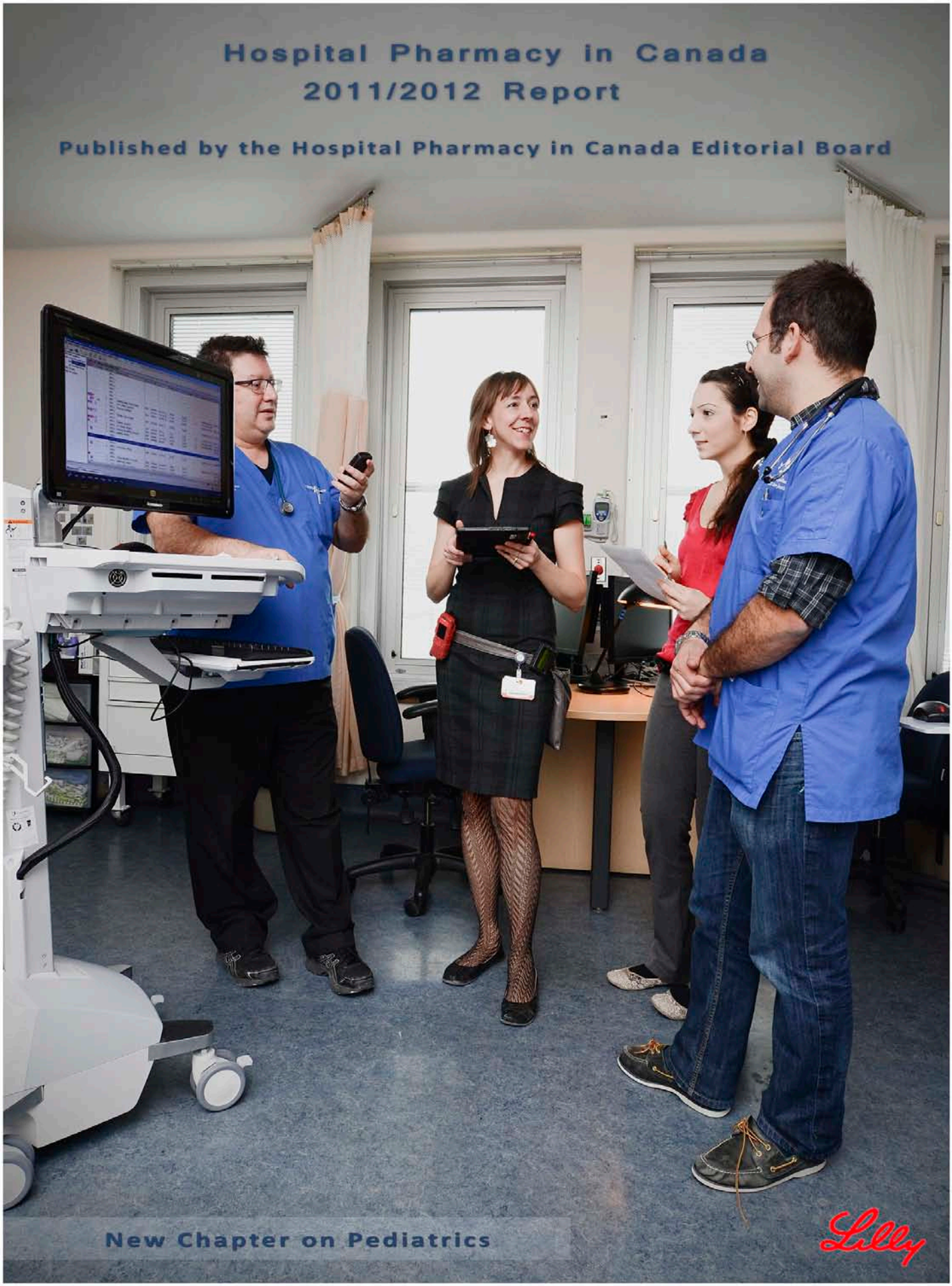
Hospital Pharmacy in Canada 2011/2012 Report

Published by the Hospital Pharmacy in Canada Editorial Board



New Chapter on Pediatrics

Lilly

Hospital Pharmacy in Canada 2011 / 2012 Report

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The Editorial Board wishes to acknowledge and thank the support team of the 2011/12 Hospital Pharmacy in Canada Report.

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Special Thanks

The Editorial Board would like to thank Eli Lilly Canada Inc, and their representative France Dube, for their ongoing support of the Hospital Pharmacy in Canada Report.

The Editorial Board would also like to thank the staff of hospital pharmacy departments across Canada who assembled data from their respective institutions and committed the time to complete the survey.

The Editorial Board thanks the Canadian Society of Hospital Pharmacists, its Council and staff for their support for this survey.

Editorial Board

Foreword

Lauren Fischer

Eli Lilly Canada is pleased to support the 19th *Hospital Pharmacy in Canada Report* available at www.lillyhospitalsurvey.ca.

Thanks to all the hospital pharmacists across the country who completed the survey, there was an impressive 80% response rate. We are pleased that there were 176 organizations that responded to the survey, which collectively represent approximately 68,450 inpatient beds across Canada. The information contained in this survey report continues to be a reliable reference due to the high participation rate by hospital pharmacy managers in all parts of the country.

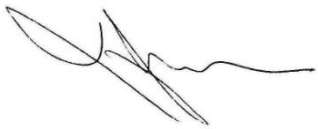
This year's report again contains a special section measuring hospital pharmacy's progress towards the goals of the Canadian Society of Hospital Pharmacists 2015 Initiative. Carolyn Bornstein, CSHP 2015 Project Coordinator, is our guest editor for this chapter. Patient safety also continues to be a major issue for health professionals, health administrators and policy makers in Canada. Once again, the Report contains information on medication safety, which now appears in Chapter I, Evaluating Pharmacy Services. That section provides information which will be useful to hospitals as they evaluate their services from a medication safety perspective.

This year's data was compiled by Paul Oeltjen Consulting. The report was edited by Chuck Wilgosh and Kevin Hall. Administrative support was provided by Marjorie Robertson.

Also, thank you to this year's Editorial Board who interpreted the data and authored the report – Michele Babich, Jean-François Bussières, Douglas Doucette, Patricia Lefebvre, Patricia Macgregor, Kyle MacNair and Emily Musing.

Management information is a valuable tool in both decision-making and planning in pharmacy and hospital administration. It is our hope that the information in this year's *Hospital Pharmacy in Canada Survey Report* assists you in making effective decisions.

Yours truly,



Lauren Fischer
Vice President, Corporate Affairs
Eli Lilly Canada Inc.

The Editorial Board's comments are based on an analysis of this data.
The views expressed in the text do not necessarily represent those of Eli Lilly Canada Inc.

Introduction

Emily Musing

The French author, Francois de la Rochefoucauld, famously said that "The only thing constant in life is change." This maxim certainly applies to the Canadian healthcare system. Viewing the province of Ontario as one microcosm of the national landscape, the rate of change over the last two years has escalated on many fronts, with significant implications for hospital pharmacy practice. Legislative changes, such as the Excellent Care for All Act,[1] have highlighted increasing expectations of accountability and transparency, requiring public posting of quality indicators and creating links between indicators and executive compensation. Clinical performance measures have also been embedded into the funding models for hospitals and other health organizations. Reports from economists such as Don Drummond[2] have challenged the system to operate more efficiently, recommending changes to the Pharmacy Act that would enable an expanded scope of practice for pharmacy practitioners, similar to those that had previously been approved in Alberta and several other provinces. This was realized in October 2012, when the McGuinty government announced a regulation change permitting Ontario pharmacists limited prescribing and drug administration rights.[3] Many pharmacy technicians are also impacted by new regulation requirements as set forth by provincial Colleges. All this has occurred within an environment of shared concern by policy makers and the public about the increasing cost of healthcare and sustainability of the Medicare system. The Canadian Institute for Health Information[4] reported that, in 2011, hospitals made up the largest component (29.1%) of health care spending at $58.4 billion. Pharmaceuticals, the fastest-growing component of health care costs in recent decades, accounted for the second-largest category (16%), amounting to $32 billion. Pharmacy leaders are being challenged to adapt hospital pharmacy services to meet the expanding needs that exist within this shifting environment.

This year's Hospital Pharmacy in Canada Report summarizes the pace of change within hospital pharmacy practice in the 176 participating organizations that collectively represent some 68,450 inpatient beds across Canada, including for the first time, data collected from the Northwest Territories. Note that for the purposes of this report, data from the Northwest Territories was incorporated into Alberta data. The report has maintained the chapter highlights, initiated in the 2009/10 report, to allow the reader to easily note new and emerging trends.

In the spirit of change, this year's survey was expanded to incorporate two new sections to capture the perspective of front-line pharmacists and technicians on a number of important issues, such as pharmacy technician regulation, experiential training in the hospital pharmacy setting, and changing practice roles. The editorial board appreciates the time taken both by Pharmacy Directors in forwarding the surveys to their staff, and by front-line staff for generously sharing their insights. The data collected from these supplemental surveys will be analyzed for a future journal publication to complement the information provided within this report.

In the chapter on clinical pharmacy services, Jean-Francois Bussieres reviews the current state of structured patient care programs, both in the inpatient and outpatient setting, against the background of various pharmacy practice models and changing scopes of practice. This chapter also details the evolution of independent and dependent pharmacist prescribing authority in the various provincial jurisdictions across Canada.

Doug Doucette provides a comprehensive overview of drug distribution systems as integral components of a system of safe, effective and efficient drug therapy in the hospital setting. Hospitals reported a trend towards increased centralized unit dose systems as well as increased implementation of decentralized automated dispensing cabinets in most patient care areas. While 67% of respondents reported that a pharmacist reviews at least 95% of all routine of medication orders for therapeutic appropriateness before the medication order appears on the Medication Administration Record, this remains limited to the regular operating hours of the Pharmacy department when there is on-site staffing.

Michele Babich and Kevin Hall profile the changing face of hospital pharmacy human resources across Canada. They report that many of the recommendations from the Moving Forward: Pharmacy Human Resources for the Future Report, [5] a national pharmacy initiative led by the Canadian Pharmacists Association are now being realized. The increased enrolment in the Faculties of Pharmacy and resulting increase in pharmacist supply does not appear to have decreased the hospital pharmacist vacancy rate. While overall, the staffing composition has not changed since the last report, this report highlights the percentage of advanced practice pharmacists of total pharmacy staffing which ranges widely between provinces. Michele and Kevin also report on the trend towards pharmacy

technician regulation with protection of this title in many provinces. The concern that this may lead to a technician shortage has not yet materialized, but is worth monitoring in future reports.

Technological innovations have been instrumental, not only in helping to meet the challenges of human resource shortages but also in optimizing patient safety. Patricia Macgregor and Kevin Hall's review of the level of adoption of information technology highlights the increasing use of technology to embed patient safety strategies such as TALLman lettering, and barcoding throughout pharmacy processes and patient care units. Of note, use of "smart" IV pump technology is on the rise with use of wireless networks to upload or download data to and from smart pumps. From a systems perspective, respondents reported slowly increasing connectivity and interfaces built between pharmacy, laboratory and front-end clinician order entry systems, which opens up the opportunity for increased access to clinical decision support and facilitation of inter-professional communication.

Kevin Hall and Patricia Macgregor's review of adult benchmarking provides data on the pharmacy staff and medication costs that are associated with providing pharmacy services to specific types of clinical programs, including critical care, medicine, surgery, and long term care. These detailed benchmarking analyses provide pharmacy managers with important information that can be used to benchmark existing program performance, or to plan new pharmacy services.

Carolyn Bornstein, CSHP 2015 Project Coordinator, reports on the progress that Canadian hospitals have made in achieving the CSHP 2015 targets, compared to the baseline data that was presented in the 2007/08 and the follow-up data that was presented in the 2009/10 reports. Of note, some of the objectives within this quality initiative have been revised since its inception, which must be considered when this data is being interpreted. Carolyn's thoughtful analysis summarizes areas of strength as well as highlights the need for further improvement in order to attain the vision for pharmacy practice in the hospital setting by the year 2015, as envisioned by the Canadian Society of Hospital Pharmacists.

The Pharmacy Technician chapter, authored by Kyle MacNair and Chuck Wilgosh, provides an insightful synopsis of the evolving role of the pharmacy technician. Highlights include the trend towards provincial legislation to regulate pharmacy technicians with an increasing proportion of technicians receiving certification through the Pharmacy Examining Board of Canada, many of whom have graduated from accredited pharmacy technician training programs. These formal, external programs have decreased the need for internal validation and certification programs previously provided by hospital pharmacy departments. While there is substantial regional variation regarding technician involvement in activities such as medication order entry, respondents reported an increasing role for pharmacy technicians in supporting clinical pharmacy services such as admission and discharge medication reconciliation.

Patricia Lefebvre provides a snapshot of current practices related to the evaluation of pharmacy services in Canadian hospitals. These range from quantifying implementation of medication incident reduction strategies including completion of a medication safety self-assessment, evaluation of the direct patient care services provided by pharmacists and assessment of the use of technology to improve the safety of the medication-use system.

Of note, data from the seven stand-alone pediatric hospitals has been excluded from the general analysis to allow for their analysis as a distinct group, within a new Pediatrics Chapter. Jean Francois Bussieres, Kevin Hall and Patricia Macgregor provide a review of this specialty practice.

This report not only reflects the active contributions of our respondents from across the country, but also the insightful analysis of the Editorial Board members. Their dedication and focus is integral to the development of a report that remains pertinent and relevant to hospital leaders and practitioners. I would especially like to thank our Managing Editors, Kevin Hall and Chuck Wilgosh, whose attention to detail and oversight of both the survey process and report development are invaluable. Two of our long-time board members, Patricia Lefebvre and Michele Babich, will be retiring from the board in June 2013. Patricia brought with her a wealth of experience both from her role as the first Pharmacist-in-Chief of the McGill University Health Centre and her active involvement in governmental advisory groups, interdisciplinary committees, and professional associations. Michele provided great insight from her role as Director of Pharmacy Services for the Vancouver Island Health Authority. We will miss both their wisdom and sense of humour at our editorial table. I would also like to acknowledge the contributions of Iain Smith, our board member previously representing the Atlantic provinces, who resigned earlier this year after assuming the demanding role of Director of Pharmacy Services for Health PEI. We wish him well in his new responsibilities.

The success of the survey also reflects the ongoing support of Eli Lilly Canada. On behalf of the board, I would like to express my appreciation to Linda Chow, who provided active support from Eli Lilly over the past 4 years and acknowledge the ongoing active involvement of France Dube, another valued member of the Lilly support team. Last, but not least, a number of individuals provide the backbone support for the creation of the report. Paul Oeltjen collects and analyzes the data for the editors, Marjorie Robertson provides administrative support and designs the final layout of the chapters, and George Horne electronically publishes the results. Without their contributions the report would not be possible.

On behalf of the editorial board, we present to you this latest report on the state of hospital pharmacy practice in Canada with the hope that the data contained within will support our profession's continued self-assessment to inform further improvement. Mahatma Gandhi's quote is a fitting call to arms with regards to our profession: "Be the change that you wish to see in the world."

[1] Ontario Ministry of Health and Long-term Care. Excellent Care for All Act, June 2010. http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_10e14_e.htm

[2] Don Drummond, Commission on the Reform of Ontario's Public Services, 2012. http://www.fin.gov.on.ca/en/reformcommission/

[3] Ontario Regulation 302/12, The Ontario Gazette, Oct 20, 2012 (pages 1538-44). http://www.gov.on.ca/ontprodconsume/groups/content/@onca/@so/@gazette/documents/document/ont06_027964.pdf

[4] CIHI. (2011). National Health Expenditure Trends, 1975-2011. https://secure.cihi.ca/free_products/nhex_trends_report_2011_en.pdf

[5] Management Committee, Moving Forward:Pharmacy Human Resources for the Future. Final Report. Ottawa, Ontario. Canadian Pharmacists Association; (2008)

Data Collection Methodolgy

Paul Oeltjen

An initial list of hospital pharmacies was prepared based on respondents to previous surveys, hospital pharmacies identified by the members of the Editorial Board of the Hospital Pharmacy in Canada Annual Report, hospital pharmacies on the mailing list of the Hospital Pharmacy in Canada Annual Report, and the membership list of the Association of Canadian Academic Healthcare Organizations (ACAHO). The Editors were responsible for verifying the current name and e-mail address of the Director of Pharmacy and the hospital's Chief Executive Officer for each facility on the list from the province(s) that they represent. At this point, the Editors also attempted to confirm each hospital's eligibility to participate in the survey, based on the qualifying criteria of 50 or more acute beds.

A final list of 225 hospitals was then prepared, based on the information collected. It was later learned that 6 of these hospitals had fewer than 50 acute beds and therefore did not qualify. Among the 219 potentially qualified hospitals there were 45 teaching hospitals that were members of the ACAHO, 7 of these were pediatric hospitals.

The Hospital Pharmacy in Canada survey was announced in e-mails sent to Directors of Pharmacy and to CEOs of the initial selection of hospitals on May 9 and May 18, 2012. A second e-mail was sent only to the Directors of Pharmacy on May 22 and May 29, 2012. This e-mail contained the identification code and the password required to log on to the survey web site. During the following weeks, the editors followed up with potential respondents to ensure that the identification codes and passwords were received, and to encourage the potential respondents to participate in the 2011/12 survey. On June 3, June 25, July 8 and July 15, 2012 reminder notices were emailed to Directors of Pharmacy who had not completed the on-line survey, asking them to participate in the survey. In addition, in early July the editors (listed on Page iii of this report) contacted hospital pharmacies that had not yet responded, in order to explain the importance of participation in this national survey.

The respondent identification code and the password enabled a respondent to log on to the survey website at any time and to complete any part of the questionnaire in English or in French. The first page of the website contained instructions for completing the survey. The survey questions were distributed over 11 web pages. From any page a respondent was able to move to any other page of the online survey. At the beginning of every webpage there was a list of definitions of terms used in the questions on that page. These definitions also popped up when the mouse cursor was moved over one of these terms in the text of the question. Online survey completion was interactive. If a follow-up question was applicable because of the answer to a screening question, the on-line program presented a modified version of the questionnaire page that included additional questions. After saving their responses for the current page, the program warned respondents if they had had entered non-numeric information in fields that required numeric answers. To avoid problems resulting from an inconsistent use of periods or commas for decimal indicators, numeric information requiring a decimal place had to be entered in two fields, one for the whole number part and another one for the decimal part of the number.

After the survey website was closed for survey participation, a new site was created, for the exclusive use of the Managing Editors. This review site included all data that had been entered by the 180 respondents who had logged on, entered, and saved responses to questions on more than two of the 11 web pages by July 30, 2012. After selecting a responding hospital pharmacy for review, a managing editor was presented with a summary page showing 20 different ratios (for example: calculated occupancy rate, budgeted staff hours per inpatient day). If a ratio looked unreasonable the responding hospital was contacted for an explanation, or the corresponding answers were excluded from the analysis. After the review was completed, four hospitals were excluded from the analysis because there were not enough answers (fewer than 30% of the number of answers provided by the respondent with the most answers) or too many of their answers were inconsistent or outside a reasonable range. The remaining 176 hospital pharmacies were considered qualified respondents. Using the 219 potentially qualified hospitals who were invited to participate in the survey, the resulting response rate was then 80%. The actual response rate may be higher because it is not known if those hospitals who never logged on to the survey website or who never answered any question were hospitals with fewer than 50 acute beds, which were not qualified to participate in the survey.

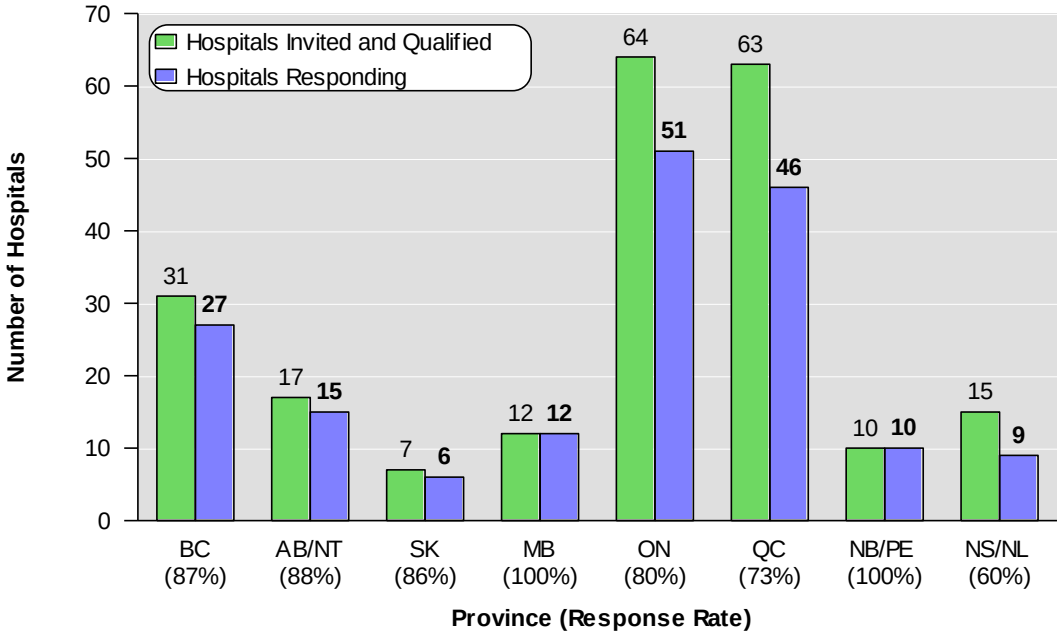
A - Demographics

Emily Musing

The 2011/12 survey response rate of 80% (176/219) was higher than the 2009/10 response rate of 72% (160/222). This reflects increased participation by respondents from Quebec 73% (46/63) compared to 56% (35/63) in 2009/10. For the first time, this report includes data collected from a response from the Northwest Territories. Unfortunately, however, organizations from Newfoundland/Labrador are not represented this year.

The breakdown with respect to the proportion of respondents in each of the three bed size categories (50 to 200 beds, 201 to 500 beds, and greater than 500 beds) was similar to that of the 2009/10 survey with a slight increase related to the number of respondents from organizations with 50 to 200 beds and with greater than 500 beds. The proportion of beds from smaller hospitals (50 to 200 bed hospitals) continue to represent only a small percentage of the total beds captured by this survey. Hospitals of 50 to 200 beds accounted for 9% of the overall acute care bed total in 2011/12, compared to 8% in 2009/10. There was also little change in the mix of teaching and non-teaching organizations which has remained fairly consistent since the report adopted the use of the Association of Canadian Academic Healthcare Organizations (ACAHO) definition of teaching status. This year, 75% of respondents were from non-teaching organizations and 25% from teaching organizations compared to 73% and 27% respectively for 2009/10.

Figure A-1. Response to the Survey by Province 2011/12



Note: Total number of respondents = 176 (including 7 pediatric hospitals)

The proportion of respondents from each province or region, as shown on Figure A-1, was very similar to previous surveys, with the exception of Quebec (QC) which rose from 22% (35/160) of total respondents in 2009/10 to 26% (46/176) of total respondents in 2011/12.

As highlighted in previous Hospital Pharmacy in Canada Reports, due to the potential variation in respondents between the current survey compared to those in past years, readers are reminded that changes in overall hospital metrics cannot be interpreted as a trend when analyzing results from this survey

Hospital demographic information presented in Table A-1 represents the average of reported data from hospitals with at least 50 acute care beds.

Table A-1. Hospital Demographic Data – Acute and Non-Acute-Care Beds 2011/12

	---	Hospital Type		Bed Size			Teaching		Region				
	All	Adult	Pediatric	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	(176)	(169)	(7)	(45)	(88)	(430	(45)	(131)	(27)	(33)	(51)	(46)	(19)
Beds - acute care	**50,549**	**48,883**	**1,666**	**4,791**	**20,827**	**24,931**	**23,967**	**26,582**	**6,694**	**10,789**	**15,287**	**13,494**	**4,285**
Beds - non-acute care	**19,630**	**19,567**	**63**	**1,301**	**7,852**	**10,477**	**2,625**	**17,005**	**4,117**	**1,466**	**3,415**	**9,492**	**1,140**
(n=)	(169)	(162)	(7)	(44)	(84)	(41)	(45)	(124)	(26)	(32)	(51)	(42)	(18)
Average length of inpatient stay - acute care (days)	**7.2**	**7.3**	**5.8**	**6.5**	**7.5**	**7.3**	**7.3**	**7.2**	**8.4**	**7.3**	**5.7**	**8.1**	**7.8**

Base: all respondents

- The average reported number of acute care beds was 287, showing a decrease compared to 294 in the previous report. The average number of non-acute care beds, reported as 112 similarly was less than the 140 reported in 2009/10.
- The total number of beds included in this survey was 70,179, of which 50,549 were acute care beds and 26,592 were in teaching hospitals. The relative comprehensiveness of the sample in this survey can be demonstrated by comparing to nationally reported statistics. The Canadian Institute for Health Information (CIHI)[1] reported that there were 115,120 beds staffed and in operation in Canada in 2002/03, of which 29,237 beds were in teaching hospitals. In comparison, 2010/11 data from CIHI[2] indicate there were 76,280 beds staffed and in operation in Canada with 21,846 in teaching hospitals but unfortunately data from Quebec and Nunavut were not captured in these latest statistics.
- Average length of stay of 7.2 has remained virtually constant for the past 2 surveys (7.1 from 2009/10 and 7.2 from the 2007/08 survey). Note that this year's survey did not include a question regarding acute care admissions.

[1] Hospital Trends in Canada: Results of a Project to Create a Historical Series of Statistical and Financial Data for Canadian Hospitals Over Twenty-Seven Years, 2005, CIHI, Ottawa Ontario

[2] Hospital Beds Staffed and in Operation, Fiscal Year 2010-2011, Canadian Management Information System Database, CIHI, Ottawa, Ontario

B – Clinical Pharmacy Practice

Jean-Francois Bussieres

Introduction

In this chapter of the Hospital Pharmacy in Canada Report, the focus is on patient-centred (clinical) pharmacy activities. A good case can be made, based on the data that will be presented in this chapter, that the role of pharmacists in the hospital practice setting in Canada has passed the tipping point and is now primarily focused on patient-centred responsibilities and accountabilities. Although drug distribution activities remain an important component of overall pharmacy services, pharmacy technicians have largely assumed responsibility for drug distribution activities in many hospitals, and that trend is likely to continue until pharmacists play only a minimal role in the drug distribution system. Pharmacy practice, in the context of what hospital pharmacists do on a day to day basis, is now primarily "clinical" in nature.

Since our last report there have been a number of developments and publications which are relevant to the survey data that will be presented in this chapter. In the keynote address given by Dr Linda Strand at a 2012 American College of Clinical Pharmacists (ACPP) meeting, she stated that that "*there is a need for a comprehensive and consistent practice model for clinical pharmacists, particularly at a time when health care systems are being reformed and the essential health care team members who deliver high-quality, cost-effective, patient-centered services are being identified.*[1] Reflecting on the variability of clinical pharmacists' approaches to providing clinical pharmacy services, she further commented that the contributions of clinical pharmacists to patient care are often difficult to define. She also noted that this variability might pose a challenge to the profession as it seeks to define discipline-specific patient care roles and responsibilities, for which reimbursement would be provided. Dr. Strand identified five components for defining pharmacy-specific patient care roles.[1]

1. the service must be described simply, in terms of what it does for the patient;
2. the service must be based on standards of care, so that it can be delivered consistently from one practitioner to the next and from one patient to the next;
3. the service must integrate with the rest of the health care team in terms of consistent terminology, philosophy, care process, and standards of practice;
4. the service must be able to generate measureable results that are reproducible; and
5. the service must be paid for the same way as other patient care is reimbursed.

If patient-centred care is becoming the norm in Canadian healthcare organizations, what should be done to train and empower pharmacists to spend the majority of their time at the bedside, delivering the kind of consistent, reproducible and measureable services which Dr. Strand referred to? In the United States (US), entry-level Pharm D programs have been in place nationwide since 2000-2001. A quarter of the undergraduate Pharm. D. curriculum involves experiential training, in which pharmacy students are directly involved in the delivery of care. In 2012, the ACCP published a commentary on the importance of students providing direct patient care services during the student's advanced experiential rotations.[2] ACCP believes that students in training should engage in high-quality patient care experiences and assume responsibility and accountability for drug therapy outcomes. Mersfelder et al. conducted a review of the literature about the value of pharmacy students involved in experiential practice sites[3] and concluded that recommendations made by pharmacy students had high acceptance rates. Furthermore, during their pharmacy practice experiences, students generally confer economic and clinical benefits to the practice site, as well as developing their own clinical practice skills. This type of experiential training is an important strategy for providing students with the knowledge and confidence needed to practice in a patient-centred practice model.

In Canada, at its 2010 Annual General Meeting, the Association of Faculties of Pharmacy of Canada adopted educational outcomes for entry-to-practice Pharmacy programs (first professional degree programs) in Canada.[4] Based on these recommendations, the revised educational outcomes are formatted with the overall goal of graduating Medication Therapy Experts. "This requires graduates to integrate knowledge, skills and attitudes from

seven educational outcomes which have been defined under the roles of: Care Provider, Communicator, Collaborator, Manager, Advocate, Scholar, and Professional. Emphasis is placed on the multiple roles of graduates through explicit statements within the appropriate educational outcomes".[4]

In 2011, the Canadian Pharmacists Association (CPhA) revised its position statement on entry-to-practice degree programs, and now supports the doctor of pharmacy degree as the desired entry-level training required to practice the profession of pharmacy.[5] The CPhA, the Canadian Society of Hospital Pharmacists (CSHP), and other pharmacy organizations, working together through the "Blueprint for Pharmacy" initiative, have developed a vision for pharmacy, - "*optimal drug therapy outcomes for Canadians through patient-centred care*". Models of pharmacy learning must evolve in order for members of the profession to achieve the vision for pharmacy. There is now a groundswell of support from pharmacy organizations and individual pharmacists for the 2010 position statement and joint resolution of the Association of Faculties of Pharmacy of Canada (AFPC), and the Association of Deans of Pharmacy of Canada (ADPC), for replacing the current baccalaureate degree programs with the Doctor of Pharmacy (PharmD) as the first professional degree/entry to practice degree offered by Canadian universities by 2020. At the time of the writing of this report, at least four Canadian faculties of pharmacy have received approval to offer an entry-level Pharm. D. program (the University of Montreal – first graduates in 2011, University Laval – first graduates in 2015, University of Toronto – first graduates expected by 2018, and the University of Waterloo – first graduates expected by 2018).

Finally, advanced clinical pharmacy practice should be provided by appropriately trained and certified pharmacists. Ariano and Loewen have discussed the pros and the cons of having a requirement that all pharmacists responsible for pharmacotherapeutic management of patients with complex or special drug therapy needs must be certified by an external body (e.g. Board of Pharmacy Specialties).[6] In Canada, there is no consensus concerning how advanced practice should be regulated. In its 2015 vision, CSHP has a goal that 100% of new pharmacists entering hospital and related healthcare setting practice will have completed a Canadian Hospital Pharmacy Residency Board (CHPRB)-accredited residency. Respondents to the 2011/2012 survey indicated that only 20% of respondents have reached that goal. In Quebec, the Ordre des pharmaciens du Québec, has published an update of its formal request to establish a specialist certification program for pharmacists who have completed a post-graduate masters degree in advanced pharmacotherapy (previously named master in pharmacy practice).[7] Such recognition for appropriately trained and certified pharmacists providing advanced pharmacotherapy services would mirror the certification processes used by other health care professions, such as medicine and surgery, for the certification of specialists.

Structured Patient Care Programs

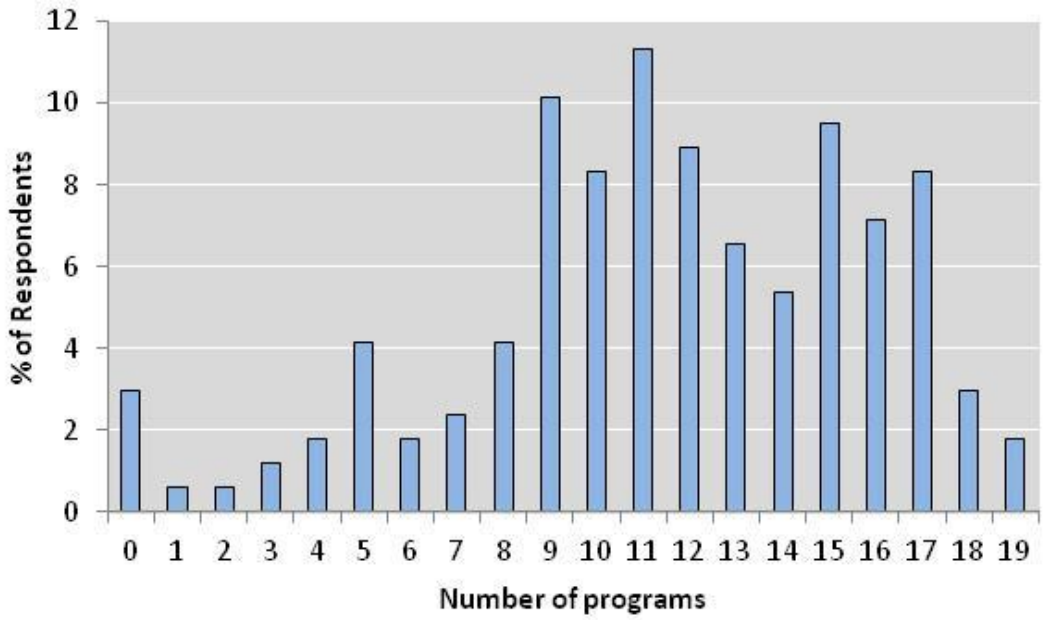
A definition of a "patient care program" was included in the 2007/08 and 2009/10 surveys. A patient care program was defined as:

> *"a healthcare delivery system that is formally structured around a group of patients with similar healthcare needs (e.g. child health program, mental health program, critical care program, etc.). There is usually a physician and/or nurse leader/director for a formal patient care program."*

Respondents to the 2011/12 survey were asked if their facility had, or did not have, a formal patient care program for each of a number of patient groupings (e.g. general medicine patients, cardiology patients, dialysis patients, etc.). Because of this change, caution is required when comparing data in this survey, dealing with patient care programs and pharmacist involvement in those programs, with data reported in the 2005/06 and earlier surveys.

- Out of a total of 19 patient care programs, the average number of patient care programs that respondents reported having at their facility was 11.5 ± 4.4 programs [range – 0-19] with an average of 10.7 ± 5.1 programs in British Columbia (BC), 9.3 ± 4.9 programs in the Prairies, 13.0 ±3.3 programs in Ontario (ON), 12.0 ± 3.9 programs in Quebec (QC) and 10.8 ± 4.5 programs in the Atlantic Provinces.
- Figure B-1 summarizes the distribution of respondents providing formal patient care programs in 2011/12. The distribution is similar to the one observed in 2009/10. Only 3% (5/168) of respondents reported no formal patient care programs.

Figure B-1. Respondents Providing Formal Patient Care Programs 2011/12



Base: All respondents (n=168)

After respondents had indicated that they had a specific formal patient care program at their hospital, they were then asked to indicate if they had a pharmacist(s) assigned to that program for inpatient and/or outpatient services. Formal assignment of a pharmacist to a patient care program is felt to be a good indicator that a reasonable level of clinical pharmacy support is being provided to a patient care program. Granko et al. have proposed a method to determine allocation of clinical pharmacist resources.[8] Man, Mahasa, Wang and Co discussed the pros and the cons of a cap on the number of patients under the care of clinical pharmacists in Canada.[9]

Outpatient Clinical Pharmacy Services

In the 2011/12 survey, 78% (131/168) of respondents indicated that they had a pharmacist assigned to at least one of the 17 outpatient practice areas included in the survey. This is similar to the 78% (135/160) reported in 2009/10, but lower than the 81% (134/166) reported in the 2007/08 survey. It is probable that pharmacists in some hospitals (e.g. smaller hospitals) do provide clinical pharmacy services, but in a less structured manner, without pharmacists being assigned to specific patient care programs.

- The average number of outpatient programs with an assigned pharmacist was reported by respondents to be 2.7 ± 2.4 programs [range – 0 to 10 programs] with an average of 1.7 ± 1.9 programs in BC, 1.7 ± 2.4 programs in the Prairies, 3.2 ± 2.4 programs in ON, 3.4 programs ± 2.2 in QC and 2.3 ±2.4 programs in the Atlantic Provinces.
- The percentage of hospitals that reported having a pharmacist assigned to a particular outpatient program ranged from a low of 2% for obstetrics/gynecology to 81% for haematology/oncology. (Table B-1) The distribution of outpatient programs with an assigned pharmacist is similar to 2009/10, except for infectious disease /AIDS that decreased from 57% (31/54) in 2009/10 to 39% in the 2011/12 survey.
- Among the respondents who reported that they had a pharmacist assigned to a particular outpatient care program, the percentage doing so was usually higher for respondents with teaching affiliation than for non-teaching hospitals, except for haematology/anticoagulation, hematology/oncology and mental health.
- Among the respondents who reported that they had a pharmacist assigned to the outpatient component of a patient care program, the percentage doing so was usually higher for respondents from larger bed-size hospitals (i.e. > 500 beds vs. 50-200 beds). This was particularly true for the following outpatient programs: cardiovascular/lipid, geriatrics, and diabetes. Regional differences were noted for

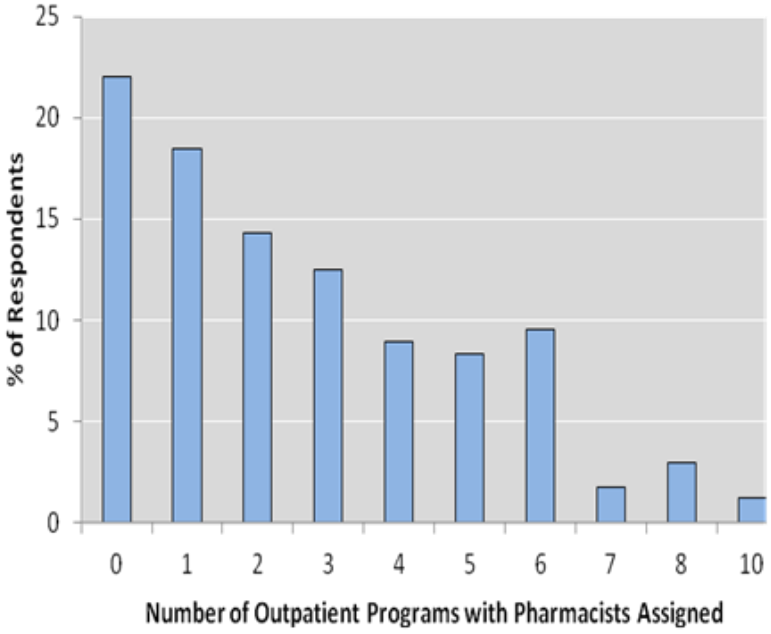
outpatient pharmacist assignment to particular outpatient care programs. Examples where there was a lower percentage of respondents in a particular region who reported having an outpatient pharmacist assigned to particular patient care programs included: haematology/oncology – 31% of respondents in the Prairies, and 64% of respondents in BC, vs. 81% nationally; haematology/anticoagulation 36% in BC, and 48% in ON, vs. 56% nationally; renal/dialysis - 41% of respondents in the Prairies vs. 66% nationally; emergency – 10% in BC , vs. 57% nationally; transplantation - 33% of respondents in BC, vs. 56% nationally; and diabetes – 0% in the Prairies and 10% in BC, vs. 34% nationally.

There are significant regional differences in the outpatient programs that have clinical pharmacists support

Table B-1 summarizes the profile of pharmacist assignment to outpatient care programs in 2011/12.

Figure B-2 illustrates the number of outpatient programs with pharmacists assigned to the program.

Figure B-2. Respondents Providing Outpatient Clinical Pharmacy Services 2011/12



Base: All respondents (n=168)

Table B-1. Pharmacist Assignment to Outpatient Programs 2011/12

	All	Bed size			Teaching Status		Regions				
		50-200	201-500	> 500	Teaching	Non-Teach	BC	Prai	ON	QC	Atl
Hospitals (n=)	(168)	(41)	(84)	(43)	(38)	(130)	(26)	(31)	(49)	(44)	(18)
Hematology-oncology											
program exists	113	21	54	38	29	84	14	13	35	37	14
pharmacists assigned	91	13	50	28	22	69	9	4	31	37	10
	81%	**62%**	**93%**	**74%**	**76%**	**82%**	**64%**	**31%**	**89%**	**100%**	**71%**
Hematology/anticoagulation											
program exists	71	8	33	30	24	47	11	11	23	24	2
pharmacists assigned	40	3	18	19	13	27	4	9	11	14	2
	56%	**38%**	**55%**	**63%**	**54%**	**57%**	**36%**	**82%**	**48%**	**58%**	**100%**
Infectious Disease / AIDS											
program exists	66	6	25	35	28	38	9	8	29	15	5
pharmacists assigned	26	0	10	16	19	7	5	4	8	6	3
	39%	**0%**	**40%**	**46%**	**68%**	**18%**	**56%**	**50%**	**28%**	**40%**	**60%**
Renal / Dialysis											
program exists	90	13	41	36	28	62	10	17	26	26	11
pharmacists assigned	59	2	30	27	22	37	7	7	20	18	7
	66%	**15%**	**73%**	**75%**	**79%**	**60%**	**70%**	**41%**	**77%**	**69%**	**64%**
Emergency											
program exists	147	31	73	43	37	110	21	25	46	42	13
pharmacists assigned	84	9	45	30	30	54	2	11	32	31	8
	57%	**29%**	**62%**	**70%**	**81%**	**49%**	**10%**	**44%**	**70%**	**74%**	**62%**
Transplantation											
program exists	25	1	7	17	23	2	3	6	7	6	3
pharmacists assigned	14	0	4	10	14	0	1	4	3	4	2
	56%	**0%**	**57%**	**59%**	**61%**	**0%**	**33%**	**67%**	**43%**	**67%**	**67%**
Diabetes											
program exists	89	13	46	30	22	67	10	6	32	34	7
pharmacists assigned	30	1	14	15	11	19	1	0	10	17	2
	34%	**8%**	**30%**	**50%**	**50%**	**28%**	**10%**	**0%**	**31%**	**50%**	**29%**
Cardiovascular / lipid											
program exists	82	4	41	37	32	50	12	11	29	22	8
pharmacists assigned	27	0	11	16	12	15	4	6	7	8	2
	33%	**0%**	**27%**	**43%**	**38%**	**30%**	**33%**	**55%**	**24%**	**36%**	**25%**
Geriatrics											
program exists	105	8	63	34	28	77	19	12	28	37	9
pharmacists assigned	19	0	10	9	7	12	3	3	8	3	2
	18%	**0%**	**16%**	**26%**	**25%**	**16%**	**16%**	**25%**	**29%**	**8%**	**22%**
Asthma / Allergy											
program exists	49	2	21	26	20	29	5	3	15	22	4
pharmacists assigned	6	0	2	4	4	2	2	1	0	1	2
	12%	**0%**	**10%**	**15%**	**20%**	**7%**	**40%**	**33%**	**0%**	**5%**	**50%**
Pain / palliative care											
program exists	109	21	55	33	30	79	18	14	33	29	15
pharmacists assigned	10	1	5	4	3	7	4	0	1	5	0
	9%	**5%**	**9%**	**12%**	**10%**	**9%**	**22%**	**0%**	**3%**	**17%**	**0%**
Mental Health											
program exists	129	20	68	41	33	96	18	18	43	35	15
pharmacists assigned	14	2	7	5	3	11	1	2	9	1	1
	11%	**10%**	**10%**	**12%**	**9%**	**11%**	**6%**	**11%**	**21%**	**3%**	**7%**
General Surgery											
program exists	144	31	70	43	35	109	21	23	45	40	15
pharmacists assigned	12	1	7	4	3	9	0	0	9	2	1
	8%	**3%**	**10%**	**9%**	**9%**	**8%**	**0%**	**0%**	**20%**	**5%**	**7%**
Neurology											
program exists	48	2	21	25	23	25	6	6	19	12	5
pharmacists assigned	2	0	2	0	1	1	0	1	1	0	0
	4%	**0%**	**10%**	**0%**	**4%**	**4%**	**0%**	**17%**	**5%**	**0%**	**0%**
General Medicine											
program exists	142	31	69	42	35	107	21	22	45	39	15
pharmacists assigned	11	0	6	5	4	7	0	1	7	3	0
	8%	**0%**	**9%**	**12%**	**11%**	**7%**	**0%**	**5%**	**16%**	**8%**	**0%**
Gynecology / Obstetrics											
program exists provided	125	26	61	38	27	98	19	20	41	34	11
pharmacists assigned	3	0	1	2	1	2	1	1	0	1	0
	2%	**0%**	**2%**	**5%**	**4%**	**2%**	**5%**	**5%**	**0%**	**3%**	**0%**
Rehabilitation											
program exists	87	17	42	28	19	68	15	12	33	17	10
pharmacists assigned	3	0	1	2	2	1	1	0	2	0	0
	3%	**0%**	**2%**	**7%**	**11%**	**1%**	**7%**	**0%**	**6%**	**0%**	**0%**

Base: all respondents

Inpatient Clinical Pharmacy Services

- In the 2011/12 survey, 88% (147/168) of respondents indicated that they had a pharmacist assigned to at least one of the 18 inpatient programs included in the survey. This is similar to the 89% (143/160) reported in the 2009/10 report and the 92% (152/166) reported in the 2007/08 report.
- The average number of inpatient care programs with an assigned pharmacist was reported by respondents to be 6.4 programs [range of 0-17 programs] with an average of 6.2 ± 4.4 in BC, 5.0 ± 4.3 in the Prairies, 9.1 ± 4.2 in ON, 4.6 ± 3.3 in QC and 5.8 ± 3.7 in the Atlantic Provinces.
- The proportion of hospitals that reported having a pharmacist assigned to a particular inpatient program (Table B-2) ranged from a low of 11% for diabetes, to a high of 85% for transplantation. The distribution of inpatient programs with an assigned pharmacist is similar to the 2009/10 results except for hematology – oncology, which decreased from 72% (76/106) in 2009/10 to 62% in the 2011/12 survey and for gynecology/obstetrics that decreased from 49% (58/119) in 2009/10 to 39% in the 2011/12 survey.
- Among the respondents who reported that they had a pharmacist assigned to particular patient care programs, the proportion offering this service was usually higher for respondents from teaching facilities than for non-teaching facilities. This was particularly true for the following clinical pharmacy services: cardiovascular/lipid, mental health, transplantation, hematology/oncology and adult critical care. More non-teaching hospitals (45%) than teaching hospitals (33%) reported pharmacist supported hematology/anticoagulation programs.

Not surprisingly, large hospitals and teaching hospitals were more likely to have a pharmacist assigned to a particular inpatient program.

- Among the respondents who reported that they had a pharmacist assigned to particular patient care programs, the proportion offering this service was usually higher for respondents from larger bed-size hospitals (e.g. > 500 beds vs. 50-200 beds). This was particularly true for the following clinical pharmacy services: hematology/oncology and asthma/allergy. The 50-200 beds hospitals had a higher percentage of pharmacists assigned to the following inpatient programs: hematology/anticoagulation, asthma/allergy and neurology.
- Regionally, there was usually a lower proportion of respondents in the Atlantic Provinces and QC who reported that pharmacists were assigned to inpatient care programs. The lower proportions in QC may be related to the vacancy rates for pharmacists in QC, which remain considerably higher than the pharmacist vacancy rates in other regions.
- There were regional differences in the percentage of respondents that reported having pharmacists assigned to certain inpatient programs: transplantation – 67 % in BC and the Atlantic Provinces vs. 85% nationally; geriatrics - 54% in the Prairies vs. 79% nationally; adult critical care – 61% in QC vs. 80% nationally; general medicine – 54% in QC vs. 77% nationally, haematology/oncology – 50% in BC vs. 62% nationally; cardiovascular/lipid – 45% in QC vs. 74% nationally; pediatric/neonatal critical care – 40% in QC, 53% in BC, and 57% in the Atlantic Provinces vs. 71% nationally; general surgery – 32 % in QC and 56% in the Atlantic Provinces vs. 66% nationally.

Table B-2 summarizes the profile of pharmacist assignment to inpatient programs in 2011/12.

Further evidence of the value of pharmacist involvement in patient care programs has been published since our last report, including for pharmacist services provided in the areas of medication management in primary care medical homes,[10] in emergency preparedness,[11] in diabetes,[12,13] in oncology,[14] in depression,[15] in dyslipidemia,[16] in cardiology,[17,18] in nephrology,[19,20] in osteoporosis,[21] in pain management[22] and in antimicrobial stewardship.[23]

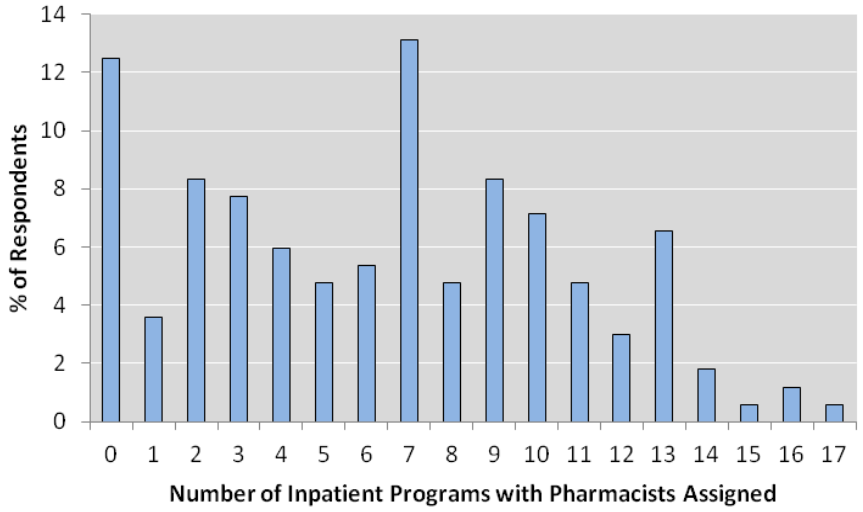
Table B-2. Pharmacist Assignment to Inpatient Programs 2011/12

	All	Bed size			Teaching Status		Region				
		50-200	201-500	> 500	Teaching	Non-Teach	BC	Prai	ON	QC	Atl
Hospitals (n=)	(168)	(41)	(84)	(43)	(38)	(130)	(26)	(31)	(49)	(44)	(18)
Geriatrics											
program exists	111	11	66	34	30	81	20	13	29	39	10
pharmacists assigned	88	9	52	27	26	62	18	7	24	31	8
	79%	**82%**	**79%**	**79%**	**87%**	**77%**	**90%**	**54%**	**83%**	**79%**	**80%**
Transplantation											
program exists	26	2	7	17	24	2	3	6	7	7	3
pharmacists assigned	22	1	6	15	21	1	2	5	7	6	2
	85%	**50%**	**86%**	**88%**	**88%**	**50%**	**67%**	**83%**	**100%**	**86%**	**67%**
Adult Critical Care											
program exists	149	28	78	43	36	113	22	24	47	41	15
pharmacists assigned	119	16	64	39	36	83	19	19	43	25	13
	80%	**57%**	**82%**	**91%**	**100%**	**73%**	**86%**	**79%**	**91%**	**61%**	**87%**
General Medicine											
program exists	154	35	77	42	38	116	22	26	49	41	16
pharmacists assigned	118	24	60	34	34	84	20	20	44	22	12
	77%	**69%**	**78%**	**81%**	**89%**	**72%**	**91%**	**77%**	**90%**	**54%**	**75%**
Hematology-oncology											
program exists	117	22	57	38	31	86	14	14	36	38	15
pharmacists assigned	73	9	34	30	26	47	7	8	21	26	11
	62%	**41%**	**60%**	**79%**	**84%**	**55%**	**50%**	**57%**	**58%**	**68%**	**73%**
Cardiovascular / lipid											
program exists	86	5	44	37	33	53	12	13	31	22	8
pharmacists assigned	64	3	34	27	30	34	9	12	28	10	5
	74%	**60%**	**77%**	**73%**	**91%**	**64%**	**75%**	**92%**	**90%**	**45%**	**63%**
Ped/Neonatal Critical care											
program exists	84	12	41	31	24	60	15	14	38	10	7
pharmacists assigned	60	7	29	24	21	39	8	11	33	4	4
	71%	**58%**	**71%**	**77%**	**88%**	**65%**	**53%**	**79%**	**87%**	**40%**	**57%**
Infectious disease / AIDS											
program exists	68	6	27	35	29	39	9	8	31	15	5
pharmacists assigned	47	2	21	24	23	24	5	3	27	9	3
	69%	**33%**	**78%**	**69%**	**79%**	**62%**	**56%**	**38%**	**87%**	**60%**	**60%**
Pain / palliative care											
program exists	117	25	59	33	32	85	18	18	36	30	15
pharmacists assigned	64	14	32	18	17	47	8	9	22	16	9
	55%	**56%**	**54%**	**55%**	**53%**	**55%**	**44%**	**50%**	**61%**	**53%**	**60%**
General Surgery											
program exists	153	35	75	43	37	116	22	25	49	41	16
pharmacists assigned	101	19	51	31	28	73	17	17	45	13	9
	66%	**54%**	**68%**	**72%**	**76%**	**63%**	**77%**	**68%**	**92%**	**32%**	**56%**
Mental Health											
program exists	134	21	72	41	35	99	18	20	45	36	15
pharmacists assigned	81	10	43	28	27	54	10	10	37	15	9
	60%	**48%**	**60%**	**68%**	**77%**	**55%**	**56%**	**50%**	**82%**	**42%**	**60%**
Rehabilitation											
program exists	91	17	46	28	20	71	16	12	34	18	11
pharmacists assigned	57	11	29	17	12	45	9	5	29	7	7
	63%	**65%**	**63%**	**61%**	**60%**	**63%**	**56%**	**42%**	**85%**	**39%**	**64%**
Neurology											
program exists	49	2	22	25	23	26	6	6	20	12	5
Pharmacists assigned	30	2	15	13	15	15	3	5	16	2	4
	61%	**100%**	**68%**	**52%**	**65%**	**58%**	**50%**	**83%**	**80%**	**17%**	**80%**
Renal / dialysis											
program exists	92	15	41	36	28	64	11	18	26	26	11
Pharmacists assigned	47	6	20	21	18	29	8	10	16	8	5
	51%	**40%**	**49%**	**58%**	**64%**	**45%**	**73%**	**56%**	**62%**	**31%**	**45%**
Gynecology / obstetrics											
program exists	132	28	66	38	28	104	20	21	45	34	12
Pharmacists assigned	52	10	27	15	13	39	7	6	33	3	3
	39%	**36%**	**41%**	**39%**	**46%**	**38%**	**35%**	**29%**	**73%**	**9%**	**25%**
Hematology/anticoagulation											
program exists	73	9	34	30	24	49	11	13	23	24	2
Pharmacists assigned	30	6	13	11	8	22	7	5	13	4	1
	41%	**67%**	**38%**	**37%**	**33%**	**45%**	**64%**	**38%**	**57%**	**17%**	**50%**
Asthma / allergy											
program exists	49	2	21	26	20	29	5	3	15	22	4
Pharmacists assigned	10	2	1	7	5	5	3	1	6	0	0
	20%	**100%**	**5%**	**27%**	**25%**	**17%**	**60%**	**33%**	**40%**	**0%**	**0%**
Diabetes											
program exists	88	13	45	30	21	67	10	6	31	33	8
Pharmacists assigned	10	1	7	2	3	7	1	1	6	2	0
	11%	**8%**	**16%**	**7%**	**14%**	**10%**	**10%**	**17%**	**19%**	**6%**	**0%**

Base: all respondents

Figure B-3 illustrates the number of inpatient programs with pharmacists assigned to the program.

Figure B-3. Respondents Providing Inpatient Clinical Pharmacy Services 2011/12



Base: All respondents (n=168)

Pharmacy Practice Models

ASHP and the ASHP Foundation have established a Pharmacy Practice Model Initiative (PPMI) that has included a consensus summit in November 2010, a marketing campaign, a website and program evaluations[24]. *"The goal of this initiative is to significantly advance the health and well- being of patients by developing and disseminating a futuristic practice model that supports the most effective use of pharmacists as direct patient care providers".* The PPMI website includes examples of innovative practice models that have been implemented as well as other relevant resources.[24]

ACCP also published a white paper on acute care practice models where they compare "unit-based" and "service-based" orientation of clinical pharmacists within an acute care pharmacy practice model[25]. A unit-based pharmacist is usually in a position of reacting to an established order or decision and frequently is focused on task-oriented clinical services, while a service-based clinical pharmacist functions as a member of the interprofessional team. ACCP believes that as a team member, pharmacists proactively contribute to the decision-making process and the development of patient-centered care plans. *"The service-based orientation of the pharmacist is consistent with both the practice vision embraced by ACCP and its definition of clinical pharmacy. The task force strongly recommends that institutions pursue a service-based pharmacy practice model to optimally deploy their clinical pharmacists".*[25]

Considering the practice model definitions that have been developed by ACCP and ASHP the Hospital Pharmacy in Canada (HPC) board developed practice model descriptions that are used in the HPC Report. Four practice models were defined and respondents were asked to indicate the practice model used by their department, the percentage of inpatient beds served by each model, and the percentage of pharmacists in their hospital that were practicing under each model. The practice model definitions were:

Drug distribution centred model - Pharmacists largely function in a drug distribution role, with limited clinical services being provided. Clinical activities are largely limited to pharmacy interventions that occur as a result of drug order review in the central pharmacy.

Separate clinical and distributive practice model - Pharmacists are divided into two groups. One group largely provides distributive services while the second group largely functions in clinical roles. Those pharmacists who largely function in clinical roles have little or no distributive responsibilities, either in the central pharmacy or in satellite pharmacies.

Clinical practice centred model– Nearly all pharmacists function largely in clinical roles, with less than 20% of their time spent in a distributive role. Pharmacy technicians and/or automation are largely responsible for distributive activities.

Integrated drug distribution/clinical practice model - Nearly all pharmacists have a balance of both distributive and clinical responsibilities. It may include a balanced mix of both distributive and clinical responsibilities during each shift, or a rotation through distributive and clinical shifts.

- In the 2011/12 survey, 94% (159/169) of respondents provided information on the clinical practice models in place within their hospital, which is similar to the 95% (152/160) from the 2009/10 survey.
- Not surprisingly, many hospitals use more than one practice model. The percentage of respondents who use each pharmacy practice model, either for all beds or for a portion of all beds in their facility varied, with 66% (105/159) of respondents reporting that they use the integrated drug distribution/clinical practice model, 48% (77/159) of respondents reported using the drug distribution centred model, 37% (59/159) reported using clinical practice centred model and 18% (29/159) reported using the separate clinical and drug distribution practice model.
- The percentage of inpatient beds covered by the drug distribution centred practice model is higher in smaller hospitals (38% in 50-200 beds vs. 22 % in 201-500 beds vs. 22 % in > 500 beds), and in non-teaching hospitals (28 % in non-teaching vs. 16% in teaching).
- Regional differences were noted, with a lower proportion of inpatient beds covered by the integrated drug distribution/clinical practice model in QC (36%) and the Atlantic Provinces (40%) vs. nationally (49%). The percentage of inpatient beds covered by a clinical practice centred model is higher in ON (32%) and QC (21%) vs. nationally (18%).

Although the integrated drug distribution/clinical practice model is the most common, percent of beds covered by the clinical practice centred model is significant.

- In the 2011/12 survey, 49% (77/157) of respondents indicated that they reviewed their pharmacy practice model in the past 12 months and 53% (41/77) of these indicated that they have plans to change their pharmacy practice model.
- The sum of the percentages of pharmacists who practice under the integrated drug distribution/clinical practice model (51%) and the clinical practice centred model (20%) is 71%, which reinforces our comment at the start of this chapter in which we stated that the tipping point has been passed in hospital practice, with 71% of hospital pharmacy practitioners now spending at least 50% of their time performing patient-centred activities.

Table B-3 summarizes the types of clinical pharmacy practice models.

Table B-3. Pharmacy Practice Models 2011/12

	All	Bed Size			Teaching Status		Region				
		50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	Prai	ON	QC	Atl
(n=)	(159)	(39)	(79)	(41)	(34)	(125)	(25)	(26)	(48)	(44)	(16)
Drug distribution centred model											
Mean % inpatient beds	26%	38%	22%	22%	16%	28%	16%	34%	12%	38%	36%
Mean % pharmacists	**22%**	**38%**	**18%**	**15%**	**9%**	**26%**	**14%**	**26%**	**11%**	**33%**	**34%**
Predominant model	2%	0%	0%	8%	0%	3%	0%	0%	0%	10%	0%
Separate clinical and distributive practice model											
Mean % of inpatient beds	8%	3%	10%	10%	5%	9%	24%	8%	1%	7%	8%
Mean % pharmacists	**8%**	**3%**	**10%**	**10%**	**7%**	**9%**	**23%**	**7%**	**1%**	**8%**	**8%**
Predominant model	7%	13%	10%	0%	0%	9%	0%	0%	6%	10%	33%
Integrated drug distribution / clinical practice model											
Mean % of inpatient beds	49%	47%	51%	47%	53%	48%	56%	57%	56%	36%	40%
Mean % of pharmacists	**51%**	**49%**	**52%**	**51%**	**58%**	**49%**	**57%**	**65%**	**56%**	**37%**	**41%**
Predominant model	44%	50%	43%	42%	38%	45%	40%	80%	39%	50%	0%
Clinical practice centred model											
Mean % of inpatient beds	18%	11%	19%	23%	25%	16%	6%	1%	32%	21%	17%
Mean % of pharmacists	**20%**	**10%**	**21%**	**25%**	**27%**	**18%**	**7%**	**1%**	**33%**	**24%**	**18%**
Predominant model	46%	38%	48%	50%	63%	42%	60%	20%	56%	30%	67%

Base: Respondents with complete answers to questions about clinical practice model

As noted earlier, the American College of Clinical Pharmacy has taken a somewhat different approach to defining models of clinical pharmacy practice. They argue that there is a reactive model and a proactive model of practice.

Reactive model - The pharmacist primarily reacts to an established medication order or decision (referred to by ACCP as the "unit-based model")

Proactive model - The pharmacist functions as a member of the interprofessional team, proactively contributing to the decision-making process and the development of patient-centered care plans (referred to by ACCP as the "service-based model"). Inherent in this model is the assumption that the pharmacist is routinely present at the point where drug therapy decisions are being made (e.g. routine participation in interdisciplinary rounds and the provision of input into most medication therapy decisions that are made).

- In the 2011/12 survey, respondents indicated that 68 ± 30% of inpatient beds were serviced by a reactive model. This proportion was higher in non-teaching (74 ± 29%) vs. teaching (47 ± 24%) hospitals.
- In the 2011/12 survey, 37% (57/154) of respondents indicated that in the past 12 months they had reviewed their clinical practice model from the perspective of the reactive vs. proactive practice model and 72% (41/57) of respondents indicated that they have plans to change their pharmacy practice model towards a more proactive model.

In the 2011/12 survey, respondents were asked to respond to questions concerning how they prioritize the assignment of their staff to different clinical program areas.

- Forty-seven percent (78/166) of respondents reported using an approach that takes advantage of opportunities, 43% (72/166) of respondents reported using a structured approach within the pharmacy department to make that decision, and 10% (16/166) reported using a structured multidisciplinary approach for deciding where pharmacy services should be targeted.

Evaluation of Clinical Pharmacy Services

The responses to questions regarding the evaluation of clinical pharmacy services are covered in Chapter I - Evaluating Pharmacy Services.

Prescribing Rights

In Canada, the *Food and Drug Act,* the *Controlled Drugs and Substances Act* and provincial pharmacy acts define the licensed practitioners who can prescribe drugs. Pharmacists are drug experts and their right to prescribe independently or dependently has changed and evolved in the last decade. In 2009, CSHP published an information paper on prescribing by pharmacists.[26]

Independent prescribing rights refer to prescribing rights that are granted to specified healthcare professionals by the legislation governing their practice (e.g. the legislated right for a pharmacist to prescribe, often involving a set of requirements that a pharmacist must meet in order to be able to do so). Generally speaking, independent prescribing rights for pharmacists cover drugs contained in Schedule F of the *Food and Drug Act.* Prescribing of narcotics by pharmacists is not permitted under the Controlled Drugs and Substances Act.

Dependent prescribing rights refer to prescribing rights that are delegated by a legally recognized prescriber to another health professional who does not have the legal right to independently prescribe (e.g. delegation of a physician's prescribing rights to a pharmacist, usually based on a well-defined protocol to which the pharmacist must conform). Dependent pharmacist prescribing generally refers to prescribing that occurs within the context of a collaborative relationship between a pharmacist and a physician.

In November, 2010, ACCP published a task force report on optimal medication therapy prescribing and management.[27] The task force proposed a vision for the pharmacist's ultimate role in patient-specific drug therapy decision-making. One of the questions addressed in the report was whether or not the pharmacist's role will evolve to the point where prescribing is primarily a pharmacist responsibility. In other words, will the current Collaborative Drug Therapy Management model (CDTM) change to one where there is a physician diagnostician and a pharmacist prescriber? In the US, the Institute of Medicine (IOM) has been critical of how pharmacists are used and not used in the current US health care system, suggesting that an expanded role for pharmacists in drug therapy decision-making (prescribing) was warranted. These are just a few of the recent developments that

challenge the pharmacy profession to move forward with future practice models that will include pharmacist prescribing.

Possession of the right to prescribe does not necessarily lead to the pharmacists exercising that right. Hutchison et al. presented the results of a survey which looked at the reasons for the slow adoption of prescribing rights by hospital pharmacists in Alberta.[28] At the time of the survey, only 52 hospital pharmacists had sought and been granted what is referred to as "additional prescribing authorization", which allows pharmacists the right to prescribe Schedule F drugs, as long as the use of those drugs falls within the pharmacist's area of practice expertise. Interestingly, additional prescribing authorization is adopted more often by pharmacists whose primary focus is ambulatory care, than those practicing in the inpatient setting.

Schindel et al. analysed newspaper coverage in Canada of pharmacists' new prescribing role.[29] The results suggested that there was considerable variability in the way that pharmacist prescribing was portrayed and understood. Pharmacists and pharmacy organizations need to bring clarity and consistency to the public and professional understanding of what pharmacist prescribing involves, how the public interest is served by pharmacists providing the service (convenience and cost-saving) and the expertise possessed by pharmacists that enables them to provide patients with safe and effective access to prescription medications. Nissen also commented on the prescribing role of pharmacists.[30]

In 2011, CPhA published its position statement on pharmacist prescribing.[31] That statement recognized that "*pharmacists have long had a prescriber role in the institutional setting in Canada, where they make significant contributions to the quality of drug therapy and patient outcomes by initiating, monitoring and adjusting drug therapy. In the community setting, pharmacists assess and triage patients for chronic and self-limiting conditions, and assess, recommend and monitor prescription and nonprescription drug therapy for thousands of Canadians each day*".[31] CPhA also stated that "*all decisions related to medication management, including prescribing, must be collaborative, patient-centred, and focused on addressing the health care needs of the patient*".[31] The Blueprint for pharmacy website provides a province-by-province comparison of the scope of practice that pharmacists possess, including prescribing rights.[32] In May 2012, Marie Berry published an update on that topic in her Canadian Pharmacy Law book.[33]

The 2011/12 survey included a number of questions related to pharmacist prescribing rights.

- The number of respondents reporting that pharmacists have prescribing rights approved within their hospital remained constant at 55% in 2009/10 (88/159) and 2011/12 (92/167).
- Regional differences were noted. Overall, the percentage of respondents reporting prescribing rights approved within their hospital was lower in the Atlantic Provinces (33%, 6/18), ON (45%, 22/49) and the Prairies (47%, 14/30), while the percentage reporting prescribing rights was higher in QC (68%, 30/44) and BC (77%, 20/26).

For hospitals reporting that prescribing rights had been approved for pharmacists within their hospitals, there was a decrease for dependent prescribing rights approved for pharmacists and an increase for independent prescribing rights. As the legal framework is evolving in most provinces to allow more pharmacists prescribing, this trend toward independent prescribing rights is likely to increase, assuming that pharmacy managers advocate effectively for this role for pharmacists within their facility.

- Dependent prescribing for dosage adjustment was reported by 64% of respondents with approved prescribing rights, similar to the 69% (59/88) in 2009/10, but lower than the 79% (78/99) in 2007/08.
- Dependent prescribing for lab tests was reported by 43% of respondents with approved prescribing rights, down from 57% (49/88) in 2009/10 and 68% (67/99) in 2007/08. Dependent prescribing for new therapy was reported by 41% (38/92) of respondents, compared with 34% (29/88) in 2009/10 and 49% (48/99) in 2007/08.

There has been a notable increase in independent prescribing rights for pharmacists.

The decrease in dependent prescribing rights has been offset by a notable increase in independent prescribing rights.

- Independent prescribing rights for lab tests was reported by 59% of respondents with approved prescribing rights in 2011/12, up from 49% (42/88) in 2009/10 and from 33% (33/99) in 2007/08.
- Independent prescribing rights for dosage adjustment was reported by 48% of respondents with approved prescribing rights, up from 42% (36/88) in 2009/10 and 24% (24/99) in 2007/08. Independent

prescribing rights for new therapy was reported by 16%, a decrease from the 21% (18/88) in 2009/10, but it remained higher than the 6% (6/99) reported in 2007/2008.

- Regional differences were noted for dependent pharmacist prescribing rights with the highest percentages reported by respondents in ON for dosage adjustment (91%, 20/22) and for lab tests (77%, 17/22), and by respondents in QC for dosage adjustment (77%, 23/30). For new therapy, QC reported the highest dependent prescribing at 57% (17/30).
- Regional differences were noted for independent pharmacist prescribing rights with the highest percentages reported by respondents in BC for lab tests (85%, 17/20) and for dosage adjustments (75%, 15/20) and for QC residents for lab tests (70%, 21/30). For new therapy, the Prairies reported the highest independent prescribing rights at 43% (6/14).

Table B-4 summarizes the prescribing rights for pharmacists.

Table B-4. Prescribing Rights for Pharmacists 2011/12

	All	Bed size			Teaching Status	
		50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	(167)	(41)	(83)	(43)	(38)	(129)
Prescribing rights have been approved for pharmacists within the hospital	92	15	49	28	24	68
	55%	**37%**	**59%**	**65%**	**63%**	**53%**
Type of prescribing rights approved for pharmacists :						
Independent, for lab tests	54	7	26	21	17	37
	59%	**47%**	**53%**	**75%**	**71%**	**54%**
Independent, for dosage adjustment	44	7	20	17	13	31
	48%	**47%**	**41%**	**61%**	**54%**	**46%**
Independent, for new therapy	15	3	4	8	7	8
	16%	**20%**	**8%**	**29%**	**29%**	**12%**
Type of prescribing rights approved for pharmacists :						
Dependent, for lab tests	40	7	22	11	8	32
	43%	**47%**	**45%**	**39%**	**33%**	**47%**
Dependent, for dosage adjustment	59	8	34	17	17	42
	64%	**53%**	**69%**	**61%**	**71%**	**62%**
Dependent, for new therapy	38	2	21	15	9	29
	41%	**13%**	**43%**	**54%**	**38%**	**43%**

Base: Facilities with pharmacist prescribing
Note : multiple mentions permissible

Priority and Service Level of Clinical Services

In 2011/12, we did not survey the nature of clinical pharmacy services provided, and the level of service that these respondents provide, primarily because the data had largely remained constant over the three previous surveys. CSHP is currently leading an initiative to develop key performance indicators. The mandate of the CSHP National Clinical Pharmacy Key Performance Indicator Task Force is to develop a core set of indicators (cpKPI) to guide pharmacy practice in the hospital setting.[34] Key Performance Indicators (KPIs) are defined as being quantifiable measures of quality, which can be used to both guide and assess pharmacy practitioners. A systematic (Delphi), evidence-informed, consensus process is being used to develop those indicators. Hopefully, that task force will publish their results by the end of 2013. The core set of national cpKPI might be used in future reports to benchmark clinical pharmacy activities.

Finally, a few key papers were published about some of these clinical pharmacy activities. Mueller et al. conducted a systematic review on hospital-based medication reconciliation.[35] *"Fifteen of 26 studies reported pharmacist-related interventions, 6 evaluated IT [information technology] interventions, and 5 studied other interventions. Six studies were classified as good quality. Available evidence supports medication reconciliation interventions that heavily use pharmacy staff and focus on patients at high risk for adverse events. Higher-quality studies are needed to determine the most effective approaches to inpatient medication reconciliation".*[35] Chhabra et al. conducted a systematic review on medication reconciliation in long-term care settings.[36] Although improvement in the outcome(s) examined was shown in all of the studies, there were study design limitations. The authors concluded that there is a need for well-designed studies demonstrating the

effectiveness of medication reconciliation interventions in long-term care settings. The American Pharmaceutical Association has also published material on this topic.[37]

Support from Pharmacy Technicians for Clinical Pharmacy Services

The responses to questions regarding the support from pharmacy technicians for clinical pharmacy services are covered in Chapter H - Pharmacy Technicians.

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C - Drug Distribution Systems

Douglas Doucette

Oral Medication Systems

One of the foundational pillars of all institutional pharmacy departments is a system to safely, effectively and efficiently procure, prepare and distribute medications. Depending on the unique characteristics of each hospital, the drug distribution system will encompass a wide range of activities that include purchasing, receipt and storage of medications, repackaging of oral medications, compounding of sterile and non-sterile preparations, and the distribution of medications to numerous points throughout the hospital where those medications will be used. Health care organizations are increasingly employing technology and automation to allow these services to be provided with fewer errors than those associated with traditional, manual systems. [1,2,3] The type of drug distribution system can also have an impact on clinical services, with decentralized medication dispensing systems generally having been shown to allow pharmacists to devote more of their time to patient-centered activities.[4]

- Centralized unit dose systems, in which unit dose medications are dispensed from the central pharmacy, were reported to be in use by 73% of all respondents (Table C-1), compared to 70% (111/158) in 2009/10 and 64% (103/162) in 2007/08.

The use of centralized Unit Dose systems continues to increase.

Prior to the 2009/10 survey, decentralized unit dose systems were considered as a whole and were not separated into satellite pharmacy and automated dispensing models. As a result, the 2011/12 data dealing with these two types of systems can only be compared to the 2009/10 survey results.

- Decentralized unit dose systems, in which unit dose medications are dispensed from a satellite pharmacy, were reported to be in use by 9% of all respondents. However, unit dose drug distribution from satellite pharmacies served, on average, only 1% of acute care beds in respondents' hospitals. Decentralized unit dose drug distribution from satellite pharmacies was more commonly reported by respondents in Quebec (18%, 8/44) than in other regions, and no respondents from the Atlantic region reported their use.

- Decentralized unit dose systems, in which unit dose medications are provided from automated dispensing cabinets located in patient care areas servicing overnight beds, were reported to be used by 45% of all respondents, compared to 36% (57/158) of all respondents in the 2009/10 report.

- Combined data from all respondents indicate that, on average, 81% of acute care beds in Canadian hospitals (Figure C-1) receive the majority of their scheduled oral doses via a centralized unit dose system (58%), a decentralized unit dose system (22%), or controlled/carded dose system (1%). Those three types of unit-dose drug distribution systems are considered to be safer and more efficient than traditional multi-dose or total wardstock systems.

- The remaining 19% of acute care beds were serviced with traditional multi-dose or total wardstock drug distribution systems (Figure C-1).

- There were notable regional variations in the average percentage of acute care beds that received the majority of their scheduled oral doses via a centralized or decentralized unit dose system, or a controlled/carded dose system. Fifty-one percent of respondents in British Columbia (BC), 78% of those in the Atlantic Provinces, 80% of those in the Prairies, 83% of those in Ontario (ON), and 95% of those in Quebec (QC) reported that they used these unit dose systems.

- With respect to non-acute beds, combined data from all respondents indicated that, on average, 87% of the non-acute beds received the majority of their scheduled oral doses via a centralized or decentralized unit dose system (71%), or a controlled/carded dose system (16%). The remaining 13% of non-acute

care beds were serviced with traditional multi-dose or total wardstock drug distribution systems. (Figure C-1) Compared to acute care beds, there was greater use of controlled/carded dose systems and lesser use of automated dispensing cabinets for servicing non-acute care beds.

Table C-1. Drug Distribution Systems 2011/12 (Percentage of Facilities using Drug Distribution Systems for Patient Care Areas Servicing Over-night Beds)

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n all facilities / facilities with acute beds)	(168)	(41)	(84)	(43)	(38)	(130)
(n facilities with non-acute beds)	(126)	(28)	(63)	(35)	(19)	(107)
(1) Unit dose system - centralized	123	20	66	37	32	91
	73%	**49%**	**79%**	**86%**	**84%**	**70%**
used for acute beds	117	19	62	36	32	85
	70%	**46%**	**74%**	**84%**	**84%**	**65%**
used for non-acute beds	79	12	40	27	16	63
	63%	**43%**	**63%**	**77%**	**84%**	**59%**
(2) Unit dose system - decentralized from pharmacy satellites	15	1	6	8	8	7
	9%	**2%**	**7%**	**19%**	**21%**	**5%**
used for acute beds	14	1	5	8	8	6
	8%	**2%**	**6%**	**19%**	**21%**	**5%**
used for non-acute beds	2	0	1	1	0	2
	2%	**0%**	**2%**	**3%**	**0%**	**2%**
(3) Unit dose system - decentralized from automated dispensing cabinets	75	16	35	24	20	55
	45%	**39%**	**42%**	**56%**	**53%**	**42%**
used for acute beds	74	16	34	24	20	54
	44%	**39%**	**40%**	**56%**	**53%**	**42%**
used for non-acute beds	23	7	11	5	2	21
	18%	**25%**	**17%**	**14%**	**11%**	**20%**
(4) Traditional drug distribution system	51	18	24	9	3	48
	30%	**44%**	**29%**	**21%**	**8%**	**37%**
used for acute beds	49	18	23	8	3	46
	29%	**44%**	**27%**	**19%**	**8%**	**35%**
used for non-acute beds	21	6	10	5	0	21
	17%	**21%**	**16%**	**14%**	**0%**	**20%**
(5) Total wardstock system	30	10	16	4	6	24
	18%	**24%**	**19%**	**9%**	**16%**	**18%**
used for acute beds	29	9	16	4	6	23
	17%	**22%**	**19%**	**9%**	**16%**	**18%**
used for non-acute beds	14	7	6	1	2	12
	11%	**25%**	**10%**	**3%**	**11%**	**11%**
(6) Controlled / carded dose system	29	10	14	5	2	27
	17%	**24%**	**17%**	**12%**	**5%**	**21%**
used for acute beds	10	4	4	2	0	10
	6%	**10%**	**5%**	**5%**	**0%**	**8%**
used for non-acute beds	26	8	13	5	2	24
	21%	**29%**	**21%**	**14%**	**11%**	**22%**

Base: Respondents with complete answers to questions about drug distribution systems

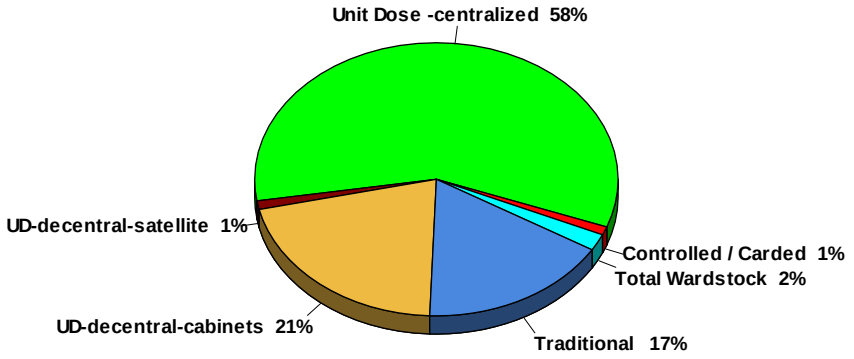
Overall there were 138 respondents who reported that their facility used a unit dose or controlled/carded drug distribution system. These respondents were asked a series of questions to determine the extent to which their systems provided unit dose packaged medication in a form that requires no further dose manipulation prior to being administered to the patient.

- When asked if 95% or more of all oral doses were provided as unit dose packaged medication that is ready to administer to patients without further dose manipulation by nursing staff, 46% (63/137) of respondents reported that this was the case in their facility. In contrast, 41% (56/137) of respondents reported that nursing staff are sometimes required to perform dose manipulation of the medication, such as splitting tablets or pouring measured liquid doses. The remaining 13% percent (18/137) of respondents reported that a risk assessment is performed, on a drug by drug basis, to determine if tablet splitting and measuring of liquid doses will be performed by nurses or if the pharmacy will provide a package containing medication that can be administered without further dose manipulation.

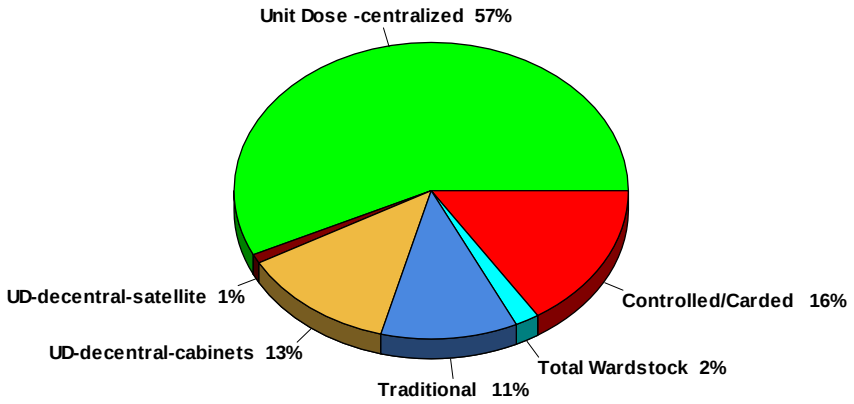
- An estimated average of 88% of all oral doses administered through a unit dose and or controlled/carded system are in a true unit dose form (i.e. require no further dose manipulation by nursing staff prior to patient administration).

Figure C-1. Drug Distribution Systems – Average Percentage of Beds 2011/12

Acute beds



Non-acute beds



Base: Facilities providing complete distribution data (168 for acute beds, 126 for non-acute beds)

The use of automated dispensing cabinets 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 the operating rooms of a hospital, was reported by 61% of the respondents to the 2011/12 survey. Adoption of this technology had grown steadily in recent years, reaching 36% (59/162) of respondents in 2007/08 and 53% (84/159) of respondents in 2009/10. This growth in automated dispensing cabinet use parallels the situation in the United States where the 2010 American Society of Health-System Pharmacists (ASHP) survey of hospital pharmacies reported a continuing increase in the use of automated dispensing cabinets in their drug distribution systems, rising from 49% of facilities in 1999 to 89% in 2010.[4] That report also showed a trend of less centralized and more decentralized drug distribution systems. From 2002 to 2011, the ratio of centralized to decentralized

Implementation of Automated Dispensing Cabinets continues to increase in Canada.

systems shifted from 80:20 to 60:40. When respondents to the 2011 ASHP survey were asked about their future plans, the results suggested that the trend will continue, reaching an estimated breakdown of 42% centralized and 58% decentralized drug distribution systems. A trend away from centralized systems is not yet apparent in the 2011/12 Hospital Pharmacy in Canada Report. The reported frequency of using centralized robotic systems for unit dose inpatient drug distribution is similar in both countries, with 13% (22/169) of respondents in Canada and 11% of respondents in the US reporting the use of robotic technologies in their drug distribution systems. In the 2009/10 report, 8.8% (14/150) of facilities reported utilizing robotics.

A higher percentage of US hospitals use Automated Decentralized Cabinets compared to Canadian hospitals.

- Sixty-one percent (103/169) of respondents reported the use of automated dispensing cabinets in their hospital.
- Of the 103 respondents who reported the use of automated dispensing cabinets in their facility in 2011/12, 43% (44/103) reported that automated dispensing cabinets were used in more than 75% of their general adult medical/surgical units.
- Table C-2 shows the reported location of automated dispensing cabinets for those facilities that use automated dispensing cabinets. As in 2009/10, the use of automated dispensing cabinets was most frequently reported in emergency departments (91% of respondents with automated dispensing cabinets in their facility), unchanged from 2009/10 (94%, 79/84). Automated dispensing cabinets were also frequently reported to be used in adult critical care units (70% of respondents), operating rooms (50% of respondents), and general adult medical/surgical units (66% of respondents) compared to 70% (59/84), 50% (42/84), and 56% (47/84), respectively, in 2009/10. The percentage of respondents who reported the use of automated dispensing cabinets in all other patient care areas also increased substantively since the last report in 2009/10.

The percentage of respondents using automated dispensing cabinets has increased substantively in most patient care areas since the last report in 2009/10.

Table C-2. Automated Dispensing Cabinets Use and Access

Location where Automated Cabinets are in Use	Use of Automated Dispensing Cabinets at that location	Patient Specific Profiles Used to Control Access
	(n= 103)	(n= A)
General adult medical / surgical units	68 **66%**	60 **88%**
Adult critical care units	82 **80%**	66 **80%**
Operating rooms	51 **50%**	5 **10%**
Recovery rooms	50 **49%**	9 **18%**
Labor and Delivery units	39 **38%**	21 **54%**
Ante / Post-Partum units	38 **37%**	33 **87%**
Mental health units	55 **53%**	47 **85%**
Emergency departments	94 **91%**	42 **45%**
General pediatric medical / surgical units	38 **37%**	30 **79%**
Pediatric critical care units	25 **24%**	20 **80%**

Base for use of cabinets (Column A):
Facilities with automated dispensing cabinets (at any location)
Base for use of patient profiles to control access (Column B):
Facilities using automated dispensing cabinets at that location (Column A)

Those who reported using automated dispensing cabinets were asked if patient-specific medication profiles were used to control access to medications contained in those cabinets.

- While only 10% and 18% respectively of respondents using automated dispensing cabinets in operating rooms and recovery rooms reported that patient-specific medication profiles were used to control access to medication, this is an increase from 0% and 7% in 2009/10. In contrast, more than 80% of respondents with automated dispensing cabinets in general medical/surgical units (both adult and pediatric), critical care units (both adult and pediatric), mental health units, and ante-partum/post-partum units reported using patient-specific profiles to control access to medications in automated dispensing cabinets.

The use of patient-specific medication profiles to control access to medications in automated dispensing cabinets located in ORs and other short stay areas remains low.

- Respondents who reported that they used automated dispensing cabinets indicated that on average 51% of medications were located in storage drawers that only gave the nurse access to a single medication. The remaining 49% of medications were located in carousel, matrix or similar storage drawers where the nurse must select the correct drug from a number of drugs that were stored in the same drawer. This was similar to the 2009/10 report.

Medication Order Entry and Verification

- Pharmacists and pharmacy technicians continue to be reported as the categories of personnel who most frequently perform medication order entry (Table C-3). The percentage of respondents reporting that pharmacists enter medication orders into the pharmacy information system was reported to be 72% compared to 78% (125/160) in 2009/10. The percentage of respondents reporting that pharmacy technicians enter medication orders into the pharmacy information system was 79% compared to 73% (113/160) in 2009/10, 81% (134/166) in 2007/08 and 78% (111/142) in 2005/2006.

Table C-3. Medication Order Entry 2011/12

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(169)	(41)	(850	(43)	(38)	(131)
Order Entry performed by Pharmacists	122	30	66	26	27	95
	72%	**73%**	**78%**	**60%**	**71%**	**73%**
Verification of order entry by Pharmacists is done by: (n=)	(117)	(29)	(63)	(25)	(26)	(91)
A second pharmacist only	16	4	10	2	4	12
	14%	**14%**	**16%**	**8%**	**15%**	**13%**
A pharmacy technician only	2	1	0	1	0	2
	2%	**3%**	**0%**	**4%**	**0%**	**2%**
Either a second pharmacist or a pharmacy technician	15	4	8	3	2	13
	13%	**14%**	**13%**	**12%**	**8%**	**14%**
Verification of a pharmacist's order entry is not required	84	20	45	19	20	64
	72%	**69%**	**71%**	**76%**	**77%**	**70%**
(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Order Entry performed by Pharmacy Technicians	133	31	66	36	29	104
	79%	**76%**	**78%**	**84%**	**76%**	**79%**
Verification of order entry by Pharmacy Technicians is done by: (n=)	(128)	(29)	(64)	(35)	(27)	(101)
A pharmacist only	107	21	57	29	22	85
	84%	**72%**	**89%**	**83%**	**81%**	**84%**
A second pharmacy technician only	4	2	1	1	1	3
	3%	**7%**	**2%**	**3%**	**4%**	**3%**
Either a pharmacist or a second pharmacy technician	10	4	5	1	1	9
	8%	**14%**	**8%**	**3%**	**4%**	**9%**
Verification of a pharmacy technician's order entry is not required	7	2	1	4	3	4
	5%	**7%**	**2%**	**11%**	**11%**	**4%**
(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Order Entry performed by Prescribers	12	1	9	2	6	6
	7%	**2%**	**11%**	**5%**	**16%**	**5%**

Base: All respondents

- Medication order entry carried out by pharmacy technicians was reported by 47% (15/32) of respondents in the Prairies, 61% (30/49) of respondents in ON, and 100% of respondents in QC (44/44), B.C. (26/26) and the Atlantic Provinces (18/18). The regional variation may be linked to the stage of pharmacy technician regulation and/or the availability of pharmacists in each region.
- Order entry of medication by prescribers was reported by 7% of respondents; nine respondents in ON, and one each in B.C., the Prairies and in the Atlantic Provinces. Two respondents reported that prescribers entered 100% of orders while six respondents indicated that 50% to 90% of all orders were entered by prescribers.
- Among respondents who reported that medication orders were entered by pharmacists, 16% required verification of the entry by either a second pharmacist or a pharmacy technician. Seventy-two percent of all respondents did not require verification of a pharmacist's order entry.
- Among respondents who reported that medication orders were entered by a pharmacy technician, 84% reported that technician-entered orders were verified only by a pharmacist, 8% reported that orders were verified by either a pharmacist or a second pharmacy technician, and 3% reported that orders were verified by a second technician only. Five percent of respondents reported that verification of technician-entered orders was not required at their facility.

The adoption of CPOE by responding sites is unchanged at 7% from the last report. Most of the CPOE systems are in use in Ontario. The 2010 ASHP survey reported medication orders were primarily transmitted to the Pharmacy via a CPOE system in 16.1% of hospitals, compared to 5.1% of all responding hospitals in 2007. The use of CPOE ranged from 8.4% of hospitals with less than 50 beds to 56.6% of hospitals with 600 or more beds.[5]

Pharmacist Review of Medication Orders for Therapeutic Appropriateness

- Ninety-nine percent (167/169) of all respondents reported that the pharmacy was closed for some period of time each day. This is essentially unchanged from the past two reports. One respondent in ON and one respondent in the Prairies reported that the pharmacy was open 24 hours a day.
- During the hours that the pharmacy is open, 93% of respondents reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication is dispensed from the central or satellite pharmacy. Forty-one percent reported that this review occurs before medication is accessed from wardstock by nurses or other unit-based staff. Forty-four percent of respondents who have automated cabinets on the patient care units reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before medication is accessed from an automated cabinet. (Table C-4)
- During the hours that the pharmacy is open, 67% of respondents reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication order appears on the Medication Administration Record (MAR).

During periods when the pharmacy is closed there is limited pharmacist review of medication orders prior to medication administration.

- During the hours that the pharmacy is closed, 5% of respondents reported that a pharmacist, either on call or working off site, reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication is accessed from a night cupboard or similar method for after-hours medication supply. One percent of respondents reported that this review occurs before medication is accessed from wardstock, and 1% of respondents using automated cabinets on the patient care units reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before medication is accessed from an automated cabinet.
- During the hours that the pharmacy is closed, 16% of respondents reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication order appears on the MAR.

Table C-4. Pharmacist Review of Medication Orders when the Pharmacy is Open or Closed 2011/12

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
During the hours that the pharmacy is open, a pharmacist reviews at least 95% of mediation orders before:						
(n=)	(168)	(41)	(85)	(42)	(37)	(131)
Medications being dispensed from the central or satellite pharmacy	156	35	80	41	36	120
	93%	**85%**	**94%**	**98%**	**97%**	**92%**
Medications being accessed from automated cabinets on the patient care units	74	16	30	28	25	49
	44%	**39%**	**35%**	**67%**	**68%**	**37%**
Medications being accessed from wardstock	69	11	41	17	17	52
	41%	**27%**	**48%**	**40%**	**46%**	**40%**
Medication order appearing on MAR	112	23	59	30	25	87
	67%	**56%**	**69%**	**71%**	**68%**	**66%**
During the hours that the pharmacy is closed, a pharmacist reviews at least 95% of mediation orders before:						
(n=)	(165)	(41)	(83)	(41)	(35)	(130)
Medications being accessed from a night cupboard or similar	9	3	4	2	4	5
	5%	**7%**	**5%**	**5%**	**11%**	**4%**
Medications being accessed from automated cabinets on the patient care units	2	1	1	0	1	1
	1%	**2%**	**1%**	**0%**	**3%**	**1%**
Medications being accessed from wardstock	2	1	1	0	1	1
	1%	**2%**	**1%**	**0%**	**3%**	**1%**
Medication orders appearing on MAR	27	8	11	8	11	16
	16%	**20%**	**13%**	**20%**	**31%**	**12%**

Base: All respondents

The 2010 ASHP survey of hospital pharmacy directors reported that 63.3% of respondents indicated that all medication orders, regardless of the time they were written, were reviewed by a pharmacist before being acted upon, either through 24-hour on-site staffing (39%), after-hours review/entry by an affiliated hospital with 24-hour service (12%), review and entry by a national or regional telepharmacy service (11%), or by having an employee pharmacist on-call to provide order review and entry (2%). The remaining 36.7% of hospitals did not have orders reviewed by a pharmacist when the pharmacy was closed.[4] Similar accreditation standards are in place in both Canada (standards 11.0 and 14.0) and the US (standard MM 4.10) [6, 7] requiring that medication orders be reviewed for appropriateness prior to being dispensed or removed from a storage area or automated dispensing cabinet. The differences between the results reported in the ASHP survey report vs. the 2011/12 Hospital Pharmacy in Canada Report are likely related to higher availability of 24-hour pharmacist review (on-site, affiliated hospital or other remote service) in American hospitals.

Medication Profiles and Medication Administration Records

- Sixty-six percent of all respondents reported that prescribers have easy and reliable access to a complete medication profile for all patients when writing medication orders.
- Seventy-eight percent of all respondents reported that pharmacists have easy and reliable access to a complete medication profile for all patients when reviewing medication orders.
- The manual preparation of some or all MARs was reported by 26% of all respondents.
- Seventy-five percent reported that some or all MARs were generated in hard copy through the Pharmacy Information System (PIS), and 10% reported that some or all MARs are electronic, share a common database with the PIS, and documentation occurs on line. (Table C-5)

Significant progress has been made in replacement of manually prepared MARs.

From 2004 to 2012, the percentage of respondents reporting the use of manually prepared MARs decreased from 44% to 26%, with a corresponding increase in the respondents reporting the use of computer generated MARs, from 56% in 2009/10 to 75% in 2011/12. Use of electronic MARs has remained relatively stable at 10% since 2004. The risk of medication error associated with manual transcription is reduced when computer generated MARs or electronic MARs are used. Modern Pharmacy Information Systems possess the ability to generate MARs. There are still gains to be realized, especially in the Atlantic Provinces, ON and the Prairies where over 40% of

MARs are prepared manually. In the ASHP 2010 Survey 67.3% of hospitals reported that they use electronic MARs, 24.3% reported that they use computer-generated paper MARs, and 8.4% reported that they use handwritten MARs.[4]

- Ninety-seven percent of respondents reported the existence of a policy where two patient identifiers are checked before administering medications.

Table C-5. Medication Profiles and Medication Administration Records 2011/12

		---	Bed Size			Teaching Status	
		All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Prescribers, when writing orders for inpatients, have access to a complete inpatient medication profile	(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Yes, for all patients		111	25	60	26	28	83
		66%	**61%**	**71%**	**60%**	**74%**	**63%**
Yes, for most patients (50% to 99%) in the facility		50	15	19	16	9	41
		30%	**37%**	**22%**	**37%**	**24%**	**31%**
Yes, for some patients (<50%) in the facility		2	0	2	0	0	2
		1%	**0%**	**2%**	**0%**	**0%**	**2%**
Pharmacists, when reviewing orders for inpatients, have access to a complete inpatient medication profile	(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Yes, for all patients		132	29	69	34	32	100
		78%	**71%**	**81%**	**79%**	**84%**	**76%**
Yes, for most patients (50% to 99%) in the facility		34	10	15	9	5	29
		20%	**24%**	**18%**	**21%**	**13%**	**22%**
Yes, for some patients (<50%) in the facility		1	1	0	0	0	1
		1%	**2%**	**0%**	**0%**	**0%**	**1%**
Medication Administration Records (MARs)	(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Are manually prepared		44	13	23	8	7	37
		26%	**33%**	**27%**	**19%**	**18%**	**28%**
Are generated in hard copy through the PIS and documentation of administered doses is manual		126	29	61	36	27	99
		75%	**73%**	**72%**	**84%**	**71%**	**76%**
Are electronic, share a common database with the PIS and documentation is on line		16	2	11	3	9	7
		10%	**5%**	**13%**	**7%**	**24%**	**5%**

Base: All respondents.
Note: multiple mentions permissible

Drug Purchasing and Inventory Control

Drug Costs

- The average drug cost per acute patient day was reported to be $35.73 (Table C-6), 18% less than the cost reported in the 2009/10 report ($43.40) and 4% less than the 2007/08 reported cost ($37.16). Regional variation was noted in this report with QC respondents reporting the highest cost per acute patient day at $39.31, followed by B.C. at $39.00, the Prairies at $35.12, ON at $33.79 and the Atlantic Provinces at $28.77.
- The average drug cost per non-acute patient day is $8.73. This is approximately 8% higher than the figure of $8.11 reported in 2009/10 but still lower than the figure of $10.16 reported in the 2007/08 report.

Inventory Turnover

- The average reported inventory turnover rate for 2011/12 was 9.8 times. This continues the downward trend compared to rates of 10.2 in 2009/10 and 10.6 in 2007/08. Regional differences were noted with QC respondents reporting an inventory turnover rate of 13.7 compared to 9.8 in ON, 8.9 in B.C., 7.2 in the Atlantic Provinces and 6.6 in the Prairies. The recent issues with drug shortages across Canada may be influencing some pharmacies to hold larger inventory levels of some medications.

Table C-6. Inventory Turnover and Drug Costs 2011/12

Table C-6. Inventory Turnover and Drug Costs 2011/12

			Bed Size			Teaching	
		All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Inventory Turnover Rate	(n=)	(156)	(35)	(80)	(41)	(37)	(119)
		9.8	**6.6**	**9.7**	**12.6**	**11.5**	**9.2**
Drug Cost Ratios							
Acute Drug Costs/ Acute Patient Day		139	34	70	35	33	106
		35.73	**34.02**	**33.35**	**42.15**	**43.02**	**33.46**
Non-acute Drug Costs/ Non-acute Patient Day		89	16	47	26	15	74
		8.73	**6.48**	**9.35**	**9.01**	**10.66**	**8.34**

Base: all respondents

[1] Canadian Society of Hospital Pharmacists. Drug distribution: statement on unit-dose & intravenous admixture. Ottawa (ON): Canadian Society of Hospital Pharmacists; 2008.

[2] Institute for Safe Medication Practices (ISMP) Guidance on the Interdisciplinary Safe Use of Automated Dispensing Cabinets. ISMP, 2008.

[3] Automated Medication Dispensing Systems: A Review of the Clinical Benefits, Harms, and Cost-Effectiveness. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health (CADTH) Health Technology Inquiry Service, 2010.

[4] Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Dispensing and administration – 2011. Am J Health-Syst Pharm 2012;69:768-85.

[5] Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Prescribing and transcribing – 2010. Am J Health-Syst Pharm 2011;68:669-88.

[6] Standards: Managing Medications, Ver. 7. Qmentum Program. Accreditation Canada: January 2012.

[7] Rich DS. New JCAHO medication management standards for 2004. Am J Health-Syst Pharm 2004;61:1349-58.

D – Human Resources

Michele Babich, Kevin Hall

In the 2007/08 Hospital Pharmacy in Canada (HPC) Report, it was noted that the Health Council of Canada had stated that human resource shortages were the most serious challenge facing Canada's healthcare system.[1] In the 2009/10 Hospital Pharmacy in Canada Report, the findings and recommendations of the "Moving Forward: Pharmacy Human Resources for the Future"[2] study were reviewed, with an emphasis on the recommendations dealing with how the pharmacist manpower shortage could be addressed, in large part, through changes in the roles and responsibilities of pharmacists and pharmacy technicians. The strategies recommended by the Moving Forward study included the regulation of pharmacy technicians, changes in the scopes of practice of pharmacists and pharmacy technicians, more effective integration of foreign-trained pharmacy graduates into the Canadian workforce and an increase in the number of students who are enrolled in, and graduated from, Canadian faculties of pharmacy.

The number of students admitted to pharmacy programs in Canada has increased significantly over the past 10 years. In the 2009/10 report it was noted that enrolment in the Faculties of Pharmacy had increased by 50% and the number of graduates has been increasing as those larger classes have reached the point of graduation. The total number of pharmacy graduates is now reported to be 36% higher than it was 10 years ago.[3] In a 2011 report released by the Canadian Institute of Health Information (CIHI) it was reported that the supply of registered pharmacists grew by 19.8% between 2006 and 2011.[4] The per population supply of pharmacists has also increased since 2006. In 2006 the ratio was 82.1 pharmacists per 100,000 population, compared to 92.9 pharmacists per 100,000 population in 2011. CIHI also reported that the number of international pharmacy graduates (IPGs) in Canada has increased, with IPGs now representing 27.4% of all pharmacists in Canada.[4] It would be reasonable to assume that these changes in the number of pharmacists entering the Canadian work force would reduce the vacancy rates in both the community and hospital settings. There is evidence that this has occurred in the United States (US), with the reported vacancy rate for hospital pharmacists in the US having fallen to 2.4% in 2011.[5]

There is an increased supply of pharmacists in most regions of Canada

Technician regulation is now a reality in Ontario (ON), Alberta (AB) and British Columbia (BC). Only those technicians who fulfill the legal requirements for registration as a pharmacy technician in those provinces can use the protected title of "pharmacy technician". The regulatory environment that is now in place in those provinces permits pharmacy technicians to assume responsibility and accountability for most drug distribution activities, allowing pharmacists to redirect their efforts to direct patient care activities. This opportunity to achieve transformational change in the practice of pharmacy, which the profession has been pursuing for the past forty to fifty years, is being met with both enthusiasm and trepidation. In the hospital practice setting, where technicians have gradually been assuming greater responsibility for the drug distribution system over the past decade or so, the new practice models are being embraced with considerable enthusiasm. In the community pharmacy practice setting, where the payment models for pharmacy services are still primarily linked to drug distribution activities (i.e. the filling of prescriptions), the roles of pharmacy technicians appear to be evolving more slowly. The chapter on pharmacy technicians explores a number of these issues in more depth.

Human Resource Shortages – Pharmacists

- The average reported vacancy rate for hospital pharmacists (staff pharmacists plus advanced practice pharmacists) was 8.1% (Table D-1), as of March 31, 2012. This is similar to the vacancy rate reported in the 2009/10 HPC Report (8.2%). This stabilization in the vacancy rate follows three previous reports in which the vacancy rates had been declining.
- Overall, respondents reported a total of 237 pharmacist position vacancies in the 2011/12 survey (Table D-1), similar to the 235 pharmacist position vacancies in 2009/10, but less than the 292 vacancies in 2007/08 and 270 vacancies in 2005/06. The average number of pharmacist position vacancies per

respondent was 1.6 (237 vacancies reported by 149 respondents), similar to the 1.5 pharmacist position vacancies per respondent (235 vacancies reported by 159 respondents) that was reported in 2009/10.

- In the 2011/12 report, BC and Quebec (QC) reported the highest pharmacist vacancy rates of 13.3% and 12.9% respectively (Table D-1). The BC mean vacancy rate was almost double their 2009/2010 pharmacist vacancy rate of 7.1%. Salaries have recently been increased in QC which may explain the fall in the QC vacancy rate from 16.4% in 2009/10 to 12.9% in 2011/12.

The increasing pharmacist supply does not appear to have substantially reduced the hospital pharmacist vacancy rate.

- The pharmacist vacancy rate of 2.9% in Nova Scotia (NS) was the lowest in the country.

Human Resource Shortages – Technicians

Similar to data reported in previous HPC reports, the data from the 2011/12 report indicate that the pharmacy technician vacancy rate is much less of an issue than the pharmacist vacancy rate. As pharmacy technician regulation occurred, it was postulated that there might be a reduction in the technician manpower pool, if a significant number of the individuals who were previously called "pharmacy technicians" failed to qualify and be registered as regulated pharmacy technicians. To date, there is no evidence that a shortage of pharmacy technicians is developing.

Table D-1. Percent and Number of Positions Vacant as of March 31, 2012

		Bed Size			Teaching Status		Province							
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS
Pharmacists (n=)	(160)	(40)	(80)	(40)	(36)	(124)	(24)	(14)	(6)	(11)	(48)	(41)	(90	(7)
vacant positions	**237**	**16**	**89**	**133**	**89**	**148**	**49**	**23**	**11**	**14**	**44**	**87**	**7**	**3**
vacancy rate	**8.1%**	**9.3%**	**7.6%**	**8.4%**	**6.0%**	**10.3%**	**13.3%**	**5.5%**	**8.7%**	**9.1%**	**4.5%**	**12.9%**	**5.6%**	**2.9%**
Staff Pharmacists (n=)	(149)	(38)	(77)	(34)	(30)	(119)	(24)	(14)	(6)	(11)	(48)	(30)	(9)	(7)
vacant positions	**182**	**12**	**77**	**94**	**70**	**112**	**40**	**23**	**10**	**14**	**40**	**48**	**7**	**1**
vacancy rate	**7.7%**	**7.6%**	**7.7%**	**7.7%**	**5.9%**	**9.6%**	**13.5%**	**5.8%**	**7.9%**	**9.6%**	**4.5%**	**15.1%**	**6.0%**	**0.6%**
Advanced Practice Pharmacists (n=)	(77)	(6)	(41)	(30)	(26)	(51)	(16)	(3)	(2)	(3)	(26)	(22)	(3)	(2)
vacant positions	**55**	**5**	**12**	**39**	**19**	**36**	**9**	**0**	**2**	**0**	**4**	**39**	**0**	**2**
vacancy rate	**10.0%**	**21.4%**	**7.0%**	**10.7%**	**6.7%**	**13.6%**	**12.5%**	**0.0%**	**23.1%**	**0.0%**	**4.9%**	**10.9%**	**0.0%**	**33.3 %**
Pharmacist Managers (n=)	(149)	(36)	(73)	(40)	(36)	(113)	(23)	(13)	(6)	(11)	(41)	(40)	(8)	(7)
vacant positions	**11**	**4**	**3**	**4**	**1**	**10**	**3**	**1**	**0**	**0**	**4**	**3**	**0**	**0**
vacancy rate	**4.4%**	**11.6%**	**2.9%**	**3.5%**	**0.9%**	**7.2%**	**9.7%**	**4.9%**	**0.0%**	**0.0%**	**5.0%**	**4.7%**	**0.0%**	**0.0%**
Pharmacy Technician Managers (n=)	(60)	(10)	(31)	(19)	(23)	(37)	(5)	(10)	(1)	(6)	(19)	(10)	(6)	(3)
vacant positions	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
vacancy rate	**1.2%**	**0.0%**	**0.0%**	**2.3%**	**2.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**4.3%**	**0.0%**	**0.0%**	**0.0%**
Pharmacy Technicians and Pharmacy Assistants (both) (n=)	(160)	(40)	(80)	(40)	(36)	(124)	(24)	(14)	(6)	(11)	(48)	(41)	(9)	(7)
vacant positions	**87**	**5**	**35**	**47**	**46**	**40**	**18**	**23**	**8**	**4**	**18**	**17**	**0**	**0**
vacancy rate	**2.3%**	**1.7%**	**2.5%**	**2.3%**	**2.5%**	**2.2%**	**4.5%**	**4.0%**	**7.1%**	**2.3%**	**1.3%**	**2.0%**	**0.0%**	**0.0%**
Total (Pharmacists, Managers, Technicians, Assistants) (n=)	(160)	(40)	(80)	(40)	(36)	(124)	(24)	(14)	(6)	(11)	(48)	(41)	(9)	(7)
vacant positions	**336**	**25**	**126**	**184**	**138**	**198**	**70**	**47**	**19**	**18**	**66**	**107**	**7**	**3**
vacancy rate	**4.8%**	**5.0%**	**4.7%**	**4.9%**	**3.9%**	**5.7%**	**8.7%**	**4.6%**	**7.4%**	**5.1%**	**2.8%**	**6.6%**	**2.1%**	**1.1%**

Base: Facilities with related FTE > 0

As pharmacy technician regulation proceeds, decisions have had to be made concerning the classification of those individuals who were previously called pharmacy technicians. In BC, prior to technician regulation in January 2011, there were no pharmacy staff members who were classified as pharmacy assistants. After technician regulation occurred, those pharmacy staff members who had previously been classified as pharmacy technicians, but who had not fulfilled the requirements for registration as a regulated pharmacy technician, had their title changed to pharmacy assistant. Although different approaches may be taken in other provincial jurisdictions, each province will have to deal with this issue. Caution is recommended when making any comparison of pharmacy technician data reported in the 2011/12 report with technician data that was reported in earlier HPC reports. It is important to consider whether the changes that are occurring as a result of technician regulation, such as the reclassification of former pharmacy technicians, may be affecting the results.

The number of institutions that offer technician training programs was expected to decrease due to the requirement for accreditation through the Canadian Council for Accreditation of Pharmacy Programs (CCAPP). A decrease in pharmacy technician training programs would decrease the supply of pharmacy technician graduates, which could lead to a shortage of pharmacy technicians. In 2010, there were 38 technician training programs that had achieved either provisional or full CCAPP accreditation status. As of November 2012, there were actually 47 programs that had achieved provisional or full accreditation status.[6] With the increase in programs, the supply of pharmacy technicians may not be as much of an issue as was originally thought.

There is no evidence of an emerging pharmacy technician shortage.

- The overall reported vacancy rate for technicians/assistants was 2.3% in 2011/12 (Table D-1), compared to 1.5% in 2009/10. There were a total of 87 vacancies reported, with the highest vacancy rate in Saskatchewan (SK) at 7.1%.

Human Resource Shortages – Management

- The total number of vacant pharmacist management positions in 2011/12 was reported to be 11 (Table D-1). The vacancy rate of 4.4% was considerably lower than the vacancy rate of 7.2% that was reported in 2009/10.
- The pharmacy technician manager vacancy rate was first collected and reported in the 2009/10 report. No vacancies were reported in 2009/10 report and only one pharmacy technician manager vacancy was reported in 2011/12.

Table D-2. Pharmacist, Technician Vacancy Rates 2006-2012

			Bed Size			Teaching Status		Province							
		All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
	(n=)	(149)	(380	(77)	(34)	(300	(119)	(24)	(14)	(6)	(11)	(48)	(30)	(9)	(7)
2012	Pharmacists	7.7%	7.6%	7.7%	7.7%	5.9%	9.6%	13.5%	5.8%	7.9%	9.6%	4.5%	15.2%	6.0%	0.6%
	Technicians /Assistants	2.3%	1.7%	2.5%	2.3%	2.5%	2.2%	4.5%	4.0%	7.1%	2.3%	1.3%	2.0%	0.0%	0.0%
	(n=)	(159)	(33)	(94)	(32)	(43)	(116)	(25)	(15)	(5)	(11)	(51)	(35)	(9)	(8)
2010	Pharmacists	8.2%	12.5%	8.6%	7.2%	7.4%	9.2%	7.1%	4.3%	4.9%	5.4%	6.0%	16.4%	8.8%	3.1%
	Technicians /Assistants	1.5%	2.5%	1.5%	1.4%	2.0%	0.9%	0.9%	1.0%	1.9%	4.7%	1.0%	2.8%	0.5%	0.3%
	(n=)	(163)	(32)	(90)	(41)	(40)	(123)	(22)	(12)	(7)	(10)	(45)	(51)	(8)	(8)
2008	Pharmacists	10.4%	9.8%	13.0%	8.2%	9.6%	11.2%	6.6%	10.0%	2.8%	1.0%	8.3%	17.2%	14.3%	6.0%
	Technicians /Assistants	1.4%	2.3%	1.4%	1.3%	1.5%	1.2%	2.6%	3.0%	0.0%	1.5%	1.2%	0.4%	3.5%	0.0%
	(n=)	(103)	(15)	(56)	(32)	(30)	(73)	(13)	(6)	(3)	(6)	(38)	(28)	(7)	(2)
2006	Pharmacists	13.3%	22.7%	14.7%	11.4%	10.7%	16.9%	21.7%	11.6%	6.9%	7.0%	11.0%	17.4%	21.0%	4.8%
	Technicians	2.1%	0.8%	2.0%	2.3%	2.3%	1.8%	3.6%	8.9%	4.0%	0.0%	1.3%	0.3%	0.0%	5.3%

Base: Facilities with related FTE > 0

Pharmacy Staffing Ratios

Since the inception of the HPC Survey, data needed to calculate staffing ratios (budgeted hours per patient day) has been collected from respondents and used to calculate ratios that would help pharmacy managers to compare their staffing to that of other hospitals, and to estimate the staffing requirements for new and expanded programs. The mean ratios reported in the HPC report are provided for all hospitals, for teaching versus non-teaching hospitals, for hospitals of different sizes, and for the hospitals in each province. The numerator in the 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 number of patient days. Patient days serve as a proxy for the workload that the department has to deal with. The use of patient days as an indicator of workload is admittedly an imperfect proxy for workload, but produces results that have demonstrated a high degree of consistency and reproducibility, even at the macro level when all types of patient days are lumped together in the denominator. In order to address the reality that different types of patient days are associated with differing pharmacy workload demands, we added a benchmarking section to the report where we create staffing ratios for 8 different types of patient days, such as critical care patient days, oncology patient days, medicine patient days, long-term care patient days, etc. Those program-specific staffing ratios can be found in Chapter F. In this chapter we report on overall pharmacy staffing ratios that have been calculated for the hospital as a whole.

Prior to the 2007/08 Hospital Pharmacy in Canada Report, a single ratio was reported. That ratio used all budgeted staffing hours in the numerator and all acute patient days in the denominator. Non-acute patient days were not included in the denominator and were essentially ignored in the calculation of the staffing ratio. For most hospitals, the calculated staffing ratios made sense when compared to other similar hospitals. Users of the data were generally satisfied with using it to compare their own pharmacy staffing to the staffing reported by other hospitals of a similar size and teaching status.

However, for a small number of hospitals the calculated ratios produced an unexpectedly high "budgeted hours per acute patient day" ratio. As the data for these hospitals was analyzed in more detail, it became clear that ignoring the non-acute patient days was problematic if a significant proportion of a hospital's patient days were non-acute patient days. For example in one large hospital with about 10% acute beds and 90% non-acute beds, the calculated staffing ratio was 3.29 budgeted hours per acute patient day, which decreased dramatically to 0.25 budgeted hours per total patient day, when both acute and non-acute days were included in the denominator. In order to better understand the impact of non-acute patient days, a decision was made for the 2007/08 HPC Survey to create a new staffing ratio that would take the non-acute patient days into consideration. This new ratio was calculated using total patient days (acute plus non-acute patient days) in the denominator. That analysis indicated, not surprisingly, that the mix of acute to non-acute beds had a significant impact on the staffing ratios. Five hospital subgroups were created to get a better idea of how the mix of acute to non-acute beds affected the staffing ratios. The five subgroups were hospitals with 10 -39% acute beds, 40-59% acute beds, 60-79% acute beds, 80-99% acute beds, and 100% acute beds. For the 5 subgroups of hospitals, based on the percentage of acute beds vs. non-acute beds, the staffing ratios, using total patient days as the denominator, increased in each subgroup as the percentage of acute beds increased. Those results were included in the 2007/08 Hospital Pharmacy in Canada (HPC) Report. Hospital pharmacy managers could use that data for comparison purposes by first determining which of the five subgroups their hospital falls within (i.e. hospitals with 10 -39% acute beds, 40-59% acute beds, 60-79% acute beds, 80-99% acute beds, or 100% acute beds) and then comparing their own staffing ratio to the mean staffing ratio for the subgroup that they fall within, in terms of their percentage of acute beds. Since the 2007/08 survey we have recommended that hospitals look at both the staffing ratios that only use acute beds in the denominator, as well as the ratios that include both acute and non-acute patient days (total days) in the denominator.

The expansion of ambulatory care pharmacy services within the hospital setting has led us to add yet another analysis to our staffing ratios. In the past, most of the staffing resources in the hospital setting were committed to the provision of inpatient services. Hospitals were not asked to break their staffing down into inpatient and outpatient staffing. Over time, however, it became clear that the staffing ratios for hospitals with a large component of outpatient services were being skewed upwards by the inclusion of outpatient staffing resources. A decision was made to ask hospitals to break their staffing down into inpatient and outpatient staffing. In the 2009/10 report, we added a new staffing ratio analysis in which we excluded outpatient staffing before calculating staffing ratios. This ratio was called "inpatient budgeted hours per total patient day" and in the 2011/12 report we have added the ratio "inpatient budgeted hours per acute patient day." These last two ratios allow hospitals to compare their inpatient staffing with the mean reported by other hospitals, without the confounding factor of having outpatient staffing included in the denominator.

- As can be seen in Tables D.3a/b, excluding outpatient staffing from the numerator reduces the mean staffing for all hospitals from 0.87 total budgeted hours per acute patient day to 0.80 inpatient budgeted hours per acute patient day. Likewise, excluding outpatient staffing from the numerator reduces the mean staffing for all hospitals from 0.64 total budgeted hours per total patient day to 0.58 inpatient budgeted hours per acute patient day. These data suggest that, on average, approximately 10% of all pharmacy staffing is dedicated to the provision of outpatient services. The larger the amount of outpatient staffing that a facility has, the greater the difference will be between the ratios that include outpatient staffing in the numerator, compared to those ratios that don't include outpatient staffing in the numerator.

Table D-3a. Staffing Ratios– Budgeted Hours / Patient Day 2011/12

	---	Bed Size			Teaching Status		Percent of acute beds				
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	10-39%	40-59%	60-79%	80-99%	100%
ALL HOSPITALS											
(n=)	(148)	(37)	(74)	(37)	(35)	(113)	(19)	(20)	(34)	(37)	(38)
Total budgeted hours/ acute patient day	**0.87**	**0.80**	**0.87**	**0.95**	**0.99**	**0.83**	**0.84**	**0.77**	**0.90**	**0.93**	**0.85**
(n=)	(148)	(37)	(74)	(37)	(35)	(113)	(19)	(20)	(34)	(37)	(38)
Inpatient budgeted hours/ acute patient day	**0.80**	**0.76**	**0.78**	**0.86**	**0.90**	**0.77**	**0.76**	**0.70**	**0.83**	**0.85**	**0.79**
(n=)	(143)	(36)	(74)	(33)	(33)	(110)	(18)	(20)	(33)	(34)	(38)
Total budgeted hours/ total patient day	**0.64**	**0.61**	**0.62**	**0.70**	**0.92**	**0.55**	**0.22**	**0.35**	**0.63**	**0.80**	**0.84**
(n=)	(143)	(36)	(74)	(33)	(33)	(110)	(18)	(20)	(33)	(34)	(38)
Inpatient budgeted hours/ total patient day	**0.58**	**0.58**	**0.56**	**0.64**	**0.84**	**0.51**	**0.20**	**0.32**	**0.58**	**0.73**	**0.78**
TEACHING HOSPITALS											
(n=)	(35)	(2)	(15)	(18)	(35)	(0)	(0)	(1)	(4)	(12)	(18)
Total budgeted hours/ acute patient day	**0.99**	**.**	**0.91**	**1.06**	**0.99**	**.**		**.**	**1.19**	**1.00**	**0.96**
(n=)	(35)	(2)	(15)	(18)	(35)	(0)	(0)	(1)	(4)	(12)	(18)
Inpatient budgeted hours/ acute patient day	**0.90**	**.**	**0.83**	**0.94**	**0.90**			**.**	**1.03**	**0.91**	**0.88**
(n=)	(33)	(2)	(15)	(16)	(33)	(0)	(0)	(1)	(4)	(10)	(18)
Total budgeted hours/ total patient day	**0.92**	**.**	**0.87**	**0.97**	**0.92**			**.**	**0.87**	**0.94**	**0.95**
(n=)	(33)	(2)	(15)	(16)	(33)	(0)	(0)	(1)	(4)	(10)	(18)
Inpatient budgeted hours/ total patient day	**0.84**	**.**	**0.79**	**0.86**	**0.84**	**.**		**.**	**0.76**	**0.85**	**0.87**
NON-TEACHING HOSPITALS											
(n=)	(113)	(35)	(59)	(19)	(0)	(113)	(19)	(19)	(30)	(25)	(20)
Total budgeted hours/ acute patient day	**0.83**	**0.79**	**0.85**	**0.85**		**0.83**	**0.84**	**0.77**	**0.87**	**0.90**	**0.76**
(n=)	(113)	(35)	(59)	(19)	(0)	(113)	(19)	(19)	(30)	(25)	(20)
Inpatient budgeted hours/ acute patient day	**0.77**	**0.75**	**0.77**	**0.78**		**0.77**	**0.76**	**0.70**	**0.81**	**0.82**	**0.71**
(n=)	(110)	(34)	(59)	(17)	(0)	(110)	(18)	(19)	(29)	(24)	(20)
Total budgeted hours/ total patient day	**0.55**	**0.59**	**0.56**	**0.45**		**0.55**	**0.22**	**0.34**	**0.59**	**0.74**	**0.75**
(n=)	(110)	(34)	(59)	(17)	(0)	(110)	(18)	(19)	(29)	(24)	(20)
Inpatient budgeted hours/ total patient day	**0.51**	**0.56**	**0.50**	**0.42**		**0.51**	**0.20**	**0.31**	**0.55**	**0.68**	**0.69**

. Results not shown because data available for fewer than three facilities
Base: all respondents
Note that budgeted hours exclude pharmacy residents
Total budgeted hours = inpatient budgeted hours + outpatient budgeted hours
Total patient days includes both, acute patient days and non-acute patient days

With respect to the other ratios that have been included in past HPC reports, a few of the findings are as follows:

- Teaching hospitals continue to report higher total budgeted hours per acute patient day (0.99) than non-teaching hospitals (0.83). As shown in Tables D-3.a/b, larger hospitals with greater than 500 beds also continue to report higher budgeted hours per acute patient day (0.95) than smaller hospitals with 201 – 500 beds (0.87) and hospitals with 50 – 200 beds (0.80) as shown in Tables D-3.a/b.
- Teaching hospitals also report higher inpatient budgeted hours per acute patient day (0.90) than non-teaching hospitals (0.77). As shown in Tables D-3.a/b larger hospitals with greater than 500 beds also

report higher inpatient budgeted hours per acute patient day (0.86) than smaller hospitals with 201 – 500 beds (0.78) and hospitals with 50 – 200 beds (0.76).

- There were 38 respondents in the 2011/12 report, compared to 45 in the 2009/10 report, who reported that 100% of their beds were acute care beds. Of these, 18 were teaching hospitals and 20 were non-teaching hospitals. These 38 hospitals reported 0.85 total budgeted hours per acute patient day compared to 0.89 in the last report. (Table D-3a) Teaching hospitals with 100% acute beds, reported a ratio of 0.96 total budgeted hours per acute patient day, compared to 1.03 in the 2009/10 report. For non-teaching hospitals with 100% acute beds, respondents reported having an average of 0.76 total budgeted hours per acute patient day versus 0.77 in the last report. (Table D-3b)
- BC respondents reported the lowest staffing for all four of the staffing ratios which appear in this year's HPC report. AB, ON and NB/PE reported the highest staffing ratios.

Table D-3b. Staffing Ratios – Budgeted Hours / Patient Day 2011/12

	---	Bed Size			Teaching Status		Province							
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
ALL HOSPITALS														
(n=)	(148)	(37)	(74)	(37)	(35)	(113)	(22)	(14)	(6)	(11)	(44)	(36)	(9)	(6)
Total budgeted hours/ acute patient day	**0.87**	**0.80**	**0.87**	**0.95**	**0.99**	**0.83**	**0.69**	**0.96**	**0.81**	**0.81**	**0.92**	**0.91**	**0.97**	**0.82**
(n=)	(148)	(37)	(74)	(37)	(35)	(113)	(22)	(14)	(6)	(11)	(44)	(36)	(9)	(6)
Inpatient budgeted hours/ acute patient day	**0.80**	**0.76**	**0.78**	**0.86**	**0.90**	**0.77**	**0.66**	**0.94**	**0.74**	**0.75**	**0.84**	**0.77**	**0.94**	**0.74**
(n=)	(143)	(36)	(74)	(33)	(33)	(110)	(21)	(14)	(6)	(11)	(43)	(33)	(9)	(6)
Total budgeted hours/ total patient day	**0.64**	**0.61**	**0.62**	**0.70**	**0.92**	**0.55**	**0.41**	**0.82**	**0.72**	**0.58**	**0.74**	**0.53**	**0.76**	**0.63**
(n=)	(143)	(36)	(74)	(33)	(33)	(110)	(21)	(14)	(6)	(11)	(43)	(33)	(9)	(6)
Inpatient budgeted hours/ total patient day	**0.58**	**0.58**	**0.56**	**0.64**	**0.84**	**0.51**	**0.39**	**0.80**	**0.66**	**0.53**	**0.67**	**0.46**	**0.73**	**0.58**
TEACHING HOSPITALS														
(n=)	(35)	(2)	(15)	(18)	(35)	(0)	(1)	(5)	(2)	(2)	(9)	(10)	(5)	(1)
Total budgeted hours/ acute patient day	**0.99**	**.**	**0.91**	**1.06**	**0.99**	**.**	**.**	**0.92**	**.**	**.**	**1.10**	**0.94**	**0.92**	**.**
(n=)	(35)	(2)	(15)	(18)	(35)	(0)	(1)	(5)	(2)	(2)	(9)	(10)	(5)	(1)
Inpatient budgeted hours/ acute patient day	**0.90**	**.**	**0.83**	**0.94**	**0.90**		**.**	**0.89**	**.**	**.**	**0.97**	**0.83**	**0.86**	**.**
(n=)	(33)	(2)	(15)	(16)	(33)	(0)	(1)	(5)	(2)	(2)	(8)	(9)	(5)	(1)
Total budgeted hours/ total patient day	**0.92**	**.**	**0.87**	**0.97**	**0.92**		**.**	**0.89**	**.**	**.**	**1.05**	**0.92**	**0.79**	**.**
(n=)	(33)	(2)	(15)	(16)	(33)	(0)	(1)	(5)	(2)	(2)	(8)	(9)	(5)	(1)
Inpatient budgeted hours/ total patient day	**0.84**	**.**	**0.79**	**0.86**	**0.84**	**.**	**.**	**0.86**	**.**	**.**	**0.92**	**0.82**	**0.75**	**.**
NON-TEACHING HOSPITALS														
(n=)	(113)	(35)	(59)	(19)	(0)	(113)	(21)	(9)	(4)	(9)	(35)	(26)	(4)	(5)
Total budgeted hours/ acute patient day	**0.83**	**0.79**	**0.85**	**0.85**		**0.83**	**0.68**	**0.99**	**0.76**	**0.72**	**0.88**	**0.89**	**1.03**	**0.75**
(n=)	(113)	(35)	(59)	(19)	(0)	(113)	(21)	(9)	(4)	(9)	(35)	(26)	(4)	(5)
Inpatient budgeted hours/ acute patient day	**0.77**	**0.75**	**0.77**	**0.78**		**0.77**	**0.65**	**0.97**	**0.72**	**0.66**	**0.81**	**0.75**	**1.03**	**0.71**
(n=)	(110)	(34)	(59)	(17)	(0)	(110)	(20)	(9)	(4)	(9)	(35)	(24)	(4)	(5)
Total budgeted hours/ total patient day	**0.55**	**0.59**	**0.56**	**0.45**		**0.55**	**0.38**	**0.78**	**0.71**	**0.47**	**0.67**	**0.39**	**0.71**	**0.59**
(n=)	(110)	(34)	(59)	(17)	(0)	(110)	(20)	(9)	(4)	(9)	(35)	(24)	(4)	(5)
Inpatient budgeted hours/ total patient day	**0.51**	**0.56**	**0.50**	**0.42**		**0.51**	**0.37**	**0.76**	**0.68**	**0.42**	**0.62**	**0.32**	**0.71**	**0.56**

. Results not shown because data available for fewer than three facilities.

Base: all respondents

Note that budgeted hours exclude pharmacy residents

Total budgeted hours = inpatient budgeted hours + outpatient budgeted hours

Total patient days includes both, acute patient days and non-acute patient days

In order for these ratios to be useful to a pharmacy department, it is important to look at the ratios that are applicable to your own facility. The teaching or non-teaching status of your hospital will be an important factor to consider. In addition, the size of your hospital and the ratio of acute to non-acute patient days may be important. If your facility has a mix of acute and non-acute patient days, or has a lot of staffing committed to outpatient services, you will want to select the ratios that take your own hospital's particular characteristics into

consideration. In some cases you may have to use several ratios for comparison purposes. Appropriate use of these ratios will allow pharmacy managers to understand how their manpower compares to that at other similar hospitals. This data may useful in supporting a request for additional staffing, for defending your existing staffing, and for illustrating how the mix of acute versus chronic beds, or the mix of inpatient versus outpatient services, must be considered when comparing facilities of the same size same bed size and/or teaching status.

Staff Composition of the Average Hospital Pharmacy Department

The staffing ratios above allow a hospital to compare the staffing that they have to that of other similar hospitals, using a workload indicator (patient days) as a standardized proxy for workload. However, it does not provide information that allows the staff composition of a pharmacy department to be examined. In order to provide data for this purpose, the Hospital Pharmacy in Canada report has also collected and reported data on the number of different types of staff that each respondent employs (i.e. managers, staff pharmacists, pharmacy technicians, support staff and pharmacy residents). This information is useful for examining issues like pharmacist to technician ratios, differences in staff composition between different provinces, differences in staff composition between teaching and non-teaching hospitals, and differences in staff composition between hospitals of different sizes. In the 2011/12 HPC Report, the results remain quite similar to those reported in the 2009/10 report.

This report is the first report that includes advanced practice pharmacists as a group separate from staff pharmacists. Previous reports grouped these two categories together.

- The average number of pharmacist positions reported by respondents, including advanced practice pharmacists, represents 40% of total pharmacy staffing (Fig D.1), similar to the figure of 40% that was reported in 2009/10. The percentage of pharmacists is highest in SK (47%) and lowest in NS (35%).
- Advanced practice pharmacists represented 7.6% of total staffing. Of note is QC, where respondents reported that advanced practice pharmacists represented 20.6% of their total staffing. This high percentage is likely the result of the introduction of the entry to practice Pharm.D. degree at both faculties of pharmacy in that province. The next highest is BC, where respondents reported that advanced practice pharmacists represent 8.6% of their total pharmacy staffing. BC also has a Pharm. D. program, but it is a post baccalaureate program which accepts a much smaller number of students each year than the QC Pharm. D. programs which are entry-to-practice Pharm. D. programs. These two provinces affect the average considerably, with the other provinces reporting that advanced practice pharmacists make up only 1.4% to 3.3% of their total staffing.

Table D-4. Average Budgeted Pharmacy Staffing (FTE's) 2011/12

	---	Bed Size			Teaching Status		Province							
	All	50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS
(n=)	(160)	(40)	(80)	(40)	(36)	(124)	(24)	(14)	(6)	(11)	(48)	(41)	(9)	(7)
Staff Pharmacists	**14.8**	**3.8**	**12.4**	**30.4**	**33.2**	**9.4**	**12.4**	**28.3**	**20.6**	**13.4**	**18.5**	**7.8**	**12.5**	**11.3**
Advanced Practice Pharmacists	**3.5**	**0.6**	**2.2**	**9.0**	**8.0**	**2.1**	**3.0**	**1.1**	**1.1**	**0.8**	**1.7**	**8.7**	**1.0**	**0.9**
Pharmacist Managers	**1.6**	**0.9**	**1.3**	**2.9**	**3.2**	**1.1**	**1.3**	**1.5**	**2.3**	**1.5**	**1.7**	**1.6**	**1.8**	**1.5**
Pharmacy Manager (neither a pharmacist or a technician)	**0.1**	**0.0**	**0.1**	**0.3**	**0.3**	**0.1**	**0.0**	**0.1**	**0.3**	**0.0**	**0.1**	**0.2**	**0.2**	**0.0**
Pharmacy Technician Managers	**0.5**	**0.2**	**0.4**	**1.1**	**1.2**	**0.3**	**0.4**	**1.5**	**0.5**	**0.8**	**0.5**	**0.2**	**0.8**	**0.4**
Pharmacy Technicians and Pharmacy Assistants (both)	**23.4**	**7.2**	**17.4**	**51.4**	**52.4**	**14.9**	**16.4**	**41.0**	**18.7**	**16.1**	**27.3**	**20.9**	**19.7**	**19.7**
Support Personnel (clerical / porter / aide)	**1.4**	**0.2**	**1.1**	**3.2**	**3.3**	**0.8**	**1.3**	**1.5**	**1.2**	**0.8**	**1.5**	**1.6**	**1.5**	**0.9**
Residents	**0.6**	**0.0**	**0.4**	**1.6**	**2.3**	**0.1**	**0.3**	**0.6**	**1.0**	**0.2**	**0.6**	**1.0**	**0.4**	**0.3**
Total(excluding residents)	**45.2**	**12.8**	**34.8**	**98.3**	**101.6**	**28.8**	**34.8**	**74.9**	**44.7**	**33.4**	**51.1**	**40.9**	**37.5**	**34.7**

Base: All Respondents providing staffing information

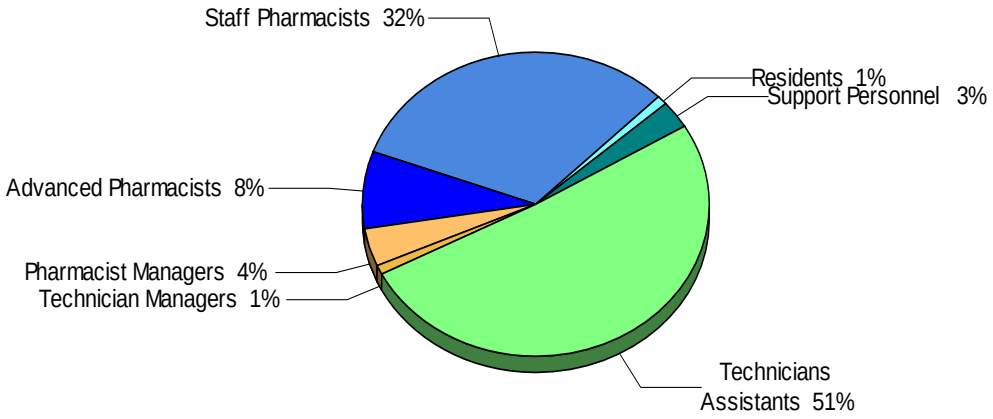
- Combined pharmacist and technician management positions represent 4.8% of total staffing, similar to the 4% figure reported in 2009/10.

- Technician/Assistant positions represent 51% of total staffing, similar to the 51% in 2009/10 and 49% in 2007/08.
- Support personnel represent 3.0% of total pharmacy staffing in 2011/12, compared to the figure of 3.4% that was reported in 2009/10, and the figure of 3.8% that was reported in 2007/08.

There is considerable variability from province to province in the percentage of staff who are classified as "advanced practice pharmacists"

Overall the staff composition has remained relatively unchanged since the last report. Advanced practice pharmacists, as a percentage of total staff, is new for the 2011/12 report and therefore cannot be compared to previous reports.

Figure D-1. Staff Composition of the Average Hospital Pharmacy Department 2011/12



Base: Respondents providing relevant data (160)

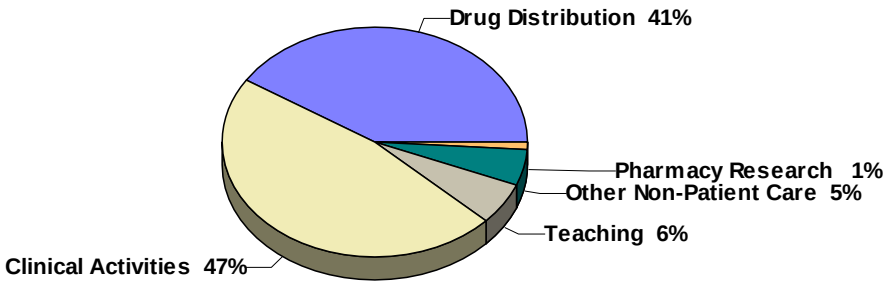
Overall, the proportion of time that pharmacists spend performing different functions has not changed much since the last report. Only when a longer trend time is examined do you see changes. Looking back to 1997/98, the time spent then on clinical activities has increased from 33% in 1997/98 to 47% in the 2011/12 HPC report.

Table D-5. Proportion of Pharmacist Time Spent Performing Different Activities 2011/12

		Bed Size			Teaching Status		Province							
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS
(n=)	(163)	(40)	(81)	(42)	(37)	(126)	(26)	(13)	(6)	(12)	(46)	(44)	(9)	(7)
Drug distribution	**41%**	**50%**	**39%**	**35%**	**30%**	**44%**	**45%**	**45%**	**54%**	**43%**	**34%**	**39%**	**60%**	**34%**
Clinical activities	**47%**	**41%**	**49%**	**51%**	**54%**	**45%**	**46%**	**45%**	**39%**	**47%**	**51%**	**46%**	**34%**	**56%**
Teaching	**6%**	**5%**	**6%**	**8%**	**9%**	**5%**	**5%**	**7%**	**7%**	**5%**	**6%**	**8%**	**2%**	**4%**
Pharmacy research	**1%**	**0%**	**1%**	**2%**	**3%**	**0%**	**1%**	**1%**	**0%**	**1%**	**1%**	**1%**	**1%**	**1%**
Other non-patient care activities	**5%**	**5%**	**6%**	**5%**	**5%**	**5%**	**3%**	**3%**	**0%**	**5%**	**7%**	**6%**	**4%**	**5%**

Base: all respondents

Figure D-2. Proportion of Pharmacist Time Spent Performing Different Activities 2011/12



Base: Respondents providing relevant data (163)

Salaries

Throughout this section, the salary increases that occurred over the 2 year period between 2009/10 and 2011/12 have been annualized. When a percentage increase is referred to in the points below, the percentage reported applies to each of the 2 years between the 2009/10 report and the 2011/12 report.

- Average salary changes for all staff ranged from a decrease of 1.1% for pharmacy technicians where there was only one level of pharmacy technician staff to an increase of 5.7% for managers who were neither technicians nor pharmacists.
- Overall, respondents reported that staff pharmacists had a mean salary increase of 1% at the top level of their salary scale. This is a considerably lower increase than the 4% annual increase reported in 2009/10, the 4.8% annual increase reported in 2007/08 and 2.8% annual increase reported in 2005/06. This may be reflective of the current economic conditions across Canada, as well as an easing of the pharmacist manpower shortage. The largest salary increases for staff pharmacists at the top level were in QC, reported at 4.6%. This reflects successful efforts in that province to bring their pharmacist salaries to a level that is more competitive with those offered in the community pharmacy sector and salaries paid to hospital pharmacists in other provinces. All other provinces reported changes of 3.5% or less. BC respondents reported a decrease of 0.5% but this may be the result of the BC government announcement that the market adjustment for pharmacists would be eliminated, a decision that was later rescinded.
- Salaries for staff pharmacists in teaching hospitals were higher than in non-teaching hospitals, with no notable differences in staff pharmacist salaries based on the size of the hospital.
- Staff technician salaries at the top level rose by 0.3% for level one and 0.8% for level two technicians. This is in contrast to increases of 7.1% reported in 2009/10, and the 4.4% increase reported in 2007/08. Pharmacy technician salaries are highest in AB and lowest in QC. Pharmacy assistant salaries rose by 5.3% but this may be an anomaly due to some former pharmacy technicians being reclassified as pharmacy assistants.
- The average residency stipend increased by 3.7%. This might be a result of the fact that respondents in 4 provinces did not report stipend amounts in the last report whereas respondents in all provinces reported a stipend in the 2011/12 report. Stipends range from a low of $30,000 in NS to a high of $50,000 in BC, with increases reported in most provinces when the reported 2011/12 stipends are compared to the stipend amounts reported in the 2009/10 report.
- Pharmacy director's salaries have increased over the past few surveys. In 2011/12, 95% of pharmacy directors earned over $100,000, compared with 84% in 2009/10, 65% in 2007/08 and 42% in 2005/06.

BC (68%) and ON (44%) continue to report the highest number of pharmacy directors with salaries over $130,000. The salary increases may be due in part to pharmacy directors taking over more responsibility, often having responsibility for multiple sites.

Table D-6a. Average Annual Salary by Position 2011/12

		---	Bed Size			Teaching Status		Province							
		All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
Start $ - Staff Pharmacist	(n=)	(163)	(40)	(81)	(42)	(37)	(126)	(26)	(13)	(6)	(12)	(46)	(44)	(9)	(7)
		77,324	**79,142**	**76,702**	**76,755**	**79,905**	**76,562**	**70,575**	**89,170**	**85,504**	**89,502**	**76,303**	**74,361**	**76,289**	**73,507**
Top $ - Staff Pharmacist	(n=)	(141)	(35)	(73)	(33)	(31)	(110)	(26)	(14)	(6)	(11)	(41)	(27)	(9)	(7)
		94,528	**94,744**	**94,832**	**93,627**	**97,540**	**93,679**	**90,612**	**111,912**	**95,486**	**98,339**	**94,944**	**91,497**	**87,980**	**85,168**
Start $ - Advanced Practice Pharmacist	(n=)	(72)	(6)	(37)	(29)	(28)	(44)	(19)	(7)	(2)	(4)	(19)	(18)	(3)	(0)
		84,552	**86,229**	**83,423**	**85,646**	**87,168**	**82,887**	**82,385**	**86,543**	**.**	**98,953**	**84,617**	**82,091**	**80,419**	**.**
Top $ - Advanced Practice Pharmacist	(n=)	(75)	(6)	(39)	(30)	(28)	(47)	(19)	(7)	(2)	(4)	(19)	(20)	(4)	(0)
		101,066	**106,926**	**100,696**	**100,374**	**102,537**	**100,189**	**102,979**	**113,729**	**.**	**108,681**	**99,870**	**95,968**	**89,382**	**.**
Start $ - Pharmacist Manager	(n=)	(109)	(22)	(56)	(31)	(30)	(79)	(24)	(13)	(6)	(7)	(25)	(23)	(7)	(4)
		90,090	**88,905**	**90,251**	**90,642**	**90,681**	**89,866**	**87,841**	**88,745**	**106,667**	**108,414**	**88,443**	**89,288**	**85,756**	**73,523**
Top $ - Pharmacist Manager	(n=)	(123)	(25)	(63)	(35)	(35)	(88)	(24)	(14)	(6)	(10)	(27)	(31)	(7)	(4)
		112,628	**111,472**	**113,043**	**112,706**	**113,601**	**112,240**	**118,542**	**124,325**	**111,424**	**119,239**	**107,488**	**110,653**	**98,304**	**96,540**
Start $ - Pharmacy Manager (neither a pharmacist or a technician)	(n=)	(23)	(5)	(10)	(8)	(10)	(13)	(0)	(6)	(1)	(0)	(5)	(9)	(20	(0)
		72,132	**76,703**	**72,259**	**69,117**	**65,129**	**77,520**	**.**	**85,500**	**.**	**.**	**82,223**	**56,281**	**.**	**.**
Top $ - Pharmacy Manager (neither a pharmacist or a technician)	(n=)	(24)	(5)	(11)	(8)	(10)	(14)	(0)	(6)	(1)	(0)	(5)	(9)	(3)	(0)
		95,902	**104,966**	**94,949**	**91,548**	**86,740**	**102,447**	**.**	**128,500**	**.**	**.**	**98,777**	**77,629**	**81,776**	**.**
Start $ - Practice Leader / Coordinator (Pharmacist)	(n=)	(56)	(8)	(29)	(19)	(19)	(37)	(18)	(9)	(2)	(0)	(15)	(7)	(4)	(1)
		82,200	**83,831**	**80,628**	**83,913**	**82,458**	**82,068**	**82,987**	**77,811**	**.**	**.**	**82,603**	**82,992**	**79,125**	**.**
Top $ - Practice Leader / Coordinator (Pharmacist)	(n=)	(61)	(8)	(32)	(21)	(21)	(40)	(18)	(9)	(2)	(0)	(17)	(10)	(4)	(1)
		107,997	**108,364**	**108,085**	**107,725**	**106,517**	**108,775**	**117,996**	**116,444**	**.**	**.**	**102,582**	**99,112**	**94,209**	**.**
Start $ - Pharmacy Supervisor / Coordinator (Pharmacist)	(n=)	(48)	(6)	(26)	(16)	(18)	(30)	(18)	(7)	(2)	(1)	(7)	(11)	(1)	(1)
		83,082	**76,674**	**81,581**	**87,923**	**86,025**	**81,316**	**83,115**	**93,760**	**.**	**.**	**71,201**	**85,213**	**.**	**.**
Top $ - Pharmacy Supervisor / Coordinator (Pharmacist)	(n=)	(51)	(6)	(28)	(17)	(18)	(33)	(18)	(7)	(2)	(1)	(7)	(13)	(2)	(1)
		104,023	**98,449**	**103,768**	**106,411**	**107,626**	**102,058**	**108,701**	**123,539**	**.**	**.**	**84,559**	**103,344**	**.**	**.**
Start $ - Pharmacy Technician Manager	(n=)	(57)	(10)	(32)	(15)	(19)	(38)	(17)	(11)	(0)	(6)	(12)	(3)	(70	(1)
		55,118	**54,268**	**54,926**	**56,094**	**54,972**	**55,191**	**54,208**	**68,091**	**.**	**43,597**	**61,294**	**37,093**	**44,155**	**.**
Top $ - Pharmacy Technician Manager	(n=)	(64)	(10)	(37)	(17)	(20)	(44)	(19)	(11)	(0)	(7)	(14)	(4)	(8)	(1)
		70,646	**70,945**	**69,355**	**73,278**	**70,951**	**70,507**	**72,955**	**99,455**	**.**	**50,141**	**75,087**	**47,467**	**47,747**	**.**
Start $ - Pharmacy Assistant	(n=)	(64)	(14)	(36)	(14)	(14)	(50)	(19)	(13)	(1)	(4)	(23)	(2)	(2)	(0)
		41,574	**40,889**	**42,444**	**40,024**	**38,577**	**42,413**	**45,384**	**35,740**	**.**	**33,070**	**44,619**	**.**	**.**	**.**
Top $ - Pharmacy Assistant	(n=)	(69)	(15)	(40)	(14)	(15)	(54)	(21)	(13)	(1)	(5)	(23)	(3)	(3)	(0)
		45,744	**44,847**	**46,443**	**44,707**	**42,723**	**46,583**	**45,522**	**41,180**	**.**	**39,704**	**52,025**	**37,000**	**39,481**	**.**
Resident Stipend	(n=)	(56)	(3)	(27)	(26)	(29)	(27)	(20)	(4)	(2)	(1)	(14)	(12)	(2)	(1)
		41,683	**50,000**	**42,227**	**40,159**	**37,740**	**45,918**	**50,000**	**46,844**	**.**	**.**	**35,702**	**35,917**	**.**	**.**

.Results not shown because data available for fewer than three facilities / Base: all respondents providing relevant data

Table D-6b. Technician Salaries from Facilities with Only One Technician Salary Scale 2011/12

	-	Bed Size			Teaching Status		Province							
	All	50 - 200	200-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
Start $ - Pharmacy Technician - one level only (n=)	(71)	(22)	(30)	(19)	(15)	(56)	(1)	(11)	(30)	(10)	(15)	(23)	(3)	(5)
	40,288	43,417	40,486	36,351	40,975	40,104	.	56,453	47,200	35,164	46,750	30,284	39,557	36,722
Top $ - Pharmacy Technician - one level only (n=)	(77)	(22)	(35)	(20)	(15)	(62)	(2)	(11)	(3)	(10)	(15)	(27)	(4)	(5)
	47,253	51,074	46,748	43,933	48,691	46,905	.	68,155	57,118	41,630	53,095	38,222	42,135	41,599

Base: all respondents providing relevant data

Table D-6c. Technician Salaries from Facilities with Two Technician Salary Scales 2011/12

	-	Bed Size			Teaching Status		Province							
	All	50-200	200-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
Start $ - Pharmacy Technician - Level 1 / Staff (n=)	(60)	(8)	(35)	(17)	(19)	(41)	(20)	(1)	(3)	(0)	(19)	(10)	(5)	(2)
	42,321	42,364	42,554	41,819	41,302	42,793	44,859	.	43,181	.	45,795	32,253	38,379	.
Top $ - Pharmacy Technician - Level 1 / Staff (n=)	(60)	(8)	(35)	(17)	(19)	(41)	(20)	(1)	(3)	(0)	(19)	(10)	(5)	(2)
	47,471	44,913	48,715	46,112	48,101	47,179	45,686	.	47,212	.	54,881	39,621	40,477	.
Start $ - Pharmacy Technician - Level 2 / Senior (n=)	(60)	(8)	(35)	(17)	(19)	(41)	(20)	(1)	(3)	(0)	(19)	(10)	(5)	(2)
	46,004	46,399	46,283	45,243	44,761	46,580	48,729	.	51,749	.	50,191	33,755	39,601	.
Top $ - Pharmacy Technician - Level 2 / Senior (n=)	(60)	(8)	(35)	(17)	(19)	(41)	(20)	(1)	(3)	(0)	(19)	(10)	(5)	(2)
	51,405	48,645	53,084	49,245	52,044	51,108	48,829	.	55,474	.	60,024	41,870	42,391	.

Base: all respondents providing relevant data

Table D-7. Distribution of Director Salary Ranges 2011/12

	---	Bed Size			Teaching Status		Province							
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS
(n=)	(165)	(41)	(81)	(43)	(38)	(127)	(25)	(13)	(6)	(12)	(48)	(44)	(9)	(8)
under $ 80,000	1%	2%	1%	0%	0%	2%	0%	0%	0%	8%	0%	2%	0%	0%
$ 80,000 - $ 89,999	4%	7%	4%	2%	0%	6%	4%	0%	0%	0%	2%	5%	22%	13%
$ 90,000 - $ 99,999	10%	22%	6%	7%	11%	10%	0%	0%	33%	0%	4%	9%	44%	63%
$100 000 - $109 999	14%	20%	12%	12%	5%	17%	12%	0%	17%	0%	17%	20%	22%	0%
$110,000 - $119,999	18%	24%	21%	5%	8%	20%	12%	31%	17%	42%	21%	11%	11%	0%
$120,000 - $129,000	18%	12%	19%	23%	26%	16%	4%	31%	0%	42%	13%	27%	0%	25%
$130,000 - $139,000	12%	2%	14%	16%	13%	11%	8%	8%	17%	8%	25%	5%	0%	0%
$140,000+	23%	10%	23%	35%	37%	19%	60%	31%	17%	0%	19%	20%	0%	0%

Base: all respondents

Credentials of Pharmacists

Although all hospital pharmacists in Canada must have a minimum academic credential for licensure as a pharmacist, many have additional academic credentials. In the 2009/10 report, for the first time, respondents were asked to provide information on the additional credentials that their pharmacist staff members possessed. The wording of the question led respondents to report all credentials that each of their pharmacists possessed, which made the data somewhat difficult to interpret. In the 2011/12 survey, respondents were asked to report the "highest" credential that each of their staff pharmacists possessed. Since the questions were different, the results cannot be compared.

- Nationally, respondents reported that an average of 60% of their pharmacists held a Bachelor Degree as their highest academic credential. This ranged from a high of 90% in Manitoba (MB) to a low of 25% in

QC. Teaching hospitals, and larger hospitals, reported a lower percentage of pharmacists who had a Bachelor degree as their highest credential.

Entry to practice Pharm. D. programs are not offered in Canada except in QC which recently graduated their first Pharm. D. class. Other than in QC, there are a relatively small number of pharmacists who possess an entry to practice Pharm. D. degree, which would have been obtained in other countries, such as the United States, where the entry to practice degree is a Pharm. D. degree. With the recent announcement that both faculties of pharmacy in ON have approval to implement entry to practice Pharm. D. degrees, and with similar approvals expected in other provinces, it is expected that considerable change will occur over time in the credentials that pharmacists possess.

- The overall mean percentage of pharmacists who held a Canadian Society of Hospital Pharmacists (CSHP) Accredited Residency was 32%. This ranged from a high of 72% in QC to a low of 7% in MB. Teaching hospitals reported that 51% of their pharmacists had completed a residency program as their highest credential, compared to 27% of pharmacists in non-teaching hospitals. Hospitals with greater than 500 beds reported a higher % of residency trained pharmacists than hospitals with less than 500 beds.

Similarly to the results reported in the 2009/10 report, no respondent reported that their hospital would only hire pharmacists who had completed a residency program. Teaching and large hospitals often have a preference, written into their job descriptions, for residency trained pharmacists, which likely explains the larger percentage of residency trained pharmacists in those organizations. These institutions may also have an advantage in recruiting residency trained pharmacists due to their size, location and teaching affiliation. Also of note is that residency programs in QC are university affiliated and confer an M.Sc. degree to those who complete the program.

- The average percentage of M.Sc.Pharm. trained pharmacists was 1% and the percentage of those with a postgraduate Pharm. D. as their highest academic credential was 5%. The provinces with the most pharmacists who possessed a postgraduate Pharm. D. were BC where respondents reported that 11% of their pharmacists had a Pharm. D., and SK where respondents reported that 10% of their staff had a postgraduate Pharm. D.

Table D-8. Average Percentage of Pharmacist Staff with Highest Credential 2011/12

	-	Bed Size			Teaching Status		Province							
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
(n=)	(168)	(41)	(85)	(42)	(38)	(130)	(26)	(14)	(6)	(12)	(48)	(44)	(10)	(80
Bachelor degree in pharmacy	60%	84%	60%	36%	40%	66%	50%	88%	70%	90%	72%	25%	79%	87%
CSHP Accredited Residency Program	32%	14%	30%	53%	51%	27%	35%	10%	19%	7%	16%	72%	13%	10%
Post Graduate Pharm.D.	5%	2%	6%	6%	8%	4%	11%	2%	10%	1%	7%	1%	5%	3%
Entry Level Pharm.D.	3%	0%	3%	4%	1%	3%	5%	0%	0%	1%	4%	2%	0%	0%
Other M.Sc.Pharm	1%	0%	1%	1%	1%	1%	0%	0%	1%	1%	1%	0%	3%	0%

Base: all respondents

Summary

This year's report indicates that pharmacist vacancy rates remain relatively unchanged, compared to the last HPC report in 2009/10. With the increased supply of pharmacists and the regulation of technicians now a reality, it will be interesting to see if the projections of having a technician driven drug distribution system and pharmacists that work solely in a clinical practice will be realized. Over the next few surveys one would expect the proportion of pharmacist time spent performing different activities will shift more quickly than in the past. Although the trend is downward for pharmacist vacancies, with the shift in pharmacists practicing more in a clinical setting and the requirement for better medication management, we may see a need for more pharmacists if they are being more appropriately utilized and the clinical benefits are recognized in the executive arena.

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[2] Management Committee, Moving Forward: Pharmacy Human Resources for the Future. Final Report. Ottawa, Ontario. Canadian Pharmacists Association; (2008)

[3] Personal Communication – Harold Lopatka, Executive Director, AFPC/ADPC – November 18, 2010

[4] Pharmacists in Canada, 2011 – National and Jurisdictional Highlights, Canadian Institute for Health Information accessed on November 25, 2012, at http://www.cihi.ca/CIHI-ext-portal/pdf/internet/PHARM_2011_HIGHLIGHTS_PROF_EN

[5] Pedersen C, Schneider P, Scheckelhoff D. ASHP National Survey of Pharmacy Practice in Hospital Settings: Dispensing and Administration – 2011, Am J Health-Syst Pharm. 2012;69: 768-785.

[6] The Canadian Council for Accreditation of Pharmacy Programs (CCAPP) - accessed on November 25, 2012 ,at http://www.ccapp-accredit.ca/accredited_programs/technician/history_by_program

E - Technology

Patricia Macgregor, Kevin Hall

In 1999, the U.S. Institute of Medicine (IOM) released a report titled 'To Err is Human".[1] That report represented a turning point in our understanding of the magnitude of the patient safety risks that exist within our health care systems. Although the IOM report dealt with patient safety risks in the United States, the 2004 results of "The Canadian Adverse Events Study"[2] showed that patient safety risks in the Canadian health care system were similar in magnitude and frequency to those that had been reported in the 1999 IOM report. These studies led governments and health care managers to give a long overdue priority to patient safety, and the focus on patient safety has continued to the present time. In 2001 another IOM report, titled "Crossing the Chasm"[3], addressed a number of patient safety initiatives that had the potential to significantly improve the safety of health care systems. These included a call for an increase in the use of automation and communication technologies that would lead to seamless communication and an integrated electronic healthcare management model. This vision would involve the incorporation of evidence based guidelines and clinical decision making tools into electronic health care systems, allowing practitioners to have real time access to laboratory and diagnostic test results. The goal has been the creation of systems in which the use of health information technologies provide timely and accurate information at the point of care, enhance the quality of clinical decision making, improve documentation, and streamline processes, which together produce safer and higher quality care. However, this vision has proven challenging to attain. Barriers have included the financial costs of the technology, acceptance by health care professionals, gaps in connectivity between the various technology components, and the challenges associated with implementing a vision that may not fit well with the short-term, task-oriented culture that many hospitals operate within.

The technology section of the 2011/12 Hospital Pharmacy in Canada Report provides an update on the progress that has been made in the adoption and use of technologies that have the potential to substantially improve the safety and quality of medication processes in Canadian hospitals.

Systems Integration: Availability of Laboratory Test Results and Other Patient Information

Integration of systems and real time access to information at the point of care continue to be challenges for hospitals in Canada, even though the literature indicates that such systems can reduce errors, enhance decision making and positively impact patient care and clinical outcomes.[4] The integration of laboratory and medication order entry systems enhances the ability of the pharmacist to ensure patient- specific drug selection and dosing, to detect and prevent drug interactions, and to monitor for toxicity and adverse drug events. Integration of lab and pharmacy systems with prescriber order entry and clinical decision making systems enhances the quality of care, timeliness of decision making and reduction of risk.[4]

Table E-1. Pharmacy Access to Lab Results 2011/12

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
How pharmacists are provided with access to laboratory test results? (n=)	(169)	(41)	(85)	(43)	(38)	(131)
Lab system is fully interfaced with medication order entry system	82	13	48	21	13	69
	49%	**32%**	**56%**	**49%**	**34%**	**53%**
View-only access available from pharmacy terminals (interface or separate log-in)	81	24	35	22	25	56
	48%	**59%**	**41%**	**51%**	**66%**	**43%**
Through paper-based medical record only	6	4	2	0	0	6
	4%	**10%**	**2%**	**0%**	**0%**	**5%**

Base: all respondents

The 2011/12 survey results indicate that there has been continued progress with respect to pharmacists' ability to access and use laboratory data as they assess medication orders and make clinical decisions concerning the appropriateness of their patients' medication therapy.

- Forty-nine percent of respondents reported that their laboratory system is fully interfaced with the medication order entry system, compared with 43% (68/160) of respondents in the 2009/10 survey and 35% (57/165) of respondents in the 2007/08 survey. The increase in the percentage of respondents who have the desired level of connectivity between these two systems is a positive trend that will hopefully continue.

Interconnectivity of systems is increasing.

- A similar percentage of respondents (48%) reported that they have view-only access to lab data through a terminal in the pharmacy, or through a separate log-in process.
- The remaining 4% of respondents indicated that they can only access lab data from the patient's paper-based medical record.
- These overall results indicate that over 50% of respondents do not have a fully interfaced connection between the lab and pharmacy systems. As a result, there are no alerts that warn practitioners when changes in the drug or drug dose might be required as a result of lab results. The limited ability of pharmacists to access lab data at the point of care represents a significant obstacle to a pharmacist's ability to effectively manage drug therapy and prevent drug dosing errors.
- British Columbia (BC) leads other regions in the percentage of respondents who report having fully interfaced laboratory and pharmacy information systems. Seventy seven percent (20/26) of BC respondents reported having such systems, followed by Ontario (ON) at 65% (32/49), the Atlantic Provinces at 50% (9/18), Quebec (QC) at 34% (15/44) and the Prairies at only 19% (6/32).

TALLman Lettering

The 2011/12 survey included a section on the application of TALLman lettering, an initiative promoted by the Institute of Safe Medication Practices (Canada) to enhance medication safety through visual cues that would help to differentiate look-alike drug names. Although the literature contains only a few research studies on the effectiveness of TALLman lettering, there is some evidence that the use of TALLman lettering provides visual clues that make look-alike drug names easier to distinguish, thus reducing the possibility of errors in drug selection[5,6,7] Gerrett et al studied the impact of TALLMan lettering in electronic healthcare order entry systems on the incidence of medication selection error.[5] They also studied the impact of different formats and combinations of TALLman and normal lettering, concluding that the use of TALLman lettering for purely look alike drug name identification did not significantly impact error rates. However, they also noted that error rates increased fivefold when drugs had similar dose and or formulation characteristics (e.g. size, shape, colour, etc), in addition to similar names. Given this observation, Gerrett et al recommended the selective use of TALLman lettering for a specific group of lookalike drugs which are more likely to be involved in errors and recommended that further research should be conducted into the human factors related to recognition and selection of lookalike drugs.

In a study conducted by the Institute of Safe Medication practices in 2011, 64% of respondents reported that TALLman lettering had prevented them from dispensing or administering the wrong medication in their practice.[8]

- Eighty-one percent of the respondents from adult hospitals in the 2011/12 survey reported that their facility uses TALLman lettering to reduce error caused by confusion between drug products with look-alike names. In both BC and the Atlantic Provinces 100% of respondents reported the use of TALLman lettering and ON followed closely at 92%. Only 48% of respondents in QC reported that they use TALLman lettering, which may be a reflection of differences between the French and English language versions of various drug names.

TALLman lettering was reported to be used extensively in pharmacy processes and on patient care units.

- The use of TALLman lettering was reported to be extensively used throughout pharmacy processes and on patient care units. (Table E-2)

Table E-2. TALLman Lettering 2011/12

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Facility uses TALLman lettering to reduce errors caused by confusion between drug products with look-alike drug names	137	33	72	32	34	103
	81%	**80%**	**85%**	**74%**	**89%**	**79%**
Base: All respondents						
Where TALLman lettering is used (n=)	(136)	(33)	(71)	(32)	(34)	(102)
In the Pharmacy Information System (PIS)	109	25	57	27	25	84
	80%	**76%**	**80%**	**84%**	**74%**	**82%**
On Pharmacy-generated labels	121	28	62	31	31	90
	89%	**85%**	**87%**	**97%**	**91%**	**88%**
On Pharmacy unit dose packaging	108	24	58	26	24	84
	79%	**73%**	**82%**	**81%**	**71%**	**82%**
On Pharmacy-generated Medication Administration Records (MARs)	93	25	46	22	19	74
	68%	**76%**	**65%**	**69%**	**56%**	**73%**
In Pharmacy, on shelf labels	77	17	42	18	24	53
	57%	**52%**	**59%**	**56%**	**71%**	**52%**
In the medication rooms on patient care units (e.g., shelf labels)	52	13	25	14	15	37
	38%	**39%**	**35%**	**44%**	**44%**	**36%**
On medication carts	40	8	22	10	10	30
	29%	**24%**	**31%**	**31%**	**29%**	**29%**

Base: Facilities using TALLman lettering. Note: multiple mentions permissible

COMPUTERIZED PRESCRIBER ORDER ENTRY SYSTEMS (CPOE)

CPOE systems allow prescribers to enter orders for medications, laboratory tests, diagnostic tests and other procedures into an electronic system that transmits the order electronically to individuals who will carry out the order. CPOE systems are intended to insure accurate electronic transmission of the prescriber's intent and to reduce errors related to illegible handwriting and the manual transcription of orders. In addition, when a CPOE system is electronically connected to other health information systems, such as laboratory and pharmacy systems, and is combined with clinical decision support functionality, there is the potential to create systems that provide the prescriber with current and accurate data that is essential to making quality patient care decisions. The most advanced systems provide real-time clinical decision support such as dosage assessment, alternative medication suggestions, duplicate therapy warnings, therapeutic guidelines and protocols, drug interaction checking, and drug allergy checking.

For the purposes of the Hospital Pharmacy in Canada Report, a "Clinical Decision Support System" (CDSS) is defined as: "*A computer program feature that provides automatic reminders, advice, or interpretation as data is entered for a specific patient and/or a specific medication order. A clinical decision support system (CDSS) uses patient specific data and evidence based practice guidelines to generate an alert and/or a suggested course of action*."

The 2011/12 survey results indicate there is slow but ongoing progress in the implementation of CPOE systems. However, despite this progress the number of facilities that reported operational CPOE systems in Canada remains remarkably small.

The number of facilities with operational CPOE systems in Canada remains remarkably small.

- Only eight percent of respondents reported they had an operational CPOE system (TableE-3), compared with 8% (13/160) of respondents in 2009/10 and 5% (9/165) of respondents in 2007/08

Data reported by the Health Information and Management Systems Society (HIMMS) paints an even bleaker picture with respect to CPOE implementation, with only 2.4% of Canadian hospitals reported to have CPOE systems with clinical decision support functionality, as compared to 14% of hospitals in the United States.[9]

- In the 2011/12 Hospital Pharmacy in Canada survey, teaching hospitals were considerably more likely to report an operational CPOE (24%) than non-teaching hospitals.

- Hospitals in ON were more likely to report a CPOE system in place (16%, 8/49) than other regions of the country. There were no respondents in BC that reported having a CPOE system in operation Two respondents in the Prairies , two respondents in the Atlantic Provinces and 1 respondent in QC reported that they had a CPOE system in place and operational.
- Thirty three percent of respondents to the 2011/12 survey reported they have an approved plan to implement CPOE.

In total there are now 55 respondents, an increase of 17 over the number in the 2009/10 survey, who report that there is an approved plan within their facility to implement CPOE. This figure is encouraging, but a cautionary note is in order. Although there were 38 respondents in the 2009/10 survey who indicated that they had an approved plan to implement a CPOE system, the actual number of respondents with an operational CPOE system has only increased by two respondents since the 2009/10 survey. These results suggest that having an approved plan to implement CPOE does not necessarily mean that a CPOE system will be up and running soon. The lengthy time that it takes to bring up an operational CPOE system is likely due to the cost, complexity and high human resource demands associated with the implementation of a CPOE system.

- In the 2011/102 survey 60% of respondents reported that they did not have an approved plan for CPOE, compared with 68% (109/160) percent of respondents in the 2009/10 survey who did not have an approved plan. This small increase in the number of facilities who are pursuing a plan to implement CPOE suggests that CPOE implementation is still not high on the priority list of many Canadian hospitals, despite the arguments that CPOE is a critical requirement for building safer health care systems.

CPOE does not appear to be a high priority for many Canadian hospitals.

Given the cost and other resources required to implement a CPOE system, it would seem reasonable to expect that facilities would insure that the system they implemented would be designed to achieve the goal of enhancing connectivity between the CPOE system and other information systems within the hospital, such as pharmacy information systems and lab information systems.

- Of the 13 respondents who reported an operational CPOE, 3 reported that the CPOE system was not interfaced to the pharmacy information system and one respondent indicated that they had a unidirectional interface. The number of respondents in the 2011/12 survey who reported having a bidirectional interface (9 respondents) was similar to the 2009/10 survey.
- Of the respondents with CPOE systems, 75% reported that a clinical decision support system was part of their CPOE system, compared with seven respondents in 2009/10 who reported that they had clinical decision support as part of their CPOE system and only one respondent with this functionality in 2007/08.
- There was an increase in the number of respondents who reported that their CPOE system was interfaced with their laboratory systems to alert practitioners about the need for drug therapy changes in response to lab test results. Nine respondents reported that their CPOE system is interfaced with the lab system compared with four respondents in 2009/10 and five respondents in 2007/08.
- There was an increase in the number of respondents who reported that their CPOE system was used to guide the dosing of medications in specialty populations (8/12 in the 2011/12 survey, compared with 5/12 in the 2009/10 survey).

The connectivity between CPOE systems, clinical decision support systems and other information systems appears to be progressing very slowly.

Eighty-three percent (10/12) of respondents reported that their CPOE system alerts prescribers to unsafe orders during order entry and 67% (812) of respondents reported that their CPOE system guides the use of weight-based or surface area-based dosing for selected drugs and/or patient populations, similar to 2009/10 report.

Table E-3. Computerized Prescriber Order Entry System (CPOE) 2011/12

		All	Bed Size			Teaching Status	
			50 - 200	201- 500	>500	Teaching	Non-Teaching
A computerized prescriber order entry system (CPOE) is operational	(n=)	(169)	(41)	(85)	(43)	(38)	(131)
No, and no CPOE plan approved		101	28	50	23	17	84
		60%	**68%**	**59%**	**53%**	**45%**	**64%**
No, but approved plan to implement CPOE		55	10	27	18	12	43
		33%	**24%**	**32%**	**42%**	**32%**	**33%**
Yes, CPOE operational		13	3	8	2	9	4
		8%	**7%**	**9%**	**5%**	**24%**	**3%**
CPOE and PIS interface	(n=)	(13)	(3)	(8)	(2)	(9)	(4)
CPOE is interfaced to PIS (unidirectional)		1	0	1	0	1	0
		8%	**0%**	**13%**	**0%**	**11%**	**0%**
CPOE is interfaced to PIS (bidirectional)		9	2	6	1	5	4
		69%	**67%**	**75%**	**50%**	**56%**	**100%**
CPOE is NOT interfaced to PIS		3	1	1	1	3	0
		23%	**33%**	**13%**	**50%**	**33%**	**0%**
Integration and use of a CPOE	(n=)	(12)	(3)	(7)	(2)	(8)	(4)
Is integrated with a clinical decision support system		9	2	6	1	6	3
		75%	**67%**	**86%**	**50%**	**75%**	**75%**
Is interfaced with the lab system to alert practitioners		9	2	5	2	5	4
		75%	**67%**	**71%**	**100%**	**63%**	**100%**
Alerts prescribers to unsafe orders during order entry		10	2	6	2	6	4
		83%	**67%**	**86%**	**100%**	**75%**	**100%**
Guides the use of formulary drugs		9	0	7	2	7	2
		75%	**0%**	**100%**	**100%**	**88%**	**50%**
Guides the use of weight-based or surface area based dosing for selected drugs and/or patient populations		8	1	5	2	5	3
		67%	**33%**	**71%**	**100%**	**63%**	**75%**
Guides the dosing of medications in special populations		8	1	5	2	5	3
		67%	**33%**	**71%**	**100%**	**63%**	**75%**

Base: facilities with an operational CPOE system
Note: multiple mentions permissible

SMART PUMPS

Smart pumps incorporating drug libraries, high/low dosage alerts, and barcode-driven dose and rate programming have the potential to significantly enhance parenteral medication safety and reduce infusion related medication errors and their associated adverse events. Many hospitals report having access to smart pump technology but a considerably lower number optimize their operational capabilities through the full use of library alert functionality, regularly updating the pump programming, and using downloaded data on how the pumps are being used to improve the practices of nurses and others who utilize the pumps. The continued low utilization of the full value of smart pumps is concerning, given that the likelihood of serious adverse events is more prevalent with infused medications, and the fact that approximately 39% of medication errors are reported to occur at the point of care where there is less than a 2% error interception rate.[2]

- Seventy five percent of respondents to the 2011/12 survey reported that smart pumps were being used in their hospital, compared with 68% (108/160) in the 2009/10 survey, and 61% (101/165) in the 2007/08. This represents a considerable increase in smart pump usage over the last two to three survey cycles.

Reported use of smart pump technology is increasing.

- There were regional differences in the reported use of smart pumps. Fifty-five percent (24/44) of respondents in QC and 67% (12/18) of respondents in the Atlantic Provinces reported that they were using smart pumps, compared to 82-88% of respondents in the other regions of Canada.
- Twenty-four percent of respondents using smart pumps reported that they used a wireless network to upload and download data to smart pumps, which is slightly below the thirty percent (32/108) of respondents who reported doing so in the 2009/10 survey, but represents considerable growth since the 2007/08 survey when only nine percent (9/101) of respondents reported the use of wireless systems for this purpose.

- Ontario reported the highest use of wireless systems for transferring information to and from smart pumps (41%, 16/39) while BC reported the lowest at 9% (2/23).

- Fifty-eight percent of respondents using smart pumps reported that they review and update the pump libraries at least annually, versus 62% (66/107) who reported doing so in the 2009/10 survey.

Reported use of wireless networks to upload or download data to/from smart pumps has increased.

Table E-4. Smart Pumps 2011/12

		All	Bed Size			Teaching Status	
			50 - 200	201- 500	>500	Teaching	Non-Teaching
	(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Hospital uses IV Smart pumps		126	30	65	31	26	100
		75%	**73%**	**76%**	**72%**	**68%**	**76%**
	(n=)	(125)	(30)	(64)	(31)	(26)	(99)
Use of a wireless network to upload or download data to smart pumps		30	6	17	7	7	23
		24%	**20%**	**27%**	**23%**	**27%**	**23%**
Review and update the pumps' drug-specific programming (i.e., the pump's library) at least annually		72	16	38	18	15	57
		58%	**53%**	**59%**	**58%**	**58%**	**58%**

Base: all respondents

BARCODING

Barcode capable technology and the presence of readable barcodes on medications are becoming more commonly available in Canada, facilitated in part by The Canadian Pharmaceutical Bar Coding Project,[10] a collaborative project spearheaded by ISMP Canada. Its purpose is to develop a national consensus on standards associated with pharmaceutical Automated Identification and Data Capture (AIDC) (e.g., barcoding). The multi-sector consensus is designed to establish a single barcode strategy to enhance patient medication safety while sustaining the business efficiencies associated with product supply chain from the manufacturers to the patient care level. It has received endorsements from major Canadian health practice organizations, including the Canadian Society of Hospital Pharmacists, the Canadian Nurses Association, and the Canadian Medical Association.

The project released a Joint Technical Statement (version II: 2012) on the use of the GS1 global AIDC standard, which is available at the project web pages, hosted by ISMP Canada. This technical document describes the recommended application of the AIDC on pharmaceuticals, and the purpose for each aspect of the standard. (http://www.ismp-canada.org/barcoding/index.htm)

The ISMP/CPSI project will also be releasing a practice-related report in 2013 which discusses the use and effectiveness of medication barcode verification and documentation in reducing preventable medication errors in frontline medication processes. The report will assist discipline leaders and executives in developing arguments to support the local acquisition and implementation of automated barcode systems, both in hospital and community-based (nursing home) care environments. It also provides a primer for barcode knowledge, and system implementation considerations.

There is strong support in the literature for the effectiveness of barcode systems in improving patient safety. Studies indicate that the use of such systems has proven to be a useful tool for identifying risk- prone activities and enhances the ability to develop targeted continuous quality improvement processes.[11] Within the medication use system, barcode technologies have been shown to reduce medication dispensing and administration errors by as much as 60-85% and to reduce potential adverse events by over 60%.[12,13]

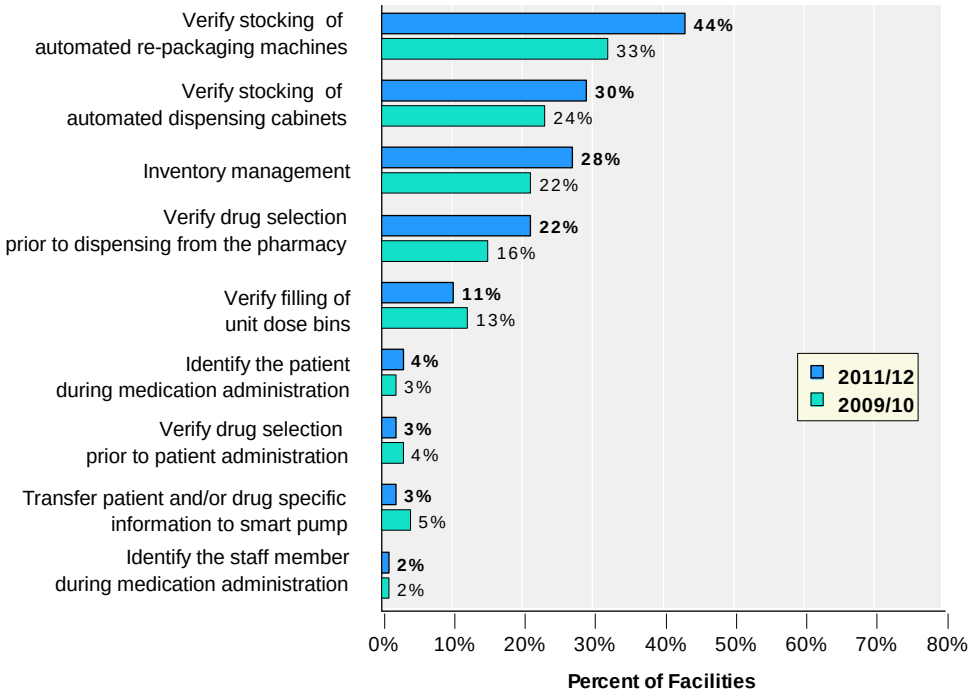
The use of some bar-coding applications is increasing quite quickly.

It should be noted that our methodology for calculating the percentage of respondents reporting use of each bar-coding application has changed since the last report. Percentages from the 2009/10 report have been recalculated using the same methodology for comparison purposes in the 2011/12 report. Therefore, the percentage of respondents reporting use of each bar-coding application, as quoted in the 2009/12 report, will not be comparable to 20011/12.

The most commonly reported uses of bar-coding in medication management systems were the verification of the stocking of automated repackaging machines, the verification of the stocking of automated dispensing cabinets, inventory management, and the verification drug selection before dispensing from pharmacy.

- Forty-four percent of respondents reported that they were using a bar-code application for verifying the stocking of automated repackaging machines, compared with 33% (53/160) in 2009/10. An additional 7% of respondents in 2011/12 indicated that they had an approved plan for the implementation of bar-coding for this application.

Figure E-1. Uses of Barcoding 2011/12



Base: All facilities (160 in 2009/10, 167 in 2011/12)

- Thirty percent of respondents reported that they used barcode systems for verifying the stocking of automated dispensing cabinets, compared with 24% (38/160) of respondents in the 2009/10 survey. An additional 16% of respondents in 2011/12 reported that they had an approved plan to implement bar-coding for this application
- Twenty-eight percent of respondents reported that they used bar-code systems for inventory management, compared with 22% (35/160) of respondents in 2009/10. An additional 16% of respondents in 2011/12 reported that they had an approved plan to implement bar-coding for this application
- Twenty two percent of respondents reported that they use barcoding to verify drug selection before dispensing from pharmacy, compared with 16% (26/160) in the 2009/10 survey.

Other areas of bar-code application are showing minimal or no growth.

Use of bar-coding for the majority of applications has shown minimal growth since 2009/10.

- Only 5 respondents reported they had implemented barcode scanning to transfer patient and/or drug specific information to smart pumps, compared with 8 respondents in 2009/10.
- The use of barcode scanning for patient identification during drug administration was reported by 7 respondents in 2011/12, compared with 5 respondents in 2009/10. Only 5 respondents reported the use of barcode scanning for drug verification prior to administration to the patient, compared to 6 respondents who reported doing so in 2009/10.
- Only 7 respondents in 2010/12, compared to 5 respondents in 2009/10, reported that they use bar-code scanning to identify the patient prior to drug administration.

- Only 3 respondents in both 2010/12 and 2009/10 reported that they use bar-code scanning to identify the staff member during drug administration.

Table E-5. Barcoding 2011/12

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
Bar Coding is used to (n=)	(167)	(40)	(85)	(42)	(38)	(129)
Verify drug selection prior to dispensing from the pharmacy						
not used yet, but there is an approved and funded plan to do so	22	6	12	4	8	14
	13%	15%	14%	10%	21%	11%
used for this activity	37	7	18	12	8	29
	22%	**18%**	**21%**	**29%**	**21%**	**22%**
Verify drug selection prior to patient administration						
not used yet, but there is an approved and funded plan to do so	19	5	8	6	8	11
	11%	13%	9%	14%	21%	9%
used for this activity	5	1	4	0	1	4
	3%	**3%**	**5%**	**0%**	**3%**	**3%**
Identify the patient during medication administration						
not used yet, but there is an approved and funded plan to do so	14	3	5	6	6	8
	8%	8%	6%	14%	16%	6%
used for this activity	7	1	6	0	1	6
	4%	**3%**	**7%**	**0%**	**3%**	**5%**
Identify the staff member during medication administration						
not used yet, but there is an approved and funded plan to do so	13	3	5	5	5	8
	8%	8%	6%	12%	13%	6%
used for this activity	3	0	3	0	1	2
	2%	**0%**	**4%**	**0%**	**3%**	**2%**
Inventory management						
not used yet, but there is an approved and funded plan to do so	27	6	13	8	10	17
	16%	15%	15%	19%	26%	13%
used for this activity	47	5	24	18	10	37
	28%	**13%**	**28%**	**43%**	**26%**	**29%**
Verify filling of unit dose bins						
not used yet, but there is an approved and funded plan to do so	19	3	11	5	6	13
	11%	8%	13%	12%	16%	10%
used for this activity	19	3	10	6	4	15
	11%	**8%**	**12%**	**14%**	**11%**	**12%**
Verify stocking of automated dispensing cabinets						
not used yet, but there is an approved and funded plan to do so	26	6	11	9	7	19
	16%	15%	13%	21%	18%	15%
used for this activity	50	10	21	19	17	33
	30%	**25%**	**25%**	**45%**	**45%**	**26%**
Verify stocking of automated re-packaging machines						
not used yet, but there is an approved and funded plan to do so	11	3	3	5	5	6
	7%	8%	4%	12%	13%	5%
used for this activity	74	14	37	23	18	56
	44%	**35%**	**44%**	**55%**	**47%**	**43%**
Transfer patient and/or drug specific information to smart pump						
not used yet, but there is an approved and funded plan to do so	10	2	7	1	2	8
	6%	5%	8%	2%	5%	6%
used for this activity	5	1	2	2	3	2
	3%	**3%**	**2%**	**5%**	**8%**	**2%**

Base: all respondents

Conclusion

The literature suggests that the adoption and utilization of various health system technologies within an integrated environment can impact the effectiveness and safety of medication processes. These technologies are reported to contribute to the enhancement of quality, safety, efficiency, and health outcomes by providing the healthcare team with timely access to data needed to make informed decisions to manage the health of their patients. This includes the incorporation of evidence based order sets, clinical decision making at point of care, patient specific reminders, alerts and triggers, and automated processing and verification. Access to comprehensive information by all members of the healthcare team facilitates improved care coordination and more efficient, informed, and appropriate clinical decisions. However these technologies are resource intensive to implement and support.

The results of the 2011/12 survey indicate that medication systems technology continues to evolve, yet the slow adoption indicates that achieving the goal of a fully integrated health technology infrastructure will take many years to be fully realized. Progress in systems integration continues. More respondents reported access to integrated lab: pharmacy, lab:CPOE and/or CPOE:Pharmacy systems than in previous surveys.

Adoption of TALLman lettering is widely reported by respondents as a measure to potentially reduce medication errors related to selection of look-alike drugs, despite a small body of evidence in the literature to substantiate this claim. The implementation of TALLman lettering is a relatively modest and inexpensive activity and therefore should be used until further evidence accumulates regarding its usefulness in preventing medication selection errors caused by look-alike drugs.

Progress was reported in the use of smart pumps, use of wireless networks for uploading and downloading data to and from smart pumps, as well as the use of this data for regular quality reviews and drug library updates.

The implementation of CPOE systems continues to remain a challenge with minimal increases in implementation reported over the last few survey cycles, despite large numbers of respondents reporting that their facilities had "approved plans" for implementing CPOE technology. Little or no increase was reported in the use of bar-code applications for bedside medication verification, patient verification, or identification of staff members who administer medications.

In contrast, there has been a fairly steady growth in the use of some barcode applications. It is expected that in future surveys there will be a considerable increase in the reported use of bar-code applications for bedside verification of medications, patients and staff.

In conclusion, despite a large body of literature supporting the use of technological solutions to enhance both the safety and the efficiency of medication management processes, adoption continues to be slower than anticipated for most of these solutions. How can we surmount the challenges, accelerate the adoption of technologies, and enhance the effectiveness of those that have been implemented? The funding requirements present a significant challenge. However the change management aspects are just as challenging. Does the technology meet the practical needs of the clinician users? Do we still attempt to simply automate the tasks currently performed by health care practitioners or can we transform and re-engineer the way we work, with the objective of optimizing clinical practice and patient outcomes? Some of the obstacles to achieving meaningful change may include a lack of skilled, experienced personnel to envision and execute such changes. Leaders of this type of transformative change would ideally have expertise in informatics, change management and pharmacy practice. Such individuals are hard to find, but programs have been created in the US to help develop "Pharmacy Informatics Officers" who would possess the combination of skills needed to accelerate the adoption of communication and automation technologies that have been shown to improve the quality, efficiency and safety of medication systems and processes.[14]

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F - Benchmarking Indicators – Acute Care Hospitals

Kevin Hall, Patricia Macgregor

This chapter contains data on the pharmacy staffing and drug costs that are associated with the delivery of drug distribution and clinical pharmacy services to specific patient care programs (e.g. medicine, surgery, oncology, mental health, etc.).

The objectives of generating this data are two-fold:

i) to create more detailed benchmark data for those who require or desire to compare and justify their own pharmacy staffing and drug costs against those reported by other hospitals

ii) to facilitate planning for new and expanded programs and services, by providing information on the pharmacy resources typically required to operate particular programs and services

For the 2001/12 survey, several changes were made to the questions that were asked in the benchmarking section. Some data were no longer requested if the number of respondents who had been able to provide the data in past surveys was very small, raising concerns about the reliability of the calculated ratios. In addition, the drug cost and staffing data which had been collected in previous surveys for oncology admixture services, parenteral admixture services, total parenteral nutrition services, investigational drugs, renal dialysis and students precepted, were not collected in the 2011/12 survey. However, the data collected on the staffing resources and drug costs associated with specific clinical programs such as critical care, medicine, surgery etc., had been quite consistent and reproducible over the previous surveys so the collection of benchmarking data for those programs was continued in the 2011/12 survey.

Methodology

Even if respondents weren't able to complete all sections of the benchmark survey, they were encouraged to provide any data that they could for staffing resources and drug costs associated with eight common clinical programs that are present in many hospitals. For example, many respondents were able to provide a breakdown of drug costs by clinical program, but were not able to supply data on the staffing allocated to specific clinical programs. Similarly, many facilities were able to identify the clinical staff time provided to specific programs, but were not able to provide data on the breakdown of their drug distribution staffing for individual clinical programs. As a result of this approach to the data collection, the "n" (number of respondents), on which the reported mean values are based, is variable.

Staffing Indicators for Specific Inpatient Clinical Programs

In Table F-1, data on staffing for 8 inpatient clinical programs, typically found in many Canadian hospitals, are presented. Readers are reminded that the number of respondents in each cell may be different from those in other cells. As a result, there are some minor anomalies in the data. For example if the paid hours per patient day for clinical services and the paid hours per patient day for drug distribution services are summed, for any given clinical program in the table, the result may not be exactly the same as the total paid hours per patient day that is reported for that program. That is because the number of respondents who provided data for each of those indicators may be different.

The staffing data can be summarized as follows:

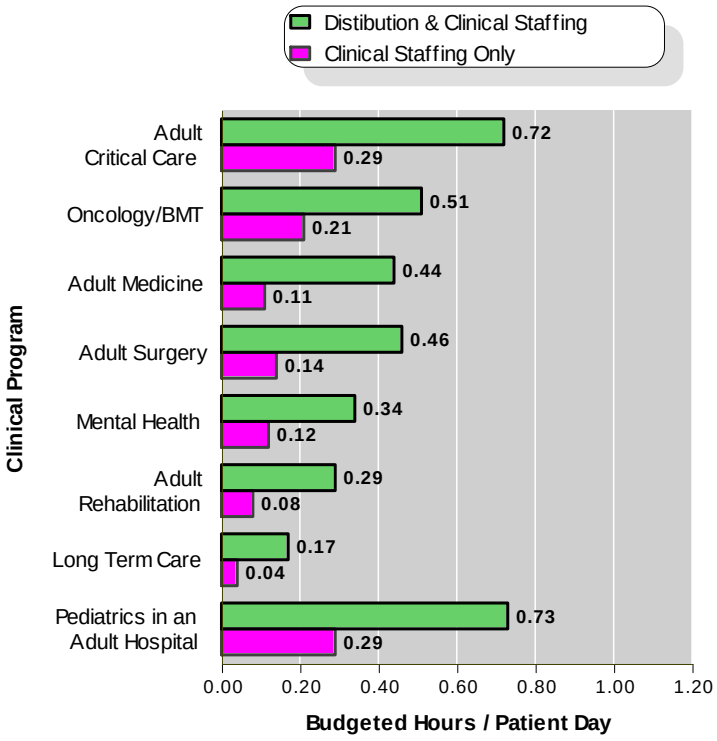
- As might be expected, high acuity/high complexity clinical programs, such as critical care, oncology/bone marrow transplant, and pediatrics consumed significantly larger amounts of pharmacy staffing, on a paid hour per patient day basis, than did low acuity/low complexity programs. This was true for both the clinical and drug distribution staffing indicators.

Table F-1. Benchmarking Ratios – Budgeted Hours / Patient Day 2011/12

	Total Budgeted Hours per Patient Day			Drug Distribution Budgeted Hours per Patient Day			Clinical Services Budgeted Hours per Patient Day		
	---	Teaching Status		---	Teaching Status		---	Teaching Status	
	All	Teaching	Non-Teaching	All	Teaching	Non-Teaching	All	Teaching	Non-Teaching
Clinical Program									
(n=)	(43)	(16)	(27)	(44)	(16)	(28)	(69)	(24)	(45)
Adult Critical Care	**0.72**	**0.70**	**0.73**	**0.46**	**0.41**	**0.48**	**0.29**	**0.35**	**0.26**
(n=)	(14)	(7)	(7)	(16)	(9)	(7)	(23)	(13)	(10)
Adult Oncology / Bone Marrow Transplant	**0.51**	**0.58**	**0.43**	**0.45**	**0.57**	**0.29**	**0.21**	**0.27**	**0.14**
(n=)	(48)	(16)	(32)	(50)	(16)	(34)	(74)	(25)	(49)
Adult Medicine Areas	**0.44**	**0.50**	**0.40**	**0.34**	**0.34**	**0.33**	**0.11**	**0.14**	**0.09**
(n=)	(39)	(12)	(27)	(44)	(13)	(31)	(61)	(21)	(40)
Adult Surgery Areas	**0.46**	**0.48**	**0.45**	**0.36**	**0.35**	**0.36**	**0.10**	**0.11**	**0.10**
(n=)	(30)	(10)	(20)	(36)	(11)	(25)	(46)	(18)	(28)
Adult Mental Health	**0.34**	**0.39**	**0.32**	**0.23**	**0.31**	**0.19**	**0.11**	**0.14**	**0.09**
(n=)	(22)	(4)	(18)	(23)	(4)	(19)	(32)	(6)	(26)
Adult Rehabilitation	**0.29**	**0.25**	**0.30**	**0.22**	**0.20**	**0.23**	**0.08**	**0.07**	**0.08**
(n=)	(20)	(2)	(18)	(21)	(2)	(19)	(27)	(4)	(23)
Long Term Care	**0.17**	**0.25**	**0.16**	**0.13**	**0.22**	**0.12**	**0.04**	**0.06**	**0.03**
(n=)	(15)	(5)	(10)	(21)	(7)	(14)	(30)	(9)	(21)
Pediatrics (Within A General Hospital)	**0.73**	**0.75**	**0.72**	**0.58**	**0.77**	**0.49**	**0.29**	**0.33**	**0.27**

Base: respondents who provided relevant information

Figure F-1. Mean Pharmacy Staffing for Selected Clinical Programs



Base: Facilities providing relevant data (14 to 44)

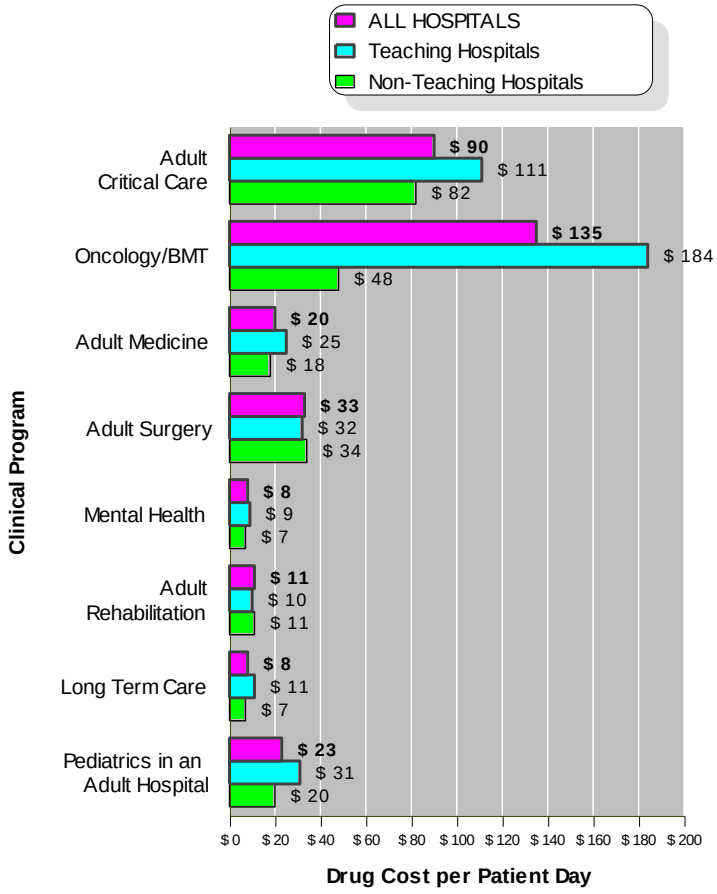
- When the staffing figures were looked at for teaching versus non-teaching hospitals, the total staffing resources utilized by the teaching hospitals for both drug distribution and clinical services were 10% to 55% higher than the staffing resources used in non-teaching hospitals, for the oncology, medicine, surgery, mental health and long term care clinical programs.

Human resource and drug cost data for most programs is remarkably consistent with data from previous surveys.

- In the case of adult critical care, total pharmacy staffing resources were almost identical for teaching versus non-teaching hospitals. In the case of rehabilitation programs, the staffing resources used in non-teaching hospitals were actually higher than the staffing resources used in teaching hospitals. This finding related to rehabilitation programs was similar to the results reported in the last HPC report. It is possible that most rehabilitation services are provided after the patient has been moved from an acute care setting in teaching hospitals to a non-acute setting in a non-teaching hospital.
- Comparison of the staffing for distribution and clinical services (Figure F-1) indicates that the budgeted hours per patient day for clinical services represent between 23% to 41% of the total budgeted hours per patient day that are required for both distributive and clinical services. Phrased another way, the data suggest that the majority of pharmacy staff time between 59% and 77% of the total combined budgeted hours for pharmacists and technicians are utilized to provide drug distribution services.
- Staffing resources required for pediatric patients cared for within an adult or general hospital are high, reflecting the many challenges that are involved in the care of children. Weight-based or body surface area-based individualization of dosage, the need to compound many dosage forms, and the limited availability of information on the use of many drugs in the pediatric population are but a few of the challenges to caring for these patients. Those demands translate into the need for more staffing resources to safely manage these patients. It should be noted that most pediatric patients that are managed in an adult or general hospital are usually not acutely ill. Many, if not most, seriously ill pediatric patients end up being transferred to pediatric hospitals that specialize in the care of those complex cases. As can be seen in the pediatrics chapter of this report, the resources required to care for pediatric patients in those specialized pediatric facilities are 2 to 3 times higher than the resources required to care for the less seriously ill pediatric patients who are usually seen in adult or general hospitals.

Drug costs for Specific Inpatient Clinical Programs

Figure F-2. Mean Drug Costs by Teaching Status for Selected Clinical Programs



Base: Facilities providing relevant data (8 to 91)

Table F-2. Benchmarking Ratios – Drug Costs / Patient Day 2011/12

	---	Teaching Status	
	All	Teaching	Non-Teaching
Clinical Program			
(n=)	(91)	(24)	(67)
Adult Critical Care	**89.58**	**111.34**	**81.79**
(n=)	(25)	(16)	(9)
Adult Oncology / Bone Marrow Transplant	**135.50**	**184.46**	**48.45**
(n=)	(90)	(23)	(67)
Adult Medicine Areas	**20.02**	**24.82**	**18.37**
(n=)	(87)	(24)	(63)
Adult Surgery Areas	**33.18**	**31.97**	**33.64**
(n=)	(73)	(19)	(54)
Adult Mental Health	**7.71**	**8.79**	**7.33**
(n=)	(50)	(9)	(41)
Adult Rehabilitation	**10.55**	**10.40**	**10.59**
(n=)	(49)	(8)	(41)
Long Term Care	**7.61**	**10.60**	**7.03**
(n=)	(49)	(11)	(38)
Pediatrics (Within A General Hospital)	**22.56**	**31.43**	**19.99**

Base: respondents who provided relevant information

- Like the staffing data provided above, the drug cost data are very similar to the data that appear in the 2009/10 HPC Report. The consistency and reproducibility of this data suggests that it can be used to estimate the approximate pharmacy staffing and drug costs that are required to service these different programs.

In summary, the benchmarking indicators for pharmacy staffing required to manage the eight clinical programs were remarkably consistent. It is hoped that the data contained in this section of the survey will prove useful to pharmacy managers and others who are interested in benchmarking pharmacy resource utilization and/or using this data for the planning of new and expanded pharmacy programs.

G – CSHP 2015

Carolyn Bornstein

CSHP 2015 is a quality initiative of the Canadian Society of Hospital Pharmacists that describes a preferred vision for pharmacy practice in the hospital setting by the year 2015. CSHP 2015 has 6 goals and related to each goal are a number of specific objectives with measurable targets for achieving pharmacy practice excellence. By achieving those goals and objectives, hospital pharmacy's contribution to the safe, effective, and evidence-based use of medications, and its contribution to the overall health of the public, would be significantly enhanced.

(see www.cshp.ca/programs/cshp2015/index_e.asp).

The results of this year's survey provide information on the progress that Canadian hospitals have made in achieving the CSHP 2015 targets, compared to the baseline and progress data that was presented in the 2007/08 and 2009/10 reports. Please note that, because some of the CSHP 2015 objectives were revised after the 2007/08 report, their baseline data is not included until the 2009/10 report.

The increase in respondents from 157 in the 2009/10 report to 168 in 2011/12 provides more information on the progress (or lack thereof) of the CSHP 2015 initiative.

Goal 1: Increase the extent to which pharmacists in hospitals and related healthcare settings help individual hospital inpatients achieve the best use of medications.

Objective 1.1: *In 100% of hospitals and related healthcare settings, pharmacists will ensure that medication reconciliation occurs during transitions across the continuum of care (admission, transfer and discharge).*

- Respondents indicated that medication reconciliation occurred more often upon hospital admission (85%, 142/168) than upon transfer between levels of care (47%, 80/169) or discharge (44%, 74/168). Activity at all 3 transitions in care has increased since the previous report.
- Medication reconciliation upon admission was highest in hospitals of 50 to 200 beds (90%, 37/41) and in teaching hospitals (95%, 36/38). Medication reconciliation upon transfer between levels of care was highest in hospitals with 201 to 500 beds (52%, 44/85). Hospitals with 50 to 200 beds reported the highest responses for medication reconciliation upon discharge (49%, 20/41). Teaching hospitals also reported higher rates than non-teaching hospitals for medication reconciliation upon transfer between levels of care (50%, 19/38) and discharge (55%, 21/38).
- Regionally, the highest level of medication reconciliation activity was reported in Ontario (ON) on admission: (98%, 48/49), on transfer: (73%, 36/49), and on discharge: (54%, 26/48). Despite notable increases in activity since the 2009/10 report, British Columbia (BC) had the lowest rates for admission (58%, 15/26) and discharge (19%, 5/26). The Atlantic region (ATL) had the lowest upon transfer (22%, 4/18).

Medication reconciliation upon transfer and at discharge is well below the CSHP 2015 target.

Objective 1.2: *The medication therapy of 100% of hospital inpatients with complex and high-risk medication regimens will be monitored by a pharmacist.*

- Only 10% (17/168) of respondents reported that 100% of their inpatients with complex and high-risk medication regimens had their medication therapy monitored by a pharmacist. This falls far short of the goal of having all hospitals provide this service to 100% of the targeted population. However, it is encouraging to see that 55% (93/168) of respondents are providing this service to 50% or more of their inpatients with complex and high-risk medication regimens. This suggests that progress is being made towards the CSHP 2015 objective. When comparing the results for 50 to 100% of patients, there was little difference between hospitals of different bed size, but teaching hospitals performed better (71%, 27/38) than non-teaching hospitals (50%, 66/130). The highest response for providing this service to 50% or more of inpatients was from ON (72%, 34/48) and the lowest was from ATL (29%, 5/18).

Objective 1.3: *In 90% of hospitals, pharmacists manage medication therapy for inpatients with complex and high-risk medication regimens in collaboration with other members of the healthcare team.*

- The majority of 2011/12 respondents (85%, 143/169) reported that pharmacists were managing medication therapy in collaboration with other members of the healthcare team. The target of having 90% or more of hospitals providing this service is within reach. Teaching hospitals (97%, 37/38) and hospitals in ON (94%, 46/49) have surpassed the CSHP 2015 target. Hospitals with 50 to 200 beds (73%, 30/41) and hospitals in ATL (72%, 13/18) reported the lowest responses for providing this service.

The CSHP 2015 target for having pharmacists involved in the medication management of inpatients with high-risk medication regimens is within reach.

Objective 1.4: *75% of hospital inpatients discharged with complex and high-risk medication regimens will receive medication counselling managed by a pharmacist.*

- Only 2% (4/168) of respondents indicated that they met the target of providing discharge counselling managed by a pharmacist to 75% or more of inpatients with complex and high-risk medication regimens. Regardless of bed size, teaching status or region, 71% to 96% of respondents indicated that this service was provided to less than 50% of their inpatients. If medication reconciliation at discharge is an Accreditation Canada requirement, why aren't pharmacists providing medication counselling to help prevent hospital readmissions?

Table G-1. Results for Goal 1

Goal 1: Increase the extent to which pharmacists **help individual hospital inpatients achieve the best use of medications.**

	CSHP 2015 Objective	CSHP 2015 Target	% Achievement 2012	% Achievement 2010	% Achievement 2008	2011/12 Hospital Pharmacy in Canada Responses						
						(n=)	YES					NO
1.1	In 100% of hospitals and related healthcare settings, pharmacists will ensure that medication reconciliation occurs during transitions across the continuum of care (admission, transfer and discharge).											
	Admission	**100%**	**85%**	69%	n/a	*(168)*	**85%**					15%
	Transfer	**100%**	**47%**	41%	n/a	*(169)*	**47%**					53%
	Discharge	**100%**	**44%**	36%	n/a	*(168)*	**44%**					56%
1.2	The medication therapy of 100% of hospital inpatients with complex and high-risk medication regimens will be monitored by a pharmacist.	**100%**	**10%**	5%	≤18%*	*(168)*		**100%**	75- 99%	50- 74%	25- 49%	0- 24%
								10%	28%	17%	23%	22%
1.3	In 90% of hospitals, pharmacists manage medication therapy for inpatients with complex and high-risk medication regimens in collaboration with other members of the healthcare team.	**90%**	**85%**	87%	n/a	*(169)*	**85%**					15%
1.4	75% of hospital inpatients discharged with complex and high-risk medication regimens will receive medication counselling managed by a pharmacist.	**75%**	**2%**	2%	3%	*(168)*		**75-100%**		50- 74%	25- 49%	0- 24%
								2%		12%	15%	71%
1.5	50% of recently hospitalized patients or their caregivers (family members for example) will recall speaking with a pharmacist while in the hospital.	**50%**	**6%**	**0%**	11%	*(32)*		**50-100%**			25- 49%	0- 24%
								6%			9%	84%

* This value represents responses for 75 to 100% of patients in 2007/08

CSHP 2015 target achieved ***CSHP 2015 target not achieved***

Objective 1.5: *50% of recently hospitalized patients or their caregivers (family members for example) will recall speaking with a pharmacist while in the hospital.*

- Of the 129 respondents who reported conducting client satisfaction surveys, only 25% (32/129) reported that a question about speaking to a pharmacist while in hospital was included in their survey. Only 6% (2/32) of those respondents met the CSHP target of having 50% (or more) of recently hospitalized patients or their caregivers (family members for example) recall speaking with a pharmacist while in the hospital.

Pharmacists are not providing medication counselling for inpatients with complex and high-risk medication regimens on discharge.

Compared to the results in the 2009/10 report, progress has been made with medication reconciliation, primarily upon admission. Considerable work is needed to achieve 100% compliance with the CSHP 2015 targets for medication reconciliation across the continuum of care, which is also an Accreditation Canada Required Organizational Practice. A notable number of respondents (45%, 75/168) report that fewer than 50% of their inpatients with complex and high-risk medication regimens had their medication therapy monitored by a pharmacist. Discharge counseling by a pharmacist is not being provided to these patients. Do pharmacy departments lack the human resources to provide medication monitoring and discharge counseling for high-risk patients? Are these pharmacist services not a departmental priority or are they not considered a key component of quality patient care? The challenges of medication reconciliation create a greater demand for pharmacist services. Will pharmacists be a key player in medication reconciliation at discharge? If so, perhaps we will come closer to the CSHP 2015 target for discharge counseling and our patients or their family members will recall their interaction with a pharmacist when asked post-discharge.

Goal 2: Increase the extent to which pharmacists help individual non-hospitalized patients achieve the best use of medications.

Objective 2.1: *In 70% of ambulatory and specialized care clinics providing clinic care, pharmacists will manage medication therapy for clinic patients with complex and high-risk medication regimens, in collaboration with other members of the healthcare team.*

- Ninety-four percent of respondents (145/155) reported having ambulatory and specialized clinics with pharmacist involvement. This is a small increase from 91% (133/146) of respondents in the previous report. The responses were highest in hospitals with more than 500 beds (100%, 43/43) and teaching hospitals (97%, 37/38), and lowest in ATL (83%, 15/18). Of all the respondents with pharmacist involvement in ambulatory clinics, 17% (24/145) indicated that pharmacists were managing medication therapy for patients with complex and high-risk medication regimens in 70% or more of these clinics. The percentage of respondents who achieved the 70% target was highest in hospitals of 201 to 500 beds (24%, 18/74), non-teaching hospitals (19%, 20/108) and hospitals from the Prairies (26%, 6/23). In ATL 87% of respondents (13/15) reported a pharmacist is managing therapy in only 24% or less of their clinics.

Objective 2.2: *In 95% of ambulatory and specialized care clinics, pharmacists will counsel clinic patients with complex and high-risk medication regimens.*

- The results for this CSHP objective were similar to the 2009/10 report. Again, only 12% (18/145) of respondents met the objective. When broadening the results to those respondents who provided this service in 50% or more of their ambulatory care clinics, the response increases to 26% (38/145). Thirty-two percent of respondents (25/76) from hospitals with 201 to 500 beds reported providing this service in 50% or more of their clinics. Regionally, QC (38%, 16/42) respondents were more likely to report that they provided this service to 50% or more of their clinics.

Pharmacists in ambulatory and specialty clinics are managing medication therapy and providing counselling for less than 20 percent of their patients.

Objective 2.3: *In 85% of home care services, pharmacists will manage medication therapy for patients with complex and high-risk medication regimens, in collaboration with other members of the healthcare team.*

- Forty-six percent (77/169) of respondents indicated that their hospital provided home care services. Of those respondents who had a pharmacist involved with the home care

A pharmacist is involved with 75% of hospital home care programs. Almost 60% of those pharmacists manage medication therapy in collaboration with the healthcare team.

service (75%, 58/77), 59% (34/58) indicated that pharmacists were managing medication therapy for home care patients with complex and high-risk regimens, in collaboration with other members of the healthcare team. That result has increased from 48% (19/40) in 2009/10. The provision of this service was highest in teaching hospitals (69%, 9/13) and in BC (83%, 10/12). The provision of this service was lower in hospitals with 201 to 500 beds (52%, 13/25) and in QC (32%, 6/19).

Table G-2. Results for Goal 2

Goal 2: Increase the extent to which pharmacists **help individual non-hospitalized patients achieve the best use of medications.**

CSHP 2015 Objective		CSHP 2015 Target	% Achievement 2012	% Achievement 2010	% Achievement 2008	2011/12 Hospital Pharmacy in Canada Responses						
						(n=)	YES					NO
2.1	In 70% of ambulatory and specialized care clinics providing clinic care, pharmacists will manage medication therapy for clinic patients with complex and high-risk medication regimens, in collaboration with other members of the healthcare team.	**70%**	**17%**	11%		*(145)*		**70-100%**	**50-69%**	**25-49%**	**0-24%**	
								17%	8%	15%	60%	
2.2	In 95% of ambulatory and specialized care clinics, pharmacists will counsel clinic patients with complex and high-risk medication regimens.	**95%**	**12%**	12%	≤41%*	*(145)*		**95-100%**	**50-94%**	**25-49%**	**0-24%**	
								12%	14%	12%	61%	
2.3	In 85% of home care services, pharmacists will manage medication therapy for patients with complex and high-risk medication regimens, in collaboration with other members of the healthcare team.	**85%**	**59%**	48%		*(58)*	**59%**					41%

* This value represents responses for 75 to 100% of clinics with pharmacists counselling patients in 2007/08

CSHP 2015 target achieved ***CSHP 2015 target not achieved***

The extent of pharmacist's role in managing medication therapy in ambulatory and specialized care clinics has increased, but it is still far short of the CSHP 2015 target. The provision of medication counselling to clinic patients by pharmacists has changed little from the last report. Is the role of the pharmacist in the ambulatory clinic setting still being defined or do pharmacy departments focus their resources on other services? Legislative changes in many provinces are expanding the scope of practice for pharmacists, which should lead to an increased role for pharmacists in managing this patient population. However, it is unclear if that will occur within and/or outside the hospital setting. With the expanding need for home care services, it appears the role of the pharmacist has been recognized and their involvement has increased.

Goal 3: Increase the extent to which hospital and related healthcare setting pharmacists actively apply evidence-based methods to the improvement of medication therapy.

Objective 3.1: *In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in providing care to individual patients that is based on evidence, such as the use of quality drug information resources, published clinical studies or guidelines, and expert consensus advice.*

Evidence based patient care and drug therapy protocols and/or order sets appear to be the standard for most pharmacy departments in Canada.

- Ninety-four percent of respondents (156/166) reported that pharmacists were actively involved in providing this service. All teaching hospitals (37/37) as well as all respondents from BC (26/26) and the Prairies (32/32) reported that they provided this service. In hospitals with 50 to 200 beds, 98% (39/40) reported that they provided this service.

Objective 3.2: *In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in the development and implementation of evidence-based drug therapy protocols and/or order sets.*

- Ninety-five percent of respondents (159/167) reported that they were involved in this activity. This result is very close to the CSHP 2015 target of 100% and is 10% higher than in 2009/10. Hospitals with

more than 500 beds and the ON respondents achieved the target of 100%. All responses across bed size, teaching status and region were 89% or higher!

Objective 3.3: *90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive angiotensin-converting enzyme inhibitors or angiotensin receptor blockers at discharge*

Objective 3.4: *90% of hospital pharmacies will participate in ensuring that patients hospitalized for congestive heart failure will receive angiotensin-converting enzyme inhibitors or angiotensin receptor blockers at discharge.*

Objective 3.5: *90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive beta-blockers at discharge.*

Objective 3.6: *90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive aspirin at discharge.*

The level of pharmacist involvement in insuring that MI patients receive appropriate, evidence-based therapy on discharge is unchanged from the 2009/10 report.

Objective 3.7: *90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive lipid-lowering therapy at discharge.*

- Of the 163 respondents whose patient population included adults with acute myocardial infarction and/or congestive heart failure, almost 60% reported that pharmacists were involved in insuring that patients hospitalized for acute myocardial infarction received, on discharge, either an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker (58%, 94/163), a beta-blocker (59%, 96/163), aspirin (58%, 94/163) and lipid-lowering therapy (58%, 95/163). For patients with congestive heart failure, 56% (91/163) of respondents indicated that pharmacists actively participated in ensuring that they received either an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker. Teaching hospitals reported higher participation in these activities (range 83% to 86%) compared to non-teaching hospitals (range 48% to 51%). The Prairie respondents reported 65% to 71% involvement, while QC respondents reported the lowest levels of involvement (range 39% to 41%). These responses are very similar to those in the 2009/10 report.

Objective 3.8: *In 90% of hospitals and related healthcare settings providing clinic care, pharmacists will participate in ensuring that non-hospitalized patients who are receiving medications to decrease blood glucose levels will be assessed at least annually with a HbA1c test.*

- Of the hospitals that provide outpatient care to diabetic patients (71%, 119/168), only 56% (67/119) have a pharmacist in the diabetes clinic. Of those respondents 66% (44/67) indicated that it was not current practice for pharmacists to ensure that diabetic patients have a HbA1C test performed at least annually. This was even less likely to happen in hospitals of 50 to 200 beds (92%, 11/12), in non-teaching hospitals (72%, 31/43), in the Prairies (88%, 7/8), in BC (86%, 6/7) and in ATL (83%, 5/6).

Objective 3.9: *In 70% of hospitals and related healthcare settings, pharmacists will be actively involved in medication- and vaccination-related infection control programs.*

- While 68% (114/168) of respondents indicated that their pharmacists are actively involved in medication-related infection control programs, only 35% (58/168) reported having a pharmacist actively involved in vaccination-related infection control programs. When asked about pharmacist participation in both programs, the response was 33% (55/167). The highest responses for both programs were in hospitals with more than 500 beds (47%, 20/43) and in ON (50%, 24/48). Involvement was lowest in BC (19%, 5/26).

The data indicates that pharmacists in almost every respondent hospital are actively involved in providing evidence-based patient care and in developing and implementing evidence-based drug therapy protocols and/or order sets. The CSHP 2015 targets for these two objectives are within reach. No changes are evident since the 2009/10 report for pharmacists insuring compliance with drug therapy objectives. Is it possible that once the drug protocols and/or order sets are developed, their implementation is the responsibility of other healthcare professionals and not of pharmacists? It is surprising that, if pharmacists are present in a diabetes clinic, they are not ensuring that a HbA1c test is done at least annually; this objective was recently identified as a "low priority" in an informal online survey of pharmacy directors and managers in Canada to determine the implementation status and priority level (low, medium or high) of the CSHP 2015 objectives.[1] Antimicrobial stewardship is a new

Accreditation Canada standard. Has this possibly caused the focus of the pharmacist to shift away from vaccination-related infection control programs to medication-related infection control programs?

Table G-3. Results for Goal 3

Goal 3: Increase the extent to which hospital and related healthcare setting pharmacists **actively apply evidence-based methods to the improvement of medication therapy**.								
CSHP 2015 Objective		**CSHP 2015 Target**	**% Achievement 2012**	**% Achievement 2010**	**% Achievement 2008**	**2011/12 Hospital Pharmacy in Canada Responses**		
						(n=)	**YES**	**NO**
3.1	In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in providing care to individual patients that is based on evidence, such as the use of quality drug information resources, published clinical studies or guidelines, and expert consensus advice.	**100%**	**94%**	90%	n/a	*(166)*	**94%**	**6%**
3.2	In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in the development and implementation of evidence-based drug therapy protocols and/or order sets.	**100%**	**95%**	85%	n/a	*(167)*	95%	5%
3.3	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive angiotensin-converting enzyme inhibitors or angiotensin receptor blockers at discharge.	**90%**	**58%**	59%	53%	*(162)*	58%	42%
3.4	90% of hospital pharmacies will participate in ensuring that patients hospitalized for congestive heart failure will receive angiotensin-converting enzyme inhibitors or angiotensin receptor blockers at discharge.	**90%**	**56%**	54%	50%	*(163)*	56%	44%
3.5	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive beta-blockers at discharge.	**90%**	**59%**	59%	52%	*(163)*	59%	41%
3.6	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive aspirin at discharge.	**90%**	**58%**	59%	52%	*(163)*	58%	42%
3.7	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive lipid-lowering therapy at discharge.	**90%**	**58%**	59%	51%	*(163)*	58%	42%
3.8	In 90% of hospitals and related healthcare settings providing clinic care, pharmacists will participate in ensuring that non-hospitalized patients who are receiving medications to decrease blood glucose levels will be assessed at least annually with a HbA1c test.	**90%**	**34%**	28%	23%	*(67)*	34%	66%
3.9	In 70% of hospitals and related healthcare settings, pharmacists will be actively involved in medication- and vaccination-related infection control programs.	**70%**	**33%**	45%	n/a	*(167)*	33%	67%

CSHP 2015 target achieved ***CSHP 2015 target not achieved***

Goal 4: Increase the extent to which pharmacy departments in hospitals and related healthcare settings have a significant role in improving the safety of medication use.

Objective 4.1: *90% of hospitals and related healthcare settings will have an organizational program, with appropriate pharmacy involvement, to achieve significant annual, documented improvement in the safety of all steps in medication use.*

- The 2011/12 survey data indicates that 78% (131/168) of respondents have such a medication safety quality improvement program in place. This is a substantial increase from the 2009/10 report (62%, 98/157). Teaching hospitals (95%, 36/38) have surpassed the CSHP 2015 target, and respondents from BC (88%, 22/25) and hospitals of more than 500 beds (88%, 38/43) are almost there.

Objective 4.2: *80% of pharmacies in hospitals and related healthcare settings will conduct an annual assessment of the processes used for compounding sterile medications, consistent with established standards and best practices.*

- Only 48% (80/167) of respondents indicated that they conduct an annual review of sterile product quality improvement processes. Teaching hospitals (74%, 28/38) have almost reached the CSHP 2015 target. The Prairies are not far behind (66%, 21/32) and hospitals with more than 500 beds are at 58% (25/43). BC had the lowest response (32%, 8/25). This is a substantial improvement from the previous report. It is interesting to note that the responses to a similar, but more specific question in Chapter I, Evaluation of Pharmacy Services, about validating the aseptic technique of employees annually had a higher response rate of 58% (97/167); BC was the lowest (16%, 4/25), while QC (75%, 33/44) and ATL (72%, 13/18) were much higher.

Substantial progress has been made in the area of an annual assessment of the quality of the sterile products service.

Objective 4.3: *80% of hospitals have at least 95% of routine medication orders reviewed for appropriateness by a pharmacist before administration of the first dose.*

- One-third (34%, 58/169) of respondents indicated that they did not achieve this performance target for the review of routine medication orders. This is an improvement from the previous report, but still short of the CSHP 2015 target. Teaching hospitals (89%, 34/38) and respondents in QC (89%, 39/44) exceeded the target. The lowest responses were reported in hospitals with 50 to 200 beds (51%, 21/41) and in the Prairies (53%, 17/32). It should be noted that in Chapter C, Drug Distribution, when this same question was asked but included the proviso "during the hours that the Pharmacy is open" the response was 93% (156/168).

Objective 4.4: *100% of medication orders in a hospital's emergency department will be reviewed by hospital pharmacists within 24 hours.*

- Review by a pharmacist, within 24 hours, of some or all medication orders written in the emergency department was reported by 75% (126/169) of respondents, compared to 67% (105/156) in the previous report. Hospitals with more than 500 beds (88%, 38/43) and respondents in QC (100%, 44/44) reported the highest activity. Respondents with 50 to 200 beds (56%, 23/41) and those from the Prairies (41%, 13/32) reported the lowest responses. It is notable that, with the exception of the Prairies and hospitals with 50 to 200 beds, response rates increased in all categories from the previous report, with the highest increase in ATL (83%, 15/18 from 53%, 9/17). Seventy-three percent (93/126) of respondents who reported that medication orders written in the emergency department were reviewed by pharmacists within 24 hours specified that they did so for 75% to 100% of the orders. This is similar to the previous report (77%, 84/109). The CSHP 2015 target that 100% of medication orders written in the emergency department are reviewed within 24 hours by pharmacists was only achieved by 29% (37/126) of respondents, with BC respondents being the highest at 45% (9/20), and teaching hospitals (37%, 11/30) and hospitals with 50 to 200 beds (35%, 8/23) close behind.

More pharmacists are reviewing orders from the Emergency Department, but the target of reviewing 100% of orders is far from reality.

Objective 4.5: *90% of hospital pharmacies will participate in ensuring that patients receiving antibiotics as prophylaxis for surgical infections will have their prophylactic antibiotic therapy discontinued within 24 hours after the surgery end time.*

- Forty-eight percent (80/168) of respondents indicated that this practice was in place, compared to CSHP 2015's target of 90%. This is slightly higher than in 2009/10 (45%, 70/156). Teaching hospitals were more likely to have had this practice in place (66%, 25/38), compared to non-teaching hospitals (42%, 55/130). Sixty percent (29/48) of ON respondents reported having this in place. Lower responses were reported in hospitals with 50 to 200 beds (29%, 12/41) and in ATL (22%, 4/18).

Objective 4.6: *85% of pharmacy technicians in hospitals and related healthcare settings will be certified by a clearly identifiable and recognized training program.*

- This question was revised in this survey, based on the changing landscape of pharmacy technician roles and the existence of regulation in some provinces. Consequently this data should not be directly compared to previous results. The question read, "What percentage of pharmacy technicians have completed either a recognized certification program or an accredited college training program?" This

eliminated non-accredited training programs from this year's responses. Only 33% (55/168) reported 85% or more of their pharmacy technicians had completed such programs. The highest responses were from hospitals with 50 to 200 beds (43%, 17/40) and in ON (49%, 24/29). BC had the lowest response (12%, 3/26). At the time of the survey, Ontario, Alberta and BC had pharmacy technician regulation in place.

Objective 4.7: *75% of pharmacies in hospitals utilize a unit-dose system for drug distribution for 90% or more of their total beds.*

- Seventy-five percent (126/169) of all respondents indicated that they had achieved this objective. This meets the CSHP 2015 target of 75%. Higher rates were reported in hospitals with more than 500 beds (84%, 36/43), in teaching hospitals (89%, 34/38) and in QC hospitals (95%, 42/44). Lower responses were reported by hospitals with 50 to 200 beds (54%, 22/41) and in BC (42%, 11/26). These responses are lower than those in Chapter C, Drug Distribution, where 82% (138/169) of respondents reported using a unit dose or controlled/carded unit dose system. This CSHP 2015 target has been achieved.

Objective 4.8: *100% of new pharmacists entering hospital and related healthcare setting practice will have completed a Canadian Hospital Pharmacy Residency Board (CHPRB)-accredited residency.*

- Of those respondents who hired pharmacists in the 12 months preceding the survey, 23% (33/145) were able to hire only pharmacists who had completed accredited residency programs. The target was reached by 41% (15/37) of hospitals with more than 500 beds, by 35% (13/37) of teaching hospitals and by 76% (25/33) of QC respondents. The response rates for 100% of new hires having completed a hospital pharmacy residency was 0% in hospitals with 50 to 200 beds and in the Prairies. Only 5% (2/44) of ON respondents met the 100% target.

It is encouraging to see the progress that has been made with organizational programs to review safe medication use and to assess sterile compounding practices. It is disappointing to see the lack of progress for the pharmacist review of routine medication orders prior to administration of first doses and pharmacist participation in the discontinuation of post-surgical prophylactic antibiotic therapy. The increase in the level of activity with respect to the review of medication orders from the emergency department by pharmacists is encouraging. Could this be related to the requirements by Accreditation Canada for medication reconciliation upon admission? With the new focus by Accreditation Canada on antimicrobial stewardship, one might expect the responses for the review of surgical prophylaxis to be higher. But a recent online survey by CSHP of pharmacy directors and managers revealed that Objective 4.5 was a "low priority" for them.[1] The utilization of unit-dose distribution systems in Canadian hospitals continues to meet the CSHP 2015 target. Pharmacy technician training requirements continue to vary across the country as provinces discuss and implement pharmacy technician regulation. The ability to hire pharmacists who have completed an accredited hospital pharmacy residency program will continue be a challenge unless the number of accredited hospital pharmacy residency programs increases substantially; it is encouraging that Quebec had such a high success rate with this CSHP 2015 target.

It appears there are not enough Hospital Pharmacy Residency trained pharmacists to meet the hiring needs of hospitals in Canada.

Table G-4. Results for Goal 4

Goal 4: Increase the extent to which pharmacy departments in hospitals and related healthcare settings **have a significant role in improving the safety of medication use.**								
CSHP 2015 Objective	**CSHP 2015 Target**	**% Achievement 2012**	**% Achievement 2010**	**% Achievement 2008**	**2011/12 Hospital Pharmacy in Canada Responses**			
					(n=)	**YES**		**NO**

4.1	90% of hospitals and related healthcare settings will have an organizational program, with appropriate pharmacy involvement, to achieve significant annual, documented improvement in the safety of all steps in medication use.	90%	**78%**	62%	64%	*(168)*	**78%**						22%
4.2	80% of pharmacies in hospitals and related healthcare settings will conduct an annual assessment of the processes used for compounding sterile medications, consistent with established standards and best practices.	80%	**48%**	29%	24%	*(167)*	**48%**						52%
4.3	80% of hospitals have at least 95% of routine medication orders reviewed for appropriateness by a pharmacist before administration of the first dose.	80%	**66%**	61%	59%	*(169)*	**66%**						34%
4.4	100% of medication orders in a hospital's emergency department will be reviewed by hospital pharmacists within 24 hours.	100%	**29%**	27%	≤59%*	*(126)*		**100%**	**75-99%**	**50-74%**	**25-49%**	**0-24%**	
								29%	44%	17%	6%	4%	
4.5	90% of hospital pharmacies will participate in ensuring that patients receiving antibiotics as prophylaxis for surgical infections will have their prophylactic antibiotic therapy discontinued within 24 hours after the surgery end time.	90%	**48%**	45%	39%	*(168)*	**48%**						52%
4.6	85% of pharmacy technicians in hospitals and related healthcare settings will be certified by a clearly identifiable and recognized training program**.	85%	**33%**	63%	≤59%*	*(168)*		**85-100%**	**50-84%**	**25-49%**	**0-24%**		
								33%	12%	8%	48%		
4.7	75% of pharmacies in hospitals utilize a unit-dose system for drug distribution for 90% or more of their total beds.	75%	**75%**	76%	62%	*(169)*	**75%**						25%
4.8	100% of new pharmacists entering hospital and related healthcare setting practice will have completed a Canadian Hospital Pharmacy Residency Board (CHPRB)-accredited residency.	100%	**23%**	29%	n/a	*(145)*		**100%**	**75-99%**	**50-74%**	**25-49%**	**0-24%**	
								23%	4%	7%	10%	56%	

* These values represent the responses for 75 to 100% in 2008/09

**Survey question in 2011/12 was reworded to ask, "What percentage of pharmacy technicians have completed either a recognized certification program or an accredited college training program?"

CSHP 2015 target achieved ***CSHP 2015 target not achieved***

Goal 5: Increase the extent to which hospitals and related healthcare settings apply technology effectively to improve the safety of medication use.

Objective 5.1: *75% of hospitals will use machine-readable coding to verify medications before dispensing*

- Only 20% (33/168) of respondents reported that they routinely used machine-readable coding in the inpatient pharmacy to verify medications before dispensing, a modest increase from the previous report (17%, 27/157). There was higher utilization in hospitals with more than 500 beds (28%, 12/43), teaching hospitals (24%, 9/38) and in QC (36%, 16/44). It was lowest in BC (8%, 2/25) and ATL (11%, 2/18). In Chapter E, Technology, the response for the use of bar-coding for verifying medications prior to dispensing was similar at 22% (37/167).

Objective 5.2: *75% of hospitals will use machine-readable coding to verify all medications before administration to a patient.*

- Machine-readable coding to verify the identity of the patient and the accuracy of medication administration at the point-of-care was reported by only 4% (6/168) of respondents. The results are similar to those in Chapter E, Technology, with a response of 3% (5/167) for verifying medication and 4% (7/166) for verifying patient identity prior to medication administration. The highest percentage of responses was in ON with 12% (6/49), with no other regions reporting activity in this area.

The use of barcode systems for the positive identification of medications and patients is noticeably absent in the majority of Canadian hospitals.

Objective 5.3: *For routine medication prescribing for inpatients, 75% of hospitals will use computerized prescriber order entry systems that include clinical decision support.*

- Nine percent (15/168) of respondents indicated that a CPOE system with clinical decision support was in place at their facility, compared to 6% (10/157) in 2009/10. Higher implementation rates were reported in teaching hospitals (21%, 8/38), hospitals with 201 to 500 beds (14%, 12/84) and in ON (14%, 7/49). There was activity reported in all respondent categories, compared to 2009/10 when none of the respondents from small hospitals (50 to 200 beds), BC or QC reported having a CPOE system.

Objective 5.4: *100% of hospital pharmacists will use computerized pharmacy order entry systems that include clinical decision support.*

- The results indicate that 78% of respondents (131/168) have this in place. This is unchanged from 2009/10. BC respondents reported the highest activity with 88% (22/25). Activity in all respondent categories increased from 2009/10, with the exception of ATL which dropped to 61% (11/18) from 82% (14/17) in 2009/10. The Prairies increased to 72% (23/32) from 53% (16/30) in 2009/10. Interestingly, in Chapter I, Evaluation of Pharmacy Services, the response to a similar question "Does your facility use a Pharmacy Information System (PIS) that has built-in clinical decision support functionality?" was 88% (148/168).

Twenty-two percent of respondents do not have a computerized pharmacy order entry system with clinical decision support.

Objective 5.5: *In 75% of hospitals and related healthcare settings, pharmacists will use medication-relevant portions of patients' electronic medical records for managing patients' medication therapy.*

- Only 48% (81/168) of respondents reported that their hospital had an electronic health record (EHR), which falls below the 75% target. Of these respondents, 96% (78/81) indicated that pharmacists used the medication-relevant portions of the record to manage patients' medication therapy. The CSHP target of 75% has been surpassed in hospitals that have an EHR. The availability of the EHR is highest in BC (72%, 18/25), ON (69%, 34/49) and ATL (67%, 12/18). The lowest responses were in the Prairies (22%, 7/32) and QC (23%, 10/44). The use of the EHR by pharmacists has increased in all respondent categories since the last report.

Objective 5.6: *In 75% of hospitals and related healthcare settings, pharmacists will be able to electronically access pertinent patient information and communicate across settings of care (e.g. hospitals, clinics, home care operations, and chronic care operations) to ensure continuity of pharmaceutical care for patients with complex and high-risk medication regimens.*

- Thirty-five percent (58/165) of respondents indicated that their pharmacists had this capability compared to the CSHP 2015 target of 75%. Teaching hospitals reported only 24% (9/38) vs. non-teaching hospitals at 39% (49/127). Hospitals with 201 to 500 beds reported only 29% access to patient information across settings (24/82). The Prairies reported the highest activity (48%, 15/31) and QC the lowest with 23% (10/44).

The adoption of technology for medication management (prescribing, dispensing, and administration) in the hospital setting is increasing very slowly. The data reflects an increase in the use of barcoding technology by respondents, primarily for verification of stocking automated repackaging machines. It is surprising that 22% of respondents do not have a computerized pharmacy order entry system with clinical decision support. The use of computerized prescriber order entry systems with clinical decision support has increased very little since 2007/08 (7%, 11/159). It is not surprising that the majority of hospital pharmacy directors and managers who responded to a recent informal online survey by CSHP to gauge the level of implementation and priority of the CSHP 2015

objectives ranked objectives 5.1, 5.2 and 5.3 as "low priority" and objective 5.5 as "high priority".[1] It is encouraging to see that the use of the EHR by pharmacists for medication management continues to increase.

Table G-5. Results for Goal 5

Goal 5: Increase the extent to which hospitals and related healthcare settings **apply technology effectively to improve the safety of medication use.**								
CSHP 2015 Objective		**CSHP 2015 Target**	**% Achievement 2012**	**% Achievement 2010**	**% Achievement 2008**	**2011/12 Hospital Pharmacy in Canada Responses**		
						(n=)	**YES**	**NO**
5.1	75% of hospitals will use machine-readable coding to verify medications before dispensing.	**75%**	**20%**	17%	13	*(168)*	20%	80%
5.2	75% of hospitals will use machine-readable coding to verify all medications before administration to a patient.	**75%**	**4%**	5%	1%	*(168)*	4%	96%
5.3	For routine medication prescribing for inpatients, 75% of hospitals will use computerized prescriber order entry systems that include clinical decision support.	**75%**	**9%**	6%	7%	*(168)*	9%	91%
5.4	100% of hospital pharmacists will use computerized pharmacy order entry systems that include clinical decision support.	**100%**	**78%**	77%	69%	*(168)*	78%	22%
5.5	In 75% of hospitals and related healthcare settings, pharmacists will use medication-relevant portions of patients' electronic medical records for managing patients' medication therapy.	**75%**	**96%**	89%	81%	*(81)*	96%	4%
5.6	In 75% of hospitals and related healthcare settings, pharmacists will be able to electronically access pertinent patient information and communicate across settings of care (e.g. hospitals, clinics, home care operations, and chronic care operations) to ensure continuity of pharmaceutical care for patients with complex and high-risk medication regimens.	**75%**	**35%**	37%	39%	*(165)*	35%	65%

CSHP 2015 target achieved ***CSHP 2015 target not achieved***

Goal 6: Increase the extent to which pharmacy departments in hospitals and related healthcare settings engage in public health initiatives on behalf of their communities.

Objective 6.1: *60% of pharmacies in hospitals and related healthcare settings will have specific ongoing initiatives that target community health.*

- Only 14% (23/166) of respondents reported that their pharmacy had specific ongoing initiatives that target community health. The response was highest for teaching hospitals (24%, 9/38) and in ON (29%, 14/48). It was only 5% (2/39) in hospitals with 50 to 200 beds, and 4% (1/26) in BC.

Objective 6.2: *85% of hospital pharmacies will participate in ensuring that high risk patients in hospitals and related healthcare settings receive vaccinations for influenza and pneumococcus.*

- Thirty-five percent (58/166) of respondents indicated that they had a process in place for both vaccinations. The reported performance for influenza vaccination alone was slightly higher (43%, 71/167), especially in teaching hospitals (50%, 19/38) and in ON (65%, 31/48). For pneumococcal vaccination alone 34% (57/167) of respondents reported pharmacy involvement.

Objective 6.3: *80% of hospital pharmacies will participate in ensuring that hospitalized patients who smoke receive smoking-cessation counselling.*

- Only 27% (45/168) of respondents reported having a process in place for ensuring that hospitalized patients who smoke receive smoking cessation counselling. This is a small increase over 2009/10 (22%, 35/157). Participation was highest in hospitals with more than 500 beds (35%, 15/43) and in ON (35%, 17/49). For pharmacy departments that did not participate in the process, 62% (76/123) indicated that smoking cessation counselling was provided by another healthcare professional in their hospital. When combining the results for the provision of smoking cessation counselling by a pharmacist and another healthcare professional, the

Smoking cessation counselling provided by pharmacists is below the CSHP 2015 target. However when combining the results for the provision of this service by a pharmacist and another healthcare professional, the result is 72% and almost at the CSHP 2015 target.

response rate is 72% (45+76/168). In ATL 100% of respondents reported that smoking cessation counselling is provided in their hospitals.

Objective 6.4: *90% of pharmacy departments in hospitals and related healthcare settings will have formal up-to-date emergency preparedness programs integrated with their hospitals and related healthcare settings' and their communities' emergency preparedness and response programs.*

- Seventy-four percent (123/167) of respondents indicated that they had such a program in place. This is not far from the CSHP 2015 target of 90%. There was no notable difference between hospitals of different bed sizes but teaching hospitals reported higher participation (84%, 32/28) than non-teaching hospitals (71%, 91/129). ON and BC reported the highest participation with 88% (42/48) and 85% (22/26), respectively. QC reported the lowest level of participation at 45% (20/44).

There is not much interest by respondents in community health initiatives. There have been small increases in the participation of hospital pharmacists in vaccination and smoking cessation programs since 2009/10. The results show that smoking cessation programs are being provided not just by pharmacists, but more likely by other healthcare professionals in the hospitals; when considered together, this brings the CSHP 2015 target within reach. The establishment of an integrated emergency preparedness program has not increased since 2009/10 but the target is also within reach. The recent CSHP online survey asking pharmacy directors and managers to rank the priority of the CSHP 2015 objectives revealed that objectives 6.1, 6.2 and 6.3 were all very low priority.[1] This appears to be reflected in the results of this report.

Table G-6. Results for Goal 6

Goal 6: Increase the extent to which pharmacy departments in hospitals and related healthcare settings **engage in public health initiatives on behalf of their communities.**								
CSHP 2015 Objective		**CSHP 2015 Target**	**% Achievement 2012**	**% Achievement 2010**	**% Achievement 2008**	**2011/12 Hospital Pharmacy in Canada Responses**		
						(n=)	**YES**	**NO**
6.1	60% of pharmacies in hospitals and related healthcare settings will have specific ongoing initiatives that target community health.	**60%**	**14%**	17%	21%	*(166)*	14%	86%
6.2	85% of hospital pharmacies will participate in ensuring that high risk patients in hospitals and related healthcare settings receive vaccinations for influenza and pneumococcus.	**85%**	**35%**	30%	23%	*(166)*	35%	65%
6.3	80% of hospital pharmacies will participate in ensuring that hospitalized patients who smoke receive smoking-cessation counselling.	**80%**	**27% (72%*)**	22%	19%	*(168)*	27% (72%*)	73%
6.4	90% of pharmacy departments in hospitals and related healthcare settings will have formal up-to-date emergency preparedness programs integrated with their hospitals and related healthcare settings' and their communities' emergency preparedness and response programs.	**90%**	**74%**	78%	54%	*(167)*	74%	26%

*Percent of respondents who indicated smoking cessation counselling is provided by either a pharmacist OR another healthcare professional

CSHP 2015 target achieved ***CSHP 2015 target not achieved***

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[1] Moving Forward to CSHP 2015 Goals and Objectives. A Survey of Hospital Pharmacy Directors and Managers (2012) © Canadian Society of Hospital Pharmacists, 2012, accessed at: http://www.cshp.ca/dms/dmsView/1_CSHP2015Survey_report_2012October.pdf Nov 2012

H - Pharmacy Technicians

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Introduction

The landscape of pharmacy technician practice in Canada is rapidly evolving. Through legislative changes, a growing number of provinces are formally recognizing technicians and granting them the protected title of "Pharmacy Technician". However, along with these changes come added responsibility, accountability and liability for technicians, as well as the requirement that they possess a recognized professional education and certification. At this point in time, legislation to regulate pharmacy technicians is at some point in development in six provinces, and is being actively pursued in the other four. In 2010, Ontario (ON) became the first province to pass legislation to regulate pharmacy technicians, followed shortly by British Columbia (BC) and Alberta (AB) where technician regulation occurred in 2011.[1] Manitoba (MB) also has legislation approved that is currently working its way through the regulation development and approval process. The MB legislation will protect the pharmacy technician title and give them specific authorities, but falls short of creating a fully regulated health profession. Nova Scotia (NS) and New Brunswick (NB) both have draft legislation for pharmacy technician regulation that is awaiting legislative approval.[2] Although no legislation has been drafted in Saskatchewan (SK), the College of Pharmacists has been actively pressing for that to occur. The College conducted a survey of pharmacists, pharmacy owners and their non-regulated pharmacy technicians, which showed broad support for pharmacy technician regulation.[3] In addition, a concept paper and business plan to support the move to regulation of pharmacy technician has been developed.[3] Similarly, in Prince Edward Island (PEI) technician regulation has not reached the stage where legislation has been introduced, but the PEI Board of Pharmacy has set up a voluntary registration process with existing pharmacy technicians, and has submitted a proposal to regulate pharmacy technicians, along with draft regulations, to their provincial government.[2] The Newfoundland & Labrador (NL) Pharmacy Board has developed a number of background papers, dealing with a range of proposed changes to their pharmacy act and regulations[4], which have been submitted to their provincial government. One of those papers deals with pharmacy technician regulation. In Quebec (QC), pharmacy technician regulation is currently under consideration by their pharmacy regulatory authority.

With the professional status of pharmacy technicians now, or soon to be, recognized in most provinces, the need for consistent regulatory frameworks and standards has been recognized, leading to a number of initiatives within the profession.

Legislation to regulate pharmacy technicians has been passed in 3 provinces, is in the legislative pipeline in three more provinces, and is being actively pursued in the remaining four.

The Canadian Council for Accreditation of Pharmacy Programs (CCAPP) began accrediting schools that offer a pharmacy technician training program in 2008. In the short interval between 2008 and 2012, 47 pharmacy technician programs in Canada have been granted accreditation, with either qualifying or provisional status. One school in Qatar has also been granted provisional CCAPP accreditation status.[5] In 2012, in response to increased expectations of technician training programs, CCAPP has already revised its "Standards for Accreditation of Pharmacy Technician Programs in Canada" which were first published in 2007.

In the area of entry to practice requirements, the Pharmacy Examining Board of Canada (PEBC) continues to offer the Evaluating and Qualifying examinations for individuals who are pursuing recognition as a regulated pharmacy technician. The Evaluating Examination must be written if an individual did not have the opportunity to graduate from a pharmacy technician training program that is accredited by CCAPP, but have acquired knowledge and skills in their place of work and/or graduated from a non-accredited program. Graduates of CCAPP accredited technician training programs, as well as individuals who have passed the Evaluating Exam, can write the Qualifying Exam, which assesses an individual's entry-level competence (knowledge, skills and abilities needed to practise safely and effectively), as defined in "Professional Competencies for Canadian Pharmacy Technicians at Entry to Practice". PEBC grants a certificate to an individual who has successfully passed the Pharmacy Technician Qualifying Examination; a certificate which all provincial regulatory authorities, with perhaps the exception of Quebec, will require for an individual to become a regulated pharmacy technician.

In response to the increased demand by individuals wanting to write the exams, the number of locations at which the exams are offered has been increased. In March of 2013 the Qualifying exam will be available in 8 cities in 4 provinces. In April of 2013 the Evaluating exam will be offered in 12 cities in 6 provinces.[6] As of March 2012, 1325 technicians had been added to the national Pharmacy Technician Register since registration began in 2009.[7]

Three provinces (ON, BC and AB) offer Pharmacy Technician Bridging Programs to assist individuals who have not graduated from a CCAPP accredited technician training program to upgrade their knowledge and skills in preparation for writing the PEBC Qualifying exam and entering practice as a regulated pharmacy technician. To be eligible for the bridging program, the individual must have successfully completed a provincial certification exam (AB or ON) or the PEBC Evaluating exam. The bridging educational program was initially created in ON. The BC and AB Colleges of Pharmacy adopted the program and modified it for their own needs. The program consists of courses in Professional Practice, Pharmacology, Management of Drug Distribution Systems and Product Preparation. The Bridging Program is available through a number of CCAPP accredited schools in ON, BC and AB.

Three provinces currently offer Pharmacy Technician Bridging programs.

In the area of regulatory oversight, the National Association of Pharmacy Regulatory Authorities (NAPRA) will be taking a lead role in ensuring that individuals currently practicing as non-regulated pharmacy technicians have an opportunity to upgrade their knowledge and skills in order to achieve certification without having to return to school. In May of 2012, NAPRA received a grant of almost $400,000 from the Labour Market Partnerships Support Measure Program of Human Resources and Development Canada for the development of a national bridging program for individuals currently practicing as "non-regulated" pharmacy technicians.[8] The aim is to have the program up and running by March 2013. To guide the development of the national bridging program, NAPRA is currently revising its 2007 "Professional Competencies for Canadian Pharmacy Technicians at Entry to Practice" and plans to release the new competency requirements in 2013.[9] Building upon the entry to practice competencies, NAPRA released the "Model Standards of Practice for Canadian Pharmacy Technicians" in November of 2011.[10] This document groups the model standards of practice under four key areas:

- Expertise in drug distribution systems
- Collaboration
- Safety and Quality
- Professionalism and Ethics

With the greater reliance on pharmacy technicians for the delivery of quality pharmacy care, research has been carried out to identify the roles and responsibilities that are appropriate for regulated pharmacy technicians to assume. A literature review of articles dealing with the accuracy and safety of technician verification of the work performed by other technicians was published in the American Journal of Health-System Pharmacy in October 2011.[11] The authors identified 11 studies published between 1978 and 2009 that evaluated the accuracy of technicians versus pharmacists in checking orders filled by technicians. The overall results of the analysis showed comparable accuracy rates between pharmacists and technicians, with some trial results significantly favoring technician checking.

Research has demonstrated pharmacy technician competence, comparable to pharmacists, in performing a number of tasks.

In a study conducted in the emergency department at the Moncton Hospital in New Brunswick, a prospective comparison of best possible medication histories obtained by pharmacy technicians versus pharmacists was conducted.[12] Sixty patients were enrolled in the trial with half randomly assigned to receive a medication history by the technician and the other half by a pharmacist. The investigator found no significant difference in the number or severity of medication discrepancies discovered by the pharmacist versus the pharmacy technician. Studies like these should be supported and encouraged, as they provide valuable guidance to pharmacy leaders and health administrators with respect to the appropriate use of pharmacy personnel in various settings.

Technician Roles and Validation Requirements

Table H-1 summarizes the results of a number of questions related to technician roles and validation requirements that were posed in the 2011/12 Hospital Pharmacy in Canada Survey. The questions gathered information dealing with the functions performed by technicians in the 169 hospitals that responded to the survey. Table H-1 indicates whether or not technicians check the work of other technicians who perform these functions, and whether or not a validation program must be completed by the technician prior to performing or checking the specific activity. Validation refers to an internal pharmacy department process designed to ensure that a pharmacy technician is competent to perform a particular task. Validation is based on a defined policy and/or procedure that describes the training required to perform a task and establishes the objective assessment criteria that are used to confirm a pharmacy technician's ability to repeatedly perform a specific task with a high degree of accuracy. (e.g. accuracy rate).

Table H-1. Functions Performed by Technicians, Functions Checked by Technicians, and Validation Requirements 2011/2012

	A	B	C	D	E
	(n=)	Function performed (n=A)	Validation required to perform task (n=B)	Checked by technician (n=B)	Validation required to check (n=D)
(01) Perform medication order entry	(168)	130 **77%**	73 **56%**	21 **16%**	16 **76%**
(02) Fill traditional prescriptions, new orders	(165)	148 **90%**	74 **50%**	81 **55%**	68 **84%**
(03) Fill traditional prescriptions, refills	(165)	148 **90%**	74 **50%**	103 **70%**	90 **87%**
(04) Package unit dose items	(165)	153 **93%**	79 **52%**	138 **90%**	106 **77%**
(05) Fill unit dose trays	(158)	122 **77%**	67 **55%**	107 **88%**	82 **77%**
(06) Fill interim doses	(159)	139 **87%**	71 **51%**	104 **75%**	84 **81%**
(07) Prepare patient-specific IV admixtures	(162)	155 **96%**	122 **79%**	69 **45%**	57 **83%**
(08) Prepare batch IV admixtures	(164)	150 **91%**	118 **79%**	90 **60%**	77 **86%**
(09) Prepare TPN solutions	(165)	148 **90%**	111 **75%**	53 **36%**	44 **83%**
(10) Prepare chemotherapy	(164)	143 **87%**	115 **80%**	25 **17%**	23 **92%**
(11) Compound extemporaneous products	(165)	163 **99%**	81 **50%**	96 **59%**	76 **79%**
(12) Fill cardiac arrest trays	(164)	140 **85%**	59 **42%**	102 **73%**	66 **65%**
(13) Replenish automated dispensing cabinets	(159)	102 **64%**	51 **50%**	68 **67%**	38 **56%**

Base: All respondents

A high percentage of respondents reported that pharmacy technicians performed routine technical functions, such as the compounding of extemporaneous products (99% of respondents) and the preparation of patient specific IV admixtures (96% of respondents). Slightly smaller percentages of respondents reported that pharmacy technicians perform more cognitively complex functions, such as performing medication order-entry (77% of respondents), or activities involving newer technologies such as replenishing of automated dispensing cabinets (64% of respondents). In some cases, there was substantial regional variation in the percentage of respondents who indicated that a given task was performed by a pharmacy technician. For example, all respondents from QC (43/43) and Atlantic Canada (18/18) reported that technicians performed medication order entry, while only 44% (14/32) of respondents in the Prairies and 63% (31/49) of respondents in ON reported that their technicians performed that activity.

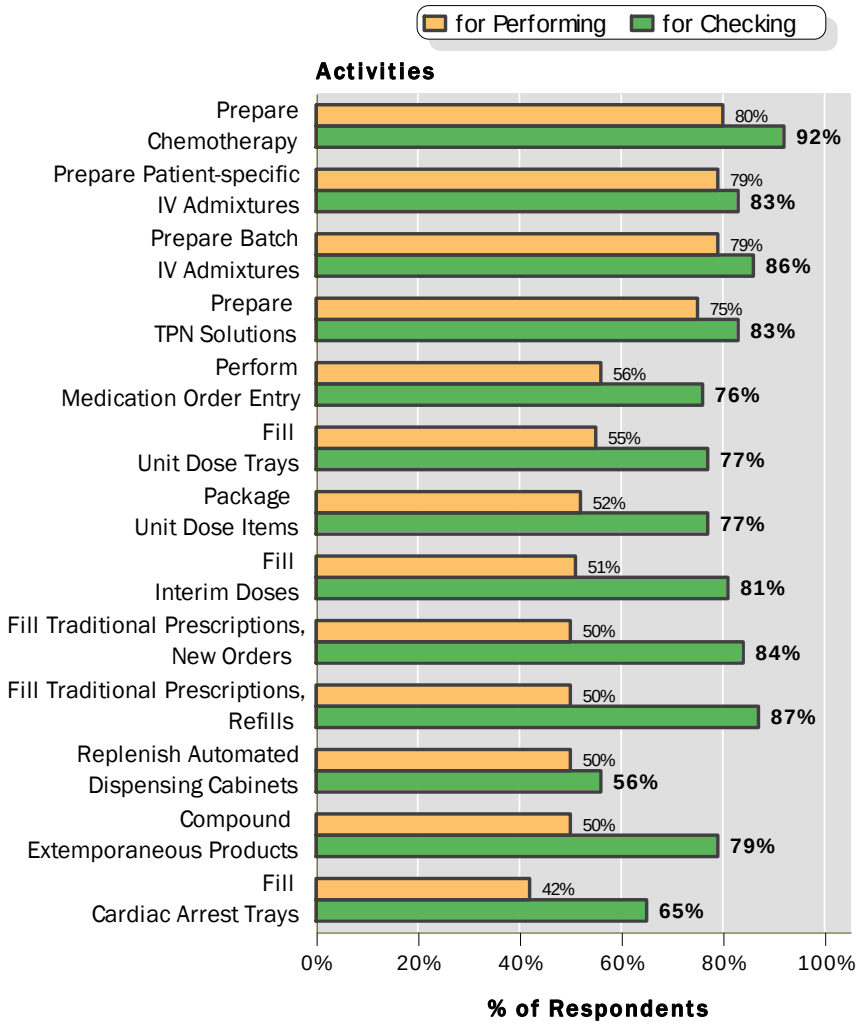
The proportion of respondents reporting that pharmacy technicians perform specific functions has remained relatively consistent over the last two survey cycles.

- For all of the tasks performed by technicians, with the sole exception of the filling of cardiac arrest trays, the rate of these activities being performed by a pharmacy technician was highest in those facilities with a bed count above 500, and lowest in the facilities with a 50-200 bed count.

Substantial regional variation exists in the percentage of respondents who reported that technicians perform certain activities, such as medication order entry.

- A trend noted in the 2009/2010 report was that validation was more commonly required to allow a pharmacy technician to check a task rather than to perform that task. This trend continued in the 2011/2012 survey as shown in Figure H-1. The requirement for validation in order to check the work of others was most prominent in the areas where the risk associated with an error is perceived to be high, such as preparation of chemotherapy and preparation of batch IV mixtures.

Figure H-1. Technician Validation Requirements for Performing and Checking 2011/2012



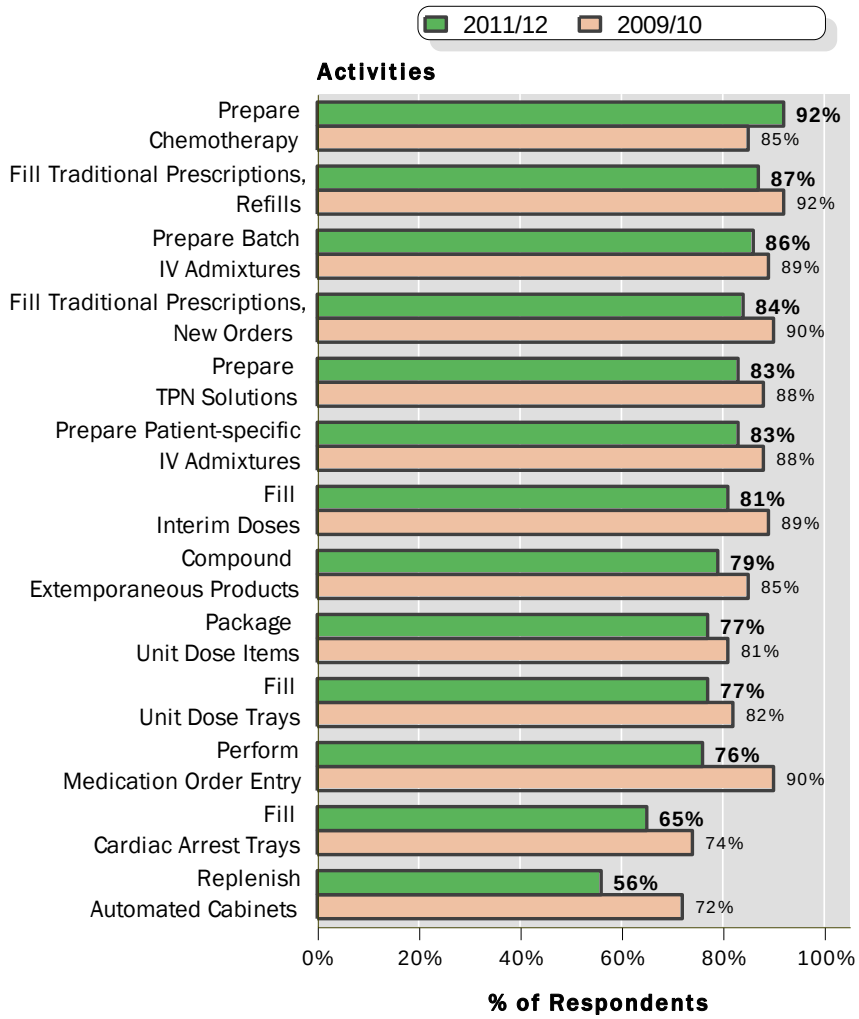
Base for 'Validation Required for Performing Task': Respondents reporting that technicians perform that activity (Table H-1, Column B); Base for 'Validation Required for Checking': Respondents reporting that technicians check that activity performed by technicians (Table H-1 Column D)

It is notable that the requirement for validation of a technician's accuracy, before allowing that pharmacy technician to check an activity performed by another technician, appear to be trending downward. As shown for all activities in Figure H-2, with the exception of preparation of chemotherapy, the proportion of respondents requiring validation of a technician's accuracy before being allowed to check the work of others has decreased between the 2009/2010 report and the 2011/2012 report. There are several possible explanations for this trend. The practice of having pharmacy technicians check the work of others has

The requirement for validation of a technician's accuracy, prior to allowing the pharmacy technician to check the work of others, appears to be trending downward.

been in place for many years in most hospitals. Over that time, many pharmacy managers have developed confidence that this is a safe and efficient process. The studies which have shown that this practice is at least as safe having a pharmacist do that checking have undoubtedly added to the acceptance of technician checking as a standard part of the pharmacy technician's role. Another possibility is that, with the pharmacy technician now being considered a regulated practitioner in more and more provinces, the role of checking the work of others is now considered part of the pharmacy technician's responsibilities, for which the pharmacy technician, rather than a pharmacist, should be responsible.

Figure H-2. Technician Validation Requirements for Checking 2009/2010 vs. 2011/2012



Base: Respondents reporting that technicians check that activity performed by technicians (Table H-1, Column D)

Pharmacy Technician Support for Clinical Pharmacy Services

The role that pharmacy technicians play in supporting clinical pharmacy services was first assessed in the 2007/2008 report. In the 2009/2010 survey, new questions, dealing with the participation of pharmacy technicians in medication reconciliation at the time of admission, transfer and discharge, as well as the participation of technicians in drug dosage adjustments, were added. The questions related to technician involvement in drug dosage adjustment were dropped from the 2011/12 survey because of the very low rates of technician involvement that were reported in the 2009/10 survey.

Table H-2 summarizes the roles that pharmacy technicians play in direct support of the pharmacist's clinical role.

- Sixty-nine percent of all respondents reported that pharmacy technicians performed tasks that directly support pharmacists in carrying out their clinical activities, a result that is almost identical to the 2009/2010 report.

Table H-2. Support Roles for Pharmacy Technicians for Clinical Pharmacy Services 2011/2012

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(169)	(41)	(85)	(43)	(38)	(131)
Pharmacy technicians perform tasks that directly support pharmacists in carrying out their clinical activities	116 **69%**	24 **59%**	55 **65%**	37 **86%**	32 **84%**	84 **64%**
Base: all respondents						
Tasks performed by pharmacy technicians						
(n=)	(115)	(24)	(54)	(37)	(32)	(83)
Serve as the initial Pharmacy liaison for solving drug distribution problems	94 **82%**	22 **92%**	41 **76%**	31 **84%**	26 **81%**	68 **82%**
Collect and collate information concerning the patient's pre-admission drug therapy	80 **70%**	14 **58%**	34 **63%**	32 **86%**	29 **91%**	51 **61%**
Create initial inpatient drug therapy documentation and discharge drug therapy plan at discharge	22 **19%**	4 **17%**	8 **15%**	10 **27%**	9 **28%**	13 **16%**
Collect laboratory test results to support drug therapy evaluation / monitoring	19 **17%**	3 **13%**	9 **17%**	7 **19%**	7 **22%**	12 **14%**
Assembly of pamphlets and documentation to be given to the patient	18 **16%**	3 **13%**	10 **19%**	5 **14%**	6 **19%**	12 **14%**
Calculate changes to parenteral nutrition therapy	9 **8%**	1 **4%**	4 **7%**	4 **11%**	3 **9%**	6 **7%**
Collate information used in the preparation of drug formulary submissions	19 **17%**	6 **25%**	8 **15%**	5 **14%**	3 **9%**	16 **19%**
Assist in collection of data for presentation to the Medication Safety Committee	43 **37%**	7 **29%**	24 **44%**	12 **32%**	10 **31%**	33 **40%**
Collect data for drug utilization review to support the drug use evaluation program	30 **26%**	10 **42%**	14 **26%**	6 **16%**	2 **6%**	28 **34%**
Other	20 **17%**	3 **13%**	8 **15%**	9 **24%**	8 **25%**	12 **14%**

Base: Facilities where pharmacy technicians perform tasks that directly support pharmacists in carrying out their clinical activities
Note: multiple mentions permissible

- The participation of technicians in the collection and collation of information concerning the patient's pre-admission drug therapy - the first step in admission medication reconciliation - increased substantially from the 52% (59/113) recorded in the 2009/2010 report to 70% (80/115) in the 2011/12 report. What is more notable was the high percentage of respondents from teaching hospitals (91%) who reported that their technicians were involved in performing this function. One could speculate that the evidence supporting the effectiveness of pharmacy technicians conducting medication histories, coupled with the cost-effectiveness of having pharmacy technicians perform this task, has lead to the rapid introduction of pharmacy technicians into this role, especially in teaching institutions.

Pharmacy Technician involvement in activities related to admission and discharge medication reconciliation increased substantially, compared to the 2009/2010 report.

- Participation in the initial creation of inpatient drug therapy documentation and the discharge drug therapy plan, the first steps in the discharge medication reconciliation process, were also up substantially to19% in 2011/2012 from the 7% (8/113) recorded in the 2009/2010 report.

Technician Certification and Regulation

Certification refers to a pharmacy technician designation that is conferred by a recognized external organization, such as the Ontario College of Pharmacists' Pharmacy Technician Certification unit, the Pharmacy Technician Certification Board of Alberta, or the Pharmacy Examining Board of Canada.

- The number of respondents reporting that any of their pharmacy technicians were certified rose modestly from 43% (68/159) in the 2009/2010 report to 51% in the 2011/12 report. However, there were significant regional differences, with 88% of respondents in BC and 94% of respondents in ON reporting that they had certified technicians, compared to the respondents in QC and Atlantic provinces, none of whom reported having any certified technicians on their staff.

Table H-3. Certification of Pharmacy Technicians 2011/2012

	---	Bed Size			Teaching Status		Province							
	All	50-200	201-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS
Pharmacy technicians are certified through an established program														
(n=)	(167)	(41)	(83)	(43)	(38)	(129)	(25)	(14)	(6)	(12)	(49)	(43)	(10)	(8)
	86	19	48	19	18	68	22	12	4	2	46	0	0	0
	51%	**46%**	**58%**	**44%**	**47%**	**53%**	**88%**	**86%**	**67%**	**17%**	**94%**	**0%**	**0%**	**0%**
Base: All respondents														
Organization(s) from which pharmacy technician(s) received their certification?														
(n=)	(86)	(19)	(48)	(19)	(18)	(68)	(22)	(12)	(4)	(2)	(46)	(0)	(0)	(0)
Ontario College of Pharmacists Pharmacy Technician Certification	47	8	29	10	10	37	1	0	0	1	45	0	0	0
	55%	**42%**	**60%**	**53%**	**56%**	**54%**	**5%**	**0%**	**0%**	**50%**	**98%**	**0%**	**0%**	**0%**
Pharmacy Technician Certification Board of Alberta	13	5	5	3	5	8	1	8	3	1	0	0	0	0
	15%	**26%**	**10%**	**16%**	**28%**	**12%**	**5%**	**67%**	**75%**	**50%**	**0%**	**0%**	**0%**	**0%**
Pharmacy Examining Board of Canada	67	13	37	17	14	53	22	9	2	1	33	0	0	0
	78%	**68%**	**77%**	**89%**	**78%**	**78%**	**100%**	**75%**	**50%**	**50%**	**72%**	**0%**	**0%**	**0%**
Base: Facilities where technicians are certified ***Note: multiple mentions permissible***														
(n=)	(86)	(19)	(48)	(19)	(18)	(68)	(22)	(12)	(4)	(2)	(46)	(0)	(0)	(0)
greater than 90% of pharmacy technicians	17	3	12	2	2	15	0	2	0	0	15	0	0	0
	20%	**16%**	**25%**	**11%**	**11%**	**22%**	**0%**	**17%**	**0%**	**0%**	**33%**	**0%**	**0%**	**0%**
51 to 90% of pharmacy technicians	8	1	4	3	2	6	0	1	0	0	7	0	0	0
	9%	**5%**	**8%**	**16%**	**11%**	**9%**	**0%**	**8%**	**0%**	**0%**	**15%**	**0%**	**0%**	**0%**
10 to 50 % of pharmacy technicians	29	12	13	4	5	24	4	5	4	0	16	0	0	0
	34%	**63%**	**27%**	**21%**	**28%**	**35%**	**18%**	**42%**	**100%**	**0%**	**35%**	**0%**	**0%**	**0%**
less than 10% of pharmacy technicians	32	3	19	10	9	23	18	4	0	2	8	0	0	0
	37%	**16%**	**40%**	**53%**	**50%**	**34%**	**82%**	**33%**	**0%**	**100%**	**17%**	**0%**	**0%**	**0%**

Base: Facilities where technicians are certified

- As more schools attain CCAPP accreditation and their students write and pass the PEBC "qualifying" exam, the proportion of facilities having at least some of their technicians certified through the PEBC process has increased considerably, with 78% of respondents in 2011/12 reporting that they have one or more certified technicians on their staff, compared to 26% (18/68) of respondents who reported having technician(s) certified through this exam in 2009/2010.

> ***The proportion of respondents who reported having one or more technicians certified through completion of the PEBC exam tripled from 26% in 2009/10 to 78% in 2011/12.***

- As much as pharmacy technician certification is becoming more prominent within hospital pharmacy practice, it should be recognized that a large percentage of our pharmacy technician staff remain non-certified. Seventy-one percent of the respondents with certified technicians indicated that the percentage of their staff having certification was either less than 10%, or between 10% and 50%.
- Thirty-three percent of ON respondents reported that more than 90% of their pharmacy technicians were certified.
- Overall 44% of respondents indicated that job descriptions have been modified so that only registered pharmacy technicians will be hired in the future. This is up from the 27% (42/156) of respondents in the 2009/2010 report who reported that job descriptions had been modified. The regional variability in this area is notable, with 92% of BC respondents reporting that they have made this decision, while only 11% of respondents in the Atlantic Provinces reporting that they have done so.

> ***100% of respondents in ON reported that financial support is being provided to pharmacy technicians who wish to become certified.***

- The percentage of respondents indicating that they provide financial support to pharmacy technicians who wish to become certified increased to 45% in 2011/12, compared to the 32% (50/156) of respondents who reported doing so in the 2009/2010 report. The increase was largely driven by the ON respondents, all of whom reported

that they are providing financial support. With the highly unionized nature of institutional pharmacy practice, it is possible that a similar policy will be adopted in other parts of the country.

Table H-4. Recognition and Support for Technician Certification 2011/2012

		---	Teaching Status		Province							
		All	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
Educational sessions have been provided to inform pharmacy technicians	(n=)	(166)	(38)	(128)	(25)	(13)	(6)	(12)	(49)	(43)	(10)	(8)
		114	27	87	25	10	3	10	44	8	7	7
		69%	**71%**	**68%**	**100%**	**77%**	**50%**	**83%**	**90%**	**19%**	**70%**	**88%**
Pharmacy technician job descriptions have been revised, requiring new hires to be certified	(n=)	(166)	(38)	(128)	(25)	(13)	(6)	(12)	(49)	(43)	(10)	(8)
		73	14	59	23	9	0	1	37	1	0	2
		44%	**37%**	**46%**	**92%**	**69%**	**0%**	**8%**	**76%**	**2%**	**0%**	**25%**
Existing pharmacy technicians are required to be certified	(n=)	(163)	(36)	(127)	(25)	(14)	(6)	(12)	(49)	(43)	(8)	(6)
		98	20	78	24	14	5	2	47	0	2	4
		60%	**56%**	**61%**	**96%**	**100%**	**83%**	**17%**	**96%**	**0%**	**25%**	**67%**
Financial support is being provided to pharmacy technicians who wish to become certified	(n=)	(162)	(36)	(126)	(25)	(12)	(6)	(12)	(49)	(43)	(8)	(7)
		73	10	63	10	4	3	1	49	0	1	5
		45%	**28%**	**50%**	**40%**	**33%**	**50%**	**8%**	**100%**	**0%**	**13%**	**71%**

Base: all respondents

Pharmacy Technician Workforce Integration

It is generally accepted that hospital pharmacy will benefit from having pharmacy technicians assume greater responsibility and accountability as regulated healthcare professionals. However, with 49% of survey respondents reporting that none of their pharmacy technicians are certified (Table H3) there is much work to be done before the full benefits of technician certification and regulation will be realized. A sustained effort will be needed to convince the large numbers of those currently working as non-certified pharmacy technicians that it is in their best interest to pursue certification. In addition, decisions need to be made concerning how those technicians who don't achieve certification will be handled. Will they be offered continued employment? What will their job title be? Will they be paid on a lower wage scale than those who become certified? A series of questions developed for the 2011/2012 survey were designed to elucidate how these integrative steps will occur. Table H-5 examines the degree to which decisions have been made by hospital pharmacy departments concerning those individuals who do not become certified and are ineligible to become a regulated pharmacy technician. Table H-6 examines how hiring practices will be changing in this new environment of regulated Pharmacy Technicians.

- Overall 53% of respondents indicated that they had made some decisions about the future of previously employed pharmacy technicians who don't qualify for certification, while 47% (78/166) had not. Respondents in the regions in which pharmacy technician regulation has been in place the longest (BC and ON) were most likely to report that decisions had been made (96% of BC respondents and 94% of ON respondents).

> ***47% of all respondents indicated that they have not made any decisions about the future of non-regulated pharmacy technicians on their staffs who don't become registered pharmacy technicians.***

- Of 88 respondents who indicated that they had made some decisions about those who fail to become certified as pharmacy technicians, there still remains a great deal of variability and uncertainty with respect to what those decisions will ultimately involve. For example, on the question of whether or not those individuals would have their employment terminated, 40% of respondents reported that those non-regulated pharmacy technicians would be terminated; while 38% reported that there employment would not be terminated. The remaining 23% indicated that a decision regarding termination had not yet been determined.
- For the 40% of respondents who will be giving these individuals new titles, such as "Pharmacy Assistant", there remains substantial variation in how their roles and salaries will change. Forty-four percent of those respondents (16/36) indicated that they will continue to perform the same duties, with the exception of tasks that can only be performed by a registered pharmacy technician, while 61%

(22/36) reported that they will have a new position description that limits their responsibilities to very basic activities.

Table H-5. Individuals Who Fail to Become Registered as Pharmacy Technicians 2011/2012

		---	Teaching		Province							
		All	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS
	(n=)	(166)	(37)	(129)	(25)	(14)	(6)	(12)	(49)	(43)	(10)	(7)
Facility has made decisions concerning the future of previously employed 'Pharmacy Technicians' who fail to qualify for registration.		88	15	73	24	11	0	2	46	0	1	4
		53%	**41%**	**57%**	**96%**	**79%**	**0%**	**17%**	**94%**	**0%**	**10%**	**57%**
Base: All respondents												
Decisions regarding individuals who fail to become registered as a pharmacy technician												
	(n=)	(88)	(15)	(73)	(24)	(11)	(0)	(2)	(45)	(1)	(1)	(4)
Their employment with your facility will be terminated		35	8	27	0	7	0	0	27	0	0	1
		40%	**53%**	**37%**	**0%**	**64%**	**0%**	**0%**	**60%**	**0%**	**0%**	**25%**
	not yet determined	33	6	27	17	3	0	0	10	1	0	2
		38%	**40%**	**37%**	**71%**	**27%**	**0%**	**0%**	**22%**	**100%**	**0%**	**50%**
They will be offered positions elsewhere in the organization where registration as a pharmacy technician is not required		25	6	19	1	5	0	0	17	0	1	1
		28%	**40%**	**26%**	**4%**	**45%**	**0%**	**0%**	**37%**	**0%**	**100%**	**25%**
	not yet determined	40	6	34	17	3	0	0	17	1	0	2
		45%	**40%**	**47%**	**71%**	**27%**	**0%**	**0%**	**37%**	**100%**	**0%**	**50%**
They will be given a new title, such as 'Pharmacy Assistant'		36	4	32	24	2	0	2	5	0	1	2
		40%	**27%**	**43%**	**100%**	**18%**	**0%**	**100%**	**11%**	**0%**	**100%**	**50%**
	not yet determined	10	2	8	0	4	0	0	4	1	0	1
		11%	**13%**	**11%**	**0%**	**36%**	**0%**	**0%**	**9%**	**100%**	**0%**	**25%**
Base: Facilities where decisions have been made re pharmacy technicians												
Responsibilities and salary of former Pharmacy Technicians who will be given a new title (such as "Pharmacy Assistant")												
They will continue to perform the same duties, with the exception of tasks that must only be performed by a registered pharmacy technician	(n=)	(36)	(4)	(32)	(24)	(2)	(0)	(2)	(5)	(0)	(1)	(2)
		16	1	15	8	0	0	2	5	0	1	0
		44%	**25%**	**47%**	**33%**	**0%**	**0%**	**100%**	**100%**	**0%**	**100%**	**0%**
	not yet determined	1	0	1	1	0	0	0	0	0	0	0
		3%	**0%**	**3%**	**4%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
They will have a new position description that limits their responsibilities	(n=)	(36)	(4)	(32)	(24)	(2)	(0)	(2)	(5)	(0)	(1)	(2)
		22	3	19	17	1	0	0	2	0	0	2
		61%	**75%**	**59%**	**71%**	**50%**	**0%**	**0%**	**40%**	**0%**	**0%**	**100%**
	not yet determined	7	0	7	7	0	0	0	0	0	0	0
		19%	**0%**	**22%**	**29%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
They will continue to be paid on the same salary scale as the registered pharmacy technicians	(n=)	(36)	(4)	(32)	(24)	(2)	(0)	(2)	(5)	(0)	(1)	(2)
		2	0	2	0	0	0	1	0	0	1	0
		6%	**0%**	**6%**	**0%**	**0%**	**0%**	**50%**	**0%**	**0%**	**100%**	**0%**
	not yet determined	7	0	7	2	0	0	1	2	0	0	2
		19%	**0%**	**22%**	**8%**	**0%**	**0%**	**50%**	**40%**	**0%**	**0%**	**100%**
They will be placed on a new salary scale, but will be 'red-circled'	(n=)	(36)	(4)	(32)	(24)	(2)	(0)	(2)	(5)	(0)	(1)	(2)
		2	0	2	0	0	0	1	1	0	0	0
		6%	**0%**	**6%**	**0%**	**0%**	**0%**	**50%**	**20%**	**0%**	**0%**	**0%**
	not yet determined	23	2	21	18	1	0	1	1	0	0	2
		64%	**50%**	**66%**	**75%**	**50%**	**0%**	**50%**	**20%**	**0%**	**0%**	**100%**
They will be placed on a new salary scale that will pay them less than their current wage rate	(n=)	(35)	(4)	(31)	(24)	(2)	(0)	(1)	(5)	(0)	(1)	(2)
		2	2	0	0	1	0	0	1	0	0	0
		6%	**50%**	**0%**	**0%**	**50%**	**0%**	**0%**	**20%**	**0%**	**0%**	**0%**
	not yet determined	23	2	21	18	1	0	1	1	0	0	2
		66%	**50%**	**68%**	**75%**	**50%**	**0%**	**100%**	**20%**	**0%**	**0%**	**100%**

Base: Facilities Pharmacy Technicians will be given a new title, such as "Pharmacy Assistant"

- How salaries will be handled also does not seem to be well established. Seventy-five percent of respondents who reported a change in duties for non-registered technicians (27/36) reported that they would not be continuing with the same salary scale as registered pharmacy technicians. However 64% (23/36) have not yet determined if non-registered technicians will be placed on a new salary scale, but will be "red circled", and 66% (23/35) have not yet determined if non-registered technicians will be placed on a new salary scale that will pay them less than their current wage rate.

Table H-6. Pharmacy Technician Hiring Practices 2011/2012

	---	Teaching Status		Province							
	All	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS
(n=)	(164)	(38)	(126)	(25)	(14)	(6)	(12)	(48)	(41)	(10)	(8)
Only registered pharmacy technicians will be hired, no second category of support personnel will be created	58	10	48	0	5	2	0	44	4	0	3
	35%	26%	38%	0%	36%	33%	0%	92%	10%	0%	38%
Registered pharmacy technicians will be hired as 'Pharmacy Technician', others will be hired as 'Pharmacy Assistant'	36	7	29	22	8	0	1	2	1	1	1
	22%	18%	23%	88%	57%	0%	8%	4%	2%	10%	13%
not yet determined	70	21	49	3	1	4	11	2	36	9	4
	43%	55%	39%	12%	7%	67%	92%	4%	88%	90%	50%

Base: all respondents

- When asked about their planned hiring practices when pharmacy technician registration comes into effect within their jurisdiction, the most common response was "not yet determined" (43%). However, in the two provinces where technician regulation has been in effect the longest (BC and ON) there is less uncertainty, with only 12% and 4% respectively, responding that this was not yet determined.

In the two provinces where technician regulation has been in affect the longest (BC and ON) there is less uncertainty about how hiring practices will change.

- Although ON and BC have determined what their hiring practices will be in the new environment, it is notable that these two jurisdictions have gone in different directions. Ninety-two percent of respondents from ON indicate that only registered pharmacy technicians will be hired and no second category of support personnel will be created. But in BC, 88% have a less restrictive stance that registered pharmacy technicians will be hired as a 'Pharmacy Technician' and others will be hired as a 'Pharmacy Assistant'.

What is evident from the results of these questions is that there remains a great deal of uncertainty in terms of how regulated and non-regulated pharmacy technicians will be integrated into the workforce in hospitals across the country, and how those that do not become certified will be dealt with. With the rapid pace at which pharmacy technician regulation is proceeding across the country, it is likely that those decisions cannot be delayed much longer. It is expected that there will be a substantial increase in certainty with respect to these issues in the next survey report.

Pharmacy Technician Salaries

For a summary and discussion of pharmacy technician salaries, see Chapter D, Human Resources.

[1] *Blueprint for pharmacy website. http://blueprintforpharmacy.ca/policy-changes-by-region (accessed 10 November 2012)*

[2] *Prince Edward Island Board of Pharmacy website http://www.pepharmacists.ca/site/technicians?nav=04 (accessed 9 November 2012).*

[3] *Saskatchewan College of Pharmacists website http://scp.in1touch.org/client/document/documents.html;jsessionid=5D60F0D12DAC66460037C424AAFA60C7?categoryId=162 (accessed 6 November 2012).*

[4] *Newfoundland and Labrador Pharmacy Board website. Fall Apothecary News http://www.nlpb.ca/news.html (accessed 9 November 2012).*

[5] *CCAPP - Pharmacy Technician Programs Current Accreditation Award Status http://www.ccapp-accredit.ca/accredited_programs/technician/history_by_program (accessed 28October 2012).*

[6] *PEBC website. Examination Dates http://www.pebc.ca/index.php/ci_id/3094/la_id/1.htm (accessed 9 November 2012).*

[7] *PEBC Update. 2012 Annual Board Meeting Summary. Vol. 16 No. 1 March 2012.*

[8] *Correspondence with Carole Bouchard, Executive Director of NAPRA (Nov 12th, 2012).*

[9] *NAPRA Professional Competencies for Canadian Pharmacy Technicians, September 2007 http://napra.ca/Content_Files/Files/Professional_Competencies_for_Canadian_Pharmacy_Technicians2007.pdf (Accessed February 10, 2013).*

[10] *NAPRA Model Standards of Practice for Canadian Pharmacy Technicians, November 2011 http://www.napra.org/Content_Files/Files/Model_Standards_of_Prac_for_Cdn_PharmTechs_Nov11.pdf (accessed 28 October 2012).*

[11] *Adams AJ, Martin SJ, Stolpe SF. "Tech-check-tech": A review of the evidence on its safety and benefits. AJHP 2011; 68: 1824-33.*

[12] *Johnston R, Saulnier L, Gould O.Best Possible Medication History in the Emergency Department: Comparing Pharmacy Technicians and Pharmacists. CJHP 2010; 63(5): 359-365.*

I – Evaluating Pharmacy Services

Patricia Lefebvre

This chapter of the Hospital Pharmacy in Canada Report focuses on the structure, resources, processes and tools that have been developed for evaluating activities carried out by pharmacy personnel in Canadian hospitals. Performance measurement is key to enabling managers and staff to better understand work processes, clinical services and their outcomes. Quality improvement metrics are necessary for identifying areas of improvement, implementing positive change and monitoring progress toward established objective.[1]

Numerous frameworks for evaluating pharmacy services are available through regulatory authorities, professional associations (e.g.: CHSP, CPhA), and accreditation agencies. Each framework has its own set of important performance dimensions, performance indicators, and targets, based on standards and established norms. The most common measurement areas include the patient experience, accessibility to care, patient safety, and service quality, efficiency, effectiveness, and continuity.

CSHP 2015 – Targeting excellence in Pharmacy Practice - proposes six goals and thirty-six objectives, each with measurable targets, to ensure that medication use is effective, evidence-based, safe and contributing meaningfully to public health. Building from that framework, pharmacy departments can design their evaluation activities to ensure alignment with organizational goals and priorities.

Evaluating services cannot be viewed as an isolated task. It should be embedded in the fabric of providing care and services. It informs us on what we are doing well, what we should improve, and what we should stop doing because of evidence that it provides little or no added-value.

Evaluation of pharmacy services is an important tool for improving patient experience, access to care, patient safety, and service quality, effectiveness, efficiency, and continuity.

Most hospital pharmacy departments are collecting data related to structure and process, but not outcomes. Structure-related measurement activities examine structural aspects of a pharmacy department that are believed to be indicators of quality care, such as the number and type of staff, the organizational structure and reporting relationships, and the availability of equipment and technology, the pharmacist/technician ratio, and the proportion of time that pharmacists spend in drug distribution versus clinical activities. Process related measurement activities look at whether or not the expected processes, as defined by standards and professional norms are being followed in activities such as drug compounding, preparation of sterile parenteral products, and clinical practice expectations (e.g. insuring that post myocardial infarct patients are discharged on appropriate medications such as statins and beta-blockers), all of which measure how well certain activities are being performed. Some hospital pharmacy departments also measure a limited number of outcome measures such as adverse events related to medication use, wrong dose related to renal function, and percentage of palliative care patients with controlled pain). With the shift to the pharmaceutical care model, there is a need to capture more extensive outcome-related measures in order to document the added-value of providing direct patient-care services. Best practices call for a balanced set of key performance indicators that measure elements critical to the success of an organization. In healthcare, value should be defined from a patient-perspective and evaluated on the basis of the outcomes that were achieved.

The 2011/12 survey results provide information on the current evaluation practices conducted by the hospital pharmacy departments that participated in the Hospital Pharmacy in Canada Survey.

Evaluation of Clinical Pharmacy Services

The evaluation of pharmacy services is increasingly being recognized as a necessary component of the practice of Pharmacy. Many external standard-setting organizations (e.g. Accreditation Canada, certification boards, regulatory authorities, professional associations, etc.) are driving evaluation through their standards, accreditation processes and licensing requirements. The high response rate and participation in this Canadian hospital pharmacy survey shows the willingness of the majority of directors of pharmacy to document, benchmark, and evaluate the

level of their practice. The 2011/12 survey results provide information on the current evaluation practices that are being applied to clinical pharmacy services in Canadian hospitals.

The evaluation of pharmacy services, by pharmacy clinicians and their managers, insures that what is taking place in the practice setting is congruent with the best available evidence that has been generated through research studies. Research-based initiatives, using rigorous scientific methods, provide the evidence that specific therapies, interventions or services, including those provided by pharmacists, actually improve outcomes. Unfortunately, more research, of a higher quality, is needed to support the value of specific pharmacy interventions. Since our last report, Melchiors et al. have conducted an analysis of the quality of systematic reviews that have been published on pharmacists' health interventions.[2] A total of 151 systematic reviews were found and 31 were included in the analysis. The authors stated that "*…in the past 20 years, many studies have evaluated the impact of pharmaceutical practices on clinical, humanistic and economic outcomes. However, few studies have critically analyzed the primary studies and published reviews regarding pharmaceutical practices. The quality of published reviews varies from moderate to poor.*" A number of suggestions were made for improving the quality of practice-based research that aims to document the value of specific pharmacy interventions.

Are hospital pharmacists prepared to conduct the kind of quality research that is needed to demonstrate the value of pharmacy services? Perreault et al. surveyed critical care pharmacists in Canada and their interest in clinical and practice research.[3] Their survey showed that Canadian critical care pharmacists are involved to varying degrees in clinical research and are very interested in initiating and supporting research activities. Opportunities are present but significant barriers exist. The value of pharmacist-initiated research needs recognition as a priority within hospital pharmacy administration. CSHP published a statement and guidelines in 2011 that aims to promote research in pharmacy practice.[4] That research would, in many cases, provide the background evidence that is needed to support the evaluation of pharmacy services.

Respondents to the 2011/12 Hospital Pharmacy in Canada Survey answered questions that were intended to establish if and how pharmacy departments were evaluating the provision of direct patient care (clinical) services.

- Forty-seven percent of survey respondents reported using a structured approach to define and prioritize pharmacists' activities. This percentage was higher in teaching hospitals (66%) vs. 42% in non-teaching facilities. (Table I-1).
- Thirty percent of respondents reported that they evaluate the direct patient care services provided by pharmacists in their hospital by auditing a sample of clinical activities. The percentage of respondents who reported evaluating pharmacy services remained largely unchanged from 31% (51/163) in 2007/08 and 31% (50/160) in 2009/10.
- Of the survey respondents who reported that they evaluated their pharmacists performance by auditing a sample of clinical activities:
    - Seventy-three percent reported that the evaluation was conducted by pharmacy practice leaders, followed by 59% by pharmacy managers, 35% by the pharmacists themselves, and 27% by peers.
    - Evaluation was conducted using five methods: retrospective chart review (60%), direct observation (64%), and self-evaluation by pharmacists (48%) peer review (22%) and other (20%). Respondents from BC, the Prairies and the Atlantic provinces reported using all methods while QC reported the exclusive use of retrospective chart review.
- Survey respondents conducting evaluation of clinical practice reported assessing five aspects of clinical practice: documentation of clinical services provided by their pharmacists (80%), the development and monitoring of an individualized pharmaceutical care plan for their patients, (62%), answers to drug information questions (43%), medication/drug counseling and evaluation of compliance (42%). And other (23%). No comparison can be made with previous report, as the five aspects are different from those evaluated in 2009/10.
- Twenty-two percent of survey respondents reported that they have established mechanisms to measure medication-related patient outcomes. Of the respondents who reported having the mechanism in place, 17% use those outcome measures when evaluating the performance of individual pharmacists. The establishment of mechanisms to measure medication-related outcomes was reported more often by respondents in teaching hospitals than those in non-teaching hospitals (38% vs. 17%) and larger bed-size hospitals (29% in hospitals with more than 500 beds, 24% in hospitals with 201-500 beds, and 10% in hospitals with 50-200 beds).

Table I-1. Evaluation of Clinical Pharmacy Services 2011/12

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(168)	(41)	(84)	(43)	(38)	(130)
A structured approach is used to define and prioritize pharmacist activities	79	14	39	26	25	54
	47%	**34%**	**46%**	**60%**	**66%**	**42%**
The provision of direct patient care services is evaluated by auditing a sample of clinical activities	51	6	30	15	19	32
	30%	**15%**	**36%**	**35%**	**50%**	**25%**
Base: All respondents						
The evaluation is done by … (n=)	(51)	(6)	(30)	(15)	(19)	(32)
.. pharmacy practice leaders	37	3	25	9	14	23
	73%	**50%**	**83%**	**60%**	**74%**	**72%**
.. the pharmacists themselves (self-evaluation)	18	2	10	6	10	8
	35%	**33%**	**33%**	**40%**	**53%**	**25%**
.. pharmacy managers	30	3	18	9	8	22
	59%	**50%**	**60%**	**60%**	**42%**	**69%**
.. peers (e.g., other pharmacists)	14	1	6	7	8	6
	27%	**17%**	**20%**	**47%**	**42%**	**19%**
.. physicians	3	0	1	2	2	1
	6%	**0%**	**3%**	**13%**	**11%**	**3%**
.. other	1	0	0	1	1	0
	2%	**0%**	**0%**	**7%**	**5%**	**0%**
The method for evaluation used is … (n=)	(50)	(6)	(29)	(15)	(19)	(31)
.. chart review - retrospective	30	2	17	11	14	16
	60%	**33%**	**59%**	**73%**	**74%**	**52%**
.. direct observation	32	4	21	7	14	18
	64%	**67%**	**72%**	**47%**	**74%**	**58%**
.. self-evaluation by pharmacists	24	3	15	6	11	13
	48%	**50%**	**52%**	**40%**	**58%**	**42%**
.. peer review	11	0	6	5	7	4
	22%	**0%**	**21%**	**33%**	**37%**	**13%**
.. other	10	1	4	5	3	7
	20%	**17%**	**14%**	**33%**	**16%**	**23%**
Base: Respondents evaluating a sample of clinical activities; Note: multiple mentions permissible						
Aspects of clinical practice evaluated (n=)	(79)	(14)	(45)	(20)	(24)	(55)
Clinical documentation	63	11	34	18	22	41
	80%	**79%**	**76%**	**90%**	**92%**	**75%**
Medication counseling and evaluation of compliance	33	4	20	9	10	23
	42%	**29%**	**44%**	**45%**	**42%**	**42%**
Answers to drug information questions	34	6	20	8	11	23
	43%	**43%**	**44%**	**40%**	**46%**	**42%**
Development of an individualized pharmaceutical care plan, including its monitoring	49	6	29	14	17	32
	62%	**43%**	**64%**	**70%**	**71%**	**58%**
Other	18	3	10	5	5	13
	23%	**21%**	**22%**	**25%**	**21%**	**24%**
Base: All respondents evaluating aspects of clinical practice; Note: multiple mentions permissible						
(n=)	(164)	(40)	(82)	(42)	(37)	(127)
Mechanisms have been established to measure patients' medication-related outcomes	36	4	20	12	14	22
	22%	**10%**	**24%**	**29%**	**38%**	**17%**
Base: All respondents						
(n=)	(36)	(4)	(20)	(12)	(14)	(22)
Patients' medication-related outcomes are used to evaluate the performance of individual pharmacists	6	0	3	3	4	2
	17%	**0%**	**15%**	**25%**	**29%**	**9%**
Base: Respondents with mechanisms to measure patients' medication-related outcomes						
(n=)	(6)	(0)	(3)	(3)	(4)	(2)
Proportion of pharmacists evaluated in the last fiscal year	**43**		**35**	**50**	**39**	**50**
Base: Respondents where patients' medication-related outcomes are used to evaluate the performance of individual pharmacists						

Evaluation of Medication Safety

The results of a medication safety self-assessment (MSSA), such as the one developed by the Institute for Safe Medication Practices (ISMP), can facilitate the prioritization of improvement initiatives in the medication-use-system. Of note, it can be used as evidence of the institution having met the medication safety self-assessment

requirements, which are evaluated by Accreditation Canada surveyors when they pay their visit to a hospital.

- Sixty-two percent of respondents (Table I-2) reported that they had completed a MSSA, using a recognized tool, compared to 76% (121/159) in 2009/10. There were considerable regional variances in the percentages of respondents who had completed a MSSA. Ontario led with 92% (45/49) followed by BC (68%, 17/25), the Prairies (61%, 19/31), the Atlantic Provinces (50%, 9/18) and QC (32%, 14/44).
- Of the respondents who indicated that they had completed MSSA, 49% had completed the assessment more than 2 years ago, 27% had completed one between 1 and 2 years ago, and 24% had completed one in the last fiscal year. Considering that significant changes take time to implement and accreditation is now on a 4 year cycle, it is likely that MSSAs will be carried out less frequently, perhaps on the same 4 year cycle as Accreditation Canada now uses.

Table I-2. Evaluation of Medication Safety 2011/12

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(167)	(41)	(83)	(43)	(38)	(129)
Hospital completed a Medication Safety Self-Assessment, using a recognized assessment tool.	104	26	51	27	24	80
	62%	**63%**	**61%**	**63%**	**63%**	**62%**
Assessment was last performed (n=)	(104)	(26)	(51)	(27)	(24)	(80)
more than 2 years ago	51	17	23	11	9	42
	49%	**65%**	**45%**	**41%**	**38%**	**53%**
between 1 and 2 years ago	28	6	14	8	8	20
	27%	**23%**	**27%**	**30%**	**33%**	**25%**
in the last fiscal year	25	3	14	8	7	18
	24%	**12%**	**27%**	**30%**	**29%**	**23%**
Base: All respondents						
When reviewing physician / clinical order sets, the content (n=)	(165)	(41)	(81)	(43)	(38)	(127)
evidence such as published clinical studies or guidelines and expert consensus advice	162	40	80	42	36	126
	98%	**98%**	**99%**	**98%**	**95%**	**99%**
patient safety checklist	156	40	77	39	36	120
	95%	**98%**	**95%**	**91%**	**95%**	**94%**
Base: All respondents; Note: multiple mentions permissible						
(n=)	(167)	(41)	(83)	(43)	(38)	(129)
Physician / clinical orders sets are approved by an appropriate multidisciplinary group	155	37	78	40	34	121
	93%	**90%**	**94%**	**93%**	**89%**	**94%**

Base: All respondents

- Almost all respondents (98%) reported using evidence, such as published clinical studies, clinical guidelines and expert consensus recommendations, when reviewing and approving physician / clinical order sets. Ninety-five percent of respondents reported using patient safety checklists when reviewing and approving physician / clinical order sets. These results were similar, regardless of the bed size, teaching status or the region in which the hospital was located.
- Ninety-three percent of respondents reported having a multidisciplinary committee responsible for approving physician / clinical order sets. All respondents from BC (25/25) and QC (44/44) reported the presence of a committee, compared to only 50% (10/20) and 42% (60/142) respectively in 2005/06, while the situation remained largely unchanged in the other provinces.

Medication Safety

The creation of safe, effective and efficient systems for managing medications in each hospital should be one of the priority objectives. A good place to start is by assessing compliance of the medication use system against the standards for Managing Medications and the medication-related Required Organizational Practices (ROPs) of the Accreditation Canada Qmentum Program.[5] In addition, comparing your facility to the results of medication safety-related questions that appear throughout this report would be a useful exercise. To facilitate that exercise, we have prepared a summary of the responses to medication safety-related questions which appeared in the past 3 Hospital Pharmacy in Canada Reports. (Table I-3)

Table I-3. Medication Safety Indicators 2011/12

Indicator	2011/12	2009/10	2007/08
Improving prescribing:			
Computerized Prescriber Order Entry is operational (CPOE) (*n =) all respondents*	**8%**	8%	5%
CPOE has a bidirectional interface to PIS *(n =) respondents with CPOE*	**69%**	46%	33%
Order entry is performed by prescribers through an interfaced CPOE	**7%**	7%	-
CPOE is integrated with a clinical decision support system that guides :	**75%**	58%	-
• through established protocols and clinical pathways			
• the use of weight-based or surface area base dosing for selected drugs	**67%**	75%	-
• the dosing of medications in special populations (e.g: renal, pediatrics)	**67%**	42%	-
Improving medication order review			
Order review by a pharmacist, when the pharmacy is closed, of at least 95% of routine medication orders , before: (*n =) all respondents*			
• Medications are accessed from a night cupboard	**5%**	8%	6%
• Medications are accessed from automated dispensing cabinets on patient care units	**1%**	8%	3%
• Medications are accessed from wardstock	**1%**	7%	3%
100% of medication orders in a hospital's emergency department are reviewed by hospital pharmacists within 24 hours of the order being written (*n =) all respondents*	**29%**	27%	-
Improving dispensing of medications (*n =) all respondents*			
Hospital utilizes a unit-dose system for drug distribution for 90% or more of their total beds	**75%**	76%	62%
95% or more of oral unit-dose packaged medications are dispensed in a ready-to-administer form, i.e. no further dose manipulation required by nursing staff	**46%**	58%	-
Improving administration of medications (*n =) all respondents*			
At least 95% of routine medication orders are reviewed by a pharmacist, when the pharmacy is closed, before medications appear on the MAR	**16%**	14%	-
MARs are electronic and documentation is online	**10%**	10%	7%
Policy is in place which requires that two (2) patient identifiers (neither to be the patient's room number) are checked before administering medications	**97%**	91%	64%
TALLman lettering is used to reduce errors caused by confusion between drug products with look-alike drugs	**82%**	70%	58%
Wireless network is used to upload or download date to smart pumps (*n =) respondents using smart pumps*	**24%**	30%	9%
Libraries of smart pumps are updated annually (*n =) respondents using smart pumps*	**58%**	62%	43%
Barcoding is used to: (*n =) all respondents*			
• Verify drug selection prior to patient administration	**3%**	8%	2%
• Identify patient during medication administration	**4%**	6%	3%
• Identify staff member during medication administration	**2%**	4%	-
Pharmacists are provided with access to laboratory results through an interface with lab system (*n =) all respondents*	**49%**	43%	35%
Patients receiving antibiotics as prophylaxis for surgical infections have their prophylactic antibiotic therapy discontinued within 24 hours after the surgery (*n =) all respondents*	**48%**	45%	39%

Evaluation of the Use of Technology

Evaluation of the use of technology primarily addressed how pharmacy departments deal with the clinical decision support alerts that are built into their Pharmacy Information Systems (PIS) and medication-related equipment.

A "Clinical Decision Support System" (CDSS) is defined as:

> *"A computer program feature that provides automatic reminders, advice, or interpretation as data is entered for a specific patient and/or a specific medication order. A clinical decision support system (CDSS) uses patient specific data and evidence based practice guidelines to generate an alert and/or a suggested course of action."*

- Pharmacy information systems with built-in clinical decision support functionality are in place in most hospital pharmacy departments. Eighty-eight percent of respondents reported that their PIS included clinical decision support functionality. The reported availability of a PIS with clinical decision support functionality was higher in ON (98%, 48/49), BC (96%, 24/25) and the Atlantic Provinces (89%, 16/18), than in the Prairies (81%, 26/32) and Qc (77%, 34/44). (Table 1-4)

Only 48% of respondents reported fully utilizing the functionality of the clinical decision support, despite the evidence that these systems improve the safety of the medication use system.

Table I-4. Clinical Decision Support Technology 2011/12

	--	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(168)	(41)	(84)	(43)	(38)	(130)
Facility uses a Pharmacy Information System (PIS) that has built-in clinical decision support functionality	148	35	75	38	33	115
	88%	**85%**	**89%**	**88%**	**87%**	**88%**
Base: All respondents						
(n=)	(148)	(35)	(75)	(38)	(33)	(115)
Clinical decision support functionality is being fully utilized	71	17	35	19	20	51
	48%	**49%**	**47%**	**50%**	**61%**	**44%**
Base: Respondents where facility uses PIS with clinical decision support functionality						
Reasons why the decision support functionality is not in use (n=)	(85)	(21)	(42)	(22)	(18)	(67)
The clinical significance of many of the alerts is questionable	54	13	28	13	9	45
	64%	**62%**	**67%**	**59%**	**50%**	**67%**
There is insufficient time to deal with all the alerts	37	11	16	10	8	29
	44%	**52%**	**38%**	**45%**	**44%**	**43%**
The database that drives the alerts is out of date	15	2	8	5	3	12
	18%	**10%**	**19%**	**23%**	**17%**	**18%**
Physicians rarely make changes to the order when contacted regarding the alert	4	2	1	1	0	4
	5%	**10%**	**2%**	**5%**	**0%**	**6%**
Other	32	10	11	11	8	24
	38%	**48%**	**26%**	**50%**	**44%**	**36%**
Base: Respondents where decision support functionality is not being fully utilized Note: multiple mentions permissible						
(n=)	(167)	(41)	(83)	(43)	(38)	(129)
Hospital has a policy dealing with the overriding of alerts	28	5	19	4	4	24
	17%	**12%**	**23%**	**9%**	**11%**	**19%**
(n=)	(164)	(41)	(81)	(42)	(37)	(127)
Facility reviews override data from smart pumps	40	5	23	12	12	28
	24%	**12%**	**28%**	**29%**	**32%**	**22%**
Base: All respondents						
(n=)	(40)	(5)	(23)	(12)	(12)	(28)
Facility has made changes following the review of the pumps' override data	31	4	17	10	12	19
	78%	**80%**	**74%**	**83%**	**100%**	**68%**

Base: Respondents where facilities overrode data from smart pumps

- Respondents from teaching hospitals (61%) were more likely than non-teaching hospitals (44%) to fully use the functionality.

The survey attempted to identify the reasons why facilities did not fully utilize the built-in- clinical decision support functionality that was present in their PIS. Eighty-five respondents provided reasons.

- Sixty-four percent of respondents reported that the clinical significance of many of the alerts is questionable.
- Forty-four percent of respondents reported that there is insufficient staff time available to deal with all the alerts.
- Eighteen percent of respondents reported that the database that drives the alerts is out of date.
- Five percent of respondents reported that physicians rarely make changes to the order when contacted regarding the alert.
- Thirty-eight percent of respondents reported they had other reasons why the functionality was not being fully utilized.

Only 17% of respondents reported that their hospital has a policy dealing with the overriding of clinical decision support alerts that are generated by their pharmacy information system.

When properly programmed, set up, and used, smart pumps have the potential to significantly reduce the risk of adverse events associated with the administration of medications via the parenteral route. According to the literature, approximately 39% of medication errors occur during drug administration and this is typically the phase of the medication system where errors are least likely to be intercepted before reaching the patient.

- Twenty-four percent of respondents reported that they review override data from smart pumps at least annually, an increase from the 36% (35/98) of respondents in the previous survey who reported doing so. There were regional differences, ON led at 38% (18/48), followed by the Prairies at 28% (9/32), BC at 20% (5/25), QC at 14% (6/43) and the Atlantic Provinces at 13% (2/16).

- Seventy-eight percent of these respondents reported that they had made changes to policies, procedures, or pump programming following the review of the pumps' override data.

Evaluation of the Process Related to Sterile Product Preparation

Hospital pharmacy departments have reported slow progress in implementing new quality assurance practices for ensuring the safety of compounded sterile products.

- Fifty-eight percent of respondents indicated that they audit the preparation of parenteral admixtures by observing employees for validation of aseptic technique, at least once a year. (Table 1-5) This is the same percentage reported in the 2009/10 survey.
- Twenty-three percent of respondents indicated that they routinely verify product sterility by laboratory testing of samples from prepared products.
- Twenty-nine percent of respondents conduct sterility testing on samples collected from surfaces in sterile product preparation areas, on a regular basis.

Table I-5. Evaluation of the Process Related to Sterile Product Preparation

	---	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
(n=)	(167)	(40)	(84)	(43)	(38)	(129)
Employees preparing parenteral admixtures are observed for validation of aseptic technique at least once a year	97 **58%**	17 **43%**	48 **57%**	32 **74%**	35 **92%**	62 **48%**
Product sterility is routinely verified by laboratory testing on a sample of products prepared	49 **29%**	9 **23%**	26 **31%**	14 **33%**	18 **47%**	31 **24%**
Surface sampling is conducted in sterile product preparation areas of the parenteral admixture service	39 **23%**	4 **10%**	21 **25%**	14 **33%**	16 **42%**	23 **18%**

Base: All respondents

These results suggest that only about half of hospital pharmacy departments have implemented these quality assurance activities within their sterile product services area. Self-assessment tools are available to identify the gap in practices related to sterile product preparation. Considering the risk of contamination of parenteral products, additional efforts are required to put in place processes to ensure the safety of parenteral products.

In summary, evaluating pharmacy services can guide our efforts, making sure we are doing the right things, the right way, with the desired results, at the right cost. Key performance indicators are useful to inform hospital pharmacy departments on areas that warrant attention and improvement; to monitor performance over time, and to prioritize improvement activities.

[1] Coutts, J. By the Numbers: Measuring for Quality Care. Healthcare Quarterly 2010;13(4):24-6.

[2] *Melchiors AC, Correr CJ, Venson R, Pontarolo R. An analysis of quality of systematic reviews on pharmacist health interventions. Int J Clin Pharm 2012;34(1):32-42.*

[3] Perreault MM, Thiboutot Z, Burry LD, Rose L, Kanji S, LeBlanc JM, Carr RR, Williamson DR. Canadian survey of critical care pharmacists' views and involvement in clinical research. Ann Pharmacother 2012;46(9):1167-73.

[4] Canadian Society of Hospital Pharmacists. Guidelines for conducting pharmacy practice research. [online] http://www.cshp.ca/productsServices/officialPublications/type_e.asp (Accessed on Feb 2nd, 2013).

[5] *Managing Medications Standards. QMentum Program 2012. Accreditation Canada. Available for purchase at http://www.accreditation.ca*

J – Pediatric Pharmacy Services

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Introduction

Although our society often views children as small adults, there are many physiologic and biologic differences between adults and children. That is particularly true for infants whose metabolic and physiologic processes are still developing. In pharmacy practice, we have developed a variety of evidence-based strategies to address the unique characteristics of children, such as adjusting drug dosages according to age, weight, or body surface area. In addition, the individualization of drug dosages often leads to situations where there isn't a commercially available dosage form that meets the needs of a child. In those cases the pharmacy department must individually compound appropriate dosage forms, such as liquid suspensions and parenteral admixtures, which can be safely and effectively administered to the child. As a result of their unique physiologic characteristics, the need to individualize drug dosages, and the challenges associated with preparing many of the dosage forms used in children, there is an increased risk of medication errors in the pediatric population. In addition, as a consequence of all of these factors, it is generally understood that the human resource requirements for the care of children are higher than they are for adult patients.

In Canada, health centres that provide care exclusively to pediatrics, or care for a significant number of pediatric patients, are represented through the Canadian Association of Pediatric Health Centres (CAPHC).[1] This association has 46 member hospitals across Canada. Most of the member hospitals have a pediatric component that is part of a larger healthcare facility that has its major focus on the care of adults. However, the CAPHC also includes a limited number of pediatric hospitals which focus their services almost exclusively on the care of children. Those facilities include the British Columbia Children's Hospital in Vancouver, the Stollery Children's Hospital in Edmonton, The Alberta Children's Hospital in Calgary, the Children's Hospital in London, the Hospital for Sick Children in Toronto, the Children's Hospital of Eastern Ontario in Ottawa, the CHU Sainte-Justine in Montreal, the Montreal Children's Hospital, CHUQ – Centre mère-enfant in Quebec, the Winnipeg Children's Hospital, and the Izaak Walton Killam Children's Hospital in Halifax.

The pediatric facilities have been included in the Hospital Pharmacy in Canada (HPC) Survey and Report since the inception of the HPC Report over 20 years ago. However, with just a few exceptions, the data from those pediatric facilities were pooled with the data from adult hospitals. Data from those pediatric hospitals were included in the analysis for "all respondents" and for "teaching hospitals", given that all of the 10 pediatric hospitals are categorized as teaching hospitals. However, this was less than ideal for a number of reasons. To begin with, pediatric hospitals are clearly different from adult hospitals in a number of ways. For example, staffing ratios are generally one and a half to two and a half times greater than those reported by adult hospitals. Pediatric hospitals do not find it useful to compare their staffing ratios to the mean staffing ratios for "all respondents" or the mean ratios for "teaching hospitals", since adult hospitals represent the vast majority of respondents in those two categories of hospitals. In addition, the inclusion of pediatric data in the overall results sometimes creates situations where the standard deviations are large and/or the mean values in certain small subgroup analyses are distorted by the inclusion of pediatric data.

After discussing the pros and cons of separately analyzing the data from pediatric hospitals, a decision was made by the HPC Board to exclude the pediatric hospitals from the overall data analysis and to separately analyze the data from adult and pediatric hospitals for the 2011/12 HPC Report. This new chapter is a result of that decision. It should be noted that this chapter only deals with the data from a relatively small number of pediatric hospitals which responded to the survey (seven hospitals in the 2011/12 Report). The data from facilities that have a pediatric component, but are primarily a hospital which deals with adult patients, are still included in the main data analysis. They are not included in the analyses that are reported in this chapter. In the benchmarking chapter, data is provided on staffing ratios and drug costs for those pediatric services that are delivered in hospitals which are primarily adult hospitals, but have a small pediatric component.

When comparing data in tables of the pediatric chapter and tables of earlier adult chapters, it should be remembered that the "All respondents" and "Teaching" columns in the pediatric chapter table includes up to

an additional seven respondents. In some cases the inclusion of those seven respondents in the "All respondents" and "Teaching" column results in small differences between the "All respondents" or "Teaching" results in this chapter, versus the "All respondents" or "Teaching" results in the earlier chapters. For example in the human resources chapter (Table D-3) the "Teaching" result for the staffing ratio "Inpatient budgeted hours/ acute patient day" is 0.90 (an average of 35 hospitals) while this pediatric chapter (Table J-7) the "Teaching" result for "Inpatient budgeted hours/ acute patient day" is 1.03 (an average of 42 hospitals).

Demographics

The 2011/12 survey response rate for the pediatric hospitals was 70% (7/10), compared to an 80% (176/219) response rate for all hospitals surveyed. Pediatric hospitals are smaller on average than adult hospitals, have a higher proportion of acute care beds, have a shorter length of stay, and all of the pediatric hospitals included in this chapter are teaching hospitals. The results presented in this chapter are based on a maximum of seven pediatric hospitals. Comparisons to the adult data, which are based on 169 respondents, must be interpreted cautiously. Each respondent in the pediatric group has a much greater impact, on a percentage basis, than an adult respondent does. As a result of these considerations the HPC Report has a policy that data based on less than 10 respondents are reported as absolute numbers, rather than as percentages. In this chapter much of the data are therefore reported as absolute numbers.

Table J-1 summarizes the hospital demographic data provided by all seven pediatric hospitals which responded to the 2011/12 HPC survey.

Table J-1. Hospital Demographic Data Including Pediatric Hospitals 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(176)	(169)	(7)	(45)	(131)
Beds - acute care	**50,549**	**48,883**	**1,666**	**23,967**	**26,582**
Beds - non-acute care	**19,630**	**19,567**	**63**	**2,625**	**17,005**
(n=)	(169)	(162)	(7)	(45)	(124)
Average length of inpatient stay - acute care (days)	**7.2**	**7.3**	**5.8**	**7.3**	**7.2**

Base: All respondents

Clinical Pharmacy Services

Respondents to the 2011/2012 survey were asked if their facility had, or did not have, a formal patient care program for each of a number of different clinical programs (e.g. general medicine, cardiology, dialysis, etc.).

Table J-2 summarizes the 2011/12 data on the formal programs that exist in pediatric hospitals.

Table J-2. Number of Formal Programs 2011/12

		---	Hospital Type		Teaching Status	
		All	Adult	Pediatric	Teaching	Non-Teaching
Number of formal patient care programs (max=19)	(n=)	(175) **11.5**	(168) **11.5**	(7) **13.0**	(45) **14.2**	(130) **10.6**
Number of pharmacy supported OUTpatient care programs (max= 17)	(n=)	(1750 **2.7**	(168) **2.7**	(7) **4.3**	(45) **4.4**	(130) **2.1**
Number of pharmacy supported INpatient care programs (max= 18)	(n=)	(175) **6.5**	(168) **6.4**	(7) **9.0**	(45) **9.4**	(130) **5.4**

Base: All respondents

Respondents were then asked to indicate if they had a pharmacist(s) assigned to each inpatient and/or outpatient clinical program. Formal assignment of a pharmacist to a patient care program is felt to be a good indicator that a reasonable level of clinical pharmacy support is being provided to a patient care program. Readers are referred to Chapter B for more details.

In the 2011/12 survey, respondents from pediatric hospitals reported that they had one or more pharmacists assigned to an average of 4.3 outpatient clinical programs, (out of a maximum of 17 outpatient programs) and an

average of 9.0 inpatient clinical programs (out of a maximum of 18 inpatient clinical programs). In comparison, respondents from adult hospitals reported that they had one or more pharmacists assigned to an average of 2.7 outpatient clinical programs, (out of a maximum of 17 outpatient programs) and an average of 6.4 inpatient clinical programs (out of a maximum of 18 inpatient clinical programs). The results in Table J-3 and J-4 suggest that in pediatric hospitals, pharmacists play a role in a larger number of inpatient and outpatient clinical programs than they do in adult hospitals.

Table J-3. Outpatient Clinical Pharmacy Services 2011/12

		---	Hospital Type		Teaching Status	
		All	Adult	Pediatric	Teaching	Non-Teaching
a) Pain and/or palliative care	program exists	115	109	6	36	79
	pharmacist assigned	12	10	2	5	7
		10%	**9%**		**14%**	**9%**
b) Cardiovascular and/or lipid	program exists	86	82	4	36	50
	pharmacist assigned	28	27	1	13	15
		33%	**33%**		**36%**	**30%**
c) Mental Health	program exists	136	129	7	40	96
	pharmacist assigned	16	14	2	5	11
		12%	**11%**		**13%**	**11%**
d) Transplantation	program exists	31	25	6	29	2
	pharmacist assigned	16	14	2	16	0
		52%	**56%**		**55%**	**0%**
e) Hematology - oncology	program exists	119	112	7	36	83
	pharmacist assigned	98	91	7	29	69
		82%	**81%**		**81%**	**83%**
f) Hematology - anticoagulation	program exists	76	71	5	29	47
	pharmacist assigned	43	40	3	16	27
		57%	**56%**		**55%**	**57%**
g) Diabetes	program exists	94	89	5	27	67
	pharmacist assigned	31	30	1	12	19
		33%	**34%**		**44%**	**28%**
h) Infectious Disease and/or AIDS	program exists	72	66	6	34	38
	pharmacist assigned	29	26	3	22	7
		40%	**39%**		**65%**	**18%**
i) Asthma and/or Allergy	program exists	55	49	6	26	29
	pharmacist assigned	8	6	2	6	2
		15%	**12%**		**23%**	**7%**
j) Neurology	program exists	51	48	3	26	25
	pharmacist assigned	3	2	1	2	1
		6%	**4%**		**8%**	**4%**
k) Geriatrics	program exists	104	104	0	27	77
	pharmacist assigned	19	19	0	7	12
		18%	**18%**		**26%**	**16%**
l) Renal Dialysis	program exists	94	89	5	32	62
	pharmacist assigned	60	58	2	23	37
		64%	**65%**		**72%**	**60%**
m) General Medicine	program exists	148	141	7	42	106
	pharmacist assigned	12	11	1	5	7
		8%	**8%**		**12%**	**7%**
n) General Surgery	program exists	148	144	4	39	109
	pharmacist assigned	12	12	0	3	9
		8%	**8%**		**8%**	**8%**
o) Gynecology and/or Obstetrics	program exists	128	124	4	31	97
	pharmacist assigned	5	3	2	3	2
		4%	**2%**		**10%**	**2%**
p) Rehabilitation	program exists	89	87	2	21	68
	pharmacist assigned	3	3	0	2	1
		3%	**3%**		**10%**	**1%**
s) Emergency	program exists	152	146	6	43	109
	pharmacist assigned	84	83	1	31	53
		55%	**57%**		**72%**	**49%**

Base: Facilities with formal programs

Table J-4. Inpatient Clinical Pharmacy Services 2011/12

		---	Hospital Type		Teaching Status	
		All	Adult	Pediatric	Teaching	Non-Teaching
a) Pain and/or palliative care	program exists	123	117	6	38	85
	pharmacist assigned	67	64	3	20	47
		54%	**55%**		**53%**	**55%**
b) Cardiovascular and/or lipid	program exists	90	86	4	37	53
	pharmacist assigned	68	64	4	34	34
		76%	**74%**		**92%**	**64%**
c) Mental Health	program exists	141	134	7	42	99
	pharmacist assigned	84	81	3	30	54
		60%	**60%**		**71%**	**55%**
d) Transplantation	program exists	32	26	6	30	2
	pharmacist assigned	26	22	4	25	1
		81%	**85%**		**83%**	**50%**
e) Hematology - oncology	program exists	123	116	7	38	85
	pharmacist assigned	80	73	7	33	47
		65%	**63%**		**87%**	**55%**
f) Hematology - anticoagulation	program exists	78	73	5	29	49
	pharmacist assigned	33	30	3	11	22
		42%	**41%**		**38%**	**45%**
g) Diabetes	program exists	93	88	5	26	67
	pharmacist assigned	13	10	3	6	7
		14%	**11%**		**23%**	**10%**
h) Infectious Disease and/or AIDS	program exists	74	68	6	35	39
	pharmacist assigned	50	47	3	26	24
		68%	**69%**		**74%**	**62%**
i) Asthma and/or Allergy	program exists	55	49	6	26	29
	pharmacist assigned	15	10	5	10	5
		27%	**20%**		**38%**	**17%**
j) Neurology	program exists	53	49	4	27	26
	pharmacist assigned	32	30	2	17	15
		60%	**61%**		**63%**	**58%**
k) Geriatrics	program exists	110	110	0	29	81
	pharmacist assigned	87	87	0	25	62
		79%	**79%**		**86%**	**77%**
l) Renal Dialysis	program exists	96	91	5	32	64
	pharmacist assigned	51	47	4	22	29
		53%	**52%**		**69%**	**45%**
m) General Medicine	program exists	160	153	7	45	115
	pharmacist assigned	124	117	7	41	83
		78%	**76%**		**91%**	**72%**
n) General Surgery	program exists	157	153	4	41	116
	pharmacist assigned	105	101	4	32	73
		67%	**66%**		**78%**	**63%**
o) Gynecology and/or Obstetrics	program exists	135	131	4	32	103
	pharmacist assigned	55	51	4	17	38
		41%	**39%**		**53%**	**37%**
p) Rehabilitation	program exists	93	91	2	22	71
	pharmacist assigned	58	57	1	13	45
		62%	**63%**		**59%**	**63%**
q) Adult Critical Care	program exists	148	148	0	35	113
	pharmacist assigned	118	118	0	35	83
		80%	**80%**		**100%**	**73%**
r) Pediatric and/or Neonatal Critical Care	program exists	89	83	6	30	59
	pharmacist assigned	65	59	6	27	38
		73%	**71%**		**90%**	**64%**

Base: Facilities with formal programs

Many factors contribute to the decision to decentralize pharmacists to outpatient and inpatient care programs. In the case of pediatrics, the prevalence of some diseases (e.g. asthma/allergy) is an important justification for pharmacy services, while in other cases (e.g. pediatric/neonatal critical care and haematology-oncology) the critical nature of the patient's illness, along with the type and intensity of drug therapy used, are

important factors in the decision to allocate pharmacy resources to those program areas. The complexity of drug therapy in the pediatric population may be responsible for the increased role that pharmacists are reported to be playing in pediatric clinical programs, compared to pharmacist involvement in clinical programs in the adult hospital setting.

Drug Distribution Systems

Types of Drug Distribution Systems

Unit dose medication systems are recognized as the preferred system of drug distribution in most hospital settings. It can be argued that a unit dose system, providing controlled access to medication on a 24 hour basis, is particularly important for the pediatric population, given that medication errors in a pediatric setting are more likely to be associated with serious consequences.

Table J-5 summarizes the data on drug distribution systems used in pediatric hospitals.

Table J-5. Drug Distribution Systems 2011/12 (Percentage of Facilities using Drug Distribution Systems)

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n all facilities / facilities with acute beds)	(175)	(168)	(7)	(45)	(130)
(n facilities with non-acute beds)	(128)	(126)	(2)	(21)	(107)
(1) Unit dose system - centralized	126	123	3	35	91
	72%	**73%**		**78%**	**70%**
used for acute beds	120	117	3	35	85
	69%	**70%**		**78%**	**65%**
used for non-acute beds	81	79	2	18	63
	63%	**63%**		**86%**	**59%**
(2) Unit dose system - decentralized from pharmacy satellites	17	15	2	10	7
	10%	**9%**		**22%**	**5%**
used for acute beds	16	14	2	10	6
	9%	**8%**		**22%**	**5%**
used for non-acute beds	2	2	0	0	2
	2%	**2%**		**0%**	**2%**
(3) Unit dose system - decentralized from automated dispensing cabinets	78	75	3	23	55
	45%	**45%**		**51%**	**42%**
used for acute beds	77	74	3	23	54
	44%	**44%**		**51%**	**42%**
used for non-acute beds	23	23	0	2	21
	18%	**18%**		**10%**	**20%**
(4) Traditional drug distribution system	53	51	2	5	48
	30%	**30%**		**11%**	**37%**
used for acute beds	51	49	2	5	46
	29%	**29%**		**11%**	**35%**
used for non-acute beds	21	21	0	0	21
	16%	**17%**		**0%**	**20%**
(5) Total wardstock system	30	30	0	6	24
	17%	**18%**		**13%**	**18%**
used for acute beds	29	29	0	6	23
	17%	**17%**		**13%**	**18%**
used for non-acute beds	14	14	0	2	12
	11%	**11%**		**10%**	**11%**
(6) Controlled / carded dose system	29	29	0	2	27
	17%	**17%**		**4%**	**21%**
used for acute beds	10	10	0	0	10
	6%	**6%**		**0%**	**8%**
used for non-acute beds	26	26	0	2	24
	20%	**21%**		**10%**	**22%**

Base: Respondents with complete answers

In Table J-5, the percentages of hospitals which use each type of drug distribution system, for some or all of their drug distribution needs, are presented. Since few hospitals use a single type of drug distribution for all areas of their hospital, more than one type of drug distribution system could be checked off by a respondent.

Three pediatric hospitals reported that they used a centralized unit dose drug distribution system for some or all of their acute care beds, three respondents reported that they used automated dispensing cabinets for some or all of their acute care beds and two respondents reported that they used a satellite-based, decentralized unit dose system for some or all of their acute care beds. Two respondents reported that they used a traditional drug distribution system for some or all of their acute care beds, and. No pediatric hospitals reported that they used either a total wardstock system or a controlled/carded unit dose system for any of their acute care beds.

Percentage of Acute Care Beds Serviced by Each Type of Drug Distribution System

Respondents also provided data on the percentage of acute care beds that were serviced by each type of drug distribution system. (Figure J-1)

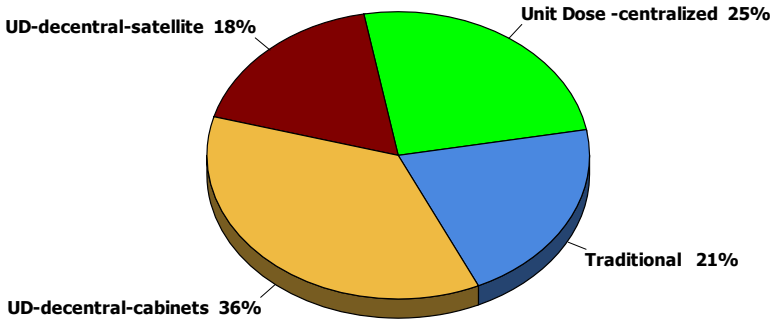
- A mean of 25% of all acute care beds in seven pediatric facilities, compared to a mean of 58% of all acute care beds in 168 adult hospitals (see Chapter C), and a mean of 72% of all acute care beds in 38 adult teaching hospitals were serviced by a *centralized unit dose system.*

Overall in 2011/12, approximately 80% of acute care beds in both adult and pediatric hospitals were serviced by a centralized or decentralized unit dose system.

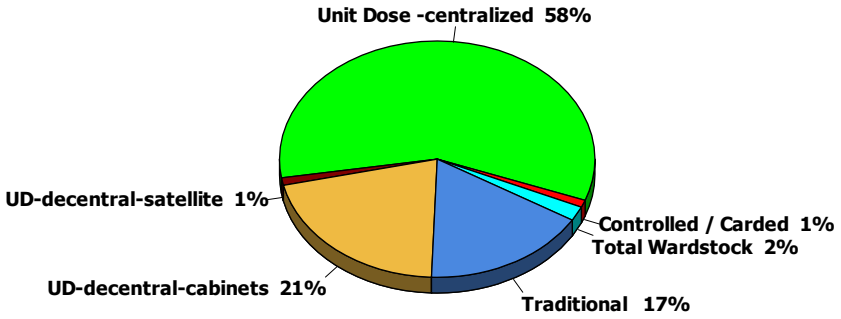
- A mean of 18% of all acute care beds in seven pediatric facilities, compared to a mean of 1% of all acute care beds in 168 adult hospitals, and a mean of 3% of all acute care beds in 38 adult teaching hospitals, were serviced by a *decentralized, satellite pharmacy-based unit dose system.*
- A mean of 36% of all acute care beds in seven pediatric facilities, compared to a mean of 21% of all acute care beds in 168 adult hospitals, and a mean of 20% of all acute care beds in 38 adult teaching hospitals, were serviced by a *decentralized, automated dispensing cabinet unit dose system.*
- A mean of 21% of all acute care beds in seven pediatric facilities, compared to a mean of 17% of all acute care beds in 168 adult hospitals, and a mean of 4% of all acute care beds in 38 adult teaching hospitals, were serviced by a *traditional, multi-dose drug distribution system.*
- A mean of 2% of all acute care beds in 168 adult facilities, and a mean of 1% of all acute care beds in 38 teaching hospitals were serviced by a wardstock system and 1% of acute care beds were serviced by a controlled/carded drug distribution system. None of the seven pediatric hospitals reported using *wardstock or controlled/carded systems* to service acute care beds.

Figure J-1. Percentage of Acute Care Beds Serviced by each type of Drug Distribution System 2011/12

Acute Beds in Seven Pediatric Hospitals (all of which are teaching hospitals)



Acute Beds in 38 Teaching Hospitals



Base: Facilities providing complete distribution data (7 for pediatric hospitals, 38 for adult teaching hospitals)

- None of the seven pediatric facilities reported that they were using robotic type automation to pick and fill patient specific unit dose bins.

In figure J-1, the percentage of acute beds served by different types of drug distribution systems is presented for the seven pediatric hospitals (all of which are teaching hospitals) and for the 38 adult teaching hospitals. This comparison between pediatric and adult teaching hospitals reveals notable differences in the percentages of acute care beds that are serviced by each type drug distribution system.

Other Drug Distribution System Attributes

Other attributes of the drug distribution systems used in pediatric hospitals were also captured.

- Four of five pediatric facilities reported that 95% or more of their unit dose medications are provided in a ready to administer form that requires no further dose manipulation prior to administration to the patient, compared to 46% of adult hospitals which reported that 95% or more of their unit dose medications are provided in a ready to administer form.
- Respondents from pediatric hospitals estimated that 84% of all doses administered through their unit dose and/or controlled/carded system(s) were in a true unit dose format that required no further dosage manipulation prior to administration to the patient, while respondents from adult hospitals estimated that 88% of all doses administered through their unit dose and/or controlled/carded system(s) were in a true unit dose format.

The results in the two points above appear to be somewhat contradictory, but the 21% of acute care beds in the pediatric hospitals that are serviced by a traditional drug distribution system appear to be concentrated in one facility, which could explain these results.

- Six of seven pediatric hospitals reported that they were using automated dispensing cabinets as part of their drug distribution system for either acute care beds or for other areas of their hospital (e.g. emergency department, operating rooms, recovery roms, etc.)
- The pediatric hospitals using automated dispensing cabinets reported that an average of 44% of all medications was contained in mini-drawers or similar drawer configurations that limit access to a single drug and/or control the number of dosage units that can be accessed. On average, the remaining 56% of medications were stored in matrix or carousel drawers that provide less control on access to medications.

Six of seven pediatric hospitals reported that they use automated dispensing cabinets

- Similar to results reported for adult hospitals, ADCs used in certain types of short stay patient care areas such as operating rooms, recovery and rooms, and emergency departments are often not “profiled”, meaning that access to medications is not linked to and controlled by the patient’s medication profile.

In contrast, ADCs used in patient care areas where the patient is likely to remain for a more prolonged period of time are usually linked to, and controlled by, the patient's medication profile. (Table J-6)

Table J-6. Automated Dispensing Cabinets Use and Access 2011/12

	A	B
Location where Automated Cabinets are in Use	**Use of Automated Dispensing Cabinets at that location**	**Patient Specific Profiles Used to Control Access**
	(n= 6)	*(n= A)*
Operating rooms	2	0
Recovery rooms	2	0
Labor and Delivery units	2	1
Ante / Post-Partum units	2	2
Mental health units	1	1
Emergency departments	4	1
General pediatric medical / surgical units	4	4
Pediatric critical care units	4	3

Base for use of cabinets (A):
Facilities with automated dispensing cabinets (at any location)
"Base for use of patient profiles to control access (B):
Facilities using automated dispensing cabinets at that location"

Medication Order Entry and Verification

With respect to medication order entry and verification:

- Six of the seven respondents reported that either a pharmacist or a technician could enter orders into the pharmacy information system (PIS). One hospital reported that only a pharmacist could enter a medication order. All of the respondents who reported that technicians could enter orders required that a pharmacist verify that technician's order entry.
- For orders that were entered by a pharmacist, four of six respondents reported that no verification of those orders was required. The remaining two hospitals reported that either a technician or a pharmacist could verify the pharmacist's order entry.

Inventory Turnover and Drug Costs

With respect to inventory turnover and drug costs:

- The mean inventory turnover rate for the seven pediatric hospitals was 9.5, compared to 9.8 for all adult hospitals and 11.3 for all teaching hospitals.

The slightly lower inventory turnover rate for pediatric hospitals may reflect a willingness to hold larger inventories in order to reduce the possibility of drug shortages, given that there may be a smaller number of alternate suppliers of pediatric medications, along with a smaller number of therapeutic alternatives that could be used in the pediatric population.

Compared to both adult hospitals and teaching hospitals, drug costs per acute patient day were substantially higher for pediatric hospitals.

- Mean drug costs were reported to be $69.47 per acute patient day for the five pediatric hospitals that provided the data needed to perform this calculation. This cost is considerably higher than the mean drug cost of $35.73 per adult acute patient day that was reported by the 139 adult hospitals which provided the necessary data to perform this calculation. It is also considerably higher than the mean drug cost of $46.50 that was reported by 38 teaching hospitals, suggesting that the higher drug costs in pediatric hospitals are only partly explained by the fact that all of the pediatric hospitals are also teaching hospitals. Other factors that may explain the higher pediatric drug costs include the shorter length of stay in pediatric hospitals and/or the use of new and expensive drugs for a variety of genetic conditions and other rare childhood diseases.

- Mean drug costs per non-acute patient day were reported to be $1.98 for the two pediatric hospitals which provided the data needed to perform this calculation. This cost is considerably lower than the mean drug cost of $8.73 per non-acute patient day that was reported by the 88 adult hospitals that

Hours of Service

Ideally, pharmacy services would be provided in a consistent manner, 24 hours a day, seven days a week. However, few hospitals have the resources to do so, and it may be possible to safely meet the demand for pharmacy services during certain time periods (e.g. nights, weekends) through an on-call system or through the use of automation solutions.

- The mean hours per week that the pharmacy was open and staffed by a pharmacist was reported to be longer in pediatric hospitals (mean of 109 hours per week) than in adult hospitals (mean of 78 hours per week). One pediatric hospital reported that their pharmacy was open 24 hours a day.

The longer hours of service in pediatric hospitals may reflect the unique challenges associated with pediatric drug therapy and/or the fact that these pediatric facilities are all teaching hospitals, with responsibility for a more complex patient population. Pediatric pharmacy departments are, on average, open longer hours than those in adult hospitals.

Access to Complete Medication Profiles

Access to a complete medication profile at the time of writing an order, or reviewing a patient's drug therapy, is considered to be an important medication safety feature. This goal has not yet been fully reached in all of the pediatric hospitals.

- Two of seven pediatric hospitals reported that prescribers have access to a complete medication profile for all patients when writing an order.
- Four of seven pediatric hospitals reported that pharmacists had access to a complete medication profile for all patients when reviewing medication orders.
- The goal of always having access to a complete medication profile when writing or reviewing orders has not yet been achieved in pediatric hospitals.

Medication Administration Records

With respect to medication administration records (MARs):

- Five of seven respondents reported that MARs are generated in hard copy through the PIS and documentation of administered doses is manual.
- One respondent reported that MARs are electronic and share a common database with the pharmacy information system.
- Two of the seven respondents reported that MARs are manually prepared and documentation of administered doses is manual.
- All seven respondents reported that there is a policy in their hospital that two patient identifiers are checked before administering medications.

Human Resources

The fact that the human resource requirements for managing pediatric patients are considerably higher than those that are required for managing adult patients is rarely disputed. However, the magnitude of the difference has not been well documented. The data that was collected from the seven pediatric hospitals provides us with a better understanding of the differences in the staffing that is utilized by pediatric hospitals, compared to adult hospitals.

Staffing Ratios

Four different staffing ratios were calculated for the seven pediatric hospitals and those results were compared to the same ratios that were calculated for all adult hospitals and for all teaching hospitals.

Table J-7 summarizes the results of the staffing ratio calculations which were performed for adult and pediatric hospitals.

- For the first staffing ratio, the mean calculated ratio of 1.72 *total budgeted hours per acute patient day,* for the seven pediatric hospitals, is almost double the mean value of 0.87 total budgeted hours per acute patient day that was calculated for the 148 adult hospitals which provided the information needed to calculate this staffing ratio. It is also substantially higher than the mean result of 1.11 total budgeted hours per acute patient day that was calculated for the 42 teaching hospitals.
- For the second staffing ratio, the calculated ratio of 1.66 *total budgeted hours per total patient day* (acute plus non-acute patient days), for the seven pediatric hospitals, is two and a half times higher than the mean value of 0.64 total budgeted hours per total patient day that was calculated for the 143 adult hospitals which provided the information needed to calculate this staffing ratio. It is also substantially higher than the mean result of 1.05 total budgeted hours per total patient day that was calculated for the 40 teaching hospitals.
- For the third staffing ratio, the calculated ratio of 1.65 *inpatient budgeted hours per acute patient day*, for the seven pediatric hospitals, is twice the mean value of 0.80 inpatient budgeted hours per acute patient day that was calculated for the 143 adult hospitals. It is also substantially higher than the mean result of 1.03 inpatient budgeted hours per acute patient day that was calculated for the 40 teaching hospitals.
- For the fourth staffing ratio, the calculated ratio of 1.60 *inpatient budgeted hours per total patient day* (acute plus non-acute patient days), for the seven pediatric hospitals, is almost three times higher than the mean value of 0.58 inpatient budgeted hours per total patient day that was calculated for the 143 adult hospitals. It is also substantially higher than the mean result of 0.97 inpatient budgeted hours per total patient day that was calculated for the 40 teaching hospitals.

Table J-7. Staffing Ratios – Budgeted Hours / Patient Day 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
ALL HOSPITALS					
(n=)	(155)	(148)	(7)	(42)	(113)
Total budgeted hours/ acute patient day	**0.91**	**0.87**	**1.72**	**1.11**	**0.83**
(n=)	(155)	(148)	(7)	(42)	(113)
Inpatient budgeted hours/ acute patient day	**0.84**	**0.80**	**1.65**	**1.03**	**0.77**
(n=)	(150)	(143)	(7)	(40)	(110)
Total budgeted hours/ total patient day	**0.68**	**0.64**	**1.66**	**1.05**	**0.55**
(n=)	(150)	(143)	(7)	(40)	(110)
Inpatient budgeted hours/ total patient day	**0.63**	**0.58**	**1.60**	**0.97**	**0.51**

Base: All Respondents providing relevant information

The above information on staffing ratios provides a clearer picture of the difference in staffing that is utilized by pediatric hospitals when compared to adult hospitals. The staffing differences between pediatric and adult hospitals are substantial. Given that these pediatric hospitals are all teaching hospitals, it has been suggested that their status as teaching hospitals may be responsible for their increased human resource requirements. However, when the seven pediatric hospitals are compared to the overall adult teaching hospitals, there is still a markedly higher staffing ratio for pediatric hospitals. Unlike many adult hospitals, the pediatric hospitals have few non-

acute patient days. As a result there is little difference between the first and second staffing ratios, since there is little difference between acute patient days and total patient days in the denominator for pediatric hospitals. The same is true with respect to the third and fourth staffing ratios which are very similar for pediatric hospitals.

Table J-7 summarizes the data related to pediatric staffing ratios.

Staff Composition

Table J-8 shows the mean number of each category of pharmacy staff (e.g. pharmacists, advanced pharmacists, etc.) in adult and pediatric hospitals.

- When expressed as a percentage of total staffing, there was a slightly higher percentage of advanced practice pharmacists in pediatric hospitals, 11.6% of total pharmacy staffing, compared to adult hospitals, where they represented 7.9% of total pharmacy staffing. However, when the seven pediatric hospitals were compared to the 43 teaching hospitals, the staffing compositions were very similar, suggesting that it was their teaching status, as opposed to their pediatric status, that was responsible for the difference in staff composition.
- When expressed as a percentage of total staffing, pharmacy technicians and assistants represented a slightly lower percentage of total pharmacy staffing (47.1%), compared to adult hospitals where they represented 51.5% of total pharmacy staffing. However, this differences in staff composition largely disappeared when the pediatric hospitals were compared to the 43 teaching hospitals.

Table J-8 summarizes the data related to pediatric staff composition.

Table J-8. Average Budgeted Pharmacy Staffing (FTE's) 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(67)	(60)		(3)	(24)
Number of FTEs:					
Staff Pharmacists	14.9	14.8	19.0	30.8	9.4
Advanced Practice Pharmacists	3.6	3.5	6.9	7.9	2.1
Pharmacist Managers	1.6	1.6	1.6	2.9	1.1
Pharmacy Manager (neither a pharmacist or a technician)	0.1	0.1	0.1	0.3	0.1
Pharmacy Technician Managers	0.5	0.5	0.3	1.1	0.3
Pharmacy Technicians and Pharmacy Assistants (both)	23.6	23.4	28.1	48.4	14.9
Support Personnel (clerical / porter / aide)	1.5	1.4	3.5	3.3	0.8
Residents	0.6	0.6	1.0	2.1	0.1
Total(excluding residents)	45.8	45.2	59.6	94.8	28.8
Percentage of Total FTEs (excluding residents):					
Staff Pharmacists	33%	33%	32%	33%	33%
Advanced Practice Pharmacists	8%	8%	11%	8%	7%
Pharmacist Managers	3%	3%	3%	3%	4%
Pharmacy Manager (neither a pharmacist or a technician)	0%	0%	0%	0%	0%
Pharmacy Technician Managers	1%	1%	1%	1%	1%
Pharmacy Technicians and Pharmacy Assistants (both)	52%	52%	47%	51%	52%
Support Personnel (clerical / porter / aide)	3%	3%	6%	4%	3%

Base: All Respondents providing staffing information

Staff Time Breakdown by Service Activity

With respect to the time that pharmacists spent performing different activities:

- Pharmacists in the seven pediatric facilities were reported to spend more of their time performing clinical activities (53% of pharmacists' time) than the pharmacists in adult hospitals (47% of pharmacists' time). The pharmacists in adult hospitals were reported to spend more of their time performing drug distribution activities (41% of pharmacists' time) than the pharmacists in the seven pediatric hospitals (30% of pharmacists' time). However, when the seven pediatric hospitals were compared to the 44 teaching hospitals which provided the necessary information, there were no discernible differences in

the percentage of time that pharmacists spent performing the different activities. This suggests that teaching status, rather than pediatric status, was responsible for the differences in time spent performing different activities.

Table 9 summarizes the data related to the proportion of pharmacist time spent performing different activities.

Table J-9. Proportion of Pharmacist Time Spent Performing Different Activities 2011/12

	____	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(170)	(163)	(7)	(44)	(126)
Drug distribution	**40%**	**41%**	**30%**	**30%**	**44%**
Clinical activities	**47%**	**47%**	**53%**	**54%**	**45%**
Teaching	**6%**	**6%**	**8%**	**8%**	**5%**
Pharmacy research	**1%**	**1%**	**3%**	**3%**	**0%**
Other non-patient care activities	**5%**	**5%**	**7%**	**5%**	**5%**

Base: All respondents

Informational and Automation Technologies

The most recent paper on the use of information technologies in pediatrics is now four years old.[2] Given the rapid pace of change in information technologies, it is difficult to know if the information in that paper provides an accurate picture of the technologies that are now being used in pediatric hospitals in the United States. Little published data is available on the use of technology in Canadian pediatric hospitals. The 2011/12 HPC Survey collected data on some aspects of technology utilization, and in this chapter the data provided by the seven pediatric hospitals is presented.

Access to Laboratory results

With respect to pharmacist access to laboratory results:

- Approximately half of the adult hospitals and half of the pediatric hospitals (4/7 pediatric hospitals) have an interface between the lab system and the pharmacy information system.
- Approximately half of the adult hospitals and half of the pediatric hospitals (3/7 pediatric hospitals) have view-only access available from pharmacy terminals with a separate interface or separate log-in.

Table J-10. Access to Lab Results 2011/12

	____	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(1760	(169)	(70	(45)	(131)
How are pharmacists provided with access to laboratory test results?					
Lab system is fully interfaced with medication order entry system	86 **49%**	82 **49%**	4	17 **38%**	69 **53%**
View-only access available from pharmacy terminals (interface or separate log-in)	84 **48%**	81 **48%**	3	28 **62%**	56 **43%**
Through paper-based medical record only	6 **3%**	6 **4%**	0	0 **0%**	6 **5%**

Base: All respondents

- Only a few respondents in the adult group of hospitals (six adult hospitals) report that they are still limited to accessing lab data through a paper-based medical record on the patient care units. No pediatric hospital reported that they were still limited to accessing lab data through a paper-based medical record on the patient care units.

The data suggest that the methods and challenges associated with pharmacist access to laboratory results are very similar in adult and pediatric hospitals.

TALLman Lettering

With respect to the use of TALLman lettering:

- The respondents from all seven pediatric hospitals reported that they use TALLman lettering in their Pharmacy Information System (PIS) and on Pharmacy-generated labels
- Six respondents indicated that they use TALLman lettering on unit dose packaging and on pharmacy-generated medication administration records (MARs).
- Smaller numbers of pediatric respondents reported that they used TALLman lettering in the Pharmacy on shelf labels (five respondents), on shelf labels in the medication rooms on patient care units (four respondents) and on medication cart labels (three respondents).

Table J-11 summarizes the data on the use of TALLman lettering in pediatric hospitals.

Table J-11. TALLman Lettering 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(176)	(169)	(7)	(45)	(131)
Facility uses TALLman lettering to reduce errors caused by confusion between drug products with look-alike drug names	144	137	7	41	103
	82%	**81%**		**91%**	**79%**
Base: All respondents					
(n=)	(143)	(136)	(7)	(41)	(102)
Where TALLman lettering is used					
In the Pharmacy Information System (PIS)	116	109	7	32	84
	81%	**80%**		**78%**	**82%**
On Pharmacy-generated labels	128	121	7	38	90
	90%	**89%**		**93%**	**88%**
On Pharmacy unit dose packaging	114	108	6	30	84
	80%	**79%**		**73%**	**82%**
On Pharmacy-generated Medication Administration	99	93	6	25	74
	69%	**68%**		**61%**	**73%**
In Pharmacy, on shelf labels	82	77	5	29	53
	57%	**57%**		**71%**	**52%**
In the medication rooms on patient care units (e.g., shelf labels)	56	52	4	19	37
	39%	**38%**		**46%**	**36%**
On medication carts	43	40	3	13	30
	30%	**29%**		**32%**	**29%**

Base: Facilities using TALLman lettering. Note: multiple mentions

Computerized Prescriber Order Entry Systems

With respect to computerized order entry systems:

- Two of seven respondents reported that they have an operational CPOE and an additional three respondents have an approved plan to implement one. Compared to adult hospitals, there appears to be a higher proportion of the pediatric facilities which either already have a CPOE system, or have an approved plan to do so.

The number of pediatric respondents is small so the results must be interpreted cautiously. However, given the complexity and challenges associated with pediatric drug therapy, it would be reasonable to speculate that CPOE implementation is given a higher priority in pediatric hospitals than in adult hospitals. What is surprising is the fact that the two pediatric respondents who reported having an operational CPOE system reported that there was no interface between the CPOE system and the Pharmacy information systems at their hospital.

- Existing CPOE systems in pediatric hospitals, like those in adult hospitals, often lack an interface to the pharmacy information system.

Table J-12 summarizes the data on the use of CPOE systems in pediatric hospitals.

Table J-12. Computerized prescriber Order Entry 2011/12

	All	Hospital Type		Teaching Status	
		Adult	Pediatric	Teaching	Non-Teaching
(n=)	(176)	(169)	(7)	(45)	(131)
Do you have an operational computerized prescriber order entry system (CPOE)?					
No, and no CPOE plan approved	103	101	2	19	84
	59%	**60%**		**42%**	**64%**
No, but approved plan to implement CPOE	58	55	3	15	43
	33%	**33%**		**33%**	**33%**
Yes, CPOE operational	15	13	2	11	4
	9%	**8%**		**24%**	**3%**
(n=)	(15)	(13)	(2)	(11)	(4)
CPOE and PIS interface					
CPOE is interfaced to PIS (unidirectional)	1	1	0	1	0
	7%	**8%**		**9%**	**0%**
CPOE is interfaced to PIS (bidirectional)	9	9	0	5	4
	60%	**69%**		**45%**	**100%**
CPOE is NOT interfaced to PIS	5	3	2	5	0
	33%	**23%**		**45%**	**0%**

Base: All respondents

Smart Pumps

With respect to the use of smart pumps:

- A similar proportion of adult (75%, 126/169) and pediatric hospitals (six of seven respondents) reported that they use smart pumps.
- A larger proportion of pediatric respondents (four of six respondents) reported that they use a wireless network to upload and download data from the pumps, compared to adult respondents (24%, 30/125)
- A larger proportion of pediatric respondents review and update the pumps' drug-specific programming (i.e., the pump's library) at least annually (six of six respondents), compared to adult hospitals (58%; 72/125).

Pediatric hospitals appear to be using better management practices for smart pumps

The critical nature of pediatric infusions may be responsible for the better management of smart pumps that seems to be occurring in pediatric hospitals.

Table J-13 summarizes the profile of smart pump utilization in pediatric hospitals.

Table J-13. Smart Pumps 2011/12

	All	Hospital Type		Teaching Status	
		Adult	Pediatric	Teaching	Non-Teaching
(n=)	(176)	(169)	(7)	(45)	(131)
Hospital uses IV Smart pumps	132	126	6	32	100
	75%	**75%**		**71%**	**76%**
(n=)	(131)	(125)	(6)	(32)	(99)
Use of a wireless network to upload or download data to smart pumps	34	30	4	11	23
	26%	**24%**		**34%**	**23%**
Review and update the pumps' drug-specific programming (i.e., the pump's library) at least annually	78	72	6	21	57
	60%	**58%**		**66%**	**58%**

Base: All respondents

Barcoding

With respect to barcoding applications:

With just a few exceptions, the proportion of both adult and pediatric hospitals which use barcoding applications remains very low. However, there are several areas where there does appears to be an increased uptake of barcode technology.

Table J-14. Barcoding 2011/12

	All	Hospital Type		Teaching Status	
		Adult	Pediatric	Teaching	Non-Teaching
Barcoding is used to					
(n=)	(174)	(167)	(7)	(45)	(129)
Verify drug selection prior to dispensing from the pharmacy					
not used yet, but there is an approved and funded plan to do so	24	22	2	10	14
	14%	**13%**		**22%**	**11%**
used for this activity	38	37	1	9	29
	22%	**22%**		**20%**	**22%**
Verify drug selection prior to patient administration					
not used yet, but there is an approved and funded plan to do so	21	19	2	10	11
	12%	**11%**		**22%**	**9%**
used for this activity	6	5	1	2	4
	3%	**3%**		**4%**	**3%**
Identify the patient during medication administration					
not used yet, but there is an approved and funded plan to do so	16	14	2	8	8
	9%	8%	29%	18%	6%
used for this activity	8	7	1	2	6
	5%	**4%**		**4%**	**5%**
Identify the staff member during medication administration					
not used yet, but there is an approved and funded plan to do so	15	13	2	7	8
	9%	**8%**		**16%**	**6%**
used for this activity	3	3	0	1	2
	2%	**2%**		**2%**	**2%**
Inventory management					
not used yet, but there is an approved and funded plan to do so	29	27	2	12	17
	17%	16%	29%	27%	13%
used for this activity	48	47	1	11	37
	28%	**28%**		**25%**	**29%**
Verify filling of unit dose bins					
not used yet, but there is an approved and funded plan to do so	21	19	2	8	13
	12%	**12%**		**18%**	**10%**
used for this activity	19	19	0	4	15
	11%	**12%**		**9%**	**12%**
Verify stocking of automated dispensing cabinets					
not used yet, but there is an approved and funded plan to do so	27	26	1	8	19
	16%	**16%**		**18%**	**15%**
used for this activity	55	50	5	22	33
	32%	**30%**		**50%**	**26%**
Verify stocking of automated re-packaging machines					
not used yet, but there is an approved and funded plan to do so	12	11	1	6	6
	7%	**7%**		**13%**	**5%**
used for this activity	77	74	3	21	56
	45%	**45%**		**47%**	**44%**
Transfer patient and/or drug specific information to smart pump					
not used yet, but there is an approved and funded plan to do so	12	10	2	4	8
	7%	**6%**		**9%**	**6%**
used for this activity	6	5	1	4	2
	3%	**3%**		**9%**	**2%**

Base: All respondents

- Approximately half of the adult respondents (45%; 74/167) reported that barcoding was used to verify the stocking of automated re-packaging machines, compared to a similar proportion of pediatric respondents (three of seven) who reported using barcoding for that purpose.

- Thirty percent (50/167) of adult respondents and five of seven pediatric hospitals reported that they use barcoding to verify the stocking of automated dispensing cabinets.

Table J-14 summarizes the use of barcoding in pediatric hospitals

Clinical Decision Support Technology

With respect to the use of clinical decision support functionality:

- Eighty-eight percent (154/175) of adult respondents and six of seven pediatric respondents reported that they had a pharmacy information system with built-in clinical decision support functionality.
- Forty-eight percent (71/148) of adult respondents reported that they were fully utilizing the clinical decision support functionality, compared to two of six pediatric respondents who reported that they were fully utilizing that functionality.

Table J-15. Clinical Decision Support Functionality 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(175)	(168)	(7)	(45)	(130)
Facility uses a Pharmacy Information System (PIS) that has built-in clinical decision support functionality	154 **88%**	148 **88%**	6	39 **87%**	115 **88%**
Base: All respondents					
(n=)	(154)	(148)	(6)	(39)	(115)
Clinical decision support functionality is being fully utilized	73 **47%**	71 **48%**	2	22 **56%**	51 **44%**
Base: Respondents where facility uses PIS with clinical decision support funtionality					
(n=)	(90)	(85)	(5)	(23)	(67)
Reasons why the decision support functionality is not in use					
The clinical significance of many of the alerts is questionable	57 **63%**	54 **64%**	3	12 **52%**	45 **67%**
There is insufficient time to deal with all the alerts	39 **43%**	37 **44%**	2	10 **43%**	29 **43%**
The database that drives the alerts is out of date	17 **19%**	15 **18%**	2	5 **22%**	12 **18%**
Physicians rarely make changes to the order when contacted regarding the alert	4 **4%**	4 **5%**	0	0 **0%**	4 **6%**
Other	33 **37%**	32 **38%**	1	9 **39%**	24 **36%**
Base: Respondents where decision support functionality is not being fully utilized					
(n=)	(174)	(167)	(7)	(45)	(129)
Hospital has a policy dealing with the overriding of alerts	32 **18%**	28 **17%**	4	8 **18%**	24 **19%**
(n=)	(171)	(164)	(7)	(44)	(127)
Facility reviews override data from smart pumps	45 **26%**	40 **24%**	5	17 **39%**	28 **22%**
Base: All respondents					
(n=)	(45)	(40)	(5)	(17)	(28)
Facility has made changes following the review of the pumps' override data	36 **80%**	31 **78%**	5	17 **100%**	19 **68%**

Base: Respondents where facilities overrode data from smart pumps

- Four of seven pediatric respondents reported that they have a policy dealing with the overriding of alerts that are generated by the pharmacy information system, compared to 17% of adult hospitals which have such a policy.
- With respect to reviewing the override data that is stored in smart pumps, five of seven pediatric respondents reported that they have a process in place for reviewing overrides, compared to 24% of adult facilities which have such a process in place.

Compared to adult hospitals, pediatric hospitals appear to have better practices in place for managing the use of clinical decision support technologies.

Table J-15 summarizes the data on utilization of clinical decision support technologies.

Evaluation of Pharmacy Practise

The continuous evaluation of pharmacy practice can contribute to the reduction of medication errors and improve patient safety.[2,3,4,5] In Chapter I, the overall data on the evaluation of pharmacy practice is reviewed. In this chapter, a few areas are identified where there appear to be differences in evaluation practices between adult and pediatric hospitals.

In general, there appears to be a greater emphasis on the evaluation of pharmacy practice among the pediatric facilities than there is among the adult hospitals. However, in most cases the differences are not large and the small number of pediatric respondents makes it difficult to reach a conclusion that there are any meaningful differences between the evaluation practices between the two groups. However there are a few areas where there appears to be a possible difference between the pediatric and adult hospitals.

Evaluation of Pharmacist Practice

With respect to aspects of pharmacists' clinical practice which are evaluated:

- Three of four pediatric respondents reported that they evaluate medication counselling and evaluation of compliance, compared to 42% (33/79) of adult hospitals which do so.

- With respect to aspects of clinical practice that are evaluated, all pediatric respondents reported that they evaluate answers to drug information questions compared to 43% (34/79) of adult hospitals which do so. This difference was maintained even when the teaching status of pediatric hospitals was taken into consideration.

Table J-16 summarizes the data related to the evaluation of clinical pharmacist practice in pediatric hospitals.

Table J-16. Evaluation of Clinical Services 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(175)	(168)	(7)	(45)	(130)
A structured approach is used to define and prioritize pharmacist activities	83	79	4	29	54
	47%	**47%**		**64%**	**42%**
The provision of direct patient care services is evaluated by auditing a sample of clinical activities	54	51	3	22	32
	31%	**30%**		**49%**	**25%**
Base: All respondents					
(n=)	(83)	(79)	(4)	(28)	(55)
Aspects of clinical practice evaluated					
Clinical documentation	66	63	3	25	41
	80%	**80%**		**89%**	**75%**
Medication counseling and evaluation of compliance	36	33	3	13	23
	43%	**42%**		**46%**	**42%**
Answers to drug information questions	38	34	4	15	23
	46%	**43%**		**54%**	**42%**
Development of an individualized pharmaceutical care plan, including its monitoring	52	49	3	20	32
	63%	**62%**		**71%**	**58%**
Other	19	18	1	6	13
	23%	**23%**		**21%**	**24%**
Base: All respondents evaluating aspects of clinical practice; Note: multiple mentions permissible					
(n=)	(171)	(164)	(7)	(44)	(127)
Mechanisms have been established to measure patients' medication-related outcomes	40	36	4	18	22
	23%	**22%**		**41%**	**17%**
Base: All respondents					
(n=)	(40)	(36)	(4)	(18)	(22)
Patients' medication-related outcomes are used to evaluate the performance of individual pharmacists	6	6	0	4	2
	15%	**17%**		**22%**	**9%**
(n=)	(6)	(6)	(0)	(4)	(2)
There are plans to collect and use outcomes information for evaluation of pharmacists in the future?	6	6	0	4	2
	100%	**100%**		**100%**	**100%**
Base: Respondents with mechanisms to measure patients' medication-related outcomes					

Evaluation of Medication Safety

With respect to the evaluation of medication safety:

- Five of the seven pediatric respondents indicated that they had performed a medication safety assessment, using a recognized assessment tool (e.g. the ISMP Medication Safety Self-Evaluation tool).

Since this is an accreditation requirement, it is surprising that some pediatric facilities had not conducted such an assessment.

- Two of the five pediatric respondents, who reported that they had conducted a medication safety self-assessment, reported that they had conducted the assessment more than 2 years ago.

This result is also somewhat surprising, given that it is recommended that an assessment be conducted every two years or less.

Table J-17 summarizes the data on the evaluation of medication safety practices in pediatric hospitals.

Table J-17. Evaluation of Medication Safety Practices 2011/12

	---	Hospital Type		Teaching Status	
	All	Adult	Pediatric	Teaching	Non-Teaching
(n=)	(174)	(167)	(7)	(45)	(129)
Hospital completed a Medication Safety Self-Assessment, using a	109	104	5	29	80
	63%	**62%**		**64%**	**62%**
(n=)	(109)	(104)	(5)	(29)	(80)
Assessment was last performed					
more than 2 years ago	53	51	2	11	42
	49%	**49%**		**38%**	**53%**
between 1 and 2 years ago	29	28	1	9	20
	27%	**27%**		**31%**	**25%**
in the last fiscal year	27	25	2	9	18
	25%	**24%**		**31%**	**23%**

Base: All respondents

Evaluation of Sterile Product Preparation

With respect to the evaluation of sterile product preparation:

- Five of six pediatric respondents reported that they conduct surface sampling in sterile product preparation areas of their parenteral admixture services, compared to 23% (39/167) of adult hospitals which have such a process in place.
- With respect to routinely verifying product sterility by laboratory testing of a sample of the products prepared in their sterile products preparation, five of seven pediatric respondents reported that they have a process in place for doing so, compared to 29% (49/167) of adult facilities which have such a process in place.

Table J-18 summarizes the data on the evaluation of sterile product preparation.

Table J-18. Evaluation of the Process Related to Sterile Product Preparation 2011/12

	---	Bed Size		Teaching Status	
	All	50 - 200	>500	Teaching	Non-Teaching
(n=	(174)	(167)	(7)	(45)	(129)
Employees preparing parenteral admixtures are observed for validation of aseptic technique at least once a year	101	97	4	39	62
	58%	**58%**		**87%**	**48%**
Product sterility is routinely verified by laboratory testing on a sample of the products prepared?	54	49	5	23	31
	31%	**29%**		**51%**	**24%**
Surface sampling is conducted in sterile product preparation areas of your parenteral admixture service	44	39	5	21	23
	25%	**23%**		**47%**	**18%**

Base: All respondents

In conclusion, the results presented in this chapter highlight the fact that pediatric hospitals are different than adult hospital in a number of different areas. Of note are the substantially higher staffing ratios and drug costs that are associated with the provision of pharmacy services to pediatric patients. In addition it appears that pediatric hospitals appear to place a greater emphasis on safety and service evaluation, perhaps because of the unique challenges associated with providing safe and effective medication therapy to pediatric patients.

[1] Canadian Association of Pediatric Health Centres. http://www.caphc.org/ (accessed on Feb 9th, 2013).

[2] Menachemi N, Brooks RG, Schwalenstocker E, Simpson L. Use of health information technology by children's hospitals in the United States. Pediatrics 2009;123 Suppl 2:S80-4.

[3] Conroy S, Sweis D, Planner C, Yeung V, Collier J, Haines L, Wong IC. Interventions to reduce dosing errors in children: a systematic review of the literature. Drug Saf 2007;30(12):1111-25.

[4] Gonzales K. Medication administration errors and the pediatric population: a systematic search of the literature. J Pediatr Nurs 2010;25(6):555-65.

[5] Mehndiratta S. Strategies to reduce medication errors in pediatric ambulatory settings. J Postgrad Med 2012;58(1):47-53.

List of Tables and Figures

Recognition List

We wish to recognize all of the health care facilities in the list below for their willingness to contribute to the success of the 2011/12 Hospital Pharmacy in Canada Survey. Respondents from hospitals that appear in this list participated, or attempted to participate, in the survey by submitting data from their facility on or before August 1, 2012. 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 50-200 beds

Bethesda Hospital, Steinbach, MB
C.H. et de soins de longue durée Fleury, Montréal, QC
Campbell River Hospital, Campbell River, BC
Children's & Women's Health Centre of BC, Vancouver, BC*
Children's Hospital of Eastern Ontario, Ottawa, ON*
Colchester East Hants Health Authority, Truro, NS
Collingwood General and Marine Hospital, Collingwood, ON
Concordia Hospital, Winnipeg, MB
Cornwall Community Hospital, Cornwall, ON
CSSS de la Côte-de-Gaspé, Gaspé, QC
CSSS Eskers de l'Abitibi, Amos, QC
CSSS Maria-Chapdelaine, Dolbeau-Mistassini, QC
Cumberland Regional Health Authority, Amherst, NS
Cypress Regional Hospital, Swift Current, SK
Dartmouth General Hospital, Dartmouth, NS
Dauphin Regional General Hospital, Dauphin, MB
Delta Hospital, Delta, BC
Guelph General Hospital, Guelph, ON
Guysborough Antigonish Strait HA, Antigonish, NS
Headwaters Health Care Centre, Orangeville, ON
Hôpital de Montréal pour enfants, Montréal, QC*
Institut de cardiologie de Montréal, Montréal, QC*
Lake of the Woods District Hospital, Kenora, ON
Leduc Community Hospital, Leduc, AB
Miramichi Regional Hospital, Miramichi, NB*
Moose Jaw Union Hospital, Moose Jaw, SK
Norfolk General Hospital, Simcoe, ON
Northern Lights Regional Health Centre, Fort McMurray, AB
Orillia Soldiers' Memorial Hospital, Orillia, ON
Pembroke General Hospital, Pembroke, ON
Pictou County Health Authority, New Glasgow, NS
Prince County Hospital, Summerside, PE
Richmond General Hospital, Richmond, BC
St. Mary's Hospital, Camrose, AB
St. Thomas - Elgin General Hospital, St. Thomas, ON
Stanton Territorial Hospital, Yellowknife, NT
Stollery Children's Hospitals, Edmonton, AB*
Stratford General Hospital, Stratford, ON
Sturgeon Community Hospital, St. Albert, AB
Thompson General Hospital, Thompson, MB
Victoria Hospital, PAPHR, Prince Albert, SK
West Coast General Hospital, Port Alberni, BC
Woodstock General Hospital, Woodstock, ON
Yarmouth Regional Hospital, Yarmouth, NS
Yorkton Regional Health Center, Yorkton, SK

Hospitals 201-500 beds

Boundary Trails Health Center, Winkler, MB
Brandon Regional Health Authority, Brandon, MB
Brant Community Healthcare System, Brantford, ON
Burnaby Hospital, Burnaby, BC
Campbellton Regional Hospital, Campbellton, NB
Centre hospitalier universitaire Sainte-Justine, Montréal, QC*
Chaleur Regional Hospital, Bathurst, NB
CHAQ - Hôpital de l'Enfant-Jésus, Québec, QC*
CHAQ - Hôpital Saint-Sacrement, Québec, QC*
Chatham Kent Health Alliance, Chatham, ON
CHAU de St. Mary, Montréal, QC
Chilliwack General / Fraser Canyon Hospitals, Chilliwack, BC
Chinook (Lethbridge) Regional Hospital, Lethbridge, AB
Cowichan District Hospital, Duncan, BC
CSSS Beauce, Beauceville, QC
CSSS de la région de Thetford, Thetford Mines, QC
CSSS de Papineau, Gatineau, QC
CSSS des Aurores-Boréales, La Sarre, QC
CSSS Domaine-du-Roy, Roberval, QC
CSSS du Coeur de l'Ile, Montréal, QC
CSSS l'Ouest-de-l'Île, Pointe Claire, QC
CSSS La Pommeraie, Cowansville, QC
CSSS Lac-Saint-Jean-Est, Alma, QC
CSSS Manicouagan, Baie-Comeau, QC
CSSS Montmagny-L'Islet, Montmagny, QC
CSSS Pierre-de-Saurel, Sorel-Tracy, QC
CSSS Rimouski-Neigette, Rimouski, QC
CSSS Rivière-du-Loup, Rivière-du-Loup, QC
Doctor Everett Chalmers Hospital, Fredericton, NB
Dr Georges L Dumont Hospital, Moncton, NB
Eagle Ridge Hospital, Port Moody, BC
Edmundston Regional Hospital, Edmundston, NB
Etobicoke General Hospital (Wm Osler HS), Etobicoke, ON
Grace Hospital, Winnipeg, MB
Grey Bruce Health Services, Owen Sound, ON
Grey Nuns Community Hospital, Edmonton, AB*
Hôpital Charles-LeMoyne, Greenfield Park, QC
Hôpital général de Montréal, Montréal, QC*
Hôpital Laval*, Sainte-Foy, QC
Hôtel-Dieu de Lévis, Lévis, QC
Hôtel-Dieu Grace Hospital (Windsor), Windsor, ON
IWK Health Centre, Halifax, NS*
Joseph Brant Memorial Hospital, Burlington, ON
Kootenay Boundary Regional Hospital, Trail, BC
Langley Memorial Hospital, Langley, BC

201-500 continued

Hospitals 201-500 beds (continued)

Mackenzie Richmond Hill Hospital, Richmond Hill, ON
Markham-Stouffville Hospital, Markham, ON
Medicine Hat Regional Hospital, Medicine Hat, AB
Misericordia Community Hospital, Edmonton, AB*
Mount Sinai Hospital, Toronto, ON*
Nanaimo Regional General Hospital, Nanaimo, BC
North Bay Regional Health Centre, North Bay, ON
North York General Hospital, Toronto, ON
Oakville-Trafalgar Memorial/Halton Healthcare, Oakville, ON
Peace Arch Hospital, White Rock, BC
Penticton Regional / SO General Hospitals, Penticton, BC
Peterborough Regional Health Centre, Peterborough, ON
Portage District General Hospital, Portage la Prairie, MB
Queen Elizabeth / Hillsborough Hospitals, Charlottetown, PE
Queen Elizabeth II Hospital, Grande Prairie, AB
Queen's Park Care Centre, New Westminster, BC
Queensway-Carleton Hospital, Nepean, ON
Quinte Healthcare Corporation, Belleville, ON
Red Deer Regional Hospital Center, Red Deer, AB
Ridge Meadows Hospital, Maple Ridge, BC
Royal Columbian Hospital, New Westminster, BC
Royal Victoria Regional Health Centre, Barrie, ON
Saanich Peninsula Hospital, Victoria, BC
Saint John Regional Hospital, Saint John, NB*
Sault Area Hospital, Sault Ste Marie, ON
Seven Oaks General Hospital, Winnipeg, MB
Southlake Regional Health Centre, Newmarket, ON
St. Joseph's Health Centre-Toronto, Toronto, ON
St. Joseph's Hospital, Comox, BC
St. Michael's Hospital, Toronto, ON*
The Credit Valley Hospital, Mississauga, ON
The Hospital for Sick Children, Toronto, ON*
The Moncton Hospital, Moncton, NB*
The Scarborough Hospital - Birchmount, Scarborough, ON
The Scarborough Hospital - General, Scarborough, ON
Thunder Bay RHAC, Thunder Bay, ON
Toronto East General Hospital, Toronto, ON*
Toronto General Hospital (UHN), Toronto, ON*
Toronto Western Hospital (UHN), Toronto, ON
University Hospital of Northern BC, Prince George, BC
Victoria General Hospital, Winnipeg, MB

Hospitals >500+ beds

Abbotsford Regional/MSA/Mission Memorial, Abbotsford, BC*
C.H. de l'Université de Montréal, Montréal, QC*
Calgary Health Region Pharmacy Department, Calgary, AB*
Cape Breton District Healthcare Complex, Sydney, NS
CH universitaire de Sherbrooke, Sherbrooke, QC*
CHUQ - C.H. de l'Université Laval, Québec, QC*
CSSS D'Arthabaska-Érable, Victoriaville, QC
CSSS de Chicoutimi, Chicoutimi, QC
CSSS Dorval Lachine LaSalle, LaSalle, QC
CSSS Gatineau, Gatineau, QC
CSSS Haut Richelieu / Rouville, St Jean sur Richelieu, QC
CSSS Jardins-Roussillon, Châteauguay, QC
CSSS Laval, Laval, QC
CSSS Pierre-Boucher, Longueuil, QC
CSSS Richelieu-Yamaska, Saint-Hyacinthe, QC
CSSS Sud De Lanaudiére, Terrebonne, QC
CSSS Suroît, Salaberry-de-Valleyfield, QC
Grand River Hospital, Kitchener, ON
Hamilton Health Sciences Corporation, Hamilton, ON*
Hôpital du Sacré-Cœur de Montréal, Montréal, QC*
Hôpital général juif Sir Mortimer B Davis, Montréal, QC*
Hôpital Maisonneuve-Rosemont, Montréal, QC*
Hôpital Royal-Victoria, Montréal, QC*
Humber River Regional Hospital, Toronto, ON
Kelowna General Hospital, Kelowna, BC
Kingston General Hospital, Kingston, ON*
Lions Gate Hospital, North Vancouver, BC
London Health Sciences Centre, London, ON*
Niagara Health System , Niagara Falls (St.Catherine), ON
Providence Health Care, Vancouver, BC*
Queen Elizabeth II Health Sciences Centre, Halifax, NS*
Regina Qu'Appelle Health Region, Regina, SK*
Royal Alexandra Hospital, Edmonton, AB*
Royal Jubilee Hospital/Victoria General Hospitals, Victoria, BC
Saskatoon Regional Health Authority, Saskatoon, SK*
St. Boniface Hospital, Winnipeg, MB*
St. Joseph's Health Care, Hamilton, ON*
Surrey Memorial Hospital, Surrey, BC
The Ottawa Hospital, Ottawa, ON*
Trillium Health Centre, Mississauga, ON
UofA Hospital / Mazankowski Heart Institute, Edmonton, AB*
Vancouver General Hospital, Vancouver, BC*
William Osler - Brampton Civic Hospital, Brampton, ON
Windsor Regional Hospital, Windsor, ON
Winnipeg Health Sciences Centre, Winnipeg, MB*

** Teaching Hospitals (ACAHO)*

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, inventory turnover rates, and acute/non-acute drug costs. The ratios represent the mean of the results for the hospitals in each subgroup and are provided by hospital size and teaching status to allow pharmacy managers to compare their department to their closest peer group. Details on how the ratios have been calculated for a participating hospital that has provided sufficient data can be found in a pdf document that can be requested by the pharmacy manager at each participating hospital (by sending an e-mail to the Research Analyst, paul@pdora.com , with the subject line: 'Request for respondent questionnaire'). This pdf document also contains not only the hospital's key ratios, but also the benchmarking ratios (if applicable) and the hospital's responses to each survey question.

Please note that facility-specific data are only available to the participating hospital.

	Participating Facility's Ratio	All Hospitals	All Pediatric Hospitals	Adult Hospitals					
				All Adult Hospitals	Bed Size			Teaching Status	
					50- 200	201- 500	>500	Teaching	Non-Teaching
Inpatient budgeted hours per acute inpatient day	(n=)	(155)	(7)	(148)	(37)	(74)	(37)	(35)	(113)
		.84	**1.65**	**.80**	**.76**	**.78**	**.86**	**.90**	**.77**
Inpatient budgeted hours per total (acute + non-acute) inpatient day	(n=)	(150)	(7)	(143)	(36)	(74)	(33)	(33)	(110)
		.63	**1.60**	**.58**	**.58**	**.56**	**.64**	**.84**	**.51**
Total (inpatient + outpatient) budgeted hours per acute inpatient day	(n=)	(155)	(7)	(148)	(37)	(74)	(37)	(35)	(113)
		.91	**1.72**	**.87**	**.80**	**.87**	**.95**	**.99**	**.83**
Total (inpatient + outpatient) budgeted hours per total (acute + non-acute) inpatient day	(n=)	(150)	(7)	(143)	(36)	(74)	(33)	(33)	(110)
		.68	**1.66**	**.64**	**.61**	**.62**	**.70**	**.92**	**.55**
Inpatient technician + assistant FTE / inpatient pharmacist FTE (weighted)	(n=)	(167)	(7)	(160)	(40)	(80)	(40)	(36)	(124)
		1.36	**1.12**	**1.38**	**1.68**	**1.30**	**1.40**	**1.37**	**1.39**
Pharmacist vacancy rate (weighted)	(n=)	(155)	(6)	(149)	(38)	(77)	(34)	(30)	(119)
		7.9%	**4.4%**	**8.1%**	**9.3%**	**7.6%**	**8.4%**	**6.0%**	**10.3%**
Inventory turnover rate	(n=)	(161)	(5)	(156)	(35)	(80)	(41)	(37)	(119)
		9.8	**9.5**	**9.8**	**6.6**	**9.7**	**12.6**	**11.5**	**9.2**
Drug costs per acute day	(n=)	(144)	(5)	(139)	(34)	(70)	(35)	(33)	(106)
		$36.90	**$69.47**	**$35.73**	**$34.02**	**$33.35**	**$42.15**	**$43.02**	**$33.46**
Drug costs per non-acute day	(n=)			(89)	(16)	(47)	(26)	(15)	(74)
				$8.73	**$6.48**	**$9.35**	**$9.01**	**$10.66**	**$8.34**

Notes