecting pharmacists and in mandatory evaluation of pharmacists and regulated pharmacy technicians will further influence the types and relative predominance of clinical pharmacy activities. Dependence on national standards (e.g., those of NAPRA) will ideally lead to more standardization across Canada.
- cpKPIs continue to be integrated into clinical pharmacy practice. However, with the increasing challenges of unpredictable events such as the COVID-19 pandemic and the increased emphasis of Accreditation Canada ROPs on medication management, their impact on performance expectations of pharmacists seems to have diminished.
- The evaluation of clinical pharmacist practice continues to progress, although additional investments are needed to ensure delivery of quality care and protection of the public.

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C - Drug Distribution Systems

Allan Mills

Drug distribution systems have formed the core of pharmacy departments for many years and are key components of any modern healthcare institution.[1] Over time, distribution systems have become more sophisticated, evolving to enhance patient safety, create efficiencies and improve patient outcomes.[2] Distribution practices continue to evolve with the introduction of new standards,[3] the adoption and implementation of new technologies[4] and the integration of regulated pharmacy technicians into patient care teams in many jurisdictions.[5] The goal of this progression has been to create a system that delivers medications in a safe, accountable and cost-effective manner. Pharmacy oversight on drug procurement, storage, compounding, packaging, labelling and dispensing is recognized as a critical element of safe and effective care, to the extent that it is enshrined in regulations and standards.[6]

Unit-dose systems were first designed and studied in the 1970s, and research conducted at that time clearly demonstrated a significant reduction in medication errors with such systems.[7] More specifically, reductions were observed in errors of commission, including giving the wrong dose, giving the wrong medication or giving a medication that had not been ordered, as well as in errors of omission, such as doses not being given at all.[8] Collectively, the profession of pharmacy has determined that utilization of unit-dose systems is a standard practice. For example, the Institute for Safe Medication Practices (ISMP) has clearly stated that unit-dose systems represent a key element of safe medication distribution and has indicated that bulk multi-dose items should be converted, whenever possible, to an alternative unit-dose form.[9,10] Similarly, Accreditation Canada has specified as a high-priority standard the dispensing of medications in unit-dose packaging whenever possible (as per medication management standard 9.1.2 of the Health Standards Organization).[11]

The use of automated dispensing cabinets (ADCs) to improve medication safety has been a long-standing point of discussion.[12,13] Early studies investigating the ability of ADCs to enhance patient safety outcomes were criticized for their design,[8] and a subsequent CADTH (Canadian Agency for Drugs and Technologies in Health) rapid response report[14] suggested that automated dispensing improved inventory management and decreased nursing time required to manage narcotics and controlled drugs. However, the same literature review noted a lack of evidence that this form of automation improves the safety of medication use or medication appropriateness.[14] Other sources have suggested that ADCs could improve safety outcomes when used in an environment that adheres to specific procedures such as profiling cabinets, retrieving medications for one patient at a time, avoiding multi-dose containers and using single-product drawers.[15,16] Hyland and others[15] noted risks associated with the use of ADCs when safety procedures are not followed. For example, in 2019, ISMP[17] called out the use of overrides and non-profiled cabinets as particularly increasing the risk of error. Evidence also suggests that permitting behaviours such as overrides when using ADCs can create medication errors.[18] In its guidelines on ADC use, the American Society of Health-System Pharmacists (ASHP) indicates that ADC technology "is used to improve patient care, enhance the efficiency and accuracy of medication dispensing in the medication-use system, support medication storage and security, and provide evaluation of ADC-user interactions."[19] These guidelines carefully outline the ways in which ADCs can enhance patient care if appropriately implemented and applied.

The compounding of medications, to create medication formats not available through manufacturers, is a core function of pharmacy departments.[20] It is recognized that poor compounding practices can lead to serious medication quality problems that could in turn cause serious harm to patients.[21] Numerous serious incidents, including an experience of widespread chemotherapy under-dosing, spurred a review of compounding practices in Canadian organizations and the adoption and updating of national compounding standards.[22] Québec (QC), through the Ordre des pharmaciens du Québec (OPQ), was the first jurisdiction to implement standards for sterile[23,24] and non-sterile[25] compounding, and these standards informed the creation of a new set of National Association of Pharmacy Regulatory Authorities (NAPRA) sterile and non-sterile compounding standards. These standards outline appropriate methods for compounding hazardous sterile products,[26] non-hazardous sterile products[3] and non-sterile products.[27] Sterile compounding is

recognized as a high-risk activity requiring as much mitigation of risk as possible, and indeed such risk mitigation was the rationale for creating the NAPRA standards.[3,26,27] At the time of the 2020/21 survey, these standards had not yet been adopted by the provincial regulatory bodies in British Columbia (BC) and Prince Edward Island (PE), although BC had plans to adopt them earlier (which were deferred to July 2022 because of the COVID-19 pandemic). Even early in the adoption process for other jurisdictions, it was recognized that implementation of these standards would require significant change-management strategies, which in turn would necessitate substantial capital investment and procedural changes.[28]

The utilization of closed-system transfer devices (CSTDs) has been considered for the sterile production of hazardous medications as a means to reduce exposure of hospital staff and patients to hazardous materials and to decrease drug wastage. In their Cochrane review, Gurusamy and others[29] noted the lack of adequate study data to conclude whether CSTDs, when combined with safe drug-handling practices, provided any added protection for staff. Others, however, have reported that the use of CSTDs can reduce surface contamination[30] and that these devices can maintain the sterility of partly used vials.[31] The possibility of extending the use of part vials of hazardous drugs while protecting staff and patients from hazardous drug exposure has prompted some pharmacy departments to evaluate the use of these devices.[32] It has been shown that CSTDs are commonly considered for application in oncology practice but that challenges, such as a lack of information about their compatibility with oncology medications and the high cost of these devices, have influenced their adoption.[33]

In his report on oncology under-dosing, Thiessen[22] noted that the organizations involved had great difficulty identifying the individual patients affected because of poor traceability. In the pharmacy context, traceability is the ability to track the stages of the medication supply chain up to and including administration to the patient.[34] As a standard of practice, it has been an area of focus with benefits for the public, including the ability to recall medications safely and effectively and the ability to quantify exposure and harm.[35] As organizations implement barcoding and electronic health records, tracking medication distribution becomes far more effective through reduced dependence on manual processes and labour inputs, with overall benefits for patient safety.[36]

Over time, the CSHP Hospital Pharmacy in Canada Survey has documented the collective adjustments that Canadian organizations have made in terms of enhancing systems to reduce risk. This 2020/21 report looks at the rates of utilization of different types of drug distribution systems, approaches to order entry and verification, availability of pharmacy staff, compounding approaches, storage and handling of medications, traceability of medications and drug purchasing practices. With such a broad approach, this report now covers more areas of drug distribution practice than did past reports in the series, as well as tracking the transition of systems over time.

The province of Alberta's single health authority was unable to participate in the 2020/21 survey because the provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region are limited to Saskatchewan (SK) and Manitoba (MB). In addition, for trending purposes over the long term, regional data for BC and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon during this iteration of the survey.

Inpatient Drug Distribution Systems

Historically, the Hospital Pharmacy in Canada Report has documented the transition from traditional dispensing systems to unit-dose systems. The 2020/21 survey showed stabilization in the types of drug distribution systems utilized in respondent organizations, with unit-dose systems remaining the most prevalent. This suggests that Canadian organizations have continued to administer drugs in ready-to-use unit-dose packaging, which has been noted to reduce medication errors and improve patient safety.[8]

Table C-1 highlights that 77% (110/142) of respondents nationwide reported the use of centralized unit-dose systems, whereby unit-dose medications are dispensed from a central pharmacy. This result is similar to what was reported for 2016/17 and could represent a plateau in adoption of this type of system. This trend will be interesting to watch in future surveys.

Table C-1. Drug Distribution Systems for Acute Care Beds, 2020/21

Drug distribution system (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Unit-dose system: centralized (CUD)	(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
	Yes	110	22	47	41	24	82	4	19	13	29	36	13
		77%	**55%**	**81%**	**93%**	**75%**	**78%**		**70%**	**57%**	**74%**	**100%**	**76%**
	Average	**70.6**	**62.8**	**71.1**	**74.2**	**71.2**	**71.5**	**48.0**	**53.2**	**56.5**	**67.8**	**87.3**	**70.2**
	SD	30.8	36.6	30.1	28.2	28.3	31.2	35.8	29.8	34.6	34.4	15.4	33.0
Unit-dose system: decentralized from pharmacy satellites (DUD)	Yes	12	2	6	4	5	5	2	2	3	3	3	1
		8%	**5%**	**10%**	**9%**	**16%**	**5%**		**7%**	**13%**	**8%**	**8%**	**6%**
	Average	**14.8**	**12.5**	**16.5**	**13.3**	**13.4**	**15.0**	**17.5**	**35.0**	**17.3**	**8.3**	**8.4**	**5.0**
	SD	11.6	10.6	15.4	7.0	6.1	15.8	17.7	7.1	3.1	2.9	10.3	
Unit-dose system: decentralized from automated dispensing cabinets (UDADC)	Yes	88	26	34	28	24	61	3	17	16	25	17	13
		62%	**65%**	**59%**	**64%**	**75%**	**58%**		**63%**	**70%**	**64%**	**47%**	**76%**
	Average	**55.9**	**76.1**	**52.1**	**41.7**	**47.7**	**58.2**	**73.3**	**73.6**	**64.5**	**61.2**	**20.0**	**58.6**
	SD	36.1	33.4	37.0	29.6	34.5	36.9	25.2	28.9	35.3	37.1	10.6	37.8
Traditional drug distribution system – acute care	Yes	30	8	15	7	7	22	1	14	5	8	2	1
		21%	**20%**	**26%**	**16%**	**22%**	**21%**		**52%**	**22%**	**21%**	**6%**	**6%**
	Average	**30.7**	**54.4**	**27.2**	**11.0**	**31.4**	**31.8**	**1.0**	**16.4**	**80.8**	**31.4**	**12.5**	**10.0**
	SD	34.2	49.3	26.0	4.5	23.2	37.7		15.9	42.9	31.2	3.5	
Total wardstock system	Yes	25	7	12	6	4	20	1	8	4	7	5	1
		18%	**18%**	**21%**	**14%**	**13%**	**19%**		**30%**	**17%**	**18%**	**14%**	**6%**
	Average	**15.0**	**23.4**	**13.6**	**7.8**	**12.5**	**14.1**	**42.0**	**16.5**	**19.3**	**15.3**	**10.0**	**8.0**
	SD	13.8	21.1	8.7	6.5	11.9	13.3		10.5	27.4	13.6	6.1	
Controlled/carded dose system	Yes	8	2	3	3	1	6	1	1	0	2	4	1
		6%	**5%**	**5%**	**7%**	**3%**	**6%**		**4%**	**0%**	**5%**	**11%**	**6%**
	Average	**5.6**	**7.5**	**5.7**	**4.3**	**10.0**	**4.2**	**10.0**	**5.0**		**10.0**	**4.5**	**2.0**
	SD	2.9	3.5	4.0	1.2		1.3				0.0	1.0	

Base: All respondents, n = 142
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons
Average = average percentage of beds serviced by this drug distribution system

QC continued to lead the nation in utilization of the centralized unit-dose distribution model, with 100% of respondents (36/36) indicating that 87.3% of beds (on average) were serviced by this model. As for the national result highlighted above, the regional results are consistent with those reported for 2016/17, suggesting there has been little change in implementation over the past four years.

Québec hospitals led the nation, with 100% of respondents reporting the use of centralized unit-dose distribution.

The use of decentralized unit-dose systems, whereby unit-dose medications are provided from ADCs located in patient care areas that service overnight beds (i.e., not including the Emergency Department [ED], operating rooms and other outpatient locations), was reported by 62% (88/142) of respondents. As in previous surveys, the Atlantic region (New Brunswick, Nova Scotia [NS], PE, and Newfoundland and Labrador) led the way in use of this system (76%, 13/17), followed by the Prairies (SK/MB) (70%, 16/23), Ontario (ON) (64%, 25/39) and BC/YT (63%, 17/27). Among respondents from the Prairies, use of this system was higher than in 2016/17, but without data from Alberta it is difficult to know if this represented a substantial change in practice for 2020/21. The 2020 ASHP survey demonstrated greater utilization of ADCs in US hospitals, with 75% of organizations using a decentralized system in which medications were distributed primarily through ADCs.[37] Data from the 2020/21 CSHP Hospital Pharmacy in Canada Survey indicated an average 55.9% of Canadian beds were serviced through this model, whereas the US data suggest higher adoption of this technology over a more prolonged period.

Decentralized unit-dose systems, which involve dispensing of unit-dose medications from a satellite pharmacy, were reported by 8% (12/142) of respondents (Table C-1), down slightly from the 2016/17 survey (15%, 28/181) and similar to the 2013/14 survey (8%, 12/157). The average percentage of beds serviced using this system in 2020/21 was also relatively low, at 14.8%, which suggests that this system has limited scope within those hospitals that do use it.

Previous survey results have revealed decreasing use of traditional systems (i.e., drug distribution systems in which most medications are labelled and dispensed in multi-dose formats) and total wardstock systems (i.e., drug distribution systems in which most medications are stocked on patient care units in bulk containers) in favour of centralized and decentralized unit-dose systems. In 2020/21, these older distribution systems continued to be used at similar rates (21% [30/142] and 18% [25/142], respectively) to those in 2016/17 (19% [34/181] and 18% [32/181], respectively).

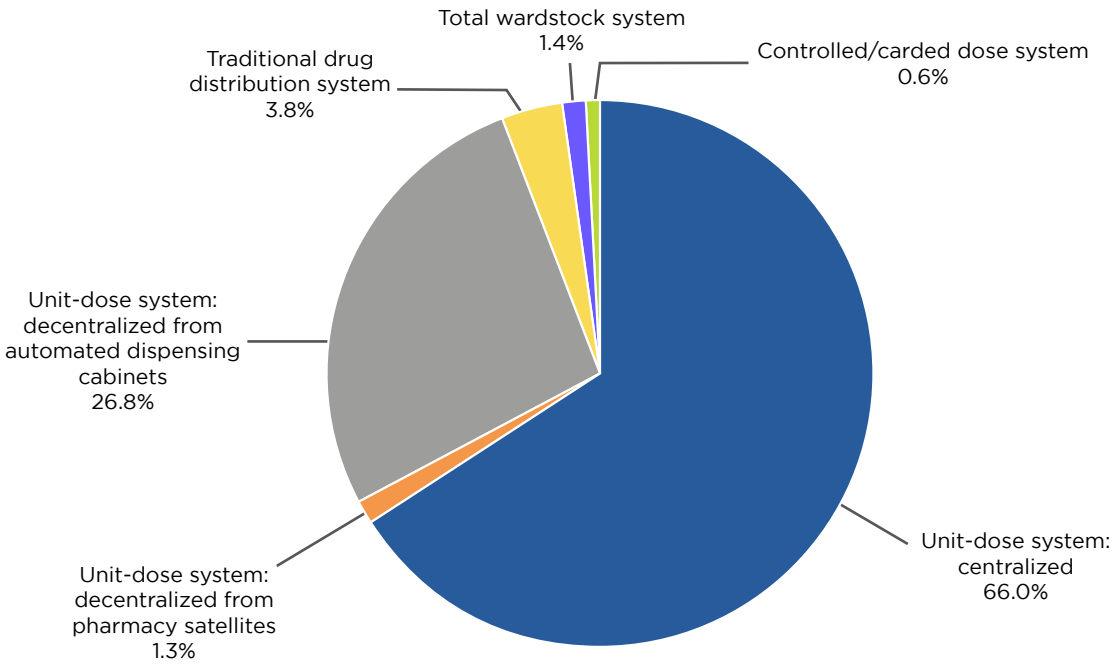
The near-universal adoption of automated distribution in QC can be traced to a program of the province's Department of Health and Social Services, known as Systèmes Automatisés et Robotisés de la Distribution des Médicaments, which aimed to increase the adoption of automated and robotic technologies to improve patient care.[38] This initiative was facilitated by the provincial ministry's mandate to encourage adoption of best practices through financial support. The success of this model in QC indicates that other provinces could also adopt this approach if financial barriers were removed.

In 2020/21, the system used most often to distribute medications for acute care beds was also the system most often used for non-acute care beds (Figure C-1). More specifically, 66.0% (46,181/69,969) of Canadian acute care beds included in this survey and 85.4% (23,597/27,620) of non-acute care beds were noted to use a centralized unit-dose distribution system, making it the most prevalent system in Canadian facilities. Decentralized unit-dose distribution using ADCs was the next most common method of supplying acute care beds (26.8%, 18,785/69,969) and non-acute care beds (7.8%, 2,143/27,620), with traditional, wardstock and carded systems being used for far fewer beds, according to respondents.

Centralized unit-dose distribution was the most commonly used distribution system for both acute and non-acute care beds.

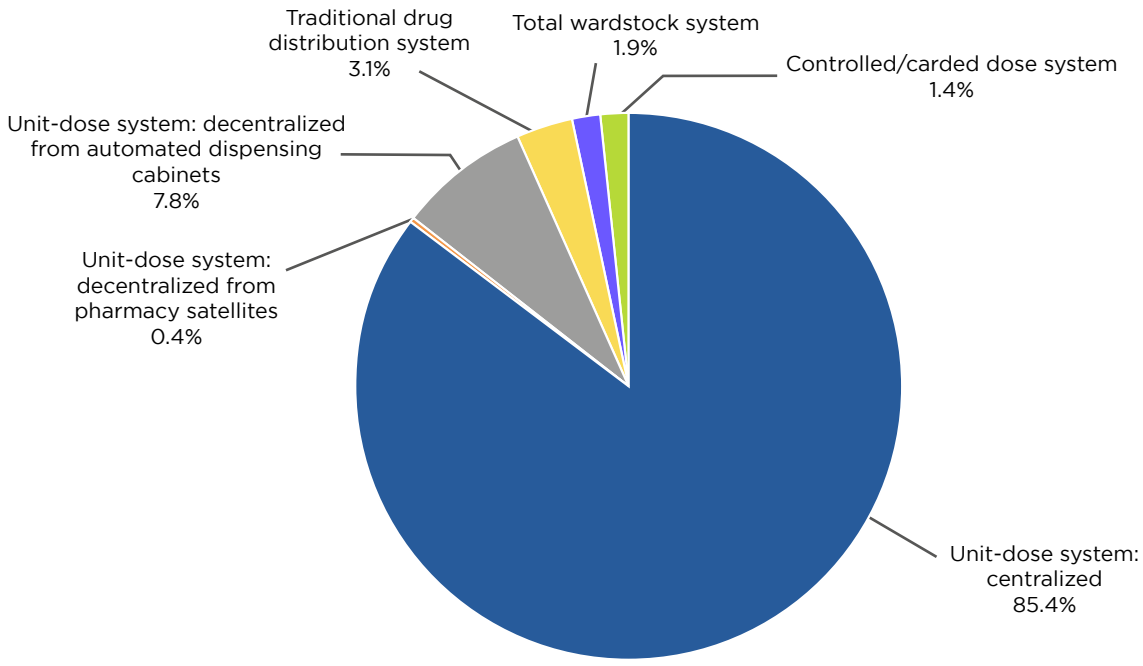
Figure C-1. Drug Distribution Systems Used to Provide Medications, by Percentage of Canadian Beds Serviced, 2020/21

Acute Care Beds



n = 69,969 acute care beds

Non-acute Care Beds



n = 27,620 non-acute care beds

Robotic Automation to Support the Drug Distribution Model

The use of pharmacy robotic automation (any automated system [e.g., ROBOT-Rx central pharmacy robotic system, Omnicell; PillPick automated packaging and dispensing system, Swisslog Healthcare; BoxPicker automated storage and retrieval system, Swisslog Healthcare]) in which a robotic arm selects the correct drug from racks holding pre-packaged unit-dose medications) has in previous surveys been relatively stable: 12% (22/183) in 2016/17, 12% (19/161) in 2013/14 and 13% (22/169) in 2011/12. In 2020/21, the proportion of respondents reporting use of this technology was higher (20%, 28/142), as was the number of facilities (n = 28) (Table C-2). Data from the United States (US) appear to suggest a much lower rate of utilization, with 3% of respondents in the 2013 ASHP survey[39] and 4% of those in the 2020 survey[37] indicating use of these systems. On a regional basis, the highest level of utilization continued to be reported by ON (44%, 17/39), followed by QC (17%, 6/36) and then BC/YT (15%, 4/27). Although reported utilization in most regions was similar to that in previous surveys, ON was the exception, with an increase from 21% (11/52) in 2016/17 to 44% (17/39) in 2020/21. This increase may have been influenced by several factors, including new hospital builds and a reduction in the number of respondents (from 52 to 39), given that the absolute number of respondents reporting use of this technology increased by only 6 (from 11 to 17) between 2016/17 and 2020/21.

Ontario hospitals had the highest rate of adoption of robotic automation.

Table C-2. Robotic Automation to Fill Patient-Specific Medications, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
Yes	28	3	10	15	10	18	0	4	1	17	6	0
	20%	**8%**	**17%**	**34%**	**31%**	**17%**		**15%**	**4%**	**44%**	**17%**	**0%**
No	114	37	48	29	22	87	5	23	22	22	30	17
	80%	93%	83%	66%	69%	83%		85%	96%	56%	83%	100%

Base: n = 142 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

As in the 2016/17 survey, robotic automation was reported more often by teaching hospitals (31%, 10/32) than pediatric hospitals (0/5) or non-teaching hospitals (17%, 18/105). In terms of hospital size, robotic systems were reported more often by facilities with more than 500 beds (34%, 15/44) than by facilities with 201-500 beds (17%, 10/58) or 50-200 beds (8%, 3/40).

Automated Dispensing Cabinets

The use of ADCs in any location within the hospital, either as part of a unit-dose dispensing system or as a method of controlling access to certain medications (such as narcotic medications in operating rooms), was reported by 89% (126/142) of respondents (Table C-3). This continues the previously established trend of increased utilization, from 71% (114/161) of respondents in 2013/14 to 80% (147/184) in 2016/17.

The use of automated dispensing cabinets has increased to 89% of respondents, compared with 71% in 2013/14 and 80% in 2016/17.

Table C-3. Automated Dispensing Cabinet Use, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
Yes	126	32	53	41	31	90	5	20	18	37	35	16
	89%	**80%**	**91%**	**93%**	**97%**	**86%**		**74%**	**78%**	**95%**	**97%**	**94%**
No	16	8	5	3	1	15	0	7	5	2	1	1
	11%	20%	9%	7%	3%	14%		26%	22%	5%	3%	6%

Base: n = 142 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

An increase in the use of ADCs has been occurring at the same time as substantial consolidation within the ADC market, with two providers now dominating the Canadian market. On a regional basis, the use of ADCs was most commonly reported in QC (97%, 35/36), ON (95%, 37/39) and the Atlantic region (94%, 16/17). Teaching hospitals (97%, 31/32) and pediatric hospitals (5/5) were more likely to have ADCs than non-teaching hospitals (86%, 90/105). As also shown in Table C-3, facilities with more than 500 beds (93%, 41/44) and those with 201-550 beds (91%, 53/58) reported ADC use more often than facilities with 50-200 beds (80%, 32/40). All of these rates are higher than in previous reports.

The reported locations of ADC use and the total percentage of beds supported by these devices are summarized in Table C-4. For the fifth consecutive survey, the ED was the most common location for ADCs, reported by all (123/123) respondents whose facilities had an ED. These rates for ED use are slightly higher than in previous reports in this series. Adult critical care units remained the second most common location for ADCs, reported by 94% (103/109) of respondents, trending higher than in 2016/17 (87%, 128/147). The third most common location was general adult medical/surgical units, reported by 91% (105/115) of facilities that had this type of unit, which continues an increasing trend seen over the last three surveys. Table C-4 also shows that respondents' organizations may not use ADCs in every individual unit within a category of units where ADCs are deployed. For example, facilities that reported having ADCs for general adult medical/surgical units did not have these devices in 100% of units of this type; rather, 8% (9/115) of respondents had ADC coverage for 76%-99% of their general adult medical/surgical units.

Table C-4. Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
General adult medical/ surgical unit	(n=)	(126)	(32)	(53)	(41)	(31)	(90)	(5)	(20)	(18)	(37)	(35)	(16)
	n/a	11	3	7	1	2	5	4	1	2	5	2	1
		9%	**9%**	**13%**	**2%**	**6%**	**6%**		**5%**	**11%**	**14%**	**6%**	**6%**
	0%	10	3	5	2	2	8	0	2	1	0	5	2
		9%	10%	11%	5%	7%	9%		11%	6%	0%	15%	13%
	1%-25%	2	1	0	1	0	2	0	0	1	1	0	0
		2%	3%	0%	3%	0%	2%		0%	6%	3%	0%	0%
	26%-50%	7	0	3	4	3	4	0	1	0	2	3	1
		6%	0%	7%	10%	10%	5%		5%	0%	6%	9%	7%
	51%-75%	3	1	2	0	2	1	0	0	2	0	0	1
		3%	3%	4%	0%	7%	1%		0%	13%	0%	0%	7%
	76%-99%	9	2	0	7	4	5	0	0	2	2	5	0
		8%	7%	0%	18%	14%	6%		0%	13%	6%	15%	0%
	100%	84	22	36	26	18	65	1	16	10	27	20	11
		72%	**76%**	**78%**	**65%**	**62%**	**76%**		**84%**	**63%**	**84%**	**61%**	**73%**
	% Using	105	26	41	38	27	77	1	17	15	32	28	13
		91%	**90%**	**89%**	**95%**	**93%**	**91%**		**89%**	**94%**	**100%**	**85%**	**87%**
Adult critical care unit	**n/a**	17	8	9	0	3	10	4	2	7	6	1	1
		13%	**25%**	**17%**	**0%**	**10%**	**11%**		**10%**	**39%**	**16%**	**3%**	**6%**
	0%	6	3	2	1	2	4	0	1	2	0	3	0
		6%	13%	5%	2%	7%	5%		6%	18%	0%	9%	0%
	1%-25%	1	1	0	0	0	1	0	0	1	0	0	0
		1%	4%	0%	0%	0%	1%		0%	9%	0%	0%	0%
	26%-50%	4	0	2	2	1	3	0	0	0	2	2	0
		4%	0%	5%	5%	4%	4%		0%	0%	6%	6%	0%

Table C-4 (continued). Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Adult critical care unit (continued)	51%-75%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%
	76%-99%	2	1	0	1	0	2	0	0	1	1	0	0
		2%	4%	0%	2%	0%	3%		0%	9%	3%	0%	0%
	100%	96	19	40	37	25	70	1	17	7	28	29	15
		88%	**79%**	**91%**	**90%**	**89%**	**88%**		**94%**	**64%**	**90%**	**85%**	**100%**
	% Using	103	21	42	40	26	76	1	17	9	31	31	15
		94%	**88%**	**95%**	**98%**	**93%**	**95%**		**94%**	**82%**	**100%**	**91%**	**100%**
Operating room	n/a	11	3	6	2	2	9	0	0	3	2	5	1
		9%	**9%**	**11%**	**5%**	**6%**	**10%**		**0%**	**17%**	**5%**	**14%**	**6%**
	0%	53	14	18	21	14	39	0	1	8	8	25	11
		46%	48%	38%	54%	48%	48%		5%	53%	23%	83%	73%
	1%-25%	4	0	2	2	2	2	0	2	1	1	0	0
		3%	0%	4%	5%	7%	2%		10%	7%	3%	0%	0%
	26%-50%	5	0	3	2	1	4	0	2	0	1	2	0
		4%	0%	6%	5%	3%	5%		10%	0%	3%	7%	0%
	51%-75%	4	2	0	2	2	2	0	1	0	1	1	1
		3%	7%	0%	5%	7%	2%		5%	0%	3%	3%	7%
	76%-99%	5	0	3	2	1	3	1	2	0	2	0	1
		4%	0%	6%	5%	3%	4%		10%	0%	6%	0%	7%
	100%	44	13	21	10	9	31	4	12	6	22	2	2
		38%	**45%**	**45%**	**26%**	**31%**	**38%**		**60%**	**40%**	**63%**	**7%**	**13%**
	% Using	62	15	29	18	15	42	5	19	7	27	5	4
		54%	**52%**	**62%**	**46%**	**52%**	**52%**		**95%**	**47%**	**77%**	**17%**	**27%**
Recovery room	n/a	11	3	6	2	1	10	0	0	2	4	5	0
		9%	**9%**	**11%**	**5%**	**3%**	**11%**		**0%**	**11%**	**11%**	**14%**	**0%**

Table C-4 (continued). Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
	0%	33	10	12	11	6	27	0	2	7	3	18	3
		29%	34%	26%	28%	20%	34%		10%	44%	9%	60%	19%
	1%-25%	3	0	1	2	2	1	0	0	0	1	2	0
		3%	0%	2%	5%	7%	1%		0%	0%	3%	7%	0%
	26%-50%	1	0	0	1	1	0	0	0	0	1	0	0
		1%	0%	0%	3%	3%	0%		0%	0%	3%	0%	0%
	51%-75%	4	0	1	3	1	3	0	0	0	0	3	1
		3%	0%	2%	8%	3%	4%		0%	0%	0%	10%	6%
	76%-99%	5	1	2	2	1	3	1	1	1	3	0	0
		4%	3%	4%	5%	3%	4%		5%	6%	9%	0%	0%
	100%	69	18	31	20	19	46	4	17	8	25	7	12
		60%	**62%**	**66%**	**51%**	**63%**	**58%**		**85%**	**50%**	**76%**	**23%**	**75%**
	% Using	82	19	35	28	24	53	5	18	9	30	12	13
		71%	**66%**	**74%**	**72%**	**80%**	**66%**		**90%**	**56%**	**91%**	**40%**	**81%**
Labour and delivery unit	n/a	25	8	13	4	10	14	1	2	8	6	7	2
		20%	**25%**	**25%**	**10%**	**32%**	**16%**		**10%**	**44%**	**16%**	**20%**	**13%**
	0%	28	6	10	12	5	23	0	2	3	4	14	5
		28%	25%	25%	32%	24%	30%		11%	30%	13%	50%	36%
	1%-25%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%
	26%-50%	2	0	0	2	1	1	0	0	0	1	1	0
		2%	0%	0%	5%	5%	1%		0%	0%	3%	4%	0%
	51%-75%	3	2	1	0	0	3	0	1	0	2	0	0
		3%	8%	3%	0%	0%	4%		6%	0%	6%	0%	0%
	76%-99%	7	1	2	4	1	5	1	2	0	3	2	0
		7%	4%	5%	11%	5%	7%		11%	0%	10%	7%	0%

Table C-4 (continued). Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Labour and delivery unit (continued)	100%	61	15	27	19	14	44	3	13	7	21	11	9
		60%	**63%**	**68%**	**51%**	**67%**	**58%**		**72%**	**70%**	**68%**	**39%**	**64%**
	% Using	73	18	30	25	16	53	4	16	7	27	14	9
		72%	**75%**	**75%**	**68%**	**76%**	**70%**		**89%**	**70%**	**87%**	**50%**	**64%**
Ante-partum/ post-partum units	n/a	29	10	12	7	10	18	1	2	8	8	9	2
		23%	**31%**	**23%**	**17%**	**32%**	**20%**		**10%**	**44%**	**22%**	**26%**	**13%**
	0%	24	5	9	10	6	18	0	2	2	5	10	5
		25%	23%	22%	29%	29%	25%		11%	20%	17%	38%	36%
	1%-25%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%
	26%-50%	2	0	0	2	1	1	0	0	0	1	1	0
		2%	0%	0%	6%	5%	1%		0%	0%	3%	4%	0%
	51%-75%	2	1	1	0	0	2	0	1	0	1	0	0
		2%	5%	2%	0%	0%	3%		6%	0%	3%	0%	0%
	76%-99%	3	1	1	1	0	2	1	1	1	1	0	0
		3%	5%	2%	3%	0%	3%		6%	10%	3%	0%	0%
	100%	66	15	30	21	14	49	3	14	7	21	15	9
		68%	**68%**	**73%**	**62%**	**67%**	**68%**		**78%**	**70%**	**72%**	**58%**	**64%**
	% Using	73	17	32	24	15	54	4	16	8	24	16	9
		75%	**77%**	**78%**	**71%**	**71%**	**75%**		**89%**	**80%**	**83%**	**62%**	**64%**
Mental health unit	n/a	26	11	11	4	7	18	1	1	9	6	8	2
		21%	**34%**	**21%**	**10%**	**23%**	**20%**		**5%**	**50%**	**16%**	**23%**	**13%**
	0%	18	5	6	7	2	16	0	2	2	3	9	2
		18%	24%	14%	19%	8%	22%		11%	22%	10%	33%	14%
	1%-25%	4	2	1	1	2	1	1	0	1	2	1	0
		4%	10%	2%	3%	8%	1%		0%	11%	6%	4%	0%

Table C-4 (continued). Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Mental health unit (continued)	26%-50%	4	0	1	3	2	2	0	0	0	2	1	1
		4%	0%	2%	8%	8%	3%		0%	0%	6%	4%	7%
	51%-75%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%
	76%-99%	7	0	3	4	1	4	2	3	0	2	1	1
		7%	0%	7%	11%	4%	6%		16%	0%	6%	4%	7%
	100%	67	14	31	22	17	49	1	14	6	22	15	10
		67%	**67%**	**74%**	**59%**	**71%**	**68%**		**74%**	**67%**	**71%**	**56%**	**71%**
	% Using	82	16	36	30	22	56	4	17	7	28	18	12
		82%	**76%**	**86%**	**81%**	**92%**	**78%**		**89%**	**78%**	**90%**	**67%**	**86%**
Emergency Department	n/a	3	0	3	0	1	2	0	0	0	2	1	0
		2%	**0%**	**6%**	**0%**	**3%**	**2%**		**0%**	**0%**	**5%**	**3%**	**0%**
	0%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%
	1%-25%	1	0	1	0	1	0	0	0	0	1	0	0
		1%	0%	2%	0%	3%	0%		0%	0%	3%	0%	0%
	26%-50%	1	0	0	1	0	1	0	0	0	0	1	0
		1%	0%	0%	2%	0%	1%		0%	0%	0%	3%	0%
	51%-75%	1	1	0	0	0	1	0	0	1	0	0	0
		1%	3%	0%	0%	0%	1%		0%	6%	0%	0%	0%
	76%-99%	15	5	5	5	2	12	1	5	1	5	4	0
		12%	16%	10%	12%	7%	14%		25%	6%	14%	12%	0%
	100%	105	26	44	35	27	74	4	15	16	29	29	16
		85%	**81%**	**88%**	**85%**	**90%**	**84%**		**75%**	**89%**	**83%**	**85%**	**100%**
	% Using	123	32	50	41	30	88	5	20	18	35	34	16
		100%	**100%**	**100%**	**100%**	**100%**	**100%**		**100%**	**100%**	**100%**	**100%**	**100%**

Table C-4 (continued). Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
General pediatric medical/ surgical unit	n/a	46	12	21	13	16	30	0	3	11	10	17	5
		37%	**38%**	**40%**	**32%**	**52%**	**33%**		**15%**	**61%**	**27%**	**49%**	**31%**
	0%	14	3	5	6	1	13	0	1	0	3	8	2
		18%	15%	16%	21%	7%	22%		6%	0%	11%	44%	18%
	1%-25%	4	2	1	1	1	2	1	0	1	2	1	0
		5%	10%	3%	4%	7%	3%		0%	14%	7%	6%	0%
	26%-50%	1	0	0	1	1	0	0	0	0	1	0	0
		1%	0%	0%	4%	7%	0%		0%	0%	4%	0%	0%
	51%-75%	1	0	1	0	0	1	0	0	0	1	0	0
		1%	0%	3%	0%	0%	2%		0%	0%	4%	0%	0%
	76%-99%	6	1	2	3	1	3	2	1	2	1	1	1
		8%	5%	6%	11%	7%	5%		6%	29%	4%	6%	9%
	100%	54	14	23	17	11	41	2	15	4	19	8	8
		68%	**70%**	**72%**	**61%**	**73%**	**68%**		**88%**	**57%**	**70%**	**44%**	**73%**
	% Using	66	17	27	22	14	47	5	16	7	24	10	9
		83%	**85%**	**84%**	**79%**	**93%**	**78%**		**94%**	**100%**	**89%**	**56%**	**82%**
Pediatric critical care unit	n/a	87	26	33	28	19	68	0	11	14	24	26	12
		69%	**81%**	**62%**	**68%**	**61%**	**76%**		**55%**	**78%**	**65%**	**74%**	**75%**
	0%	12	1	8	3	1	11	0	2	0	4	5	1
		31%	17%	40%	23%	8%	50%		22%	0%	31%	56%	25%
	1%-25%	3	1	1	1	1	1	1	0	0	2	1	0
		8%	17%	5%	8%	8%	5%		0%	0%	15%	11%	0%
	26%-50%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%
	51%-75%	0	0	0	0	0	0	0	0	0	0	0	0
		0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%

Table C-4 (continued). Automated Dispensing Cabinet Use and Access in Specified Units, 2020/21

Percentage of patient care units with medication access from automated dispensing cabinets		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pediatric critical care unit (continued)	76%-99%	3	0	2	1	0	2	1	1	0	2	0	0
		8%	0%	10%	8%	0%	9%		11%	0%	15%	0%	0%
	100%	21	4	9	8	10	8	3	6	4	5	3	3
		54%	**67%**	**45%**	**62%**	**83%**	**36%**		**67%**	**100%**	**38%**	**33%**	**75%**
	% Using	27	5	12	10	11	11	5	7	4	9	4	3
		69%	**83%**	**60%**	**77%**	**92%**	**50%**		**78%**	**100%**	**69%**	**44%**	**75%**

Base: n = 126 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons
n/a = number of respondents without this patient care unit in their facility; these respondents were excluded from percentage calculations
% Using = percentage of respondents with this type of patient care unit who had ADCs on the units (i.e., sum of non-zero responses divided by sum of non-n/a responses times 100)

It has been suggested that the use of ADCs is safer when the cabinets are profiled. In the current survey, profiled cabinets were well utilized in mental health units (96%, 79/82), adult critical care units (96%, 99/103), general medical/surgical units (96%, 101/105) and ante-partum/post-partum units (90%, 66/73). ADC profiling was similarly well utilized in pediatric medical/surgical units (95%, 63/66) and pediatric critical care units (85%, 23/27). However, as in previous surveys, areas with transient populations, such as the operating room (23%, 14/62), the recovery room (45%, 37/82) and the ED (56%, 69/123), and those with rapid turnover, such as labour and delivery units (71%, 52/73), had lower rates of ADC profiling. These data suggest that organizations are selecting areas for ADC profiling according to where they anticipate the benefits will outweigh the operational challenges.

Medication Order Entry

Medication orders can be entered into electronic platforms by a variety of individuals. Traditionally, pharmacy personnel transcribed written orders into a pharmacy information system; however, with the adoption of computerized provider order entry (CPOE) and electronic health records, the options for data entry into the pharmacy information system have expanded. For the purposes of this survey, a pharmacy information system was defined as a computer system used by the pharmacy to maintain an accurate record of drug dispensing activity, patient medication profiles and other relevant patient information. CPOE systems support a process whereby a healthcare provider enters medication orders or other instructions electronically, rather than on paper charts. Both systems can provide opportunities for pharmacists, regulated pharmacy technicians and/or non-regulated pharmacy assistants, and others (e.g., nurse practitioners, dieticians) to enter medication orders. In many cases verification of these entries is required before the process is complete.

As in previous surveys, pharmacists continued to verify the majority of orders entered into the computerized information systems.

Table C-5 outlines the individuals who enter medication orders in these various systems. Many respondents indicated use of a pharmacy information system, with transcription of prescribers' orders into the system by pharmacists (72%, 102/141), by regulated pharmacy technicians (44%, 62/140) or by non-regulated pharmacy assistants (40%, 56/140). Some respondents indicated that prescribing pharmacists (31%, 44/141), as well as physicians (28%, 40/142) and other prescribers (including nurse practitioners, physician assistants, respiratory technicians, midwives and dieticians; 20%, 27/133), performed their own medication order entry into a CPOE system; these rates were unchanged from the 2016/17 survey. As has been the case since the 2013/14 survey, transcription of prescribers' orders by pharmacists (72%, 102/141) remained the dominant method of documenting in an electronic system with 72% (102/141) of respondents indicating some verification by pharmacists.

Table C-5. Medication Order Entry by Prescriber and System, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Prescribing physicians entering their own orders into a computerized provider order entry (CPOE) system	(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
	Has any use	40	8	17	15	13	25	2	4	2	24	7	3
		28%	20%	29%	34%	41%	24%		15%	9%	62%	19%	18%
	100%	**12**	**2**	**5**	**5**	**6**	**5**	**1**	**1**	**1**	**7**	**1**	**2**
		8%	**25%**	**29%**	**33%**	**19%**	**5%**		**25%**	**50%**	**29%**	**14%**	**67%**
	50%-99%	12	2	7	3	4	8	0	2	1	8	0	1
		8%	5%	12%	7%	13%	8%		7%	4%	21%	0%	6%
	1%-49%	16	4	5	7	3	12	1	1	0	9	6	0
		11%	10%	9%	16%	9%	11%		4%	0%	23%	17%	0%
	0%	102	32	41	29	19	80	3	23	21	15	29	14
		72%	80%	71%	66%	59%	76%		85%	91%	38%	81%	82%
Prescribing pharmacists entering their own orders into a CPOE system or pharmacy information system (PIS)	(n=)	(141)	(40)	(57)	(44)	(31)	(105)	(5)	(27)	(22)	(39)	(36)	(17)
	Has any use	44	7	19	18	15	27	2	3	4	19	10	8
		31%	18%	33%	41%	48%	26%		11%	18%	49%	28%	47%
	100%	**12**	**1**	**4**	**7**	**5**	**7**	**0**	**2**	**1**	**7**	**1**	**1**
		9%	**3%**	**7%**	**16%**	**16%**	**7%**		**7%**	**5%**	**18%**	**3%**	**6%**
	50%-99%	6	0	6	0	4	2	0	0	0	4	0	2
		4%	0%	11%	0%	13%	2%		0%	0%	10%	0%	12%
	1%-49%	26	6	9	11	6	18	2	1	3	8	9	5
		18%	15%	16%	25%	19%	17%		4%	14%	21%	25%	29%
	0%	97	33	38	26	16	78	3	24	18	20	26	9
		69%	83%	67%	59%	52%	74%		89%	82%	51%	72%	53%

Table C-5 (continued). Medication Order Entry by Prescriber and System, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pharmacists entering prescribers' orders into a PIS	(n=)	(141)	(40)	(57)	(44)	(31)	(105)	(5)	(27)	(22)	(39)	(36)	(17)
	Has any use	102	33	41	28	21	77	4	18	21	32	15	16
		72%	83%	72%	64%	68%	73%		67%	95%	82%	42%	94%
	100%	**25**	**9**	**9**	**7**	**5**	**17**	**3**	**5**	**12**	**5**	**1**	**2**
		18%	**23%**	**16%**	**16%**	**16%**	**16%**		**19%**	**55%**	**13%**	**3%**	**12%**
	50%-99%	26	8	11	7	6	19	1	2	5	13	1	5
		18%	20%	19%	16%	19%	18%		7%	23%	33%	3%	29%
	1%-49%	51	16	21	14	10	41	0	11	4	14	13	9
		36%	40%	37%	32%	32%	39%		41%	18%	36%	36%	53%
	0%	39	7	16	16	10	28	1	9	1	7	21	1
		28%	18%	28%	36%	32%	27%		33%	5%	18%	58%	6%
Regulated pharmacy technicians entering prescribers' orders into a PIS	(n=)	(140)	(39)	(57)	(44)	(30)	(105)	(5)	(27)	(22)	(39)	(35)	(17)
	Has any use	62	22	27	13	15	46	1	22	8	20	1	11
		44%	56%	47%	30%	50%	44%		81%	36%	51%	3%	65%
	100%	**14**	**5**	**5**	**4**	**2**	**12**	**0**	**9**	**0**	**4**	**1**	**0**
		10%	**13%**	**9%**	**9%**	**7%**	**11%**		**33%**	**0%**	**10%**	**3%**	**0%**
	50%-99%	21	8	11	2	6	15	0	10	1	6	0	4
		15%	21%	19%	5%	20%	14%		37%	5%	15%	0%	24%
	1%-49%	27	9	11	7	7	19	1	3	7	10	0	7
		19%	23%	19%	16%	23%	18%		11%	32%	26%	0%	41%
	0%	78	17	30	31	15	59	4	5	14	19	34	6
		56%	44%	53%	70%	50%	56%		19%	64%	49%	97%	35%
Non-regulated pharmacy assistants entering prescribers' orders into a PIS	(n=)	(140)	(39)	(57)	(44)	(31)	(104)	(5)	(26)	(22)	(39)	(36)	(17)
	Has any use	56	14	20	22	11	44	1	5	5	3	34	9
		40%	36%	35%	50%	35%	42%		19%	23%	8%	94%	53%
	100%	**22**	**4**	**7**	**11**	**6**	**16**	**0**	**1**	**0**	**0**	**21**	**0**
		16%	**10%**	**12%**	**25%**	**19%**	**15%**		**4%**	**0%**	**0%**	**58%**	**0%**
	50%-99%	16	1	6	9	2	13	1	0	0	0	13	3
		11%	3%	11%	20%	6%	13%		0%	0%	0%	36%	18%
	1%-49%	18	9	7	2	3	15	0	4	5	3	0	6
		13%	23%	12%	5%	10%	14%		15%	23%	8%	0%	35%
	0%	84	25	37	22	20	60	4	21	17	36	2	8
		60%	64%	65%	50%	65%	58%		81%	77%	92%	6%	47%

Table C-5 (continued). Medication Order Entry by Prescriber and System, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Others (e.g., nurse practitioners, medical assistants, midwives, dentists, dietitians)	(n=)	(133)	(35)	(55)	(43)	(29)	(99)	(5)	(25)	(19)	(39)	(34)	(16)
	Has any use	27	5	10	12	10	16	1	3	0	16	4	4
		20%	14%	18%	28%	34%	16%		12%	0%	41%	12%	25%
	100%	**5**	**1**	**1**	**3**	**3**	**2**	**0**	**0**	**0**	**3**	**1**	**1**
		4%	**3%**	**2%**	**7%**	**10%**	**2%**		**0%**	**0%**	**8%**	**3%**	**6%**
	50%-99%	4	0	3	1	0	4	0	2	0	2	0	0
		3%	0%	5%	2%	0%	4%		8%	0%	5%	0%	0%
	1%-49%	18	4	6	8	7	10	1	1	0	11	3	3
		14%	11%	11%	19%	24%	10%		4%	0%	28%	9%	19%
	0%	106	30	45	31	19	83	4	22	19	23	30	12
		80%	86%	82%	72%	66%	84%		88%	100%	59%	88%	75%

Base: n = 133 to 142 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons
Value for "has any use" is the sum of values for categories 100%, 50%-99% and 1%-49% and indicates those respondents utilizing this type of system for any portion of their drug distribution model

Verification of medication order entries continues to be completed primarily by pharmacists, with 50% (51/101) of respondents reporting that a pharmacist verifies orders that have been transcribed into the pharmacy information system by other pharmacists. Pharmacist verification of orders transcribed by regulated pharmacy technicians or non-regulated pharmacy assistants was reported by 88% (52/59) and 96% (52/54) of respondents, respectively. In certain situations, however, respondents reported that verification of order transcription was not required, for example, when a pharmacist transcribed orders into a pharmacy information system (38%, 38/101) or entered their own orders into a CPOE or pharmacy information system (33%, 14/43). These rates are similar to 2016/17, when 32% (40/126) of respondents did not require verification for pharmacists transcribing prescribers' orders into a pharmacy information system. This finding is somewhat unexpected, given that the scope of pharmacy practice in most Canadian jurisdictions provinces has been expanded to include adaptation of medication orders and more independent prescribing by pharmacists. Interestingly, pharmacist verification was typically required where transcription was completed by regulated pharmacy technicians and non-regulated pharmacy assistants. Similarly, pediatric hospitals had pharmacists verify orders, irrespective of the system for order transcription.

Pharmacy Hours of Operation

In 2020/21, hospital pharmacies in respondents' facilities were open an average of 86 hours/week, similar to the 84 hours/week reported for 2016/17 and 7 hours more than the average of 79 hours reported for 2013/14. Pediatric teaching hospitals had the highest average number of opening hours (139 hours/week), with three of the five pediatric facilities open 168 hours/week (i.e., 24 hours/day, 7 days/week). As in previous surveys, hospitals with more than 500 beds had longer average opening hours (96 hours/week) than hospitals with 201-500 beds (89 hours/week) or hospitals with 50-200 beds (69 hours/week), and teaching hospitals had longer opening hours (101 hours/week) than non-teaching hospitals (78 hours/week).

For 2020/21, 9% (13/142) of respondents reported that their pharmacies were open 168 hours/week (i.e., 24 hours/day, 7 days/week), an increase from the 11 respondents with these opening hours in 2016/17. Seven of these 13 hospitals were located in ON. Interestingly, the rates were similar for hospitals with more than 500 beds (13%, 5/39) and those with 201-500 beds (12%, 6/52).

Most Canadian hospital pharmacy departments are not open 24/7.

After-Hours Medication Order Review

The Health Standards Organization medication management standards,[11] which are used by Accreditation Canada, suggest that medication orders should be reviewed by a pharmacist before administration. The ISMP has suggested that "A pharmacist's review of each medication order is important to assess potential duplication in therapy, contraindications, unsafe dosing, allergies, and other medication-related concerns before a drug is removed from stock and administered."[17] During the hours that a hospital pharmacy is closed, it is difficult to manage such reviews, with only a small fraction of respondents reporting an ability to do so. More specifically, only 2% (2/121) of respondents stated that a pharmacist, either on call or working off site, reviewed at least 95% of all routine medication orders for therapeutic appropriateness before medications were accessed from a night cupboard. Furthermore, only 3% (4/123) and 3% (4/121) of respondents indicated that a review occurred before after-hours access to ADCs and wardstock, respectively.

A larger proportion (17%, 21/126) of respondents indicated that a review was carried out before an order appeared on the medication administration record (MAR), similar to the 18% (28/156) in the 2016/17 survey. Completing a review before the order appears on the MAR was more likely in teaching hospitals (22%, 6/27) than in non-teaching hospitals (14%, 14/97).

In the 2020 ASHP survey,[37] hospital pharmacy directors in 92.5% of responding organizations indicated capacity to complete overnight review of medication orders. US facilities are accountable to standards of the Joint Commission (formerly the Joint Commission on the Accreditation of Healthcare Organizations), which require review of orders by pharmacists.[40] US hospitals have achieved higher rates of compliance through 24-hour on-site staffing (42.8%), use of national or regional telepharmacy services (29.7%), use of an affiliated hospital with 24-hour service (15.0%) or provision of order review and entry by an on-call employee pharmacist (5.1%). In fact, US institutions increased their use of all these techniques and solutions since the ASHP 2013 survey.[39] Unfortunately, results of the 2020/21 CSHP Hospital Pharmacy in Canada Survey suggest very little progress over the preceding four years, with response rates similar to those documented in the 2016/17 report. This suggests a continued inability to ensure reliable performance of medication reviews, especially after hours. Given that US facilities appear to have found solutions to meet accreditation standards in this area, it behooves Canadian organizations to review and consider practice changes that would help meet existing accreditation standards.

Canadian hospital pharmacy departments remain unable to reliably review all medication orders before medication administration.

Preparation of Medication Administration Records

The manual preparation of some or all MARs was reported by 14% (20/142) of respondents, down from 30% (54/183) reported for 2016/17 and returning to the downward trend seen between the 2003/04 and 2011/12 surveys. No pediatric hospitals reported manual preparation of MARs. Regionally, no respondents in BC/YT or QC reported manual MARs; facilities in these regions used only printed and electronic (eMAR) solutions. Manual MARs were less likely to be used in facilities with more than 500 beds (7%, 3/44) and those with 201-500 beds (12%, 7/58), but were reported by 25% (10/40) of those with 50-200 beds.

The use of MARs generated in hard copy through the pharmacy information system was reported by 61% (86/142) of respondents, whereas eMARs derived through a common database aligned with the pharmacy information system (with electronic documentation of medication doses administered) were reported by 25% (36/142) of respondents. In ON, 54% (21/39) of respondents reported using eMARs whereas the corresponding proportion of BC/YT respondents was only 30% (8/27). Table C-6 summarizes how Canadian hospitals responding to the 2020/21 survey approached the preparation of MARs.

Table C-6. Preparation of Medication Administration Records (MARs), 2020/21

Method of MAR generation	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
Manual preparation on patient care units	20	10	7	3	6	14	0	0	10	4	0	6
	14%	**25%**	**12%**	**7%**	**19%**	**13%**		**0%**	**43%**	**10%**	**0%**	**35%**
Generation of a hard copy by the pharmacy information system (PIS), with manual documentation of administered medication doses	86	23	33	30	15	67	4	19	12	14	34	7
	61%	**58%**	**57%**	**68%**	**47%**	**64%**		**70%**	**52%**	**36%**	**94%**	**41%**
Creation of an electronically derived MAR through a common database aligned with a PIS, with electronic documentation of administered medication doses	36	7	18	11	11	24	1	8	1	21	2	4
	25%	**18%**	**31%**	**25%**	**34%**	**23%**		**30%**	**4%**	**54%**	**6%**	**24%**

Base: n = 142 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Parenteral Admixture Services

In the 2020/21 survey, 92% (130/141) of respondents indicated that they provide or support inpatient parenteral admixture services for their organization, a small increase from the 2016/17 survey. The majority (63%, 82/130) of these respondents reported providing admixtures for 90% or more of their own inpatients. Among the remaining 37% (48/130) of respondents who reported providing admixtures for less than 90% of inpatients, an average of 35% of inpatients were supported by such admixture services; notably, 58% (28/48) of respondents covered admixture services for less than half of their inpatients.

As shown in Table C-7, among respondents that reported provision of admixture services, larger hospitals provided a higher level of coverage than smaller facilities. The data for certain regions are noteworthy as well (data not shown in Table C-7): ON had the highest rate of admixture provision (75%, 27/36), followed by BC/YT (68%, 17/25). The Prairies (SK/MB) had the highest percentage of respondents reporting that they did not provide this service; however, those that did were more likely to provide it for more than 90% of inpatients. When asked about the proportion of intravenous and epidural doses mixed on patient care

units, 19% (27/139) of respondents indicated that this was done for more than 90% of their products. Table C-7 includes the average and median percentages of intravenous and epidural products mixed on patient care units. Overall, half of the products made were mixed on the units. BC/YT (median 30%, average 38.5%) had the lowest rates of admixture preparation on patient care units, followed by ON (median 35%, average 42.3%). As noted in Table C-7, smaller hospitals appeared to have a larger proportion of compounds mixed on the units.

Table C-7. Percentage of Intravenous and Epidural Products Mixed on a Patient Care Unit, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(139)	(40)	(56)	(43)	(31)	(103)	(5)	(26)	(23)	(38)	(35)	(17)
Average	**50.7**	**60.0**	**45.5**	**48.8**	**44.4**	**53.3**	**35.0**	**38.5**	**60.2**	**42.3**	**54.1**	**68.1**
SD	31.9	36.6	30.1	28.1	27.1	33.2	26.0	29.1	35.9	32.3	24.8	32.7
Minimum	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0
Median	**50**	**75**	**40**	**50**	**40**	**59**	**50**	**30**	**60**	**35**	**50**	**75**
Maximum	100.0	100.0	99.0	100.0	99.0	100.0	60.0	100.0	100.0	95.0	99.0	99.0
Mode	10	0	10	10	30	10	50	30	60	10	50	75

Base: n = 139 respondents

Many respondents reported the provision of compounding services for both inpatients and outpatients, with the majority indicating that most of their compounding of parenteral admixtures was for inpatient use. In terms of hospital types, the average percentage of intravenous admixtures directed to inpatient use was highest for pediatric hospital respondents (83.0%) and lowest for non-teaching hospitals (65.3%). The largest hospitals (> 500 beds) reported higher percentages of inpatient use than the smallest hospitals (50-200 beds) (72.3% vs. 59.2%, respectively).

Non-hazardous Sterile Compounding Services

There are several sources of compounded non-hazardous sterile medications. Most respondents reported that their pharmacy department was completely accountable for or was the primary source of compounded sterile products. As shown in Table C-8, 61% (87/142) of respondents reported that the pharmacy department or organization was the primary (but not exclusive) provider of sterile compounded products, including products made by centralized production centres. Another 15% (22/142) of respondents reported that all sterile compounded products were supplied by the pharmacy. Some respondents (13%, 19/142) acknowledged external suppliers as the primary provider, but none indicated exclusive use of external compounding services. It is interesting to note that QC respondents reported the highest rate of compliance with provincial (OPQ) compounding standards (data not shown) and also the highest number of respondents providing all sterile compounded products (n = 12). BC/YT facilities also appeared to rely less on external compounders. In contrast, ON and the Prairies (SK/MB) appeared to rely on external compounders to a greater extent, with fewer respondents utilizing their own pharmacies for all of their sterile products. The use of external suppliers as the primary providers for sterile products has increased, from 5% (9/184) in 2016/17 to 13% (19/142) in 2020/21.

Table C-8. Primary Provider of Non-hazardous Sterile Compounding Services, 2020/21

Primary provider	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
Primarily provided by an external contractor (e.g., Baxter-CIVA, Calea, Fresenius Kabi)	19	8	5	6	4	15	0	1	5	10	0	3
	13%	**20%**	**9%**	**14%**	**13%**	**14%**		**4%**	**22%**	**26%**	**0%**	**18%**
Primarily provided by the pharmacy department or organization (including centralized production centres)	87	18	41	28	23	62	2	19	13	22	23	10
	61%	**45%**	**71%**	**64%**	**72%**	**59%**		**70%**	**57%**	**56%**	**64%**	**59%**
Completely provided by the pharmacy department or organization	22	5	8	9	4	15	3	5	0	3	12	2
	15%	**13%**	**14%**	**20%**	**13%**	**14%**		**19%**	**0%**	**8%**	**33%**	**12%**
Completely provided by an external contractor	0	0	0	0	0	0	0	0	0	0	0	0
	0%	**0%**	**0%**	**0%**	**0%**	**0%**		**0%**	**0%**	**0%**	**0%**	**0%**
Not provided (admixtures are prepared in patient care areas by non-pharmacy personnel)	14	9	4	1	1	13	0	2	5	4	1	2
	10%	**23%**	**7%**	**2%**	**3%**	**12%**		**7%**	**22%**	**10%**	**3%**	**12%**
Not required for respondent's patient population	0	0	0	0	0	0	0	0	0	0	0	0
	0%	**0%**	**0%**	**0%**	**0%**	**0%**		**0%**	**0%**	**0%**	**0%**	**0%**

Base: n = 142 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Starting with the 2016/17 iteration, the CSHP Hospital Pharmacy in Canada Survey has included questions about compliance with evolving regulatory requirements. In the 2020/21 survey, we continued to ask about compliance with NAPRA standards for non-hazardous sterile compounding[3] as a way of exploring some of the key elements of these standards. Although most Canadian jurisdictions have adopted the NAPRA compounding standards, a few provinces are still working toward implementation.

Consistent with the results from 2016/17, QC respondents continued to have high rates of compliance with standards for clean rooms, ante-rooms, positive pressure environments, biological safety cabinets and full HEPA (high-efficiency particulate absorption) environments. As outlined in Table C-9, overall utilization of a segregated ISO class 7 clean room has improved since 2016/17, with 79% (85/108) of respondents now having compliant clean rooms. QC maintained its high level of compliance (97%, 34/35), with ON (84%, 21/25), BC/YT (65%, 15/23) and the Prairies (SK/MB) (77%, 10/13) all showing improvement. However, the improvement for the Prairies may be due to the lower number of respondents from that region.

The data were similar for utilization of a segregated ISO class 8 ante-room. Relative to the 2016/17 survey, respondents in each region either maintained or improved compliance with the ante-room standard. BC/YT had the greatest improvement against previous performance, with an increase in compliance rate to 52% (12/23), while the Prairies (SK/MB) had an increase to 62% (8/13); ON (60%, 15/25) and the Atlantic region (33%, 4/12) had only modest increases in compliance. QC maintained a very high rate of compliance (94%, 33/35).

Maintenance of a positive-pressure environment also increased in 2020/21, with 78% (84/108) of respondents reporting compliance with this standard. Again, all regions maintained or improved their level of compliance, with BC/YT (65%, 15/23) having the greatest improvement, and the Prairies (SK/MB; 77%, 10/13), ON (84%, 21/25) and the Atlantic region (50%, 6/12) also showing increases.

In 2020/21, the only aspect of compounding with reduced compliance related to utilization of a biological safety cabinet or laminar airflow workstation (also called a primary environmental control [C-PEC] or hood), for all sterile compounding. For this standard, there was a slight reduction in compliance, from 95% (148/155) in 2016/17 to 91% (98/108) in 2020/21. Compliance in ON decreased from 98% (40/41) to 88% (22/25), compliance in BC/YT was unchanged (96% [27/28] vs. 96% [22/23], respectively), and compliance in QC dropped from 100% (41/41) to 94% (33/35). Conversely, the Prairies (SK/MB) at 92% (12/13) and the Atlantic provinces (75%, 9/12) showed improvement. Again, the response for the Prairies may be due to the reduced number of respondents.

Establishing a low-particulate environment with full HEPA filtration and a specific number of air exchanges per hour (specified as ≥ 20/hour in the 2020/21 survey, with the NAPRA standard being ≥ 30/hour) continues to be one of the greatest compliance challenges for organizations. Once again, QC had the highest rate of compliance (94%, 33/35), because of the province's approach to addressing the OPQ standard for non-hazardous sterile compounding (Norme 2014.01).[23] Since the 2016/17 survey, compliance on this aspect of compounding increased to 72% (78/108) nationally, but with wide regional variation. In BC/YT, compliance increased to 74% (17/23), with improvements also occurring in ON (64%, 16/25) and the Prairies (SK/MB) (62%, 8/13). Unfortunately, the Atlantic provinces reported only 33% (4/12) compliance, although this reduction could be due to the lower number of NS respondents for the most recent survey.

Table C-9. Non-hazardous Sterile Compounding Services – Compliance with Standards of National Association of Pharmacy Regulatory Authorities or Ordre des pharmaciens du Québec, 2020/21

Standard	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(108)	(23)	(48)	(37)	(27)	(76)	(5)	(23)	(13)	(25)	(35)	(12)
Segregated ISO class 7 clean room	85	16	37	32	17	63	5	15	10	21	34	5
	79%	**70%**	**77%**	**86%**	**63%**	**83%**		**65%**	**77%**	**84%**	**97%**	**42%**
Segregated ISO class 8 ante-room	72	13	30	29	14	55	3	12	8	15	33	4
	67%	**57%**	**63%**	**78%**	**52%**	**72%**		**52%**	**62%**	**60%**	**94%**	**33%**
An environment that maintains positive pressure	84	16	36	32	17	63	4	15	10	21	32	6
	78%	**70%**	**75%**	**86%**	**63%**	**83%**		**65%**	**77%**	**84%**	**91%**	**50%**

Table C-9 (continued). Non-hazardous Sterile Compounding Services – Compliance with Standards of National Association of Pharmacy Regulatory Authorities or Ordre des pharmaciens du Québec, 2020/21

Standard	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Biological safety cabinets or laminar airflow workstations	98	23	42	33	24	70	4	22	12	22	33	9
	91%	**100%**	**88%**	**89%**	**89%**	**92%**		**96%**	**92%**	**88%**	**94%**	**75%**
An environment with full high-efficiency particulate absorption (HEPA) filtration and at least 20 air exchanges per hour	78	17	32	29	14	60	4	17	8	16	33	4
	72%	**74%**	**67%**	**78%**	**52%**	**79%**		**74%**	**62%**	**64%**	**94%**	**33%**

Base: n = 108 respondents (facilities preparing non-hazardous medications)
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Quality assurance processes are also an important part of the NAPRA and OPQ standards. Overall, 88% (89/109) of respondents reported that they had a quality assurance program in place, with application to both personnel and product preparation processes. All 89 of these respondents reported verifying equipment, including the C-PECs (e.g., laminar flow hoods). The rates of verification of controlled areas (clean room and ante-room) and of aseptic compounding processes were similar (89% [79/89] and 90% [80/89], respectively), with a slightly lower rate of verification of final preparations (81%, 72/89) (Table C-10). Non-teaching hospitals appeared to outperform teaching hospitals in one of the four categories for physical environment compliance, and matched or nearly matched teaching hospitals in the other three categories (Table C-10).

Table C-10. Quality Assurance Processes for Non-hazardous Sterile Compounding, 2020/21

Process	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(89)	(17)	(43)	(29)	(24)	(60)	(5)	(13)	(10)	(25)	(31)	(10)
Verification of equipment, including primary environmental controls (C-PECs; e.g., laminar flow hoods	89	17	43	29	24	60	5	13	10	25	31	10
	100%	**100%**	**100%**	**100%**	**100%**	**100%**		**100%**	**100%**	**100%**	**100%**	**100%**
Verification of controlled areas (clean room and ante-room)	79	12	39	28	19	55	5	11	8	23	31	6
	89%	**71%**	**91%**	**97%**	**79%**	**92%**		**85%**	**80%**	**92%**	**100%**	**60%**
Verification of aseptic compounding processes	80	14	39	27	22	53	5	7	9	23	31	10
	90%	**82%**	**91%**	**93%**	**92%**	**88%**		**54%**	**90%**	**92%**	**100%**	**100%**
Verification of final preparations	72	13	35	24	21	46	5	8	8	22	25	9
	81%	**76%**	**81%**	**83%**	**88%**	**77%**		**62%**	**80%**	**88%**	**81%**	**90%**

Base: n = 89 respondents (facilities with a quality assurance program for non-hazardous medication preparation in place)

About two-thirds (66%, 71/108) of respondents reported completing environmental verification, including the detection of microbial and chemical contamination; ON (92%, 23/25) and QC (80%, 28/35) had the highest rates of compliance for this type of verification (Table C-11). Among those performing environmental verification, the majority (80%, 57/71) used external contractors, with only 18% (13/71) using in-house personnel. BC/YT (42%, 10/24) and the Atlantic provinces (27%, 3/11) had lower levels of environmental testing, and facilities with 50-200 beds appeared to apply this testing at a lower rate than facilities with more than 500 beds (55% [12/22] vs. 76% [28/37], respectively).

Table C-11. Environmental Verification of Non-hazardous Sterile Compounding, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Program exists (n=)	(108)	(22)	(49)	(37)	(27)	(76)	(5)	(24)	(13)	(25)	(35)	(11)
Yes	**71**	**12**	**31**	**28**	**18**	**49**	**4**	**10**	**7**	**23**	**28**	**3**
	66%	**55%**	**63%**	**76%**	**67%**	**64%**		**42%**	**54%**	**92%**	**80%**	**27%**
No	37	10	18	9	9	27	1	14	6	2	7	8
	34%	45%	37%	24%	33%	36%		58%	46%	8%	20%	73%
Base: n = 108 (respondents whose facilities prepared non-hazardous medications												
Who performs the verification (n=)	(71)	(12)	(31)	(28)	(18)	(49)	(4)	(10)	(7)	(23)	(28)	(3)
Personnel in the organization	13	0	9	4	4	8	1	0	2	8	2	1
	18%	**0%**	**29%**	**14%**	**22%**	**16%**		**0%**		**35%**	**7%**	
External contractors	57	12	21	24	14	40	3	9	5	15	26	2
	80%	**100%**	**68%**	**86%**	**78%**	**82%**		**90%**		**65%**	**93%**	
Others	1	0	1	0	0	1	0	1	0	0	0	0
	1%	**0%**	**3%**	**0%**	**0%**	**2%**		**10%**		**0%**	**0%**	
Base: n = 71 (respondents with an environmental verification program in place) Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons												

Documentation of all staff training and certification and retention of these records was reported by 86% (94/109) of respondents. Regionally, BC/YT had the lowest compliance with this standard (67%, 16/24). Retention of documents for all activities related to non-hazardous sterile compounding, as outlined in the NAPRA[3] or OPQ[23] standards, was high overall (87%, 95/109); however, compliance in BC/YT (67%, 16/24) and the Atlantic provinces (58%, 7/12) was lower than in the other regions (92% to 100%). Compounding supervisors were in place for 79% (85/108) of respondents, with the greatest compliance in ON (100%, 25/25) and QC (94%, 33/35). Compliance with beyond-use dating (BUD) requirements was reported by 68% (73/108) of respondents. BC/YT had the lowest compliance with this standard (29%, 7/24), whereas QC (89%, 31/35) and ON (84%, 21/25) had the highest rates. Most respondents (90%, 97/108) did not complete product sterility testing to extend the BUD for non-hazardous sterile products.

Québec continued to lead the nation with the highest compliance with compounding standards for hazardous and non-hazardous compounding.

Hazardous Sterile Compounding Services

As was the case for non-hazardous sterile compounding, most respondents indicated that hazardous sterile compounds are completely provided (53%, 75/142) or primarily provided (39%, 56/142) by the pharmacy department or organization. No respondents reported mixing of hazardous medications in patient care areas by non-pharmacy staff such as nurses. A small percentage of respondents reported using external suppliers as the primary provider (2%, 3/142) or sole provider (2%, 3/142) of hazardous sterile products (Table C-12), similar to the situation in 2016/17.

Table C-12. Primary Provider of Compounding Services for Hazardous Sterile Products (e.g., Carcinogens, Teratogens), 2020/21

Primary provider	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(142)	(40)	(58)	(44)	(32)	(105)	(5)	(27)	(23)	(39)	(36)	(17)
Primarily provided by an external contractor (e.g., Baxter-CIVA, Calea, Fresenius Kabi)	3	2	1	0	1	1	1	0	2	1	0	0
	2%	**5%**	**2%**	**0%**	**3%**	**1%**		**0%**	**9%**	**3%**	**0%**	**0%**
Primarily provided by the pharmacy department	56	11	26	19	14	41	1	16	10	15	13	2
	39%	**28%**	**45%**	**43%**	**44%**	**39%**		**59%**	**43%**	**38%**	**36%**	**12%**
Completely provided by the pharmacy department or organization	75	22	29	24	15	57	3	11	11	18	21	14
	53%	**55%**	**50%**	**55%**	**47%**	**54%**		**41%**	**48%**	**46%**	**58%**	**82%**
Completely provided by an external contractor	3	1	2	0	1	2	0	0	0	2	1	0
	2%	**3%**	**3%**	**0%**	**3%**	**2%**		**0%**	**0%**	**5%**	**3%**	**0%**
Not provided (admixtures are prepared in patient care areas by non-pharmacy personnel)	0	0	0	0	0	0	0	0	0	0	0	0
	0%	**0%**	**0%**	**0%**	**0%**	**0%**		**0%**	**0%**	**0%**	**0%**	**0%**
Not required for respondent's patient population	5	4	0	1	1	4	0	0	0	3	1	1
	4%	**10%**	**0%**	**2%**	**3%**	**4%**		**0%**	**0%**	**8%**	**3%**	**6%**

Base: n = 142 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Questions regarding compliance with aspects of the standards for compounding of hazardous sterile products set out by NAPRA[26] or the OPQ,[24] first included in the 2016/17 survey, were repeated in the 2020/21 survey. Respondents providing hazardous compounding services were asked about the physical spaces used for compounding of hazardous sterile products. As in 2016/17, QC respondents had the highest rates of compliance with these physical space requirements (Table C-13). The largest facilities (> 500 beds) generally reported higher rates of adoption of these standards than hospitals with 201-500 beds or 50-200 beds: for the use of segregated ISO class 7 clean rooms, 81% (35/43), 83% (45/54) and 61% (20/33), respectively; for the use of ISO class 8 ante-rooms, 72% (31/43), 56% (30/54) and 48% (16/33), respectively; and for having a negative-pressure environment, 88% (38/43), 81% (44/54) and 67% (22/33), respectively. The use of biological safety cabinets or laminar airflow workstations (also called C-PECs or hoods) for all hazardous sterile compounding remained high, with an overall rate of 95% (124/130),

similar to what was reported for 2016/17 (96%, 164/170). For certain other requirements, compliance improved since the 2016/7 survey, with utilization of ISO class 7 clean rooms reported by 77% (100/130) of respondents (previously 64%, 109/170), utilization of ISO class 8 ante rooms reported by 59% (77/130) (previously 51%, 86/170) and an environment with full HEPA filtration and at least 20 air exchanges per hour reported by 72% (94/130) (previously 63%, 107/170). The percentages of facilities with an environment that maintains negative pressure (76% [129/170] in 2016/17; 80% [104/130] in 2020/21) and a drug storage area that maintains negative pressure (48% [80/168] in 2016/17; 52% [67/130] in 2020/21) remained relatively unchanged. A sub-analysis revealed that only 40% (52/130) of respondents had all these requirements in place, compared with 25% (43/170) in 2016/17. QC accounted for 54% (28/52) of respondents reporting compliance with all aspects of the relevant standard. This suggests that facilities outside of QC continue to struggle in meeting all of the NAPRA requirements.

Table C-13. Hazardous Sterile Compounding Services – Compliance with Standards of National Association of Pharmacy Regulatory Authorities or Ordre des pharmaciens du Québec, 2020/21

Standard	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(130)	(33)	(54)	(43)	(29)	(97)	(4)	(26)	(21)	(33)	(34)	(16)
Segregated ISO class 7 clean room	100	20	45	35	20	77	3	16	12	28	32	12
	77%	**61%**	**83%**	**81%**	**69%**	**79%**		**62%**	**57%**	**85%**	**94%**	**75%**
Segregated ISO class 8 ante-room	77	16	30	31	13	61	3	14	9	12	31	11
	59%	**48%**	**56%**	**72%**	**45%**	**63%**		**54%**	**43%**	**36%**	**91%**	**69%**
An environment that maintains negative pressure	104	22	44	38	21	80	3	22	13	23	33	13
	80%	**67%**	**81%**	**88%**	**72%**	**82%**		**85%**	**62%**	**70%**	**97%**	**81%**
Biological safety cabinets or laminar airflow workstations (also called primary environmental controls [C-PECs] or hoods)	124	31	51	42	28	93	3	26	19	31	33	15
	95%	**94%**	**94%**	**98%**	**97%**	**96%**		**100%**	**90%**	**94%**	**97%**	**94%**
An environment with full high-efficiency particulate absorption (HEPA) filtration and at least 20 air exchanges per hour	94	21	40	33	18	73	3	18	10	20	33	13
	72%	**64%**	**74%**	**77%**	**62%**	**75%**		**69%**	**48%**	**61%**	**97%**	**81%**
A drug storage area that maintains negative pressure	67	13	27	27	16	48	3	9	5	16	30	7
	52%	**39%**	**50%**	**63%**	**55%**	**49%**		**35%**	**24%**	**48%**	**88%**	**44%**

Base: n = 130 respondents (facilities preparing hazardous medications)
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Both the NAPRA and the OPQ standards include a requirement for a quality assurance program, and 81% (106/131) of respondents reported that such a program was in place for their hazardous sterile compounding service. Of those with a quality assurance program, verification of equipment (99%, 105/106) was the most common activity, followed by verification of the clean room and ante-room (91%, 96/106), verification of the process (90%, 95/106) and verification of the final preparation (76%, 81/106). Environmental testing was reported by 73% (94/129) of respondents, with QC (97%, 33/34) and ON (85%, 28/33) having the highest rates. Most respondents (80%, 75/94) reported using external providers to support environmental testing, with fewer (16%, 15/94) having personnel in their own organization perform this testing. There were few differences among regions, among hospitals of different sizes, or between teaching and non-teaching hospitals.

Retention of documentation of staff training for sterile compounding of hazardous medications was reported by all respondents from the Atlantic provinces (100%, 16/16) and ON (100%, 33/33), and by 90% (117/130) of respondents nationally (Table C-14). QC (100%, 34/34) and ON (100%, 33/33) indicated full compliance with retention of documentation of all activities related to sterile compounding of hazardous medications, as outlined in the NAPRA standards[26] or the OPQ standards.[24] ON was the only province where all respondents indicated full compliance with retention of both types of documentation.

Table C-14. Retention of Documentation of Staff Training and Certification and of All Activities Related to Compounding of Hazardous Sterile Medications, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Retain staff training and certification documentation												
(n=)	(130)	(33)	(54)	(43)	(29)	(97)	(4)	(26)	(21)	(33)	(34)	(16)
Yes	**117**	**30**	**50**	**37**	**25**	**88**	**4**	**19**	**18**	**33**	**31**	**16**
	90%	**91%**	**93%**	**86%**	**86%**	**91%**	**100%**	**73%**	**86%**	**100%**	**91%**	**100%**
No	13	3	4	6	4	9	0	7	3	0	3	0
	10%	9%	7%	14%	14%	9%	0%	27%	14%	0%	9%	0%
Retain documentation of all activities related to compounding of hazardous sterile medications												
(n=)	(129)	(32)	(54)	(43)	(29)	(96)	(4)	(26)	(21)	(33)	(34)	(15)
Yes	**115**	**27**	**49**	**39**	**27**	**84**	**4**	**18**	**18**	**33**	**34**	**12**
	89%	**84%**	**91%**	**91%**	**93%**	**88%**	**100%**	**69%**	**86%**	**100%**	**100%**	**80%**
No	14	5	5	4	2	12	0	8	3	0	0	3
	11%	16%	9%	9%	7%	13%	0%	31%	14%	0%	0%	20%

Base: n = 130 and n = 129 (facilities with compounding of hazardous sterile medications)

Most respondents reported designation of a sterile compounding supervisor to monitor and oversee activities related to sterile compounding of hazardous compounds (80%, 103/129) and reported compliance with the BUD dating standards (73%, 94/129), but they were less likely to report complete sterility testing to extend product BUD (16%, 21/128); compliance with BUD dating standards in 2020/21 represented an increase from 2016/17 (48%, 81/169). At the same time, there were regional differences in designating a compounding supervisor for hazardous sterile compounding: ON (100%, 33/33) and QC (97%, 33/34)

had the highest rates, whereas BC/YT (54%, 14/26), the Prairies (SK/MB) (57%, 12/21) and the Atlantic provinces (73%, 11/15) had lower rates. ON respondents (36%, 12/33) also indicated the highest use of sterility testing to extend the BUD for hazardous compounds, but this was still low relative to compliance with other standards in this area.

Written policies and procedures form a key component of ensuring the safe handling of hazardous products. Overall, 92% (130/142) of respondents reported the existence of written policies and procedures to ensure the health and safety of employees who prepare, transport, administer and dispose of hazardous drugs. Of respondents with written policies and procedures in place, 99% (129/130) had such policies for personal protective equipment, 99% (129/130) for handling cytotoxic/hazardous drugs (receiving, storage and transport) and 97% (126/130) for the response to spills (Table C-15). Fewer respondents had policies for environmental sampling (47%, 61/130) and equipment maintenance (79%, 103/130).

Table C-15. Safe Handling of Hazardous Products – Topics Addressed and Defined by Written Policies and Procedures, 2020/21

Topic	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(130)	(36)	(54)	(40)	(32)	(93)	(5)	(27)	(22)	(38)	(30)	(13)
Definition of cytotoxic/ hazardous drugs	122	33	53	36	31	86	5	26	21	38	26	11
	94%	**92%**	**98%**	**90%**	**97%**	**92%**		**96%**	**95%**	**100%**	**87%**	**85%**
Handling of cytotoxic/ hazardous drugs (receiving, storage and transport)	129	35	54	40	32	92	5	27	22	38	30	12
	99%	**97%**	**100%**	**100%**	**100%**	**99%**		**100%**	**100%**	**100%**	**100%**	**92%**
Personal protective equipment (e.g., protective gloves and gowns)	129	35	54	40	32	92	5	27	22	38	30	12
	99%	**97%**	**100%**	**100%**	**100%**	**99%**		**100%**	**100%**	**100%**	**100%**	**92%**
Safe practices for administering cytotoxic/ hazardous drugs	124	34	52	38	31	88	5	26	21	37	27	13
	95%	**94%**	**96%**	**95%**	**97%**	**95%**		**96%**	**95%**	**97%**	**90%**	**100%**
Equipment maintenance	103	26	44	33	21	77	5	20	17	28	28	10
	79%	**72%**	**81%**	**83%**	**66%**	**83%**		**74%**	**77%**	**74%**	**93%**	**77%**
Decontamination and cleaning	120	30	52	38	28	87	5	27	20	32	30	11
	92%	**83%**	**96%**	**95%**	**88%**	**94%**		**100%**	**91%**	**84%**	**100%**	**85%**
Waste handling	118	30	53	35	29	84	5	25	19	36	26	12
	91%	**83%**	**98%**	**88%**	**91%**	**90%**		**93%**	**86%**	**95%**	**87%**	**92%**
Response to spills	126	34	53	39	31	90	5	26	21	38	29	12
	97%	**94%**	**98%**	**98%**	**97%**	**97%**		**96%**	**95%**	**100%**	**97%**	**92%**
Environmental sampling	61	14	30	17	15	41	5	5	12	22	14	8
	47%	**39%**	**56%**	**43%**	**47%**	**44%**		**19%**	**55%**	**58%**	**47%**	**62%**

Base: n = 130 respondents (facilities with written policies and procedures to ensure the health and safety of employees who prepare, transport, administer and dispose of hazardous drugs)

Only 18% (26/141) of respondents reported the presence of a medical surveillance program for employees who handle cytotoxic/hazardous drugs (Table C-16). On a regional basis, BC/YT had the highest rate (59%, 16/27), while the Prairies (SK/MB) (0%, 0/23) and QC (3% 1/36,) had limited availability of such programs. The higher rate for BC/YT may be due to the recent implementation of testing as a provincial health requirement in BC.

Table C-16. Medical Surveillance Programs for Employees Who Handle Cytotoxic/Hazardous Drugs, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(141)	(39)	(58)	(44)	(32)	(104)	(5)	(27)	(23)	(39)	(36)	(16)
Yes	26	7	13	6	4	20	2	16	0	7	1	2
	18%	**18%**	**22%**	**14%**	**13%**	**19%**		**59%**	**0%**	**18%**	**3%**	**13%**
No	111	30	45	36	27	81	3	11	23	32	31	14
	79%	77%	78%	82%	84%	78%		41%	100%	82%	86%	88%
n/a	4	2	0	2	1	3	0	0	0	0	4	0
	3%	5%	0%	5%	3%	3%		0%	0%	0%	11%	0%

Base: n = 141 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons
n/a = not applicable

Monitoring of Refrigerators and Freezers

Nationally, all respondents (100%, 142/142) reported daily monitoring of the refrigerators and freezers used in their facilities.

Closed-System Transfer Devices

The 2020/21 survey investigated utilization rates for CSTDs, asking respondents whether they used these devices and the reasons for using or not using them. Nationally, 53% (71/133) of respondents reported use of CSTDs for all or some of their hazardous sterile compounding, with 42 respondents reporting use of these devices for all hazardous sterile products. Among facilities that performed hazardous sterile compounding, use for all or some products was highest in the Atlantic provinces (100%, 16/16). Use was also high in ON (83%, 29/35), but neither hospital teaching status nor bed size appeared to make much difference in utilization. BC/YT had the lowest use (19%, 5/26).

Among the 47% (62/133) of respondents who said they did not use CSTDs, 79% (49/62) reported cost as the reason. Low volume of use was reported by another 18% (11/62), mostly in ON and the Prairies (SK/MB). Hospital size did not seem to affect the reasoning for not using CSTDs.

Of the 71 respondents who reported using CSTDs, the most common reasons were employee safety (94%, 67/71) and patient safety (69%, 49/71). Using CSTDs to support an audit or regulatory recommendation was less common (38%, 27/71), and only 11% (8/71) of respondents reported (in free-text responses) extending the BUD of partial vials as a factor. Together, QC (nine respondents) and the Prairies (SK/MB) (four respondents) accounted for almost half of the respondents using CSTDs because of audit or regulatory recommendations, with another 11 in ON.

Automation in Parenteral Admixing

Relative to results reported from the 2013/14 and 2016/17 surveys, results for 2020/21 indicated a higher rate (61%, 86/140) of not using any form of automation for parenteral admixtures. As far back as 2013/14, reported utilization of automated compounding devices was higher (38%, 55/143) than in 2020/21 (26%, 36/140); the use of automated syringe-filling devices followed the same pattern: 32% (46/143) in 2013/14 and 24% (33/140) in 2020/21. The largest declines in numbers of facilities using automated devices occurred in BC/YT and QC. However, stand-alone robotic devices were reported by only seven respondents—all in ON—an increase from previous reports.

Traceability

As previously noted, the ability to track medications, to allow determination of which patient received which brand and lot of medication, is a standard of practice. Nationally, respondents were evenly split regarding the ability to trace medications, with exactly half (50%, 71/142) of respondents reporting that they had (or did not have) traceability of products. ON (77%, 30/39) and BC/YT (56%, 15/27) had the highest reported rates of traceability. Hospitals with more than 500 beds (57%, 25/44) were more likely to have this capability than those with 201-500 beds (50%, 29/58) and those with 50-200 beds (43%, 17/40). Interestingly, teaching status did not appear to affect traceability. Facilities with this capability varied in terms of the types of products that could be traced. Regionally, BC/YT stood out, with high rates of traceability for oral solids (100%, 15/15), non-hazardous parenteral products (93%, 14/15), topical products (87%, 13/15), hazardous parenteral products (80%, 12/15) and vaccines (73%, 11/15). Respondents from the Prairies (SK/MB) reported traceability of various product types, with seven of nine facilities tracing hazardous parenteral products and three of nine tracing vaccines. All QC respondents (100%, 13/13) reported traceability for vaccines; these facilities used the Québec vaccination registry (Registre de vaccination du Québec) for this purpose. Methadone was another product for which respondents reported traceability. Unfortunately, most respondents who reported product traceability used a manual process (68%, 48/71), with more automated systems, such as barcoding within a hospital information system (28%, 20/71) and stand-alone systems (18%, 13/71), used less frequently

Only half of respondents (71/142) reported the ability to trace products through the medication distribution process.

Inventory Control

After essentially no change in approaches to purchasing over the past three survey reports, responses for 2020/21 indicate a change in strategy. Overall, inventory turnover was reduced to an average of 7.8 per year (Table C-17) from the previous level of 9.7 in 2016/17 and 9.8 in 2013/14 and 2011/12. Respondents in all regions except the Atlantic provinces noted a reduction in inventory turnover in 2020/21, with the greatest reductions occurring in BC/YT (average reduction of 3) and QC (average reduction of 4.2). It should be noted that the 2020/21 survey was distributed at the end of the third wave and the beginning of the fourth wave of hospital admissions due to COVID-19 infections, and this timing likely influenced these results.[41]

Table C-17. Inventory Turnover Ratios, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(112)	(28)	(48)	(36)	(24)	(84)	(4)	(20)	(17)	(31)	(32)	(12)
Average	**7.8**	**7.3**	**7.8**	**8.1**	**7.7**	**7.0**	**23.2**	**6.9**	**5.1**	**10.4**	**7.5**	**6.9**
SD	6.7	12.0	3.3	4.1	3.6	3.6	29.2	4.4	2.1	11.1	3.5	2.4
Minimum	0.5	0.5	0.8	2.5	2.5	0.5	7.8	0.7	1.7	0.8	2.9	0.5
Median	**7**	**5**	**8**	**8**	**8**	**7**	**9**	**7**	**5**	**9**	**7**	**7**
Maximum	67.0	67.0	16.0	18.0	18.0	17.0	67.0	16.0	9.0	67.0	18.0	10.0
Base: n = 112 respondents												

It has been suggested that the pandemic influenced pharmacy departments to adjust their inventory to accommodate the pressures associated with COVID-19.[42,43] Our data support the idea that, in general, organizations increased their inventory levels to accommodate drug shortages and the pressures being experienced at the time. Please refer to Chapter H – The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services for more information on inventory management during the COVID-19 pandemic.

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D - Human Resources

André Bonnici

The COVID-19 pandemic has significantly affected the lives of all workers around the world. Nowhere is this more evident than in healthcare, where practically all aspects of work life have changed, making existing challenges even more difficult and rendering the maintenance of required levels of service a daily struggle.

Healthcare worker burnout, sick leave due to COVID-19 and workforce shortages have been widely reported in the media. The pharmacy workforce has been particularly implicated, given that medication therapy is at the centre of the battle against COVID-19. Maintaining adequate inventory of medications, handling procurement issues, optimizing the use of available medications, undertaking investigational treatments for COVID-19, organizing mass vaccination campaigns and redirecting pharmacists to areas with increased need for medication expertise (such as critical care) are among the many demands the hospital pharmacy workforce has faced since the beginning of the pandemic.[1,2] These challenges are discussed in more detail in Chapter H – The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services.

One goal of the analyses presented in this human resources chapter was to determine whether COVID-19 had a measurable impact on staffing levels and vacancy rates in pharmacy departments and whether previously observed trends in human resources (such as the resolution of pharmacist shortages) continued or were altered during the pandemic.

More broadly, the Canadian Institute for Health Information (CIHI) has reported data showing that the overall supply of pharmacists in all fields increased over the period 2016 to 2020 (from 40,888 to 44,094, respectively) and that hospital pharmacy positions followed the same trend (from 5,471 to 6,163, respectively, excluding Québec [QC]).[3] However, CIHI has also reported that the number of new graduates from pharmacy programs in Canadian universities declined over the same period (from 1,328 to 1,255, respectively), which may present problems in the coming years.[3] According to the National Association of Pharmacy Regulatory Authorities, the number of registered pharmacy technicians in Canada increased over the period 2016 to 2022 (from 6,601 to 9,960, respectively),[4] which is encouraging but may not be enough to meet the increasing demands of hospital pharmacy practice.

Please note that Alberta's single health authority was unable to participate in the 2020/21 survey because provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region are limited to Manitoba (MB) and Saskatchewan (SK). In addition, for trending purposes over the long-term, regional data for British Columbia and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon during this iteration of the survey.

Human Resource Shortages – Pharmacists

In previous reports in the Hospital Pharmacy in Canada series, vacancy rates were reported only in terms of existing positions that were vacant, without considering positions that were currently occupied, but for which the incumbent personnel were on leave of absence (LOA; for reasons of maternity leave, sick leave or other types of leave) without replacement. In the 2020/21 survey, respondents were asked to report vacancy rates both with and without counting LOAs.

It should also be noted that low vacancy rates do not necessarily indicate that all patient needs for pharmaceutical care were being met; rather, they may simply reflect insufficient funding to create needed pharmacist positions. It would be advisable for all directors of pharmacy to perform a gap analysis to document unmet service needs in the context of current staffing. Equal access to pharmaceutical care for all patients should be a goal toward which all pharmacy departments strive.

As of March 31, 2021, the total number of pharmacist positions (staff + advanced) reported by respondents was 3,071 (Table D-1).

- The average vacancy rate for hospital pharmacists (staff + advanced) was 5.1% (156.7/3,071), excluding LOAs. This is similar to the vacancy rate of 4.8% (171.5/3,538) reported for 2016/17. The vacancy rate in 2020/21 climbed to 8.0% (244.9/3,071) when pharmacists on LOA were included.
- The average vacancy rate for hospital pharmacists in the United States (US), as reported for 2021, was 4.3%,[2] similar to the Canadian rate.
- Non-teaching hospitals had a higher pharmacist vacancy rate than did teaching hospitals and pediatric hospitals (6.6% vs. 3.1% and 3.9%, respectively).
- On a regional basis, QC had the highest pharmacist vacancy rate (8.5%, 83.4/982), followed by BC/YT at 6.8% (34.1/504). With LOAs included, the pharmacist vacancy rate increased to 14.0% (137.8/982) for QC and 8.0% (40.1/504) for BC/YT.

The average vacancy rate for pharmacists in Canada overall has remained relatively low and stable. Québec had the highest regional vacancy rate.

Human Resource Shortages – Pharmacy Technicians

As of March 31, 2021, the total numbers of positions reported by respondents for regulated pharmacy technicians and non-regulated pharmacy assistants were 2,153 and 1,832, respectively. The largest proportion of non-regulated pharmacy assistants was reported from QC (1,416), where regulated pharmacy technicians do not yet exist. The vacancy rates were lower for regulated pharmacy technicians than for non-regulated pharmacy assistants.

- The overall vacancy rate for regulated pharmacy technicians was 4.4% (93.7/2,153), up from 3.1% (79.1/2,536) in 2016/17. The vacancy rate increased to 7.0% (150.2/2,153) when regulated pharmacy technicians on LOA were included.
- The overall vacancy rate for non-regulated pharmacy assistants was 7.6% (139.1/1,832), up from 3.1% (63.5/2,078) in 2016/17. The vacancy rate increased to 9.7% (178.6/1,832) when non-regulated pharmacy assistants on LOA were included.
- In the US, the overall vacancy rate for pharmacy technicians reported in 2021 was 13.1%,[2] higher than the Canadian rate.
- The vacancy rate for regulated pharmacy technicians was highest in Ontario (ON), at 5.8% (68.4/1,188).
- For non-regulated pharmacy assistants, vacancy rates were highest in QC (8.1%, 115.3/1,416) and the Atlantic provinces (New Brunswick [NB], Nova Scotia [NS], Prince Edward Island, Newfoundland and Labrador) (8.6%, 14.0/163).

The vacancy rate for non-regulated pharmacy assistants was higher than for regulated pharmacy technicians.

Table D-1. Positions Vacant as of March 31, 2021

Position		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pharmacists (staff + advanced)	(n=)	(136)	(38)	(56)	(42)	(31)	(100)	(5)	(26)	(23)	(37)	(34)	(16)
	Total number of positions	3,071	267	1,127	1,677	1,193	1,724	154	504	336	985	982	264
	Vacant positions (non-LOA)	156.7	12.1	44.5	100.1	37.4	113.3	6.0	34.1	7.2	24.5	83.4	7.5
	Vacancy rate (non-LOA)	**5.1%**	**4.5%**	**3.9%**	**6.0%**	**3.1%**	**6.6%**	**3.9%**	**6.8%**	**2.1%**	**2.5%**	**8.5%**	**2.8%**
	Vacant positions (including LOA)	244.9	23.1	72.3	149.5	60.3	173.6	11.0	40.1	19.1	36.4	137.8	11.5
	Vacancy rate (including LOA)	**8.0%**	**8.7%**	**6.4%**	**8.9%**	**5.1%**	**10.1%**	**7.21**	**8.0%**	**5.7%**	**3.7%**	**14.0%**	**4.4%**
Pharmacist managers	(n=)	(128)	(34)	(52)	(42)	(30)	(93)	(5)	(26)	(20)	(35)	(33)	(14)
	Total number of positions	289	31	86	172	103	176	9	54	22	71	122	20
	Vacant positions (non-LOA)	10.0	0.0	3.0	7.0	10.0	0.0	0.0	0.0	1.0	3.0	0.0	6.0
	Vacancy rate (non-LOA)	**3.5%**	**0.0%**	**3.5%**	**4.1%**	**9.7%**	**0.0%**	**0.0%**	**0.0%**	**4.5%**	**4.2%**	**0.0%**	**30.0%**
	Vacant positions (including LOA)	12.2	1.0	3.0	8.2	0.0	12.2	0.0	1.0	1.0	3.0	7.2	0.0
	Vacancy rate (including LOA)	**4.2%**	**3.2%**	**3.5%**	**4.8%**	**0.0%**	**6.9%**	**0.0%**	**1.9%**	**4.5%**	**4.2%**	**5.9%**	**0.0%**
Pharmacy technician managers	(n=)	(56)	(13)	(29)	(14)	(17)	(38)	(1)	(21)	(9)	(16)	(0)	(10)
	Total number of positions	65	13	28	24	29	35	1	13	13	26	0	13
	Vacant positions (non-LOA)	3.0	2.0	0.0	1.0	0.0	3.0	0.0	0.0	0.0	1.0	0.0	2.0
	Vacancy rate (non-LOA)	**4.6%**	**15.6%**	**0.0%**	**4.2%**	**0.0%**	**8.5%**	**0.0%**	**0.0%**	**0.0%**	**3.8%**	**0.0%**	**15.4%**
	Vacant positions (including LOA)	3.0	2.0	0.0	1.0	0.0	3.0	0.0	0.0	0.0	1.0	0.0	2.0
	Vacancy rate (including LOA)	**4.6%**	**15.6%**	**0.0%**	**4.2%**	**0.0%**	**8.5%**	**0.0%**	**0.0%**	**0.0%**	**3.8%**	**0.0%**	**15.4%**
Regulated pharmacy technicians	(n=)	(100)	(34)	(45)	(21)	(24)	(73)	(3)	(26)	(23)	(38)	(0)	(13)
	Total number of positions	2,153	275	986	892	734	1,342	77	589	205	1,188	0	171
	Vacant positions (non-LOA)	93.7	14.2	41.5	38.0	38.2	53.5	2.0	12.2	5.5	68.4	0.0	7.6
	Vacancy rate (non-LOA)	**4.4%**	**5.2%**	**4.2%**	**4.3%**	**5.2%**	**4.0%**	**2.6%**	**2.1%**	**2.7%**	**5.8%**	**0.0%**	**4.4%**
	Vacant positions (including LOA)	150.2	29.7	59.5	61.0	60.2	86.0	4.0	21.7	24.5	86.4	0.0	17.6
	Vacancy rate (including LOA)	**7.0%**	**10.8%**	**6.0%**	**6.8%**	**8.2%**	**6.4%**	**5.2%**	**3.7%**	**12.0%**	**7.3%**	**0.0%**	**10.3%**
Non-regulated pharmacy assistants	(n=)	(88)	(23)	(35)	(30)	(20)	(65)	(3)	(19)	(20)	(6)	(34)	(9)
	Total number of positions	1,832	141	373	1,318	744	1,008	80	79	160	14	1,416	163
	Vacant positions (non-LOA)	139.1	9.0	14.8	115.3	44.8	89.3	5.0	0.0	9.8	0.0	115.3	14.0
	Vacancy rate (non-LOA)	**7.6%**	**6.3%**	**4.0%**	**8.7%**	**6.0%**	**8.9%**	**6.3%**	**0.0%**	**6.1%**	**0.0%**	**8.1%**	**8.6%**
	Vacant positions (including LOA)	178.6	9.0	24.8	144.8	72.8	97.8	8.0	0.0	16.8	0.0	146.8	15.0
	Vacancy rate (including LOA)	**9.7%**	**6.3%**	**6.6%**	**11.0%**	**9.8%**	**9.7%**	**10.0%**	**0.0%**	**10.5%**	**0.0%**	**10.4%**	**9.2%**

Base: All respondents with full-time equivalent (FTE) positions > 0 for the corresponding job categories
LOA = leave of absence

Human Resource Shortages – Managers

- The vacancy rate for pharmacist managers was 3.5% (10.0/289, up from 2.1% (6.6/319) in 2016/17. This increase was driven mainly by 6 vacant positions in the Atlantic provinces.
- The vacancy rate for pharmacy technician managers was 4.6% (3.0/65), up from 0% (0/100) in 2016/17. These low vacancy rates may reflect the small number of pharmacy technician manager positions currently in existence.

Pharmacy Staffing Ratios

This section will be useful for pharmacy directors and managers who want to compare their staffing allocations with those of other similar-sized hospitals or justify staffing requirements for new services to hospital administrators. In this report, average ratios are provided for all hospitals combined, for teaching vs. non-teaching hospitals, for hospitals of different bed sizes and for hospitals within each region. The numerator in each ratio is the number of hours of staff time that a pharmacy department has at its disposal to provide pharmacy services (budgeted hours), and the denominator is the total number of patient days.

The number of patient days is a measure widely used to assess and compare workload and resource allocation not only for pharmacy, but also for most departments within the healthcare system, making it a proxy for workload that is universally accepted by healthcare executives. The number of patient days is admittedly an imperfect proxy for workload in the context of hospital pharmacy, but experience has shown that results expressed in these terms have a high degree of consistency and reproducibility, even when all types of patient days are grouped in the denominator.

The 2020/21 survey collected data for program-specific staffing ratios (e.g., critical care patient days, oncology patient days and medicine patient days), as presented in Chapter E – Benchmarking. Here, we report pharmacy staffing ratios calculated for the hospital as a whole. Four distinct ratios have been calculated, to account for the composition of different hospitals in terms of acute care and non-acute care beds, and to account for the important investment of resources in ambulatory/outpatient programs that are offered in most hospitals.

Total budgeted hours/acute patient day: This ratio excludes from the denominator patient days for non-acute care beds, such as long-term care beds, but it includes in the numerator budgeted hours allotted for non-acute care beds and for ambulatory care services.

Inpatient budgeted hours/acute patient day: This ratio affords a more accurate view of resources used specifically for inpatient-related acute care beds by excluding from the numerator budgeted hours allotted for ambulatory care and non-acute care, as well as excluding from the denominator patient days for non-acute care beds.

Total (inpatient + outpatient) budgeted hours/total (acute + non-acute) patient day: This ratio is all-inclusive and should be used with caution by pharmacy managers, as there are important variations when the proportion of acute care beds is taken into account. For example, in 2013/14, in hospitals with 100% acute care beds, this ratio was 0.89, whereas in hospitals with 10%–39% acute care beds, the ratio was 0.32.

Inpatient budgeted hours/total (acute + non-acute) patient day: This ratio excludes from the numerator the hours devoted to providing ambulatory care services. However, as for the previous ratio, caution should be used, as important variations exist when the proportion of acute care beds is taken into account.

Two of these ratios use total budgeted hours because many respondents were unable to separate non-acute care workload (in hours) from acute care workload.

As can be seen in Table D-2, excluding outpatient staffing from the numerator reduced the average staffing ratio for all hospitals from 1.27 total budgeted hours/acute patient day to 1.11 inpatient budgeted hours/acute patient day. Likewise, excluding outpatient staffing from the numerator reduced the average staffing ratio for all hospitals from 0.92 total budgeted hours/acute and non-acute patient day to 0.82 inpatient budgeted hours/acute and non-acute patient day. These data suggest that, on average, about 11% of all pharmacy staffing is dedicated to the provision of outpatient care services. The larger the amount of outpatient staffing a facility has, the greater the difference between ratios that include outpatient staffing in the numerator and those that do not.

Table D-2. Staffing Ratios – Budgeted Hours/Patient Day, 2020/21

Ratio		All	Bed Size			Hospital Type			Province								
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC	SK	MB	ON	QC	NB	NS	PE	NL
Inpatient budgeted hours per acute patient day	(n=)	(135)	(37)	(56)	(42)	(31)	(99)	(5)	(26)	(10)	(12)	(37)	(34)	(6)	(3)	(2)	(5)
	Average	**1.11**	**1.12**	**1.12**	**1.10**	**1.21**	**1.04**	**1.89**	**1.09**	**1.17**	**0.95**	**1.11**	**1.17**	**1.33**	**1.01**	**1.06**	**0.99**
Inpatient budgeted hours per acute and non-acute patient day	(n=)	(135)	(37)	(56)	(42)	(31)	(99)	(5)	(26)	(10)	(12)	(37)	(34)	(6)	(3)	(2)	(5)
	Average	**0.82**	**0.94**	**0.85**	**0.67**	**1.10**	**0.68**	**1.84**	**0.85**	**0.98**	**0.89**	**0.89**	**0.61**	**0.93**	**0.98**	**1.06**	**0.74**
Total budgeted hours per acute patient day	(n=)	(135)	(37)	(56)	(42)	(31)	(99)	(5)	(26)	(10)	(12)	(37)	(34)	(6)	(3)	(2)	(5)
	Average	**1.27**	**1.21**	**1.26**	**1.32**	**1.35**	**1.20**	**2.06**	**1.18**	**1.22**	**1.00**	**1.21**	**1.48**	**1.47**	**1.06**	**1.16**	**1.29**
Total budgeted hours per acute and non-acute patient day	(n=)	(135)	(37)	(56)	(42)	(31)	(99)	(5)	(26)	(10)	(12)	(37)	(34)	(6)	(3)	(2)	(5)
	Average	**0.92**	**1.03**	**0.94**	**0.79**	**1.23**	**0.77**	**2.00**	**0.93**	**1.03**	**0.93**	**0.97**	**0.76**	**1.04**	**1.02**	**1.16**	**0.96**
Base: All respondents providing staffing and patient days information, n = 135																	

- Pediatric hospitals continued to have the highest values for all 4 staffing ratios.
- Teaching hospitals continued to report higher total budgeted hours/acute care patient day than non-teaching hospitals (1.35 vs. 1.20).
- Hospitals with > 500 beds continued to report slightly higher total budgeted hours/acute care patient day than hospitals with 201-500 beds and 50-200 beds (1.32 vs 1.26 and 1.21, respectively).
- Teaching hospitals reported higher inpatient budgeted hours/acute care patient day than non-teaching hospitals (1.21 vs. 1.04). However, this ratio was similar across hospitals of all sizes (1.12, 1.12 and 1.10 for hospitals with 50-200, 201-500 and > 500 beds, respectively).
- Regionally, QC and NB reported the highest ratios when only acute patient days were used as the denominator. However, when both acute and non-acute patient days were used, QC had the lowest ratios, while NB remained above the Canadian averages. This finding is consistent with the fact that QC hospitals have a high number of non-acute patient days. Data in Chapter A – Demographics show that QC had a disproportionately high number of non-acute care beds (19,597) relative to other regions, such as ON (3,842) and BC/YT (2,295).
- Overall, most staffing ratios have increased since 2007/08, indicating steady, continued growth in Canadian hospital pharmacy departments over the past 15 years (Table D-3).
- The increase in staffing ratios observed in the 2020/21 report compared to the 2016/17 report appears to be proportionally more important compared to increases observed between previous reports. This could be explained by factors related to the pandemic that led to lower acute bed occupancy rates seen in 2020/21 (81%) compared to 2016/17 (91%). (Table A-2, Chapter A)

Staffing ratios have continued to increase since 2007/08, indicating steady, continued growth in Canadian hospital pharmacy departments.

Table D-3. Staffing Ratios – Trends from 2007/08 to 2020/21

Ratio		2020/21	2016/17	2013/14	2011/12	2009/10	2007/08
Inpatient budgeted hours per acute patient day	(n=)	(135)	(166)	(149)	(148)		
	Average	**1.11**	**0.89**	**0.86**	**0.80**		
Inpatient budgeted hours per acute and non-acute patient day	(n=)	(135)	(161)	(142)	(143)	(149)	
	Average	**0.82**	**0.69**	**0.62**	**0.58**	**0.62**	
Total budgeted hours per acute patient day	(n=)	(135)	(166)	(149)	(148)	(154)	(144)
	Average	**1.27**	**0.99**	**0.95**	**0.87**	**0.87**	**0.85**
Total budgeted hours per acute and non-acute patient day	(n=)	(135)	(161)	(142)	(143)	(149)	(139)
	Average	**0.92**	**0.77**	**0.68**	**0.64**	**0.68**	**0.63**

Base: All respondents providing staffing and patient days information
Note: Data are for total number of hospitals (including pediatric facilities)

Staff Composition of the Typical Hospital Pharmacy Department

To allow pharmacy directors to compare the staff composition of their respective departments with that of other comparable hospitals, this report includes data on the different types of staff that facilities employ, specifically managers, staff pharmacists, pharmacy technicians, support staff and pharmacy residents. This information will be useful for examining characteristics such as pharmacy technician/pharmacist ratios and for comparing staff composition among different regions, between teaching and non-teaching hospitals, and among hospitals of different sizes.

- Respondents reported an average of 16.9 full-time equivalent (FTE) staff pharmacists and an average of 11.5 FTE advanced practice pharmacists (Table D-4). The only region with a higher ratio of advanced practice pharmacists to staff pharmacists was QC, as a result of the MSc advanced pharmacotherapy program that is offered by both pharmacy faculties in that province.

Table D-4. Average Budgeted Pharmacy Staffing (Full-Time Equivalents), 2020/21

Staff position		All	Bed Size			Hospital Type			Province								
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC	SK	MB	ON	QC	NB	NS	PE	NL
	(n=)	(121)	(34)	(50)	(37)	(27)	(90)	(4)	(25)	(11)	(12)	(37)	(20)	(6)	(3)	(2)	(5)
Staff pharmacist	-	**16.9**	**6.4**	**17.3**	**26.2**	**30.1**	**12.6**	**25.5**	**14.7**	**14.2**	**13.3**	**24.8**	**11.1**	**15.4**	**17.6**	**5.9**	**13.9**
Advanced practice pharmacist (PGY1, PGY2, MSc)	-	**11.5**	**4.2**	**6.3**	**20.2**	**15.8**	**9.6**	**12.9**	**6.8**	**0.9**	**3.0**	**3.6**	**24.5**	**3.9**	**2.3**	**9.0**	**0.0**
Pharmacist manager	-	2.3	0.9	1.6	4.1	3.4	1.9	1.8	2.1	1.0	1.2	2.0	3.7	1.5	1.0	2.0	1.3
Pharmacy manager (not a pharmacist or technician)		1.5	1.0	1.1	1.8	.2.5	0.9	1.0	0.0	0.0	0.0	1.3	1.6	1.0	0.0	0.0	0.0

Table D-4 (continued). Average Budgeted Pharmacy Staffing (Full-Time Equivalents), 2020/21

Staff position		All	Bed Size			Hospital Type			Region								
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC	SK	MB	ON	QC	NB	NS	PE	NL
Pharmacy technician manager	-	1.2	1.0	1.0	1.7	1.7	0.9	1.0	0.6	1.7	1.3	1.6	0.0	1.4	1.0	1.5	0.0
Regulated pharmacy technician	-	**21.5**	**8.1**	**21.9**	**42.5**	**30.6**	**18.4**	**25.6**	**22.7**	**13.2**	**5.0**	**31.3**	0.0	**9.2**	0.0	**17.3**	**16.2**
Non-regulated pharmacy assistant	-	**20.8**	**6.2**	**10.7**	**43.9**	**37.2**	**15.5**	**26.7**	**4.2**	**4.4**	**10.4**	**2.3**	**41.7**	**16.5**	**21.5**	0.0	0.0
Non-regulated pharmacy assistant manager		1.4	1.0	1.0	1.6	1.0	1.5	0.0	0.0	0.0	0.0	0.9	2.0	1.0	0.0	0.0	0.0
Support personnel (clerk, porter, aide)		2.2	0.9	1.6	3.2	3.6	1.5	5.2	1.6	1.0	1.4	1.5	3.8	1.8	1.0	1.0	1.0
Residents	-	3.4	1.4	2.4	4.5	4.7	2.5	2.2	2.8	2.7	2.0	2.6	5.3	2.0	1.0	0.0	0.0
Total pharmacy staff (including residents)	-	**56.7**	**19.0**	**48.4**	**102.8**	**96.5**	**43.9**	**69.1**	**50.4**	**33.0**	**32.6**	**61.6**	**79.7**	**50.6**	**43.3**	31.7	31.3
Combined Staffing Averages																	
Total pharmacists (staff + advanced)		**22.6**	**7.0**	**20.1**	**39.9**	**38.5**	**17.2**	**30.7**	**19.4**	**14.5**	**14.7**	**26.6**	**28.9**	**19.3**	**19.2**	**10.4**	**13.9**
Total regulated pharmacy technicians and non-regulated pharmacy assistants		**29.1**	**10.7**	**24.3**	**52.6**	**47.7**	**23.3**	**31.4**	**25.7**	**16.4**	**15.4**	**31.6**	**41.7**	**25.7**	**21.5**	**17.3**	**16.2**
Base: All respondents providing staffing information																	

Table D-5. Ratios of Regulated Pharmacy Technicians and Non-regulated Pharmacy Assistants to Pharmacists, 2020/21

Ratio		All	Bed Size			Hospital Type			Province								
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC	SK	MB	ON	QC	NB	NS	PE	NL
Inpatient pharmacy technicians and non-regulated pharmacy assistants to inpatient pharmacists (staff + advanced)	(n=)	(136)	(38)	(56)	(42)	(31)	(100)	(5)	(26)	(11)	(12)	(37)	(34)	(6)	(3)	(2)	(5)
	Average	**1.60**	**1.85**	**1.48**	**1.54**	**1.43**	**1.69**	**1.07**	**1.82**	**1.37**	**1.31**	**1.54**	**1.69**	**1.57**	**1.32**	**2.26**	**1.56**
Outpatient regulated pharmacy technicians and non-regulated pharmacy assistants to outpatient pharmacists (staff + advanced)	(n=)	(100)	(17)	(43)	(40)	(23)	(73)	(4)	(22)	(4)	(4)	(24)	(34)	(5)	(1)	(1)	(5)
	Average	**0.82**	**0.74**	**0.77**	**0.90**	**0.71**	**0.86**	**0.72**	**0.68**	**0.40**	**0.62**	**0.70**	**1.05**	**0.64**	**0.71**	**0.00**	**1.28**
Inpatient + outpatient regulated pharmacy technicians and non-regulated pharmacy assistants to inpatient + outpatient pharmacists (staff + advanced)	(n=)	(136)	(38)	(56)	(42)	(31)	(100)	(5)	(26)	(11)	(12)	(37)	(34)	(6)	(3)	(2)	(5)
	Average	**1.45**	**1.65**	**1.35**	**1.39**	**1.27**	**1.52**	**1.08**	**1.57**	**1.23**	**1.28**	**1.43**	**1.51**	**1.44**	**1.32**	**1.63**	**1.33**
Base: All respondents providing staffing information																	

Across all respondents, the average ratio of pharmacy technicians (regulated and non-regulated) to pharmacists was 1.45 (Table D-5), identical with the corresponding ratio in 2016/17.

- When only inpatient staff were considered, the ratio was 1.60, similar to 1.54 as reported for 2016/17.
- As in previous reports, the ratio of pharmacy technicians (regulated and non-regulated) to pharmacists for inpatient staff only was higher for non-teaching hospitals than for teaching hospitals and pediatric hospitals (1.69 vs. 1.43 and 1.07, respectively). The lower ratios for teaching and pediatric hospitals may be due to higher numbers of clinical pharmacists and teaching/research pharmacists in these institutions, which would increase the total number of pharmacists.
- BC had the highest ratio of inpatient pharmacy technicians (regulated and non-regulated) to inpatient pharmacists (1.82), whereas MB, NS and SK had the lowest ratios (1.31, 1.32 and 1.37, respectively).
- QC had the highest ratio of pharmacy technicians (regulated and non-regulated) to pharmacists for outpatient staff (1.05), while SK had the lowest ratio (0.40).
- Staff dedicated to providing services in a retail pharmacy owned and operated by the respondent's facility was reported in only three provinces (BC, MB and ON). ON was the province where this practice was most common, with 15 respondents reporting an average of 3.2 FTEs of staff pharmacists and 4.3 FTEs of regulated pharmacy technicians in the retail setting (Table D-6).

Table D-6. Pharmacy Full-Time Equivalent Positions in a Retail Pharmacy Owned and Operated by the Respondent's Facility, 2020/21

Position		All	Bed Size			Hospital Type			Region		
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC	MB	ON
Staff pharmacist	(n=)	(17)	(1)	(9)	(7)	(7)	(8)	(2)	(1)	(1)	(15)
	Average	**3.0**	**1.4**	**3.5**	**2.5**	**4.6**	**2.0**	**1.2**	**1.0**	**1.4**	**3.2**
Pharmacist manager	(n=)	(12)	(1)	(6)	(5)	(6)	(4)	(2)	(1)	(1)	(10)
	Average	**0.7**	**1.0**	**0.8**	**0.6**	**0.8**	**0.5**	**1.0**	**1.0**	**0.4**	**0.7**
Pharmacy technician manager	(n=)	(4)	(0)	(2)	(2)	(2)	(2)	(0)	(0)	(1)	(3)
	Average	**0.5**		**0.7**	**0.3**	**0.7**	**0.2**			**0.4**	**0.5**
Non-regulated pharmacy assistant manager	(n=)	(1)	(0)	(0)	(1)	(0)	(1)	(0)	(0)	(0)	(1)
	Average	**0.1**			**0.1**		**0.1**				**0.1**
Regulated pharmacy technician	(n=)	(17)	(1)	(9)	(7)	(7)	(8)	(2)	(1)	(1)	(15)
	Average	**4.0**	**4.0**	**4.9**	**2.8**	**5.7**	**2.6**	**3.5**	**3.0**	**0.5**	**4.3**
Non-regulated pharmacy assistant	(n=)	(3)	(0)	(1)	(2)	(1)	(2)	(0)	(0)	(1)	(2)
	Average	**1.0**		**0.6**	**1.3**	**1.5**	**0.8**			**1.5**	**0.8**
Support personnel (clerk, porter, aide)	(n=)	(6)	(0)	(3)	(3)	(3)	(3)	(0)	(0)	(0)	(6)
	Average	**3.6**		**6.8**	**0.4**	**7.0**	**0.2**				**3.6**

Base: All respondents owning and operating a retail pharmacy, n = 17
Note: No advanced practice pharmacists, pharmacy managers or residents were reported to be working in retail pharmacies

Table D-7. Percentage of Pharmacists' Time Spent Performing Different Activities – Trends from 2007/08 to 2020/21

Activity	2020/21	2016/17	2013/14	2011/12	2009/10	2007/08
(n=)	(141)	(184)	(160)	(163)	(159)	(165)
Drug distribution	**36%**	**35%**	**36%**	**41%**	**40%**	**42%**
Clinical activities	**52%**	**54%**	**51%**	**47%**	**47%**	**45%**
Teaching	**6%**	**5%**	**6%**	**6%**	**6%**	**6%**
Other non-direct patient care activities	**5%**	**5%**	**6%**	**5%**	**6%**	**6%**
Pharmacy research	**1%**	**1%**	**1%**	**1%**	**1%**	**1%**

Overall, the estimated percentage of time that pharmacists spend performing various functions has not changed substantially since the 2016/17 and 2013/14 reports. The time spent on clinical activities appears to have reached a plateau in 2020/21 at 52%, compared with 54% in 2016/17 and 51% in 2013/14 (Table D-7). The addition of regulated pharmacy technicians to the workforce does not seem to have resulted in an increase in the amount of time that pharmacists spend on clinical activities. Interestingly, the provinces with the highest percentage of time spent on clinical activities had mostly regulated pharmacy technicians in their staff composition (Table D-8).

The estimated percentage of time spent by pharmacists on clinical activities appears to have reached a plateau in 2020/21 when compared with the two previous reports.

- Teaching hospitals reported a higher percentage of time spent on clinical activities (59%) than non-teaching and pediatric hospitals (50% and 51%, respectively).
- The highest proportions of clinical activities were reported from NS, SK and ON (61%, 61% and 59%, respectively).

Table D-8. Percentage of Pharmacists' Time Spent Performing Different Activities, 2020/21

Activity		All	Bed Size			Hospital Type			Province								
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC	SK	MB	ON	QC	NB	NS	PE	NL
Drug distribution (including investigational drugs)	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(11)	(12)	(39)	(35)	(6)	(4)	(2)	(5)
	Avg%	**36**	**47**	**33**	**31**	**27**	**39**	**37**	**43**	**29**	**43**	**29**	**33**	**46**	**24**	**60**	**59**
Clinical activities	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(11)	(12)	(39)	(35)	(6)	(4)	(2)	(5)
	Avg%	**52**	**43**	**56**	**56**	**59**	**50**	**51**	**48**	**61**	**50**	**59**	**51**	**40**	**61**	**30**	**39**
Teaching	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(11)	(12)	(39)	(35)	(6)	(4)	(2)	(5)
	Avg%	**6**	**4**	**6**	**6**	**8**	**5**	**6**	**7**	**5**	**3**	**5**	**8**	**3**	**5**	**2**	**0**
Other non-direct patient care activities (e.g., drug use evaluation, audits, drug information)	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(11)	(12)	(39)	(35)	(6)	(4)	(2)	(5)
	Avg%	**5**	**5**	**4**	**6**	**4**	**5**	**4**	**1**	**4**	**3**	**6**	**7**	**10**	**6**	**8**	**2**
Pharmacy research	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(11)	(12)	(39)	(35)	(6)	(4)	(2)	(5)
	Avg%	**1**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**4**	**0**	**0**

Base: All respondents, n = 141
Avg% = average percentage

Salaries

The average starting and top salaries for staff pharmacists were higher in larger hospitals (> 500 beds) (Table D-9a).

- There were some notable regional differences (Table D-9b). NS and NB had substantially lower starting and top salaries for staff pharmacists, and QC had the highest starting and top salaries. It should be noted that Alberta, which had the highest salaries in the 2016/17 survey, did not participate in the 2020/21 survey.

Table D-9a. Average Annual Starting and Top Salaries by Position (Excluding Pharmacy Technicians), by Hospital Size and Type, 2020/21

Position		All	Bed Size			Hospital Type		
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric
Staff pharmacist	(n=)	(107)	(28)	(44)	(35)	(23)	(81)	(3)
	Start $	89,182	88,589	86,527	92,996	87,638	89,657	88,210
	(n=)	(111)	(28)	(48)	(35)	(25)	(82)	(4)
	Top $	110,143	107,611	107,510	115,781	107,876	111,076	105,189
Advanced practice pharmacist (PGY1, PGY2, MSc	(n=)	(74)	(10)	(33)	(31)	(20)	(51)	(3)
	Start $	99,935	104,471	97,492	101,073	95,146	101,664	102,474
	(n=)	(78)	(11)	(36)	(31)	(22)	(52)	(4)
	Top $	119,840	122,864	118,279	120,580	117,523	120,606	122,628
Practice leader/coordinator	(n=)	(55)	(4)	(25)	(26)	(17)	(35)	(3)
	Start $	113,082	103,667	115,513	112,193	106,956	115,793	116,174
	(n=)	(59)	(4)	(29)	(26)	(18)	(37)	(4)
	Top $	147,716	122,600	127,592	174,027	192,092	128,480	125,961
Pharmacy supervisor/ coordinator	(n=)	(33)	(3)	(18)	(12)	(9)	(22)	(2)
	Start $	104,644	108,209	99,416	111,593	104,422	104,681	105,235
	(n=)	(38)	(5)	(21)	(12)	(11)	(24)	(3)
	Top $	151,922	98,868	117,972	233,439	224,731	122,054	123,897
Pharmacist manager	(n=)	(104)	(24)	(43)	(37)	(24)	(76)	(4)
	Start $	113,181	112,444	110,246	117,070	113,671	112,513	122,938
	(n=)	(107)	(24)	(45)	(38)	(26)	(76)	(5)
	Top $	135,870	129,727	134,622	141,227	134,430	136,262	137,391
Pharmacy manager (neither pharmacist nor pharmacy technician)	(n=)	(19)	(2)	(8)	(9)	(7)	(11)	(1)
	Start $	75,316	58,048	81,219	73,905	78,449	73,445	73,955
	(n=)	(23)	(2)	(12)	(9)	(8)	(14)	(1)
	Top $	96,487	71,308	101,874	94,899	101,066	93,895	96,141
Pharmacy technician manager	(n=)	(41)	(7)	(22)	(12)	(13)	(27)	(1)
	Start $	74,304	66,793	73,898	79,430	77,388	72,528	82,156
	(n=)	(42)	(8)	(22)	(12)	(12)	(28)	(2)
	Top $	81,795	71,938	80,443	90,844	94,083	77,138	73,253

Table D-9a (continued). Average Annual Starting and Top Salaries by Position (Excluding Pharmacy Technicians), by Hospital Size and Type, 2020/21

Position		All	Bed Size			Hospital Type		
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric
Non-regulated pharmacy assistant manager	(n=)	(5)	(1)	(0)	(4)	(1)	(4)	(0)
	Start $	40,436	47,070		38,777	66,608	33,893	
	(n=)	(6)	(1)	(0)	(5)	(1)	(5)	(0)
	Top $	66,376	50,666		69,518	86,591	62,333	
Resident stipend	(n=)	(56)	(5)	(27)	(24)	(25)	(27)	(4)
	Average	37,372	39,000	36,488	38,026	38,047	36,945	36,031

Base: All respondents who provided salary information

Table D-9b. Average Annual Starting and Top Salaries by Position (Excluding Pharmacy Technicians), by Province, 2020/21

Position		All	Province								
			BC	SK	MB	ON	QC	NB	NS	PE	NL
Staff pharmacist	(n=)	(107)	(23)	(10)	(6)	(33)	(23)	(5)	(1)	(2)	(4)
	Start $	89,182	83,928	91,513	87,415	88,147	99,222	74,204	75,000	97,948	84,912
	(n=)	(111)	(23)	(10)	(6)	(34)	(23)	(6)	(2)	(2)	(5)
	Top $	110,143	107,240	106,184	110,516	110,192	122,562	94,679	97,250	113,197	96,008
Advanced practice pharmacist (PGY1, PGY2, MSc	(n=)	(74)	(19)	(4)	(0)	(13)	(32)	(5)	(0)	(1)	(0)
	Start $	99,935	97,370	103,770		95,021	106,422	78,270		97,948	
	(n=)	(78)	(19)	(5)	(0)	(13)	(32)	(6)	(1)	(1)	(1)
	Top $	119,840	119,162	119,923		119,332	124,719	99,478	122,438	113,197	109,000
Practice leader/ coordinator	(n=)	(55)	(17)	(4)	(0)	(8)	(24)	(1)	(1)	(0)	(0)
	Start $	113,082	127,271	97,839		100,864	111,221	78,330	110,000		
	(n=)	(59)	(17)	(4)	(0)	(9)	(25)	(2)	(2)	(0)	(0)
	Top $	147,716	134,729	113,578		119,097	178,299	101,895	118,719		
Pharmacy supervisor/ coordinator	(n=)	(33)	(6)	(1)	(0)	(6)	(19)	(1)	(0)	(0)	(0)
	Start $	104,644	108,065	97,515		75,657	116,122	47,069			
	(n=)	(38)	(6)	(1)	(0)	(7)	(19)	(1)	(1)	(0)	(3)
	Top $	151,922	136,047	113,181		95,770	199,293	47,069	122,438		72,367
Pharmacist manager	(n=)	(104)	(20)	(9)	(7)	(31)	(28)	(5)	(1)	(2)	(1)
	Start $	113,181	128,316	119,074	96,575	105,000	119,582	86,529	100,000	104,812	111,283
	(n=)	(107)	(20)	(8)	(6)	(30)	(29)	(6)	(2)	(2)	(4)
	Top $	135,870	160,173	126,888	121,930	127,809	145,104	105,188	112,500	121,114	111,821
Pharmacy manager (neither pharmacist nor pharmacy technician)	(n=)	(19)	(1)	(0)	(0)	(5)	(12)	(1)	(0)	(0)	(0)
	Start $	75,316	59,000			87,801	72,991	57,096			
	(n=)	(23)	(2)	(0)	(0)	(6)	(12)	(3)	(0)	(0)	(0)
	Top $	96,487	77,000			115,924	94,005	80,530			

Table D-9b (continued). Average Annual Starting and Top Salaries by Position (Excluding Pharmacy Technicians), by Province, 2020/21

Position		All	Province								
			BC	SK	MB	ON	QC	NB	NS	PE	NL
Pharmacy technician manager	(n=)	(41)	(20)	(3)	(0)	(12)	(0)	(3)	(1)	(2)	(0)
	Start $	74,304	76,108	83,137		79,006		48,904	75,000	52,552	
	(n=)	(42)	(19)	(3)	(0)	(12)	(0)	(4)	(2)	(2)	(0)
	Top $	81,795	77,006	95,794		99,500		52,146	76,675	64,467	
Non-regulated Pharmacy Assistant Manager	(n=)	(5)	(0)	(0)	(0)	(1)	(3)	(1)	(0)	(0)	(0)
	Start $	40,436				10,500	48,203	47,070			
	(n=)	(6)	(0)	(0)	(0)	(1)	(4)	(1)	(0)	(0)	(0)
	Top $	66,376				105,000	60,648	50,666			
Resident stipend	(n=)	(56)	(19)	(4)	(1)	(13)	(15)	(2)	(1)	(0)	(1)
	Average	37,372	35,421	43,732	36,097	36,084	40,333	34,283	34,125		32,000

Base: All respondents who provided salary information

Table D-10a. Average Annual Starting and Top Salaries of Regulated Pharmacy Technicians and Non-regulated Pharmacy Assistants, by Hospital Size and Type, 2020/21

Position		All	Bed Size			Hospital Type		
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric
Regulated pharmacy technician (Level 1 or staff)	(n=)	(84)	(27)	(38)	(19)	(21)	(60)	(3)
	Start $	54,434	54,502	54,165	54,875	54,620	54,185	58,105
	(n=)	(80)	(25)	(37)	(18)	(19)	(59)	(2)
	Top $	59,931	58,855	60,084	61,112	61,008	59,484	62,900
Regulated pharmacy technician (Level 2 or senior)	(n=)	(45)	(11)	(21)	(13)	(12)	(30)	(3)
	Start $	60,010	59,681	60,630	59,285	61,582	59,131	62,503
	(n=)	(46)	(11)	(22)	(13)	(14)	(29)	(3)
	Top $	64,242	62,323	64,411	65,579	63,379	64,132	69,330
Non-regulated pharmacy assistant (Level 1 or staff)	(n=)	(56)	(14)	(27)	(15)	(13)	(41)	(2)
	Start $	44,605	42,771	45,602	44,522	43,633	44,926	44,357
	(n=)	(57)	(15)	(27)	(15)	(12)	(42)	(3)
	Top $	48,241	48,192	48,632	47,586	46,296	48,866	47,271
Non-regulated pharmacy assistant (Level 2 or senior)	(n=)	(49)	(5)	(21)	(23)	(12)	(35)	(2)
	Start $	43,666	42,251	45,943	41,894	42,578	43,935	45,484
	(n=)	(50)	(5)	(22)	(23)	(13)	(35)	(2)
	Top $	46,920	46,103	48,414	45,668	45,658	47,292	48,605

Base: All respondents who provided salary information

Table D-10b. Average Annual Starting and Top Salaries of Regulated Pharmacy Technicians and Non-regulated Pharmacy Assistants, by Province, 2020/21

Position		All	Province								
			BC	SK	MB	ON	QC	NB	NS	PE	NL
Regulated pharmacy technician (Level 1 or staff)	(n=)	(84)	(22)	(10)	(5)	(35)	(0)	(5)	(0)	(2)	(5)
	Start $	54,434	57,380	64,094	45,428	54,241		43,071		50,173	45,574
	(n=)	(80)	(21)	(9)	(5)	(33)	(0)	(5)	(0)	(2)	(5)
	Top $	59,931	57,629	68,802	51,588	64,025		45,719		56,667	50,473
Regulated pharmacy technician (Level 2 or senior)	(n=)	(45)	(18)	(6)	(1)	(17)	(0)	(2)	(0)	(0)	(1)
	Start $	60,010	59,666	68,747	48,347	60,528		44,570			47,500
	(n=)	(46)	(18)	(5)	(1)	(17)	(0)	(3)	(0)	(0)	(2)
	Top $	64,242	61,462	73,946	53,470	69,335		47,088			52,825
Non-regulated pharmacy assistant (Level 1 or staff)	(n=)	(56)	(19)	(7)	(6)	(8)	(10)	(5)	(1)	(0)	(0)
	Start $	44,605	48,147	42,677	41,069	49,932	38,904	41,491	42,000		
	(n=)	(57)	(19)	(7)	(6)	(8)	(10)	(5)	(2)	(0)	(0)
	Top $	48,241	49,590	45,902	48,825	56,848	42,150	44,045	48,375		
Non-regulated pharmacy assistant (Level 2 or senior)	(n=)	(49)	(17)	(0)	(0)	(0)	(29)	(3)	(0)	(0)	(0)
	Start $	43,666	51,603				39,177	42,085			
	(n=)	(50)	(17)	(0)	(0)	(0)	(29)	(4)	(0)	(0)	(0)
	Top $	46,920	53,017				43,737	44,082			

Base: All respondents who provided salary information

There were substantial regional differences in starting and top salaries for most categories of employees. There was also a significant gap between salaries of regulated pharmacy technicians and those of non-regulated pharmacy assistants.

- Regulated pharmacy technicians had higher starting and top salaries than non-regulated pharmacy assistants (Tables D-10a and D10-b).
- Regulated pharmacy technicians in SK had the highest starting and top salaries ($68,747 and $73,946, respectively).
- Non-regulated pharmacy assistants in QC had the lowest starting and top salaries ($38,904 and $42,150, respectively).
- For all pharmacy staffing categories, average starting salaries have increased over time (Table D-11).
- Pharmacy directors' salaries have increased, with 54% (73/136) earning $150,000 or more, compared with 35% (61/175) in 2016/17 (Table D-12).

Table D-11. Average Starting Salaries – Trends from 2007/08 to 2020/21

Position		2020/21	2016/17	2013/14	2011/12	2009/10	2007/08
Pharmacist manager	(n=)	(104)	(130)	(127)	(115)	(110)	(122)
		$113,181	$104,758	$96,318	$89,718	$90,843	$87,290
Pharmacy manager (neither pharmacist nor technician)	(n=)	(19)	(19)	(34)	(25)	(10)	(14)
		$75,316	$74,868	$63,198	$71,708	$67,611	$62,006
Practice leader/coordinator	(n=)	(55)	(69)	(66)	(60)	(55)	(62)
		$113,082	$104,188	$90,843	$82,282	$84,897	$83,600
Pharmacy supervisor/ coordinator	(n=)	(33)	(44)	(53)	(49)	(39)	(43)
		$104,644	$92,509	$87,515	$83,076	$81,247	$80,416
Pharmacy technician manager	(n=)	(41)	(70)	(66)	(60)	(55)	(26)
		$74,304	$64,548	$57,690	$54,976	$53,464	$51,992
Staff pharmacist	(n=)	(107)	(162)	(149)	(142)	(138)	(130)
		$89,182	$85,272	$82,576	$77,286	$76,784	$73,467
Advanced practice pharmacist (PGY1, PGY2, MSc)	(n=)	(74)	(98)	(76)	(77)	(46)	(70)
		$99,935	$92,616	$87,681	$84,696	$81,099	$74,502
Regulated pharmacy technician (Level 1 or staff, where Level 2 exists)	(n=)	(84)	(49)	(32)			
		$54,434	$50,247	$49,713			
Regulated pharmacy technician (Level 2 or senior, where Level 1 exists)	(n=)	(45)	(49)	(32)			
		$60,010	$53,831	$52,931			
Non-regulated pharmacy assistant (Level 1 only)	(n=)	(56)	(108)	(84)			
		$44,605	$41,066	$40,375			
Non-regulated pharmacy assistant (Level 2 or senior, where Level 1 exists)	(n=)	(49)					
		$43,666					

Base: All respondents
Note: Data are for total number of hospitals (including pediatric facilities)

Table D-12. Director Salary Ranges – Trends from 2007/08 to 2020/21

Salary range	2020/21	2016/17	2013/14	2011/12	2009/10	2007/08
(n=)	(136)	(175)	(165)	(172)	(155)	(162)
< $90,000	0	1%	1%	5%	6%	15%
$90,000 - $99,999	1%	2%	5%	10%	10%	20%
$100,000 - $109,999	4%	7%	10%	13%	19%	29%
$110,000 - $119,999	3%	10%	13%	18%	22%	12%
$120,000 - $129,999	10%	13%	28%	19%	19%	14%
$130,000 - $139,999 (≥ $130,000 was the highest category listed in 2007/08 and 2009/10)	12%	9%	19%	11%	25%	10%
$140,000 - $149,999 (≥ $140,000 was the highest category listed in 2011/12)	16%	23%	8%	24%		

Table D-12 (continued). Director Salary Ranges – Trends from 2007/08 to 2020/21						
Salary range	**2020/21**	**2016/17**	**2013/14**	**2011/12**	**2009/10**	**2007/08**
$150,000 - $159,999	**24%**	**12%**	**6%**			
$160,000 - $169,999 (≥ $160,000 was the highest category listed in 2013/14)	**9%**	**6%**	**9%**			
≥ $170,000 (added in 2016/17)	**21%**	**17%**				
Base: All respondents Note: Data are for total number of hospitals (including pediatric facilities)						

Conclusion

The results of the 2020/21 CSHP Hospital Pharmacy in Canada Survey indicate that vacancy rates for pharmacist and regulated pharmacy technician positions in Canada have remained stable and relatively moderate, except in QC, where vacancy rates for pharmacists and non-regulated pharmacy assistants are increasing. Overall, pharmacy staffing ratios have continued to increase for all categories of staff, indicating continued growth in pharmacy departments.

The increase in staffing ratios observed in the 2020/21 report compared to the 2016/17 report appears to be proportionally more important compared to increases observed between previous reports. This could be explained by factors related to the pandemic that led to lower acute bed occupancy rates in 2020/21.

There continues to be considerable variation among regions in terms of the percentage of advanced practice pharmacists on staff. The percentage of time that pharmacists spend on clinical activities appears to have reached a plateau, but some regional differences exist. Salaries for all categories of pharmacy staff have continued to increase, with some regional differences for both pharmacists and non-regulated pharmacy assistants.

The impact of COVID-19 on staffing trends was mostly evident on staffing ratios. It will be interesting to see what effect factors such as "post-COVID disengagement", generalized workforce shortages and the aging Canadian population will have on hospital pharmacy human resources in the coming years. Meeting the needs of patients will likely require creative solutions, including technology, new or redefined roles for some health professionals and working conditions that promote staff retention.

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E - Benchmarking

Jean-François Bussières and Douglas Doucette

Incorporated under the Canada Corporations Act in 1994, the Canadian Institute for Health Information (CIHI) was created by the federal, provincial and territorial governments as an independent, not-for-profit organization dedicated to developing a common approach to Canadian health information. However, the data collected and published by CIHI are very limited with respect to hospital pharmacy practice.

The CSHP Hospital Pharmacy in Canada Survey has collected extensive data on hospital pharmacy practice since 1985. Few professions can count on such data sharing by departmental directors to allow external comparisons and implementation of best practices. Since then, respondents have been invited to report data relating to their human workforce and material resources (e.g., staffing and drug costs) and some volumes of activity (e.g., number of patient days). These data have made it possible to calculate a few ratios (e.g., budgeted hours per patient day); however, directors of pharmacy departments have expressed the need for more detailed data (i.e., additional ratios, ratios per patient care programs) to help with their workforce planning for various patient care programs. Thus, starting with the 1997/98 survey, a section of the report has been dedicated to benchmarking. In the 2020/21 survey, respondents were asked to provide data related to specific patient care programs, if possible; however, it was recognized that partial data (e.g., for drug costs, paid hours, admissions or patient days) would still be useful. Although the number of respondents who provided detailed benchmarking data is smaller than for other sections of the survey, the data were thought to be substantial enough to warrant calculating and exploring these ratios.

With regard to drug costs, respondents were asked to provide all drug costs, regardless of the source of funding (e.g., inpatient and outpatient oncology drugs. which may be partly covered by cancer agencies), as well as costs for anesthetic gases, parenteral nutrition solutions and lipids, and any inpatient drug costs recovered from outside agencies. Respondents were asked to exclude costs for intravenous solutions (e.g., normal saline, 5% dextrose in water [D5W]), continuous bladder irrigation solutions, dialysis solutions, contrast media and bulk gases (e.g., oxygen, nitric oxide).

With respect to human resources, respondents were asked to provide actual or reasonable estimates of annual paid hours (not budgeted hours) for pharmacy staff in both drug distribution and clinical activities. If for certain patient care programs, respondents could provide only drug distribution or clinical staffing information, these data were considered useful for benchmarking purposes. For example, if clinical staff were assigned to the program, but drug distribution staff were centralized and their hours could not be easily allocated to the program, respondents were allowed to provide the paid hours for clinical activities only for that specific patient care program. If respondents were only able to provide totals for the various variables, those data were also deemed usable. If respondents were providing data for a pediatric stand-alone hospital, they were invited to supply data according to the same patient care programs as were used for adult hospitals, with the exception of adult critical care and pediatrics.

In Chapter B, Clinical Pharmacy Practice, a list of 38 patient care programs is used, to allow more detailed descriptions of the placement of decentralized pharmacists in ambulatory and inpatient care; here, however, we have used a shortened list of only 11 programs.

Before consulting the following tables, we recommend that you consider the following:

- In general, the data are non-parametric, so they are presented as medians and 10th and 90th percentiles.
- In the 2020/21 survey, respondents were asked to report paid hours, whereas in the 2016/17 survey, they were asked to report budgeted hours. The advantage of using ratios calculated on the basis of paid hours, as has been done in this report, is that data for hours paid reflect the real situation, including the effects of absences linked to staff shortages, sick leave, maternity leave or unpaid leave,

unlike budgeted hours, which reflect a theoretical situation. This change must be taken into account when comparing ratios from this survey and the previous one.

- Although hospital pharmacy data have been collected and published for many years, there are no formal human resource management ratios per department or per patient care program; rather, each local pharmacy management team proposes the designation of its own workforce, considering the needs of the organization, the expertise of the available resources and the history of the development of pharmaceutical services and care within their facility.
- Given the data collection tools provided to the respondents and the time dedicated to responding to this survey, the number of respondents varied greatly from one ratio to another. It is important to note the number of respondents for each ratio, bearing in mind that the higher the number of respondents, the better representation will be provided by the associated ratios.
- In some cases, there were very few respondents, which can be explained by the subspecialty associated with the patient care program (e.g., bone marrow transplant, BMT). Data were considered sufficiently valid to warrant presentation when the number of respondents was at least five.
- The ratios are broken down by job title groupings: for example, pharmacists (drug distribution and clinical pharmacists, as well as managers), regulated pharmacy technicians and non-regulated pharmacy assistants (those performing drug distribution and clinical duties, as well as those with other administrative support titles), and all (pharmacists, regulated pharmacy technicians and non-regulated pharmacy assistants in all roles). Since the base per ratio varies, the total for all patient care programs could not be adequately calculated.
- Although regional ratios might indicate regional trends in terms of human resources or costs, we have chosen not to publish the data in this manner, given the small number of responses per region for most of the ratios.
- When comparing the 2020/21 data with those from 2016/17, please exercise caution. For 2016/17, the ratios were calculated separately for pharmacists and for pharmacy technicians (including non-regulated pharmacy assistants), with no ratios combining the two positions. In addition, only ratios per inpatient day or per visit were calculated for the previous report.
- The increase in staffing ratios observed in the 2020/21 report compared to the 2016/17 report appears to be proportionally more important compared to increases observed between previous reports. This could be explained by factors related to the pandemic that led to lower acute bed occupancy rates seen in 2020/21 (81%) compared to 2016/17 (91%) (Table A-2, Chapter A).

Patient care programs were defined as follows for this section of the survey:

- “Medicine” includes alternate level of care, cardiology, clinical pharmacology and toxicology, diabetes and endocrinology, gastroenterology, general medicine, genetics, geriatrics, hematology/anticoagulation, HIV/AIDS, infectious diseases, mental health, nephrology/renal/dialysis care, neurology, pain service, palliative care, respirology
- “Surgery” includes cardiac, general surgery, neurosurgery, orthopedic, solid organ transplant, vascular, other surgeries
- “Obstetrics/Gynecology” includes all aspects of women’s health
- “Pediatrics” includes pediatric or newborn care within an adult facility
- “Oncology” includes all malignancies, including hematological
- “Long-term care” includes complex continuing care and long-term care
- “Other” (inpatient services/programs) includes all other inpatient services not specified in the list
- “Other” (outpatient services/programs) includes all other outpatient clinics, including anticoagulant, cardiac, home care, surgical pre-admission clinic, outpatient IV services, etc.

Inpatient Paid Hours

Table E-1 presents a profile of paid hours by job grouping, per inpatient bed, per inpatient admission and per patient day. We have more experience with the ratios per patient day but less experience with ratios per admission and per bed. We decided to share all of them to allow more benchmarking opportunities.

The following observations are pertinent:

- The data collected are heterogeneous; given the nature of the data provided and the data collection method, we have chosen not to publish overall ratios encompassing all patient care programs.
- With respect to paid hours per inpatient bed, the median ratios were very high for BMT (312.3), oncology (255.9), adult critical care (226.7) and pediatrics (115.6).
- With respect to paid hours per patient day, the median ratios were very high for BMT (1.05), adult critical care (0.86), oncology (0.66), pediatrics (0.52) and obstetrics/gynecology (0.45).
- With respect to paid hours per admission, the median ratios were very high for BMT (20.4), oncology (12.7), pediatric critical care (11.5) and adult critical care (9.0).
- For the 2016/17 report, only ratios per patient day were calculated; comparing the ratios for 2020/21 with those for 2016/17, we note the following observations:
  - For pharmacists, the median paid hours per patient day were similar to budgeted hours in the previous survey for obstetrics/gynecology (0.15 in 2020/21 vs. 0.10 in 2016/17), rehabilitation (0.11 vs. 0.11) and pediatrics (0.39 vs. 0.39).
  - For pharmacists, the median paid hours per patient day were higher in 2020/21 than budgeted hours in 2016/17 for medicine (0.23 vs. 0.18), surgery (0.27 vs. 0.16), adult critical care (0.56 vs. 0.48) and pediatric critical care (0.35 vs. 0.32).
  - In the 2016/17 survey, we did not collect data for long-term care, BMT or other programs.

Overall, the same trends were noted for paid hours per patient day for pharmacy technicians and non-regulated pharmacy assistants.

Table E-1. Inpatient Paid Hours per Inpatient Bed, per Patient Day and per Inpatient Admission, 2020/21

		Patient Care Programs										
Ratio	**Statistics**	**Medicine**	**Surgery**	**Obstetrics / Gynecology**	**Pediatrics**	**Adult Critical Care**	**Pediatric Critical Care**	**Oncology**	**Bone Marrow Transplant**	**Rehabilitation**	**Long-Term Care**	**Other**
Pharmacist paid hours per inpatient bed	(n=)	(41)	(37)	(22)	(25)	(39)	(15)	(11)	(6)	(13)	(16)	(16)
	10%ile	10.9	8.7	2.2	18.1	65.6	38.6	13.2	n/a	0.1	1.9	0.1
	Median	**63.9**	**97.2**	**27.4**	**48.8**	**156.0**	**100.0**	**117.7**	**312.3**	**21.5**	**10.0**	**88.6**
	90%ile	193.6	192.7	57.6	173.5	288.9	330.8	553.7	n/a	73.1	55.6	330.2
Regulated pharmacy technician or non-regulated pharmacy assistant paid hours per inpatient bed	(n=)	(27)	(23)	(19)	(15)	(28)	(8)	(7)	(< 5)	(9)	(13)	(8)
	10%ile	11.6	10.9	30.6	22.0	23.9	n/a	n/a	n/a	n/a	7.7	n/a
	Median	**66.5**	**97.2**	**82.2**	**93.3**	**160.7**	**67.0**	**139.8**	**n/a**	**30.7**	**16.1**	**57.0**
	90%ile	169.6	296.3	181.8	195.7	404.7	n/a	n/a	n/a	0.3	43.1	n/a

Table E-1 (continued). Inpatient Paid Hours per Inpatient Bed, per Patient Day and per Inpatient Admission, 2020/21

		Patient Care Programs										
Ratio	**Statistics**	**Medicine**	**Surgery**	**Obstetrics / Gynecology**	**Pediatrics**	**Adult Critical Care**	**Pediatric Critical Care**	**Oncology**	**Bone Marrow Transplant**	**Rehabilitation**	**Long-Term Care**	**Other**
All paid hours per inpatient bed	(n=)	(43)	(39)	(24)	(27)	(42)	(16)	(13)	(6)	(13)	(16)	(17)
	10%ile	17.1	9.2	2.3	24.8	75.4	25.1	22.0	n/a	0.1	3.2	0.1
	Median	**85.8**	**86.6**	**77.0**	**115.6**	**226.7**	**107.5**	**255.9**	**312.3**	**30.8**	**24.1**	**131.4**
	90%ile	351.3	422.5	198.5	297.8	603.9	514.5	936.4	n/a	199.2	78.1	457.2
Pharmacist paid hours per patient day	(n=)	(34)	(33)	(21)	(20)	(31)	(13)	(9)	(5)	(10)	(16)	(10)
	10%ile	0.07	0.06	0.01	0.22	0.31	0.08	n/a	n/a	0.01	0.01	0.09
	Median	**0.23**	**0.27**	**0.15**	**0.39**	**0.56**	**0.35**	**0.40**	**1.05**	**0.11**	**0.03**	**0.36**
	90%ile	0.84	0.67	0.33	0.92	1.10	1.14	n/a	n/a	0.28	0.35	1.02
Regulated pharmacy technician or non-regulated pharmacy assistant paid hours per patient day	(n=)	(25)	(22)	(19)	(13)	(24)	(7)	(7)	(< 5)	(8)	(14)	(5)
	10%ile	0.06	0.10	0.12	0.11	0.20	n/a	n/a	n/a	n/a	0.03	n/a
	Median	**0.27**	**0.43**	**0.37**	**0.51**	**0.77**	**0.34**	**0.43**	**n/a**	**0.20**	**0.05**	**0.21**
	90%ile	1.37	1.75	0.78	3.89	1.54	n/a	n/a	n/a	n/a	0.17	n/a
All paid hours per patient day	(n=)	(36)	(35)	(22)	(22)	(34)	(14)	(11)	(5)	(10)	(16)	(11)
	10%ile	0.12	0.06	0.04	0.20	0.45	0.13	0.06	n/a	0.03	0.03	0.12
	Median	**0.40**	**0.49**	**0.45**	**0.52**	**0.86**	**0.39**	**0.66**	**1.05**	**0.31**	**0.07**	**0.38**
	90%ile	2.04	2.02	1.00	2.53	2.49	1.64	5.51	n/a	43.28	0.46	1.03
Pharmacist paid hours per inpatient admission	(n=)	(29)	(30)	(21)	(18)	(29)	(11)	(8)	(5)	(11)	(14)	(11)
	10%ile	0.9	0.6	0.0	0.2	1.3	0.7	n/a	n/a	0.1	4.1	0.1
	Median	**2.3**	**1.8**	**0.3**	**1.6**	**8.2**	**10.2**	**5.5**	**20.4**	**4.2**	**16.7**	**2.7**
	90%ile	10.1	5.3	0.7	3.5	17.2	50.4	n/a	n/a	43.3	43.2	39.0
Regulated pharmacy technician or non-regulated pharmacy assistant paid hours per inpatient admission	(n=)	(22)	(22)	(19)	(13)	(24)	(7)	(7)	(< 5)	(8)	(13)	(5)
	10%ile	0.8	0.7	0.2	0.2	1.3	n/a	n/a	n/a	n/a	7.6	n/a
	Median	**3.3**	**3.7**	**0.7**	**2.0**	**6.7**	**11.5**	**10.3**	**n/a**	**18.6**	**22.8**	**5.6**
	90%ile	17.5	9.7	1.8	5.4	24.5	n/a	n/a	n/a	n/a	81.1	n/a
All paid hours per inpatient admission	(n=)	(31)	(32)	(22)	(20)	(32)	(12)	(10)	(5)	(11)	(14)	(12)
	10%ile	1.7	0.7	0.1	0.5	2.5	1.5	0.4	n/a	0.6	14.4	0.2
	Median	**4.2**	**5.0**	**1.1**	**2.7**	**9.0**	**11.5**	**12.7**	**20.4**	**6.1**	**36.5**	**7.1**
	90%ile	24.9	11.1	2.1	8.4	39.2	74.4	47.4	n/a	129.1	122.2	38.1

Base: All hospitals providing benchmarking data. n/a: not applicable (more specifically, when count < 5, no data are reported; when the count is between 5 and 9, only median is reported, without percentiles).

Outpatient Paid Hours

Table E-2 presents a profile of paid hours per 100 outpatient visits by job grouping.

The following observations were made:

- The data collected are heterogeneous; given the nature of the data provided and the data collection method, we have chosen not to publish overall ratios encompassing all outpatient care programs.
- As reported in Chapter B, pharmacists are involved with several ambulatory programs. For the purposes of benchmarking, we have chosen to present the data for all other ambulatory care programs under "other."
- In the 2016/17 report, ratios were calculated per 100 visits to facilitate appreciation of the numeric values; we use the same ratios in reporting data from the 2020/21 survey.
- The median ratio for all paid hours per 100 outpatient visits was higher for oncology (43.65) than for dialysis (11.84), emergency (10.29) and other (3.51).
- The median ratio for pharmacists' paid hours per 100 outpatient visits were higher in 2020/21 than 2016/17 for oncology (35.81 vs. 22.47) and emergency (5.38 vs. 3.07).

Table E-2. Outpatient Paid Hours per 100 Outpatient Visits, 2020/21

		Patient Care Programs			
Ratio	**Statistics**	**Emergency**	**Oncology**	**Dialysis**	**Other**
Pharmacist paid hours per 100 outpatient visits	(n=)	(46)	(38)	(28)	(20)
	10%ile	0.93	15.50	1.52	0.77
	Median	**5.38**	**35.81**	**10.17**	**2.81**
	90%ile	12.48	127.49	95.68	21.1
Regulated pharmacy technician or non-regulated pharmacy assistant paid hours per 100 outpatient visits	(n=)	(43)	(37)	(21)	(13)
	10%ile	1.16	15.89	0.77	0.68
	Median	**5.2**	**37.50**	**6.17**	**2.81**
	90%ile	16.11	104.46	338.34	94.72
All paid hours per 100 outpatient visits	(n=)	(51)	(33)	(33)	(25)
	10%ile	1.87	4.57	1.52	0.79
	Median	**10.29**	**43.65**	**11.84**	**3.51**
	90%ile	25.76	235.72	385.09	23.01

Base: All hospitals providing benchmarking data.

Inpatient Drug Costs

Table E-3 presents a profile of inpatient drug costs per paid hour by job grouping, per inpatient bed, per patient day and per inpatient admission.

- The financing of drugs in hospitals varies from one province to another. For example, some pharmacy departments receive some or all of their oncology funding from a provincial cancer agency, whereas other pharmacy departments are funded from the global hospital budget.
- For BMT, the number of respondents was insufficient to generate valid results.

- In the 2016/17 report, only median inpatient ratios per patient day were presented. Comparing the ratios of 2020/21 with those of 2016/17, we note the following: in general, the costs were higher in 2020/21 than in 2016/17 for surgery ($32.14 vs. $27.05), obstetrics/gynecology ($34.78 vs. $26.24), pediatrics ($23.72 vs. $17.49), adult critical care ($99.48 vs. $92.79), pediatric critical care ($22.32 vs. $21.19), oncology ($128.25 vs. $107.40) and rehabilitation ($13.14 vs. $10.12). They were lower for medicine ($19.31 vs. $21.06).

Table E-3. Profile of Drug Costs per Inpatient Bed, per Patient Day and per Inpatient Admission, 2020/21 (All Figures Shown in Canadian Dollars)

		Patient Care Programs									
Ratio	**Statistics**	**Medicine**	**Surgery**	**Obstetrics / Gynecology**	**Pediatrics**	**Adult Critical Care**	**Pediatric Critical Care**	**Oncology**	**Rehabilitation**	**Long-Term Care**	**Other**
Drug costs per inpatient bed	(n=)	(42)	(37)	(36)	(27)	(43)	(16)	(14)	(20)	(23)	(19)
	10%ile	1,167.38	1,583.94	677.62	395.91	8,402.90	1,100.97	4,707.66	129.53	870.71	478.99
	Median	**6,008.80**	**8,760.18**	**7,062.77**	**4,302.14**	**24,079.13**	**5,672.12**	**47,420.54**	**3,687.59**	**1,555.24**	**4,434.75**
	90%ile	10,852.43	20,138.08	15,281.72	16,659.57	54,435.84	28,768.40	156,083.33	14,557.59	3,473.53	86,109.36
Drug costs per patient day	(n=)	(39)	(35)	(35)	(26)	(39)	(16)	(12)	(18)	(25)	(17)
	10%ile	11.44	20.54	5.60	2.81	43.66	3.92	8.81	1.25	3.42	1.40
	Median	**19.31**	**32.14**	**34.78**	**23.72**	**99.48**	**22.32**	**128.25**	**13.34**	**5.86**	**12.20**
	90%ile	54.37	73.27	58.15	56.10	178.94	101.32	426.49	53.21	14.80	73.30
Drug costs per inpatient admission	(n=)	(35)	(34)	(31)	(24)	(34)	(14)	(13)	(18)	(22)	(17)
	10%ile	74.66	25.07	6.79	3.18	207.47	21.87	152.11	12.71	317.45	78.85
	Median	**258.97**	**224.21**	**69.71**	**75.66**	**762.25**	**378.45**	**1,859.12**	**511.67**	**1,309.74**	**243.15**
	90%ile	1,033.84	446.92	144.90	385.44	2,794.01	2,252.79	8,904.91	1,446.10	4,301.70	1,230.04

Base: All hospitals providing benchmarking data.

Outpatient Drug Costs

Table E-4 presents a profile of median outpatient drug costs per outpatient visit.

- The financing of drugs in hospitals varies from one province to another. For example, some pharmacy departments receive some or all of their oncology funding from a provincial cancer agency, whereas other pharmacy departments are funded from the global hospital budget.
- In the 2016/17 report, only median outpatient drug costs per visit were reported. Comparing the ratios of 2020/21 with those of 2016/17, we note that, in general, the ratios were much higher in 2020/21 than in 2016/17.

Table E-4. Profile of Median Outpatient Drug Costs per Visit, 2020/21 (All Figures Shown in Canadian Dollars)

		Patient Care Programs			
Ratio	**Statistics**	**Emergency**	**Oncology**	**Dialysis**	**Other**
Outpatient drug costs per outpatient visit	(n=)	(44)	(39)	(28)	(40)
	10%ile	4.8	1.7	3.6	0.8
	Median	**9.0**	**491.0**	**4.3**	**4.3**
	90%ile	21.3	1,952.3	1,960.4	21.9
Base: All hospitals providing benchmarking data.					

F - Pharmacy Technician Practice

Bal Dhillon

In 2010, following a series of amendments to various articles of provincial legislation, Ontario (ON) became the first province in Canada to regulate pharmacy technicians.[1] Other provinces introduced similar changes in their legislation to enable pharmacy technicians as regulated health professionals and recognizing "Pharmacy Technician" as a protected title.[2]

Pharmacy technicians had to meet rigorous entry-to-practice requirements, outlined in the *Professional Competencies for Canadian Pharmacy Technicians at Entry to Practice,*[3] including being educated through a nationally accredited education program and passing nationally administered examinations set by the Pharmacy Examining Board of Canada (PEBC).[4] They are required to maintain their skills through ongoing education, practice in accordance with standards of practice and a code of ethics, and they are legally responsible and accountable. For regulated pharmacy technicians, this means an obligation to perform tasks and answer for outcomes. They assume responsibility for all the decisions and actions they undertake in their professional practice, including failure to make a decision and take appropriate action when necessary.

Assumption and fulfillment of these responsibilities allows regulated pharmacy technicians to earn and maintain public trust.[5] Regulation not only provides assurance that regulated pharmacy technicians are competent to take on more responsibility than other technical personnel but also allows pharmacists to be more accessible to patients and focus on enhanced patient care.[6]

As of January 2022, pharmacy technicians are regulated in nine provinces. They are not regulated in the jurisdictions of Québec (QC), Nunavut, the Northwest Territories and Yukon, nor are they regulated within the Canadian Armed Forces. QC is in the process of creating a Diploma of Collegial Studies (Diplôme d'études collégiales) for the training of pharmacy technicians, with the first graduating class anticipated for 2024.[7] The enabling legislation will continue to be one of delegation, whereby the pharmacist remains ultimately responsible, and pharmacy technicians will not have licences or be integrated into the Ordre des pharmaciens du Québec as members or with any other registration, at least for now.

In Nova Scotia (NS), the licences of regulated pharmacy technicians are not recognized in hospitals. Technical staff are called pharmacy practice assistants, and this group includes a combination of regulated pharmacy technicians and non-regulated pharmacy assistants. In New Brunswick (NB) hospitals, the transition to technician regulation was optional, which led to a mix of regulated pharmacy technicians and non-regulated pharmacy assistants with different classifications but similar workplace duties, with the same rate of pay, which has presented challenges for recruitment and retention.

In 2008, the Canadian Council for Accreditation of Pharmacy Programs (CCAPP) introduced an accreditation process for pharmacy technician programs. As of early 2018, 39 schools had been accredited.[8] This number later increased to 47, but as of when the 2020/21 CSHP Hospital Pharmacy in Canada Survey was distributed, accredited programs had decreased in number to 35 with the closure of several programs for various reasons.

The PEBC is the national certification body for pharmacists and pharmacy technicians. To be licensed as a pharmacy technician in Canada, candidates must complete an accredited pharmacy technician educational program and the PEBC Pharmacy Technician Certificate of Qualification and must fulfill the requirements of a provincial regulatory authority.

According to the National Association of Pharmacy Regulatory Agencies (NAPRA), as of January 1, 2022, there were 9,960 regulated pharmacy technicians in Canada, with 49% (4,861/9,960) known to be practising in hospital pharmacy across Canada.[9] Regulatory authorities do not track numbers of regulated pharmacy technicians on their registers in a consistent manner, and not all provinces distinguish among practice settings. Almost no data are available on the number of non-regulated pharmacy assistants, and this lack of information presents a challenge for pharmacy workforce planning in Canada. Furthermore, the scope of practice of regulated pharmacy technicians varies. NAPRA developed the Pharmacy Technicians' Scope of Practice in Canadian Jurisdictions, which was adopted in December 2021.[10]

Early editions of the Hospital Pharmacy in Canada Survey did not incorporate questions about regulated pharmacy technicians and non-regulated pharmacy assistants. It was not until the 2001/02 survey that "technician checking technician" functions were acknowledged. The 2016/17 survey was the first to gather baseline data about regulated pharmacy technicians in hospital pharmacy practice. For the 2020/21 iteration, respondents were asked 12 questions in the pharmacy technician section of the survey.

The province of Alberta's single health authority was unable to participate in the 2020/21 survey because provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region is limited to Manitoba (MB) and Saskatchewan (SK). In addition, for trending purposes over the long-term, regional data for British Columbia and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon during this iteration of the survey.

Regulated Pharmacy Technician and Non-regulated Pharmacy Assistant Support for Clinical Pharmacy Services

Data collected in the 2016/17 survey did not differentiate the specific tasks performed by regulated pharmacy technicians and non-regulated pharmacy assistants. As such, this report represents the first time that tasks performed by each group are presented separately. From this point forward, it will be possible to analyze results for both types of technical staff to determine trends, which will assist in measuring the impact of regulation on hospital pharmacy practice. We anticipate being able to discern such trends once the next two surveys have been completed.

Regulated pharmacy technicians have supported clinical pharmacy services in patient care areas by performing activities beyond those in drug distribution. The duties of technical staff that directly support the pharmacist's role in clinical services are summarized in Table F-1.

Table F-1. Tasks Performed by Regulated Pharmacy Technicians and/or Non-regulated Pharmacy Assistants to Support Pharmacists' Clinical Activities, 2020/21

Task performed (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Serve as initial pharmacy liaison for solving drug distribution problems on patient care units	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(23)	(39)	(35)	(17)
	Yes (either group)	111	32	44	35	24	85	2	17	18	33	29	14
		79%	**80%**	**76%**	**81%**	**75%**	**82%**		**63%**	**78%**	**85%**	**83%**	**82%**
	Regulated pharmacy technicians	79	27	34	18	19	59	1	17	17	33	0	12
		71%	**84%**	**77%**	**51%**	**79%**	**69%**		**100%**	**94%**	**100%**	**0%**	**86%**
	Non-regulated pharmacy assistants	60	16	24	20	13	46	1	3	14	6	29	8
		54%	**50%**	**55%**	**57%**	**54%**	**54%**		**18%**	**78%**	**18%**	**100%**	**57%**
	n/a	30	8	14	8	8	19	3	10	5	6	6	3

Table F-1 (continued). Tasks Performed by Regulated Pharmacy Technicians and/or Non-regulated Pharmacy Assistants to Support Pharmacists' Clinical Activities, 2020/21

Task performed (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Collect and collate information concerning each patient's pre-admission drug therapy, to support medication reconciliation at admission (e.g., BPMH)	(n=)	(139)	(39)	(58)	(42)	(32)	(102)	(5)	(25)	(23)	(39)	(35)	(17)
	Yes (either group)	83	14	37	32	21	60	2	9	6	30	26	12
		60%	**36%**	**64%**	**76%**	**66%**	**59%**		**36%**	**26%**	**77%**	**74%**	**71%**
	Regulated pharmacy technicians	55	10	28	17	15	38	2	9	6	30	0	10
		66%	**71%**	**76%**	**53%**	**71%**	**63%**				**100%**	**0%**	**83%**
	Non-regulated pharmacy assistants	36	6	14	16	9	27	0	0	1	2	26	7
		43%	**43%**	**38%**	**50%**	**43%**	**45%**				**7%**	**100%**	**58%**
	n/a	56	25	21	10	11	42	3	16	17	9	9	5
Create initial inpatient drug therapy documentation and discharge drug therapy plan to support medication reconciliation at discharge	(n=)	(138)	(37)	(58)	(43)	(32)	(101)	(5)	(26)	(23)	(39)	(35)	(15)
	Yes (either group)	24	2	8	14	5	18	1	3	1	1	15	4
		17%	**5%**	**14%**	**33%**	**16%**	**18%**		**12%**	**4%**	**3%**	**43%**	**27%**
	Regulated pharmacy technicians	7	2	3	2	2	5	0	3	1	1	0	2
		29%			**14%**		**28%**					**0%**	
	Non-regulated pharmacy assistants	19	0	7	12	4	14	1	0	0	1	15	3
		79%			**86%**		**78%**					**100%**	
	n/a	114	35	50	29	27	83	4	23	22	38	20	11
Collect laboratory test results to support drug therapy evaluation and monitoring	(n=)	(137)	(37)	(57)	(43)	(32)	(101)	(4)	(26)	(23)	(39)	(35)	(14)
	Yes (either group)	12	0	4	8	4	8	0	5	0	0	6	1
		9%	**0%**	**7%**	**19%**	**13%**	**8%**		**19%**	**0%**	**0%**	**17%**	**7%**
	Regulated pharmacy technicians	6	0	3	3	3	3	0	5	0	0	0	1
		50%											
	Non-regulated pharmacy assistants	6	0	1	5	1	5	0	0	0	0	6	0
		50%											
	n/a	125	37	53	35	28	93	4	21	23	39	29	13
Assemble pamphlets/ documentation to be given to patient by pharmacist during medication counselling	(n=)	(137)	(37)	(57)	(43)	(32)	(101)	(4)	(26)	(23)	(39)	(35)	(14)
	Yes (either group)	13	2	6	5	2	11	0	3	0	2	8	0
		9%	**5%**	**11%**	**12%**	**6%**	**11%**		**12%**	**0%**	**5%**	**23%**	**0%**
	Regulated pharmacy technicians	5	1	3	1	1	4	0	3	0	2	0	0
		38%					**36%**						
	Non-regulated pharmacy assistants	10	2	4	4	1	9	0	1	0	1	8	0
		77%					**82%**						
	n/a	124	35	51	38	30	90	4	23	23	37	27	14

Table F-1 (continued). Tasks Performed by Regulated Pharmacy Technicians and/or Non-regulated Pharmacy Assistants to Support Pharmacists' Clinical Activities, 2020/21

Task performed (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Calculate changes to parenteral nutrition therapy using established protocols and laboratory values	(n=)	(136)	(37)	(56)	(43)	(32)	(100)	(4)	(26)	(23)	(39)	(34)	(14)
	Yes (either group)	4	2	1	1	1	3	0	1	2	0	0	1
		3%	**5%**	**2%**	**2%**	**3%**	**3%**		**4%**	**9%**	**0%**	**0%**	**7%**
	Regulated pharmacy technicians	4	2	1	1	1	3	0	1	2	0	0	1
		100%											
	Non-regulated pharmacy assistants	1	0	1	0	1	0	0	0	0	0	0	1
		25%											
	n/a	132	35	55	42	31	97	4	25	21	39	34	13
Collect/collate information used in preparation of drug formulary submissions and in investigation of non-compliance with formulary rules and other problems, to support the drugs and therapeutics committee	(n=)	(137)	(37)	(57)	(43)	(32)	(101)	(4)	(26)	(23)	(39)	(35)	(14)
	Yes (either group)	13	8	4	1	1	12	0	2	3	6	1	1
		9%	**22%**	**7%**	**2%**	**3%**	**12%**		**8%**	**13%**	**15%**	**3%**	**7%**
	Regulated pharmacy technicians	10	6	3	1	0	10	0	2	2	6	0	0
		77%					**83%**						
	Non-regulated pharmacy assistants	3	2	1	0	1	2	0	0	1	0	1	1
		23%					17%						
	n/a	124	29	53	42	31	89	4	24	20	33	34	13
Assist in collecting data for presentation to medication safety committee (e.g., conduct audits to identify and collect information on orders containing banned abbreviations)	(n=)	(139)	(38)	(58)	(43)	(32)	(102)	(5)	(27)	(23)	(39)	(35)	(15)
	Yes (either group)	60	18	25	17	14	44	2	9	7	22	11	11
		43%	**47%**	**43%**	**40%**	**44%**	**43%**		**33%**	**30%**	**56%**	**31%**	**73%**
	Regulated pharmacy technicians	44	14	19	11	10	33	1	9	5	22	0	8
		73%	**78%**	**76%**	**65%**	**71%**	**75%**				**100%**	**0%**	**73%**
	Non-regulated pharmacy assistants	21	6	8	7	6	14	1	0	4	0	11	6
		35%	**33%**	**32%**	**41%**	**43%**	**32%**				**0%**	**100%**	**55%**
	n/a	79	20	33	26	18	58	3	18	16	17	24	4
Collect data for drug utilization review, to support the drug use evaluation program	(n=)	(138)	(37)	(58)	(43)	(32)	(101)	(5)	(26)	(23)	(39)	(35)	(15)
	Yes (either group)	31	10	11	10	6	24	1	4	5	12	6	4
		22%	**27%**	**19%**	**23%**	**19%**	**24%**		**15%**	**22%**	**31%**	**17%**	**27%**
	Regulated pharmacy technicians	22	8	9	5	4	18	0	4	5	12	0	1
		71%	**80%**	**82%**	**50%**		**75%**				**100%**		
	Non-regulated pharmacy assistants	13	4	3	6	3	9	1	1	2	0	6	4
		42%	**40%**	**27%**	**60%**		**38%**				**0%**		
	n/a	107	27	47	33	26	77	4	22	18	27	29	11

Table F-1 (continued). Tasks Performed by Regulated Pharmacy Technicians and/or Non-regulated Pharmacy Assistants to Support Pharmacists' Clinical Activities, 2020/21

Task performed (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Manage investigational drug inventory and provide technical assistance with clinical trial protocols	(n=)	(138)	(37)	(58)	(43)	(32)	(101)	(5)	(26)	(23)	(39)	(35)	(15)
	Yes (either group)	65	8	27	30	24	38	3	5	8	29	16	7
		47%	**22%**	**47%**	**70%**	**75%**	**38%**		**19%**	**35%**	**74%**	**46%**	**47%**
	Regulated pharmacy technicians	43	5	22	16	15	26	2	4	7	29	0	3
		66%		**81%**	**53%**	**63%**	**68%**				**100%**	**0%**	
	Non-regulated pharmacy assistants	28	5	8	15	10	17	1	1	6	1	16	4
		43%		**30%**	**50%**	**42%**	**45%**				**3%**	**100%**	
	n/a	73	29	31	13	8	63	2	21	15	10	19	8
Other	(n=)	(128)	(34)	(55)	(39)	(31)	(93)	(4)	(25)	(23)	(36)	(33)	(11)
	Yes (either group)	13	1	6	6	5	7	1	1	0	5	6	1
		10%	**3%**	**11%**	**15%**	**16%**	**8%**		**4%**	**0%**	**14%**	**18%**	**9%**
	Regulated pharmacy technicians	7	1	3	3	4	2	1	1	0	5	0	1
		54%											
	Non-regulated pharmacy assistants	6	0	3	3	1	5	0	0	0	0	6	0
		46%											
	n/a	115	33	49	33	26	86	3	24	23	31	27	10

Base: Respondents to each question, n = 128-141
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons
n/a = not applicable
BPMH = best possible medication history

Although Table F-1 indicates that most tasks are performed most frequently by regulated pharmacy technicians, two activities had higher results for non-regulated pharmacy assistants. Among the 24 (of 138) respondents who reported that either category of technical personnel were responsible for creating initial inpatient drug therapy documentation and a discharge drug therapy plan to support medication reconciliation at discharge, this task was performed by non-regulated pharmacy assistants at 79% (19/24) of responding facilities, and by regulated pharmacy technicians at only 29% (7/24). Among the 13 (of 137) respondents who reported assembly of pamphlets/documentation to be given to patients by a pharmacist during medication counselling, this task was performed by non-regulated pharmacy assistants at 77% (10/13) of responding facilities, and by regulated pharmacy technicians at only 38% (5/13). It appears that non-regulated pharmacy assistants are focused more on clerical duties, while the focus of regulated pharmacy technicians is shifting to more advanced responsibilities. Among the 111 (of 141) respondents who reported that technical personnel served as the initial liaison for solving drug distribution problems on patient care units, this task was completed by regulated pharmacy technicians at 71% (79/111) of responding facilities and by non-regulated pharmacy assistants at 54% (60/111).

Of the 65 (out of 138) respondents who indicated that technical staff managed investigational drug inventory and assisted with study protocols, 66% (43/65) reported that regulated pharmacy technicians performed this task, compared with 43% (28/65) who reported that non-regulated pharmacy assistants did so. The global clinical trials market, valued at $US40 billion in 2016, is expected to increase by 5.7% by 2025.[11] The Government of Canada has invested $250 million through the Canadian Institutes of Health Research to

strengthen the clinical trials ecosystem and thereby to improve healthcare and health outcomes for all Canadians.[12] Regulated pharmacy technicians are important members of research and development teams and continue to support clinical trials.

The Cedars-Sinai Medical Center, an 886-bed acute tertiary care teaching hospital in Los Angeles, California, has made it a priority to facilitate licensed pharmacy technicians performing to the full extent of their licences. To meet this goal, the facility has developed multiple specialized roles for its pharmacy technicians to support their learning and development of new knowledge and skills. Not only do these specialized roles free pharmacists to focus on clinical pursuits and improve patient care, they also encourage career advancement for regulated pharmacy technicians, which improves job satisfaction.[13] As the transition toward employing more regulated pharmacy technicians continues, future reports and the healthcare literature will continue to track the contributions of regulated pharmacy technicians in supporting clinical pharmacists and patient care services.

There continues to be opportunity to increase the utilization of pharmacy technical staff in the following activities:

- creating initial inpatient drug therapy documentation and discharge drug therapy plans (17%, 24/138)
  - Reports of innovative use of regulated pharmacy technicians to obtain medication histories have shown a reduction in potential inpatient medication errors and an increase in the effective utilization of resources.[14,15]
- collecting laboratory test results to support drug therapy evaluation (9%, 12/137)
  - As the practice of pharmacy continues to advance, the involvement of regulated pharmacy technicians in point-of-care testing (POCT), to assist clinical practice related to diabetes, cholesterol management and anticoagulation, may improve POCT efficiency because results can be obtained within seconds to minutes, which can help direct care.[16] Regulated pharmacy technicians' knowledge of basic medication use, common disease states and patient care workflow may reinforce their role as ideal collaborators for such activities.
- calculating changes to parenteral nutrition therapy (3%, 4/136)
  - Developing a master formula or compounding protocol is part of the NAPRA-regulated pharmacy technician scope of practice for BC, NB and Prince Edward Island (PE).[10]
- collecting data for drug utilization reviews (22%, 31/138)
  - Support from regulated pharmacy technicians also reduces the average time that pharmacists need to develop care plans. Regulated pharmacy technicians can accurately screen patients to determine the need for pharmacist intervention and can also collect clinical information to facilitate and optimize patient care.[17]

Responses concerning specific clinical support tasks have remained relatively unchanged, although there was substantial regional disparity. For example, collection and collation by technical staff of patients' pre-admission medication history at the time of admission was reported by at least 71% of respondents from ON, QC and the Atlantic region (consisting of NB, NS, PE and Newfoundland and Labrador [NL]), but only 26% (6/23) of Prairie (SK/MB) respondents and 36% (9/25) of BC/YT respondents. Collecting laboratory test results to support drug therapy evaluation and monitoring was reported by at least some respondents from BC/YT (19%, 5/26), QC (17%, 6/35) and the Atlantic region (7%, 1/14), but not by any respondents from the Prairies (SK/MB) or ON.

Roles of Regulated Pharmacy Technicians and Non-regulated Pharmacy Assistants

The benefits of an enhanced role for pharmacy technicians continue to be realized. In settings where expansion of technician roles is championed, patients receive comprehensive care through screening, identification and referral of the patient's medication-related needs to the pharmacist.[17] Summarized in Table F-2 are the tasks performed by technical staff.

Table F-2. Tasks Performed by Regulated Pharmacy Technicians or Non-regulated Pharmacy Assistants, 2020/21

Task (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Perform medication order entry	(n=)	(141)	(40)	(58)	(43)	(32)	(104)	(5)	(27)	(23)	(39)	(35)	(17)
	Yes	93	25	36	32	22	70	1	21	8	19	34	11
		66%	**63%**	**62%**	**74%**	**69%**	**67%**		**78%**	**35%**	**49%**	**97%**	**65%**
	If yes, by regulated pharmacy technician	58	21	26	11	15	43	0	21	8	19	0	10
		62%	**84%**	**72%**	**34%**	**68%**	**61%**		**100%**		**100%**	**0%**	**91%**
	If yes, by non-regulated pharmacy assistant	54	13	18	23	11	42	1	5	5	2	34	8
		58%	**52%**	**50%**	**72%**	**50%**	**60%**		**24%**		**11%**	**100%**	**73%**
Fill traditional prescriptions: new orders	Yes	110	31	45	34	27	79	4	26	16	28	24	16
		78%	**78%**	**78%**	**79%**	**84%**	**76%**		**96%**	**70%**	**72%**	**69%**	**94%**
	If yes, by regulated pharmacy technician	81	27	37	17	22	57	2	25	16	27	0	13
		74%	**87%**	**82%**	**50%**	**81%**	**72%**		**96%**	**100%**	**96%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	60	16	23	21	14	43	3	9	14	4	24	9
		55%	**52%**	**51%**	**62%**	**52%**	**54%**		**35%**	**88%**	**14%**	**100%**	**56%**
Fill traditional prescriptions: refills	Yes	118	34	48	36	27	86	5	27	17	30	28	16
		84%	**85%**	**83%**	**84%**	**84%**	**83%**		**100%**	**74%**	**77%**	**80%**	**94%**
	If yes, by regulated pharmacy technician	85	28	39	18	22	60	3	26	17	29	0	13
		72%	**82%**	**81%**	**50%**	**81%**	**70%**		**96%**	**100%**	**97%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	63	18	23	22	13	47	3	9	14	4	28	8
		53%	**53%**	**48%**	**61%**	**48%**	**55%**		**33%**	**82%**	**13%**	**100%**	**50%**
Package unit-dose items	Yes	137	36	58	43	32	100	5	27	20	39	35	16
		97%	**90%**	**100%**	**100%**	**100%**	**96%**		**100%**	**87%**	**100%**	**100%**	**94%**
	If yes, by regulated pharmacy technician	97	30	46	21	24	70	3	26	20	39	0	12
		71%	**83%**	**79%**	**49%**	**75%**	**70%**		**96%**	**100%**	**100%**	**0%**	**75%**
	If yes, by non-regulated pharmacy assistant	79	18	30	31	21	55	3	8	18	9	35	9
		58%	**50%**	**52%**	**72%**	**66%**	**55%**		**30%**	**90%**	**23%**	**100%**	**56%**

Table F-2 (continued). Tasks Performed by Regulated Pharmacy Technicians or Non-regulated Pharmacy Assistants, 2020/21

Task (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Fill unit-dose trays	Yes	122	33	50	39	29	88	5	17	17	37	35	16
		87%	**83%**	**86%**	**91%**	**91%**	**85%**		**63%**	**74%**	**95%**	**100%**	**94%**
	If yes, by regulated pharmacy technician	84	28	38	18	22	59	3	17	17	37	0	13
		69%	**85%**	**76%**	**46%**	**76%**	**67%**		**100%**	**100%**	**100%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	71	16	27	28	18	50	3	5	14	8	35	9
		58%	**48%**	**54%**	**72%**	**62%**	**57%**		**29%**	**82%**	**22%**	**100%**	**56%**
Fill interim doses	Yes	135	35	58	42	32	98	5	27	20	38	34	16
		96%	**88%**	**100%**	**98%**	**100%**	**94%**		**100%**	**87%**	**97%**	**97%**	**94%**
	If yes, by regulated pharmacy technician	98	30	46	22	25	70	3	27	20	38	0	13
		73%	**86%**	**79%**	**52%**	**78%**	**71%**		**100%**	**100%**	**100%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	75	18	31	26	19	53	3	9	17	6	34	9
		56%	**51%**	**53%**	**62%**	**59%**	**54%**		**33%**	**85%**	**16%**	**100%**	**56%**
Compound patient-specific intravenous admixtures	Yes	135	35	57	43	31	99	5	27	22	36	35	15
		96%	**88%**	**98%**	**100%**	**97%**	**95%**		**100%**	**96%**	**92%**	**100%**	**88%**
	If yes, by regulated pharmacy technician	97	30	45	22	24	70	3	27	22	36	0	12
		72%	**86%**	**79%**	**51%**	**77%**	**71%**		**100%**	**100%**	**100%**	**0%**	**80%**
	If yes, by non-regulated pharmacy assistant	65	16	26	23	14	49	2	3	14	3	35	10
		48%	**46%**	**46%**	**53%**	**45%**	**49%**		**11%**	**64%**	**8%**	**100%**	**67%**
Compound batch intravenous admixtures	Yes	128	30	56	42	30	93	5	25	19	36	34	14
		91%	**75%**	**97%**	**98%**	**94%**	**89%**		**93%**	**83%**	**92%**	**97%**	**82%**
	If yes, by regulated pharmacy technician	91	25	45	21	23	65	3	25	19	36	0	11
		71%	**83%**	**80%**	**50%**	**77%**	**70%**		**100%**	**100%**	**100%**	**0%**	**79%**
	If yes, by non-regulated pharmacy assistant	60	13	24	23	13	45	2	3	10	3	34	10
		47%	**43%**	**43%**	**55%**	**43%**	**48%**		**12%**	**53%**	**8%**	**100%**	**71%**
Compound total parenteral nutrition solutions	Yes	116	24	51	41	27	84	5	22	12	33	34	15
		82%	**60%**	**88%**	**95%**	**84%**	**81%**		**81%**	**52%**	**85%**	**97%**	**88%**
	If yes, by regulated pharmacy technician	80	20	40	20	20	57	3	22	12	33	0	13
		69%	**83%**	**78%**	**49%**	**74%**	**68%**		**100%**	**100%**	**100%**	**0%**	**87%**
	If yes, by non-regulated pharmacy assistant	55	9	23	23	13	40	2	3	6	3	34	9
		47%	**38%**	**45%**	**56%**	**48%**	**48%**		**14%**	**50%**	**9%**	**100%**	**60%**
Compound chemotherapy medications	Yes	123	29	52	42	28	90	5	24	19	32	33	15
		87%	**73%**	**90%**	**98%**	**88%**	**87%**		**89%**	**83%**	**82%**	**94%**	**88%**
	If yes, by regulated pharmacy technician	88	26	40	22	22	63	3	24	19	32	0	13
		72%	**90%**	**77%**	**52%**	**79%**	**70%**		**100%**	**100%**	**100%**	**0%**	**87%**
	If yes, by non-regulated pharmacy assistant	55	13	20	22	11	42	2	1	11	1	33	9
		45%	**45%**	**38%**	**52%**	**39%**	**47%**		**4%**	**58%**	**3%**	**100%**	**60%**

Table F-2 (continued). Tasks Performed by Regulated Pharmacy Technicians or Non-regulated Pharmacy Assistants, 2020/21

Task (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Perform extemporaneous compounding	Yes	136	38	56	42	31	100	5	27	22	37	33	17
		96%	**95%**	**97%**	**98%**	**97%**	**96%**		**100%**	**96%**	**95%**	**94%**	**100%**
	If yes, by regulated pharmacy technician	100	33	45	22	25	72	3	27	22	37	0	14
		74%	**87%**	**80%**	**52%**	**81%**	**72%**		**100%**	**100%**	**100%**	**0%**	**82%**
	If yes, by non-regulated pharmacy assistant	76	21	30	25	18	56	2	11	17	5	33	10
		56%	**55%**	**54%**	**60%**	**58%**	**56%**		**41%**	**77%**	**14%**	**100%**	**59%**
Fill cardiac arrest trays	Yes	129	34	54	41	31	93	5	26	16	37	33	17
		91%	**85%**	**93%**	**95%**	**97%**	**89%**		**96%**	**70%**	**95%**	**94%**	**100%**
	If yes, by regulated pharmacy technician	90	28	42	20	22	65	3	25	16	36	0	13
		70%	**82%**	**78%**	**49%**	**71%**	**70%**		**96%**	**100%**	**97%**	**0%**	**76%**
	If yes, by non-regulated pharmacy assistant	69	16	26	27	19	47	3	10	12	5	32	10
		53%	**47%**	**48%**	**66%**	**61%**	**51%**		**38%**	**75%**	**14%**	**97%**	**59%**
Replenish automated dispensing cabinets	Yes	127	33	53	41	32	90	5	21	18	38	34	16
		90%	**83%**	**91%**	**95%**	**100%**	**87%**		**78%**	**78%**	**97%**	**97%**	**94%**
	If yes, by regulated pharmacy technician	89	27	41	21	25	61	3	21	17	38	0	13
		70%	**82%**	**77%**	**51%**	**78%**	**68%**		**100%**	**94%**	**100%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	74	18	29	27	20	51	3	9	15	6	34	10
		58%	**55%**	**55%**	**66%**	**63%**	**57%**		**43%**	**83%**	**16%**	**100%**	**63%**

Base: n = 141 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

With the exception of three activities (filling unit-dose trays, preparing patient-specific intravenous [IV] admixtures and replenishing automated dispensing cabinets [ADCs]), the rate of performance of specific functions by technical staff has remained unchanged since the 2009/10 survey

The rates of performance of specific functions by regulated pharmacy technicians or non-regulated pharmacy assistants have remained stable over the past decade, except for increases in rates of filling unit-dose trays, preparing patient-specific IV admixtures and replenishing automated dispensing cabinets.

- In relation to hospital bed size, the 2020/21 survey showed that the rate of performance of functions by regulated pharmacy technicians was highest (> 82%) for facilities with fewer than 200 beds.
- Replenishment of ADCs was reported by 90% (127/141) of respondents in the current survey, up from 79% (146/184) in 2016/17.
  - In 2020/21, performance of this activity by regulated pharmacy technicians was more frequent in hospitals with 50-200 beds (82%, 27/33) and less frequent in hospitals with more than 500 beds (51%, 21/41). This change may be due to an increase in ADCs, assignment of this duty to regulated pharmacy technicians or other personnel, or a combination of these two factors.

- There was some regional variation for filling unit-dose trays, with the lowest rates in BC/YT (63%, 17/27) and the Prairies (SK/MB) (74%, 17/23), higher rates in the Atlantic region (94%, 16/17) and ON (95%, 37/39), and the highest rate in QC (100%, 35/35).
- The increase in preparation of patient-specific IV admixtures by technical personnel may be due to the need for greater oversight of sterile compounding to ensure patient safety, the potential for cost savings,[18] and the implementation of NAPRA compounding guidelines across provincial regulatory authorities and the resulting reduction in the use of batch solutions.

Figure F-1 and Table F-3 summarize the functions checked by pharmacy technical staff. Since the 2009/10 report, there have been notable increases in checking by pharmacy technical staff for the following functions:

- replenish ADCs, by 36 percentage points, from 61% (51/84) to 97% (118/122)
- compound extemporaneous products, by 31 percentage points, from 54% (84/156) to 85% (117/137)
- fill interim doses, by 28 percentage points, from 64% (89/139) to 92% (122/132)
- fill cardiac arrest trays, by 27 percentage points, from 68% (90/133) to 95% (123/129)
- compound chemotherapy orders, by 26 percentage points, from 20% (27/135) to 46% (57/124)
- fill traditional prescriptions for new orders, by 20 percentage points, from 51% (67/131) to 71% (89/125)
- compound patient-specific IV admixtures, by 20 percentage points, from 52% (78/150) to 72% (99/137)

Technical staff checking the work of others has increased by up to 36 percentage points in the categories of traditional prescriptions for new orders and interim orders, patient-specific IV admixtures, chemotherapy, cardiac arrest trays, compounded extemporaneous products and, most notably, the replenishment of automated cabinets.

Before pharmacy technician regulation came into effect, these checks were probably performed primarily by pharmacists. Regulation has provided a defined scope of practice and with that, accountability and liability. These trends show the impact of regulated pharmacy technicians in core hospital pharmacy distribution activities and indicate trust in their competencies.

Figure F-1. Functions Checked by Regulated Pharmacy Technicians or Non-regulated Pharmacy Assistants, 2009/10 vs 2020/21

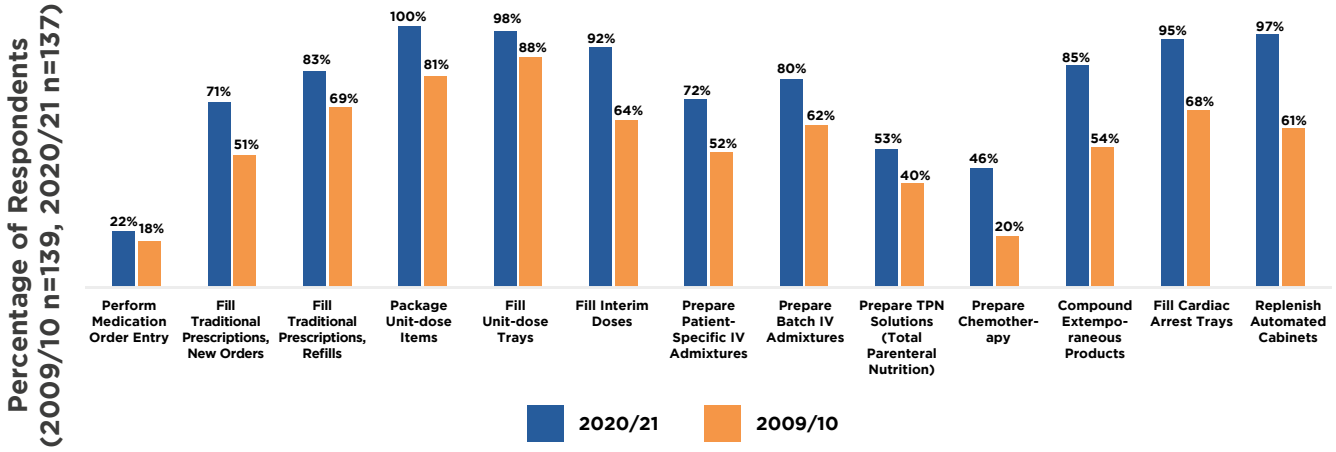


Table F-3. Functions Checked by Either a Regulated Pharmacy Technician or Non-regulated Pharmacy Assistant, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Perform medication order entry	(n=)	(123)	(38)	(47)	(38)	(26)	(92)	(5)	(25)	(20)	(33)	(32)	(13)
	Yes	27	12	11	4	7	19	1	6	9	10	1	1
		22%	**32%**	**23%**	**11%**	**27%**	**21%**		**24%**	**45%**	**30%**	**3%**	**8%**
	If yes, by regulated pharmacy technician	25	11	10	4	7	17	1	5	9	10	0	1
		93%	**92%**	**91%**			**89%**				**100%**		
	If yes, by non-regulated pharmacy assistant	3	1	1	1	0	3	0	0	0	1	1	1
		11%	**8%**	**9%**			**16%**				**10%**		
Fill traditional prescriptions: new orders	(n=)	(125)	(36)	(52)	(37)	(29)	(91)	(5)	(25)	(19)	(32)	(32)	(17)
	Yes	89	28	39	22	22	64	3	24	16	26	8	15
		71%	**78%**	**75%**	**59%**	**76%**	**70%**		**96%**	**84%**	**81%**	**25%**	**88%**
	If yes, by regulated pharmacy technician	78	26	34	18	22	54	2	24	16	26	0	12
		88%	**93%**	**87%**	**82%**	**100%**	**84%**		**100%**	**100%**	**100%**		**80%**
	If yes, by non-regulated pharmacy assistant	21	4	11	6	4	16	1	1	1	3	8	8
		24%	**14%**	**28%**	**27%**	**18%**	**25%**		**4%**	**6%**	**12%**		**53%**
Fill traditional prescriptions: refills	(n=)	(126)	(36)	(52)	(38)	(29)	(92)	(5)	(25)	(19)	(32)	(33)	(17)
	Yes	104	32	45	27	25	75	4	25	17	28	18	16
		83%	**89%**	**87%**	**71%**	**86%**	**82%**		**100%**	**89%**	**88%**	**55%**	**94%**
	If yes, by regulated pharmacy technician	82	27	37	18	22	57	3	25	17	27	0	13
		79%	**84%**	**82%**	**67%**	**88%**	**76%**		**100%**	**100%**	**96%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	32	7	15	10	7	24	1	1	1	3	18	9
		31%	**22%**	**33%**	**37%**	**28%**	**32%**		**4%**	**6%**	**11%**	**100%**	**56%**
Package unit-dose items	(n=)	(137)	(36)	(58)	(43)	(32)	(100)	(5)	(27)	(20)	(39)	(35)	(16)
	Yes	137	36	58	43	32	100	5	27	20	39	35	16
		100%	**100%**	**100%**	**100%**	**100%**	**100%**		**100%**	**100%**	**100%**	**100%**	**100%**
	If yes, by regulated pharmacy technician	99	31	46	22	25	71	3	27	20	39	0	13
		72%	**86%**	**79%**	**51%**	**78%**	**71%**		**100%**	**100%**	**100%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	52	8	19	25	12	38	2	2	1	4	35	10
		38%	**22%**	**33%**	**58%**	**38%**	**38%**		**7%**	**5%**	**10%**	**100%**	**63%**
Fill unit-dose trays	(n=)	(120)	(32)	(50)	(38)	(29)	(86)	(5)	(17)	(17)	(37)	(34)	(15)
	Yes	118	32	49	37	28	85	5	17	17	36	33	15
		98%	**100%**	**98%**	**97%**	**97%**	**99%**		**100%**	**100%**	**97%**	**97%**	**100%**
	If yes, by regulated pharmacy technician	83	28	38	17	22	58	3	17	17	36	0	13
		70%	**88%**	**78%**	**46%**	**79%**	**68%**		**100%**	**100%**	**100%**	**0%**	**87%**
	If yes, by non-regulated pharmacy assistant	47	7	17	23	10	35	2	0	1	4	33	9
		40%	**22%**	**35%**	**62%**	**36%**	**41%**		**0%**	**6%**	**11%**	**100%**	**60%**

Table F-3 (continued). Functions Checked by Either a Regulated Pharmacy Technician or Non-regulated Pharmacy Assistant, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Fill interim doses	(n=)	(132)	(35)	(57)	(40)	(32)	(95)	(5)	(26)	(20)	(38)	(32)	(16)
	Yes	122	33	53	36	31	87	4	25	20	37	25	15
		92%	**94%**	**93%**	**90%**	**97%**	**92%**		**96%**	**100%**	**97%**	**78%**	**94%**
	If yes, by regulated pharmacy technician	95	30	43	22	25	68	2	25	20	37	0	13
		78%	**91%**	**81%**	**61%**	**81%**	**78%**		**100%**	**100%**	**100%**	**0%**	**87%**
	If yes, by non-regulated pharmacy assistant	37	6	15	16	10	25	2	1	1	3	25	7
		30%	**18%**	**28%**	**44%**	**32%**	**29%**		**4%**	**5%**	**8%**	**100%**	**47%**
Compound patient-specific intravenous admixtures	(n=)	(137)	(37)	(57)	(43)	(31)	(101)	(5)	(27)	(23)	(37)	(35)	(15)
	Yes	99	24	45	30	24	71	4	27	15	31	15	11
		72%	**65%**	**79%**	**70%**	**77%**	**70%**		**100%**	**65%**	**84%**	**43%**	**73%**
	If yes, by regulated pharmacy technician	81	22	41	18	20	58	3	27	15	31	0	8
		82%	**92%**	**91%**	**60%**	**83%**	**82%**		**100%**	**100%**	**100%**	**0%**	**73%**
	If yes, by non-regulated pharmacy assistant	26	5	8	13	7	18	1	0	1	1	15	9
		26%	**21%**	**18%**	**43%**	**29%**	**25%**		**0%**	**7%**	**3%**	**100%**	**82%**
Compound batch intravenous admixtures	(n=)	(127)	(28)	(57)	(42)	(30)	(92)	(5)	(24)	(19)	(36)	(34)	(14)
	Yes	102	21	46	35	27	71	4	24	15	35	17	11
		80%	**75%**	**81%**	**83%**	**90%**	**77%**		**100%**	**79%**	**97%**	**50%**	**79%**
	If yes, by regulated pharmacy technician	82	20	42	20	21	58	3	24	15	35	0	8
		80%	**95%**	**91%**	**57%**	**78%**	**82%**		**100%**	**100%**	**100%**	**0%**	**73%**
	If yes, by non-regulated pharmacy assistant	28	4	8	16	9	18	1	0	1	1	17	9
		27%	**19%**	**17%**	**46%**	**33%**	**25%**		**0%**	**7%**	**3%**	**100%**	**82%**
Compound total parenteral nutrition solutions	(n=)	(115)	(25)	(51)	(39)	(28)	(82)	(5)	(20)	(13)	(34)	(33)	(15)
	Yes	61	10	31	20	16	42	3	17	2	25	8	9
		53%	**40%**	**61%**	**51%**	**57%**	**51%**		**85%**	**15%**	**74%**	**24%**	**60%**
	If yes, by regulated pharmacy technician	51	10	28	13	13	36	2	17	2	25	0	7
		84%	**100%**	**90%**	**65%**	**81%**	**86%**		**100%**		**100%**		
	If yes, by non-regulated pharmacy assistant	16	2	6	8	6	9	1	0	0	1	8	7
		26%	**20%**	**19%**	**40%**	**38%**	**21%**		**0%**		**4%**		
Compound chemotherapy medications	(n=)	(124)	(31)	(52)	(41)	(29)	(90)	(5)	(23)	(20)	(34)	(32)	(15)
	Yes	57	14	25	18	11	43	3	14	6	20	9	8
		46%	**45%**	**48%**	**44%**	**38%**	**48%**		**61%**	**30%**	**59%**	**28%**	**53%**
	If yes, by regulated pharmacy technician	45	12	21	12	10	33	2	13	6	20	0	6
		79%	**86%**	**84%**	**67%**	**91%**	**77%**		**93%**		**100%**		
	If yes, by non-regulated pharmacy assistant	15	3	5	7	3	11	1	0	1	0	9	5
		26%	**21%**	**20%**	**39%**	**27%**	**26%**		**0%**		**0%**		

Table F-3 (continued). Functions Checked by Either a Regulated Pharmacy Technician or Non-regulated Pharmacy Assistant, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Perform extemporaneous compounding	(n=)	(137)	(38)	(58)	(41)	(32)	(100)	(5)	(27)	(22)	(38)	(33)	(17)
	Yes	117	35	50	32	28	85	4	27	22	36	16	16
		85%	**92%**	**86%**	**78%**	**88%**	**85%**		**100%**	**100%**	**95%**	**48%**	**94%**
	If yes, by regulated pharmacy technician	98	33	44	21	25	70	3	27	22	36	0	13
		84%	**94%**	**88%**	**66%**	**89%**	**82%**		**100%**	**100%**	**100%**	**0%**	**81%**
	If yes, by non-regulated pharmacy assistant	31	7	13	11	6	24	1	1	3	2	16	9
		26%	**20%**	**26%**	**34%**	**21%**	**28%**		**4%**	**14%**	**6%**	**100%**	**56%**
Fill cardiac arrest trays	(n=)	(129)	(33)	(56)	(40)	(31)	(93)	(5)	(27)	(16)	(37)	(32)	(17)
	Yes	123	32	52	39	31	87	5	27	15	36	28	17
		95%	**97%**	**93%**	**98%**	**100%**	**94%**		**100%**	**94%**	**97%**	**88%**	**100%**
	If yes, by regulated pharmacy technician	91	27	43	21	24	64	3	27	15	36	0	13
		74%	**84%**	**83%**	**54%**	**77%**	**74%**		**100%**	**100%**	**100%**	**0%**	**76%**
	If yes, by non-regulated pharmacy assistant	46	8	16	22	13	31	2	4	2	2	28	10
		37%	**25%**	**31%**	**56%**	**42%**	**36%**		**15%**	**13%**	**6%**	**100%**	**59%**
Replenish automated dispensing cabinets	(n=)	(122)	(33)	(51)	(38)	(29)	(88)	(5)	(20)	(17)	(36)	(34)	(15)
	Yes	118	33	47	38	29	84	5	19	17	35	32	15
		97%	**100%**	**92%**	**100%**	**100%**	**95%**		**95%**	**100%**	**97%**	**94%**	**100%**
	If yes, by regulated pharmacy technician	82	28	36	18	22	57	3	19	17	34	0	12
		69%	**85%**	**77%**	**47%**	**76%**	**68%**		**100%**	**100%**	**97%**	**0%**	**80%**
	If yes, by non-regulated pharmacy assistant	54	10	21	23	11	41	2	4	5	4	32	9
		46%	**30%**	**45%**	**61%**	**38%**	**49%**		**21%**	**29%**	**11%**	**100%**	**60%**

Base: Respondents to each question, n = 115-137
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

As shown in Table F-4, 45% (60/132) of respondents reported that more than 90% of technical work was carried out by regulated pharmacy technicians. This is substantially higher than the 60% (60/100) who reported this level of activity in the 2016/17 survey. Some respondents commented that after eliminating the non-regulated pharmacy assistant classification, they experienced a lack of regulated pharmacy technicians available to fill vacant positions. They were looking forward to the benefits of regulation, but staff vacancies have not allowed them to realize these benefits.

Table F-4. Percentage of Staff Performing Technical Functions Who Are Regulated Pharmacy Technicians, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(132)	(39)	(56)	(37)	(32)	(95)	(5)	(27)	(23)	(39)	(26)	(17)
> 90% of technical	60	17	28	15	13	45	2	17	3	33	0	7
	45%	**32%**	**23%**	**11%**	**27%**	**21%**		**24%**	**45%**	**30%**	**3%**	**8%**
51%-90% of technical staff	24	8	11	5	8	15	1	10	8	5	0	1
	18%	**21%**	**20%**	**14%**	**25%**	**16%**		**37%**	**35%**	**13%**	**0%**	**6%**
10%-50% of technical staff	21	9	9	3	5	15	1	0	12	1	1	7
	16%	**23%**	**16%**	**8%**	**16%**	**16%**		**0%**	**52%**	**3%**	**4%**	**41%**
< 10% of technical staff	27	5	8	14	6	20	1	0	0	0	25	2
	20%	**13%**	**14%**	**38%**	**19%**	**21%**		**0%**	**0%**	**0%**	**96%**	**12%**

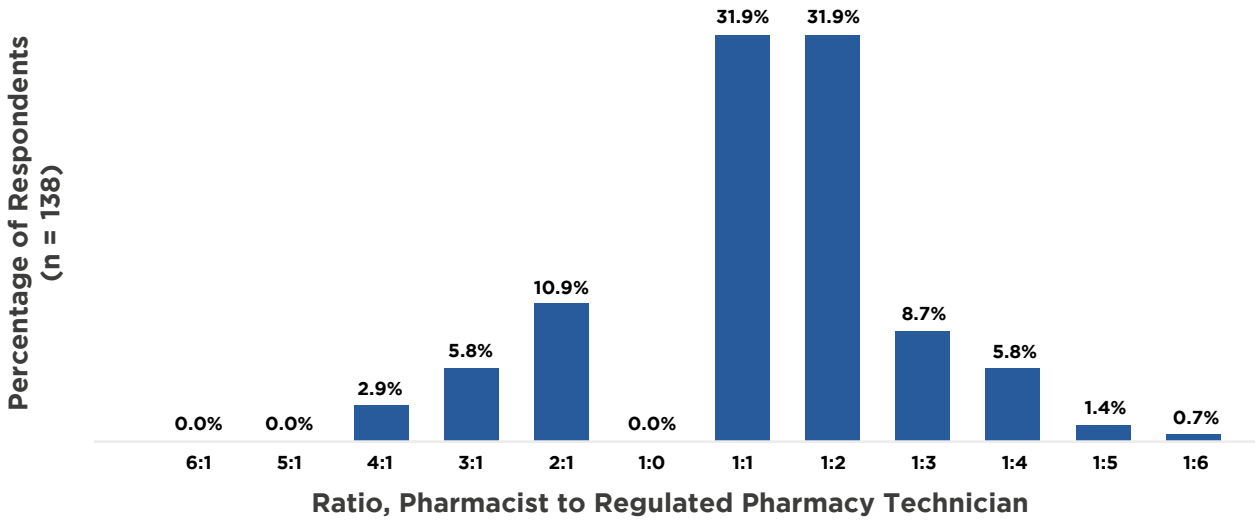
Base: n = 132 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons
Percentages within a column may not sum to 100 because of rounding

Pharmacy Staff Ratios

Pharmacy staffing ratios are reported in Chapter D – Human Resources. Here, we report data for the following question: "For every one pharmacist, what would be the ideal ratio of regulated pharmacy technicians in your facility?" Figure F-2 shows that about one-third of respondents selected a ratio of 1:1 (31.9%, 44/138) or 1:2 (31.9%, 44/138).

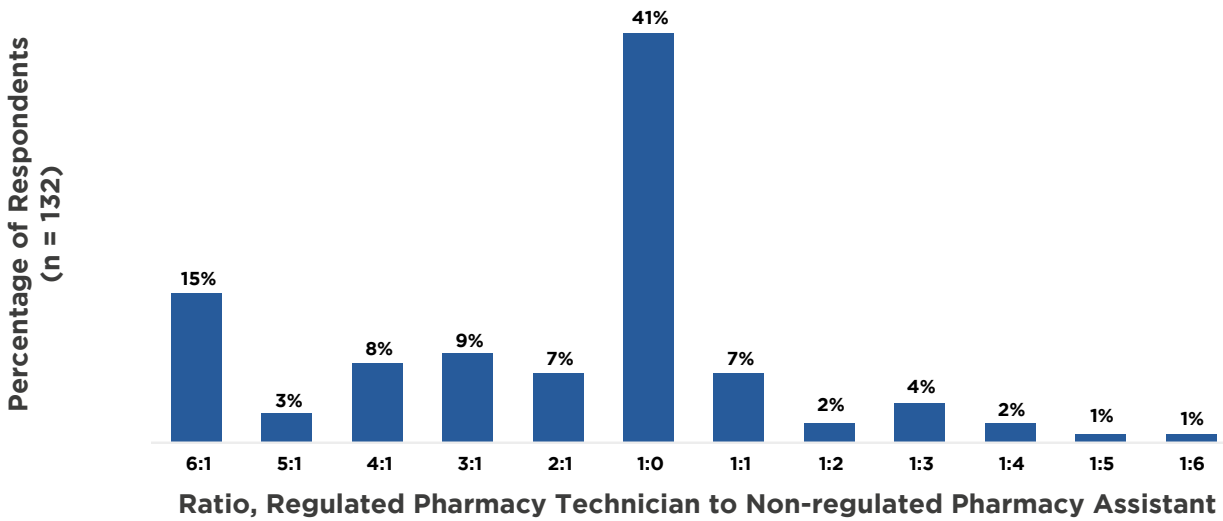
In a study published in the *Journal of the American Pharmacists Association*, Bess and others[19] compared systems of setting the ratio of pharmacy technicians to pharmacists in Florida (ratio set out by legislation) and Tennessee (ratio determined by the pharmacy regulatory authority, following consultation with stakeholders). The final rule created by the Tennessee Board of Pharmacy set the ratio of pharmacy technicians to pharmacists at 2:1 but permitted a 4:1 ratio based on public safety considerations and availability of at least two pharmacy technicians.[19] Organizations can conduct research and collaborate with legislators on appropriate and safe ratios of regulated pharmacy technicians to pharmacists, with a focus on overall quality and safety of pharmaceutical services.

Figure F-2. Ideal Ratio of Pharmacists to Regulated Pharmacy Technicians, 2020/21



Respondents were also asked, "For every one regulated pharmacy technician, what would be the ideal ratio of non-regulated pharmacy assistants for your facility?" The largest proportion of respondents (41%, 54/132) selected a 1:0 ratio of regulated pharmacy technician to non-regulated pharmacy assistant (Figure F-3). ON had the highest proportion of respondents selecting this ratio (73%, 24/33), and the Prairies (SK/MB) had the lowest (17%, 4/23). This regional variation likely reflects the availability of regulated pharmacy technicians in the various regions.

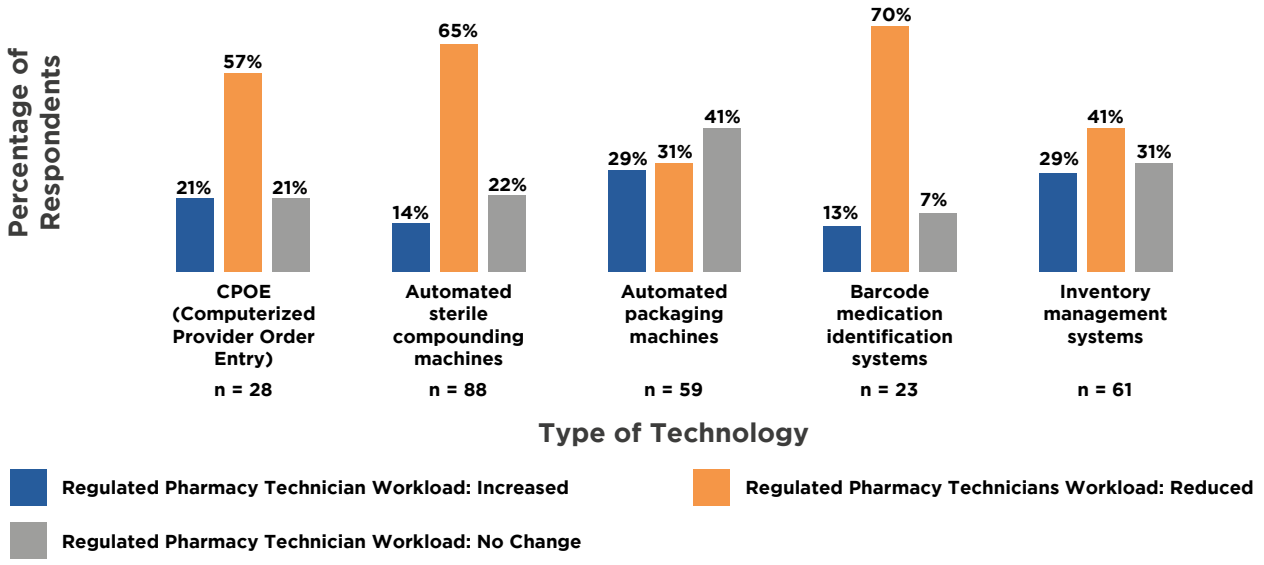
Figure F-3. Ideal Ratio of Regulated Pharmacy Technicians to Non-regulated Pharmacy Assistants, 2020/21



Impact of Technology Integration on Pharmacy Technical Staff

As shown in Figure F-4, respondents reported that the implementation of various technologies had decreased the workload of regulated pharmacy technicians: with barcode medication identification systems, workload decrease was reported by 70% (16/23) of respondents; with automated sterile compounding, workload decrease was reported by 65% (57/88); with computerized provider order entry (CPOE), workload decrease was reported by 57% (16/28); and with inventory management systems, workload decrease was reported by 41% (25/61).

Figure F-4. Impact of Technologies on the Workload of Regulated Pharmacy Technicians, 2020/21

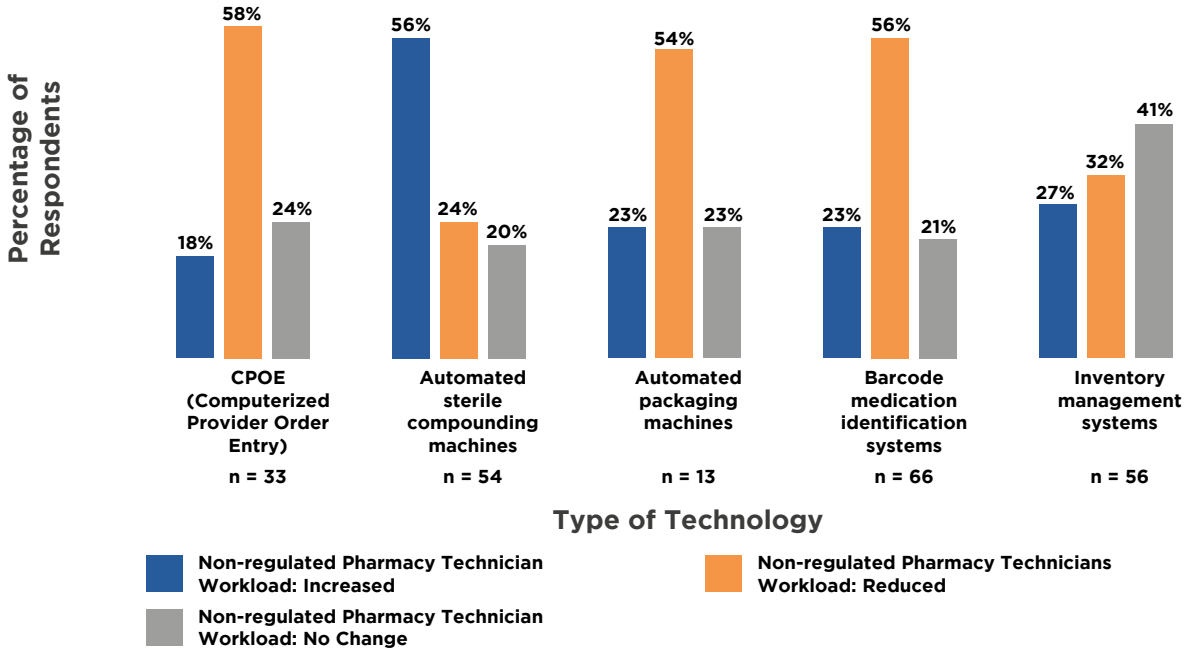


As shown in Figure F-5, an increase in the workload of non-regulated pharmacy assistants was reported by 56% (30/54) of respondents with implementation of automated sterile compounding machines, whereas workload remained unchanged for 41% (23/56) of respondents with implementation of inventory management systems. Reductions in the workload of non-regulated pharmacy assistants were reported with the following technologies:

- CPOE, workload reduction reported by 58% (19/33)
- barcode medication identification systems, workload reduction reported by 56% (37/66)
- automated packaging machines, workload reduction reported by 54% (7/13)

The reported increase in workload with implementation of sterile compounding machines may be due to a requirement for personnel with additional training, as well as increased complexity of the task when products are switched or added.[20]

Figure F-5. Impact of Technologies on the Workload of Non-regulated Pharmacy Assistants, 2020/21



The increasing utilization of CPOE across Canada removes pharmacy technical staff from order entry tasks, allowing them to take on other functions.

Enhanced Roles Performed by Regulated Pharmacy Technicians

Table F-5 shows that regulated pharmacy technicians are utilized for many tasks, but the following functions continue to be performed primarily by pharmacists:

- receiving verbal orders (except for controlled substances), reported by 100% (135/135) of respondents
- developing master formula or compounding protocols, reported by 92% (125/136) of respondents
- determining beyond-use date, reported by 89% (120/135)
- providing instructions on how to operate medical devices, reported by 89% (97/109)
- transferring prescriptions (except for controlled substances), reported by 88% (63/72)
- supervising the pharmacy dispensary in the facility, reported by 87% (108/124)
- creating, updating and validating the drug database library in the facility, reported by 83% (104/125)
- supervising the pharmacy operations of a regional distribution centre, reported by 79% (45/57)

Table F-5. Staff Performing Pharmacy Functions, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Developing master formulas or compounding protocols	(n=)	(136)	(39)	(54)	(43)	(32)	(99)	(5)	(23)	(23)	(38)	(35)	(17)
	Pharmacist	125	32	51	42	32	88	5	21	19	34	34	17
		92%	**82%**	**94%**	**98%**	**100%**	**89%**		**91%**	**83%**	**89%**	**97%**	**100%**
	Regulated pharmacy technician	34	16	10	8	4	28	2	6	13	14	0	1
		25%	**41%**	**19%**	**19%**	**13%**	**28%**		**26%**	**57%**	**37%**	**0%**	**6%**
	Non-regulated pharmacy assistant	4	1	2	1	1	2	1	0	0	0	2	2
		3%	**3%**	**4%**	**2%**	**3%**	**2%**		**0%**	**0%**	**0%**	**6%**	**12%**
	n/a	5	1	4	0	0	5	0	4	0	1	0	0
Sterile compounding of pharmaceuticals	(n=)	(138)	(37)	(58)	(43)	(32)	(101)	(5)	(27)	(22)	(37)	(35)	(17)
	Pharmacist	9	3	4	2	2	6	1	2	3	1	0	3
		7%	**8%**	**7%**	**5%**	**6%**	**6%**		**7%**	**14%**	**3%**	**0%**	**18%**
	Regulated pharmacy technician	95	30	43	22	24	68	3	26	20	36	0	13
		69%	**81%**	**74%**	**51%**	**75%**	**67%**		**96%**	**91%**	**97%**	**0%**	**76%**
	Non-regulated pharmacy assistant	60	15	22	23	13	46	1	2	12	3	35	8
		43%	**41%**	**38%**	**53%**	**41%**	**46%**		**7%**	**55%**	**8%**	**100%**	**47%**
	n/a	3	3	0	0	0	3	0	0	1	2	0	0
Non-sterile compounding of pharmaceuticals	(n=)	(138)	(37)	(58)	(43)	(32)	(101)	(5)	(27)	(21)	(38)	(35)	(17)
	Pharmacist	7	2	4	1	1	5	1	2	2	1	0	2
		5%	**5%**	**7%**	**2%**	**3%**	**5%**		**7%**	**10%**	**3%**	**0%**	**12%**
	Regulated pharmacy technician	94	29	43	22	24	67	3	26	18	37	0	13
		68%	**78%**	**74%**	**51%**	**75%**	**66%**		**96%**	**86%**	**97%**	**0%**	**76%**
	Non-regulated pharmacy assistant	67	18	25	24	15	51	1	6	14	4	35	8
		49%	**49%**	**43%**	**56%**	**47%**	**50%**		**22%**	**67%**	**11%**	**100%**	**47%**
	n/a	3	3	0	0	0	3	0	0	2	1	0	0
Determining beyond-use date (BUD)	(n=)	(135)	(39)	(55)	(41)	(31)	(99)	(5)	(24)	(22)	(38)	(34)	(17)
	Pharmacist	120	28	52	40	30	86	4	20	17	34	33	16
		89%	**72%**	**95%**	**98%**	**97%**	**87%**		**83%**	**77%**	**89%**	**97%**	**94%**
	Regulated pharmacy technician	35	19	9	7	4	29	2	7	13	13	0	2
		26%	**49%**	**16%**	**17%**	**13%**	**29%**		**29%**	**59%**	**34%**	**0%**	**12%**
	Non-regulated pharmacy assistant	3	2	0	1	1	2	0	0	1	0	1	1
		2%	**5%**	**0%**	**2%**	**3%**	**2%**		**0%**	**5%**	**0%**	**3%**	**6%**
	n/a	6	1	3	2	1	5	0	3	1	1	1	0

Table F-5 (continued). Staff Performing Pharmacy Functions, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Receiving verbal orders (except for controlled substances)	(n=)	(135)	(37)	(56)	(42)	(31)	(99)	(5)	(27)	(22)	(35)	(34)	(17)
	Pharmacist	135	37	56	42	31	99	5	27	22	35	34	17
		100%	**100%**	**100%**	**100%**	**100%**	**100%**		**100%**	**100%**	**100%**	**100%**	**100%**
	Regulated pharmacy technician	4	3	0	1	1	3	0	1	2	0	1	0
		3%	**8%**	**0%**	**2%**	**3%**	**3%**		**4%**	**9%**	**0%**	**3%**	**0%**
	Non-regulated pharmacy assistant	1	0	0	1	0	1	0	0	0	0	1	0
		1%	**0%**	**0%**	**2%**	**0%**	**1%**		**0%**	**0%**	**0%**	**3%**	**0%**
	n/a	6 (1)	3	2 (1)	1	1	5 (1)	0	0	1	4 (1)	1	0
Performing the final product check for new prescriptions, including prescriptions for controlled and hazardous substances	(n=)	(138)	(39)	(57)	(42)	(32)	(101)	(5)	(27)	(23)	(36)	(35)	(17)
	Pharmacist	74	28	26	20	17	52	5	11	18	17	20	8
		54%	**72%**	**46%**	**48%**	**53%**	**51%**		**41%**	**78%**	**47%**	**57%**	**47%**
	Regulated pharmacy technician	81	24	36	21	20	60	1	23	16	30	0	12
		59%	**62%**	**63%**	**50%**	**63%**	**59%**		**85%**	**70%**	**83%**	**0%**	**71%**
	Non-regulated pharmacy assistant	31	3	13	15	6	25	0	0	0	2	20	9
		22%	**8%**	**23%**	**36%**	**19%**	**25%**		**0%**	**0%**	**6%**	**57%**	**53%**
	n/a	3	1	1	1	0	3	0	0	0	3	0	0
Performing the final product check for refill prescriptions, including refill prescriptions for controlled and hazardous substances	(n=)	(138)	(39)	(57)	(42)	(32)	(101)	(5)	(27)	(23)	(36)	(35)	(17)
	Pharmacist	58	23	18	17	14	40	4	9	17	13	12	7
		42%	**59%**	**32%**	**40%**	**44%**	**40%**		**33%**	**74%**	**36%**	**34%**	**41%**
	Regulated pharmacy technician	90	27	42	21	22	65	3	26	18	34	0	12
		65%	**69%**	**74%**	**50%**	**69%**	**64%**		**96%**	**78%**	**94%**	**0%**	**71%**
	Non-regulated pharmacy assistant	35	6	13	16	7	28	0	0	0	2	25	8
		25%	**15%**	**23%**	**38%**	**22%**	**28%**		**0%**	**0%**	**6%**	**71%**	**47%**
	n/a	3	1	1	1	0	3	0	0	0	3	0	0
Transferring prescriptions (except for controlled substances)	(n=)	(72)	(19)	(28)	(25)	(16)	(53)	(3)	(17)	(11)	(15)	(23)	(6)
	Pharmacist	63	16	25	22	14	46	3	15	11	9	23	5
		88%	**84%**	**89%**	**88%**	**88%**	**87%**		**88%**	**100%**	**60%**	**100%**	
	Regulated pharmacy technician	13	5	3	5	3	10	0	4	1	6	0	2
		18%	**26%**	**11%**	**20%**	**19%**	**19%**		**24%**	**9%**	**40%**	**0%**	
	Non-regulated pharmacy assistant	2	0	0	2	0	2	0	1	0	1	0	0
		3%	**0%**	**0%**	**8%**	**0%**	**4%**		**6%**	**0%**	**7%**	**0%**	
	n/a (and non-pharmacy personnel)	69 (1)	21	30 (1)	18	16	51 (1)	2	10	12	24 (1)	12	11

Table F-5 (continued). Staff Performing Pharmacy Functions, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Providing instructions on how to operate medical devices	(n=)	(109)	(27)	(43)	(39)	(26)	(79)	(4)	(17)	(20)	(27)	(30)	(15)
	Pharmacist	97	25	36	36	24	70	3	14	20	20	30	13
		89%	**93%**	**84%**	**92%**	**92%**	**89%**		**82%**	**100%**	**74%**	**100%**	**87%**
	Regulated pharmacy technician	7	2	4	1	1	6	0	1	1	5	0	0
		6%	**7%**	**9%**	**3%**	**4%**	**8%**		**6%**	**5%**	**19%**	**0%**	**0%**
	Non-regulated pharmacy assistant	1	0	1	0	0	0	1	0	0	0	0	1
		1%	**0%**	**2%**	**0%**	**0%**	**0%**		**0%**	**0%**	**0%**	**0%**	**7%**
	n/a (and non-pharmacy personnel)	32 (5)	13 (1)	15 (2)	4 (2)	6 (1)	25 (4)	1	10 (2)	3	12 (2)	5	2 (1)
Supervising the pharmacy operations of a regional distribution centre	(n=)	(57)	(14)	(21)	(22)	(15)	(41)	(1)	(8)	(12)	(17)	(13)	(7)
	Pharmacist	45	12	16	17	10	34	1	3	11	14	12	5
		79%	**86%**	**76%**	**77%**	**67%**	**83%**			**92%**	**82%**	**92%**	**71%**
	Regulated pharmacy technician	17	4	4	9	5	12	0	5	3	5	0	4
		30%	**29%**	**19%**	**41%**	**33%**	**29%**			**25%**	**29%**	**0%**	**57%**
	Non-regulated pharmacy assistant	1	0	0	1	1	0	0	0	0	0	0	1
		2%	**0%**	**0%**	**5%**	**7%**	**0%**			**0%**	**0%**	**0%**	**14%**
	n/a (and non-pharmacy personnel)	83 (2)	26	36 (2)	21	17 (2)	62	4	19 (1)	11	22	22 (1)	9
Supervising the pharmacy dispensary in your facility	(n=)	(124)	(36)	(55)	(33)	(30)	(89)	(5)	(27)	(22)	(38)	(21)	(16)
	Pharmacist	108	31	46	31	26	77	5	24	19	31	21	13
		87%	**86%**	**84%**	**94%**	**87%**	**87%**		89%	**86%**	**82%**	**100%**	**81%**
	Regulated pharmacy technician	40	10	19	11	10	30	0	12	6	17	0	5
		32%	**28%**	**35%**	**33%**	**33%**	**34%**		44%	**27%**	**45%**	**0%**	**31%**
	Non-regulated pharmacy assistant	3	1	2	0	1	2	0	0	0	0	0	3
		2%	**3%**	**4%**	**0%**	**3%**	**2%**		0%	**0%**	**0%**	**0%**	**19%**
	n/a (and non-pharmacy personnel)	17	4	3	10	2	15	0	0	1	1	14	1
Creating, updating and validating the drug database library in your facility	(n=)	(125)	(30)	(52)	(43)	(29)	(91)	(5)	(20)	(18)	(37)	(35)	(15)
	Pharmacist	104	24	39	41	24	75	5	15	16	26	35	12
		83%	**80%**	**75%**	**95%**	**83%**	**82%**		75%	**89%**	**70%**	**100%**	**80%**
	Regulated pharmacy technician	31	7	16	8	4	27	0	8	4	15	0	4
		25%	**23%**	**31%**	**19%**	**14%**	**30%**		40%	**22%**	**41%**	**0%**	**27%**
	Non-regulated pharmacy assistant	9	2	3	4	3	6	0	0	1	0	6	2
		7%	**7%**	**6%**	**9%**	**10%**	**7%**		0%	**6%**	**0%**	**17%**	**13%**
	n/a (and non-pharmacy personnel)	15 (2)	10 (1)	5 (1)	0	3 (1)	12 (1)	0	7 (1)	5	1	0	2

Table F-5 (continued). Staff Performing Pharmacy Functions, 2020/21

Function (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Performing final verification of compounded non-sterile pharmaceuticals, including narcotics and controlled substances	(n=)	(139)	(39)	(57)	(43)	(31)	(103)	(5)	(27)	(22)	(38)	(35)	(17)
	Pharmacist	62	23	21	18	13	46	3	11	16	11	19	5
		45%	**59%**	**37%**	**42%**	**42%**	**45%**		41%	**73%**	**29%**	**54%**	**29%**
	Regulated pharmacy technician	88	28	40	20	23	63	2	22	17	36	0	13
		63%	**72%**	**70%**	**47%**	**74%**	**61%**		81%	**77%**	**95%**	**0%**	**76%**
	Non-regulated pharmacy assistant	32	4	14	14	7	24	1	0	0	1	23	8
		23%	**10%**	**25%**	**33%**	**23%**	**23%**		0%	**0%**	**3%**	**66%**	**47%**
	n/a (and non-pharmacy personnel)	1	1	0	0	0	1	0	0	0	1	0	0
Performing final verification of compounded sterile pharmaceuticals, including narcotics and controlled substances	(n=)	(139)	(38)	(58)	(43)	(32)	(102)	(5)	(27)	(23)	(37)	(35)	(17)
	Pharmacist	71	25	24	22	16	52	3	11	16	11	25	8
		51%	**66%**	**41%**	**51%**	**50%**	**51%**		41%	**70%**	**30%**	**71%**	**47%**
	Regulated pharmacy technician	77	19	40	18	21	54	2	21	15	33	0	8
		55%	**50%**	**69%**	**42%**	**66%**	**53%**		78%	**65%**	**89%**	**0%**	**47%**
	Non-regulated pharmacy assistant	23	4	8	11	6	16	1	0	0	1	13	9
		17%	**11%**	**14%**	**26%**	**19%**	**16%**		0%	**0%**	**3%**	**37%**	**53%**
	n/a (and non-pharmacy personnel)	2	2	0	0	0	2	0	0	0	2	0	0
Performing quality audits on the automated system	(n=)	(119)	(31)	(50)	(38)	(28)	(86)	(5)	(19)	(16)	(39)	(30)	(15)
	Pharmacist	48	11	19	18	6	39	3	8	7	14	13	6
		40%	**35%**	**38%**	**47%**	**21%**	**45%**		42%	**44%**	**36%**	**43%**	**40%**
	Regulated pharmacy technician	74	24	33	17	20	51	3	17	14	35	0	8
		62%	**77%**	**66%**	**45%**	**71%**	**59%**		89%	**88%**	**90%**	**0%**	**53%**
	Non-regulated pharmacy assistant	29	9	8	12	4	24	1	2	3	1	17	6
		24%	**29%**	**16%**	**32%**	**14%**	**28%**		11%	**19%**	**3%**	**57%**	**40%**
	n/a (and non-pharmacy personnel)	22 (2)	9	8 (1)	5 (1)	4 (2)	18	0	8	7	0	5 (2)	2
Performing quality audits on the automated system	(n=)	(123)	(31)	(52)	(40)	(30)	(88)	(5)	(17)	(18)	(37)	(34)	(17)
	Pharmacist	59	11	20	28	12	45	2	3	4	10	33	9
		48%	**35%**	**38%**	**70%**	**40%**	**51%**		18%	**22%**	**27%**	**97%**	**53%**
	Regulated pharmacy technician	74	22	36	16	19	52	3	17	16	33	0	8
		60%	**71%**	**69%**	**40%**	**63%**	**59%**		100%	**89%**	**89%**	**0%**	**47%**
	Non-regulated pharmacy assistant	7	2	3	2	3	4	0	0	0	0	2	5
		6%	**6%**	**6%**	**5%**	**10%**	**5%**		0%	**0%**	**0%**	**6%**	**29%**
	n/a (and non-pharmacy personnel)	18 (1)	9	6 (1)	3	2	16 (1)	0	10	5	2 (1)	1	0

Base: All respondents, n = 141; for each function, the n value shown (and used to calculate percentages) excludes the n/a responses
Where the n value is less than 10, percentages were not calculated to avoid potentially misleading comparisons
n/a = not applicable; rows labelled "n/a" also include, within parentheses, responses for non-pharmacy personnel, where applicable

Opportunities for Pharmacists and Regulated Pharmacy Technicians

Opportunities exist to utilize regulated pharmacy technicians for many functions that are currently performed by pharmacists but fall within the regulated pharmacy technicians' scope of practice.

Organizations should optimize their regulated pharmacy technicians in performing more patient care activities. Tangible benefits are needed to inspire regulated pharmacy technicians to pursue more advanced roles.

Previously, the role of regulated pharmacy technicians and non-regulated pharmacy assistants focused on medication distribution activities. A systematic review published in 2018 in the *Journal of the American Pharmacists Association* found that the role of the pharmacy technician is evolving to include purchasing or fiscal management responsibilities, supervisory activities, assistance with obtaining medication histories, medication therapy management, immunizations, quality improvement, hazardous drug handling, patient assistance programs, education and training, drug use evaluation, monitoring of adverse drug events, industry and informatics.[21] As stated in Chapter B – Clinical Pharmacy Practice, there is an increasing need to enable pharmacists to work to the full extent of their scope of practice as it pertains to clinical activities by utilizing regulated pharmacy technicians to their full scope. This approach will improve efficiencies in healthcare and will result in better patient care.

In the United Kingdom (UK), where regulated pharmacy technicians were accepted in 2011, these professionals have gained increased recognition for their contribution to the healthcare agenda as their roles, scope of practice and autonomy have increased.[22] This increased recognition has occurred because many "traditional" pharmacist roles have become increasingly technical in function through automation and enhanced information technology, even though there is a trend to person- or patient-centred focus. Interestingly, the UK experience has been very similar to that in Canada.

A survey with a response rate of 35% (n = 62 national professional organizations) showed a significant variety of pharmacy support workforce cadres globally, with regard to their role, scope, supervision, education and regulation. Four country-specific workforce models emerged from the data:[23]

- Countries with pharmacists only and no pharmacy support workforce cadres (e.g., Japan)
- Countries where pharmacy support workforce cadres are supervised by pharmacists through direct or delegated methods (e.g., Australia and South Africa)
- Countries where certain pharmacy support workforce cadres are regulated and have accountability to undertake independent practice in a team alongside pharmacists (e.g., Canada and Denmark)
- Countries with weak or outdated legislative structures where, out of necessity, pharmacy support workforce cadres work by themselves (i.e., current legislation may not reflect actual practice)

Regulated pharmacy technicians continue to be involved in activities such as collecting comprehensive medication histories and collecting the clinical data needed to appropriately administer and monitor medications. This advancement from the traditional dispensing role should lead organizations to assess whether they are under-utilizing their regulated pharmacy technicians, who are capable of performing more patient care activities. In addition, current benefits to the pharmacy technician are primarily indirect, such as increased job satisfaction or a more desirable work schedule.[21] Tangible benefits are needed to inspire regulated pharmacy technicians to pursue more advanced roles.

In the 2016/17 CSHP Hospital Pharmacy in Canada Survey, the progressive roles of experienced technical staff in direct patient care were focused on obtaining best possible medication histories, tracking laboratory test results and aiding in completion of comprehensive medication reviews. In a pilot study to measure how ward-based pharmacy technician roles affected the reporting of omitted or delayed doses, time efficiency, cost implications and general productivity of the ward, omitted doses were reduced from 14% to 5%, and no incidents of harm were reported.[24] The authors concluded that the introduction of regulated pharmacy technicians led to fewer omitted doses and addressed persistent staffing issues by ensuring better use of nursing time.[24] Integrating regulated pharmacy technicians into the nursing team is now a well-recognized approach in forward-thinking institutions around the globe.

In another study, pharmacy technicians undertook additional roles such as processing take-home prescriptions, obtaining stock and non-stock items from the pharmacy, identifying and prioritizing the supply and administration of "critical drugs", and improving governance in relation to medicine storage in the emergency department.[25] These activities helped to avoid the need to re-dispense medications, thus saving money and reducing pharmacy workload.

In addition to improved efficiency and patient care, surveys published in the *Journal of the American Pharmacists Association* have shown that workplace training increased job satisfaction and led to an increase in technicians' confidence in their knowledge and ability to perform a particular skill.[21] In a survey published in February 2022,[26] the authors found that pharmacy practice continues to develop and evolve, with a shift from drug products to patient-centred pharmaceutical services. This evolution reduces the cost and enhances the safety of healthcare.[26]

Support for Regulated Pharmacy Technicians

A question in the 2020/21 survey asked whether organizations would support the performance of certain functions by a regulated pharmacy technician if they had appropriate education and training. The responses are summarized in Table F-6.

Table F-6. Support of Regulated Pharmacy Technicians to Perform Certain Functions, 2020/21

Would your organization support regulated pharmacy technicians to perform these functions with appropriate education and training?		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
	(n=)	(139)	(40)	(57)	(42)	(31)	(103)	(5)	(25)	(23)	(39)	(35)	(17)
Administering medications by injection or inhalation	Yes	60	12	24	24	11	47	2	10	5	19	20	6
		43%	**30%**	**42%**	**57%**	**35%**	**46%**		**40%**	**22%**	**49%**	**57%**	**35%**
Witnessing ingestion of opioid replacement therapy (e.g., methadone, buprenorphine/naloxone)	Yes	82	21	28	33	16	63	3	15	8	20	31	8
		59%	**53%**	**49%**	**79%**	**52%**	**61%**		**60%**	**35%**	**51%**	**89%**	**47%**
Receiving verbal prescriptions for narcotics and controlled substances	Yes	57	19	20	18	10	45	2	12	5	13	16	11
		41%	**48%**	**35%**	**43%**	**32%**	**44%**		**48%**	**22%**	**33%**	**46%**	**65%**
Independently destroying unserviceable narcotics and controlled substances	Yes	110	31	43	36	25	81	4	20	14	32	30	14
		79%	78%	75%	86%	81%	79%		80%	61%	82%	86%	82%

Base: n = 139 respondents
Where the n value is less than 10, percentages were not calculated to avoid potentially misleading comparisons

- More than three-quarters (79%, 110/139) of respondents indicated support for technicians to independently destroy unserviceable narcotics and controlled substances. Some respondents commented that they responded "no" for this function because the survey question used the word "independent", noting that all activities related to narcotics and controlled substances require the involvement of two independent licensed professionals, including verification of dispensing, transfer, return or destruction of this class of drugs. These respondents instead supported having two regulated pharmacy technicians perform witnessed destruction of expired controlled drugs. If Health Canada were to allow regulated pharmacy technicians to be responsible and accountable for completing tasks related to controlled substances, the efficiency of various functions could be improved.
- Interestingly, 57% (79/139) of respondents did not support administration of medications by injection or inhalation by regulated pharmacy technicians, and 59% (82/139) did not support their receiving verbal prescriptions for narcotics and controlled substances.
- Respondents in the Atlantic region were more supportive of regulated pharmacy technicians taking verbal orders for narcotics and controlled substances relative to other regions (65% [11/17] vs. 48% [12/25] for BC/YT and 46% [16/35] for QC).
- Support for these functions was lowest in the Prairies (SK/MB).
- QC had the highest levels of support for administering medications by injection or inhalation, witnessing ingestion of opioid replacement therapy and independently destroying unserviceable narcotics and controlled substances.
- Respondents from hospitals with 50-200 beds generally would not support administration of medications by injection or inhalation by regulated pharmacy technicians, even with appropriate education and training (70%, 28/40).

Adams and others noted that regulated pharmacy technicians have the potential to increase the number of vaccines administered and to reduce the occurrence of vaccine-preventable disease.[27] Similarly, McKeirnan and Sarchet affirmed that appropriately trained regulated pharmacy technicians can improve access to vaccination care, thereby increasing the number of vaccines given and reducing the number of deaths from vaccine-preventable diseases.[28]

Most jurisdictions are still in transition after authorizing regulated pharmacy technicians to administer injections during the COVID-19 pandemic (typically under pharmacist supervision), and not all provinces and territories have expanded the scope of practice for regulated pharmacy technicians to include this function. The ON government approved regulations in November 2021 allowing regulated pharmacy technicians to administer the influenza vaccine.

Respondents commented that although they supported a full scope of practice for regulated pharmacy technicians, there is more to consider. For example, it is important to prioritize various types of work and acknowledge that some of these tasks are performed by other healthcare professionals (e.g. nurses), so they would not use pharmacy resources. Some respondents specifically stated that certain tasks were performed by other professionals in their facilities (e.g., ingestion of medication therapy witnessed by nursing staff and verbal orders received by nursing staff or pharmacists).

Workforce challenges may be one reason for the lack of support for expanding the role of regulated pharmacy technicians to include tasks such as giving injections. Furthermore, pharmacists and regulated pharmacy technicians may be resistant to giving injections. One respondent commented that their institution's influenza vaccine campaign is delivered by nursing staff, with the role of regulated pharmacy technicians being limited to ordering the vaccines and pre-loading syringes. A few respondents indicated that if their pharmacists are not administering medications, there would be no reason to ask technicians to do so.

Prevention of Drug Diversion

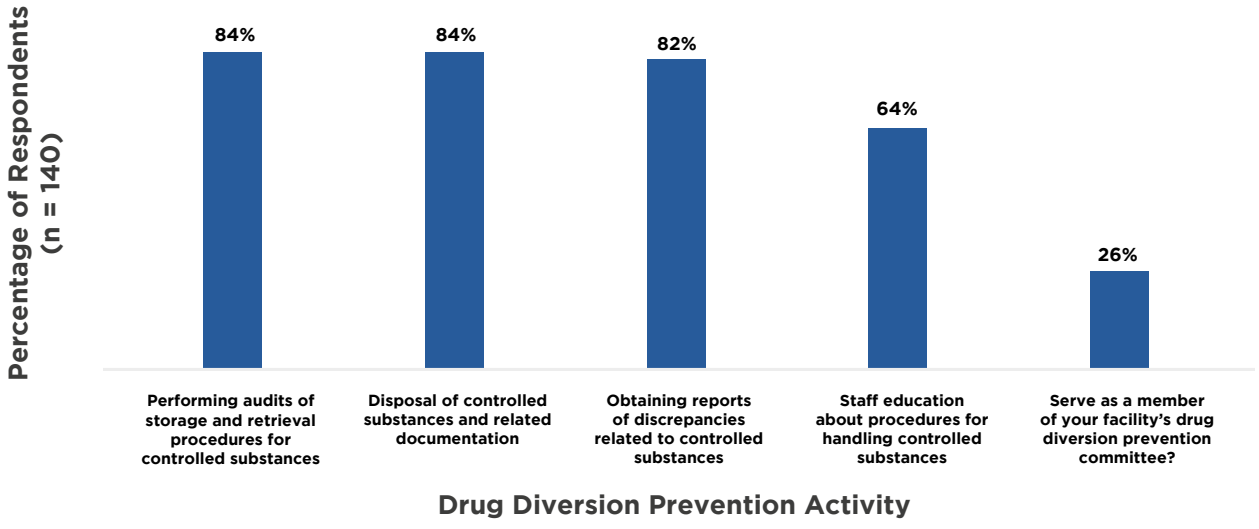
Drug diversion has legal and financial implications. Awareness and recognition are the first steps to prevention, along with promoting a safety culture to detect diversion earlier. The Canadian Society of Hospital Pharmacists (CSHP) and the American Society of Health-System Pharmacists (ASHP) have both developed guidelines on preventing diversion of controlled substances.[29,30] CSHP's guidelines aim to "provide Canadian healthcare facilities with advice and guidance on how to develop a system to prevent, detect, and respond to diversion of controlled substances, and how to continuously improve such a system once it has been established".[29] These guidelines were published to fulfil one of the Society's commitments under the Joint Statement of Action to Address the Opioid Crisis.[31] Regulated pharmacy technicians and/or non-regulated pharmacy assistants are involved in selected activities related to preventing drug diversion (see Figure F-6).

Overall, there was relatively high support for performance of the following activities by regulated pharmacy technicians or non-regulated pharmacy assistants:

- 84% (117/140) for performing audits of storage and retrieval procedures for controlled substances, ranging from 81% (21/26) for BC/YT to 88% (15/17) for the Atlantic region
- 84% (118/140) for disposal of controlled substances and related documentation, ranging from 63% (22/35) for QC to 96% (25/26) for BC/YT
- 82% (115/140) for obtaining reports of discrepancies related to controlled substances, ranging from 77% (30/39) for ON to 94% (16/17) for the Atlantic region
- 64% (89/140) for staff education about procedures for handling controlled substances, ranging from 54% (19/35) for QC to 73% (19/26) for BC/YT

A relatively small proportion of respondents indicated that regulated pharmacy technicians participated on their facility's drug diversion prevention committee. However, the survey did not ask whether the respondent's facility had such a committee, and the question about technician participation did not offer the option of "not applicable"; this may have resulted in the high level of "no" responses.

Figure F-6. Functions Related to Controlled Substances Performed by Regulated Pharmacy Technicians and/or Non-regulated Pharmacy Assistants, 2020/21



Prevention of Drug Diversion

The 2020/21 iteration of the survey asked a new question about the impact of pharmacy technician regulation at the organizational level. Among the results (Table F-7), the following are most notable:

Table F-7. Impact of Pharmacy Technician Regulation on Organizations, 2020/21

Impact on organization (multiple options allowed)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
	(n=)	(98)	(34)	(43)	(21)	(23)	(71)	(4)	(24)	(21)	(38)	(0)	(15)
Decrease in pharmacists' workload	Yes	71	26	30	15	14	55	2	16	18	27	0	10
		72%	**76%**	**70%**	**71%**	**61%**	**77%**		**67%**	**86%**	**71%**		**67%**
Enhancement of patient care	Yes	65	20	29	16	15	47	3	15	14	29	0	7
		66%	**59%**	**67%**	**76%**	**65%**	**66%**		**63%**	**67%**	**76%**		**47%**
Creation of new positions	Yes	56	19	26	11	9	45	2	17	13	22	0	4
		57%	**56%**	**60%**	**52%**	**39%**	**63%**		**71%**	**62%**	**58%**		**27%**
Expansion of services	Yes	51	15	24	12	11	39	1	14	5	27	0	5
		52%	**44%**	**56%**	**57%**	**48%**	**55%**		**58%**	**24%**	**71%**		**33%**
Decrease in medication turnaround times	Yes	31	8	17	6	5	25	1	7	3	16	0	5
		32%	**24%**	**40%**	**29%**	**22%**	**35%**		**29%**	**14%**	**42%**		**33%**
Decrease in medication errors	Yes	30	6	18	6	6	23	1	8	5	14	0	3
		31%	**18%**	**42%**	**29%**	**26%**	**32%**		**33%**	**24%**	**37%**		**20%**
Elimination of existing positions	Yes	24	8	13	3	4	19	1	9	5	10	0	0
		24%	**24%**	**30%**	**14%**	**17%**	**27%**		**38%**	**24%**	**26%**		**0%**
Decrease in staff turnover	Yes	11	4	6	1	1	9	1	4	1	5	0	1
		11%	**12%**	**14%**	**5%**	**4%**	**13%**		**17%**	**5%**	**13%**		**7%**
Other	Yes	20	7	6	7	7	11	2	6	3	5	0	6
		20%	**21%**	**14%**	**33%**	**30%**	**15%**		**25%**	**14%**	**13%**		**40%**
n/a		**41**	**6**	**14**	**21**	**8**	**32**	**1**	**1**	**2**	**1**	**35**	**2**

Base: n = 98 respondents
Where the n value is less than 10, percentages were not calculated to avoid potentially misleading comparisons
n/a = not applicable

- 72% (71/98) reported a decrease in pharmacists' workload
- 66% (65/98) reported enhancement of patient care
- 57% (56/98) reported the creation of new positions
- 52% (51/98) reported an expansion of services
- 32% (31/98) reported a decrease in turnaround times
- 31% (30/98) reported a decrease in medication errors

These data show a positive impact on organizations with expansion of the role of regulated pharmacy technicians beyond traditional dispensing activities. However, more in-depth literature specific to pharmacy technician practice and the impact on health and patient care is required. The Pharmacy Workforce Planning Committee of the Association of Faculties of Pharmacy of Canada and the Canadian Pharmacists Association suggested the following key areas of focus and influence for organizations to consider:[32]

- Developing indicators to determine whether the pharmacy technician workforce is accessible and acceptable, and whether it possesses the appropriate competencies to provide high-quality health services to support evidence-based policy decisions.
- Identifying trends in the technician workforce in relation to production and performance.
- Identifying gaps in the technician workforce in relation to productivity, performance and patient needs.
- Identifying potential disruptors in pharmacy that will affect health workforce planning in Canada for pharmacy technicians and assistants.

Conclusion

Pharmacy technician regulation is not enough. To move hospital pharmacy practice forward and ensure the successful integration of regulated pharmacy technicians, several factors must be considered:

- Shortages must be addressed. It is difficult to advance a profession with an insufficient number of trained professionals. Bailey[33] described two surveys conducted by ASHP in November 2021 to understand the factors driving the shortage of pharmacy technicians and to identify methods of improving retention. Interestingly, the strategies identified by administrators who responded to the survey included increasing the use of overtime and shifting technician tasks to pharmacists, whereas pharmacy technician respondents stated that higher compensation would help with retention. About 30% of technicians reported that they would like employers to offer retention bonuses, while 25% said they would like to see a career ladder with clear pathways to promotion.[33]
- There is some inconsistency in the education, training and certification requirements for pharmacy technicians, and regulations have not kept pace with the evolving roles of regulated pharmacy technicians.[34] Establishing training programs to support the development of regulated pharmacy technicians will improve their skills and help them to understand the increasingly complex medication use process. Vest and Kelm suggested that standardized training programs could help with the retention of skilled pharmacy technicians and expand practice.[35]
- More accredited pharmacy technician programs are needed in Canada. According to the CCAPP,[8] the number of accredited pharmacy technician programs fell from 53 in 2015 to 35 in 2021.
- Conversion of regulated pharmacy technician positions to non-regulated pharmacy assistant positions may be affecting the number of regulated pharmacy technicians through a lack of professional and compensation differentiation.
- Workplace redesign to support expanded roles for regulated pharmacy technicians is essential.
- Helping regulated pharmacy technicians to manage workplace conflict and interpersonal communication will enhance their confidence in their role.

- Further opportunities for appropriate delegation of pharmacist activities should be considered to facilitate more time and focus on the therapeutic and cognitive aspects of medication management services.[36,37]

- Limitations associated with collective agreements reached through the bargaining units should be considered. Many facilities hire regulated pharmacy technicians based solely on seniority, which hinders progress within the profession. What is needed is the option to select people based on the quality and safety of the medication system for the patient. This approach would lead to collaboration with pharmacists, such that all aspects of the pharmacy service would be performing at the highest of quality and safety for the patient. This would in turn allow for further collaboration with medicine and nursing.

- Leadership must provide the opportunity to create or revise benchmarks for critical and independent thinking roles and must also conduct surveys to find out what can be done to boost morale and engage regulated pharmacy technicians in decision-making. All roles in the healthcare system must be considered in the context of what makes sense, not merely who has the ability.

- There is also an aspect of trust that must be considered. Some pharmacists still do not trust regulated pharmacy technicians to work to their full scope, even though there is now sufficient evidence that the accuracy of regulated pharmacy technicians in performing their work is at least similar (if not superior) to that of pharmacists.

- The private sector is now hiring more regulated pharmacy technicians, which creates competitive wage pressures within the profession.

- The new generation of regulated pharmacy technicians values work-life balance. A trend has emerged within healthcare facilities over the past three to four years whereby regulated pharmacy technicians are looking for part-time as opposed to full-time work.

Salameh and others identified four strategies for the ON private sector, which could be translated to hospital practice.[36]

1. Environmental factors, such as availability of dedicated and designated workstations for regulated pharmacy technicians (to provide a measure of privacy from distraction/disruption and to optimize workflow), placement of key technologies (such as computers or packaging machines) and implementation of staffing ratios that are appropriate for the workload.

2. Interpersonal factors, given the existence of overlapping/redundant functions shared by regulated pharmacy technicians and pharmacists, which may lead to conflict within the pharmacy team because of role ambiguity and a desire for "turf protection".[36] Clear role definitions, with clear boundaries, would be beneficial.

3. Professional identity formation, whereby regulated pharmacy technicians are strong advocates for their own evolving profession. If not fully appreciated, this factor can be a potential barrier to successful integration in the role, may decrease the confidence of regulated pharmacy technicians and can lead to a lack of trust on the part of pharmacists and other healthcare professionals. Regulated pharmacy technicians are accountable and responsible for their activities and should display this accountability and responsibility in a professional manner.

4. Innovative use of delegation, allowing regulated pharmacy technicians to take responsibility for various activities, may not be in place. However, organizations should optimize workflow to ensure that regulated pharmacy technicians are working to their full scope of practice, similar to having pharmacists work to their full scope of practice in the interests of patient care.

With regulation, specialized roles that were once exclusively performed by pharmacists continue to emerge within the areas of quality assurance, medication reconciliation, clinical care, renal programs, research, drug utilization, policy creation, immunization and other regulatory work. Even though the scope of pharmacy practice continues to expand, there are still several impediments to optimal delivery of pharmaceutical care, including shortages of pharmacists, increasing complexity of medication regimens, and increasing acuity of patients and the associated workload.[26] Because regulated pharmacy technicians

are considered experts in medication distribution systems, these challenges have resulted in opportunities for the delegation of select patient-centred care activities to them.[38]

There is an opportunity and responsibility to elevate regulated pharmacy technicians to advance safety, better serve patients and enable pharmacists to fully utilize their clinical knowledge and skills. It is essential that healthcare providers be able to work interdependently. When such interdependence is well executed, not only does the patient benefit, but also the risk of medication system errors is minimized.

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G - Technology

Douglas Doucette

It has been more than two decades since the Institute of Medicine released the publication *To Err Is Human*, in which it claimed that up to 98,000 people were dying from hospital medical errors in the United States (US) annually.[1] Since that report and with supporting legislation, healthcare systems in Western societies have adopted various technologies designed to reduce such errors, including computerized provider order entry (CPOE), electronic prescribing, automated dispensing cabinets (ADCs), smart infusion pumps, robotic dispensing units and barcoding systems for the preparation and storage of medications as well as their administration to the patient.[2]

Similar studies are available for Canadian hospitals. The Canadian Adverse Events Study, published in 2004, was the first to report on the incidence of adverse events in Canadian hospitals, showing that 7.5% of adults admitted to hospital during the study period experienced adverse events. Among the patients with adverse events, 37% experienced events deemed to be preventable, and the event was fatal in 21% of cases. Based on approximately 2.5 million hospital admissions per year in Canada at the time, the authors concluded that 185,000 were associated with an adverse event and nearly 70,000 of these were potentially preventable. The authors suggested that improving medication safety and surgery would be important to improve overall patient safety in Canadian hospitals.[3] This study represented a call to action for safety in the delivery of healthcare to Canadian patients.

A decade ago, a similar study reported that more than 9% of children admitted to acute care hospitals in Canada experienced harm caused by healthcare management, leading to death, disability, prolonged hospital stays or readmission.[4] Rates of adverse events were higher in academic pediatric centres than in community hospitals. The authors concluded that outcomes for children receiving care in hospital could be improved by focusing on surgical and critical care safety, as well as by conducting research into diagnostic adverse events and methods of improving outcomes in emergency and maternal/obstetrical care.

Innovative approaches to optimizing the use of technology in acute care hospitals, with the aim of reducing preventable adverse events, were reported by a multidisciplinary working group of German, French and UK healthcare professionals. The working group identified barriers to the uptake of technological innovation that could improve patient safety, and summarized them under four themes: antimicrobial stewardship, point-of-care testing, microbiology test reporting and mobile automated dispensing systems.[5] The authors noted that workforce shortages and high workload might encourage behaviours that compromise safety, despite the availability of a plethora of technological systems and devices.

The complexity of contemporary healthcare delivery has brought us to the point that clinicians cannot function optimally without the assistance of technology. However, safety can be compromised by technological factors such as poor design, poor maintenance and implementation, inadequate training, misuse of equipment and over-reliance on technology.[6]

Electronic health records (EHRs), CPOE and barcode technologies have benefits when integrated into re-designed systems instead of being added onto existing designs. Adopting such technologies can improve the safety of medication management in clinical areas such as operating rooms and critical care units, where many errors occur, and can improve the integrity of pharmaceutical supply chains and medical device management.[7] In this regard, CADTH (formerly known as the Canadian Agency for Drugs and Technologies in Health) provides decision-makers with the evidence, analysis, advice and recommendations needed to make informed decisions in healthcare. Other resources for health information technology (IT) research and development projects can be found at the websites of organizations such as the Canada Health Infoway (https://www.infoway-inforoute.ca/en/) and the Agency for Healthcare Research and Quality (US) (https://www.ahrq.gov/).

Healthcare technology is advancing rapidly with the introduction of innovative devices and software solutions with powerful processing and storage capacity. The range of equipment and systems available and the pace of change offer healthcare institutions and providers many options for improving safety, efficiency and accuracy while managing healthcare information and serving the needs of patients. However, various barriers to the adoption of healthcare technologies have been described, including initial and ongoing costs, lack of technical support, technical concerns and maintenance needs.[8]

Despite the many challenges faced by providers and patients during the COVID-19 pandemic, this global crisis has also stimulated the adoption of digital health as the healthcare industry pivoted to virtual care. In December 2020, the Competition Bureau of Canada surveyed 425 Canadians about their experience accessing and using digital health services. Overall, 72% of respondents reported receiving medical advice from a healthcare provider by telephone, 58% reported booking an appointment electronically, 32% reported consulting a healthcare provider by email or text message, 28% reported visiting a healthcare provider virtually, and only 7% reported never having used or received digital health services. Respondents also expressed satisfaction with digital healthcare services and support for expanding the availability of such services, citing greater convenience and time savings as benefits in empowering them to take more control over their own health.[9]

A recent systematic review identified enablers and barriers to technology development, assessment and implementation.[10] The analysis found that healthcare delivery and innovation departments are often siloed and frequently have conflicting goals. Health-related devices and systems solutions are implemented at local or regional levels, which causes gaps, for both providers and patients, in transitions of care. The authors recommended that patients should be involved in the collaborative development and assessment of technology, such that the resultant outcomes of care will be effectively accessed and will appropriately satisfy patients' needs.

The study also showed that evaluation of the benefits and risks of technology usually focuses on the implementation stage and not on the sustainability of a device or solution throughout its life cycle. Finally, more financial and human resources are needed to develop and implement technology, and alternative funding and payment models are needed to facilitate adoption.

Although adopting health IT can make care safer for patients, through the introduction of new devices and processes, there is potential for unintended consequences and new safety challenges. A recent article[11] proposed nine key "to-do's" to help healthcare organizations, IT developers, researchers, policy-makers and funders focus their efforts on health IT–related patient safety. The to-do's involved features such as standard user interface features and functions, methods of unambiguous patient identification, methods for real-time surveillance and monitoring of system performance and safety, and a framework to allow sharing of information on hazards and adverse events. The authors suggested that these nine key to-do's must be completed within the next three to five years to permit safe, reliable and efficient health-related IT-based systems required to care for patients.[11]

As discussed in Chapter A, the 2020/21 survey data represent fewer respondents than the previous survey (i.e., 144 in 2020/21 vs. 184 in 2016/17). Thus, proportional changes reported in this chapter should be interpreted with caution. In some cases, such data may represent a real change, while in other cases the observed difference may be explained by the more limited survey participation. The reader is urged to consider not only the reported proportions, but also the absolute number of respondents for a specific item, especially when examining regional data.

The province of Alberta's single health authority was unable to participate in the 2020/21 survey because the provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region are limited to Saskatchewan (SK) and Manitoba (MB). In addition, for trending purposes over the long term, regional data for British Columbia and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon during this iteration of the survey.

Information Systems Integration

The use of EHR systems is associated with higher-quality healthcare through decreased documentation time, increased guideline adherence, and reduced medication errors and adverse drug reactions.[12] The availability of drug, laboratory and other EHR data systems has steadily increased in Canada, from fewer than 10,000 authorized healthcare providers in 2006 to almost 100,000 providers in 2016 having electronic access to patients' health information.[13] However, the systems are still largely based on providers accessing data as viewers, and they often lack integration and the ability to seamlessly transfer information, in part because of siloed funding and uncoordinated planning and implementation. Future success may rely on system development and project implementation spanning the patient care continuum, so that information regarding a patient's care flows seamlessly, regardless of system, vendor, provincial governing body or other factors.

The rate of adoption of EHRs in the US far exceeds that of Canada, with 9 of every 10 US hospitals using a government-certified EHR. However, based on their experience with multiple large-scale health IT adoption projects and key evaluation literature, Colicchio and others[14] reported a range of unintended consequences of EHR implementation: failed expectations, EHR market saturation, innovation vacuum, physician burnout and data obfuscation. The authors proposed that addressing these unintended challenges would allow organizations to reach the full potential of their digital health systems.[14]

Almost two-thirds (65%) of respondents had an operational electronic health record in use.

As shown in Table G-1, an operational EHR was reportedly in use by 65% (91/140) of respondents. More EHR implementation was reported in the following settings:

- facilities with 201-500 beds (70%, 40/57), relative to those with 50-200 (58%, 23/40) or more than 500 beds (65%, 28/43)
- teaching hospitals (78%, 25/32), relative to non-teaching hospitals (62%, 64/103)
- Ontario (ON; 90%, 35/39), followed by BC/YT (85%, 22/26), Atlantic provinces (New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador; 76%, 13/17), the Prairies (SK/MB; 48%, 11/23) and Québec (QC; 29%, 10/35).

Table G-1. Respondents with an Operational Electronic Health Record (EHR), 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Yes	91	23	40	28	25	64	2	22	11	35	10	13
	65%	**58%**	**70%**	**65%**	**78%**	**62%**	**-**	**85%**	**48%**	**90%**	**29%**	**76%**
No	49	17	17	15	7	39	3	4	12	4	25	4
	35%	43%	30%	35%	22%	38%	-	15%	52%	10%	71%	24%

Base: n = 140 respondents
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

In US hospitals, there has been practically full adoption of this technology, as evidenced by the very small proportion (0.2%) of 514 respondents who did not have EHR and/or CPOE in the 2019 survey conducted by the American Society of Health-System Pharmacists (ASHP). A shared EHR was present in 80.9% of US multi-hospital systems, an increase from 72.7% in the 2016 ASHP survey.[16]

The Health Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM) measures clinical outcomes, patient engagement and clinician use of electronic medical record technology to strengthen organizational performance and health outcomes across acute care inpatient populations. EMRAM is the gold standard for rating the digital maturity of health systems and hospitals around the world.[17] Similarly, the HIMSS Outpatient Electronic Medical Record Adoption Model (O-EMRAM) is used to assess EHR implementation in outpatient facilities of hospitals and healthcare institutions.[18]

In the 2020/21 survey, for the first time, respondents were asked about their facilities' EMRAM classification. The following results from Table G-2 are notable:

- Nearly half (47%, 64/137) of respondents' facilities were functioning at EMRAM stage 3 or lower: stage 3, 12% (17/137); stage 2, 18% (24/137); stage 1, 7% (9/137); and stage 0, 10% (14/137).
- Only 2 respondents reported that their facilities were at stage 7, the highest level of the EMRAM classification.
- EMRAM stage was reported as unknown by 39% (54/137) of respondents.

It is disconcerting that more than one-third (39%) of respondents reported the EMRAM stage of their facility as unknown (as opposed to stage 0). This finding may indicate the need for pharmacy directors and leaders to increase their knowledge of the EMRAM stages and related technologies that can enhance the safety of healthcare.

Nearly half (47%) of respondents' facilities were functioning at EMRAM stage 3 or lower, emphasizing further the large gap of EHR adoption between Canadian and US hospitals.

Table G-2. Classification of Respondents' Facilities According to Electronic Medical Record Adoption Model (EMRAM) of the Health Information and Management Systems Society (HIMSS), 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
HIMSS EMRAM classification (n=)	(137)	(39)	(57)	(41)	(30)	(102)	(5)	(25)	(23)	(39)	(35)	(15)
Stage 0	14	7	3	4	0	14	0	2	5	0	7	0
	10%	**18%**	**5%**	**10%**	**0**	**14**		**8%**	**22%**	**0%**	**20%**	**0%**
Stage 1	9	4	3	2	1	7	1	2	2	1	4	0
	7%	**10%**	**5%**	**5%**	**3%**	**7%**		**8%**	**9%**	**3%**	**11%**	**0%**

Table G-2 (continued). Classification of Respondents' Facilities According to Electronic Medical Record Adoption Model (EMRAM) of the Health Information and Management Systems Society (HIMSS), 2020/21

Position	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Stage 2	24	7	9	8	11	13	0	3	5	5	9	2
	18%	**18%**	**16%**	**20%**	**37%**	**13%**		**12%**	**22%**	**13%**	**26%**	**13%**
Stage 3	17	2	10	5	5	12	0	2	0	10	2	3
	12%	**5%**	**18%**	**12%**	**17%**	**12%**		**8%**	**0%**	**26%**	**6%**	**20%**
Stage 4	6	3	2	1	1	4	1	0	0	3	1	2
	4%	**8%**	**4%**	**2%**	**3%**	**4%**		**0%**	**0%**	**8%**	**3%**	**13%**
Stage 5	3	0	1	2	1	2	0	1	0	2	0	0
	2%	**0%**	**2%**	**5%**	**3%**	**2%**	**0%**	**4%**	**0%**	**5%**	**0%**	**0%**
Stage 6	8	1	6	1	2	5	1	1	0	7	0	0
	6%	**3%**	**11%**	**2%**	**7%**	**5%**		**4%**	**0%**	**18%**	**0%**	**0%**
Stage 7	2	0	0	2	1	1	0	0	0	2	0	0
	1%	**0%**	**0%**	**5%**	**3%**	**1%**	**0%**	**0%**	**0%**	**5%**	**0%**	**0%**
Unknown	54	15	23	16	8	44	2	14	11	9	12	8
	39%	**38%**	**40%**	**39%**	**27%**	**43%**		**56%**	**48%**	**23%**	**34%**	**53%**

Base: n = 137 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

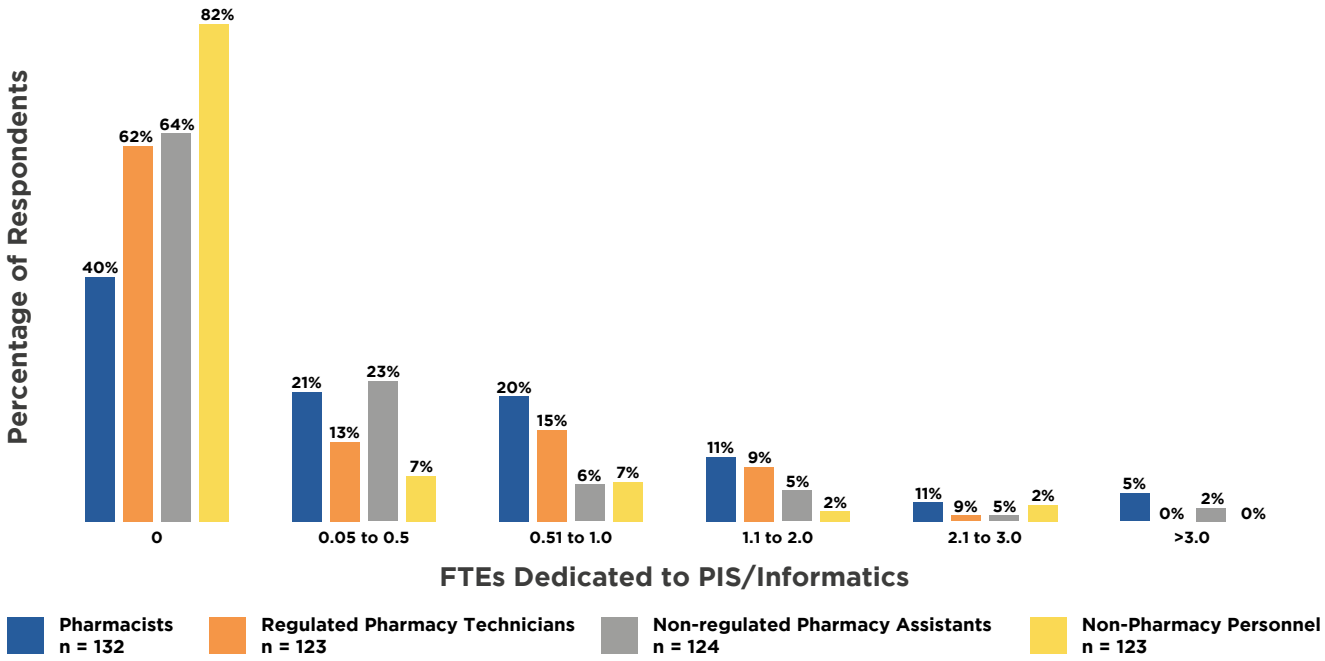
A list of validated EMRAM stage 6 and 7 providers is available from HIMSS Analytics.[19] In Canada, 3 hospitals are at stage 7 of adoption and 13 hospitals are at stage 6, indicating that some of the facilities operating at these levels were not among our survey respondents. The numbers of providers with higher EMRAM stages worldwide, as reported by HIMSS Analytics, further confirms that Canada's hospitals are lagging considerably behind US hospitals in the implementation of integrated EMRs.

Another new question in the 2020/21 iteration of the survey asked about staff (in terms of budgeted full-time equivalents [FTEs]) dedicated to working on the pharmacy information system (PIS) and any other pharmacy technology. Results were grouped by fractions of FTE and by personnel classification, as shown in Figure G-1.

- Nearly two-thirds (60%, 79/132) of respondents had pharmacists working on the PIS or other pharmacy technology. Regulated pharmacy technicians and non-regulated pharmacy assistants held these roles in 38% (47/123) and 36% (45/124) of facilities, respectively. Non-pharmacy personnel filled these roles in 19% (23/123) of facilities.
- Pharmacists in informatics roles: 21% (28/132) of respondents employed 0.05 to 0.5 FTE, 20% (27/132) employed 0.51 to 1.0 FTE, and 11% (14/132) employed 1.1 to 2.0 FTEs. Four respondents (3%) used 2.1 to 3.0 FTEs for these roles, and 6 respondents (5%) used more than 3.0 FTEs.
- Regulated pharmacy technicians performing PIS or other technology duties: 13% (16/123) of respondents employed 0.05 to 0.5 FTE, 15% (19/123) employed 0.51 to 1.0 FTE, 9% (11/123) used 1.1 to 2.0 FTEs, and one respondent employed 2.1 to 3.0 FTEs.

- Non-regulated pharmacy assistants performing PIS or other technology duties: 23% (28/124) of respondents employed 0.05 to 0.5 FTE, 6% (7/124) employed 0.51 to 1.0 FTE, 5% (6/124) employed 1.1 to 2.0 FTEs, 1% (1/124) employed 2.1 to 3.0 FTEs, and 2% (3/124) employed more than 3.0 FTEs. Larger FTE complements were found primarily in the Atlantic region and QC.
- Non-pharmacy personnel in informatics roles: 7% (9/123) respondents employed 0.05 to 0.5 FTE, 7% (9/123) employed 0.51 to 1.0 FTE, 2% (2/123) employed 1.1 to 2.0 FTEs, 2% (3/123) employed 2.1 to 3.0 FTEs. This staff category accounted for the lowest FTE numbers with 82% (100/123) of respondents not having dedicated non-pharmacy personnel working on their PIS. Among respondents from ON and QC, 29% (10/34) and 38% (8/21), respectively, had non-pharmacy staff in these roles, with a total of five respondents from the other regions reporting the use of non-pharmacy personnel. Comments submitted by respondents indicated that these staff members are sometimes part of a provincial pharmacy or IT organization or might be IT staff with responsibilities for the PIS and related systems.
- Pharmacy personnel in IT roles were more likely to be found in facilities with more than 500 beds and in teaching hospitals. Pharmacists were reported in IT roles more often in QC than in other regions. The Prairie region (SK/MB) appeared to have fewer personnel from any category working in PIS and technology roles.

Figure G-1. Number of Full-Time Equivalents (FTEs), by Position, Dedicated to Working on the Pharmacy Information System (PIS), 2020/21



With the healthcare industry, healthcare institutions, and federal, provincial and territorial governments investing in more health IT initiatives, it is essential that a highly skilled workforce be in place to support such initiatives in hospitals and health authorities. More details on the roles and responsibilities of pharmacy personnel devoted to implementation and maintenance of health IT can be found in the ASHP statements on the informatics roles of pharmacists[20] and pharmacy technicians.[21]

The survey asked respondents about the level and format of pharmacist access to laboratory results (Table

G-3). In the 2016/17 survey, all respondents reported having electronic access to laboratory data. Therefore, the option of "having access to laboratory data using a paper-based medical record only" was removed from the 2020/21 survey and will not be offered in future iterations.

- Forty-four percent (62/140) of respondents reported that pharmacists had access to laboratory data that was fully interfaced with the medication order entry system, compared with 37% (68/184) in 2016/17.
- View-only access at pharmacy terminals was reported by 56% (78/140) of respondents vs. 63% (116/184) in 2016/17.

Table G-3. Pharmacist Access to Laboratory Results, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Through view-only access available at pharmacy terminals (interface or separate log-in)	78	26	31	21	20	56	2	18	18	19	16	7
	56%	**65%**	**54%**	**49%**	**63%**	**54%**		**69%**	**78%**	**49%**	**46%**	**41%**
Through a laboratory system that is fully interfaced with the medication order entry system, to automatically alert practitioners about the need for potential changes in drug therapy	62	14	26	22	12	47	3	8	5	20	19	10
	44%	**35%**	**46%**	**51%**	**38%**	**46%**		**31%**	**22%**	**51%**	**54%**	**59%**

Base: n = 140 respondents
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Advances in health IT and in the scope of pharmacy practice have facilitated partnering of pharmacists with the medical laboratory and physicians to better support diagnosis, treatment and the management of patient care. Many, if not most, adverse drug events result from a lack of close monitoring rather than inappropriateness of the initial prescriptions.[22,23] This presents opportunities for pharmacists, physicians and laboratory staff to collaborate on monitoring treatment with anticoagulants, anti-infective agents, immunosuppressants and other medications to prevent patient harm. Pairing of certain drugs with particular laboratory tests (e.g., amiodarone and thyroid-stimulating hormone, aspartate aminotransferase or alanine aminotransferase every six months; atypical antipsychotics and annual hemoglobin A1c and lipid profile) can be used to guide monitoring when integrated into the EHR and clinical decision support tools. Pharmacogenomics and individualized medicine are rapidly evolving areas requiring partnerships among laboratory, pharmacy and medicine.[24]

Even in settings where EHRs are used, critical information is often not shared, and prescribing decisions are made with missing or inaccurate information. Miscommunication in the medication management process can result in adverse drug events, emergency department visits and hospital admissions, although many such encounters are preventable with more effective communication and collaboration.

A mixed-methods study involving interviews with clinicians in four Canadian provinces showed that shared decision-making is common in modern healthcare; however, pharmacists may be missing information about drug indications, and physicians may be lacking information about patient adherence. There is room to improve and enhance care processes, communication and information about drug indication or adherence. EHRs could be better designed to facilitate interprofessional medication management and more effective collaboration between physicians and pharmacists; however, the workflow and communication models of the various professionals involved must be considered.[25]

Safety Initiatives: TALLman Lettering

TALLman lettering employs upper case letters to segments of look-alike, sound-alike (LASA) drug names to bring attention to their differences. For methodological reasons, published studies are lacking to support the effectiveness of TALLman lettering in reducing errors associated with LASA drugs in healthcare; however, this method offers a simple approach to avoid confusion between drug products.[26] The Institute for Safe Medication Practices Canada (ISMP Canada) provides a list of recommended TALLman lettering for LASA drug names, which was developed collaboratively with the Institute for Safe Medication Practices (ISMP) (US), the US Food and Drug Administration and the Canadian Association of Provincial Cancer Agencies.[26]

Given that use of TALLman lettering is a recommendation (not a requirement) and given that clear standards for capitalization of letters (as well as use of colour on medication labels) are lacking, the use of TALLman lettering has not been adopted uniformly or widely by the pharmaceutical industry or by manufacturers of healthcare devices (e.g., ADCs, infusion pumps, packagers). Positive change in this regard may require advocacy from professional associations or government legislation requiring TALLman lettering directed at the level of design, manufacturing and distribution of devices and drugs.[23]

Table G-4. Use of TALLman Lettering, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Facility uses TALLman lettering to reduce errors caused by confusion between drug products with look-alike drug names (n =)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Yes	132	37	55	40	30	97	5	26	23	39	27	17
	94%	**93%**	**96%**	**93%**	**94%**	**94%**		**100%**	**100%**	**100%**	**77%**	**100%**
Base: n = 140 respondents												
Where TALLman lettering is used (n =)	(132)	(37)	(55)	(40)	(30)	(97)	(5)	(26)	(23)	(39)	(27)	(17)
On pharmacy-generated labels	129	35	54	40	29	95	5	26	22	38	27	16
	98%	**95%**	**98%**	**100%**	**97%**	**98%**		**100%**	**96%**	**97%**	**100%**	**94%**
On pharmacy-generated unit-dose packaging	120	33	51	36	29	87	4	24	20	39	21	16
	91%	**89%**	**93%**	**90%**	**97%**	**90%**		**92%**	**87%**	**100%**	**78%**	**94%**

Table G-4 (continued). Use of TALLman Lettering, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
In the Pharmacy Information System (PIS) (e.g., drop-down menus for drug selection)	119	30	52	37	29	86	4	24	19	36	26	14
	90%	**81%**	**95%**	**93%**	**97%**	**89%**		**92%**	**83%**	**92%**	**96%**	**82%**
On pharmacy-generated medication administration records (MARs)	114	30	48	36	22	87	5	26	15	32	27	14
	86%	**81%**	**87%**	**90%**	**73%**	**90%**		**100%**	**65%**	**82%**	**100%**	**82%**
On clinical order sets or preprinted orders	114	32	51	31	25	85	4	25	18	37	17	17
	86%	**86%**	**93%**	**78%**	**83%**	**88%**		**96%**	**78%**	**95%**	**63%**	**100%**
On automated dispensing cabinets	112	30	48	34	30	77	5	20	19	36	22	15
	85%	**81%**	**87%**	**85%**	**100%**	**79%**		**77%**	**83%**	**92%**	**81%**	**88%**
On shelf labels in the pharmacy	95	28	43	24	27	63	5	22	17	31	10	15
	72%	**76%**	**78%**	**60%**	**90%**	**65%**		**85%**	**74%**	**79%**	**37%**	**88%**
In the medication rooms of patient care units (e.g., shelf labels)	65	18	30	17	16	46	3	18	11	17	7	12
	49%	**49%**	**55%**	**43%**	**53%**	**47%**		**69%**	**48%**	**44%**	**26%**	**71%**
On medication carts	50	12	23	15	10	36	4	11	9	18	6	6
	38%	**32%**	**42%**	**38%**	**33%**	**37%**		**42%**	**39%**	**46%**	**22%**	**35%**
Within the computerized provider order entry (CPOE) environment (if applicable)	35	7	17	11	11	22	2	4	2	23	3	3
	27%	**19%**	**31%**	**28%**	**37%**	**23%**		**15%**	**9%**	**59%**	**11%**	**18%**

Base: n = 132 respondents
Note: Multiple mentions possible
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Most respondents (94%, 132/140) reported the use of TALLman lettering, continuing the rising trend over the past decade (from 70% [110/158] in 2009/10). The degree of use of TALLman lettering was consistently high, regardless of bed size or teaching status (Table G-4.). Notably, QC was the only region where the proportion of respondents using TALLman lettering was less than 100% (77%, 27/35).

- As shown in Table G-4, the use of TALLman lettering appeared to be higher in the pharmacy department (for the PIS, unit-dose packaging, pharmacy-generated medication labels and medication administration records) than in patient care areas (medication room shelf labels or medication carts), except for its use on ADCs (85%, 112/132), which may be linked to the PIS.
- TALLman lettering was also used in clinical order sets or preprinted orders, according to 86% (114/132) of respondents; the 2020/21 survey represented the first time this option was presented to respondents.

- Use of TALLman lettering within the CPOE environment was reported by 27% (35/132) of respondents, an increase from 15% (27/175) in 2016/17.

TALLman lettering for look-alike, sound-alike drug names has not been uniformly adopted by manufacturers of devices or drugs.

Safety Initiatives: CPOE (Computerized Provider Order Entry)

CPOE systems have been promoted as improving the safety and efficiency of medication management. A recent systematic review found that the implementation of CPOE resulted in an overall reduction in errors at the prescription stage of the medication-use process (relative risk reduction 0.29, 95% confidence interval 0.10-0.85, I2 = 99%) and reductions in most types of prescription errors. However, CPOE was also associated with other types of errors, such as selection of the wrong drug from drop-down menus.[27]

Another review reported that errors associated with CPOE are distinct from those seen in paper-based order systems and may persist following CPOE implementation.[28] Errors are generally more common in unidirectional systems than in bidirectional systems for the interface between CPOE and the PIS, as well as when integrated clinical decision support systems are not in use. More information on CPOE systems can be found in Chapter C – Drug Distribution Systems.

Commitments to invest in CPOE systems in Canadian healthcare facilities appear to have grown over the past decade (data for 2020/21 are presented in Table G-5).

- In the 2020/21 survey, 19% (27/140) of respondents reported having operational CPOE, compared with 8% (13/160) in 2009/10.
- Nearly half (49%, 69/140) of respondents reporting having no CPOE and no plan approved to adopt such a system, compared with 68% (109/160) in 2009/10.
- About one-third (31%, 44/140) of respondents reported having an approved plan to implement CPOE vs. 24% (38/160) in 2009/10.
- For more than three-quarters (81%, 22/27) of respondents using CPOE in 2020/21, there was a bidirectional interface between the CPOE system and the PIS. The CPOE system was unidirectional (flowing to or from the PIS) in two facilities, and there was no interface between the CPOE system and the PIS in three facilities (in the latter, medication orders were transcribed into the pharmacy computer system).
- CPOE systems were more often found in teaching hospitals (34%, 11/32) than in non-teaching hospitals (14%, 14/103). Two of five pediatric hospitals had operational CPOE in place.
- When the combined responses of having a currently operational CPOE system and an approved plan to implement such a system were considered, ON clearly led the country in terms of CPOE adoption, with a composite total of 87%, consisting of 38% (15/39) with CPOE in place and 49% (19/39) with an approved plan to implement. BC/YT had a composite total of 65% (15% [4/26] and 50% [13/26], respectively), the Atlantic provinces 35% (18% [3/17] and 18% [3/17], respectively), QC 34% (9% [3/35] and 26% [9/35], respectively) and the Prairies (SK/MB) 9% (2/23 operational and none with an approved plan).

Table G-5. Implementation and Functionality of Computerized Provider Order Entry Systems (Excluding Outpatient Oncology Services), 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
There is an operational computerized provider order entry (CPOE) system, excluding oncology services (n =)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Yes	27	6	13	8	11	14	2	4	2	15	3	3
	19%	**15%**	**23%**	**19%**	**34%**	**14%**		**15%**	**9%**	**38%**	**9%**	**18%**
No, but there is an approved plan to implement such a system	44	7	21	16	9	33	2	13	0	19	9	3
	31%	**18%**	**37%**	**37%**	**28%**	**32%**		**50%**	**0%**	**49%**	**26%**	**18%**
No, and there is no approved plan to implement such a system	69	27	23	19	12	56	1	9	21	5	23	11
	49%	**68%**	**40%**	**44%**	**38%**	**54%**		**35%**	**91%**	**13%**	**66%**	**65%**
Base: n = 140 respondents												
How the CPOE system is interfaced with the PIS (n =)	(27)	(6)	(13)	(8)	(11)	(14)	(2)	(4)	(2)	(15)	(3)	(3)
The CPOE system is interfaced unidirectionally with the PIS (information flows only from the CPOE system to the PIS, or information flows only from the PIS to the CPOE system)	2	0	1	1	1	1	0	0	0	1	0	1
	7%		**8%**		**9%**	**7%**				**7%**		
The CPOE system is interfaced bidirectionally with the PIS (information flows back and forth between the PIS and the CPOE system) or functions as a single, integrated hospital information system requiring no interfaces	22	4	11	7	9	11	2	4	1	13	2	2
	81%		**85%**		**82%**	**79%**				**87%**		
The CPOE is not interfaced with the PIS (medication orders are transcribed into the pharmacy computer system)	3	2	1	0	1	2	0	0	1	1	1	0
	11%		**8%**		**9%**	**14%**				**7%**		
Base: Respondents with operational CPOE system, excluding outpatient oncology services, n = 27 Whenever the " value was less than 10, percentages were not calculated to avoid potentially misleading comparisons. Percentages within a column may not sum to 100 because of rounding												

Of the 27 respondents using CPOE, the most common features within the CPOE environment were guiding the use of formulary drugs (93%, 25/27), integration with an EHR (89%, 24/27) and alerting prescribers to unsafe medication orders (89%, 24/27). These and other features are reported in Table G-6.

Table G-6. Features of the Computerized Provider Order Entry (CPOE) System, 2020/21

CPOE system has the following features	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n =)	(27)	(6)	(13)	(8)	(11)	(14)	(2)	(4)	(2)	(15)	(3)	(3)
Guides the use of formulary drugs	25	5	13	7	9	14	2	4	2	15	1	3
	93%		**100%**		**82%**	**100%**				**100%**		
Integrated with an electronic health record (EHR)	24	5	12	7	10	13	1	4	1	15	2	2
	89%		**92%**		**91%**	**93%**				**100%**		
Alerts prescribers to unsafe orders (e.g., allergies, maximum doses, interactions) during order entry	24	4	12	8	9	13	2	4	0	15	2	3
	89%		**92%**		**82%**	**93%**				**100%**		
Guides the use of weight-based or surface area–based dosing for selected drugs and/or patient populations	22	5	11	6	8	12	2	4	2	12	2	2
	81%		**85%**		**73%**	**86%**				**80%**		
Integrated with a clinical decision support system that guides the user through established protocols and clinical pathways	21	4	10	7	8	11	2	4	1	10	3	3
	78%		**77%**		**73%**	**79%**				**67%**		
Guides dosage determination of medications for special populations (e.g., patients with renal impairment, pediatric patients)	18	3	10	5	6	11	1	3	1	12	0	2
	67%		**77%**		**55%**	**79%**				**80%**		
Interfaced with the laboratory system to alert practitioners to the need for potential changes in drug therapy	16	3	8	5	4	11	1	4	0	10	0	2
	59%		**62%**		**36%**	**79%**				**67%**		
Other	1	0	0	1	1	0	0	0	0	1	0	0
	4%		**0%**		**9%**	**0%**				**7%**		

Base: Respondents with operational CPOE system, excluding oncology services, n = 27
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

As mentioned earlier in this chapter, only 0.2% of 514 US hospitals responding in a survey study did not have CPOE and/or an EHR system.[15] Approximately half of respondents in that survey reported the following practices: embedding drug information within the CPOE system, enforcing formulary restrictions and/or communicating with authorized approvers or an approval service at the time of ordering, allowing only pharmacy personnel to enter details for nonformulary drugs into the CPOE system, and requiring entry of a therapeutic purpose or indication as a safety check for selected LASA drugs or high-risk medications. These strategies were generally employed more often in larger vs. smaller hospitals.[15]

EHR systems were used by 95% of responding hospitals for warnings of drug-allergy interactions, drug-drug interactions and duplicate drug therapies. Approximately 80% of hospitals reported using EHR systems for dose warnings, and drug-food, drug-pregnancy and/or drug-lactation warnings were reported by two-thirds of hospitals with EHR systems. Drug cost information was provided to prescribers by 8.4% of responding sites.[15]

Safety Initiatives: Smart Pumps

Administration of medications by infusion pumps has been available for more than 40 years. Modern infusion pumps enhance safety through their ability to detect air in the line and the availability of a backup power system, pressure sensors and drug error reduction software (DERS). DERS first became available in the 1990s and offers the safety advantage of preset limits for medications to prevent out-of-range infusion rates and dosage calculation errors.[29,30] Common sources of user error involve overriding dose error alerts and manually bypassing drug libraries or the DERS. Reasons frequently cited for bypassing safety features include the complex user interface of the infusion pump, the time required to program the DERS and the incompleteness of drug libraries.[27]

Smart infusion pumps have been shown to increase medication safety; however, they reportedly also increase alert fatigue.[31,32] In addition, serious harm can occur when intravenous (IV) infusions are administered according to outdated drug limit settings because of delays in drug library updates. For example, at three hospitals in one health system, at least 16% of all IV infusions were administered by pumps with outdated drug libraries, which resulted in 18%, 24.4% and 27% of false alerts in the three hospitals, respectively. The frequency of false alerts during infusions of high-risk medications was high, which could compromise patient safety.[32]

Utilization of smart IV pumps (Table G-7) increased in 2020/21 relative to 2016/17:

- A slightly higher rate of smart pump use (93%, 130/140) was reported in 2020/21, compared with 89% (163/184) in 2016/17.
- Use of a wireless network to upload or download data to smart pumps was reported by 78% (100/129) of respondents, up from 64% (103/162) in 2016/17.
- Updating of pump-specific libraries at least annually was reported by 83% (130/140) of respondents, a slight increase from 77% (125/163) in 2016/17.

Table G-7. Smart Pumps, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Facility uses smart pumps (n=)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Yes	130	35	56	39	30	95	5	26	23	38	29	14
	93%	**88%**	**98%**	**91%**	**94%**	**92%**		**100%**	**100%**	**97%**	**83%**	**82%**

Table G-7 (continued). Smart Pumps, 2020/21

	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Use wireless networks to upload or download data to smart pumps (n=)	**(129)**	**(35)**	**(56)**	**(38)**	**(29)**	**(95)**	**(5)**	**(25)**	**(23)**	**(38)**	**(29)**	**(14)**
Yes	100	24	46	30	23	72	5	23	10	35	22	10
	78%	**69%**	**82%**	**79%**	**79%**	**76%**		**92%**	**43%**	**92%**	**76%**	**71%**
Review and update the drug-specific pump programming (i.e., the pump library) at least annually (n=)	**(130)**	**(35)**	**(56)**	**(39)**	**(30)**	**(95)**	**(5)**	**(26)**	**(23)**	**(38)**	**(29)**	**(14)**
Yes	108	28	46	34	26	78	4	19	16	34	25	14
	83%	**80%**	**82%**	**87%**	**87%**	**82%**		**73%**	**70%**	**89%**	**86%**	**100%**
The smart pump is integrated with your facility's electronic health record (EHR) (n=)	**(129)**	**(35)**	**(56)**	**(38)**	**(29)**	**(95)**	**(5)**	**(25)**	**(23)**	**(38)**	**(29)**	**(14)**
Yes	0	0	0	0	0	0	0	0	0	0	0	0
	0%	**0%**	**0%**	**0%**	**0%**	**0%**		**0%**	**0%**	**0%**	**0%**	**0%**

Base: n = 129 to 140 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Safety Initiatives: Barcoding

Barcoding has been used in healthcare for decades for managing inventories of drugs, supplies and equipment. A recent commentary stated that the adoption of barcode scanning can make a difference at a relatively low cost.[7] Barcode technology employed in high-risk areas, such as the emergency department and critical care units, can improve accountability, enhance control of the supply chain and set standards of care at a higher level of reliability.[31] The COVID-19 pandemic has increased the importance of supply chain traceability of medications, medical devices and vaccines, as well as highlighting the growing threat of counterfeit medications and vaccines.[31,33] The challenge of supply control and patient safety could be addressed, at least in part, by using barcode technology to increase the reliability of system processes.

Along with ADCs and CPOE systems, barcoded medication administration (BCMA) systems have been shown to help in reducing medication errors and improving the efficiency of medication processes. Recent reviews of BCMA showed the potential to reduce errors, but the degree of reduction varied among individual studies, and the technology alone did not guarantee an improvement in error rates.[34,35] However, for BCMA to be successful, nurse training and patient education are essential to prevent workarounds that could threaten medication safety.[36] A recent European study reported on task-related deviations during BCMA by nurses, such as failure to scan medication packages or patients' wrist bands, and policy deviations related to technological factors (low laptop battery, system freeze) and environmental factors (location of medication room, size of medication drawer).[37]

The CSHP Hospital Pharmacy in Canada Survey has asked about barcoding since 2001/02; however, only since 2016/17 have participants been asked about the degree of implementation of this technology or the existence of a plan to adopt barcoding. To a large degree, pharmacy departments appear to have adopted barcoding to verify the accuracy of medication preparation and stocking:

- Barcoding was being used to verify the stocking of automated re-packaging machines by 67% (93/138) of respondents (reported by 13 respondents for ≤ 50% of their facility and by 80 respondents for 51%-100% of their facility). Approval of a plan to use barcoding to verify stocking of re-packaging machines was reported by 7% (9/138) of respondents. Current use of barcoding or an approved plan to adopt this technology to verify the stocking of re-packaging machines increased to 74% (102/138) from 66% (121/183) in 2016/17.
- Sixty-eight percent (95/140) of respondents were using barcoding to verify the stocking of ADCs (reported by 18 respondents for ≤ 50% of their facility and by 77 respondents for 51%-100% of their facility). An additional 12% (17/140) had an approved plan to implement barcoding for this activity. In 2016/17, 70% (104/148) of respondents were using barcoding to verify the stocking of ADCs or had an approved plan to do so, compared with 80% (112/140) in 2020/21.
- Use of barcoding (or an approved plan to adopt this technology) was somewhat prominent for drug selection before dispensing (41%, 58/140) and for managing inventory (38%, 52/138).
- Use of barcoding (or an approved plan to adopt this technology) to verify the base solutions and ingredients for compounded sterile products was reported by 21% (29/139) of respondents; the 2020/21 survey was the first to ask about this application of barcoding.
- Compared with its use within pharmacy, the use of barcoding on patient care units appeared less prevalent for drug selection before and during medication administration (Table G-8).

Compared with its use within pharmacy, the use of barcoding on patient care units appeared less prevalent for drug selection before and during medication administration.

Table G-8. Barcoding, 2020/21

Uses of barcoding and extent of use	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Verify drug selection before dispensing from the pharmacy												
Yes, we are using barcoding for this application in 51%-100% of our facility	50	7	17	26	10	37	3	4	3	15	27	1
	36%	**18%**	**30%**	**60%**	**31%**	**36%**		**15%**	**13%**	**38%**	**77%**	**6%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	8	2	3	3	0	7	1	2	1	3	1	1
	6%	**5%**	**5%**	**7%**	**0%**	**7%**		**8%**	**4%**	**8%**	**3%**	**6%**
(n=)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Verify drug selection before administration to a patient												

Table G-8 (continued). Barcoding, 2020/21

Uses of barcoding and extent of use	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Yes, we are using barcoding for this application in 51%-100% of our facility	19	5	8	6	4	14	1	5	0	14	0	0
	14%	**13%**	**14%**	**14%**	**13%**	**14%**		**19%**	**0%**	**36%**	**0%**	**0%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	6	1	2	3	2	4	0	1	0	1	2	2
	4%	**3%**	**4%**	**7%**	**6%**	**4%**		**4%**	**0%**	**3%**	**6%**	**12%**
(n=) **Identify the patient during medication administration**	(139)	(40)	(57)	(42)	(31)	(103)	(5)	(25)	(23)	(39)	(35)	(17)
Yes, we are using barcoding for this application in 51%-100% of our facility	17	3	8	6	4	12	1	3	0	14	0	0
	12%	**8%**	**14%**	**14%**	**13%**	**12%**		**12%**	**0%**	**36%**	**0%**	**0%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	2	1	0	1	1	1	0	1	0	1	0	0
	1%	**3%**	**0%**	**2%**	**3%**	**1%**		**4%**	**0%**	**3%**	**0%**	**0%**
(n=) **Identify the staff member during medication administration**	(139)	(40)	(57)	(42)	(31)	(103)	(5)	(25)	(23)	(39)	(35)	(17)
Yes, we are using barcoding for this application in 51%-100% of our facility	8	2	6	0	1	6	1	0	0	8	0	0
	6%	**5%**	**11%**	**0%**	**3%**	**6%**		**0%**	**0%**	**21%**	**0%**	**0%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	2	1	0	1	1	1	0	1	0	1	0	0
	1%	**3%**	**0%**	**2%**	**3%**	**1%**		**4%**	**0%**	**3%**	**0%**	**0%**
(n=) **Conduct inventory management**	(138)	(39)	(57)	(42)	(31)	(102)	(5)	(25)	(23)	(39)	(35)	(16)
Yes, we are using barcoding for this application in 51%-100% of our facility	34	5	10	19	5	27	2	4	1	7	19	3
	25%	**13%**	**18%**	**45%**	**16%**	**26%**		**16%**	**4%**	**18%**	**54%**	**19%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	18	4	6	8	4	14	0	5	4	3	4	2
	13%	**10%**	**11%**	**19%**	**13%**	**14%**		**20%**	**17%**	**8%**	**11%**	**13%**
(n=) **Verify filling of unit-dose bins**	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Yes, we are using barcoding for this application in 51%-100% of our facility	35	8	13	14	7	26	2	2	3	11	19	0
	25%	**20%**	**23%**	**33%**	**22%**	**25%**		**8%**	**13%**	**28%**	**54%**	**0%**

Table G-8 (continued). Barcoding, 2020/21

Uses of barcoding and extent of use	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Yes, we are using barcoding for this application in ≤ 50% of our facility	12	1	3	8	1	11	0	3	0	4	4	1
	9%	**3%**	**5%**	**19%**	**3%**	**11%**		**12%**	**0%**	**10%**	**11%**	**6%**
(n=) **Verify stocking of automated dispensing cabinets**	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Yes, we are using barcoding for this application in 51%-100% of our facility	77	18	30	29	24	49	4	12	11	18	27	9
	55%	**45%**	**53%**	**67%**	**75%**	**48%**		**46%**	**48%**	**46%**	**77%**	**53%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	18	3	7	8	3	14	1	1	2	7	4	4
	13%	**8%**	**12%**	**19%**	**9%**	**14%**		**4%**	**9%**	**18%**	**11%**	**24%**
(n=) **Verify stocking of automated re-packaging machines**	(138)	(39)	(57)	(42)	(32)	(101)	(5)	(26)	(23)	(38)	(35)	(16)
Yes, we are using barcoding for this application in 51%-100% of our facility	80	19	30	31	21	54	5	10	11	24	26	9
	58%	**49%**	**53%**	**74%**	**66%**	**53%**		**38%**	**48%**	**63%**	**74%**	**56%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	13	2	6	5	4	9	0	1	2	5	1	4
	9%	**5%**	**11%**	**12%**	**13%**	**9%**		**4%**	**9%**	**13%**	**3%**	**25%**
(n=) **Verify base solutions and ingredients during preparation and verification of compounded sterile preparations**	(139)	(39)	(57)	(43)	(32)	(102)	(5)	(26)	(23)	(39)	(35)	(16)
Yes, we are using barcoding for this application in 51%-100% of our facility	18	3	4	11	4	11	3	2	2	5	6	3
	13%	**8%**	**7%**	**26%**	**13%**	**11%**		**8%**	**9%**	**13%**	**17%**	**19%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	11	0	7	4	8	3	0	0	3	4	2	2
	8%	**0%**	**12%**	**9%**	**25%**	**3%**		**0%**	**13%**	**10%**	**6%**	**13%**
(n=) **Transfer patient- and/or drug-specific information to smart pump (n=)**	(138)	(39)	(57)	(42)	(31)	(102)	(5)	(25)	(23)	(39)	(35)	(16)

Table G-8 (continued). Barcoding, 2020/21

Uses of barcoding and extent of use	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Yes, we are using barcoding for this application in 51%-100% of our facility	4	2	1	1	1	1	2	1	0	1	1	1
	3%	**5%**	**2%**	**2%**	**3%**	**1%**		**4%**	**0%**	**3%**	**3%**	**6%**
Yes, we are using barcoding for this application in ≤ 50% of our facility	2	0	2	0	1	1	0	0	0	2	0	0
	1%	**0%**	**4%**	**0%**	**3%**	**1%**		**0%**	**0%**	**5%**	**0%**	**0%**

Base: n = 138 to 140 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

Safety Initiatives: Standard Nomenclature for Medications

Various standards and procedures exist to aid in naming drugs and drug products. The safety of medication-use systems is enhanced when standard nomenclature is employed for drug products. Health Canada uses the International Non Proprietary Names (INN) as the standard to assign the preferred name to active ingredients.[38] The United States Assigned Names (USAN),[39] *Martindale: The Complete Drug Reference*[40] and the *Merck Index*[41] are other sources for items not found in the INN. The United States Pharmacopeia (USP) publishes nomenclature guidelines for a consistent and logical approach to naming compendial articles, including small-molecule and large-molecule drug substances, drug products, excipients and dietary supplements.[42]

In recent years, many new drugs have been developed for use in oncology and hematology, especially monoclonal antibodies. INN released a new nomenclature scheme for monoclonal antibodies in 2021.[43] Biosimilars are another group of drugs presenting challenges to hospital formulary managers because of the added inventory cost and storage capacity needed to carry multiple brands of the same biologic.[44,45,46] Following a standard naming convention for these agents could enhance safety by reducing the risk of errors during inventory management, prescribing and administration of biosimilars within a hospital or healthcare system.

Consistent use of standard nomenclature to describe the forms of various medications (such as sustained release [SR], controlled delivery [CD] or extended release [XR] for slow-release dosage forms) throughout a facility's systems was reported by 63% (87/139) of respondents (Table G-9).

- The use of standard nomenclature was reported more often for facilities with 201-500 beds (75%, 43/57) and in teaching hospitals (68%, 21/31).
- Respondents from ON (85%, 33/39) most frequently reported using standard nomenclature for medications in their information systems, and respondents from QC (26%, 9/35) least frequently.

Table G-9. Use of Standard Nomenclature for Medications in Information Systems, 2020/21

Use of standard nomenclature to describe medications in various information systems consistently throughout the facility	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(139)	(40)	(57)	(42)	(31)	(103)	(5)	(25)	(23)	(39)	(35)	(17)
Yes	87	21	43	23	21	61	5	20	17	33	9	8
	63%	**53%**	**75%**	**55%**	**68%**	**59%**		**80%**	**74%**	**85%**	**26%**	**47%**
No	52	19	14	19	10	42	0	5	6	6	26	9
	37%	**48%**	**25%**	**45%**	**32%**	**41%**		**20%**	**26%**	**15%**	**74%**	**53%**

Base: n = 139 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

In future iterations of the survey, questions about technology will look beyond proprietary abbreviations for sustained-release products and probe how hospital pharmacies are managing monoclonal antibodies and biosimilars with respect to standard nomenclature.

Emerging Technologies

New questions were added to the 2020/21 iteration of the survey asking about new or promising technologies in use in Canadian healthcare facilities. Most cited by respondents were use of a fluid transfer pump for sterile compounding (60%, 84/140), medication order management systems (i.e., order scanning software) (59%, 83/140), camera-based remote verification (37%, 52/140) and telecare (33%, 46/140) (Table G-10). Other technologies were lagging well behind in popularity. For example, adoption of gravimetric workflow solutions for sterile compounding is in its early stages because the technology is only partially ready for its primary use in Canadian settings.

Table G-10. Emerging Technologies in Use, 2020/21

Technology in use in your facility	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
(n=)	(140)	(40)	(57)	(43)	(32)	(103)	(5)	(26)	(23)	(39)	(35)	(17)
Fluid transfer pump: Sterile compounding device for fluid transfer and filling	84	14	37	33	29	50	5	13	9	23	29	10
	60%	**35%**	**65%**	**77%**	**91%**	**49%**		**50%**	**39%**	**59%**	**83%**	**59%**
Medication order management: Scanning of medication orders and secure transmission to a pharmacist at a remote location for review	83	21	34	28	15	64	4	12	11	15	34	11
	59%	**53%**	**60%**	**65%**	**47%**	**62%**		**46%**	**48%**	**38%**	**97%**	**65%**
Camera-based remote verification: Use of camera to manage workflow of compounding sterile preparation and permitting remote verification and documentation of activities by authorized personnel	52	11	16	25	11	40	1	1	5	4	33	9
	37%	**28%**	**28%**	**58%**	**34%**	**39%**		**4%**	**22%**	**10%**	**94%**	**53%**
Telecare: Consultations or services for patients in other healthcare facilities or at home	46	9	18	19	13	32	1	4	4	12	22	4
	33%	**23%**	**32%**	**44%**	**41%**	**31%**		**15%**	**17%**	**31%**	**63%**	**24%**
Carousel: Automated storage and dispensing system for pharmacy inventory, which may feature vertical storage capacity, barcode scanning, and ambient or refrigerated storage	22	6	6	10	5	15	2	4	2	10	3	3
	16%	**15%**	**11%**	**23%**	**16%**	**15%**		**15%**	**9%**	**26%**	**9%**	**18%**

Table G-10 (continued). Emerging Technologies in Use, 2020/21

Technology in use in your facility	All	Bed Size			Hospital Type			Region				
		50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Radio frequency identification (RFID): Use of RFID tags on devices, kits or trays used to administer or store medications	20	3	12	5	4	14	2	7	0	11	2	0
	14%	**8%**	**21%**	**12%**	**13%**	**14%**		**27%**	**0%**	**28%**	**6%**	**0%**
Gravimetry-based intravenous (IV) workflow: Software and equipment used for compounding of sterile preparations	14	2	6	6	5	8	1	3	2	4	2	3
	10%	**5%**	**11%**	**14%**	**16%**	**8%**		**12%**	**9%**	**10%**	**6%**	**18%**
Artificial intelligence: Electronic, robotic or virtual systems that employ human-created algorithms, machine-learning or deep learning	6	0	2	4	2	3	1	0	0	4	2	0
	4%	**0%**	**4%**	**9%**	**6%**	**3%**		**0%**	**0%**	**10%**	**6%**	**0%**

Base: n = 140 respondents
Whenever the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons.

A majority of respondents (approximately 60%) reported using newer technologies such as fluid transfer pumps in sterile compounding and scanning devices for remotely managing medication orders.

The use of emerging technologies has also been captured in recent ASHP surveys. For example, ASHP's 2020 survey (n = 267 responding hospitals) indicated that 33.8% used barcode scanning to verify ingredients, 25.3% obtained pictures or videos of the compounding process, 21.3% used IV workflow management technology, and 5.0% used gravimetrics to verify dose, amount or volume; conversely, 52.7% used no IV workflow technologies during compounding of sterile products.[47] The past decade of ASHP surveys has shown an increasing trend in the use of IV workflow management, barcoding, and pictures or videos in compounding activities. Adoption of gravimetric technology has remained stable at 5% of responding US hospitals over the same period,[47] compared with 10% (14/140) of Canadian respondents using gravimetrics in sterile compounding activities in the 2020/21 survey.

ASHP's 2019 survey reported that 26.9% of hospitals (n = 503) prepared more than 75% of doses using IV workflow technology; 56.4% of respondents did not use workflow technology in their compounding activities.[15] The 2020/21 iteration of the CSHP Hospital Pharmacy in Canada Survey did not ask about the use of workflow technology.

ASHP's 2020 survey reported that robotics for sterile product preparation was used for non-hazardous products and for hazardous products by 3.4% and by 1.6%, respectively, of responding hospitals (n = 267). Robotic IV compounding was used mainly by sites with 400 or more acute care beds.[47]

ASHP's 2020 survey also reported that 28.4% of hospitals had pharmacists who provided ambulatory patient care via telehealth services, with larger sites being more likely to provide such services than smaller hospitals. Pharmacists provided telehealth services by phone (70.9%), video chat (25.2%), EHR patient portal (3.3%) and email (0.6%).[47] By comparison, 33% (46/140) of respondents to the 2020/21 CSHP Hospital Pharmacy in Canada Survey reported using telecare technologies to consult with or to serve patients in hospitals or in patients' homes.

ISMP invited pharmacy technicians and pharmacists who prepare or oversee production of compounded sterile products to complete a survey of pharmacy compounding. Among the biggest challenges identified by the more than 600 respondents were the lack of procurement and utilization of various compounding technologies, such as cameras, workflow systems, gravimetrics and bar coding.[48] A recent scoping review investigated the various technologies that support compounding, including those employing gravimetric systems for precision, barcode reading to verify product identification, cameras to document processes and confirmation of these steps by a robot or pharmacy employee.[49] The authors described existing studies on technology-assisted workflow and its impact on error detection, preparation and validation time, costs and staff satisfaction. The use of technology-assisted workflow was associated with increased ability to detect preparation errors, reductions in preparation time and costs, and increased satisfaction among pharmacists and pharmacy technicians.[50]

Remote verification with cameras has allowed hospital pharmacies to digitally document the workflow associated with compounding activities and to mitigate some workload and staffing pressures within a single department or across multiple departments. Scanning devices for medication order management have enabled hospitals with manual order processes to reduce their reliance on paper orders and the associated filing and storage requirements, and to support order entry and verification by pharmacy personnel working on site, off site or with outsourced services.

As a complement to existing federal, provincial and territorial legislation, the Canadian Society of Hospital Pharmacists (CSHP) published its first guideline on telepharmacy to cover a range of pharmacy services such as patient care, verification of medication orders and medication preparation, drug information and staff education.[50] The *American Journal of Health-System Pharmacy* recently published a theme issue on telehealth, a collection of practice research articles, descriptive reports and the ASHP report on Optimizing Medication Outcomes Through Telehealth.[51] Refer to Chapter H, The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services, for more details about implementation of telepharmacy and remote services in Canada during 2020/21.

Automated carousel systems are used to improve security and efficiency of medication storage in pharmacies. Integrated barcode scanning can assist staff with accurate selection of doses; however, studies are lacking to show actual reduction in medication error rates. Fluid transfer pumps improve the efficiency of various processes for compounded sterile product preparation, such as filling syringes, cassettes and other drug administration devices, while maintaining accuracy and reducing the risk of repetitive strain injury. ASHP recently published guidelines on the safe use of automated compounding devices for parenteral nutrition. The document outlines key issues that should be considered to incorporate this technology safely and cost-effectively into pharmacy operations, including justification for use of these devices, performance responsibilities, safety and efficiency, and quality assurance monitoring.[52]

Conclusion

Survey results indicate several areas where Canadian hospital pharmacies are doing well in the implementation and utilization of health IT: use of integrated EHR in ON, BC/YT and the Atlantic provinces; use of smart pumps with wireless data exchange and regular updates of drug libraries; and use of TALLman lettering and barcoding for accuracy of medication preparation and stocking in pharmacies.

Survey results also show where hospitals may be lagging: use of integrated EHR in the Prairies (SK/MB) and QC and the implementation of CPOE and barcoding for drug selection before and during patient administration on patient care units.

With the introduction of new technologies for medication preparation, storage and administration, it is important to carefully examine workflow processes, as these often need to be altered for safe and effective

use of the equipment, devices and systems. With increased adoption of, and reliance on, technology in hospital pharmacy and medication systems, pharmacy directors need to ensure that they (and key members of their team) have requisite knowledge of information systems and regularly assess the effectiveness of existing systems and equipment. Pharmacy directors also need to advocate for assignment of informatics personnel to their departments and/or their organizations to ensure appropriate implementation of devices, equipment and software systems, as well as ongoing maintenance of those technologies. Organizations should scan the environment for emerging technologies, assess the evidence of benefit and plan for any implementation with sufficient support to ensure effective adoption in the healthcare environment.

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H - The Impact of the COVID-19 Pandemic on Hospital Pharmacy Services

Régis Vaillancourt

Population growth, changes in food systems, environmental degradation and more frequent contact between humans and disease-harbouring animals create pandemic risks, exemplified most recently by the COVID-19 pandemic that began in early 2020. The 2020/21 CSHP Hospital Pharmacy in Canada Survey presented an opportunity to document the impact of a pandemic on hospital pharmacy operations and clinical services. This information should assist hospital pharmacy leadership in planning to face future pandemics.

As of August 7, 2021, Canada had documented 1,439,506 cumulative cases of COVID-19 infection, 26,632 related deaths, 61,225 related non–intensive care unit (ICU) hospital admissions and 14,345 ICU-related admissions.[1] The survey was available to respondents between July 29 and September 26, 2021, which corresponded to the end of the third wave and the start of the fourth wave of hospital admissions due to COVID-19 infections.[2] In relation to the four phases of emergency management (1, reduction [risk mitigation]; 2, readiness [preparedness]; 3, response; and 4, recovery), the survey took place during the "Response" phase of the third wave of the pandemic,[3] when respondents would have been aware of its impact on pharmacy operations and services.

This part of the survey was divided into two sections. The first section gathered quantitative information about pharmacy operations, clinical pharmacy services, pharmacy education, and pharmacy administration and human resources. The second section used three open-ended questions to gather qualitative information from the respondents.

The province of Alberta's single health authority was unable to participate in the 2020/21 survey because the provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region are limited to Manitoba (MB) and Saskatchewan (SK). In addition, for trending purposes over the long-term, regional data for British Columbia and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon during this iteration of the survey.

Pharmacy Operations: Working Remotely

At both the federal and provincial levels, Canadian responses to the pandemic threat were intended to protect those populations most at risk of morbidity and mortality and to preserve the capacity of the healthcare system to provide care. Public health agencies promoted physical distancing and working from home. The option to work from home, where available, shielded some pharmacy staff from the virus, as well as preventing viral spread during service provision.[4] The tele-monitoring concept, which was used during the previous epidemic severe acute respiratory syndrome (SARS),[5] allowed clinical teams to stay connected while remaining away from clinical areas. Many countries with mature electronic health records (EHR) and remote access capabilities adopted some aspects of remote working to support care.[6]

In the 2020/21 survey, 65% (90/139) of facilities reported having staff work from home or remotely as a result of the pandemic. A survey of 31 Commonwealth countries showed a similar proportion of hospital pharmacy professionals working remotely.[7]

Substantially more teaching hospitals (83%, 30/36 [adult and pediatric]) were able to allow staff to work remotely relative to non-teaching hospitals (58%, 60/103) (Table H-1). Hospitals with no more than 500

beds had a lower proportion using remote work than those with more than 500 beds. Access to the necessary technology may have been a main factor in the capability to support remote work (see Chapter G – Technology for data on respondents' access to technology).

The types of activities performed remotely, as reported in Table H-1, align with known tele-pharmacy services already implemented in some Canadian hospitals, such as order validation, medication reconciliation and clinical rounds.[8] Management activities represented the most common type of remote work across all types of facilities. Increased use of technology allowing secure virtual meetings was a contributing factor. Interestingly, the five pediatric hospitals had a much higher rate of remote rounding. They also had no remote order entry or medication reconciliation, in contrast to other hospitals based on facility size or teaching status.

Lesson learned: Pharmacy digital literacy and mature EHRs facilitated remote work. Facilities must continue to develop their technology to support remote care.

Table H-1. Pharmacy Staff Working Remotely as a Result of the Pandemic and the Services Provided, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pharmacy staff working from home/remotely as a result of the pandemic	**(n=)**	(139)	(39)	(57)	(43)	(31)	(103)	(5)	(26)	(22)	(39)	(35)	(17)
		90	13	40	37	26	60	4	13	8	28	29	12
		65%	**33%**	**70%**	**86%**	**84%**	**58%**		**50%**	**36%**	**72%**	**83%**	**71%**
Base: All respondents, n = 139													
Pharmacy services provided remotely	**(n=)**	**(90)**	**(13)**	**(40)**	**(37)**	**(26)**	**(60)**	**(4)**	**(13)**	**(8)**	**(28)**	**(29)**	**(12)**
Management		66	7	28	31	19	44	3	7	5	21	26	7
		73%	**54%**	**70%**	**84%**	**73%**	**73%**		**54%**		**75%**	**90%**	**58%**
Order validation		53	9	19	25	12	41	0	6	4	13	25	5
		59%	**69%**	**48%**	**68%**	**46%**	**68%**		**46%**		**46%**	**86%**	**42%**
Pharmacy informatics		51	4	21	26	18	31	2	5	2	17	18	9
		57%	**31%**	**53%**	**70%**	**69%**	**52%**		**38%**		**61%**	**62%**	**75%**
Order entry		46	8	13	25	10	36	0	4	7	10	22	3
		51%	**62%**	**33%**	**68%**	**38%**	**60%**		**31%**		**36%**	**76%**	**25%**
Drug use evaluation		32	3	10	19	10	21	1	4	0	13	11	4
		36%	**23%**	**25%**	**51%**	**38%**	**35%**		**31%**		**46%**	**38%**	**33%**
Procurement		28	4	8	16	12	15	1	2	1	8	11	6
		31%	**31%**	**20%**	**43%**	**46%**	**25%**		**15%**		**29%**	**38%**	**50%**

Table H-1 (continued). Pharmacy Staff Working Remotely as a Result of the Pandemic and the Services Provided, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Medication reconciliation		26	2	11	13	9	17	0	1	1	11	12	1
		29%	**15%**	**28%**	**35%**	**35%**	**28%**		**8%**		**39%**	**41%**	**8%**
Clinical rounds		16	2	6	8	6	7	3	6	1	3	3	3
		18%	**15%**	**15%**	**22%**	**23%**	**12%**		**46%**		**11%**	**10%**	**25%**
Other		18	0	12	6	5	12	1	5	1	6	6	0
		20%		**30%**	**16%**	**19%**	**20%**		**38%**		**21%**	**21%**	

Base: Respondents with pharmacy staff working remotely during the pandemic, n = 90
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Clinical Rotations

Canadian pharmacy education relies heavily on advanced pharmacy practice experiences in the final year of students' formal training.[9] Hospital pharmacies play an important role in supporting this experiential training. With the declaration of the pandemic in mid-March 2020, students in mid-rotation were immediately withdrawn from all clinical placement sites.[10] This situation was not unique to Canada, and many other countries took a similar approach, which necessitated adjusting the requirements for experiential education.[11]

This change had a significant impact on the education of healthcare professionals. Only 17% (23/139) of respondents provided remote clinical rotations during the pandemic (British Columbia/Yukon [BC/YT], n = 4; Prairies [Prai, SK/MB], n = 1; Ontario [ON], n = 10; Québec [QC] = 7; Atlantic [Atl, includes NB/NS/PEI/NL], n = 1). Of the 23 respondents that provided remote clinical rotations, 65% (15/23) were non-teaching hospitals, 57% (13/23) had between 201 and 500 beds, and 39% (9/23) had more than 500 beds. Experiential learning activities not requiring direct patient contact, such as drug information and research, were easier to support remotely (see Table H-2). Most respondents did not provide experiential pharmacy technician rotations remotely (22/23). However, the survey did not gather data about the re-instatement of on-site experiential learning opportunities as public health restrictions evolved during successive stages of the pandemic.

Lesson learned: Pharmacy education must continue to adapt to support remote experiential learning.

Table H-2. Clinical Rotations Provided by Respondents during the Pandemic, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Clinical rotations were provided during the pandemic	**(n=)**	(139)	(39)	(57)	(43)	(31)	(103)	(5)	(26)	(22)	(39)	(35)	(17)
		23	2	12	9	4	15	4	4	1	10	7	1
		17%	**5%**	**21%**	**21%**	**13%**	**15%**		**15%**	**5%**	**26%**	**20%**	**6%**
Base: All respondents, n = 139													
Clinical rotations provided remotely	**(n=)**	**(23)**	**(2)**	**(12)**	**(9)**	**(4)**	**(15)**	**(4)**	**(4)**	**(1)**	**(10)**	**(7)**	**(1)**
Drug information rotations		9	1	5	3	2	6	1	0	1	6	1	1
		39%		**42%**			**40%**				**60%**		
Research related rotations		6	1	4	1	2	2	2	3	0	2	1	0
		26%		**33%**			**13%**				**20%**		
Specialty rotations		9	1	5	3	2	6	1	1	0	7	1	0
		39%		**42%**			**40%**				**70%**		
Pharmacy student rotations		11	1	6	4	2	6	3	1	0	4	5	1
		48%		**50%**			**40%**				**40%**		
Pharmacy technician rotations		1	0	1	0	0	1	0	0	0	1	0	0
		4%		**8%**			**7%**				**10%**		
Pharmacy residency rotations		9	0	3	6	2	7	0	1	0	4	4	0
		39%		**25%**			**47%**				**40%**		
Other		2	0	0	2	0	2	0	0	0	1	1	0
		9%					**13%**				**10%**		
Base: Respondents providing clinical rotations remotely during the pandemic, n = 23 Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons													

Drug Shortages

During the COVID-19 pandemic, shortages of active pharmaceutical ingredients (APIs), excipients and medications occurred worldwide. In some countries, producers stopped supplying APIs to other countries, which led to a global shortage of many drugs. Other factors that contributed to drug shortages around the world included shortages of packing materials, transportation disruptions, shipping delays, delays in custom clearance, restrictions on the import and export of APIs and increases in demand for some drugs.[12,13,14]

Hospital pharmacies played an important role in managing drug shortages by coordinating inventory locally, regionally and, for some products, provincially. As the pandemic progressed, hospitals in Canada and the United States began stockpiling medications needed for the surge of critically ill patients, specifically sedatives, opioids and paralytics. As seen in Table H-3, a high proportion of respondents (90%, 125/139) increased their medication inventory. This stockpiling was not limited to medications for treating COVID-19 but extended to oncology medications and other drug classes. More specifically, 43% (60/139) of respondents increased their inventory of oncology drugs. On average, those who stockpiled oncology medications increased their inventory by 1.2 months, whereas the increase in inventory was about 2.2 to 3 months for most other medication classes. The high cost of oncology drugs may explain why facilities decided not to increase their inventory as much as the increases for other medication classes. Oncology drug shortages experienced by hospitals well before the pandemic and potential supply chain disruptions likely contributed as well. Both community and hospital stockpiling intensified the shortages. Faced with uncertainty, the population at large started stockpiling their long-term medications at home, thus extending the drug shortages from injectable hospital-based products to common routine medications like inhalers. This resulted in the imposition of limits on outpatient supplies of long-term medications (typically to a 30-day supply) in many provinces during the early months of the pandemic.

Table H-3. Drug Inventory Increases (Expressed in Number of Months) during the Pandemic, 2020/21

Drug categories that were increased and by how many months of usage		All (n=139)	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Oncology	Yes	60	19	18	23	10	46	4	4	12	9	31	4
	Average (months)	**1.2**	**1.0**	**1.1**	**1.6**	**0.8**	**1.3**	**2.0**	**0.7**	**0.6**	**1.3**	**1.5**	**1.2**
	SD	1.0	1.0	0.9	0.9	0.7	0.9	1.8	0.4	0.9	1.3	0.8	1.3
Critical care	Yes	125	30	53	42	28	92	5	19	20	38	35	13
	Average (months)	**3.1**	**2.8**	**3.3**	**3.1**	**3.3**	**3.1**	**3.0**	**2.3**	**3.8**	**3.0**	**3.3**	**2.8**
	SD	1.3	1.2	1.4	1.2	1.2	1.3	1.2	1.3	1.4	1.3	0.9	1.2
Antibiotics	Yes	115	28	49	38	23	88	4	15	21	32	35	12
	Average (months)	**2.6**	**2.2**	**2.7**	**2.8**	**2.9**	**2.6**	**2.0**	**1.8**	**2.8**	**2.4**	**3.1**	**2.6**
	SD	1.3	1.3	1.4	1.1	1.3	1.3	1.8	1.0	1.6	1.5	0.8	1.3
Narcotics/ controlled drugs	Yes	124	29	54	41	28	91	5	18	20	38	35	13
	Average (months)	**2.9**	**2.5**	**3.0**	**3.0**	**3.2**	**2.8**	**2.4**	**1.9**	**3.5**	**2.8**	**3.2**	**2.6**
	SD	1.3	1.2	1.4	1.1	1.2	1.3	1.3	1.2	1.6	1.2	0.8	1.3

Table H-3 (continued). Drug Inventory Increases (Expressed in Number of Months) during the Pandemic, 2020/21													
Drug categories that were increased and by how many months of usage		**All (n=139)**	**Bed Size**			**Hospital Type**			**Region**				
			50-200	**201-500**	**>500**	**Teaching**	**Non-teaching**	**Pediatric**	**BC/YT**	**Prai**	**ON**	**QC**	**Atl**
Anesthetics	**Yes**	112	29	47	36	25	82	5	14	19	31	35	13
	Average (months)	**2.9**	**2.4**	**3.1**	**2.9**	**3.1**	**2.8**	**2.4**	**1.8**	**3.2**	**2.9**	**3.2**	**2.6**
	SD	1.2	1.1	1.4	1.0	1.1	1.3	1.3	0.8	1.5	1.3	0.9	1.3
Other:	**Yes**	53	9	20	24	15	37	1	3	9	13	27	1
	Average (months)	**2.2**	**2.1**	**1.9**	**2.6**	**2.9**	**2.0**	**0.1**	**0.9**	**2.9**	**1.1**	**2.8**	**0.1**
	SD	1.8	2.5	1.6	1.7	1.8	1.7		1.0	2.5	1.5	1.5	
Base: All respondents, n = 139; number of respondents with increased inventory of the various drug categories, n = 37 to 125													

These findings highlight the fragility of the medication supply chain, which relies on just-in-time inventory for hospitals and within the pharmaceutical industry. Medication shortages affected both staffing and storage requirements. Although most respondents reported increasing their inventory to some extent, only 26% (36/139) of respondents reported increases in staffing, by an average of 1.3 (standard deviation [SD] 0.9) full-time equivalent (FTE), to manage the shortages.

The increase in drug inventory levels resulted in increased storage requirements. Additional storage was required by 72% (100/139) of respondents. Table H-4 illustrates that among the 99 facilities that specified how much space was required, most (74%, 73/99) required no more than 500 m^2 extra storage space to accommodate their increased drug inventory.

Table H-4. Additional Drug Storage Space Required by Respondents during the Pandemic, 2020/21

		All	**Bed Size**			**Hospital Type**			**Region**				
			50-200	**201-500**	**>500**	**Teaching**	**Non-teaching**	**Pediatric**	**BC/YT**	**Prai**	**ON**	**QC**	**Atl**
Required additional storage space for drug inventory during the pandemic	**(n=)**	(138)	(38)	(57)	(43)	(31)	(102)	(5)	(26)	(22)	(39)	(35)	(16)
	Yes	100	19	42	39	27	69	4	13	17	30	33	7
		72%	**50%**	**74%**	**91%**	**87%**	**68%**		**50%**	**77%**	**77%**	**94%**	**44%**
Base: All respondents, n = 138													
Amount of space required	**(n=)**	**(99)**	**(19)**	**(42)**	**(38)**	**(26)**	**(69)**	**(4)**	**(12)**	**(17)**	**(30)**	**(33)**	**(7)**
1-500 m^2		73	18	31	24	14	56	3	11	14	18	25	5
		74%	**95%**	**74%**	**63%**	**54%**	**81%**		**92%**	**82%**	**60%**	**76%**	

Table H-4 (continued). Additional Drug Storage Space Required by Respondents during the Pandemic, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
501-1000 m²		19	1	8	10	11	7	1	1	2	10	4	2
		19%	**5%**	**19%**	**26%**	**42%**	**10%**		**8%**	**12%**	**33%**	**12%**	
1001-2000 m²		7	0	3	4	1	6	0	0	1	2	4	0
		7%	**0%**	**7%**	**11%**	**4%**	**9%**		**0%**	**6%**	**7%**	**12%**	
> 2000 m²		0	0	0	0	0	0	0	0	0	0	0	0

Base: Respondents reporting amount of additional space required for drug inventory during the pandemic, n = 99
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

To manage shortages, 91% (126/139) of respondents had to suggest alternative medications to support clinical care. Therapeutic alternatives were provided as follows: daily 2% (2/124), 2 to 3 times a week 14% (17/124), weekly 40% (49/124) and monthly 45% (56/124). This illustrates the contribution of clinical pharmacy to the management of drug shortages.

Lesson learned: The healthcare system must avoid just-in-time inventory management for critical medications and should plan for increased storage space. According to the data gathered, most respondents targeted an extra 3-month inventory of critical care medications. To manage medication shortages properly, in particular by recommending and providing appropriate therapeutic alternatives, clinical pharmacy knowledge is essential.

This photo of a COVID vaccination clinic was provided by North York General Hospital, Ontario. A regulated pharmacy technician is preparing the COVID-19 vaccination and it is being administered to the patient by a pharmacist.

Vaccination

Hospital pharmacies around the world, including many in Canada, have been involved with COVID-19 vaccination efforts during the pandemic. The limited supplies of COVID-19 vaccines and their complex storage requirements led Canadian hospital pharmacies to take on many new responsibilities to support mass vaccination clinics.[16] Overall, 82% (114/139) of respondents had some level of involvement with COVID-19 vaccination.

As illustrated by Table H-5, respondents assisted mainly with the logistical aspects of vaccination programs, including storage (93%, 106/114), as well as distribution, preparation and transport. Conversely, only 27% (31/114) of respondents with involvement in COVID-19 vaccination programs assigned pharmacy staff to administer vaccines.

Table H-5. Pharmacy Involvement in COVID-19 Vaccination, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Respondent's pharmacy department involved with a COVID-19 vaccination program	**(n=)**	(139)	(39)	(57)	(43)	(31)	(103)	(5)	(26)	(22)	(39)	(35)	(17)
	Yes	114	26	48	40	23	87	4	20	13	35	33	13
		82%	**67%**	**84%**	**93%**	**74%**	**84%**		**77%**	**59%**	**90%**	**94%**	**76%**
Base: All respondents, n = 139													
Aspect of pharmacy department involvement in COVID-19 vaccination program	**(n=)**	(114)	(26)	(48)	(40)	(23)	(87)	(4)	(20)	(13)	(35)	(33)	(13)
Storage of COVID-19 vaccine		106	25	47	34	20	82	4	17	13	33	30	13
		93%	**96%**	**98%**	**85%**	**87%**	**94%**		**85%**	**100%**	**94%**	**91%**	**100%**
Distribution of COVID-19 vaccine		94	22	39	33	18	72	4	10	13	31	30	10
		82%	**85%**	**81%**	**83%**	**78%**	**83%**		**50%**	**100%**	**89%**	**91%**	**77%**
Preparation of COVID-19 vaccine: reconstitution		79	15	33	31	19	57	3	8	5	35	23	8
		69%	**58%**	**69%**	**78%**	**83%**	**66%**		**40%**	**38%**	**100%**	**70%**	**62%**
Preparation of COVID-19 vaccine: preparing individual doses (syringes)		77	13	37	27	20	53	4	10	5	35	18	9
		68%	**50%**	**77%**	**68%**	**87%**	**61%**		**50%**	**38%**	**100%**	**55%**	**69%**
Transportation of COVID-19 vaccine to off-site clinics		55	11	22	22	12	41	2	3	4	24	17	7
		48%	**42%**	**46%**	**55%**	**52%**	**47%**		**15%**	**31%**	**69%**	**52%**	**54%**
Administration of COVID-19 vaccine (pharmacy staff as immunizers)		31	6	14	11	5	24	2	2	5	12	5	7
		27%	**23%**	**29%**	**28%**	**22%**	**28%**		**10%**	**38%**	**34%**	**15%**	**54%**
Other*		22	1	9	12	4	17	1	3	0	8	11	0
		19%	**4%**	**19%**	**30%**	**17%**	**20%**		**15%**	**0%**	**23%**	**33%**	**0%**

Base: Respondents whose pharmacy department was involved in aspects of a COVID-19 vaccination program, n = 114
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

*Other activities: addressing cold chain incident, n = 2; audit vaccination centre, n = 2; leadership role of mass vaccination clinics, n = 8; coordinating inpatient vaccination, n = 4; input in provincial vaccination software, n = 2; staff education, n = 1; and support outreach team, n = 1.

Of the 41 respondents (36%) who reported increasing staffing levels for vaccination purposes, the average addition was 6.9 (SD 7.5) FTEs. The number of additional FTEs was proportional to hospital size (Table H-6). Larger hospitals became vaccination hubs when vaccines were in short supply and when they required ultra-cold freezers for storage. The Prairie region was the only region that did not increase pharmacy FTEs to support COVID-19 vaccination efforts.

Table H-6. Additional Staff Hired to Support Pharmacies' Involvement with COVID-19 Vaccination Programs, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Were additional full-time equivalents (FTEs) hired to support the pharmacy department's involvement with COVID-19 vaccinations?	**(n=)**	(114)	(26)	(48)	(40)	(23)	(87)	(4)	(20)	(13)	(35)	(33)	(13)
	Yes	41	4	22	15	11	28	2	3	0	26	8	4
		36%	**15%**	**46%**	**38%**	**48%**	**32%**		**15%**	**0%**	**74%**	**24%**	**31%**
Number of additional FTEs hired to support pharmacy department's involvement with COVID-19 vaccinations	**(n=)**	(41)	(4)	(22)	(15)	(11)	(28)	(2)	(3)	(0)	(26)	(8)	(4)
	Average	**6.9**	**1.1**	**4.7**	**11.8**	**5.1**	**8**	**1.5**	**1**		**8**	**8.5**	**1.6**
	SD	7.5	0.6	5.1	8.7	5.9	8.1	0.7	0		7.8	8.1	1.1

Base: Respondents who answered the question, "Were additional FTEs hired to support the pharmacy department's involvement with COVID-19 vaccinations?", n = 114
Second base: Respondents who hired additional FTEs to support the pharmacy department's involvement with COVID-19 vaccinations, n = 41

Respondents indicated that training of regulated pharmacy technicians and/or non-regulated pharmacy assistants to administer COVID-19 vaccines was modest, with only 9% (12/139) of respondents reporting such training. All of these were from ON, where an increased scope of practice for regulated pharmacy technicians was established in early 2021, before the vaccines were widely available (but only 2 of the 12 respondents were from teaching hospitals). Among the other 127 respondents, the main reasons for not training technicians to administer vaccines were need for technicians to maintain current pharmacy services (58%, 74/127), lack of designation of technicians as potential vaccinators in the respective provincial jurisdictions (55%, 70/127; BC/YT, QC, Atl), lack of an injection training or certification program (13%, 17/127) and lack of technician interest in training to administer vaccines (9%, 12/127).

Lesson learned: Hospital pharmacy departments must be prepared to play a significant role in future pandemic-related mass vaccination efforts.

Regional Planning for COVID-19 Vaccination Strategy

Pharmacy logistics were critical for the proper operation of mass COVID-19 vaccination programs. Strong pharmacy involvement was to be expected in the planning of regional vaccination strategies. Overall, 76% (105/139) of respondents were involved with regional planning (Table H-7). Of the 114 respondents that participated in vaccination programs, 15 were not involved in regional planning. There were 7 from BC/YT, 1 from the Prairies (SK/MB), 3 from ON, 3 from QC and 1 from the Atlantic region. Conversely, 6 respondents that did not contribute to a vaccination program did have involvement in regional planning. In general, most respondents that were involved in vaccination efforts were also involved in the planning of vaccination programs, which aligns well with ideal disaster management planning.

Lesson learned: Involving pharmacy as a stakeholder in regional mass vaccination strategies is critical.

Table H-7. Pharmacy Department Involvement with Regional Planning to Support the COVID-19 Vaccination Strategy, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Was your pharmacy department involved with regional planning to support the COVID 19 vaccination strategy?	**(n=)**	(139)	(39)	(57)	(43)	(31)	(103)	(5)	(26)	(22)	(39)	(35)	(17)
	Yes	105 **76%**	22 **56%**	47 **82%**	36 **84%**	24 **77%**	77 **75%**	4	15 **58%**	13 **59%**	32 **82%**	31 **89%**	14 **82%**

Base: All respondents, n = 139
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Critical Care Coverage

The pandemic tested the critical care capacity of the healthcare system, with many patients requiring supportive ventilation. Admission of COVID-19 patients to ICUs was reported by 82% (105/128) of respondents with ICUs in their facilities. The surge in demand for critical care resulted in a corresponding surge in demand for pharmacists with critical care training. However, only 5% (5/106) of respondents hired additional pharmacists to cover the ICU, whereas 44% (47/106) reassigned pharmacists from other patient care areas, and 51% (54/106) managed with pre-pandemic ICU staffing allocations.

Additional training for pharmacists providing ICU coverage was supported in some way by 48% (62/128) of respondents. More specifically, 13% (17/128) provided additional training to pharmacists already working in the ICU, 24% (31/128) provided training to pharmacists from other patient care areas to allow them to provide ICU coverage, and 11% (14/128) provided training to all pharmacists providing clinical services in order to ensure adequate ICU coverage.

Lesson learned: A hospital pharmacy pandemic plan must include a strategy to increase the number of pharmacists capable of providing coverage to patients needing critical care. At early signs of a future pandemic, a structure should be put in place to increase critical care coverage by pharmacists.

Impact on Pharmacy Staffing

The pandemic created a staffing crisis in all sectors of the economy. This was felt more intensely in healthcare settings because of the increase in patients requiring hospitalization and the impact of staff illness due to COVID-19. Pharmacy services are essential to provide care in hospitals. Before addressing the impact of sick calls on staffing, it can be noted that 18% (25/139) of respondents lost staff through early retirement and 13% (18/139) through resignations during 2020/21; however, respondents were not asked to specify the number of staff members lost to resignation or retirement. In addition, 86% (119/139) of respondents reported losing staff because of COVID-related sick leave or isolation. The extent to which the virus affected pharmacy staff was substantial. Most notably, 70% (91/130) of respondents had staff testing positive at the time the survey was conducted. On average, of the 91 respondents affected, 7% of staff had tested positive at that time. The extent of positivity and the number of facilities varied greatly across regions (Table H-8). Of note, 3 respondents had 20% to 50% of staff testing positive, but most respondents had a positivity rate of 5% or less.

Table H-8. Percentage of Pharmacy Staff Testing Positive for COVID-19 during the Pandemic, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Percentage pharmacy staff tested positive for COVID-19 during the pandemic	**(n=)**	(130)	(34)	(54)	(42)	(29)	(97)	(4)	(25)	(21)	(39)	(34)	(11)
	Average	4.7	5.5	3.7	5.5	5.1	4.2	15.8	2.3	6.4	5.2	6.3	0.6
	SD	6.7	10.8	4.4	4.4	4.8	5.6	23.1	2.6	8.5	8.6	5.0	1.3

Base: All respondents, n = 130

Lesson learned: Early recognition of staffing challenges should be integrated into pandemic plans.

Bed Capacity

The surge in COVID-19 cases in Canada resulted in a need to increase hospitals' bed capacity as a way to increase the overall resilience of the healthcare system. Among respondents to the survey, about three-quarters (76%, 105/139) admitted patients with COVID-19, and more than half (63%, 87/139) increased the number of acute care beds as a direct result of the pandemic (Table H-9). Data on the number of beds added to support care was provided by 61% (85/139) of respondents, who reported an average 30.5 (SD 24.6) beds added per facility; however, the number of added beds varied widely, from 1 to 100. QC and ON, the most populous provinces, added the most beds (Table H-9), and ON dispersed the new beds among the greatest number of facilities.

Table H-9. Acute Care Beds Added during the Pandemic, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Did your facility increase the number of acute care beds due to the pandemic?	**(n=)**	(139)	(39)	(57)	(43)	(31)	(103)	(5)	(26)	(22)	(39)	(35)	(17)
	Yes	87	18	33	36	18	66	3	15	16	35	20	1
		63%	**46%**	**58%**	**84%**	**58%**	**64%**		**58%**	**73%**	**90%**	**57%**	**6%**
Number of acute care beds added to support care during the pandemic	**(n=)**	(85)	(18)	(32)	(35)	(17)	(65)	(3)	(14)	(16)	(34)	(20)	(1)
	Average	**30.5**	**10.7**	**27.7**	**43.3**	**37.3**	**29.8**	**8.7**	**25.4**	**21.2**	**28.5**	**46.0**	**13.0**
	SD	24.6	6.0	16.6	29.1	30.5	23.0	5.1	19.4	17.9	22.1	30.9	

Base: All respondents, n = 139
Second base: Respondents who added additional acute care beds due to the pandemic, n = 87
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Among facilities that reported numbers of beds added, just over half (55%, 47/85) had no increase in pharmacy FTEs to support the additional acute care beds. The remaining 38 facilities received an average of 2.2 FTEs of additional pharmacy staffing to support the added beds. The Prairies achieved better staff ratio adjustments per bed (see Table H-10).

Table H-10. Additional Pharmacy Full-Time Equivalents (FTEs) to Support Additional Acute Care Beds during the Pandemic, by Region, 2020/21

Region	Number of facilities with increase in acute care beds due to the pandemic	Average number of acute care beds added	Total number of acute care beds added due to the pandemic	Number of facilities with an increase in FTEs to support additional acute care beds	Average number of beds added for those with an increase in pharmacy FTEs	Average FTEs added per facility
BC/YT	14	24 (range 1-78)	588	3	24 beds	1
Prairie	16	21 (range 4-58)	336	4	42 beds	3.5
ON	34	28 (range 4-100)	952	22	33 beds	1.8
QC	20	46 (range 10-100)	920	9	53 beds	2.8
Atlantic	1	13	13	0	0	0

Lesson learned: A pandemic plan should have pre-determined bed capacity increases and pre-established pharmacy staffing requirements to support the new beds. Pharmacy staffing requirements should always be considered when acute care beds are added to a facility.

Capital Equipment

To manage the increase in hospital workload, remote working and vaccination programs, 60% (83/139) of respondents reported procuring capital equipment. The following capital equipment items were most frequently purchased: fridges (by 46%, 64/139, of respondents), freezers (by 42%, 58/139), computers (by 36%, 50/139), automated dispensing cabinets (by 24%, 33/139) and printers (by 9%, 12/139). A greater proportion of teaching hospitals (61%, 22/36) purchased capital equipment relative to non-teaching hospitals (57%, 59/103) (Table H-11).

A small proportion of respondents (15%, 21/139) reported the purchase of other items (not specified in the survey) to support operations during the pandemic, including computer screens (n = 6); medication carts, temperature monitoring devices and cameras (n = 5 each); narcotic lock box or cabinet (n = 4); storage unit for cytotoxic drugs (n = 3); computer tablets, speakers for computers, thermal shippers and coolers (n = 2 each); and IV pumps and workstations on wheels (n = 1 each). The purchase of additional fridges, freezers, temperature monitoring devices, thermal shippers and coolers was most likely related to vaccine logistics, whereas the purchase of computers, computer screens, cameras and speakers may have been related to remote work and/or physical distancing. The rest of the equipment seemed to be related to setting up new patient care units.

Table H-11. Types of Capital Equipment Procured during the Pandemic, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Procured capital equipment due to the pandemic?	**(n=) Yes**	(83)	(14)	(36)	(33)	(22)	(59)	(2)	(5)	(11)	(32)	(31)	(4)
Fridge(s)		64	8	27	29	18	45	1	2	9	22	29	2
		77%	**57%**	**75%**	**88%**	**82%**	**76%**			**82%**	**69%**	**94%**	
Freezer(s)		58	10	24	24	14	42	2	3	4	24	23	4
		70%	**71%**	**67%**	**73%**	**64%**	**71%**			**36%**	**75%**	**74%**	
Computer(s)		50	6	21	23	14	35	1	1	10	13	24	2
		60%	**43%**	**58%**	**70%**	**64%**	**59%**			**91%**	**41%**	**77%**	
Automated dispensing cabinets (ADCs)		33	3	16	14	10	23	0	1	3	20	9	0
		40%	**21%**	**44%**	**42%**	**45%**	**39%**			**27%**	**63%**	**29%**	
Printer(s)		12	0	5	7	6	5	1	0	0	7	4	1
		14%	**0%**	**14%**	**21%**	**27%**	**8%**			**0%**	**22%**	**13%**	

Table H-11 (continued). Types of Capital Equipment Procured during the Pandemic, 2020/21

		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Other		21	1	11	9	3	17	1	2	2	6	10	1
		25%	**7%**	**31%**	**27%**	**14%**	**29%**			**18%**	**19%**	**32%**	

Base: Respondents who reported purchasing capital equipment because of the pandemic, n = 83
Where the n value was less than 10, percentages were not calculated to avoid potentially misleading comparisons

Lesson learned: Canadian hospitals did not have the proper equipment to take on remote work, the provision of care for new acute care beds and mass vaccination clinics.

Readiness Assessment

Respondents were asked to rate their level of preparedness for another pandemic on four domains of pharmacy practice, using a scale from 1 (not at all prepared) to 10 (fully prepared). The average levels of preparedness were 6.9 (SD 1.7, n = 138) for pharmacy operations, 6.9 (SD 1.8, n = 137) for clinical pharmacy services, 6.0 (SD 2.1, n = 138) for pharmacy education and 5.9 (SD 2.1, n = 138) for pharmacy administration/human resources (Table H-12). The teaching hospitals rated their preparedness higher than the average for both pharmacy operations (7.5, SD 1.2) and clinical pharmacy services (7.5, SD 1.3). Conversely, teaching hospitals' preparedness aligned with that of non-teaching hospitals for education and human resources. The majority of respondents felt that they were ready to face another pandemic (Figure H-1). The lowest level of preparedness was observed for pharmacy education, which was reflected in the low level of remote pharmacy education provided during the pandemic (Table H-2).

Lesson learned: A substantial proportion of pharmacy leaders did not feel their pharmacy operations were ready to face the challenges associated with another pandemic. This finding indicates that more planning is required to ensure that Canadian hospital pharmacy departments are ready to face another pandemic.

Table H-12. Pharmacy Leadership's Perceptions of Preparedness to Face Another Pandemic, in Terms of Pharmacy Operations, Clinical Pharmacy Services, Pharmacy Education and Administration/Human Resources, 2020/21

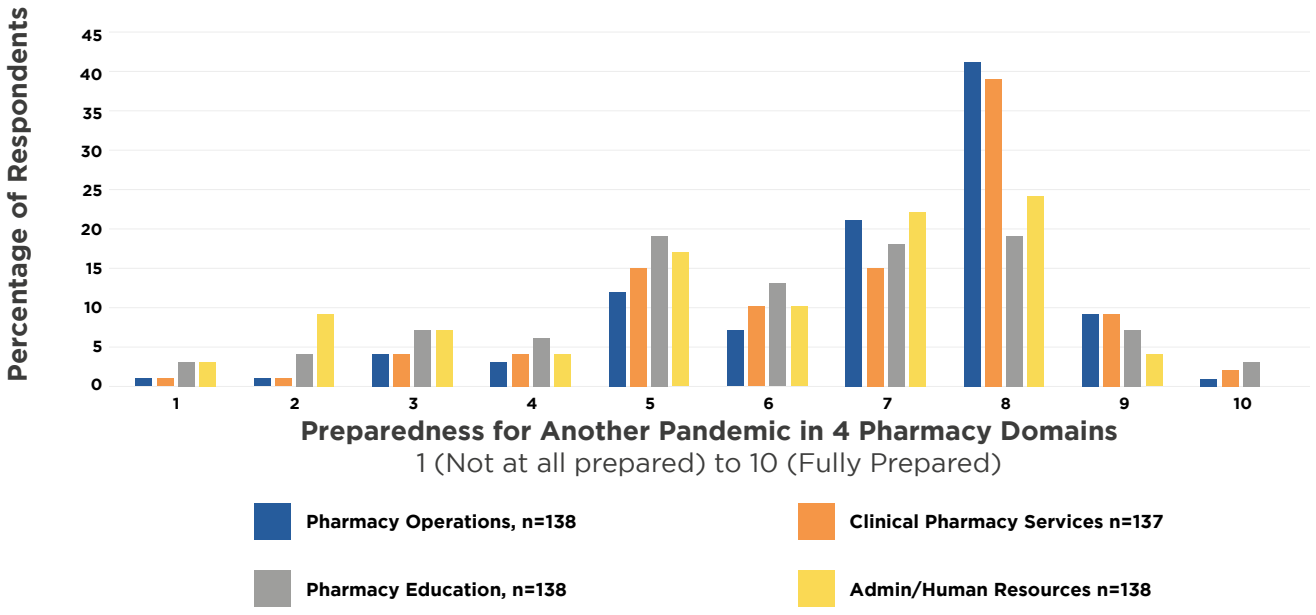
Level of Preparedness Scale (1 to 10)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pharmacy operations	(n=)	(138)	(39)	(57)	(42)	(31)	(102)	(5)	(26)	(22)	(39)	(34)	(17)
	Average	**6.9**	**6.2**	**7.1**	**7.5**	**7.5**	**6.8**	**7.6**	**6.3**	**6.9**	**7.0**	**7.6**	**6.6**
	SD	1.7	2.0	1.6	1.1	1.2	1.8	1.5	1.9	1.8	1.7	1.4	1.1
Clinical pharmacy services	(n=)	(137)	(39)	(56)	(42)	(31)	(101)	(5)	(26)	(22)	(39)	(33)	(17)
	Average	**6.9**	**6.3**	**6.9**	**7.4**	**7.5**	**6.6**	**7.8**	**6.1**	**7.0**	**6.9**	**7.5**	**6.7**
	SD	1.8	2.1	1.8	1.3	1.3	1.9	0.4	1.7	1.9	1.8	1.5	1.6

Table H-12 (continued). Pharmacy Leadership's Perceptions of Preparedness to Face Another Pandemic, in Terms of Pharmacy Operations, Clinical Pharmacy Services, Pharmacy Education and Administration/Human Resources, 2020/21

Level of Preparedness Scale (1 to 10)		All	Bed Size			Hospital Type			Region				
			50-200	201-500	>500	Teaching	Non-teaching	Pediatric	BC/YT	Prai	ON	QC	Atl
Pharmacy education	(n=)	(138)	(39)	(57)	(42)	(31)	(102)	(5)	(26)	(22)	(39)	(34)	(17)
	Average	**6.0**	**5.3**	**6.2**	**6.4**	**6.4**	**5.9**	**7.0**	**5.5**	**5.8**	**5.9**	**6.5**	**6.5**
	SD	2.1	2.5	2.0	1.7	1.9	2.2	1.9	2.4	2.3	2.3	1.8	1.5
Admin-istration / human resources	(n=)	(138)	(39)	(57)	(42)	(31)	(102)	(5)	(26)	(22)	(39)	(34)	(17)
	Average	**5.9**	**5.0**	**6.0**	**6.6**	**6.2**	**5.7**	**7.4**	**5.2**	**5.7**	**5.3**	**7.1**	**6.2**
	SD	2.1	2.1	2.1	1.9	1.8	2.2	1.5	2.3	2.1	2.4	1.6	1.1

Base: All respondents, n = 137 or 138
Levels of preparedness range from 1 (not at all prepared) to 10 (fully prepared)

Figure H-1. Pharmacy Leadership's Perceptions of Preparedness to Face Another Pandemic, in Terms of Pharmacy Operations, Clinical Pharmacy Services, Pharmacy Education and Administration/Human Resources, 2020/21



Qualitative Questions

The survey included the following three open-ended qualitative questions: What did you find most challenging in managing pharmacy services during the pandemic? What went well in managing pharmacy services during the pandemic? If you had to do it over again, what would you do differently? The dominant themes in responses to these three questions were staffing, communication, inventory management, change management, planning, vaccines, collaboration and the use of technology (Table H-13).

Table H-13. Frequency* of Themes in Responses to the Three Qualitative Questions

Theme	Most challenging	Went well	Would do differently
Staffing	100	56	59
Communication	39	26	16
Inventory management	38	30	13
Change	38	X	X
Vaccine	16	10	6
Creating COVID-19 units	16	X	X
Space	10	X	2
Infection control	7	8	X
Key initiative not on hold	3	X	3
Collaboration	X	29	X
Management support	X	8	X
Use of technology	X	13	5
Continuity of care	X	31	X

Base = All respondents to the three questions, n = 129
*Frequencies are reported as numbers of respondents mentioning the themes in their answers to the three qualitative questions.

Staffing

The most challenging issue reported by respondents was the effect of the pandemic on the state of mind of pharmacy staff members. In particular, respondents reported that COVID-19 had a negative effect on mental health, with stresses being related to "change fatigue," the demands of working in a high-risk environment with limited access to personal protective equipment (PPE), constantly changing public health directives, changing internal procedures and increased workload (Table H-14). Factors leading to increased workload included greater patient load, drug shortages and having to assume vaccination responsibilities, which resulted in higher-than-anticipated levels of sick leave, resignations and early retirements. In addition, many staff had to quarantine in accordance with public health orders. All of these factors resulted in widely reported staff shortages, staff burnout and low morale. These findings align with the results of a survey of Canadian community pharmacists, who reported that their greatest concerns during COVID-19 were their own safety (62%), drug shortages (60%), workload and staffing shortages (44%) and their own mental health (42%). In contrast, when asked what worked well, respondents to the CSHP Hospital Pharmacy in Canada Survey commonly reported the support of and collaboration among staff, despite the challenges they faced. In particular, pharmacy teams remained focused and worked well together in support of patient care (Table H-15). Staffing was also a main theme in responses to the question of what respondents could have done differently (Table H-16). Answers to this question included better supporting existing staff by hiring more workers, advocacy and listening to staff members more actively.

Lesson learned: Pharmacy staff are essential to providing care. When preparing for and dealing with a pandemic, hospital administration and management must ensure that pharmacy staff are protected from health risks with proper PPE and must also ensure that standard operating procedures include safety checks for the well-being and mental health of all staff.

Table H-14. Responses to Qualitative Question, "What Did You Find Most Challenging in Managing Pharmacy Services during the Pandemic?"

Main Theme (n = number of respondents who mentioned main theme)	Sub-theme (n = number of respondents who mentioned sub-theme)
Staffing (n = 100)	Staff anxiety/stress/fear/uncertainty among staff/mental load/moral distress/exhausted/burnout/fatigue/distrust (n = 39) Resiliency-managing human resources (n = 14) Sick calls (n = 8) Staff shortage (n = 18) Sick leave (n = 3) Casual staff not wanting to work (n = 1) Vacancies (n = 5) Recruiting (n = 1) Retirement (n = 1) Overtime (n = 1) Turnover (n = 1) Staffing issues due to public health quarantine/directive (n = 2) Managing staff expectations (n = 1) Reduced staff mobility within the hospital (n = 1) Mandatory work (n = 1) Educating staff (n = 1) Pharmacy forgotten (n = 1) Supporting multiple staff requests for remote work on the same day (n = 1)
Communication (n = 40)	Ensuring staff and pharmacy leadership are up-to-date with information and guidelines (n = 13) Communicating ever-changing directives (n = 7) Unclear communication from hospital leadership and province (n = 5) Did not know how to respond/uncertainty (n = 5) Lack of communication from the leadership team (n = 3) Lack of information regarding best practices (n = 2) Pharmacy forgotten in planning stage (n = 2) Poor communication resulting in silo-based planning (n = 1) Managing misinformation (n = 1) Virtual meetings for those challenged by technology (n = 1)
Change (n = 38)	Constant change on directives, public health procedures, protocols, workflow (n = 15) Rate of change (n = 10) Range of change/ fast pace (n = 3) Unpredictable change (n = 5) Lack of clarity of provincial directives (n = 3) Making quick decisions (n = 2) Managing change (n = 1)
Inventory management (n = 39)	Drug shortage/backorders (n = 35) Shortage of critical care medications (n = 5) Managing inventory at both regional and provincial level (n = 3)
Creating COVID unit and critical care (n = 16)	Creating COVID unit and critical care (n = 10) Increased workload/opening new beds and new units/new beds creating increased workload (n = 5) Little information system support (n = 1)
Vaccination (n = 16)	Redirecting staff to vaccination clinics/supporting vaccination clinic while maintaining pharmacy services/extra workload (n = 6) Managing vaccination clinics (n = 5) Vaccination logistics (n = 2) Impact of mandatory vaccination/dealing with staff against vaccination (n = 2) Pharmacy not leading vaccine storage and transportation (n = 1)
Planning (n = 11)	Leading the unknown/leading blindly/managing the unknown (n = 4) Poor knowledge of the role/expertise of pharmacists [translation of comment submitted in French] (n = 3) Little planning from senior management (n = 1) Waiting for provincial direction that never came (n = 1) Surge planning (n = 1) Delay in implementing provincial structure (n = 1)

Table H-14 (continued). Responses to Qualitative Question, "What Did You Find Most Challenging in Managing Pharmacy Services during the Pandemic?"

Main Theme (n = number of respondents who mentioned main theme)	Sub-theme (n = number of respondents who mentioned sub-theme)
Space (n = 10)	For physical distancing (n = 9) For storage (n = 1)
Infection control (n = 7)	Difficulty of getting PPE [personal protective equipment] for the pharmacy, implementation of physical distancing and increase in cleaning (n = 7)
Key initiatives not on hold (n = 3)	Not having other key initiatives or projects put on hold so having to deal with COVID on top of business as usual (n = 3)

Communication

The rapid changes that occurred during the evolution of the pandemic and the resulting public health directives challenged communication as experienced by hospital pharmacies. Some respondents reported that their hospital leadership forgot to communicate or consult with the pharmacy department, which may have led to miscommunication on important topics. Communication was successful when frequent, structured modes of communication were used within the pharmacy, such as regular daily huddles. In hospitals, the main channels of communication were internal, among staff, whereas in community pharmacy, the main channels of communication were directed to the public.[17]

Lesson learned: Communication channels with internal and external stakeholders should be pre-established to ensure accuracy and timeliness of information exchange.

Inventory Management

Drug shortages frequently and persistently affected hospitals long before the pandemic, and the situation only worsened during the pandemic. Indeed, the many medication back orders represented one of the worst aspects of the pandemic. The situation required the creation of a regional structure and formal collaboration to enable hospitals to support pharmacy logistic requirements. Group purchasing organizations also played a critical role in the management of back orders. The concepts of having a more robust medication reserve and making more warehousing space available were identified as needs for the future. A US study assessing collaboration in the management of drug shortages yielded similar findings, noting that shared resources could help institutions accept and adopt best practices and more efficiently access or share finite resources in times of shortage.[18]

Lesson learned: Regional and provincial inventory management was effective and well received.

Change Management

Managing change came up only in response to the question about what respondents found most challenging. No one described change processes that worked well. Change was indirectly mentioned under the themes of communication and planning. The main concerns were the rate and unpredictability of changes that affected pharmacy operations, primarily new protocols around health procedures. Given that this survey was sent to members of each hospital's pharmacy management team, it is not surprising that the need to make quick decisions and manage change in a general sense were identified as challenging.

Lesson learned: Strategies of change management, including deliberate evolution of changes over prolonged periods, would be a valuable leadership development topic for Canadian pharmacy leadership training.

Planning

Pandemic planning was mentioned in terms of both what was most challenging and what would be done differently. Planning deficiencies related to the constant evolution of directives at both the local and the provincial level, which made it difficult for pharmacy management teams to plan appropriately. It is concerning that some respondents felt the pharmacist's role and expertise were not considered in local or provincial planning. As a result, some decisions affecting pharmacy operations were made without any consultation.

Lesson learned: Better pandemic planning would include consultation with pharmacy leadership.

Vaccines

During the last two epidemics in Canada (SARS and H1N1), hospital pharmacy departments were not actively involved. However, during the COVID-19 pandemic, it was recognized that hospital pharmacies have the expertise to manage vaccines, especially if they are in limited supply and have complex logistical limitations.[19] Participation in mass vaccination efforts represented yet another challenge, with pharmacies being expected to reassign staff to vaccination clinics while maintaining pharmacy services within the hospital. Many respondents felt proud of successfully managing this new challenge while maintaining continuity of care.

Lesson learned: The hospital pharmacy's pandemic plan should include the logistics of mass vaccination clinics.

Collaboration

The theme of collaboration was reported only in response to the question about what worked well. Respondents noted that the pandemic led to connections among various hospital departments, including pharmacy. There was important teamwork between pharmacy and other disciplines, and the clinical and administrative teams worked together toward common goals. In addition, the pandemic prompted the creation of new pharmacy collaboration channels at the regional and provincial levels. Of course, collaboration is not unique to hospital pharmacy. It has become a constant theme throughout the pandemic, resulting in sharing of scientific knowledge, rapid consolidation of global outbreak data and novel partnerships.[20]

Lesson learned: Canadian healthcare providers worked well together during the pandemic crisis.

Use of Technology

Technology played a significant role in supporting pharmacy operations during the pandemic, and the pandemic itself accelerated the implementation of various technologies. Tele-pharmacy services were adopted and implemented successfully to support remote order entry, order verification and virtual care. Adaptation to virtual platforms broadened the ability to be more inclusive when meeting with team members in large health regions. Many previously denied technology initiatives received the green light, with minimal red tape (for example, the expansion of automated dispensing cabinets). In facilities that already had computerized provider order entry (CPOE), the availability of this technology facilitated tele-pharmacy.

Lesson learned: The pandemic created the need for rapid adoption of technology, and the prior implementation of EHRs facilitated remote care.

Table H-15. Responses to Qualitative Question, "What Went Well in Managing Pharmacy Services during the Pandemic?"

Main Theme (n = number of respondents who mentioned main theme)	Sub-theme (n = number of respondents who mentioned sub-theme)
Staffing (n = 56)	Working together to contribute to patient care/worked hard/teamwork (n = 25) Everyone stepped up/ efficient adaptability/ flexibility/pulled together (n = 20) Supports for staff (n = 2) Staff resilience (n = 2) Camaraderie/team spirit and togetherness (n = 2) Staff supporting each other (n = 1) Increased empathy (n = 1) Connecting more with my staff (n = 1) Had healthy staff (n = 1) Using student to reduce workload (n = 1)
Continuity of care (n = 33)	Continuity of care despite all the challenges (n = 9) Role of pharmacist on the COVID unit/scope of practice (n = 5) Contingency plan for pharmacy (n = 3) Surge planning (n = 3) Free up management to deal with pandemic (n = 2) Document management/policy and procedure (n = 3) Critical care support (n = 1) Upstaffing (n = 1) New service (n = 1) Adaptation of medication management (n = 1) Vaccine clinic (n = 1) Support from Pharmacy and Therapeutics Committee (n = 1) In charge person (n = 1) Pharmacy technicians co-managing (n = 1)
Collaboration (n = 28)	Pharmacy working/collaboration with regional/provincial approach/collaboration (n = 14) Emergency Operations Centre/rest of the hospital (n = 10) Medical team/ IPAC (Infection Prevention and Control) physician (n = 2) Recognition of pharmacy role in pandemic (n = 1) Ministry funding (n = 1)
Inventory management (n = 30)	Overall management went well (n = 14) Provincial and regional approach (n = 9) Preparation for drug shortages/proactive approach (n = 2) Group Purchasing Organization support (n = 2) Improved approach (n = 1) Creation of dashboard (n = 1) Second wave went well (n = 1)
Communication (n = 26)	Daily or regular huddle/regular communication (n = 15) Communication (n = 6) Communication from regional/provincial (n =3) Regional/provincial pharmacy director group (n = 2)
Use of technology (n = 21)	Tele-pharmacy (n = 5) Virtual care (n = 4) Working from home (n = 3) Remote order validation (n = 2) Online meetings (n = 2) Implementing remote order entry (n = 1) Automated dispensing cabinets (n = 1) Reduced red tape to implement technology (n = 1) Promote the use of technology (n = 1) CPOE (n = 1)
Vaccine (n = 12)	Integrated vaccine strategy/ vaccine management (n = 4) Being involved in vaccine (n = 3) Supporting vaccination in the community (n = 2) Logistics of moving the vaccine (n = 1) Pharmacy's involvement in vaccination preparation (n = 1) Buying ultra low=temperature freezer (n = 1)

Table H-15 (continued). Responses to Qualitative Question, "What Went Well in Managing Pharmacy Services during the Pandemic?"	
Main Theme (n = number of respondents who mentioned main theme)	**Sub-theme (n = number of respondents who mentioned sub-theme)**
Management support (n = 7)	Strong leadership (n = 2) Communication (n = 2) Dealing with human resources (n = 1) All hands on deck (n = 1) Funding access (n = 1)
Therapeutic (n = 5)	Coordination of protocols across the province (n = 2) Pharmacy leadership in COVID therapeutics committees provincially (n = 1) Standardized treatment PPOs (pre-printed orders) (n = 1) Gained more ICU knowledge on our team (started with 3 ICU trained pharmacists, now have 6) (n = 1)

Table H-16. Responses to Qualitative Question, "If You Had To Do It Over Again, What Would You Do Differently?"

Main Theme (n = number of respondents who mentioned main theme)	Sub-theme (n = number of respondents who mentioned sub-theme)
Staffing (n = 49)	More staff/larger staffing pool/earlier/more casual/hire into permanent position/advocate more strongly for extra pharmacy resources/better human resources/get additional support earlier (n = 20) Supporting the staff better (n = 4) Marathon vs sprint/foster long-term resiliency (n = 4) Better staffing to support vaccination (n = 3) More space for staff /delay in getting separator (n = 3) More time off/breaks (n = 2) Get a regional pool of HR (n = 2) More staff working from home (n = 2) More PPE for staff (n = 2) Would not institute COVID team (n = 1) Move to split schedule sooner (n = 1) Increase opportunity for staff debriefing (n = 1) More staff recognition (n = 1) Take feedback from staff more seriously (n = 1) Advocate for earlier pharmacy staff vaccination (n = 1) More management on site on weekends during the peak (n = 1)
Planning (n = 39)	Better pandemic plan (n = 16) Not done yet (n = 4) Earlier/more pharmacy involvement in planning (n = 4) Rely more on provincial infrastructure/support (n = 3) Better written log (n = 2) Review procedures (n = 1) More delegation (n = 1) Create a contingency plan (n = 2) Policy and Procedures ready to go (n = 1) Decrease time chasing dead ends (n = 2) Earlier emergency crisis (n = 1) Standard remote work (n = 1) Designate a responsible person for drug distribution earlier (n = 1)
Communication (n = 16)	More emphasis on communication to staff (n = 11) Getting the right information before sharing with staff (n = 2) Hire a communication staff (n = 1) Getting more direction from above (n = 1) Create a communication network with community pharmacies (n = 1)
Inventory (n = 13)	Better pandemic stockpile (n = 8) Warehousing space (n = 2) Better inventory management/perpetual inventory (n = 2) Not to order so many drugs "just in case" (n = 1)
Clinical training (n = 7)	More ICU-trained staff (n = 4) Cross-training between clinical areas (n = 3)

Table H-16 (continued). Responses to Qualitative Question, "If You Had To Do It Over Again, What Would You Do Differently?"

Main Theme (n = number of respondents who mentioned main theme)	Sub-theme (n = number of respondents who mentioned sub-theme)
Vaccine (n = 6)	More engaged in vaccination (n = 2) Focus less on vaccination, more on inpatient care (n = 2) Encourage vaccination (n = 1) Eliminate inefficiencies, there is no need for daily (frequently more than daily) delivery of vaccines (n = 1)
Technology (n = 5)	Adoption of technology to facilitate remote service provision/getting CPOE (n = 2) Better rules for remote work (n = 2) More automated dispensing cabinets (ADCs) (n = 1)
Clinical care (n = 4)	At the beginning of the pandemic, we removed pharmacists from the (non-COVID) units. Pharmacists were required back on the COVID clinical units, securing their role [translation of comment submitted in French] (n = 1) Change the Pharmacy services model to enable off-site facilities to operate more independently (n = 1) Validate fluidity with other professionals [translation of comment submitted in French] (n = 1) Buffer the IV team in the central pharmacy to manage the extra volume (n = 1)
Put initiative on hold (n = 3)	Put more pressure on senior leadership to put some initiatives/projects on hold (n = 1) Try to lessen the amount of other large changes taking place in the midst of the pandemic (n = 1) "I would ensure that the corporate message of 'stop doing certain things' did not mean all non-COVID work was to stop" (n = 1)
Clinical care (n = 2)	Better engagement of internal medicine to align treatment of critically ill (n = 2)

Conclusion

Hospital pharmacy departments were not prepared to face the extent of the work required to manage the pandemic response. All aspects of pharmacy operations were affected. Many of the lessons learned need to be integrated into future pandemic planning.

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I - Small Hospital Survey

Kyle MacNair

For the first time in its history, the CSHP Hospital Pharmacy in Canada Survey has delved into small hospital pharmacy practice. This expansion in scope was accomplished by including, with the main survey, an additional survey for small hospitals, defined as those with fewer than 50 acute care beds. The Small Hospital Survey (SHS) was released to participants concurrently with the 2020/21 CSHP Hospital Pharmacy in Canada Large Hospital Survey (LHS), which targeted facilities with 50 or more acute care beds.

Bed-size limits for potential respondents to the survey have changed over time. In the initial iterations of the survey, conducted in the 1980s, there were no limits on hospital participation. In the 1990s, limits were established whereby facilities submitting survey responses had to have a minimum total of 100 beds, with at least 50 of those being acute care beds. This criterion for survey participation continued up to, and including, the 2005/06 survey. For the 2007/08 survey, the requirement for a total of 100 beds was dropped, but the minimum of at least 50 acute care beds was maintained.

There are several reasons why a minimum threshold based on bed numbers has been maintained for the past three decades of surveys. The Canadian Institute for Health Information (CIHI) reported that Canada had 591 hospitals in 2017/18.[1] Of these, 354 had fewer than 50 staffed acute care beds. Cumulatively, these small hospitals account for fewer than 7,000 acute care beds. Comparatively, the seven largest hospitals in Canada account for more than 7,000 acute care beds. With the data in the survey reported mostly by respondent, not pro-rated by bed count, responses from the large number of small hospitals would have a disproportionate impact on the survey results.

Also, with the LHS restricted to facilities with at least 50 acute care beds for several cycles, the number of potential respondents has remained relatively stable. In the 2001/02 Hospital Pharmacy in Canada Survey, 217 hospitals received surveys; and 15 years later, in the 2016/17 survey, the number of survey recipients had grown by only 5, to 223. This consistency in number of potential respondents has allowed the same or similar questions to be asked in each cycle, which helps in identifying trends in hospital pharmacy practice. Adding more than double the number of respondents (by opening survey participation to small hospitals) would prevent continuation of the longitudinal trending that has been established over many years.

At the same time, however, there is a need to understand pharmacy services in all hospital environments, including small hospitals, an understanding that to date has been absent from survey reports. Furthermore, published information on pharmacy practice in Canadian small hospitals is limited. A literature search yielded only one recent publication, a survey of small hospitals in Canada supported by third-party telepharmacy services, published by Newman and others[2] in the *Canadian Journal of Hospital Pharmacy* last year. The survey (n = 24 respondents, 89% response rate) posed a comprehensive series of questions about clinical services, drug distribution practices and staffing.[2] The following are some notable results from that survey:

- Nearly three-quarters (71%, 17/24) of respondents indicated that at least 0.2 full-time equivalent (FTE) pharmacist was assigned to an inpatient clinical program.
- Although centralized and decentralized unit-dose distribution was used in a majority of sites, total wardstock was used by 33% (8/24) of respondents and traditional distribution by 13% (3/24).
- The median budgeted FTE for pharmacists was 0.6 (interquartile range 0.4-1.0), which translated to a median FTE per patient day of 0.1 (interquartile range 0.1-0.2).

Among the authors' conclusions was the following: "Creation of a survey unique to small hospitals, whether or not they use telepharmacy services, could provide a valuable resource to assist in the benchmarking, planning, and enhancement of pharmacy services in remote and rural communities."[2]

More small hospital data are available from facilities in the United States (US). Crawford and others, in a study conducted in Illinois and published in 2013, compared "critical access hospitals" (CAHs), which are small (≤25 acute care beds) and remote, with all other hospitals in the state, concluding that "there were more similarities than differences between CAHs and non-CAHs."[3] Where differences were seen, they occurred in some of the drug distribution technologies, such as the use of automated dispensing cabinets (ADCs), and in sterile compounding capacity.[3] Pharmacy clinical services, such as drug monitoring and medication reconciliation, and patient care services, such as patient counselling and adverse drug reaction monitoring, were similar between the CAHs and non-CAHs.[3]

Similar to these findings, Casey and others reported the results of a telephone survey of a random sample of rural community hospitals with no more than 100 staffed beds obtained from the American Hospital Association Survey database (n = 387 respondents, 94.6% response rate), 75.2% of which had fewer than 50 beds.[4] The study, conducted in 2005, found relatively low rates of technology application, including only 45% of respondents employing a pharmacy informatics system, 2.8% employing bedside barcoded medication administration and 55% employing unit-dose distribution.[4] With regard to clinical pharmacy practice, the survey asked about basic pharmacist activities, such as pharmacist review of all orders before dispensing; only 20% of responding hospitals reported this activity.[4]

More recent studies of small hospitals in the US have shown progression in small hospital practice in terms of both practice and technology. In a 2021 survey of rural North Carolina hospitals (n = 17 respondents, 32.6% response rate), the median number of full-time pharmacists employed was 5 (interquartile range 4-7.6), and 35.2% of the facilities had pharmacists in decentralized roles.[5] The types of clinical activities included medication reconciliation, antimicrobial stewardship, conversion from intravenous to oral therapy, anticoagulation monitoring, pharmacokinetic dosing of antimicrobials, and rounding.[5]

Further information about small hospital practice in the US is provided by the American Society of Health-System Pharmacists (ASHP) national survey series, which includes data breakdown for hospitals with fewer than 50 beds.[6,7,8] The ASHP national surveys explore a wide range of hospital-based pharmacy practices and technologies, with each annual survey focusing on one of six topics (by rotation): prescribing, transcribing, dispensing, administration, monitoring and patient education. The sample frame of the most recent surveys was between 4,865 and 4,897 hospitals, with response rates between 10% and 20%.[6,7,8]

With regard to clinical pharmacy practice, the 2018 survey found differences between hospitals with fewer than 50 beds and all hospitals in terms of antimicrobial stewardship activities (33.1% vs. 48.2%), but similarities in strategies aimed at influencing prescribing, such as therapeutic interchange (87.5% vs. 92%) and utilization of clinical practice guidelines (84.7% vs. 91.1%), as well as similar rates of anticoagulation management for inpatients.[8]

In the 2020 ASHP national survey, the predominant method of drug distribution was the combination of decentralized automated distribution (e.g., through ADCs) with centralized manual unit-dose distribution, reported by 98.1% of respondents with fewer than 50 staffed beds, similar to the 94.6% reported by all hospitals.[6] However, the use of barcode reading and robotic applications was lower in facilities with fewer than 50 staffed beds compared with all hospital respondents.[6]

Outside of North America, data on clinical services in rural/remote Australian and New Zealand hospitals is limited to a single publication that cites patient counselling, therapeutic drug monitoring, clinical review and discharge facilitation as services provided by sessional hospital pharmacists; however, that study did not include comparisons between small hospitals and other hospital groupings.[9]

Overall, then, this review of evidence pertaining to small hospital pharmacy practice found predominantly individual studies providing insights based on a small number of sites or a limited geographic area, but information on a broader spectrum of facilities is limited. The US has the largest body of information, derived mainly from the ASHP national surveys, which suggest that pharmacy practice in small hospitals is similar to that of larger hospitals in some respects, but lags in certain clinical activities and technology applications.

Information from other countries and jurisdictions is largely lacking; however, the collective lived experience of members of the CSHP Hospital Pharmacy in Canada Survey Board and the survey data

recently published by Newman and others[2] indicate that Canadian small hospitals have not kept pace with larger hospitals in some areas of pharmacy practice. Hence, there has been broad grassroots advocacy for capturing and describing small hospital practice, promoted by individuals participating in the annual Manitoba/Saskatchewan (MB/SK) CSHP Pharmacy Leadership Conference. It was through this group that the concept of a separate small hospital survey was born.

Initiation of the Small Hospital Survey was driven and supported by a grassroots movement within the CSHP membership.

Development of the SHS involved volunteers from the MB/SK Pharmacy Leadership Conference, the survey board and a broad call-out through CSHP's Small Hospital Pharmacy Specialty Network (PSN). This group was essential in bringing the SHS to fruition on several levels. Initially, the group assisted in drafting the questions specific to the small hospital environment, given that development of the survey required keen attention to factors that are unique to small hospitals. For example, the provision of hospital pharmacy services by retail providers was believed to be more prevalent for small hospitals, so the questions had to be constructed to assess this hypothesis.

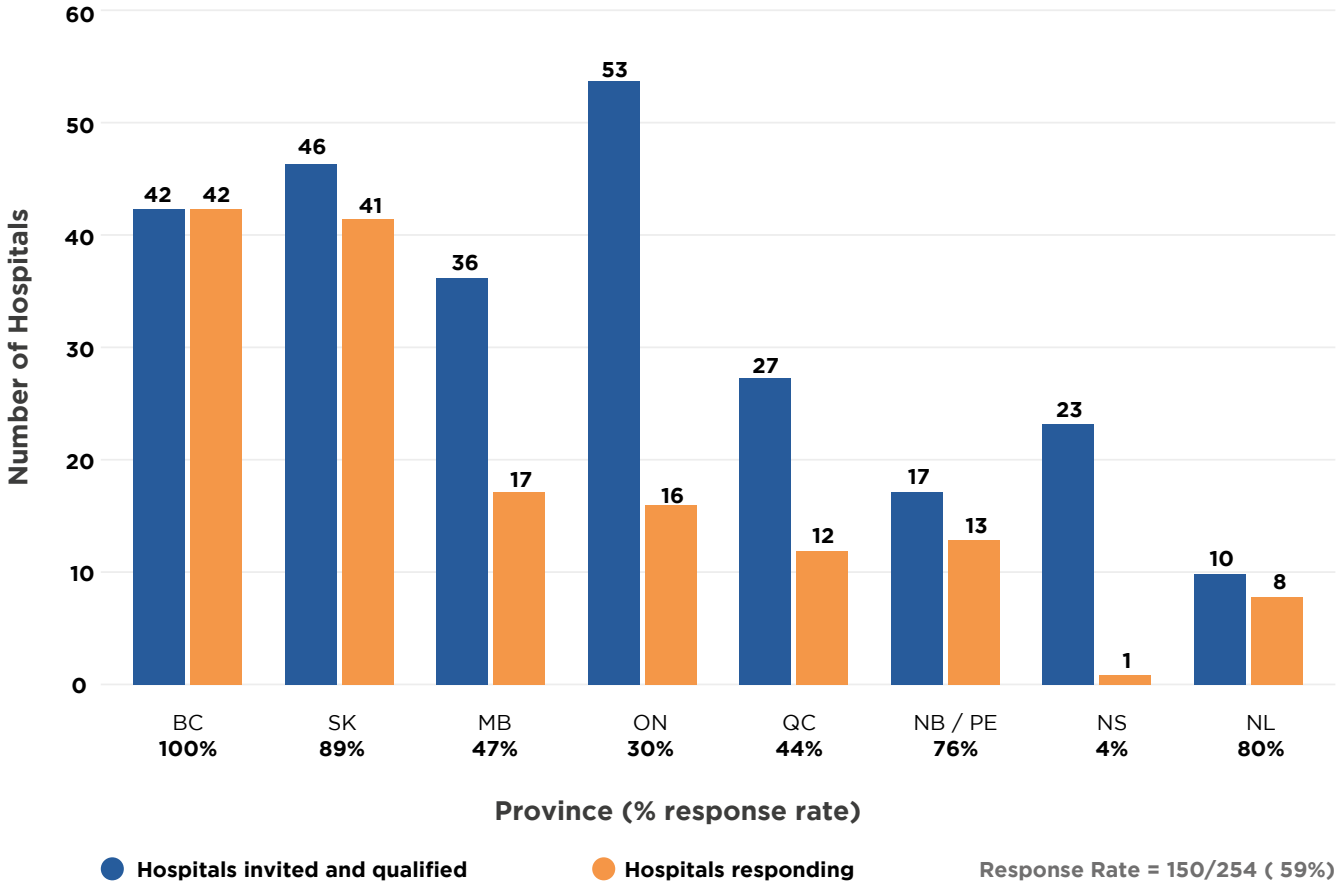
The group was also instrumental in reviewing and validating information from CIHI that was used to create the list of potential survey respondents. The CSHP Hospital Pharmacy in Canada Survey Board was also instrumental in reviewing the CIHI data to determine eligible facilities. Finally, the SHS development group assisted in populating the survey respondent list, which was a challenge because of the absence of a pre-existing list and the large number of small hospitals in Canada.

As previously noted, CIHI reported that as of 2017/18, Canada had 591 hospitals and of these, 354 had fewer than 50 staffed acute care beds, making them potentially eligible for the SHS.[1] The 58 small hospitals in Alberta were eliminated for reasons explained in the next section. Further work by survey board members and volunteers validated the remaining list of potential respondents, which resulted in removal of a further 42 facilities, because although they were designated by CIHI as acute care facilities, they were functioning operationally as long-term care or rehabilitation facilities. The final list of potential survey respondents consisted of 254 facilities, to which the 12-question SHS, developed and released alongside the LHS, was sent. The data collected, as well as the learnings that have come from this initial survey, will serve as a baseline for subsequent surveys.

Demographics

The response rate for the 2020/21 SHS was 59% (150/254) (Figure I-1). The province of Alberta's single health authority (including 58 small hospitals) was unable to participate in the 2020/21 survey because the provincial implementation of a standardized clinical information system might have produced unreliable data. Therefore, data from the Prairie region are limited to MB and SK. For trending purposes over the long term, regional data for British Columbia and Yukon are presented in the tables as "BC/YT" although no data were received from Yukon for the SHS.

Figure I-1. Small Hospital Survey Response, by Province, 2020/21



The average number of acute care beds (per SHS respondent) was 21, and the average number of non-acute care beds, among facilities that had this type of bed, was 44. The majority (94 of 150 respondents) reported having no non-acute care beds (Table I-1). The total number of beds accounted for by the small hospitals responding to the survey was 5,605, of which 3,120 were acute care beds and 2,485 were non-acute care beds. The average occupancy rate for acute care beds was 58%, which is substantively lower than the acute care bed occupancy rate reported in the LHS (81%; see Chapter A – Demographics).
There were some notable regional differences:

- Of all regions, the Prairies (MB/SK) had the largest number of acute care beds (n = 1,052), which was largely due to the high number of respondents from this region (n = 58).
- Québec (QC), despite having a relatively modest response rate (44%, 12/27), had substantially more non-acute care beds (n = 1,472), more than triple any other jurisdiction.

Table I-1. Small Hospital Demographic Data – Acute Care and Non-acute Care Beds, 2020/21

		All	Region				
			BC/YT	Prai	ON	QC	Atl
Acute Care Beds	**(n=)**	(150)	(42)	(58)	(16)	(12)	(22)
Total Beds - acute care		3,120	725	1,052	429	394	520
Average Beds - acute care		**21**	**17**	**18**	**27**	**33**	**24**
Base: All respondents, n = 150							
Non-acute Care Beds	**(n=)**	(56)	(13)	(13)	(9)	(11)	(10)
Total Beds - non-acute care		2,485	370	105	160	1,472	378
Average Beds - non-acute care		**44**	**28**	**8**	**18**	**134**	**38**
Base: All respondents with > 0 non-acute care beds, n = 56							
Occupancy Rate (acute care beds)	**(n=)**	(148)	(42)	(57)	(15)	(12)	(22)
		58%	**59%**	**47%**	**67%**	**66%**	**76%**
Base: All respondents who provided patient days, n = 148							
Occupancy Rate (non-acute care beds)	**(n=)**	(26)	(4)	(2)	(4)	(11)	(5)
		75%	**72%**	**19%**	**78%**	**80%**	**84%**
Base: All respondents with > 20 non-acute care beds, n = 26							

Pharmacy Service Models and Drug Distribution Systems

The model of pharmacy service delivery in small hospitals can vary. With a small number of beds and lower occupancy rates, an on-site pharmacy service, which is standard practice in large hospitals, may not be practical. Alternatively, combinations of service provision may be utilized. In discussions with experts in the field, four types of provider models were identified as most commonly in use: on-site hospital pharmacy, off-site hospital pharmacy, off-site community pharmacy and remote telepharmacy (Table I-2). Given the possibility that at least some respondents were using combinations of services, respondents were asked to indicate all options that applied for services in their facility.

- Almost two-thirds (63%, 95/150) of respondents reported that their pharmacy services were provided by an on-site hospital pharmacy.
- Half (52%, 78/150) of respondents reported that an off-site hospital pharmacy provider was involved.
- Only 11% (17/150) reported the use of a remote telepharmacy service, the majority of which (n = 12) were in Ontario (ON).
- There was more limited use of retail pharmacy providers than expected (7%; 11/150), over half of which (n = 6) were from the Prairies (MB/SK).

US facilities in remote settings have explored an alternative staffing model involving technology. In response to staffing challenges, midwestern and northwestern US states have reported on telepharmacy provided by pharmacists from hub hospitals.[10,11,12] The primary activities reported were 24-hour medication order review by a pharmacist using clinical adjudication software and transmission of prescribing recommendations back to the remote hospitals. Pickette and others described interventions relating to therapeutic duplications, allergy clarification and various other interventions classified as

"general", as well as renal dosing adjustments.[11] In terms of remote telepharmacy services in Canada, the concentration of their use in ON was also noted by Newman and others, who reported that 22 of the 27 facilities eligible for the survey were from that province.[2]

Nearly two-thirds (63%) of respondents reported that pharmacy services were provided by an on-site hospital pharmacy.

Table I-2. Small Hospital Pharmacy Service Models, 2020/21

How are pharmacy services provided in your facility? (Multiple options allowed)	All	Region				
		BC/YT	Prai	ON	QC	Atl
(n=)	(150)	(42)	(58)	(16)	(12)	(22)
Services are provided by an on-site hospital pharmacy	95 63%	24 57%	28 48%	13 81%	10 83%	20 91%
Services are provided by an off-site hospital pharmacy provider	78 52%	25 60%	30 52%	4 25%	7 58%	12 55%
Services are provided by an off-site community pharmacy provider	11 7%	0 0%	6 10%	3 19%	1 8%	1 5%
Services are provided by a remote telepharmacy service	17 11%	0 0%	2 3%	12 75%	1 8%	2 9%
Base: All respondents, n = 150						

Assessing the drug distribution system in the LHS involves first assessing the system or systems used within each facility and then further ascertaining the percentage of acute and non-acute care beds serviced by the various systems, assuming that multiple systems may be employed. For the SHS, it was assumed that a single system was likely to be employed; as such, respondents were asked to identify a single system.

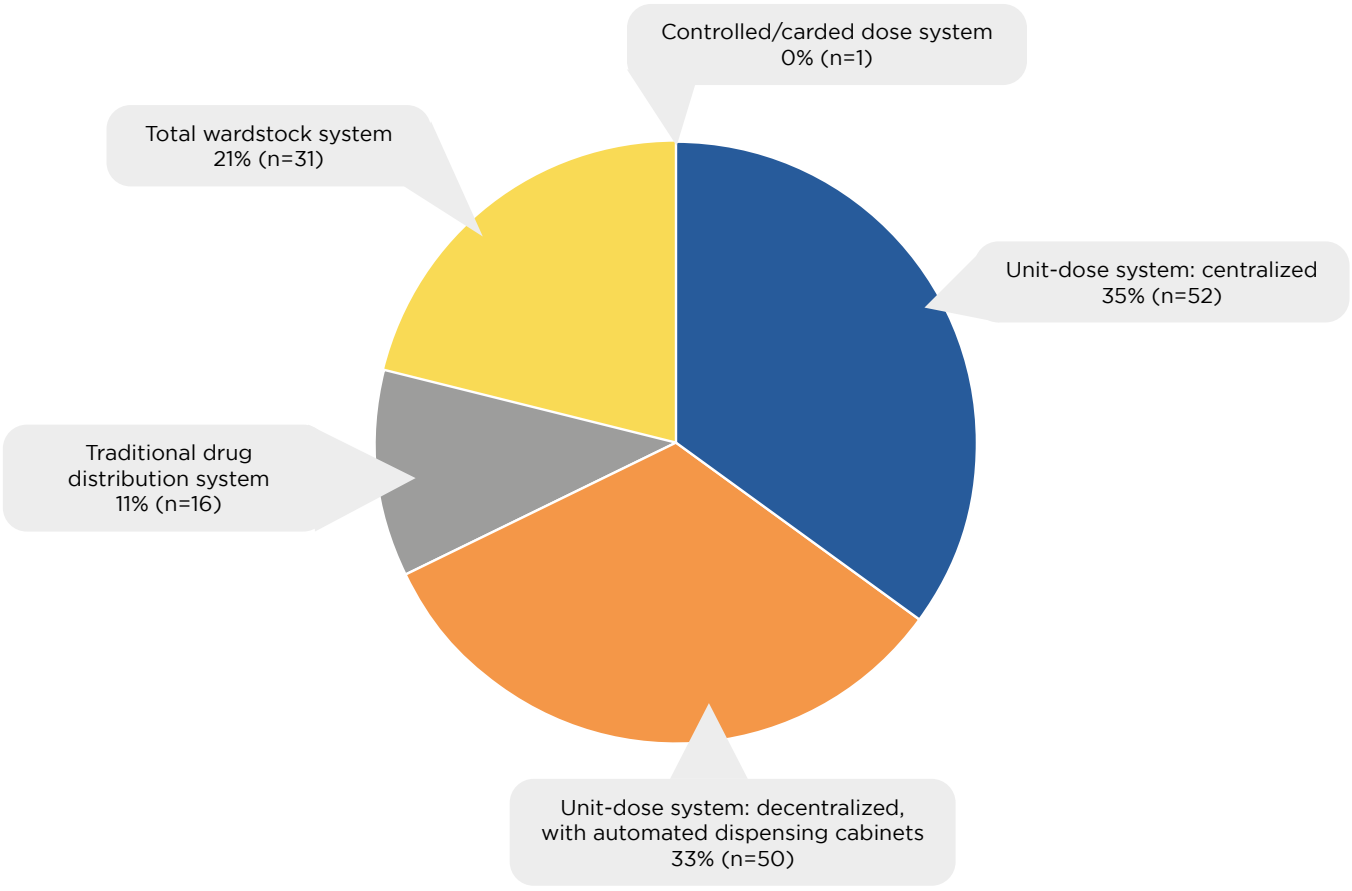
- The drug distribution system used for acute care beds was evenly distributed among unit-dose centralized (35%, 52/150), unit-dose decentralized (33%, 50/150), and a combination of traditional drug distribution and total wardstock systems (31%, 47/150) (Figure I-2).
- For non-acute care beds, a unit-dose centralized system was more commonly employed (46%, 26/56), but traditional and total wardstock systems remained prominent, with a combined total of 27% (15/56) (Figure I-3).

Almost one-third of respondents reported the use of traditional or total wardstock systems as the main method of drug distribution.

The high rate of traditional and total wardstock distribution in small hospitals is concerning, as these systems have been known, since the 1970s, to be inferior to unit-dose systems from the point of view of both medication errors and drug security.[13] The substantial use of non–unit-dose methods of drug distribution is also contrary to the standards of Accreditation Canada, which has made dispensing of medications in unit-dose packaging one of its "high priority" criteria in the evaluation of a hospital's medication management practices.[14] As stated within the standards, "Patient safety is enhanced when medications are dispensed in the most ready-to-administer form".[14] The use in small hospitals of traditional and total wardstock distribution systems contrasts with data from the LHS, which showed that these systems were used to support care for only 5.2% of acute care beds and 5.0% of non-acute care beds (for more details, see Chapter C – Drug Distribution Systems).

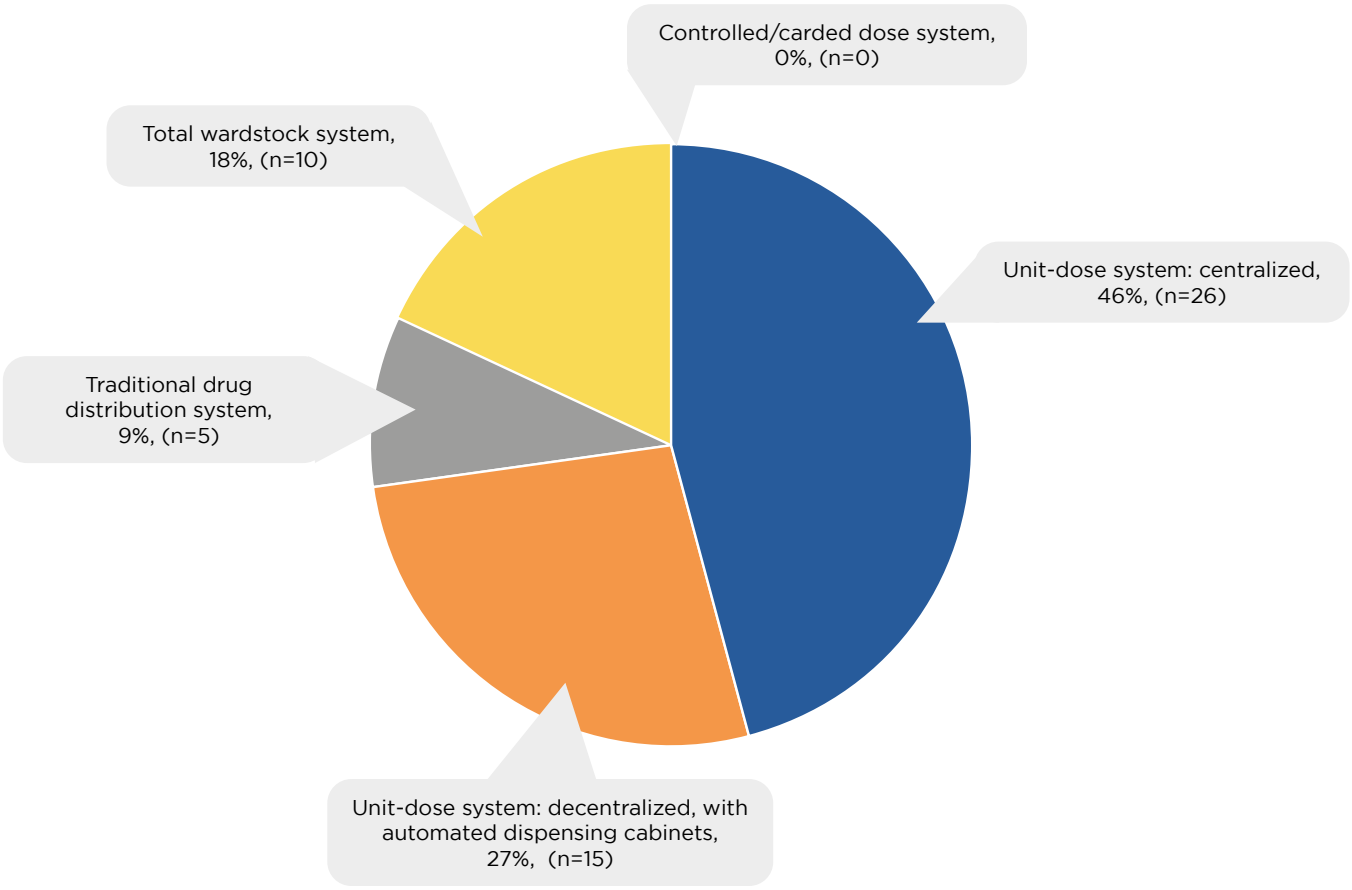
In the US, drug distribution through either decentralized automated systems (ADCs) or centralized systems (unit-dose or robotic) was complete, as reported in the ASHP 2020 national survey; even for hospitals with fewer than 50 acute care beds, these systems accounted for 100% of drug distribution systems.[6]

Figure I-2. Small Hospital Drug Distribution Systems, Acute Care Beds, 2020/21



Base: All respondents, n = 150

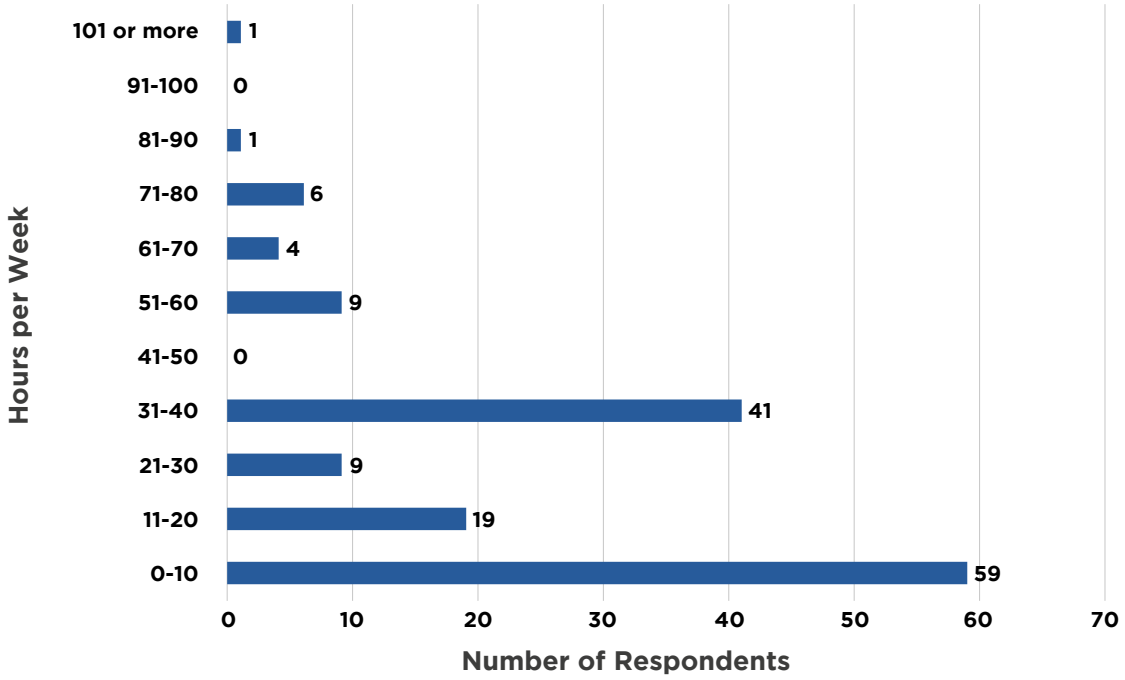
Figure I-3. Small Hospital Drug Distribution Systems, Non-acute Care Beds, 2020/21



Base: All respondents with > 0 non-acute care beds, n = 56

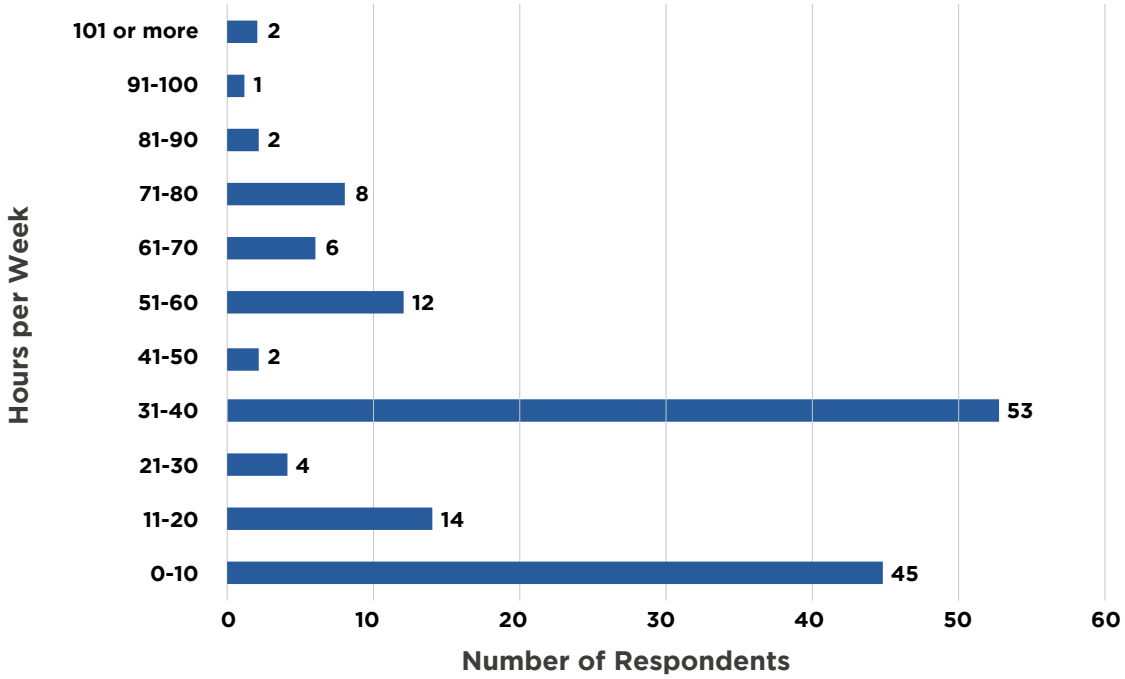
In terms of on-site hours of service for both pharmacists (Figure I-4) and regulated pharmacy technicians and non-regulated pharmacy assistants (Figure I-5), there was a bimodal distribution, with peaks at 0-10 hours (one day per week) and 31-40 hours (five days per week).

Figure I-4. Small Hospital On-Site Hours of Service, Pharmacists, 2020/21



Base: All respondents providing on-site hours of service, n = 149

Figure I-5. Small Hospital On-Site Hours of Service, Regulated Pharmacy Technicians and/or Non-regulated Pharmacy Assistants, 2020/21



Base: All respondents providing on-site hours of service, n = 149

With the increase in regulatory oversight and requirements that resulted from publication of the model standards for pharmacy compounding of hazardous and non-hazardous sterile preparations by the National Association of Pharmacy Regulatory Authorities,[15,16] small hospitals will be especially challenged in maintaining programs with a smaller staffing footprint and volume of activity. As such, the SHS sought to establish a baseline for the number of sterile compounding programs operating in small hospitals.

- About one-third of SHS respondents reported having on-site non-hazardous (34%, 51/150) and hazardous (33%, 50/150) sterile compounding services (Table I-3 and Table I-4).
- Regional variation was noted, with the Prairies (MB/SK) having substantially fewer of both.

Table I-3. Small Hospitals Reporting On-Site Non-hazardous Sterile Compounding Service, 2020/21

	All	Region				
		BC/YT	Prai	ON	QC	Atl
(n=)	(150)	(42)	(58)	(16)	(12)	(22)
Yes	51	19	10	8	7	7
	34%	**45%**	**17%**	**50%**	**58%**	**32%**
No	99	23	48	8	5	15
	66%	55%	83%	50%	42%	68%
Base: All respondents, n = 150						

Table I-4. Small Hospitals Reporting On-Site Hazardous Sterile Compounding Service, 2020/21

	All	Region				
		BC/YT	Prai	ON	QC	Atl
(n=)	(150)	(42)	(58)	(16)	(12)	(22)
Yes	50	15	12	6	7	10
	33%	**36%**	**21%**	**38%**	**58%**	**45%**
No	100	27	46	10	5	12
	67%	64%	79%	63%	42%	55%
Base: All respondents, n = 150						

The use of technologies by SHS respondents (Table I-5) was similar to that of the large hospitals.

- The rate of smart pump implementation by small hospitals was high (80%, 119/149), similar to the rate in the LHS (93%, 130/140). The only notable regional variation was lower use among small hospital respondents from QC (42%, 5/12).
- Rates of barcoding use were generally low for both drug preparation and drug dispensing (22% [33/149] and 17% [26/149], respectively). However, there was substantial regional variation, with higher rates in QC and ON and lower rates in the Prairies (MB/SK) and BC/YT.
- Use of barcoding during medication administration to patients was very low (5%, 8/149), which parallels the low rate among LHS respondents (18%; 25/140) for use of barcoding to verify drug selection before administration to a patient in all or part of the facility.

Table I-5. Small Hospital Use of Technologies, 2020/21

Does your facility employ the use of ...		All	Region				
			BC/YT	Prai	ON	QC	Atl
	(n=)	(149)	(41)	(58)	(16)	(12)	(22)
Smart pumps	**Yes**	119	36	51	11	5	16
		80%	**88%**	**88%**	**69%**	**42%**	**73%**
	No	30	5	7	5	7	6
		20%	12%	12%	31%	58%	27%
Barcoding during drug preparation	**Yes**	33	6	2	8	12	5
		22%	**15%**	**3%**	**50%**	**100%**	**23%**
	No	116	35	56	8	0	17
		78%	85%	97%	50%	0%	77%
Barcoding during drug dispensing	**Yes**	26	2	1	9	9	5
		17%	**5%**	**2%**	**56%**	**75%**	**23%**
	No	123	39	57	7	3	17
		83%	95%	98%	44%	25%	77%
Barcoding during medication administration to patients	**Yes**	8	2	1	4	0	1
		5%	**5%**	**2%**	**25%**	**0%**	**5%**
	No	141	39	57	12	12	21
		95%	95%	98%	75%	100%	95%
Operational computerized provider order entry (CPOE) system	**Yes**	17	2	2	6	2	5
		11%	**5%**	**3%**	**38%**	**17%**	**23%**
	No	132	39	56	10	10	17
		89%	95%	97%	63%	83%	77%

Base: All respondents providing information on the use of technologies, n = 149

Small hospital respondents reported high rates of smart pump use (80%, 119/149).

Human Resources

We knew that the assessment of human resource activities in small hospitals would be challenging. In large hospitals, it is relatively straightforward to calculate metrics such as budgeted or paid hours per patient day because all of these hospitals have on-site pharmacy services. The picture is not as clear for small hospitals. Table I-2 shows that 37% (55/150) of respondents had no on-site hospital pharmacy service, and several respondents reported more than one method of pharmacy service provision. Furthermore, a small number of facilities used a contract retail pharmacy service. This variation in models ultimately made it difficult for respondents to ascribe exact budgeted FTEs, and this difficulty is reflected in the results reported here.

Table I-6. Small Hospital Budgeted Full-Time Equivalent (FTE) Positions, 2020/21

Staff position		All	Region				
			BC/YT	Prai	ON	QC	Atl
Pharmacist	(n=)	(95)	(29)	(28)	(11)	(11)	(16)
	Average	**1.5**	**1.2**	**1.0**	**1.7**	**3.1**	**1.9**
	SD	1.3	1.0	0.7	1.6	1.3	1.3
	Median	**1.0**	**1.0**	**0.7**	**1.0**	**3.0**	**1.7**
	Range	0.1-6.0	0.1-4.2	0.2-2.8	0.8-6.0	0.4-4.8	0.5-4.0
Pharmacist manager	(n=)	(53)	(25)	(7)	(9)	(3)	(9)
	Average	**0.5**	**0.3**	**0.8**	**0.8**	**0.8**	**0.5**
	SD	0.4	0.4	0.3	0.3	0.2	0.4
	Median	**0.4**	**0.2**	**1.0**	**1.0**	**0.8**	**0.5**
	Range	0.03-1.3	0.03-1.3	0.2-1.0	0.2-1.0	0.6-1.0	0.05-1.0
Pharmacy technician manager	(n=)	(14)	(10)	(0)	(4)	(0)	(0)
	Average	**0.7**	**0.6**		**0.8**		
	SD	0.5	0.5		0.4		
	Median	**1.0**	**0.9**		**1.0**		
	Range	0.01-1.1	0.01-1.1		0.2-1.0		
Non-regulated pharmacy assistant manager	(n=)	(1)	(0)	(0)	(0)	(1)	(0)
	Average	**0.2**				**0.2**	
	SD						
	Median	**0.2**				**0.2**	
	Range						

Table I-6 (continued). Small Hospital Budgeted Full-Time Equivalent (FTE) Positions, 2020/21

Staff position		All	Region				
			BC/YT	Prai	ON	QC	Atl
Regulated pharmacy technician	(n=)	(76)	(31)	(15)	(11)	(1)	(18)
	Average	**2.3**	**2.2**	**1.3**	**4.2**	**7.6**	**2.0**
	SD	2.3	1.8	0.5	4.3		1.4
	Median	**1.6**	**1.0**	**1.0**	**3.0**	**7.6**	**1.7**
	Range	0.1-16.0	0.1-6.4	0.2-2.0	0.5-16.0		0.3-5.0
Non-regulated pharmacy assistant	(n=)	(41)	(5)	(18)	(1)	(11)	(6)
	Average	**2.0**	**1.2**	**0.8**	**1.0**	**4.7**	**1.2**
	SD	2.1	0.8	0.7		2.0	0.6
	Median	**1.0**	**1.1**	**0.6**	**1.0**	**5.4**	**1.1**
	Range	0.2-6.7	0.2-2.3	0.2-2.8		0.6-6.7	0.4-2.3

Base: All respondents providing staffing information, n = 95

Across all reported staff positions, a very large range of values was reported (Table I-6). Although in all likelihood there is substantial variability in staffing among small hospitals, there is also a good possibility that the influence of non-acute care bed services in some facilities, and possible over-ascribing of staff from off-site hospital pharmacy providers, may have contributed to these large variations. A comparison of data from this survey with those reported by Newman and others[2] shows some differences and some similarities. For example, the median budgeted FTE for staff pharmacists was double that reported by Newman and others[2] (1.0 vs. 0.5). However; the median budgeted FTE for (regulated) pharmacy technicians, at 1.6 FTE, and pharmacist managers, at 0.4 FTE, were similar to those reported by Newman and others[2] (1.5 FTE and 0.3 FTE, respectively).

Clinical Pharmacy Services

As in the LHS, respondents to the 2020/21 SHS were asked whether their facilities had any formal inpatient or outpatient patient care programs to which a pharmacist was assigned (minimum of 0.2 FTE pharmacist), and also whether their pharmacy program collected data on clinical pharmacy key performance indicators (cpKPIs). The LHS also asked respondents to specify the types of formal patient care programs to which pharmacists were assigned and the types of cpKPI data collected, but the SHS did not include these more in-depth inquiries. The assumption was that small bed numbers and limited outpatient activity in smaller hospitals would result in more limited patient care programs, and the data supported this assumption.

- Unlike the LHS, in which 95% (137/144) of respondents had formal inpatient patient care programs, only 18% (26/148) of small hospital respondents reported the presence of one or more formal inpatient patient care programs (Table I-7). Similarly, only 15% (22/148) reported the presence of one or more formal outpatient patient care programs.
- cpKPI data collection was reported by just over one-third of small hospital respondents (37%, 55/150) (Table I-8). A notable regional outlier was QC, where none of the respondents reported cpKPI data collection.

The volume of activity within a small hospital may make it difficult to formalize a patient care program; however, that does not mean that small hospitals are not a clinically rich environment for pharmacists. For example, Thornton and Cowan described the expansion of pharmacy student rotation experiences to small and rural hospitals as valuable because such rotations offered the opportunity to work with a variety of services and service providers, given the integrated nature of services required at small facilities.[17] Future surveys will seek to ascertain more information about the services that are provided, as a potentially better indication of clinical pharmacy services.

Table I-7. Small Hospitals with Formal Inpatient and Outpatient Patient Care Programs with a Pharmacist Assigned, 2020/21

	All	Region				
		BC/YT	Prai	ON	QC	Atl
(n=)	(148)	(41)	(58)	(16)	(12)	(21)
Inpatient programs	26	6	8	5	5	2
	18%	**15%**	**14%**	**31%**	**42%**	**10%**
Outpatient programs	22	5	5	0	9	3
	15%	**12%**	**9%**	**0%**	**75%**	**14%**

Base: All respondents providing information on formal inpatient or outpatient patient care programs with a pharmacist assigned (minimum 0.2 full-time equivalent), n = 148

Table I-8. Small Hospitals Collecting Data for Clinical Pharmacy Key Performance Indicators, 2020/21

	All	Region				
		BC/YT	Prai	ON	QC	Atl
(n=)	(150)	(42)	(58)	(16)	(12)	(22)
Yes	55	26	15	9	0	5
	37%	**62%**	**26%**	**56%**	**0%**	**23%**
No	95	16	43	7	12	17
	63%	**38%**	**74%**	**44%**	**100%**	**77%**

Base: All respondents, n = 150

Conclusion

This chapter closes our first survey of small hospital pharmacy practice in Canada. We now have an opportunity to reflect on successes, areas where improvement is needed and the direction we take from here. In terms of successes, we can consider the response rate of almost 60% excellent, given that this group of survey respondents is new to the CSHP Hospital Pharmacy in Canada Survey and given that the survey took place while the effects of the COVID-19 pandemic were still being felt.

The SHS has provided valuable insights into many areas of small hospital pharmacy practice that need improvement, including the continuing use of non-optimal drug distribution systems and the low rates of formal inpatient patient care programs. In terms of improvements needed for future iterations of the SHS, we must re-examine how to collect data on staffing of small hospital pharmacy practice. Our hope was to create human resource metrics similar to those provided in the LHS, such as staffing hours per patient day; however, the large variation in budgeted FTEs coupled with the large variety in patient day counts created results that were so widely variable that they could not be reasonably interpreted as accurate. The next iteration of the SHS will attempt to more accurately measure pharmacy staffing levels, as well as clinical pharmacy activities that are taking place but are not well assessed, through application of the assessment tools used in the LHS.

We would like to thank everyone who advocated for the development of the SHS and supported the survey board in all aspects of its development, release and response.

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Appendix I - List of Tables and Figures

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Chapter I – Small Hospital Survey

Appendices

Appendix II - **Recognition List**

We wish to recognize all of the healthcare facilities in the list below for their willingness to contribute to the success of the 2020/21 Hospital Pharmacy in Canada Survey Report. Respondents from hospitals that appear in this list participated, or attempted to participate, in the survey by submitting data from their respective facility on or before September 26, 2021. A special thank you to the 150 respondents from facilities with less than 50 acute care beds that responded to our inaugural Small Hospital Survey. Please note that some data from some respondents were not included in the analysis if the data provided were incomplete, insufficient or inconsistent with answers given to previous questions.

Hospitals with less than 50 acute care beds

- 100 Mile District General Hospital, 100 Mile, BC
- All Nations' Healling Hospital, Canora, SK
- Altona Community Memorial, Altona, MB
- Anson General Hospital, Iroquois Falls, ON
- Arborg and Districts Health Centre, Arborg, MB
- Arcola Health Centre, Arcola, SK
- Arnprior & District Memorial Hospital, Arnprior, ON
- Arrow Lakes Hospital, Naksup, BC
- Assiniboia Union Hospital, Assiniboia, SK
- Beausejour District Hospital, Beausejour, MB
- Bella Coola General Hospital, Bella Coola, BC
- Biggar Hospital, Biggar, SK
- Bingham Memorial Hospital, Matheson, ON
- Boundary Hospital, Grand Forks, BC
- Broadview Union Hospital, Broadview, SK
- Bulkley Valley District Hospital, Smithers, BC
- Burin Peninsula Health Care Centre, Burin, NL
- Canora Hospital, Canora, SK
- Cariboo Memorial Hospital, Williams Lake, BC
- Carman Memorial Hospital, Carman, MB
- Charles S. Curtis Memorial Hospital, St. Anthony, NL
- Charlotte County Hospital, Saint Stephen, NB
- Chetwynd Hospital and Health Centre, Chetwynd, BC
- CISSS de la Gaspésie - Hôpital de Sainte-Anne-des-Monts, Sainte-Anne-des-Monts, QC
- CISSS de la Montérégie-Ouest - Hôpital du Barrie Memorial, Ormstown, QC
- CISSS des Iles - Hôpital de l'Archipel, Cap-aux-meules, QC
- CISSS des Laurentides - Centre de services de Rivière-Rouge, Rivière-Rouge, QC
- CISSS des Laurentides - Centre multiservices de santé et services sociaux d'Argenteuil, Lachute, QC
- CISSS du Bas Saint-Laurent - Hôpital Notre-Dame-Du-Lac, Témiscouata, QC
- CISSS du Bas-Saint-Laurent - Hôpital d'Amqui, Amqui, QC
- CISSS du Bas-Saint-Laurent - Hôpital de Matane, Matane, QC
- CISSS du Bas-Saint-Laurent - Hôpital Notre-Dame-de-Fatima, La Pocatière, QC
- CISSSS Estrie-CHUS - CSSS de Memphrémagog, Magog, QC
- CIUSSS de la Mauricie-et-du-Centre-du-Québec - Hôpital de La Tuque, La Tuque, QC
- Cormorant Island Community Health Centre, Alert Bay, BC
- Creston Valley Hospital, Creston, BC
- Davidson Health Centre, Davidson, SK
- Dawson Creek and District Hospital, Dawson Creek, BC
- Dr. Charles Legrow Health Centre, Port aux Basques, NL
- Dr. G. B. Cross Memorial Hospital, Clarenville, NL
- Dr. Helmcken Memorial Hospital, Clearwater, BC
- E. M. Crowe Memorial Hospital, Eriksdale, MB
- Elk Valley Hospital, Fernie, BC
- Emmanuel Care - St. Anthony's Hospital, Esterhazy, SK
- Emmanuel Care - St. Joseph's Hospital [Estevan], Estevan, SK
- Emmanuel Care - St. Joseph's Hospital/Foyer d'Youville, Gravelbourg, SK
- Emmanuel Care - St. Peter's Hospital [Melville], Melville, SK
- Enfant-Jésus RHSJ † Hospital, Caraquet, NB
- Erie Shores Healthcare, Leamington, ON
- Flin Flon General Hospital, Flin Flon, MB
- Fort Nelson General Hospital, Fort Nelson, BC
- Fort St. John Hospital and Health Centre, Fort St John, BC
- G. R. Baker Memorial Hospital, Quesnel, BC
- Gimli Community Health Centre, Gimli, MB
- Golden and District General Hospital, Golden, BC
- Grand Falls General Hospital, Grand Falls, NB
- Grandview District Hospital, Grandview, MB
- Groves Memorial Community Hospital, Fergus, ON
- Haida Gwaii Hospital and Health Centre, Queen Charlotte, BC
- Halton Healthcare - Georgetown Hospital, Georgetown, ON
- Herbert and District Integrated Health Facility, Herbert, SK
- Hôpital de Smooth Rock Falls Hospital, Smooth Rock Falls, ON
- Hôpital Glengarry Memorial, Alexandria, ON
- Hôpital Kateri Memorial Hospital, Kanawhake, QC
- Hôpital Notre-Dame, Hearst, ON
- Hôpital Sainte Anne Hospital, Ste-Anne, MB
- Hornepayne Community Hospital, Hornepayne, ON
- Hôtel-Dieu Saint-Joseph de Saint-Quentin, Saint-Quentin, NB
- Hudson Bay Health Care Facility, Hudson Bay, SK
- Humboldt District Hospital, Humboldt, SK
- Huron Perth Healthcare Alliance - Alexandra Marine and General Hospital, Goderich, ON
- Indian Head Hospital, Indian Head, SK
- Invermere and District Hospital, Invermere, BC
- Janeway Children's Health and Rehabilitation Centre, St. John's, NL
- Kamsack Hospital and Nursing Home, Kamsack, SK
- Kelvington Hospital, Kelvington, SK
- Kerrobert Integrated Health Centre, Kerrobert, SK
- Kindersley and District Health Centre, Kindersley, SK
- Kings County Memorial Hospital, Montague, PE
- Kipling Integrated Health Centre, Kipling, SK
- Kitimat Hospital and Health Centre, Kitimat, BC
- Kootenay Lake Hospital, Kootenay, BC
- La Loche Health Centre, La Loche, SK
- La Ronge Health Centre, La Ronge, SK
- Labrador Health Centre, Happy Valley-Goose Bay, NL
- Labrador West Health Centre, Labrador City, NL
- Lady Minto Gulf Islands Hospital, Spring Island, BC
- Lady Minto Hospital, Cochrane, ON
- Lakes District Hospital and Health Centre, Burns Lake, BC
- Lakeshore Health Centre, Ashern, MB
- Lamèque Hospital and Community Health Centre, Lamèque, NB
- Leader Hospital, Leader, SK

Hospitals with less than 50 acute care beds (Continued)

- Lennox and Addington County General Hospital, Napanee, ON
- Lillian Fraser Memorial Hospital, Tatamagouche, NS
- Lillooet Hospital and Health Centre, Lillooet, BC
- Louise Marshall Hospital, Mount Forest, ON
- Mackenzie and District Hospital and Health Centre, Mackenzie, BC
- Maidstone Health Complex, Maidstone, SK
- McBride and District Hospital, McBride, BC
- Melfort Hospital, Melfort, SK
- Mills Memorial Hospital, Terrace, BC
- Morris General Hospital, Morris, MB
- Muskoka Algonquin Healthcare, Huntsville & Bracebridge, ON
- Nicola Valley Health Centre, Merritt, BC
- Nipawin Hospital, Nipawin, SK
- Northwest Health Facility, Meadow Lake, SK
- Notre Dame Hospital, Notre Dame de Lourdes, MB
- Oromocto Public Hospital, Oromocto, NB
- Outlook and District Health Centre, Outlook, SK
- Palmerston and District Hospital, Palmerston, ON
- Parkland Integrated Health Centre, Shellbrook, SK
- Pinawa Hospital, Pinawa, MB
- Pine Falls Health Complex, Pine Falls, MB
- Porcupine Carragana Hospital, Porcupine, SK
- Port Hardy Hospital, Port Hardy, BC
- Port McNeill and District Hospital, Port McNeill, BC
- Powell River General Hospital, Powell River, BC
- Prince Rupert Regional Hospital, Prince Rupert, BC
- Princeton General Hospital, Princeton, BC
- Queen Victoria Hospital, Revelstoke, BC
- R. W. Large Memorial Hospital, Bella Bella, BC
- Redvers Health Centre, Redvers, SK
- Riverside Health Complex, Turtleford, SK
- Rock Lake Health District Hospital, Crystal City, MB
- Rosetown Health Centre, Rosetown, SK
- Rosthern Hospital, Rosthern, SK
- Sackville Memorial Hospital, Sackville, NB
- Sechelt Hospital, Sechelt, BC
- Shaunavon Hospital and Care Centre, Shaunavon, SK
- Shuswap Lake General Hospital, Salmon Arm, BC
- Sir Thomas Roddick Hospital, Stephenville, NL
- Souris Hospital, Souris, PE
- South Okanagan General Hospital, Oliver, BC
- Southeast Integrated Care Centre - Moosomin, Moosomin, SK
- Southwest Integrated Healthcare Facility, Maple Creek, SK
- Squamish General Hospital, Squamish, BC
- St. Joseph's Hospital, Saint John, NB
- St. John Hospital, Fort St. John, BC
- Stella-Maris-de-Kent Hospital, Sainte-Anne-de-Kent, NB
- Stonewall and District Health Centre, Stonewall, MB
- Stuart Lake Hospital, Fort St James, BC
- Sussex Health Centre, Sussex, NB
- The Pas Health Complex, The Pas, MB
- Tisdale Hospital, Tisdale, SK
- Tofino General Hospital, Tofino, BC
- Unity and District Health Centre, Unity, SK
- Western Hospital, Alberton, PE
- Weyburn General Hospital, Weyburn, SK
- Wolseley Memorial Hospital, Wolseley, SK
- Wrinch Memorial Hospital, Hazelton, BC

Hospitals 50 to 200 beds

- Battlefords Union Hospital, North Battleford, SK
- Bethesda Hospital, Steinbach, MB
- Boundary Trails Hospital, Winkler, MB
- Brockville General Hospital, Brockville, ON
- Cambridge Memorial Hospital, Cambridge, ON
- Campbell River General Hospital, Campbell River, BC
- Carbonear General Hospital, Carbonear, NL
- CHEO (Children's Hospital of Eastern Ontario) * (pediatric), Ottawa, ON
- CISSS des Laurentides - Hôpital de Mont-Laurier, Mont-Laurier, QC
- CISSS du Bas-Saint-Laurent - Hôpital de Rivière-du-Loup, Rivière-du-Loup, QC
- CISSS du Bas-Saint-Laurent - Hôpital régional de Rimouski, Rimouski, QC
- Comox Valley Hospital, Courtenay, BC
- Concordia Hospital, Winnipeg, MB
- Cowichan District Hospital, Duncan, BC
- Cypress Regional Hospital, Swift Current, SK
  - Cypress Regional Hospital
  - South West Integrated Facility
  - Leader Integrated Facility
  - Herbert and District Integrated Facility
  - Shaunavon Care Center
- Dartmouth General Hospital, Dartmouth, NS
- Delta Hospital, Delta, BC
- East Kootenay Regional Hospital, Cranbrook, BC
- FH Wigmore Regional Hospital, Moose Jaw, SK
- Halton Health Care - Milton District Hospital, Milton, ON
- Hôpital régional d'Edmundston, Edmundston, NB
- Huron Perth Healthcare Alliance, Stratford, ON
  - Stratford General Hospital
  - Clinton Public Hospital
  - Seaforth Community Hospital
  - St Mary's Memorial Hospital
- Institut de cardiologie de Montréal, Montréal, QC
- Jim Pattison Children's Hospital * (pediatric), Saskatoon, SK
- Lloydminster Hospital, Lloydminster, SK
  - Lloydminster Hospital
  - Dr. Cooke Extended Care Centre
  - Lloydminster Continuing Care Facility
- Miramichi Regional Hospital, Miramichi, NB
- Norfolk General Hospital, Simcoe, ON
- Penticton Regional Hospital (Interior Health Authority), Penticton, BC
- Portage District General Hospital, Moose Jaw, MB
- Prince Albert Victoria Hospital, Prince Albert, SK
- Prince County Hospital, Summerside, PE
- Saskatoon City Hospital, Saskatoon, SK
- Selkirk Regional Health Centre, Selkirk, MB
- South Bruce Grey Health Centre, Durham, ON
  - Kincardine, Walkerton, Durham, and Chesley
- St. Clare's Mercy Hospital, St. John's, NL
- Swan River Valley Hospital, Swan River, MB
- Thompson General Hospital, Thompson, MB
- Valley Regional Hospital, Kentville, NS
- Vernon Jubilee Hospital, Vernon, BC
- Victoria General Hospital, Winnipeg, MB
- Yorkton Regional Health Center, Yorkton, SK

* indicates a pediatric hospital respondent

Hospitals 201 to 500 beds

- Bluewater Health, Sarnia, ON
  - Bluewater Health (BWH), Sarnia
  - Charlotte Eleanor Englehart Hospital (CEEH), Petrolia
- Burnaby Hospital, Burnaby, BC
- Cape Breton Regional Hospital, Sydney, NS
  - Cape Breton Regional
  - Glace Bay General
  - New Waterford Consolidated
  - Northside General
- Centre Hospitalier Universitaire Dr. Georges-L-Dumont, Moncton, NB
- Chatham-Kent Health Alliance, Chatham, ON
- Children's & Women's Health Centre of BC * (pediatric), Vancouver, BC
- Chilliwack Hospital / Fraser Canyon Hospital / Heritage Village, LMPS, Chilliwack, BC
- CHU Sainte-Justine* (pediatric), Montréal, QC
- CISSS Côte-Nord - Hôpital et CHSLD de Sept-Iles, Sept-Iles, QC
- CISSS de Chaudière-Appalaches - Hôpital de St Georges, St-Georges, QC
  - Hôpital de St-Georges
  - CSSS des Etchemins
- CISSS de Chaudière-Appalaches - Hôpital de Thetford-Mines, Thetford Mines, QC
- CISSS de Chaudière-Appalaches, secteur Montmagny-L'Islet, Montmagny, QC
- CISSS de la Montérégie-Est - Hôtel-Dieu de Sorel, Sorel-Tracy, QC
- CISSS des Laurentides - Centre de services de Rivière-Rouge, Lachute, QC
- CISSS des Laurentides - Centre multiservices de santé et services sociaux d'Argenteuil, Lachute, QC
- CISSS des Laurentides - Hôpital Laurentien, Sainte-Agathe-des-Monts, QC
- CISSSS Estrie-CHUS - CSSS de Memphrémagog, Magog, QC
- CIUSSS-de-l'ouest-de-l'Île-de-Montréal, Hôpital général du Lakeshore, Pointe Claire, QC
- CIUSSS-de-l'ouest-de-l'Île-de-Montréal, CH St-Marys de Montréal, Montréal, QC
- Dr. Everett Chalmers Regional Hospital, Fredericton, NB
- Eagle Ridge Hospital, Port Moody, BC
- Grace Hospital, Winnipeg, MB
- Guelph General Hospital, Guelph, ON
- Halton Healthcare – Oakville Trafalgar Memorial Hospital, Oakville, ON
- Hamilton Health Sciences Centre – Hamilton General Hospital, Hamilton, ON
- Health Sciences Centre - St. John's, St. John's, NL
- Hôpital Montfort, Ottawa, ON
- Hôpital Régional de Campbellton, Campbellton, NB
  - Hôpital Régional de Campbellton
  - Centre Hospitalier Restigouche
  - Centre de Santé Communautaire St-Joseph
- Institut universitaire de cardiologie et de pneumologie de Québec, Université Laval (IUCPQ), Québec, QC
- IWK Health Centre * (pediatric), Halifax, NS
- James Paton Memorial Regional Health Center, Gander, NL
- Juravinski Hospital, Hamilton, ON
- Kelowna General Hospital, Kelowna, BC
- Langley Memorial Hospital, Langley, BC
- McMaster University Medical Centre, Hamilton, ON
- Michael Garron Hospital, Toronto East Health Network, Toronto, ON
- Nanaimo Regional General Hospital, Nanaimo, BC
- North York General Hospital, Toronto, ON
- Oak Valley Health- Markham Stouffville Hospital, Markham, ON
- Orillia Soldiers' Memorial Hospital, Orillia, ON
- Queen Elizabeth Hospital, Charlottetown, PE
- Queensway Carleton Hospital, Ottawa, ON
- Richmond General Hospital, Richmond, BC
- Ridge Meadows Hospital, Maple Ridge, BC
- Royal Columbian Hospital, New Westminster, BC
- Royal Inland Hospital, Kamloops, BC
- Royal University Hospital, Saskatoon, SK
  - Royal University Hospital
  - St. Paul's Hospital
  - Saskatoon City Hospital
- Royal Victoria Regional Health Centre, Barrie, ON
- Saanich Peninsula Hospital, Saanichton, BC
- Sault Area Hospital, Sault Ste. Marie, ON
- Seven Oaks General Hospital, Winnipeg, MB
- St. Paul's Hospital, Saskatoon, SK
- St. Boniface Hospital, Winnipeg, MB
- The Moncton Hospital, Moncton, NB
- Unity Health Toronto - St. Joseph's Health Center, Toronto, ON
- Unity Health Toronto - St. Michael's Site, Toronto, ON
- University Health Network – Toronto General Hospital, Toronto, ON
- University Health Network – Toronto Western Hospital, Toronto, ON
- University Hospital of Northern BC, Prince George, BC
- Victoria General Hospital, Victoria, BC
  - Victoria General Hospital
  - Queen Alexandra Hospital
- William Osler Health Systems - Etobicoke General Hospital, Etobicoke, ON

Hospitals 500+ beds

- Abbotsford Regional Hospital, Abbotsford, BC
  - Abbotsford Regional Hospital
  - Mission Memorial Hospital
  - Matsqui Sumas Abbotsford Hospital
- Central NL Regional Health Care Center, Grand Falls-Windsor, NL
- CHU de Québec, Québec, QC
  - Hôpital de l'Enfant-Jésus
  - Hôpital Saint-François d'Assise
  - Hôtel-Dieu de Québec
  - Hôpital Saint-Sacrement
  - CHUL
- CHUM - Centre hospitalier de l'Université de Montréal, Montréal, QC
- CISSS de Chaudière-Appalaches - Hôtel-Dieu de Lévis, Lévis, QC
  - CISSS de Chaudière-Appalaches (Hôtel-Dieu de Lévis et Centre Paul-Gilbert)
- CISSS de la Gaspésie, Gaspé, QC
  - Hôpital de Gaspé
  - Hôpital de Maria
  - Hôpital de Chandler
  - Hôpital Sainte-Anne-des-Monts

* indicates a pediatric hospital respondent

Hospitals 500+ beds (Continued)

- CISSS de la Montérégie-Centre - Hôpital Charles-Lemoyne, Montérégie, QC
- CISSS de la Montérégie-Centre - Hôpital du-Haut-Richelieu, Saint-Jean-sur-Richelieu, QC
- CISSS de la Montérégie-Est - Hôpital Honoré-Mercier, Saint-Hyacinthe, QC
- CISSS de la Montérégie-Est - Hôpital Pierre Boucher, Longueuil, QC
- CISSS de la Montérégie-Ouest - Hôpital Anna-Laberge, Châteauguay, QC
- CISSS de la Montérégie-Ouest - Hôpital du Suroît, Salaberry-de-Valleyfield, QC
- CISSS de Laval - Hôpital Cité de la santé, Laval, QC
- CISSS des Laurentides - Hôpital de Saint Eustache, Saint-Eustache, QC
- CISSS des Laurentides - Hôpital régional de Saint-Jérôme, Saint-Jérôme, QC
- CIUSSS de l'Estrie - CHUS, Cowansville, QC
  - CHUS
  - CH de Granby
  - Hôpital Brome-Missisquoi Perkins
- CIUSSS de la Capitale-Nationale, La Malbaie, QC
  - Hôpital de la Malbaie
  - Hôpital Chauveau
  - Hôpital régional de Portneuf
  - Institut universitaire en santé mentale de Québec
- CIUSSS de la Mauricie-et-du-Centre-du-Québec - Hôtel-Dieu d'Arthabaska, Victoriaville, QC
- CIUSSS de l'Est-de-l'Ile-de-Montréal, Montréal, QC
  - Hôpital Maisonneuve-Rosemont
  - Hôpital Santa Cabrini
- CIUSSS de l'Ouest-de-l'Ile-de-Montréal - Hôpital de La Salle, LaSalle, QC
- CIUSSS du Centre-Ouest-de-l'Ile-de-Montréal - Hôpital général juif (Jewish General Hospital), Montréal, QC
- CIUSSS du Centre-Sud-de-l'Ile-de-Montréal - Hôpital de Verdun, Montréal, QC
  - Hôpital de Verdun
  - Hôpital Notre-Dame
- CIUSSS du Nord-de-l'Ile-de-Montréal, Montréal, QC
  - Hôpital du Sacré-Cœur
  - Hôpital Jean Talon
  - Hôpital Fleury
- CUSM - Centre universitaire de santé Mcgill - Hôpital général de Montréal, Montréal, QC
  - Hôpital général de Montréal
  - Hôpital Royal-Victoria
  - Hôpital Montréal pour enfants
  - Hôpital thoracique
  - Hôpital de Lachine
- Health Sciences North / Horizon Santé-Nord, Sudbury, ON
  - Mental Health and Addictions (Kirkwood and Cedar sites) and Northeastern Ontario Regional Cancer
- Humber River Hospital, North York, ON
- Kingston Health Sciences Centre, Kingston, ON
  - Kingston General Hospital
  - Hotel Dieu Hospital
- Lakeridge Health Corporation, Oshawa, ON
  - Ajax Pickering, Whitby, Oshawa, Bowmanville, Port Perry
- Lions Gate Hospital, North Vancouver, BC
- Niagara Health System, St. Catharines, ON
  - Greater Niagara General
  - Welland Site
  - Douglas Memorial
  - Port Colborne General
- Pasqua Hospital, Regina, SK
  - Regina General Hospital
  - Pasqua Hospital
- Peace Arch Hospital, White Rock, BC
- Royal Jubilee Hospital, Victoria, BC
- Saint John Regional Hospital, Saint John, NB
  - Saint John Regional Hospital Centracare
  - Ridgewood Veteran's Unit and Ridgewood Addictions Facility
- Scarborough Health Network, Scarborough, ON
  - Centenary Site
  - Birchmount Site
  - General Site
- Sinai Health System, Toronto, ON
- Southlake Regional Health Centre, Newmarket, ON
  - Including Stronach Regional Cancer Centre
- St. Joseph's Healthcare, Hamilton, ON
- St. Paul's Hospital, Vancouver, BC
  - St. Paul's Hospital
  - Mount St. Joseph Hospital
- Surrey Memorial Hospital, Surrey, BC
- Thunder Bay Regional Health Sciences Centre, Thunder Bay, ON
- Trillium Health Partners, Mississauga, ON
  - The Credit Valley Hospital
  - The Mississauga Hospital and
  - The Queensway Health Centre
- Western Memorial Regional Hospital, Corner Brook, NL
- William Osler Health System, Brampton, ON
  - Brampton Civic Hospital
  - Peel Memorial Centre for Integrated Health & Wellness (Urgent Care Centre and Outpatient Clinics)
- Winnipeg Health Sciences Centre, Winnipeg, MB

* indicates a pediatric hospital respondent

Appendix III - **Key Ratios**

The key ratios tabulated below can be used to carry out a high level comparison of a participating pharmacy department to those in similar hospitals across Canada, specifically for comparing pharmacy staffing, staffing ratios (specifically inpatient pharmacy technical staff to inpatient pharmacist Full Time Equivalents) and inventory turnover rates. The ratios represent the average (or mean) of the results for the respondents in each subgroup (by teaching status or bed size) to allow pharmacy managers to compare their department to their closest peer group. Please note that unlike past reports, the ratios for acute care drug costs per patient day and non-acute care drug costs per non-acute care patient day are not included in this report. The responses provided for drug costs in Chapter E – Benchmarking were too low to create these ratios for this report. Hopefully in future surveys there will be more robust data and we can again provide these ratios.

Key Ratios 2020/21		All Hospitals	Pediatric Hospitals	Adult Hospitals					
				All Adult Hospitals	Bed Size			Teaching Status	
					50-200	201-500	>500	Teaching Hospitals	Non-teaching Hospitals
Inpatient budgeted hours per acute patient day	(n=)	(135)	(5)	(130)	(35)	(53)	(42)	(31)	(99)
		1.11	**1.89**	**1.08**	**1.07**	**1.08**	**1.10**	**1.21**	**1.04**
Inpatient budgeted hours per total (acute + non-acute) patient day	(n=)	(135)	(5)	(130)	(35)	(53)	(42)	(31)	(99)
		0.82	**1.84**	**0.78**	**0.89**	**0.80**	**0.67**	**1.10**	**0.68**
Total (inpatient + outpatient) budgeted hours per acute patient day	(n=)	(135)	(5)	(130)	(35)	(53)	(42)	(31)	(99)
		1.27	**2.06**	**1.23**	**1.16**	**1.21**	**1.32**	**1.35**	**1.20**
Total (inpatient + outpatient) budgeted hours per total (acute + non-acute) patient day	(n=)	(135)	(5)	(130)	(35)	(53)	(42)	(31)	(99)
		0.92	**2.00**	**0.87**	**0.96**	**0.88**	**0.79**	**1.23**	**0.77**
Inpatient regulated pharmacy technicians and non-regulated pharmacy assistants to inpatient pharmacists (staff + advanced)	(n=)	(136)	(5)	(131)	(36)	(53)	(42)	(31)	(100)
		1.60	**1.07**	**1.62**	**1.89**	**1.51**	**1.54**	**1.43**	**1.69**
Pharmacist vacancy rates (non-LOA)	(n=)	(136)	(5)	(131)	(36)	(53)	(42)	(31)	(100)
		5.1%	**3.9%**	**5.2%**	**4.4%**	**4.0%**	**6.0%**	**3.1%**	**6.6%**
Pharmacist vacancy rates (including LOA)	(n=)	(136)	(5)	(131)	(36)	(53)	(42)	(31)	(100)
		8.0%	**7.2%**	**8.2%**	**7.9%**	**6.6%**	**8.9%**	**5.1%**	**10.1%**
Inventory turnover rate	(n=)	(112)	(4)	(108)	(27)	(45)	(36)	(24)	(84)
		7.8	**23.2**	**7.2**	**5.1**	**7.7**	**8.1**	**7.7**	**7.0**

LOA = leave of absence

Appendix IV - **Definitions**

Term	Definition
0.2 Full-Time Equivalent (FTE)	Assignment of a pharmacist to a program for a minimum of one day per week or for shorter periods that combine to the equivalent of one day per week, on average. For example, 0.2 FTE is equivalent to one pharmacist working one full day per week or two half-days per week.
Acute care	Provision, to a patient who has been formally admitted to a bed in a facility, of the necessary treatment for a disease or severe episode of illness for a short period. Patients are discharged from acute care as soon as they are healthy and their condition is stable. **Note:** Palliative care beds and alternate level of care (ALC) beds may be classified as acute or non-acute, according to how they are designated within a given facility.
Advanced Practice Pharmacist	A pharmacist who has advanced training beyond entry-to-practice requirements (e.g., PharmD, Clinical Master's [Québec], Accredited Canadian Pharmacy Residency [ACPR] and/or certification [such as certification in pharmacotherapy from the Board of Pharmacy Specialties or from the Association des pharmaciens des établissements de santé du Québec]) and who spends most of their time addressing more complex clinical questions or working through more complex patient care challenges than typically handled by staff pharmacists. This designation may not be formally recognized in labour agreements.
Alternate level of care (ALC)	Care provided to a patient who is occupying a bed in a facility but does not require the intensity of resources/services usually provided in that care setting (whether acute care, chronic or complex continuing care, mental health care or rehabilitation). In this situation, the patient must be designated "ALC" by the most appropriate care team member (physician, long-term care [LTC] assessor, patient care manager, discharge planner or other care team member). For a patient with "ALC" designation in an acute care setting, discharge/transfer destinations may include but are not limited to: ▪ home (with/without services); ▪ designated/specialized mental health treatment facility; ▪ chronic or complex continuing care (facility/bed within or outside reporting facility); and ▪ long-term care (LTC) home. The discharge or transfer destination need not be known at the time of ALC designation.
Automated dispensing cabinet (ADC)	A computer-driven mechanical system (e.g., Pyxis, Omnicell Technologies) located in a patient care area, which stores medications, controls their release to authorized personnel and captures all transaction information.
Best Possible Medication History (BPMH)	A complete medication history created using (1) a systematic process of interviewing the patient and/or the patient's family and (2) a review of at least one other reliable source of information to obtain and verify all of the patient's medication use (prescribed and non-prescribed). Complete documentation includes drug name, dosage, route and frequency (**https://www.ismp-canada.org/medrec**). Once generated, the BPMH is an important reference tool for reconciling medications at care transitions.
Budgeted hours	All staffing hours that are funded in the budget. If relief hours (e.g., for vacation or illness) are included in the budget, they should be counted as budgeted hours.
Centralized unit-dose system	A unit-dose system in which most medications for a specified time frame (e.g., 24 hours) are dispensed to the patient care unit from the central pharmacy.
Clinical decision support system	Feature of a computer program that provides automatic reminders, advice or interpretation as data are entered for a specific patient and/or a specific medication order. A clinical decision support system uses patient-specific data and evidence-based practice guidelines to generate alerts and/or suggested courses of action.
Complex continuing care	The delivery of medically complex, specialized services (e.g., ventilation therapy) to patients of any age, over extended periods of time.
Computerized provider order entry (CPOE)	Process whereby a healthcare provider enters medication orders or other instructions electronically, rather than on paper charts.
Controlled/carded dose system	A drug distribution system in which most medications are packaged in blister cards containing up to a one-month supply of medication. A pharmacist usually reviews and approves the medication order before a patient-specific label is applied to the card and the card is delivered to the patient.
Decentralized unit-dose system	A unit-dose system in which most medications are distributed from a satellite pharmacy or from an automated dispensing cabinet (ADC) located on the patient care unit.

Term	Definition
Electronic Health Record (EHR)	A longitudinal electronic record of patient health information generated as a result of one or more encounters in any care delivery setting. Included in this record are patient demographic characteristics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates and streamlines the clinician's workflow. The EHR system has the ability to generate a complete record of a clinical patient encounter, as well as supporting other care-related activities, directly or indirectly, through the interface, including evidence-based decision support, quality management and outcomes reporting.
Full-Time Equivalent (FTE)	A standardized counting unit, whereby the annual number of budgeted hours for a full-time employee (e.g., 2,015 hours) is equivalent to 1 FTE. For example, if the total number of budgeted hours for all pharmacists in a given fiscal year is 20,150, and the number of hours budgeted for a full-time pharmacist is 2,015, the number of FTEs would be 10. Budgeted casual and relief hours should be included in the calculation of FTEs.
Healthcare Information and Management Systems Society (HIMSS) classification	The HIMSS Analytics Electronic Medical Record Adoption Model (EMRAM) incorporates methodology and algorithms to automatically score hospitals around the world relative to their electronic medical record (EMR) capabilities. This eight-stage model (in which stages are designated from 0 to 7) measures the adoption and utilization of various EMR functions. Stage 7 Complete EMR; external electronic health information exchange (HIE); data analytics, governance, disaster Recovery, privacy and security Stage 6 Technology-enabled medication, blood products and human milk administration; risk reporting; full clinical decision support Stage 5 Physician documentation using structured templates; intrusion/device protection Stage 4 CPOE with clinical decision support; nursing and allied health documentation; basic business continuity Stage 3 Nursing and allied health documentation; electronic medication administration record (eMAR); role-based security Stage 2 Clinical data repository; internal interoperability; basic security Stage 1 Ancillaries: laboratory, pharmacy and radiology/cardiology information systems; picture archiving and communication system; Digital non-DICOM image management Stage 0 Ancillaries not installed
Hospital Information System (HIS)	A hospital information system (HIS) refers to an electronic system designed to manage healthcare data generated during a patient's hospital encounter. It is a comprehensive information system used to collect, store, process, retrieve, and communicate patient care and administrative information for all hospital-affiliated activities and to satisfy the functional requirements of all authorized users in the healthcare setting
Inventory turnover ratio	A measure of a facility's efficiency of inventory management, calculated as follows: total annual drug expenses / average inventory value. If only a single inventory count is done in a year, efforts should be made to ensure that the inventory count is as representative as possible of the average inventory value.
Long-term care (LTC)	Care to address the needs of patients who require nursing and personal care on a continuing basis. These patients usually have disabilities or chronic care needs, with a range of medical and/or social services being offered. The services are generally provided in residential facilities (e.g., nursing homes or assisted living facilities).
Medication counselling	A process involving direct interaction between the patient and an appropriate caregiver, during which the patient's medications are reviewed and the patient is provided with education concerning the safe and appropriate use of all medications.
Medication reconciliation	A formal process of (1) obtaining a complete and accurate list of each patient's current home medications, including name, dosage, route and frequency; (2) using that list when writing admission, transfer and/or discharge orders; and (3) comparing the list against the patient's admission, transfer and/or discharge orders, identifying any discrepancies, bringing them to the attention of the prescriber and, if appropriate, making changes to the orders. Any resulting changes in orders are documented. Care to address the needs of patients with mental illness. In the mental health care setting, the focus is on observing and providing care and treatment for patients who are experiencing mental health disorders.
Mental health care	Care to address the needs of patients with mental illness. In the mental health care setting, the focus is on observing and providing care and treatment for patients who are experiencing mental health disorders.
Monitoring	Ongoing review of all pertinent patient data (e.g., diagnoses, laboratory values, medications) and evaluation of the patient's response to therapy. The routine drug profile review that pharmacists perform at the time of order entry or order review does **not**, on its own, fulfill the criteria for monitoring.

Term	Definition
National Association of Pharmacy Regulatory Authorities (NAPRA) and Ordre des pharmaciens du Québec (OPQ) standards	***Model Standards for Pharmacy Compounding of Non-hazardous Sterile Preparations*** and ***Model Standards for Pharmacy Compounding of Hazardous Sterile Preparations***, which have been endorsed by NAPRA, or **the standards of the OPQ** (Norme 2014.01, for sterile compounding of non-hazardous products; Norme 2014.02, for sterile compounding of hazardous products).
Non-acute care	Inpatient care that is not of an acute nature, encompassing the following types of care: long-term care (LTC), rehabilitation, chronic care and complex continuing care. **Note:** Palliative care beds and alternate level of care (ALC) beds may be classified as acute or non-acute, according to how they are designated within a given facility.
Non-regulated Pharmacy Assistant	An individual who works under the direct supervision of a pharmacist or a regulated pharmacy technician to assist with various functions, such as compounding medications, preparing parenteral admixtures, entering medication orders into the pharmacy information system and checking the work of other non-regulated pharmacy assistants, or to perform basic functions, such as re-packaging medications, delivering medications, maintaining inventory records and performing clerical activities. Such an individual may also be referred to as a technical assistant.
Non-regulated Pharmacy Assistant Manager	A non-regulated pharmacy assistant who is responsible for managing one or more sites or functional areas and who is usually responsible for hiring, performance reviews, discipline and dismissal of designated staff members who report directly.
Palliative care	Care to address the needs of patients with life-limiting conditions. In the palliative care setting, the focus is on improving quality of life for the patient and their family/loved ones. Improving quality of life begins with identifying, assessing and alleviating pain and other physical, psychosocial and spiritual issues.
Patient care program	Healthcare delivery that is formally structured to service a group of patients with similar healthcare needs (e.g., child health program, mental health program, critical care program). A formal patient care program will usually have a physician and/or nurse as the leader or director.
Pharmacist Manager	A pharmacist who is responsible for managing one or more sites or functional areas and who is responsible for hiring, performance reviews, discipline and dismissal of designated staff members who report directly.
Pharmacy information system (PIS)	A computer system (e.g., BDM, Cerner, Meditech, EPIC) that is used by the pharmacy to maintain an accurate record of drug dispensing activity, patient medication profiles and other relevant patient information. Reports generated from a PIS are used to track drug costs by patient or patient care unit, drug utilization patterns, and other pertinent data.
Pharmacy Manager (neither a pharmacist nor a pharmacy technician nor a non-regulated pharmacy assistant)	A manager who is not a pharmacist or a regulated pharmacy technician or a non-regulated pharmacy assistant, but who has the same scope of responsibilities as a pharmacist manager (i.e., is responsible for managing one or more sites or functional areas and is responsible for hiring, performance reviews, discipline and dismissal of designated staff members who report directly).
Pharmacy Technician Manager	A regulated pharmacy technician who is responsible for managing one or more sites or functional areas and who is usually responsible for hiring, performance reviews, discipline and dismissal of designated staff members who report directly.
Practice Leader/Coordinator	A pharmacist who possesses a high level of content expertise in a particular clinical practice area and who supervises, trains and acts as a clinical resource for other pharmacists and/or technicians who work in the particular clinical area (e.g., Practice Leader – Pediatrics, Coordinator – Clinical Pharmacy Services).
Practice model	The method by which pharmacy department resources are used to provide patient care services and the outcomes that are intended to be achieved as a result of that model of resource utilization. A pharmacy department's practice model specifies the roles played by pharmacists, regulated pharmacy technicians, non-regulated pharmacy assistants and students, as well as the application of information technologies and automation technologies.
Regulated Pharmacy Technician	An individual who has been licensed by the relevant provincial college of pharmacists/pharmacy and who is qualified to perform, without direct supervision of a pharmacist, specialized functions, such as compounding medications, preparing parenteral admixtures, entering medication orders into the pharmacy information system and checking the work of other pharmacy technicians or non-regulated pharmacy assistants. The individual may also perform basic functions, such as re-packaging medications, delivering medications, maintaining inventory records and performing clerical activities. Individuals with this designation have passed the qualifying examination of the Pharmacy Examining Board of Canada (PEBC) after (1) graduating from an accredited pharmacy technician training program or (2) passing the PEBC evaluation examination and becoming qualified for licensure. For the purposes of this survey, the term "Regulated Pharmacy Technician" means those who are "registered" or "licensed" by a provincial regulatory body (college). **Note:** This designation is applicable only in provinces where regulation of pharmacy technicians has been implemented; Level 1 (Staff) and Level 2 (Senior) categories of the designation may be used.

Term	Definition
Rehabilitation	Care to address the needs of patients who have been disabled by disease or injury. In the rehabilitation setting, patients receive combined and coordinated care through the provision of medical, social, educational and vocational measures for training or re-training, in an effort to restore the patients to their highest possible level of functional ability.
Repeater pump or automatic syringe filler	A peristaltic pump that is used for accurately transferring aliquots of fluid from one container to another (e.g., from a bag to a syringe).
Resident	Individual who is enrolled in a formal hospital pharmacy residency program.
Robotic automation	An automated system (e.g., Robot-Rx, PillPick, BoxPicker) in which a robotic arm selects the correct drug from racks holding pre-packaged unit-dose medications in the form of tablets, capsules, syringes, pre-packaged liquids, vials, ampoules or patches. Barcoding systems are used to verify items that have been selected from the shelving racks by the robotic arm.
Segregated ISO Class 7 clean room	A clean room is an environment with a controlled level of contamination that is described in terms of the concentration of non-viable particles per cubic meter at a specified particle size. A Class 7 clean room has a maximum number of particles (≥ 0.5 µm in size) of 352,000/m^3.
Segregated ISO Class 8 ante-room	An ante-room is a buffer room between a normal room and a clean room. Like a clean room, an ante-room has a controlled level of contamination that is described in terms of the concentration of non-viable particles per cubic meter at a specified particle size. A Class 8 ante-room has a maximum number of particles (≥ 0.5 µm in size) of 3,520,000/m^3.
Smart pump	Infusion pump with a programmable drug library, including clinical alerts related to drug dose and rate, as well as the ability to store and download usage data for quality assurance, education and safety purposes.
Staff Pharmacist	A pharmacist who holds a licence to practice pharmacy and who participates in the delivery of drug distribution and/or clinical services (excluding pharmacists in management positions and any pharmacists who have been designated as Advanced Practice Pharmacists).
Support personnel (clerk, porter, aide)	Individuals who perform clerical duties, deliver medications and supplies, and perform similar duties that do not involve direct participation in the selection, re-packaging, labelling and inventory management of pharmaceuticals.
TALLman lettering	The use of uppercase letters (capitalization) to enhance the unique letters of a medication's generic drug name (e.g., DOXOrubicin, HYDROmorphone, OXYcodone, inFLIXimab, NIFEdipine, DULoxetine) to reduce errors caused by potential confusion between drug products with look-alike drug names.
Teaching hospital	A hospital that meets one or both of the following conditions: ▪ has had teaching status confirmed by the provincial ministry of health; or ▪ is identified as a teaching hospital in the provincial ministry's submission to the Canadian Management Information System Database (a database maintained by the **Canadian Institute for Health Information**, which is an independent, not-for-profit organization providing essential information on Canada's health systems and the health of Canadians
Total wardstock system	A drug distribution system in which most medications are stocked on the patient care unit in bulk containers, from which medications can be removed and administered to patients without a pharmacist having to first review and approve the medication order for each specific patient.
Traditional drug distribution system	A drug distribution system in which most medications are labelled and dispensed in multi-dose, patient-specific vials or similar medication containers, after a pharmacist has reviewed and approved the medication and dosage ordered for each specific patient.
Unit-dose system	A drug distribution system in which medications are packaged and dispensed to the patient care unit in a single-dose, ready-to-administer form. Usually, no more than a 24-hour supply of patient-specific medication is delivered to the patient care unit at any one time. A unit-dose system may be centralized or decentralized.

Appendix V - **Survey Questions**

Hospital Pharmacy in Canada Survey 2020/21

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