2005/06 Annual Report - Hospital Pharmacy in Canada

Ethics in Hospital Pharmacy

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The Editorial Board wishes to acknowledge and thank the support team of the 2005/06 Hospital Pharmacy in Canada Report.

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The Editorial Board would like to thank Eli Lilly Canada Inc, and their representatives Andrew Merrick and Anne Hiltz, 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.

2005/06 Annual Report

Hospital Pharmacy in Canada

Editorial Board

Foreword

D. Terrance McCool

Eli Lilly Canada is pleased to support the 16th *Hospital Pharmacy in Canada Report* available at www.lillyhospitalsurvey.ca.

Thanks to all the hospital pharmacists across the country who completed the survey, which resulted in a 74% response rate. The information contained in this survey report is reliable because of the very high participation rate by hospital pharmacy managers in all parts of the country.

This year's report contains a special section on a variety of ethics issues that we believe you will find very pertinent to today's hospital pharmacy practice. Patient safety also continues to be a major issue for health professionals, health administrators and policy makers in Canada. This is the third consecutive survey in which we have included a major section medication safety and the results provide valuable information on the progress that has been made in incident reporting and error reduction strategies.

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

Also, thank you to this year's Editorial Board who interpreted the data and authored the report – Michelle Babich, Jean-François Bussières, Janet Harding, Neil Johnson, Patricia Lefebvre, Patricia Macgregor, Tom Paton, and Nancy Roberts

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

Yours truly,

Terry McCool
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

Neil Johnson

The Canadian healthcare system continues to evolve as it deals with technological, political, organizational and human resources issues. Every part of the health system is challenged to do more with less, look at different ways of doing things, eliminate non-value-added interventions, increase effectiveness, and find new ways to reduce costs. Provincial governments are now establishing accountability measures for the delivery of healthcare services, such as surgical wait times. Meanwhile, with the shortage of health professionals that Canadian hospitals are now experiencing, maintenance of existing service levels is a major challenge. Maximizing professional scopes of practice is just one of the health care trends that are evolving to address the manpower shortage. Although the Canadian public continues to regard healthcare as a key priority, confidence in the current system has been shaken by reports of cancelled surgeries, lack of timely services, and medication errors. The Canadian healthcare system is being challenged to look at new ways of insuring that needed services are available and the entry of for profit organizations into the health care arena is becoming an increasing reality.

Pharmacy practice is not immune from these influences and this year's Hospital Pharmacy in Canada Report summarizes many important aspects of hospital pharmacy practice in the 142 participating organizations that collectively represent some 60,000 inpatient beds across Canada. This year the report continues its focus on medication safety and the role of pharmacy leaders in creating a safer environment for patients.

This year's report also brings a special interest chapter on Ethics in Hospital Pharmacy, authored by guest editor Tom Paton, that addresses key business, clinical and research ethical issues confronting staff and leaders in hospital practice.

The report contains our standard array of chapters such as human resources, drug distribution and clinical pharmacy. This year's benchmarking survey builds on the work of previous years and a new section dealing with mental health facilities has been added to the survey. This is part of the Board's ongoing effort to expand the report to include new topics and cover a broader array of practice settings.

This year's report introduces a standard definition of teaching hospital. All facilities that are members of the Association of Canadian Academic Healthcare Organizations (ACAHO) have been predefined as teaching hospitals, whereas in previous surveys respondents self-declared their teaching status. The self-declaration method was problematic, since most respondents do some teaching but not to the extent that university-affiliated academic healthcare organizations do. This change in methodology has more effectively differentiated "teaching" and "non-teaching" hospitals. As a result there are some interesting changes, in certain sections of the survey, with respect to the magnitude of differences between the data for the two groups.

Patricia Lefebvre's review of medication safety issues highlights the efforts being made to enhance the reporting of medication incidents and to implement organizational policies dealing with the disclosure of adverse events. This section highlights some areas in which hospitals have the opportunity to improve their safety practices. These include implementing policies requiring the checking of two patient identifiers before administering medications, limiting the use of verbal or telephone orders, and implementing procedures to monitor the occurrence of adverse drug events. Finally, Patricia's chapter ends with a comprehensive overview of the state of medication reconciliation in Canadian hospitals, providing important information on one of the Canadian Council for Health Services Accreditation's recently introduced "required organizational practices".

Effective drug distribution systems, from the point of order-writing through to the dispensing and administration of medication, can reduce the rate of occurrence of medication errors. Janet Harding's review of drug distribution systems shows that Canadian hospital pharmacies have made substantial gains in the implementation of unit dose distribution systems, now reported to be used by 69% of respondents, and IV admixture services that are now reported to be provided, to at least some extent, by 94% of respondents. This section also details important trends in medication order entry practices by pharmacists and technicians. The roles of pharmacy technicians continue to grow and advance, with 92% of respondents now reporting the use of tech-check-tech programs.

Nancy Roberts' review of drug purchasing shows that the increase in drug expenses in hospitals continues to exceed the growth rate in healthcare expenditures for other types of products and services. Drug purchasing practices continue to become more efficient, as demonstrated by the increase in inventory turns that are reported in this year's report.

Michele Babich's review of human resources highlights the effect that pharmacist shortages are having on hospital pharmacy staffing. Respondents reported more than 270 vacant pharmacist positions, which is only a slightly lower number of vacancies compared to the previous report. The report identifies a further 252 pharmacists that are eligible to retire within the next five years. This section also shows that the average growth rate of salaries for all pharmacy personnel has slowed compared to the last report in 2003/04. Pharmacist salaries in this report grew at a slower rate than those for management and staff technicians. Based on information collected this year and in previous reports, the pharmacist manpower shortage is unlikely to be resolved in the near future, further compromising the ability of hospital pharmacies to deliver comprehensive, high quality, patient-oriented pharmacy services.

Patricia Macgregor reports on the significant amount of education and training that hospital pharmacies provide. Hospitals reported providing an average of 246 days of student training in 2005/6. Patricia also details the progress hospitals are making in adopting information technology as a key component of their efforts to enhance the safety and efficiency of pharmacy practice. This section includes information on the availability and use of computerized decision-support tools (e.g. allergy alerts, maximum dose alerts, etc.), wireless technology, computerized physician order entry, hand held computing devices, and bar coding. Hospital pharmacies continue to make slow progress in fully implementing technology supports for the medication management system.

Jean-Francois Bussieres' section on clinical pharmacy services provides a thoughtful and comprehensive overview of patient oriented pharmacy services, seen in the context of a number of major practice initiatives that have been undertaken by pharmacy organizations such as the Canadian Society of Hospital Pharmacists, l'Association Pharmaciennes des établissements de santé du Québec, and the American Society of Health System Pharmacists. An analysis of the priority and scope of proven clinical services provides a revealing summary of the state of clinical services in Canada. This chapter also details the expansion of pharmacist involvement in ambulatory care practice and the current status of prescribing authority for pharmacists and other non-physician groups within Canadian hospitals.

I would like to take this opportunity to thank a number of individuals who have contributed to the success of this survey and report. The support of Eli Lilly Canada and the contributions of Andrew Merrick and Anne Hiltz of Eli Lilly Canada have ensured the ongoing success of the survey. The Editorial Board members continue to meet on a regular basis to identify trends, share information and analyze changes in practice. Their continued support for this project is appreciated by all hospital pharmacy practitioners. 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. Lastly, Kevin Hall and Chuck Wilgosh joined the team for this survey as Managing Editors. Their attention to detail and oversight has proven invaluable to the report. This team assures the quality of the Hospital Pharmacy in Canada Report and the Millcroft Symposium.

The Editorial Board would also like to especially thank two individuals, who left the board in the past year, for their significant contributions over the life of the Hospital Pharmacy in Canada Survey. Ken Forsyth, of Eli Lilly, was the driving force that brought the report to life and sustained it through many membership changes on the Board and many personnel and corporate changes at Lilly. Ron McKerrow contributed to the survey both as an editor and as Executive Editor, a position in which he played a vital leadership role for many years. Both individuals have contributed to the ongoing success of the report and have made it a valuable tool for hospital pharmacy leaders across Canada.

Data Collection Methodology

Paul Oeltjen

An initial list of hospital pharmacies was prepared, based on respondents to previous surveys, hospital pharmacies on the mailing list of the Hospital Pharmacy in Canada Annual Report website, hospital pharmacies suggested by the members of the Editorial Board of the Hospital Pharmacy in Canada Annual Report, and the membership list of the Association of Canadian Academic Healthcare Organizations (ACAHO). A telephone survey of these hospitals was conducted in order to obtain the current name and e-mail address of the Director of Pharmacy and the hospital's Chief Executive Officer, and to attempt to confirm each hospital's eligibility based on the number of their acute beds (>=50) and their total number of beds (>=100).

A final list of 203 hospitals was then prepared, based on the information collected. This list included 41 teaching hospitals that were members of the ACAHO. This list did not include mental health facilities that were handled as a separate group.

The Hospital Pharmacy in Canada survey was announced in e-mails sent to Directors of Pharmacy and to CEOs of the 203 hospitals during the period of June 23 - 27, 2006. A second e-mail was sent only to the Directors of Pharmacy between July 3 and July 5, 2006. This letter contained the respondent identification and the password required to log on to the survey web site. Respondents who had not completed the on-line survey received weekly reminders starting on July 26, 2006.

The respondent identification (user ID) and the password enabled a respondent to log on to the survey website at any time and to complete any part of the questionnaire. The first page of the website contained instructions for completing the survey. The survey questions were distributed over 22 web pages. From any page a respondent was able to move to any other page of the online survey. A respondent was also able to change the language of the questionnaire and respond to questions in English or French.

Online survey completion was interactive. If secondary questions were to be skipped in the event of a "no" or "yes" answer to the primary question, the on-line program presented a modified version of the questionnaire, without the non-applicable questions, after a screening question had been answered and saved. The program also warned respondents if they had entered numbers that were too high or too low, based on a preset range of expected minimum and maximum values, or if they had entered non-numeric information in fields that required numeric answers.

Questionnaires were included in the analyses if more than 25% of key questions had been answered by October 2, 2006 and if the hospital's bed size was known. Using these criteria, data from 142 hospital pharmacies could be analyzed. Ten hospital pharmacies did not qualify because they did not meet the bed size. The overall response rate, calculated on the basis of the remaining 193 eligible hospitals, was then 74%. The response rate for teaching hospitals was 90% and the response rate for non-teaching hospitals was 69%. The actual response rate for non-teaching hospitals may be higher because it is not known if there are more non-qualifying hospitals among the 27 hospitals who never logged on to the survey website.

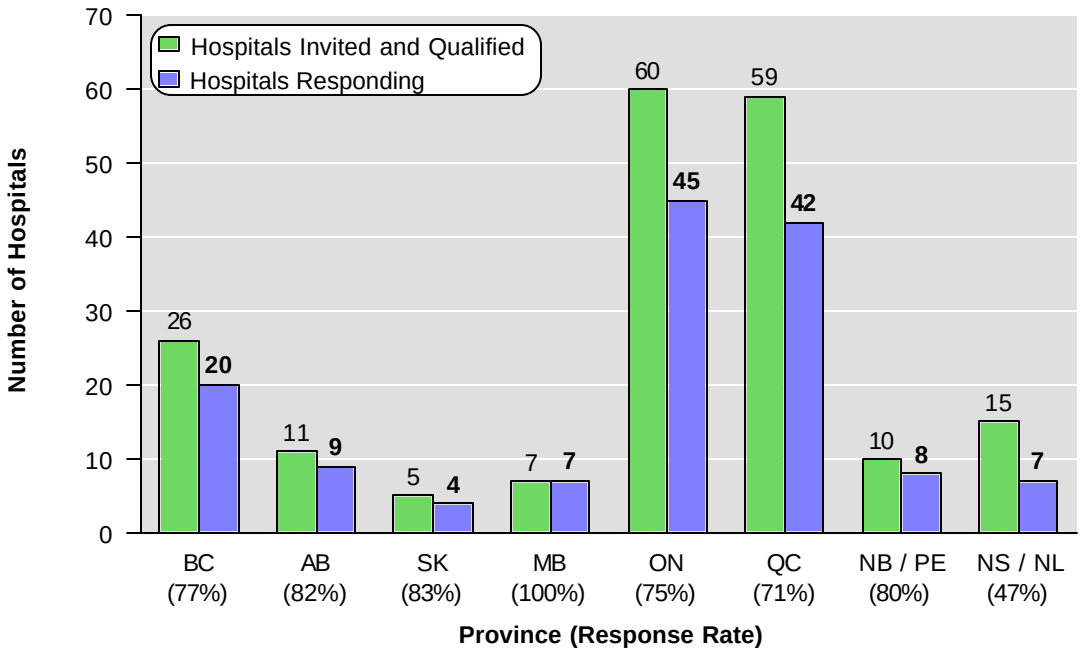
Demographics

Neil Johnson

The 2005/06 survey response rate of 74% (142/193) was similar to the 2003/04 response rate of 77% (144/186). The mix of facilities appears to have changed markedly compared to the previous survey, with 74% of respondents from non-teaching facilities compared to 61% in 2003/04, and 26% from teaching organizations compared to 39% in 2003/04. However, this was likely a result of the change in definition of teaching facilities. In previous surveys, respondents were asked to indicate their teaching status, while in this survey the information was predefined using the member list of the Association of Canadian Academic Healthcare Organizations (ACAHO). This change in methodology provides a clearer and more consistent definition of teaching status. Readers are encouraged to consider this factor as they compare the teaching versus non-teaching data in this survey with those in past surveys.

Sixty-six percent of respondents indicated they were part of a multi-site health organization (MSHO), representing a slight increase compared to the last survey (59%). Only 39% of Ontario respondents and 60% of Quebec respondents reported being part of a MSHO, while all other jurisdictions reported MSHO rates over 90%. The number of hospitals within a MSHO was notably higher in BC (Median = 12) and Alberta (Median = 9). The overall mean number of sites within a MSHO increased to eight in this survey from six in the previous survey.

Figure A-1 Response to the Survey by Province 2005/06



Hospital demographic information presented in Table A-1 represents the average of reported data from hospitals with a total of 100 beds and at least 50 acute care beds. When analyzing results from this survey, the reader should remember that changes in overall hospital metrics cannot be interpreted as a trend. The data sample from each survey varies based on the respondents who have participated. Therefore the hospital demographic data is presented to provide the contextual framework within which this year's survey results should be interpreted. Some data elements exhibited extreme variations from the mean; therefore readers are encouraged to consider these ranges when noted by the editors.

Demographic data showed the average reported acute care beds at 320, compared to 311 in the previous survey. The total number of beds included in this survey was 60,330, of which 45,448 were acute care beds and 25,053 were in teaching hospitals. The Canadian Institute for Health Information[1] reported that, in Canada, in 2002/03 there were 115,120 beds staffed and in operation and 29,237 beds in teaching hospitals. This provides the reader with some estimate of the relative comprehensiveness of the sample in this survey.

Acute care admissions were 5.3% higher than the previous survey and acute care patient days were 3.4% higher. Acute care occupancy was reported to be greater in this survey (89.8% compared to 86% in the previous year). Average emergency department visits were 11% higher at 58,398 in 2005/06 compared to 52,591 in 2003/04.

Table A-1 Hospital Demographic Data 2005/06

	Acute Care		
	All	Teaching Status	
		Teaching	Non- Teaching
Hospitals (n=)	**(142)**	**(37)**	**(105)**
Average number of beds	320	578	229
Average annual admissions	14,740	25,498	10,705
Average patient days	104,937	185,603	73,026
Average length of stay (days)	7.1	7.1	7.1
Average Clinic/ Medical Day Unit visits	148,439	347,959	75,496
Average Emergency Room visits	58,398	72,809	52,785

	Non-Acute Care		
	All	Teaching Status	
		Teaching	Non- Teaching
Hospitals (n=)	**(107)**	**(21)**	**(86)**
Average number of beds	136	175	127
Average annual admissions	508	829	429
Average patient days	41,569	57,758	37,638
Average length of stay (days)	198	101	223

Pharmacy Department information is presented in Table A-2. The data is remarkably consistent with the last survey. The average of reported number of hours the Pharmacy was open remained unchanged at 79 hours per week.

Ninety-two percent of respondents indicated that a pharmacist was the head of the pharmacy department. This is the first time that this question has appeared in the survey and provides a baseline for further assessments. It is of particular relevance given the recent policy statement by the Canadian Society of Hospital Pharmacists.[2] [3]

Forty-three percent of respondents indicated that Program Management had been implemented in their hospitals, either totally or partially. This result was unchanged from the 2003/04 survey. The majority of respondents from these facilities indicated that the pharmacists reported to Pharmacy (79%), while an additional 20% indicated that pharmacists' reporting responsibility was shared. Thirty seven percent of teaching hospitals reported a shared reporting relationship. Eighty-two percent of respondents from facilities with Program Management reported that the pharmacists' salaries were paid by Pharmacy.

Table A-2 Pharmacy Department Data 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Pharmacy hours of operation	79	63	79	91	97	73
Pharmacist is Head of Pharmacy Department	130 92%	24 89%	73 94%	33 89%	32 86%	98 93%
Program Management Model	61 43%	5 19%	34 44%	22 59%	19 51%	42 40%
Pharmacists salary paid by (n=)	(61)	(5)	(34)	(22)	(19)	(42)
Pharmacy	50 82%	5 100%	28 82%	17 77%	12 63%	38 90%
Program	3 5%	0 0%	0 0%	3 14%	2 11%	1 2%
Shared	8 13%	0 0%	6 18%	2 9%	5 26%	3 7%
Pharmacists reporting responsibility to						
Pharmacy	48 79%	4 80%	27 79%	17 77%	11 58%	37 88%
Program	1 2%	0 0%	1 3%	0 0%	1 5%	0 0%
Shared	12 20%	1 20%	6 18%	5 23%	7 37%	5 12%

[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] Statement On The Role Of The Pharmacist As Head Of Hospital Pharmacy Services, Canadian Society of Hospital Pharmacists Official Publications, 2006, CSHP, Ottawa Ontario
[3] MacKinnon NJ, Clark S, McCaffrey KJ. Storm Clouds on the Horizon: The Future of Hospital Pharmacy Management, Can J Hosp Pharm 2005;58:261-2

Clinical Pharmacy Services

Jean-François Bussières

Introduction

The profession of pharmacy continues to evolve in response to the changing needs of patients and the many developments that are occurring in the various areas of pharmacy practice. This section of the Hospital Pharmacy in Canada Survey is intended to describe and comment on the nature and evolution of a range of direct patient care pharmacy services and associated administrative activities (e.g. participation on the Pharmacy and Therapeutics Committee) that collectively represent the "clinical" contribution of the pharmacy department.

Since the publication of the 2003/04 survey, a number of reviews and commentaries have been published on the historical development and present status of clinical pharmacy practice. Of particular note, during 2006 the *Annals of Pharmacotherapy* published a series of articles that looked back at the vision for clinical pharmacy practice that a number of pharmacy leaders have promoted over the past 40 years. These articles provide an interesting look at the types of clinical services proposed since the 1960s, as well as the evolution of hospital pharmacy and clinical pharmacy practice around the world.

Since the last survey, the *American Society of Health-System Pharmacists* (ASHP) also published its "Vision 2015" in which it challenged not only pharmacists, but also healthcare organizations, to implement the pharmaceutical services that have been proven to maximize the benefits and minimize the risks of drug therapy[1]. ASHP recommends that healthcare organizations begin by documenting baselines for each recommended clinical pharmacy service. The baseline, determined through a survey methodology, establishes the extent to which the organization has already implemented proven clinical pharmacy interventions. The organization is then challenged to achieve the implementation targets for each service that ASHP proposed in its Vision 2015 document. ASHP carries out a survey similar to our *Hospital Pharmacy in Canada Survey* that enables individual institutions and the profession as whole, to track its progress in achieving the Vision 2015 targets.

The Canadian Society of Hospital Pharmacists and APES (l'Association des Pharmaciens d'établissements de santé du Québec) are in the process of developing similar initiatives. The ASHP Vision 2015 initiative, and similar ones underway in Canada, are based on a number of studies and systematic reviews that have attempted to identify those clinical pharmacy services that have been shown to have the greatest impact on patient outcomes. The work of researchers such as Bond [2,3,4,5,6], Kaboli [7], Pickard[8] and others provided the evidence on which ASHP and other organizations have evaluated and prioritized a wide variety of clinical pharmacy services.

For the 2005/06 Hospital Pharmacy in Canada Survey, the questions were designed to collect information that would help determine the extent of implementation of a variety of clinical pharmacy services in Canadian hospitals. In addition, this year's survey asked pharmacy managers to indicate the priority that they assign to a number of clinical services. By evaluating that information we hoped to be able to assess how well our reported clinical priorities align with the evidence that supports their relative effectiveness. Finally we hoped to be able to comment on how well hospital pharmacies in Canada are positioned to achieve the future (2015) clinical practice targets that are being established by ASHP, CSHP and APES.

Staffing for Clinical Pharmacy

Beginning in the 1999/2000 survey, we included questions concerning the staffing allocated to a number of inpatient and outpatient clinical pharmacy services. Because a significant number of respondents were not able to provide the detailed breakdown of clinical staffing that we had requested in previous surveys, we did not request the information in this section of the survey. However, in the new benchmarking section of the survey, we asked pharmacy managers to provide clinical staffing information for a number of specific practice areas such as general medicine, surgery, critical care, emergency, and outpatient care. Please refer to that section of the survey for clinical staffing information.

Profile of Outpatient Clinical Pharmacy Services

- In this year's survey, 92% (130/142) of respondents indicated that they provided clinical pharmacy services to at least one of 17 outpatient practice areas included in this year's survey. This was an increase from the 71% (102/144) of respondents in 2003/04 who indicated that they provided outpatient clinical pharmacy services. However, this result must be interpreted cautiously, given the redesign of the clinical practice section of this year's survey and the inclusion of 17 practice areas in the 2005/06 survey versus 14 practice areas in the 2003/04 survey.

- The proportion of hospitals that reported they offered a particular outpatient program ranged from a low of 36% (51/142) for transplantation, to 93% (132/142) for emergency. Among the respondents who reported that a particular outpatient care program was offered in their facility, we identified four patient care areas where outpatient clinical pharmacy services were offered by more than 50% of those respondents. Those outpatient care program areas were hematology-oncology (80%, 94/118), renal/dialysis (63%, 57/90), emergency (54%, 71/132) and hematology-anticoagulation (52%, 51/99).

- Among the respondents who reported that they provided outpatient clinical pharmacy services, the proportion offering the service was usually higher for respondents with teaching affiliation or more than 500 beds. This was particularly true for the following clinical pharmacy services: hematology-oncology, renal-dialysis, hematology-anticoagulation, cardiovascular-lipid, infectious-disease/AIDS, transplantation and neurology.

- Regional differences were noted for outpatient clinical pharmacy services. The survey questionnaire does not capture the reasons that could explain those differences.

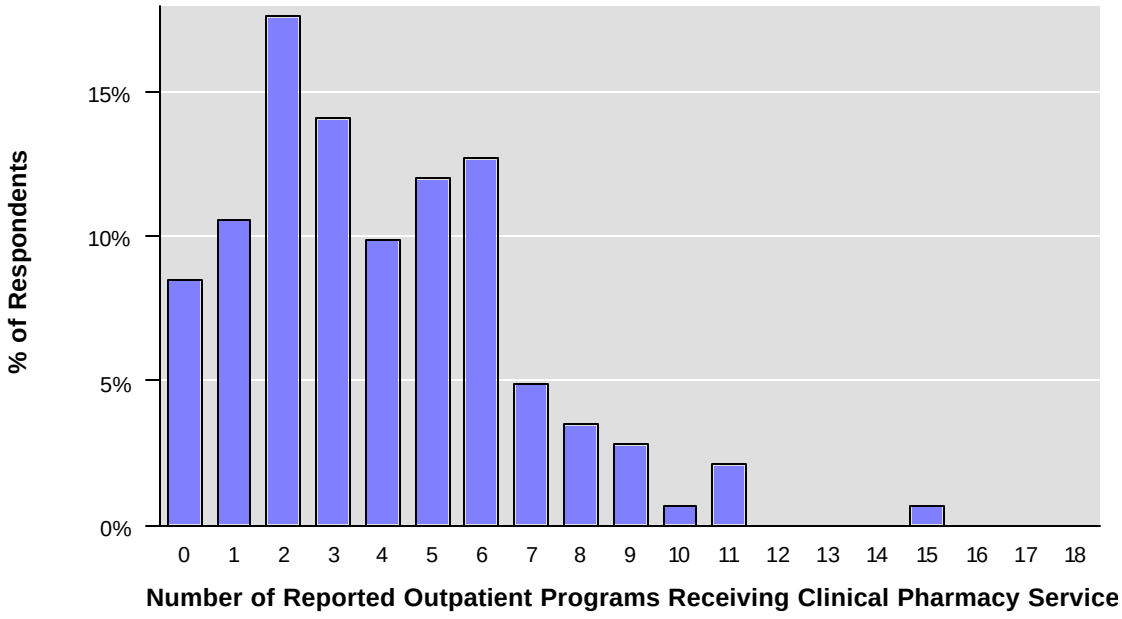
Table B-1 summarizes the profile of clinical pharmacy services for outpatient services in descending order, per bed size, teaching status and region.

Table B-1 Profile of Clinical Pharmacy Services for Outpatient 2005/06

	All	Bed Size			Teaching		Regions				
		100-200	201-500	> 500	Teaching	Non-teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**	**(20)**	**(20)**	**(45)**	**(42)**	**(15)**
Number of outpatient care programs											
Mean	11.6	9.2	11.6	13.5	13.2	11.0					
Std Dev	5.1	5.7	4.9	4.2	4.4	5.2					
Hematology-oncology											
service provided	118	20	65	33	32	86	17	14	32	40	15
pharmacists assigned	94 80%	12 60%	54 83%	28 85%	29 91%	65 76%	9 53%	9 64%	29 91%	38 95%	9 60%
Renal / Dialysis											
service provided	90	10	50	30	29	61	10	10	27	32	11
pharmacists assigned	57 63%	3 30%	33 66%	21 70%	21 72%	36 59%	5 50%	7 70%	23 85%	16 50%	6 55%
Emergency											
service provided	132	21	74	37	35	97	19	18	42	40	13
pharmacists assigned	71 54%	6 29%	43 58%	22 59%	18 51%	53 55%	10 53%	9 50%	30 71%	21 53%	1 8%
Hematology/anticoagulation											
service provided	99	14	54	31	31	68	14	12	25	38	10
pharmacists assigned	51 52%	3 21%	30 56%	18 58%	16 52%	35 51%	8 57%	7 58%	13 52%	19 50%	4 40%
Infectious Disease / AIDS											
service provided	92	15	49	28	31	61	11	13	25	31	12
pharmacists assigned	37 40%	5 33%	16 33%	16 57%	18 58%	19 31%	6 55%	9 69%	9 36%	10 32%	3 25%
Diabetes											
service provided	118	20	65	33	31	87	16	12	36	39	15
pharmacists assigned	46 39%	7 35%	25 38%	14 42%	12 39%	34 39%	2 13%	4 33%	12 33%	22 56%	6 40%
Cardiovascular / lipid											
service provided	99	15	56	28	30	69	13	14	25	36	11
pharmacists assigned	38 38%	1 7%	22 39%	15 54%	12 40%	26 38%	5 38%	7 50%	10 40%	13 36%	3 27%
Transplantation											
service provided	51	6	26	19	24	27	10	6	12	17	6
pharmacists assigned	16 31%	1 17%	7 27%	8 42%	12 50%	4 15%	3 30%	4 67%	6 50%	0 0%	3 50%
Mental Health											
service provided	110	13	62	35	31	79	14	14	33	38	11
pharmacists assigned	30 27%	2 15%	16 26%	12 34%	9 29%	21 27%	1 7%	5 36%	19 58%	5 13%	0 0%
Geriatrics / LTC											
service provided	93	16	49	28	22	71	13	12	24	32	12
pharmacists assigned	24 26%	5 31%	11 22%	8 29%	5 23%	19 27%	1 8%	8 67%	7 29%	6 19%	2 17%
Pain / palliative care											
service provided	102	21	51	30	27	75	15	11	26	38	12
pharmacists assigned	27 26%	7 33%	12 24%	8 27%	5 19%	22 29%	3 20%	6 55%	3 12%	11 29%	4 33%
Asthma/Allergy											
service provided	102	18	54	30	30	72	15	12	25	39	11
pharmacists assigned	16 16%	4 22%	7 13%	5 17%	5 17%	11 15%	1 7%	3 25%	6 24%	5 13%	1 9%
General Medicine											
service provided	93	14	52	27	31	62	14	9	23	36	11
pharmacists assigned	13 14%	2 14%	8 15%	3 11%	3 10%	10 16%	1 7%	2 22%	5 22%	4 11%	1 9%
General Surgery											
service provided	105	14	60	31	32	73	16	9	31	37	12
pharmacists assigned	15 14%	1 7%	9 15%	5 16%	3 9%	12 16%	1 6%	2 22%	10 32%	1 3%	1 8%
Neurology											
service provided	69	7	38	24	26	43	10	9	17	26	7
pharmacists assigned	9 13%	0 0%	5 13%	4 17%	4 15%	5 12%	1 10%	3 33%	2 12%	2 8%	1 14%
Gynecology / Obstetrics											
service provided	90	12	49	29	25	65	12	11	21	35	11
pharmacists assigned	7 8%	1 8%	3 6%	3 10%	3 12%	4 6%	1 8%	2 18%	2 10%	1 3%	1 9%
Rehabilitation											
service provided	86	13	47	26	22	64	14	9	25	29	9
pharmacists assigned	6 7%	2 15%	2 4%	2 8%	1 5%	5 8%	0 0%	1 11%	5 20%	0 0%	0 0%

Figure B-1 illustrates the distribution of the number of outpatient clinical pharmacy services per respondent.

Figure B-1 Respondents Providing Outpatient Clinical Pharmacy Services 2005/06



Base: All respondents (142)

Profile of Inpatient Clinical Pharmacy Services

- There was an increase in the total number of respondents that reported at least one inpatient clinical pharmacy service from 69% (100/144) in 2003/04 to 99% (140/142). However, once again this result must be interpreted cautiously, given the redesign of the clinical practice section of this year's survey and the inclusion of 18 inpatient practice areas in the 2005/06 survey, versus 16 inpatient practice areas in the 2003/04 survey.

- The proportion of hospitals that reported they offered a particular inpatient program ranged from a low of 35% (49/142) for transplantation, to 96% (136/142) who provided general medicine services. Among the respondents who reported a specific inpatient care program offered in their facility, we identified eleven where more than 50% of the respondents provided clinical pharmacy services to that patient care program e.g. geriatric/long-term care (LTC) (83%, 100/120), adult critical care (79%, 103/131), hematology-oncology (78%, 91/116), general medicine (78%, 106/136), pain/palliative care (70%, 89/128), cardiovascular/lipid (68%, 81/120), mental health (63%, 80/126), general surgery (63%, 85/135), pediatric/neonatal care (56%, 51/91), renal/dialysis (51%, 46/90), and rehabilitation (50%, 53/105).

- Among the respondents who reported they offered inpatient clinical pharmacy services, the proportion for most clinical areas was higher for respondents from teaching facilities.

- Regional differences were noted for some inpatient clinical pharmacy services. The survey questionnaire does not capture the reasons that could explain those differences.

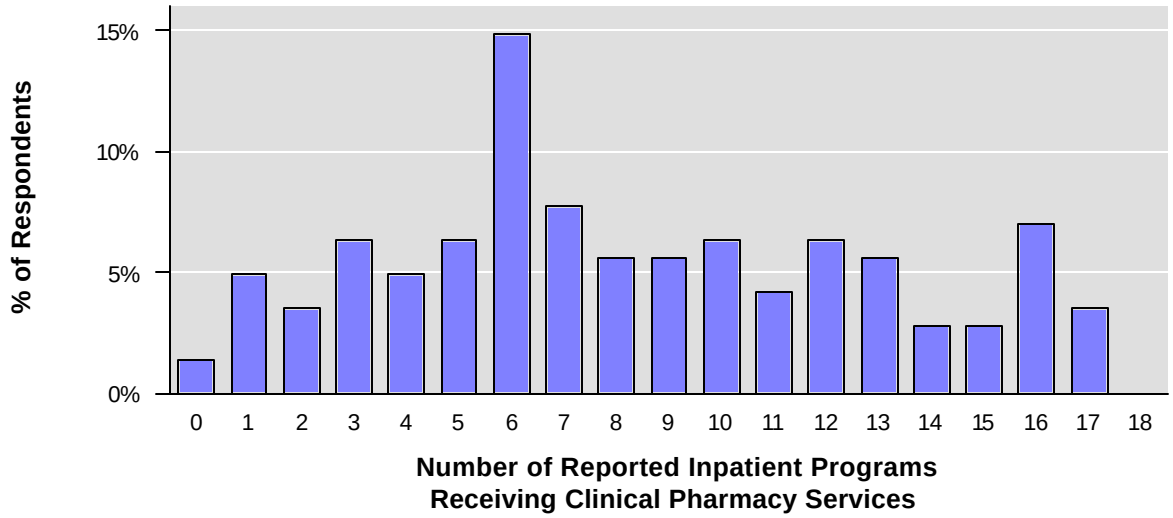
- Table B-2 summarizes the profile of clinical pharmacy services for inpatient services in descending order, per bed size, teaching status and regions.

Table B-2 Profile of Clinical Pharmacy Services for Inpatient 2005/06

	All	Bed Size			Teaching		Regions				
		100-200	201-500	> 500	Teaching	Non-teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**	**(20)**	**(20)**	**(45)**	**(42)**	**(15)**
Number of inpatient care programs											
Mean	14.1	11.9	14.3	15.4	14.6	13.9					
Std Dev	3.6	4.6	3.2	3.0	3.5	3.7					
Geriatrics / LTC											
service provided	120	20	68	32	28	92	17	13	39	37	14
pharmacists assigned	100	15	57	28	27	73	13	12	34	30	11
	83%	75%	84%	88%	96%	79%	76%	92%	87%	81%	79%
Adult Critical Care											
service provided	131	21	74	36	32	99	20	20	42	37	12
pharmacists assigned	103	13	57	33	31	72	18	19	39	20	7
	79%	62%	77%	92%	97%	73%	90%	95%	93%	54%	58%
Hematology-oncology											
service provided	116	19	64	33	30	86	16	15	34	39	12
pharmacists assigned	91	11	51	29	28	63	10	11	31	33	6
	78%	58%	80%	88%	93%	73%	63%	73%	91%	85%	50%
General Medicine											
service provided	136	24	77	35	35	101	19	19	43	41	14
pharmacists assigned	106	16	59	31	33	73	16	19	38	25	8
	78%	67%	77%	89%	94%	72%	84%	100	88%	61%	57%
Pain / palliative care											
service provided	128	24	70	34	33	95	18	15	42	38	15
pharmacists assigned	89	17	48	24	21	68	12	12	31	22	12
	70%	71%	69%	71%	64%	72%	67%	80%	74%	58%	80%
Cardiovascular / lipid											
service provided	120	21	66	33	34	86	15	18	40	36	11
pharmacists assigned	81	9	44	28	29	52	9	17	33	17	5
	68%	43%	67%	85%	85%	60%	60%	94%	83%	47%	45%
Mental Health											
service provided	126	17	74	35	34	92	19	17	40	36	14
pharmacists assigned	80	8	44	28	26	54	7	14	35	14	10
	63%	47%	59%	80%	76%	59%	37%	82%	88%	39%	71%
General Surgery											
service provided	135	22	76	37	36	99	19	19	43	41	13
pharmacists assigned	85	11	45	29	25	60	15	18	36	13	3
	63%	50%	59%	78%	69%	61%	79%	95%	84%	32%	23%
Pediatric / Neonatal Critical Care											
service provided	91	12	50	29	28	63	12	11	37	23	8
pharmacists assigned	51	3	26	22	25	26	4	8	30	8	1
	56%	25%	52%	76%	89%	41%	33%	73%	81%	35%	13%
Renal / Dialysis											
service provided	90	13	49	28	27	63	11	12	28	30	9
pharmacists assigned	46	3	24	19	17	29	4	7	20	11	4
	51%	23%	49%	68%	63%	46%	36%	58%	71%	37%	44%
Rehabilitation											
service provided	105	15	60	30	23	82	18	11	38	27	11
pharmacists assigned	53	6	29	18	12	41	5	6	30	7	5
	50%	40%	48%	60%	52%	50%	28%	55%	79%	26%	45%
Hematology/anticoagulation											
service provided	112	16	64	32	31	81	17	14	36	36	9
pharmacists assigned	52	5	31	16	13	39	8	9	19	13	3
	46%	31%	48%	50%	42%	48%	47%	64%	53%	36%	33%
Infectious Disease / AIDS											
service provided	106	19	58	29	30	76	15	13	32	34	12
pharmacists assigned	49	8	21	20	21	28	7	9	18	13	2
	46%	42%	36%	69%	70%	37%	47%	69%	56%	38%	17%
Transplantation											
service provided	49	5	24	20	25	24	9	7	15	15	3
pharmacists assigned	22	1	9	12	21	1	2	5	9	4	2
	45%	20%	38%	60%	84%	4%	22%	71%	60%	27%	67%
Gynecology / Obstetrics											
service provided	121	19	68	34	28	93	18	15	39	36	13
pharmacists assigned	52	8	27	17	16	36	8	4	29	7	4
	43%	42%	40%	50%	57%	39%	44%	27%	74%	19%	31%
Diabetes											
service provided	119	21	66	32	31	88	18	15	32	39	15
pharmacists assigned	49	9	24	16	10	39	5	12	17	12	3
	41%	43%	36%	50%	32%	44%	28%	80%	53%	31%	20%
Neurology											
service provided	91	14	49	28	28	63	13	12	31	26	9
pharmacists assigned	36	3	16	17	19	17	4	7	19	3	3
	40%	21%	33%	61%	68%	27%	31%	58%	61%	12%	33%
Asthma/Allergy											
service provided	109	18	60	31	29	80	15	13	32	39	10
pharmacists assigned	40	7	16	17	14	26	4	9	16	9	2
	37%	39%	27%	55%	48%	33%	27%	69%	50%	23%	20%

Figure B-2 illustrates the distribution of the number of inpatient clinical pharmacy services per respondent.

Figure B-2 Proportion of Respondents Providing Inpatient Clinical Pharmacy Services 2005/06



Base: All Respondents (142)

Clinical Practice Models

Over the past 15 to 20 years there has been an ongoing debate over the relative merits of the "traditional clinical pharmacy model" and the "pharmaceutical care model". Nimmo and Holland have argued that the type of pharmacy service offered must be adapted to the needs of the patient[9]. This would cover a range of patients, from those who are capable of managing their own medication therapy, to patients who only need a pharmacist to inform them of the potential problems associated with a medication at the time it is dispensed, to those who require more extensive clinical services. Depending on the patient, clinical services might be delivered using a traditional clinical pharmacy model, or the pharmaceutical care model. The Nimmo Holland model suggests that pharmacy departments should tailor the type of clinical pharmacy services/model that they provide to each patient, based on the needs of the patient and the resources available for the department to deliver clinical services.

- There was an increase in the total number of respondents reporting the use of the pharmaceutical care model for the delivery of patient-oriented pharmacy services to inpatients, from 70% (101/144) in 2003/04 to 82% (116/142) in 2005/06. The increase occurred both in teaching and non teaching hospitals. The average reported percentage of inpatient beds serviced was 35%, compared to 30% of inpatient beds in 2003/04. For hospitals reporting the use of the pharmaceutical care model, the proportion is higher in teaching hospitals (95%, 35/37) vs non teaching hospitals (77%, 81/105) and also higher in hospitals with more than 500 beds (92%, 34/37) than in hospitals with 100-200 beds (59%, 16/27). No notable differences were apparent between hospitals with different drug distribution systems, or between the different regions of the country.

- The proportion of respondents reporting the use of the traditional clinical pharmacy services model for the delivery of patient-oriented pharmacy services to inpatients was very similar to the previous survey - 89% (127/142) in 2005/06 versus 88% (126/144) in 2003/04. The average reported percentage of inpatient beds serviced was 49% in 2005/06, compared to 53% in 2003/04.

- Only minor differences were noted between hospitals with different teaching status, bed size, drug distribution systems or between regions.

- The proportion of respondents reporting that some patients do not receive any patient-oriented clinical pharmacy services was very similar to the previous survey with 80% (114/142) in 2005/06 versus 81% (117/144) in 2003/04. The average reported percentage of inpatient beds not serviced was 34% (range 1-98; median 34) in 2005/06 versus 33% in 2003/04. Again, only minor differences were noted regarding teaching status, bed size and distribution systems. The survey did not capture the potential reasons (e.g. shortage, no needs, etc.) that explain the absence of clinical pharmacy services in a third of inpatient beds in hospitals.

The Canadian Council for Health Services Accreditation (CCHSA) is the organization that evaluates and accredits the services provided by most Canadian healthcare organizations. In 2005, CCHSA published a set of Required Organizational Practices (ROPs) that are intended to help insure the safety of patients under the care of a healthcare facility[10].

One chapter in this document addresses the communication strategies that are required to insure continuity of care as patients move between different parts of the healthcare system. The facility must demonstrate that it has the following processes in place:

1. Patients and their families are informed of their role in insuring the safety of the patient, and are provided with verbal and/or written information concerning the care that the patient is receiving

2. The facility has mechanisms in place to insure the transmission of patient information at critical points in care delivery, such as transitions between sectors of care (e.g. inpatient care, outpatient care, home care, etc.)

3. The facility has verification processes in place for high-risk situations such as the receipt and communication of the results of critical lab tests, etc.

4. The facility has a process in place for reconciling medications when the patient moves between sectors of care, and insuring that the information is communicated to the caregivers who will be assuming responsibility for the care of the patient

- Thirty-seven percent (53/142) of respondents indicated that their pharmacy department has established a policy for seamless pharmaceutical care in 2005/06, up from 28% (41/144) in 2003/04. For those respondents reporting the implementation of a seamless care policy, the proportion was higher in teaching hospitals (54%, 20/37) than in non teaching hospitals (33%, 33/105). The proportion who reported having a seamless care policy was the same (40%) in all regions of the country, except BC where only 20% (4/20) reported having one.

- For hospitals reporting a seamless pharmaceutical care policy, the average percent of patients receiving seamless pharmaceutical was 24.4% (range of 5-100%, median 20%) in 2005/06, which was up from 21% in 2003/04.

- For hospitals reporting a policy for seamless pharmaceutical care, the information was provided to community pharmacists (92%, 49/53), family physicians (83%, 37/53), long-term care facilities (70%, 37/53), home care providers (60%, 32/53) and others (23%, 12/53).

- For hospitals reporting a policy for seamless pharmaceutical care, the information provided included: medications the patient is receiving at discharge (96%, 51/53), medications discontinued during stay (72%, 38/53), relevant drug monitoring parameters and lab values (60%, 32/53), care plan information (55%, 29/53), diagnosis (34%, 18/53) and other (21%, 11/53).

Table B-3 summarizes the clinical pharmacy services by clinical practice models.

Table B-3 Clinical Pharmacy Services - Clinical Practice Models 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Pharmaceutical Care model	116 82%	16 59%	66 85%	34 92%	35 95%	81 77%
Pharmaceutical care % of beds serviced (n=116)	34.6%	25.1%	35.9%	36.4%	50.6%	27.6%
Traditional clinical pharmacy services model	127 89%	27 100%	68 87%	32 86%	30 81%	97 92%
Traditional clinical pharmacy services % of beds serviced (n= 127)	49.1%	45.2%	50.1%	50.3%	41.2%	51.5%
Some patients do not receive any clinical services	114 80%	23 85%	62 79%	29 78%	28 76%	86 82%
No patient-oriented clinical services % of beds serviced (n= 114)	33.7%	46.8%	30.7%	29.4%	24.8%	36.6%
Established Policy for Seamless Pharmaceutical Care	53 37%	10 37%	26 33%	17 46%	20 54%	33 31%
Percent of patients with information transferred (n= 53)	24%	25%	24%	24%	25%	24%
Information is provided to: (n=)	(53)	(10)	(26)	(17)	(20)	(33)
community pharmacists	92%	80%	96%	94%	100%	88%
family physicians	83%	80%	88%	76%	85%	82%
long-term care facilities	70%	70%	73%	65%	65%	73%
home care providers	60%	90%	46%	65%	55%	64%
Other	23%	40%	15%	24%	25%	21%
Information provided includes:						
medications at discharge	96%	90%	100%	94%	100%	94%
medications discontinued during stay	72%	80%	73%	65%	80%	67%
care plan information	55%	70%	46%	59%	65%	48%
relevant drug / monitoring parameter and lab values	60%	70%	54%	65%	70%	55%
diagnosis	34%	30%	23%	53%	45%	27%
other	21%	40%	12%	24%	10%	27%

Evaluation of Clinical Services

In Canada, there are a number of organizations that are involved in promoting the evaluation and improvement of healthcare services. These include CCHSA, regulatory authorities, and professional organizations such as the Canadian Society of Hospital Pharmacists. They encourage high standards of practice through the publication of practice guidelines and standards, professional directives, and continuing education.

- There was a small increase in the total number of respondents reporting the evaluation of the provision of direct patient care pharmacy services - 20% (29/142) in 2005/2006 versus 17% (25/144) in 2003/04.

- The evaluation of direct patient care pharmacy services was reported more often by respondents in teaching (32%, 12/37) and larger bed size hospitals (22%, 8/37) in more than 500 beds, 26%, (20/78) in 201-500 beds, versus 4% (1/27) in the 100-200 bed hospitals.

- For hospitals reporting the evaluation of the provision of direct patient care pharmacy services, four aspects of clinical practice were reported by respondents: documentation (76%, 22/29), implementation of objectives and monitoring plan (62%, 18/29), patient assessment (55%, 16/29) and patient counselling and understanding (34%, 10/29).

- Three methods for evaluation were reported by respondents: retrospective chart review (66%, 19/29), self-evaluation by pharmacists (41%, 12/29) and direct observation (34%, 10/29).

- For hospitals reporting the evaluation of the provision of direct patient care pharmacy services, the proportion of pharmacists who were evaluated was 61% (median 75%) in 2005/06 compared to 42% in 2003/04.

Table B-4 summarizes the evaluation of clinical pharmacy services.

Table B-4 Evaluation of Clinical Pharmacy Services 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Evaluation of direct care services by auditing sample of clinical activities	29 20%	1 4%	20 26%	8 22%	12 32%	17 16%
Evaluation is done by: (n=)	(29)	(1)	(20)	(8)	(12)	(17)
pharmacy managers	12 41%	0 0%	9 45%	3 38%	5 42%	7 41%
pharmacy practice leaders	18 62%	0 0%	14 70%	4 50%	8 67%	10 59%
peers (e.g.. other pharmacists)	13 45%	0 0%	9 45%	4 50%	7 58%	6 35%
Method for evaluation:						
chart review – retrospective	19 66%	0 0%	16 80%	3 38%	10 83%	9 53%
direct observation	10 34%	0 0%	7 35%	3 38%	6 50%	4 24%
self-evaluation by pharmacists	12 41%	1 100%	7 35%	4 50%	6 50%	6 35%
other	11 38%	0 0%	7 35%	4 50%	3 25%	8 47%
Evaluated aspects of clinical practice:						
patient assessment	16 55%	1 100%	12 60%	3 38%	9 75%	7 41%
implementation of objectives and monitoring plan	18 62%	0 0%	16 80%	2 25%	9 75%	9 53%
patient counselling and understanding	10 34%	1 100%	8 40%	1 13%	6 50%	4 24%
documentation	22 76%	1 100%	16 80%	5 63%	10 83%	12 71%
other	7 24%	0 0%	4 20%	3 38%	3 25%	4 24%
Proportion of pharmacists evaluated	60%	80%	55%	72%	43%	73%

Prescribing Rights

The evolution of pharmacy practice is demonstrated most dramatically in the changes that are occurring throughout Canada with respect to prescribing rights. Although the federal government is responsible for the regulatory approval of drugs that can be sold in Canada, each province is responsible for regulating the practice of pharmacy and other healthcare professions that operate within their provincial jurisdiction.

In the past few years a number of provincial jurisdictions have passed legislation that extends prescribing rights to nurses, pharmacists and other healthcare professionals (e.g. Alberta, Manitoba, Quebec). These changes are part of a larger initiative aimed at allowing professionals to fully utilize their training within interdisciplinary models of healthcare delivery.

It is also important to recognize that in most provinces, even those where specific enabling legislation has not been passed; many hospitals have systems in place for delegating prescribing rights to non-physicians.

- There was a small increase in the total number of respondents reporting professionals other than physicians and dentists that prescribe drugs within their organization, up from 67% (96/144) in 2003/04 to 73% (104/142) in 2005/06.

- Regional differences were noted. In Quebec only 40% (17/42) of respondents reported that professionals other than physicians and dentists are prescribing drugs, as compared to BC (95%, 19/20), Ontario (91%, 41/45), Prairies (80%, 16/20) and Atlantic Canada (73%, 11/15). This can partly be explained by the late recognition of nurse practitioners in Quebec.

- For hospitals that reported prescribing rights for other professionals, there was a small increase for nurse practitioners from 47% (45/96) in 2003/04 to 56% (58/104) in 2005/06, and midwives from 45% (43/96) in 2003/04 to 48% (50/104) in 2005/06. There was a minor decrease for prescribing pharmacists from 66% (63/96) in 2003/04 to 63% (66/104) in 2005/06 and for other professionals than the above mentioned groups from 20% (19/96) in 2003/04 to 18% (19/104) in 2005/06.

- Regional differences were noted for nurse practitioners with prescribing rights in Ontario (76%, 31/41), Atlantic Canada (64%, 7/11), Prairies (63%, 10/16), BC (37%, 7/19) and Quebec (18%, 4/17). Regional differences were noted for midwives with prescribing rights - BC (79% , 15/19), Ontario (63%, 26/41), Prairies (31%, 5/16), Quebec (24%, 4/17) and Atlantic Canada (0%).

- Regional differences were also noted for pharmacists with prescribing rights - Quebec (82%, 14/17), Atlantic Canada (73%, 8/11), Ontario (66%, 27/41), Prairies (56%, 9/16) and BC (42%, 8/19).

- For hospitals that reported prescribing rights for pharmacists (63%, 66/104), there was a notable increase in most types of prescribing rights approved for pharmacists. Dependent prescribing for dosage adjustment is by far the most common prescribing right granted to pharmacists and was reported by 79% (52/66) in 2005/06, up from 70% (44/63) in 2003/04. Dependent prescribing for new therapy was reported by 42% (28/66) in 2005/06, a notable increase from 19% (12/63) in 2003/04. Independent prescribing for lab tests was reported by 41% (27/66) in 2005/05, up from 32% (20/63) in 2003/04. Finally, independent prescribing for dosage adjustment was reported by 30% (20/66) in 2005/06, down from 35% (22/63) in 2003/04. It is important to note that these increases occurred despite only a very slight increase in the absolute number of respondents with prescribing rights approved for pharmacists in the previous survey (63 in 2003/04 vs 66 in 2005/06). This suggests that the scope of pharmacist prescribing rights is slowly expanding across the country.

- Regional differences were noted for dependent pharmacist prescribing rights for dosage adjustment in Ontario (85%, 23/27), Quebec (79%, 11/14), BC (75%, 6/8), Atlantic Canada (75%, 6/8) and Prairies (67%, 6/9).

- Regional differences were noted for independent pharmacist prescribing rights for dosage adjustment in Quebec (57%, 8/14), Prairies (33%, 3/9), Atlantic Canada (25%, 2/8), Ontario (22%, 6/27) and BC (13%, 1/8). Regional differences were also noted for independent pharmacist prescribing rights for lab test in Quebec (79%, 11/14), Prairies (44%, 4/9), Ontario (33%, 9/27), Atlantic Canada (25%, 2/8), and BC (13%, 1/8). Lower numbers were noted for independent pharmacist prescribing rights for new therapy in Quebec (14%, 2/14), Prairies (11%, 1/9), Ontario (4%, 1/27), Atlantic Canada (0%) and BC (0%).

- Only minor differences were noted regarding teaching status, bed size and distribution systems.

Table B-5 summarizes the prescribing privileges for other professionals and pharmacists.

Table B-5 Prescribing Privileges 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Other professionals prescribe drugs (other than physicians and dentists)	104	19	58	27	29	75
	73%	70%	74%	73%	78%	71%
Prescribing rights of other professionals (n=)	(104)	(19)	(58)	(27)	(29)	(75)
nurse practitioners	58	11	26	21	25	33
	56%	58%	45%	78%	86%	44%
midwives	50	5	30	15	11	39
	48%	26%	52%	56%	38%	52%
others	19	2	12	5	8	11
	18%	11%	21%	19%	28%	15%
Prescribing rights have been approved for pharmacists	66	7	39	20	19	47
	63%	37%	67%	74%	66%	63%
Prescribing rights approved for pharmacists: (n=)	(66)	(7)	(39)	(20)	(19)	(47)
independent, for lab tests	27	2	20	5	8	19
	41%	29%	51%	25%	42%	40%
independent, for dosage adjustments	20	1	13	6	6	14
	30%	14%	33%	30%	32%	30%
independent, for new therapy	4	0	2	2	2	2
	6%	0%	5%	10%	11%	4%
Dependent, for dosage adjustments	52	6	30	16	13	39
	79%	86%	77%	80%	68%	83%
Dependent, for new therapy	28	2	16	10	10	18
	42%	29%	41%	50%	53%	38%

Priority and Service Level of Clinical Services

In the 1990s and early 2000s, Bond and his colleagues published a number of studies concerning clinical pharmacy services and their impact on mortality, morbidity, length of stay, drug costs and medication errors. Theses studies did contribute to the emergence of evidence-based data on clinical pharmacy practice and can be used to help prioritize clinical pharmacy services.

Recently, Bond et al published a new analysis of the data that they collected in 1998 [11], specifically targeted at the association between clinical pharmacy services and adverse drug reactions (ADRs). These authors reported that 12 of 14 clinical pharmacy services were associated with a reduction in adverse drug reactions. This positive association was particularly strong for admission drug histories, drug protocol management, and ADR management. The work of these researchers also demonstrated an association between pharmacist staffing and the number of ADR experienced by patients. Between the 20th percentile of staffing (0.93 $\pm$ 0.77 pharmacists per 100 occupied beds) and the 100th percentile of staffing (5.16 $\pm$ 4.11 pharmacists per 100 occupied beds) there was a 47.9% reduction in the number of ADRs. In the absence of pharmacist involvement in ADR management, there was a 34.9% increase in the mean number of ADRs/100 admissions, a 13.6% increase in the length of stay, a 53.6% increase in the mortality rate, and an 8.2% increase in drug charges.

In the last survey we asked respondents to identify the clinical pharmacy services available within their organisations and the level of pharmacy services offered. In this survey, we asked the respondents to indicate whether pharmacists participated in ten direct patient care activities (P.C.), three committee participation (C.P.) activities, four drug information/drug use management activities (D.I.), three clinical research (C.R.) activities, and two patient safety/quality improvement activities (P.S.). Respondents were asked to rate the level of each clinical service as follows:

- a score of 1 for a comprehensive service, delivered consistently to all patients requiring the service;
- a score of 2 for a targeted service, delivered to those who most need the service;
- a score of 3 for a limited service, provided only when time and resources permit;
- a score of 4 if the service is not offered.

The lower the mean in the level of service results, the more comprehensive the level of service that the respondents currently reported at their sites.

All respondents (100%, 142/142) were able to indicate the level of clinical pharmacy service provided.

- Table B-6 summarizes the average level of service of 22 clinical pharmacy activities, in descending order, per bed size and teaching status. Some of the clinical pharmacy services provided at a comprehensive level may be given pharmacy attention and resources in response to a regulatory obligation (e.g. P & T Committee, Medication Safety Committee, Infection Control Committee).

- The mean score reported by respondents was lower (i.e. a more comprehensive level of service offered) by at least 0.5 points or more, in favor of teaching vs non-teaching respondents, in the following clinical situations : [C.P.] Medication Safety Committee. [P.C.] Drug therapy evaluation / monitoring. [C.R.] Ethics Review Committee participation. [C.R.] Clinical Trials support. [P.C.] Medication/drug counselling. [D.I.] Formulary Compliance. [P.C.] Medical rounds participation. [D.I.] Inservice Education. [D.I.] Drug Use Evaluation. [P.C.] Admission drug histories. [D.I.] Drug Information and [C.R.] Clinical Research and [P.C.] Seamless Care. A similar pattern was observed for larger bed size hospitals vs smaller bed size hospitals.

- As we discussed in the 2003/04 report, of the clinical pharmacy services identified by Bond et al. as having a positive effect on health outcomes, most of them on average, were not offered on a comprehensive level according to our survey respondents.

    - Bond and al. also suggested that admission histories were associated with a significant improvement in six outcomes (total costs of care (TCC), drug costs (DC), mortality rates (MR), length of stay (LOS), medication errors (ME), adverse drug reactions (ADR), but our respondents seemed to place a low priority on this service. In addition to the evidence to support the value of medication histories, medication reconciliation/seamless care processes, which encompass medication histories, are now included in CCHSA's Required Organizational Practices.

- Similarly, Bond et al's work suggested that pharmacokinetic consultations are not associated with improvements in the quality or cost of care, yet our respondents ranked this service second only to P&T Committee activities in terms of its importance. A number of other clinical pharmacy services, such as participation in medical rounds, medication counselling, and drug therapy evaluation/monitoring showed a similar mismatch between the evidence supporting their effectiveness and the priority ranking that they were given by our respondents.

Table B-6 Average Level of Service 2005/06

**	All Mean	All Std Dev	Bed size			Teaching Status		Expected favorable outcomes of clinical pharmacy services on different indicators according to Bond's studies *					
			100-200	201-500	>500	Teaching	Non teaching	TCC	DC	MR	LOS	ME	ADR
[C.P.] P&T Committee (n = 140)	1.2	0.7	1.3	1.3	1.1	1.0	1.3						
[P.C.] Pharmacokinetic consultations / monitoring (n = 142)	1.8	0.7	2.3	1.7	1.8	1.7	1.8						
[C.P.] Medication Safety Committee (n = 141)	1.8	1.1	2.0	1.8	1.6	1.3	2.0						
[P.S.] Med Incident Reporting/prevention (n = 142)	1.8	0.9	1.7	1.9	1.8	1.6	1.9						
[P.C.] Lab test ordering / Drug dosage adjustment (n = 142)	2.0	0.8	2.2	2.0	2.1	1.9	2.1						
[P.C.] Drug therapy evaluation / monitoring (n = 142)	2.2	0.8	2.7	2.1	1.9	1.8	2.3						
[C.P.] Infection Control Committee (n= 141)	2.2	1.1	2.6	2.3	1.8	1.9	2.3						
[C.R.] Ethics Review Ctee participation (n= 140)	2.2	1.4	2.9	2.2	1.8	1.5	2.5						
[C.R.] Clinical Trials support (n= 141)	2.3	1.2	3.1	2.3	1.7	1.3	2.7						
[P.S.] ADR monitoring (n = 142)	2.3	0.8	2.7	2.2	2.2	2.2	2.3	+					+
[P.C.] Medication / drug counselling (n = 140)	2.4	0.6	2.6	2.3	2.3	2.0	2.5						
[P.C.] Patient education program (n= 142)	2.4	0.6	2.4	2.5	2.4	2.3	2.5						
[D.I.] Formulary Compliance (n= 141)	2.4	1.1	3.0	2.4	2.1	1.9	2.6						
[P.C.] TPN team participation (n = 140)	2.5	1.2	2.7	2.4	2.5	2.3	2.6						+
[P.C.] Medical rounds participation (n= 142)	2.6	0.9	2.7	2.6	2.3	2.0	2.8	+		+			+
[D.I.] Inservice Education (n = 142)	2.6	0.9	2.9	2.6	2.4	2.1	2.8		+				+
[D.I.] Drug Use Evaluation (n = 142)	2.6	1.0	3.1	2.6	2.1	1.8	2.9	+					
[P.C.] Admission drug histories (n = 142)	2.7	0.8	3.0	2.6	2.6	2.3	2.8	+	+	+	+		+
[P.C.] Seamless care services (n = 142)	3.0	0.8	3.2	3.0	2.8	2.4	3.2						
[D.I.] Drug Information (n = 142)	3.0	1.2	3.6	3.2	2.3	1.6	3.5	+	+	+			+
[C.R.] Clinical Research (n = 141)	3.3	0.9	3.7	3.4	2.8	2.5	3.6	+		+			
[P.C.] Cardiopulmonary resuscitation (CPR) team participation (n = 142)	3.8	0.6	3.9	3.8	3.7	3.6	3.8			+			+
Drug protocol management			Non applicable to this survey					+	+		+		+
Increased pharmacy staffing/occupied beds			Non applicable to this survey					+	+		+		+
Affiliation with a teaching program			Non applicable to this survey									+	
Decentralized pharmacists			Non applicable to this survey									+	

**** Total costs of care (TCC), drug costs (DC), mortality rates (MR), length of stay (LOS), medication errors (ME), adverse drug reactions (ADR)***

*****Committee participation (C.P.), clinical research (C.R.), patient safety/quality improvement activities (P.S.), drug information/drug use management activities (D.I.), patient care activities (P.C.)***

While all respondents (100%, 142/142) provided data on the level of clinical pharmacy service provided by their facility, a much smaller number (68%, 96/142) chose to provide a ranking of direct patient care services in the 2005/06 survey (one being the highest priority and 10 being the lowest priority).

Table B-7 summarizes the average level of service and the average ranking priority of 10 direct patient care pharmacy services.

Table B-7 Comparison of Average Level of Service and the Average Ranking Priority of 10 Direct Patient Care Pharmacy Services 2005/06

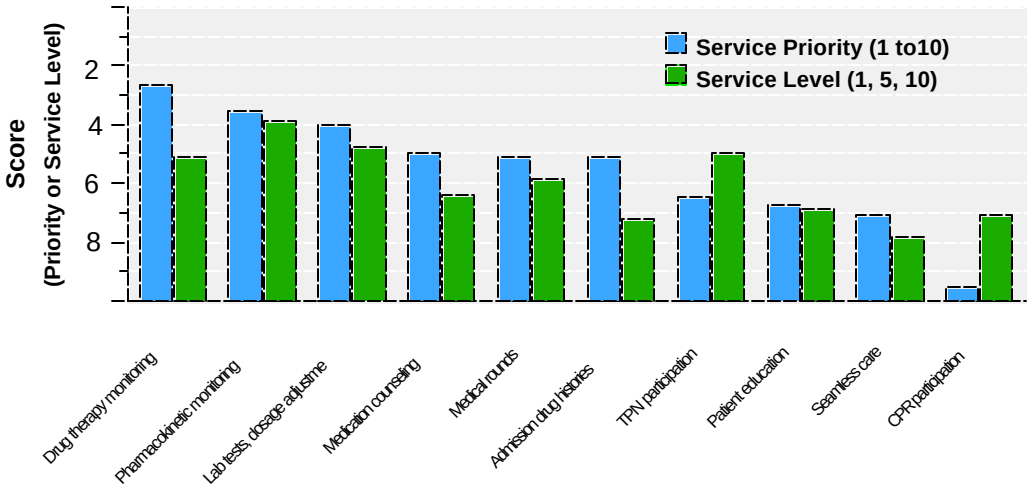
(n=96 who provided both level of service and priority rankings)

	Average level of services (score 1, 2 or 3)		Average priority ranking (score 1 to 10)	
	Mean ± S.D.	Rank	Mean ± S.D.	Rank
[P.C.] Drug therapy evaluation (DTM)/ monitoring	2.0 ± 0.6	2	2.6 ± 1.9	1
[P.C.] Pharmacokinetic consultations / monitoring	1.8 ± 0.7	1	3.6 ± 2.3	2
[P.C.] Lab test ordering / Drug dosage adjustment	2.0 ± 0.7	3	4.0 ± 2.2	3
[P.C.] Medication / drug counselling	2.3 ± 0.6	4	5.0 ± 1.6	4
[P.C.] Admission drug histories	2.6 ± 0.8	8	5.1 ± 2.7	5
[P.C.] Medical rounds participation	2.4 ± 0.9	7	5.1 ± 2.7	6
[P.C.] TPN team participation	2.3 ± 1.2	5	6.5 ± 2.8	7
[P.C.] Patient education program	2.4 ± 0.6	6	6.7 ± 1.7	8
[P.C.] Seamless care services	2.9 ± 0.8	9	7.1 ± 1.9	9
[P.C.] Cardiopulmonary resuscitation (CPR) team participation	3.7 ± 0.7	10	9.5 ± 1.5	10

S.D. = standard deviation

Figure B-3 illustrates the average level of service per direct patient care pharmacy service with the average ranking priority using a similar scale (i.e. we converted the level of service scale (1, 2 and 3) to 1, 5 and 10 scale for comparison purpose). The figure suggests a trend in the same direction between the level of service and the priority ranking given by respondents.

Figure B-3 Clinical Pharmacy Services - Average Service Priority and Level of Service 2005/06



Base: Respondents answering all relevant questions (96)

Although the average numbers trend in the same direction, for almost every service there were respondents who ranked a service number 1 and others who ranked it number 10. Given the discrepancy between the evi dence of effectiveness (e.g Bond's papers and others) and the comprehensive rankings, combined with the wide variability in the priority rankings attached to various services by our respondents, we believe there is a need to develop a profession-wide, evidence-based consensus on the services we should be prioritizing and investing our limited resources in.

Finally, we looked at the ASHP 2015 Initiative and identified several key goals related to clinical pharmacy services where corresponding baseline values could be obtained from our 2005/06 report (Table B-8). Future surveys will be designed to contribute to establishing additional baseline values for hospital pharmacy practice in Canada.

Table B-8 ASHP 2015 Goals and Canadian Baselines from the 2005/06 Hospital Pharmacy Survey

ASHP 2015 goal related to clinical pharmacy services	ASHP goals and objectives for pharmacy practice in health systems to be achieved by 2015(*Baseline)*	Results from the Report on hospital pharmacy in Canada 2005/2006
1.4	75% of hospital inpatients discharged with complex and high-risk medication regimens will receive discharge medication counselling managed by a pharmacist *22.4% (95% CI, 17.0-28.9%)*	Medication/drug counselling service is offered by 2% (3/142) of respondents at a comprehensive level and at a targeted level by a further 61% (87/142)
4.1	90% of health systems will have an organizational program, with appropriate pharmacy involvement, to achieve significant annual, documented improvement in the safety of all steps in medication use. *60.5% (95% CI, 55.4-65.3%)*	Medication Safety Committee is offered by respondents at a comprehensive level by 59% (84/142) and a targeted level by 15% (21/142)

Conclusion

This survey marks two decades of collecting information concerning clinical pharmacy services. Very few questions were asked about clinical services in the early editions of the survey, but the importance of this section has grown as the focus of our profession has shifted from distribution to clinical services. In the coming years we expect that we will be interested in adding new questions to help us document the impact that prescribing rights, specialization, and academic credentialing will have on the services that we provide to patients.

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Drug Information and Drug Use Evaluation

Patricia Macgregor

The survey results for 2005/06 indicated an increase in the percentage and number of respondents that reported having dedicated staff for drug information and drug use evaluation.

- Thirty-seven percent of the respondents reported that they have dedicated staff for drug information and drug use evaluation services, compared to 30% in 2003/04. This represents an increase of ten respondents in the 2005/06 survey that reported having dedicated drug information/drug use evaluation staff in their department, compared to the 2003/04 survey.

- The majority of respondents that reported having these positions were from teaching hospitals and hospitals with more than 500 beds. (Table C-1)

Table C-1 Drug Information and Drug Use Evaluation Services 2005/06

		All	Bed Size			Teaching Status	
			100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)		**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Respondents that have dedicated staff for drug information/ drug use evaluation		53	4	24	25	30	23
		37%	15%	31%	68%	81%	22%
FTE pharmacists for drug information services	**average**	1.4	1.6	0.8	1.8	1.6	0.9
	n	42	2	18	22	29	13
FTE support staff for drug information services	**average**	0.7	0.6	1.0	0.5	0.5	1.0
	n	25	2	9	14	19	6
FTE pharmacists for drug use evaluation services	**average**	1.1	1.1	0.7	1.5	1.3	0.9
	n	48	4	21	23	27	21
FTE support staff for drug use evaluation services	**average**	0.4	1.0	0.4	0.3	0.4	0.5
	n	14	1	7	6	9	5

- For those hospitals that reported having dedicated drug information/drug use evaluation staff, the average reported staffing for drug information services was 1.4 FTE pharmacists, similar to the average of 1.3 FTE pharmacists reported in the 2003/04 report, and 0.7 FTE support staff, which represents a notable increase from the average of 0.4 FTE support staff reported in the 2003/04 report.

- Forty-three percent of all hospitals with assigned drug information positions reported having more than 1 FTE pharmacists. Eighty-three percent of the respondents with more than 1 FTE pharmacist assigned to drug information services were teaching institutions (15/18), and 83% were hospitals with more than 500 beds (15/18).

- BC was the only region of the country where no respondents reported having more than 1 FTE for drug information services.

- The average FTEs assigned to drug utilization services were reported to be 1.1 FTE pharmacists in 2005/06, compared to 0.7 FTE pharmacist in 2003/04, and 0.4 FTE support staff in 2005/06, compared to 0.5 FTE support staff in 2003/04.

Drug Distribution Systems

Janet Harding

Oral Medication Systems

Drug distribution in a hospital is a primary responsibility of the pharmacy department. It requires multiple steps carried out by numerous health care workers with each step susceptible to mistakes and errors that can potentially lead to patient harm. It is the pharmacist's responsibility to advocate for and provide an effective and safe drug distribution system. The Canadian Society of Hospital Pharmacists endorses the Unit-Dose/Intravenous Admixture system as the drug distribution system of choice in organized health care settings.[1]

- There was an increase in the total number of respondents reporting use of unit dose systems from 56% (81/144) in 2003/04 to 69% (98/142) in 2005/06. This is a noticeable change from the previous reported increases of two to three percent between surveys dating back to 1997. The reported increase in use of unit dose systems occurred in hospitals of all bed sizes.

- Unit dose systems that provide service to =90% of beds within their hospital were reported by 38% of respondents, up from 31% in 2003/04 and 24% in 2001/02. These comprehensive unit dose systems are more common in larger hospitals (Table D-1).

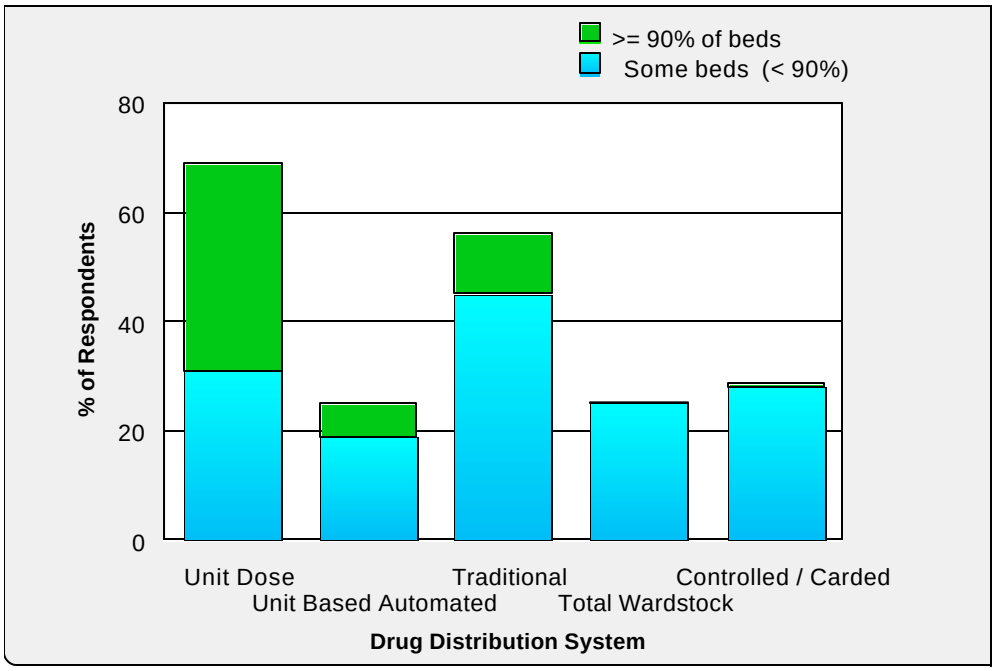
- Regional differences in the use of unit dose systems were noted with 45% (9/20) of respondents reporting a unit dose system in BC, 67% (10/15) in Atlantic Canada, 71% (32/45) in Ontario, 75% (15/20) in the Prairies and 76% (32/42) in Quebec.

Table D-1 Drug Distribution Systems 2005/06

	All	Bed Size			Teaching	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Unit dose	98 69%	13 48%	55 71%	30 81%	29 78%	69 66%
<90% of beds	44 31%	6 22%	25 32%	13 35%	14 38%	30 29%
>= 90% of beds	54 38%	7 26%	30 38%	17 46%	15 41%	39 37%
Unit based automated dispensing system	36 25%	2 7%	20 26%	14 38%	11 30%	25 24%
<90% of beds	28 19%	0 0%	16 21%	12 32%	8 22%	20 19%
>= 90% of beds	8 6%	2 7%	4 5%	2 5%	3 8%	5 5%
Traditional	79 56%	18 67%	39 50%	22 59%	22 59%	57 54%
<90% of beds	63 45%	13 48%	29 37%	21 57%	17 46%	46 44%
>= 90% of beds	16 11%	5 19%	10 13%	1 3%	5 14%	11 10%
Total wardstock	36 25%	10 37%	18 23%	8 22%	6 16%	30 29%
<90% of beds	36 25%	10 37%	18 23%	8 22%	6 16%	30 29%
>90% of beds	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Control/ carded dose	41 29%	13 48%	22 28%	6 16%	3 8%	38 36%
<90% of beds	39 28%	11 41%	22 28%	6 16%	3 8%	36 34%
>= 90% of beds	2 1%	2 7%	0 0%	0 0%	0 0%	2 2%
One system for oral medication for >=90% of beds	80 56%	16 59%	44 56%	20 54%	23 62%	57 54%

- Traditional drug distribution systems were reported to be used for =90% of beds by 11% of all respondents, a decrease from 19% (28/144) in 2003/04 (Figure D-1)

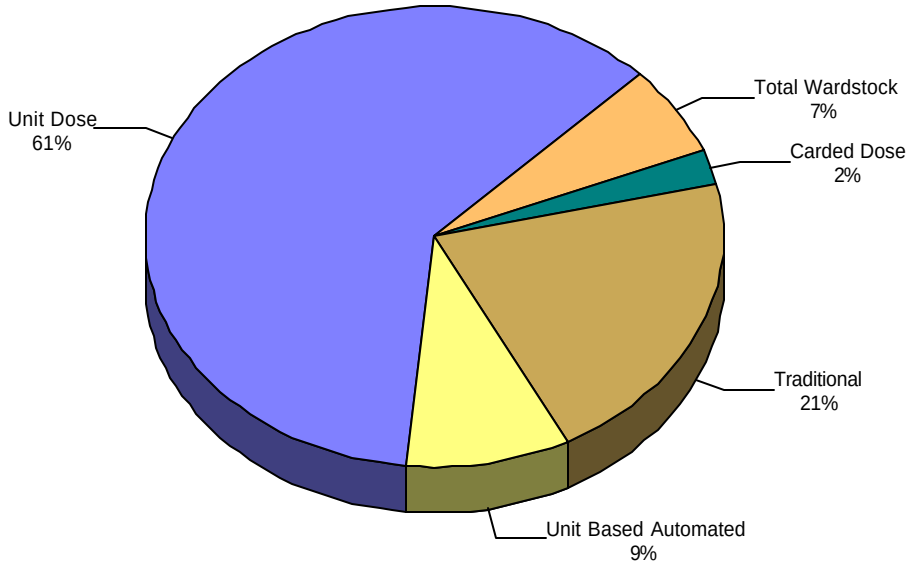
Figure D-1 Drug Distribution Systems 2005/06



Base: All respondents (142)

- Combined data from all respondents indicated that drug distribution to 72% of beds overall was by unit dose, unit-based automated systems or controlled/carded dose, while 28% of beds were provided with traditional or total wardstock drug distribution systems (Figure D-2). In 2003/04, respondents reported 35% of beds were provided with traditional or total wardstock drug distribution systems.

Figure D-2 Proportion of Beds Serviced by each Drug Distribution System 2005/06



Base: All respondents (142)

- Among respondents who reported unit dose drug distribution, 66% (65/98) indicated use of centralized automated dispensing. Regional use of centralized automated dispensing systems were reported by 44% (4/9) of respondents in BC, 53% (8/15) in the Prairies, 63% (20/32) in Ontario, 70% (7/10) in Atlantic Canada, and 81% (26/32) in Quebec.

- Among respondents who reported using centralized automated dispensing systems, 83% (54/65) use a canister type system and 17% (11/65) use a robotic system (five respondents in Quebec, four in Ontario, and one in each of BC and Atlantic Canada).

- The use of unit based automated dispensing systems was reported by 32% (46/142) of respondents, an increase from 20% (29/144) in 2003/04. This includes ten respondents who reported use of unit based automated dispensing systems this survey, but did not provide the percent of beds served by this system. There was little change in the number of respondents reporting use of unit based automated dispensing systems for =90% of beds; six in 2003/04 and eight in the current survey year.

- Among the 46 respondents that reported the use of unit based automated dispensing systems, 80% reported they are used in the emergency department, 54% in critical care units, 43% in the operating room, 39% in general inpatient units and 35% in the recovery room. Other locations where unit based automated dispensing systems were reported in use included mental health units, as well as being used for night cabinets and narcotic cabinets.

In comparison, the use of unit based automated dispensing systems in the United States has increased from 49% of hospitals reporting their use in 1999 to 71% of hospitals in 2005. In addition, 88.9% of hospitals with a unit based automated dispensing system reported the cabinets were linked to their pharmacy computer system in 2005 compared to 32.4% in 1999.[2]

The increased use of unit dose distribution systems and unit based automated dispensing systems indicates pharmacists are playing a leadership role in implementing and managing improved drug distribution systems that enhance patient safety. The increased uptake in use of unit based automated dispensing systems in Emergency Departments, Critical Care areas and Operating Rooms suggests pharmacy departments are employing improved systems for drug distribution that aid in patient safety in areas that typically rely on extensive floorstock supplies. Increased uptake may also indicate these systems are being used to address staff shortages.

Medication Order Entry

- Pharmacists and pharmacy technicians continue to be reported as the categories of personnel who most frequently perform medication order entry (Table D-2). The percent of respondents that reported pharmacy technician medication order entry (78%, 111/142) was unchanged from 2003/04 (78%, 113/144).

- Medication order entry by pharmacy technicians was reported by 95% (40/42) of respondents in Quebec, 90% (18/20) in BC, 80% (12/15) in Atlantic Canada, 71% (32/45) in Ontario and 45% (9/20) in the Prairies. There were no differences between teaching and non-teaching facilities and minimal differences between hospitals of different bed sizes.

Pharmacist review of specific patient medication orders for therapeutic appropriateness should occur, whenever possible, prior to administration of the first dose. This review can occur prior to or after medication order entry into the pharmacy information system. Verification of medication order entry confirms that the entry in the pharmacy information system matches the intended medication order and ensures transcription and/or key-punching accuracy.[3]

- Among those respondents who reported pharmacist medication order entry, 34% (43/126) reported that pharmacist order entry is verified by a pharmacist compared to 41% in 2003/04 and 27% in 2001/02. An additional 8% (10/126) reported that pharmacist order entry is verified by either a pharmacist or a pharmacy technician. Three respondents reported that orders entered by pharmacists are verified by pharmacy technicians (Table D-2).

- There has been a decrease in the percent of respondents who reported that orders entered by pharmacy technicians are verified by pharmacists. Among those respondents who reported pharmacy technician medication order entry, 69% (77/111) reported that pharmacy technician order entry is verified by a pharmacist compared to 87% in 2003/04 and 77% in 2001/02. An additional 5% (6/111) reported that pharmacy technician order entry is verified by either a pharmacist or a pharmacy technician. Five respondents reported that orders entered by pharmacy technicians are verified by pharmacy technicians.

- Fifty-six percent (70/126) of respondents who reported pharmacist medication order entry gave no response when asked about verification of order entry by pharmacists or pharmacy technicians. There was no difference between teaching or non-teaching hospitals or between hospitals of different bed sizes.

- Twenty-one percent (23/111) of respondents who reported pharmacy technician medication order entry gave no response when asked about verification of order entry by pharmacists or pharmacy technicians; 31% (9/29) of respondents from teaching hospitals and 17% (14/82) of respondents from non-teaching hospitals.

Table D-2 Medication Order Entry 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Orders entered by pharmacists	126 89%	25 93%	70 90%	31 84%	34 92%	92 88%
Verified by pharmacist	43 34%	7 28%	26 37%	10 32%	9 26%	34 37%
Verified by pharmacist or technician	10 8%	2 8%	5 7%	3 10%	4 12%	6 7%
Verified by technician	3 2%	1 4%	1 1%	1 3%	1 3%	2 2%
Orders entered by technicians	111 78%	21 78%	58 74%	32 86%	29 78%	82 78%
Verified by pharmacist	77 69%	16 69%	42 69%	19 69%	18 69%	59 69%
Verified by pharmacist or technician	6 5%	0 69%	3 69%	3 69%	2 69%	4 69%
Verified by technician	5 5%	2 69%	1 69%	2 69%	0 69%	5 69%
Orders entered by prescribers, through CPOE	7 5%	1 4%	3 4%	3 8%	4 11%	3 3%
Verified by pharmacist	7 100%	1 100%	3 100%	3 100%	4 100%	3 100%
Verified by pharmacist or technician	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Verified by technician	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Orders entered by other	6 4%	0 0%	3 4%	3 8%	4 11%	2 2%
Verified by pharmacist	4 67%	0 0%	2 67%	2 67%	2 50%	2 100%
Verified by pharmacist or technician	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Verified by technician	1 17%	0 0%	0 0%	1 33%	1 25%	0 0%

- There has been no significant change in the medication order types respondents reported as entered by pharmacy technicians since 2003/04.

- Twenty percent of respondents reported pharmacy technicians do no order entry (Table D-3), which is unchanged from 2003/04.

Table D-3 Medication Order Entry by Technicians 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(142)	(27)	(78)	(37)	(37)	(105)
No order entry by technician	28 20%	3 11%	19 24%	6 16%	8 22%	20 19%
Some Order Entry by Technicians						
Wardstock orders	101 71%	22 81%	51 65%	28 76%	24 65%	77 73%
Verified by pharmacist	56%	50%	61%	54%	67%	53%
Verified by pharmacist or technician	4%	0%	2%	11%	4%	4%
Verified by technician	19%	27%	14%	21%	13%	21%
Traditional prescriptions, new orders	90 63%	21 78%	42 54%	27 73%	21 57%	69 66%
Verified by pharmacist	83%	86%	88%	74%	81%	84%
Verified by pharmacist or technician	4%	0%	2%	11%	5%	4%
Verified by technician	4%	10%	2%	4%	0%	6%
Traditional prescriptions, refills	96 68%	23 85%	47 60%	26 70%	23 62%	73 70%
Verified by pharmacist	55%	39%	62%	58%	65%	52%
Verified by pharmacist or technician	6%	0%	6%	12%	4%	7%
Verified by technician	17%	30%	15%	8%	0%	22%
Unit dose orders	70 49%	11 41%	35 45%	24 65%	19 51%	51 49%
Verified by pharmacist	74%	73%	80%	67%	74%	75%
Verified by pharmacist or technician	6%	0%	0%	17%	11%	4%
Verified by technician	6%	18%	6%	0%	0%	8%
IV admixture orders	85 60%	11 41%	47 60%	27 73%	22 59%	63 60%
Verified by pharmacist	86%	91%	85%	85%	86%	86%
Verified by pharmacist or technician	2%	0%	2%	4%	0%	3%
Verified by technician	1%	0%	2%	0%	0%	2%
TPN Orders	63 44%	10 37%	36 46%	17 46%	17 46%	46 44%
Verified by pharmacist	84%	100%	86%	71%	88%	83%
Verified by pharmacist or technician	5%	0%	3%	12%	0%	7%
Verified by technician	2%	0%	3%	0%	0%	2%
Chemotherapy orders	47 33%	9 33%	26 33%	12 32%	12 32%	35 33%
Verified by pharmacist	94%	100%	88%	100%	100%	91%
Verified by pharmacist or technician	0%	0%	0%	0%	0%	0%
Verified by technician	2%	0%	4%	0%	0%	3%
Outpatient prescriptions, new orders	78 55%	12 44%	42 54%	24 65%	23 62%	55 52%
Verified by pharmacist	92%	100%	90%	92%	96%	91%
Verified by pharmacist or technician	0%	0%	0%	0%	0%	0%
Verified by technician	0%	0%	0%	0%	0%	0%
Outpatient prescriptions, refills	80 56%	12 44%	44 56%	24 65%	25 68%	55 52%
Verified by pharmacist	86%	83%	84%	92%	88%	85%
Verified by pharmacist or technician	1%	0%	2%	0%	0%	2%
Verified by technician	3%	8%	2%	0%	0%	4%

Note: The 3 categories of verification do not add up to 100% because some respondents did not provide responses to the sub-questions asking who verified each type of technician order entry.

- The percent of respondents who indicated that only a pharmacist could verify technician order entry, versus those who permitted technicians to do so, is shown in Table D-3. Respondents were also asked to identify if pharmacy technicians verified medication order entry by pharmacy technicians for the different categories of orders. Among respondents who reported that pharmacy technicians entered wardstock and refills of traditional prescription orders, 23% and 23% respectively reported pharmacy technicians were permitted to verify pharmacy technician order entry. For all other categories of medication orders, verification by pharmacy technicians was minimal.

Medication Tickets and Medication Profiles

- Eight percent of respondents reported the use of manually prepared medication "tickets" or "cards" in =90% of areas and 13% reported partial use. Regional variation was apparent, with use of manual tickets reported by 40% (17/42) of respondents in Quebec, 33% (5/15) in Atlantic Canada, 15% (3/20) in BC, 10% (2/20) in the Prairies, and 9% (4/45) in Ontario.

- Pharmacy medication profiles were reported to include all medications (regularly scheduled, once only, stat and wardstock) prescribed for 90% of patients or more by 88% of respondents (Table D-4). Again, there was regional variation with 100% of respondents in Atlantic Canada, 98% in Quebec, 95% in the Prairies, 82% in Ontario, and 65% in BC reporting complete medication profiles for 90% or more of their patients. This is essentially unchanged from 2003/04.

Despite the advancement of technology, the use of medication tickets remains unchanged from 2003/04. The manual production of tickets or cards places the patient at risk from errors caused by transcription and the quantity and size of medication tickets predisposes the tickets to be easily lost or misplaced. There has also been no change in the number of respondents reporting that pharmacy medication profiles include all prescribed medications even though complete medication profiles facilitate timely identification of potential drug related problems.

Table D-4 Medication Tickets and Medication Profiles 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Manually prepared medication "tickets" or "cards" used						
Yes (>= 90%)	12 8%	1 4%	9 12%	2 5%	4 11%	8 8%
Partial (< 90%)	19 13%	5 19%	10 13%	4 11%	3 8%	16 15%
Pharmacy's medication profiles include all prescribed meds						
Yes (>= 90%)	125 88%	22 81%	70 90%	33 89%	32 86%	93 89%
Partial (< 90%)	14 10%	5 19%	6 8%	3 8%	5 14%	9 9%

Technicians Checking Technicians

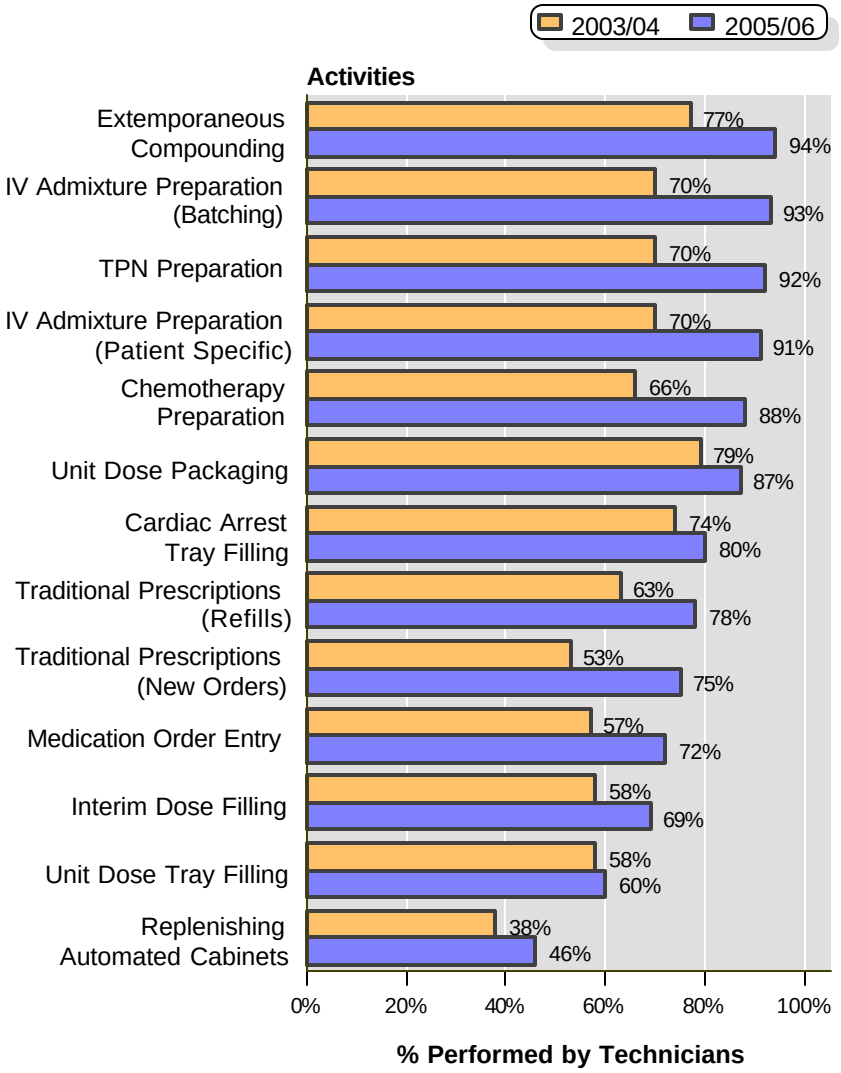
- Ninety-two percent (130/142) of respondents reported pharmacy technicians check the work of other technicians, a slight increase from 87% (125/144) in 2003/04.

- Table D-5 summarizes the functions performed by technicians reported by the 130 respondents who indicated that technicians check the work of other technicians. NOTE: *The percent of respondents indicating the function performed by technicians cannot be compared to Table D-5, 2003/04. In the 2003/04 report, the total number of respondents was used as the base resulting in a lower percent of respondents indicating the function was performed by technicians.* Comparative results for 2003/04 and 2005/06 are presented in Figure D-3. An increase in the percent of respondents reporting that technicians performed the function occurred for all activities.

Table D-5 Technician Activities Checked by Other Technicians and Certification Required 2005/06

	Function Performed (n=130)	Tech Check Tech	Certification Required (where function checked by technician)	
	yes	yes	yes	no
Prepare batch IV Admixtures	121	67	59	8
	93%	55%	88%	12%
Prepare patient-specific IV Admixtures	118	53	46	7
	91%	45%	87%	13%
Prepare TPN Solutions	119	36	30	6
	92%	30%	83%	17%
Prepare Chemotherapy	114	14	12	2
	88%	12%	86%	14%
Package Unit Dose Items	113	92	74	18
	87%	81%	80%	20%
Fill Unit Dose Trays	78	69	57	12
	60%	88%	83%	17%
Fill Interim Doses	90	51	40	11
	69%	57%	78%	22%
Replenish Automated Cabinets	60	42	20	22
	46%	70%	48%	52%
Fill Traditional Prescriptions, Refills	102	63	55	8
	78%	62%	87%	13%
Fill Traditional Prescriptions, New Orders	97	39	32	7
	75%	40%	82%	18%
Perform Medication Order Entry	94	12	9	3
	72%	13%	75%	25%
Fill Cardiac Arrest Trays	104	77	43	34
	80%	74%	56%	44%
Compound Extemporaneous Products	122	60	34	26
	94%	49%	57%	43%

Figure D-3 Functions Performed by Pharmacy Technicians 2005/06

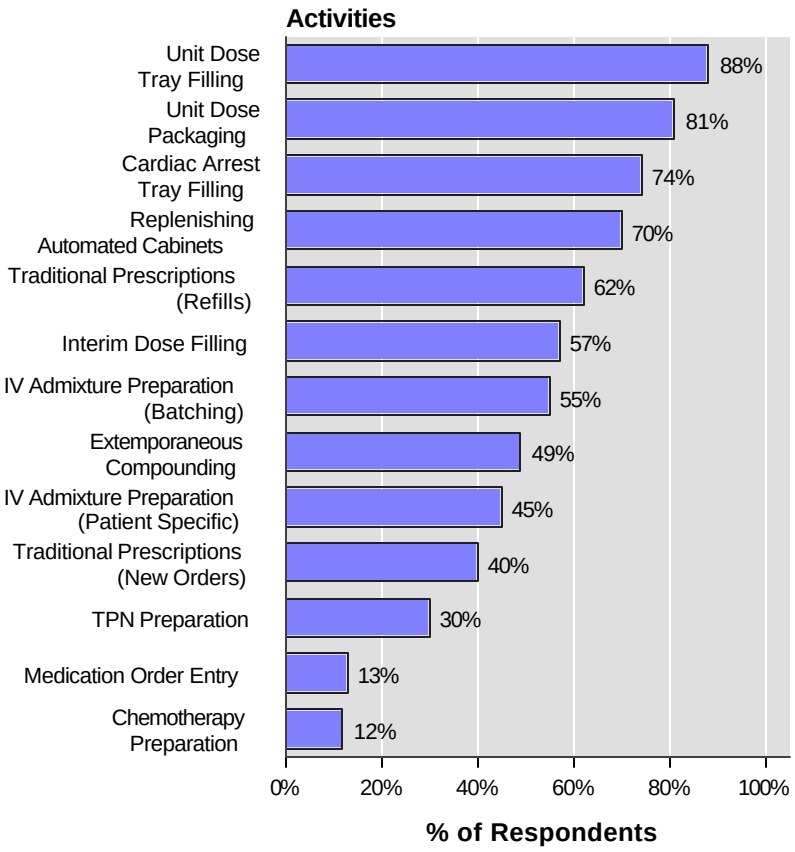


Base: Respondents reporting that technicians check technicians

- All respondents in Ontario (45/45) and Atlantic Canada (15/15), 95% (19/20) of respondents in the Prairies and 90% (18/20) in BC, reported technicians check the work of other technicians compared to 79% (33/42) of Quebec respondents.

- Unit dose tray filling, unit dose packaging and cardiac arrest tray filling were the top three activities for which respondents reported technicians were checking technicians (Figure D-4).

Figure D-4 Technician Activities Checked by Other Technicians 2005/06



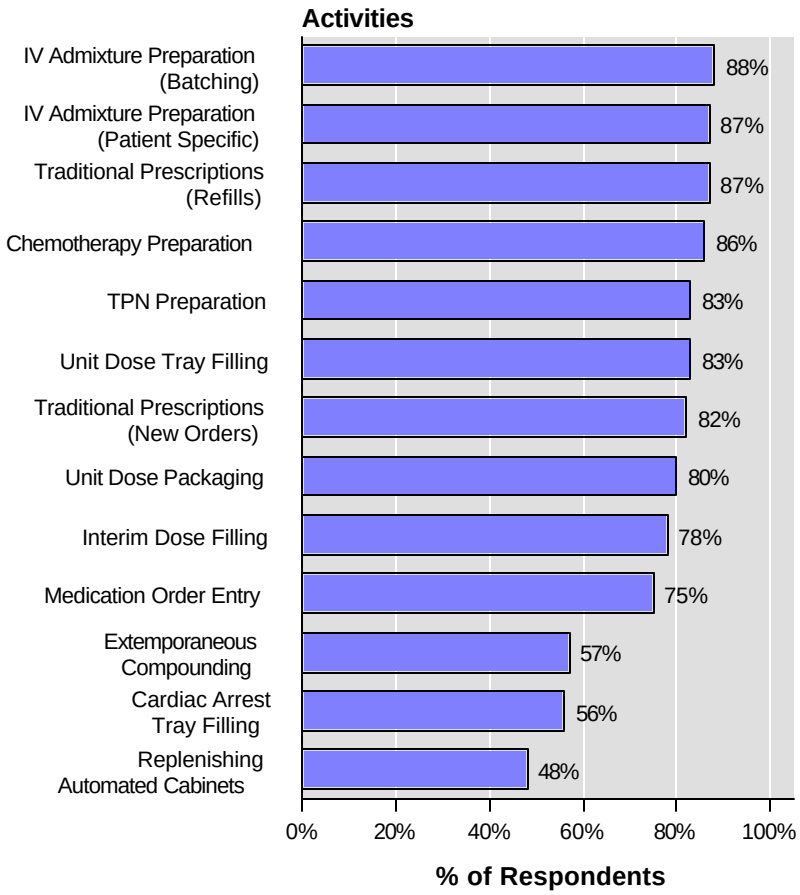
Base: Respondents reporting that function is performed

A certification process, specific to activities delegated to technicians, is recommended by CSHP.[4] Certification ensures technicians are appropriately trained and qualified. It supports the role of technicians checking the work of other technicians and provides a tool for advancing quality in the drug distribution system.

- Technician certification was reported by 85% (121/142) of respondents compared to 71% (102/144) in 2003/04. A consistently applied process for re-certification was reported to be partially in place (<90%) by 31% (37/121) of these respondents and fully implemented (=90%) by 46% (56/121). In 2003/04, 35% (36/102) of respondents who reported technician certification indicated that a process for re-certification was fully implemented at their facility.

- Among respondents who reported that technicians check technicians, 80% or more required certification for IV admixture preparation (patient specific and batching), chemotherapy and TPN preparation, traditional prescriptions (new and refills), unit dose tray filling and unit dose packaging (Figure D-5).

Figure D-5 Technician Certification Required 2005/06



Base: Respondents using technician check technician

Maximizing the scope of practice of pharmacy technicians continues to evolve in the drug distribution system. Making greater use of the pharmacy technician's role in preparing and delivering drug products is consistent with the need to have pharmacists provide and expand activities associated with direct patient care. This is an important evolution for hospital pharmacy as the shortage of pharmacists continues and the expectation of new pharmacist graduates centers around providing direct patient care, not the drug distribution system. The increase in the number of respondents requiring technician certification is indicative of an increased awareness of the role of certification in ensuring technicians are adequately trained and prepared for the activities they are assigned. The accreditation of pharmacy technician training programs and the legislative recognition of pharmacy technicians is expected to influence the delegation of functions in the future and the need for institution specific certification processes.

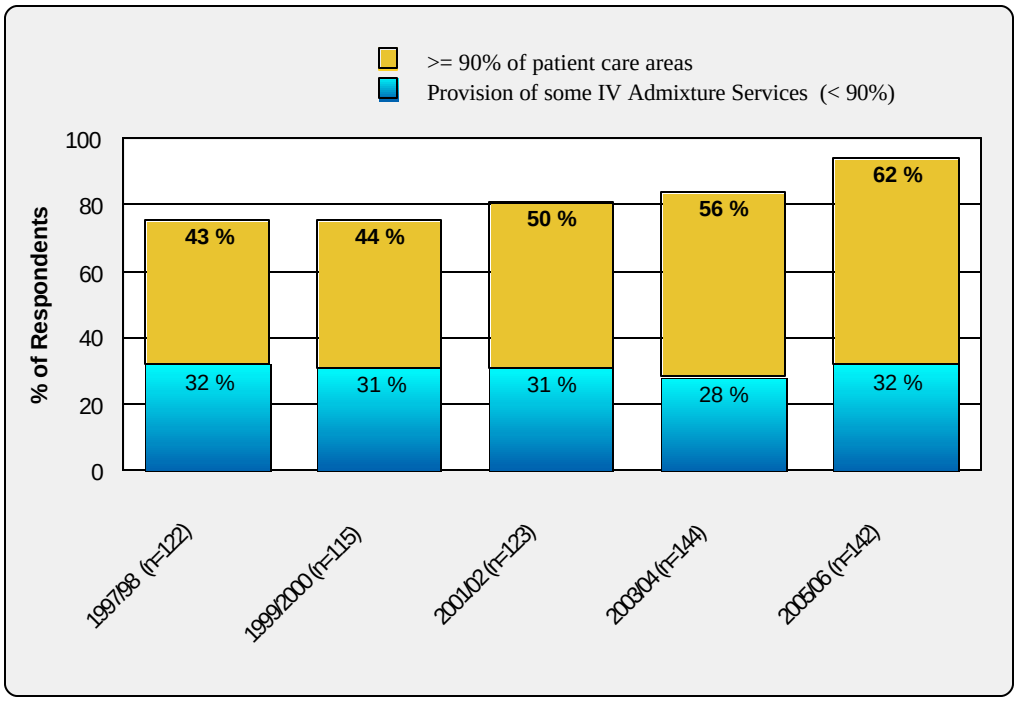
Intravenous Admixture Services

When doses are not available in a ready to administer form from the manufacturer, central preparation of intravenous medication unit doses within the pharmacy department is the ideal way to ensure that these sterile products are therapeutically appropriate, free from microbial, pyrogenic and particulate contaminants, prepared correctly and properly labelled, stored and distributed.[5] It is noteworthy that this recommendation has been in place since 1980.

- The percent of respondents that reported the provision of IV admixture has steadily increased from 75% of all respondents in 1999/2000 to 94% in 2005/06. This upward trend has also occurred for IV admixture services offered to =90% of patients or patient care areas (Figure D-6).

- Comprehensive IV admixture services (=90% of patients or patient care areas) were reported by 81% of respondents in teaching hospitals compared to 55% of non-teaching hospitals. Comprehensive IV admixture was also more commonly reported by respondents in larger hospitals; 70% in >500 beds and 73% in 201-500 beds compared to 19% in 100-200 beds. Regional variation was evident with 76% (34/45) of Ontario respondents reporting a comprehensive IV admixture service, 65% (13/20) in BC, 62% (26/42) in Quebec, 55% (11/20) in the Prairies and 27% (4/15) in Atlantic Canada.

Figure D-6 Percentage of IV Admixture Service Providers 1997/98 to 2005/06



Base: All respondents (142)

- Respondents providing IV admixture estimated that 47% of total parenteral (IV, IM, SQ, epidural) doses administered in their respective institutions were either prepared through the IV admixture service or provided as commercially available, ready to use admixtures (Table D-6). This matches the estimate of 47% reported in 2003/04.

- Respondents providing IV admixture estimated that 50% of the total number of parenteral products/line items carried by their pharmacies were either prepared through the IV admixture service or provided as commercially available, ready to use admixtures.

- In hospitals greater than 500 beds, the estimated percent of doses and products/line items prepared through the IV admixture service or provided as commercially available, ready to use admixtures was almost twice that of hospitals of 100-200 beds.

- Among the 134 facilities where respondents reported the provision of IV admixture, patient care areas receiving the service included the OR (49%), ER (63%), other outpatients (75%), critical care (83%) and other inpatients (95%).

- The provision of antibiotics was reported by 93% of respondents with IV admixture programs, large volume parenterals requiring additives by 76%, H2 blockers by 64% and inotropes by 22%. A wide range of other products, including narcotics, chemotherapy, steroids and antiemetics, were identified by 78% of respondents.

Table D-6 IV Admixture Services and Annual Average Units of Production 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Provision of Some IV Admixture Services	134 94%	22 81%	75 96%	37 100%	37 100%	97 92%
>= 90% of patient care areas	88 62%	5 19%	57 73%	26 70%	30 81%	58 55%
If partial, % of patient care areas serviced (n=42)	39%	37%	32%	56%	50%	38%
Products included in IV Admixture Service						
Large Volume Parenterals	102 76%	13 59%	58 77%	31 84%	29 78%	73 75%
Antibiotics	125 93%	19 86%	69 92%	37 100%	37 100%	88 91%
Inotropes	29 22%	2 9%	16 21%	11 30%	12 32%	17 18%
H2 Blockers	86 64%	10 45%	46 61%	30 81%	32 86%	54 56%
Other	105 78%	16 73%	57 76%	32 86%	32 86%	73 75%
Estimated percentage of doses administered (n=128)	47%	32%	47%	57%	54%	45%
Estimated percentage of line items prepared (n=122)	50%	33%	49%	61%	56%	47%
Annual Units of IV Admixtures Produced						
Average annual IV admixture units - total	95,984 110	13,683 19	68,310 60	199,989 31	216,269 33	44,433 77
Average Inpatient IV admixture units	86,286 56	8,107 12	58,336 29	202,864 15	202,510 17	35,623 39
Average Outpatient IV admixture units	6,963 39	1,908 9	5,682 19	13,312 11	10,786 13	5,052 26
Average Home IV admixture units (including Home Care Patients)	7,577 26	259 7	5,594 12	18,297 7	10,144 7	6,632 19
Average IV production per acute patient day (for facilities serving >= 90%)	0.93 70	0.99 4	0.86 45	1.06 21	1.23 26	0.75 44

- The reported average production of IV admixtures by respondents providing service to =90% of patients was 0.93 admixtures per acute patient day, compared to 1.09 in 1999/2000, 1.19 in 2001/02 and 1.07 in 2003/04.

- The primary method of administering intermittent IV doses has not changed appreciably since the 1997/98 Annual Report; minibag use was reported by 64% (91/142) of respondents, syringe infusors by 27% (38/142), and buretrol/burette by 5% (7/142). Minibag use was highest in BC (90%, 18/20), Ontario (87%, 39/45) and Atlantic Canada (73%, 11/15). Syringe infusors were used more often in Quebec (62%, 26/42) and the Prairies (30%, 6/20).

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Chemotherapy

- Ninety-six percent of respondents reported that IV cytotoxic drugs were prepared and administered in their facility. All of these respondents reported the IV cytotoxic doses were prepared in the pharmacy department.

- The average of reported number of chemotherapy doses in hospitals reporting that parenteral chemotherapy doses were prepared by Pharmacy was 9,223 (Table D-7).

Table D-7 Annual Average Units of Production - IV Chemotherapy 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(117)**	**(21)**	**(63)**	**(33)**	**(35)**	**(82)**
Average Annual units of IV Chemotherapy - total	9,223 117	2,039 21	7,172 63	17,710 33	18,165 35	5,406 82
Average Inpatient IV units	3,329 55	457 7	2,196 30	6,333 18	6,056 23	1,369 32
Average Outpatient IV units	8,746 59	1,739 12	6,978 32	18,123 15	15,715 19	5,435 40
Average Home IV units	772 11	149 2	1,024 6	684 3	220 3	979 8

- The provision of home chemotherapy services was reported by eleven respondents, three in the Prairies, seven in Quebec and one in Atlantic Canada.

- Among respondents reporting the preparation of IV chemotherapy, 98% have written policies and procedures to ensure the health and safety of employees preparing, transporting, administering and disposing of cytotoxic drugs (Table D-8).

Table D-8 Cytotoxic Drugs – Safety Practices 2005/06

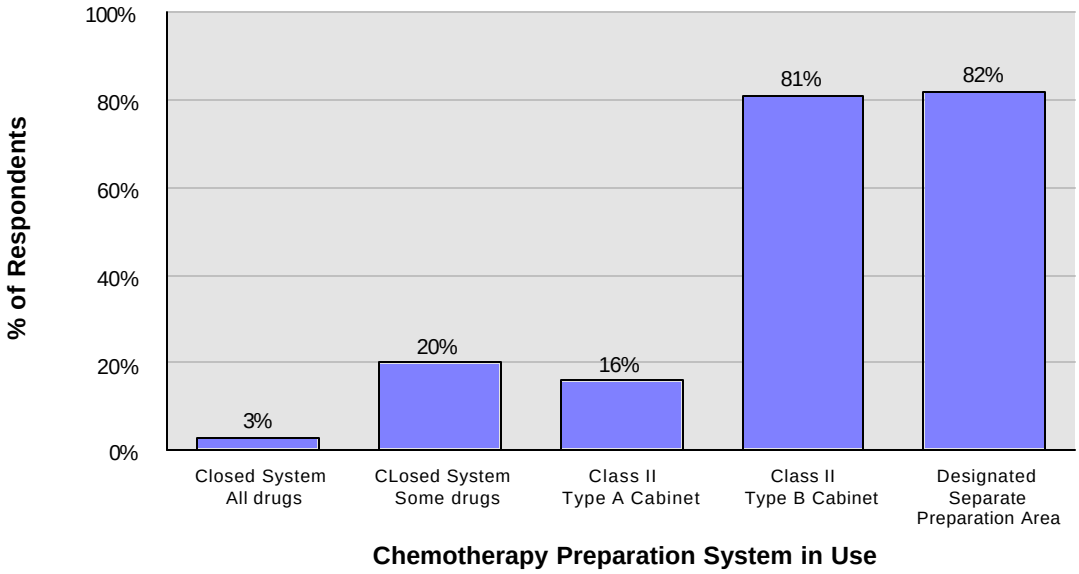
	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
IV chemotherapy prepared and administered by hospital	137 96%	24 89%	76 97%	37 100%	37 100%	100 95%
Parenteral chemotherapy prepared by Pharmacy	137 100%	24 100%	76 100%	37 100%	37 100%	100 100%
Written policies and procedures to insure employee health and safety	(137) 134 98%	(24) 24 100%	(76) 74 97%	(37) 36 97%	(37) 37 100%	(100) 97 97%
Cytotoxic drugs prepared using a closed system						
yes, for some drugs	28 20%	7 29%	12 16%	9 24%	7 19%	21 21%
yes, for all drugs	4 3%	1 4%	2 3%	1 3%	2 5%	2 2%
Cytotoxic drugs prepared in approved biological safety cabinet						
Class II Type A (cabinet air recirculated back into room)	22 16%	5 21%	12 16%	5 14%	6 16%	16 16%
Class II Type B (cabinet air ducted out of the building)	111 81%	18 75%	63 83%	30 81%	30 81%	81 81%
Other	2 1%	1 4%	0 0%	1 3%	0 0%	2 2%
Cytotoxic drugs prepared in a separate designated area						
yes	113 82%	20 83%	63 83%	30 81%	31 84%	82 82%

- Among respondents reporting the preparation of IV chemotherapy, the use of closed systems for preparation of some drugs increased from 13% in 2003/04 to 20% in 2005/06 and were used by 3% of respondents for preparation of all drugs.

- A designated separate chemotherapy preparation area was reported by 82% of respondents who indicated that Pharmacy prepared parenteral chemotherapy doses (Figure D-7).

- Among facilities reporting that Pharmacy prepared parenteral chemotherapy doses, 81% reported use of a Class II Type B Cabinet and 16% use of a Class II Type A Cabinet.

Figure D-7 Chemotherapy Preparation Systems 2005/06



Base: Pharmacy departments where parenteral chemotherapy doses were prepared (137)

Recommendations on the use of biological safety cabinets differ based on provincial Occupational Health and Safety regulations as well as provincial cancer agencies. The BC Cancer Agency states that chemotherapy preparation must take place in a Class II Type B or better, externally vented biological safety cabinet which must have airflow monitoring devices and be certified at least annually. Pharmacists should be familiar with the appropriate measures to protect workers from the dangers associated with cytotoxic drugs as well as the safe preparation of these drugs.

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[1] Canadian Society of Hospital Pharmacists Background Paper: Impact of Hospital Pharmacists on Patient Safety. Ottawa, Ontario, December 2003, available at http://www.cshp.ca.

[2] Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP National Survey of Pharmacy Practice in Hospital Settings: Dispensing and Administration – 2005. Am J Health-Syst Pharm, 2006;63:327-345.

[3] Morbidity and Mortality Rounds on the Web. Agency for Healthcare Research and Quality. Medicine, September 2006. Available at: http://www.webmm.ahrq.gov/case.aspx?caseID=136. Accessed November 7, 2006.

[4] Statement on the Role of the Pharmacy Technician, Canadian Society of Hospital Pharmacists, Ottawa, Ontario, 2001.

[5] American Society of Hospital Pharmacists. ASHP Technical Assistance Bulletin on Hospital Drug Distribution and Control. Am J Hosp Pharm. 1980;37:1097-103.

Drug Purchasing and Inventory Control

Nancy Roberts

Drug Costs

Total spending on drugs in Canada increased by 11% in 2005 to $24.8 billion according to the Canadian Institute for Health Information's (CIHI) annual drug expenditures report. This represented 17.5% of total health care spending in 2005.[1] Drug expenditure growth was higher in 2005 than the 10.9% increase reported in 2004 and the 9.1% increase in 2003. CIHI has identified a wide range of factors contributing to the increase, including:

- the advent of new drug therapies for once untreatable or under-treated diseases, or for disorders once treated by surgery,
- changes in prescription and dispensing practices,
- direct to consumer advertising by industry;
- demographic changes, ranging from the growth and aging of the population to epidemics or emerging new diseases.(1)

In a publication by Benefits Canada it is suggested that future increases in drug utilization will be impacted by pandemics, pharmacogenomics, biotech therapies, sharpened diagnostic capabilities and, perhaps, litigation costs.[2]

In a 2006 study of drug expenditures in BC, it was reported that growth in drug expenditures was primarily driven by the selection of more costly drugs per course of treatment and increases in the number of concomitant treatments per patient.[3] Expenditure per capita grew most rapidly among residents aged 45 to 64 years. The author suggested that the aging of this demographic group may threaten the financial viability of age-based drug benefit programs.[3]

In the Unites States, the rate of increase in prescription drug expenditures in 2004 (8.7%) and 2005 (8.1%) was slower than in Canada, but remained higher than the total projected growth of health care expenditures, including hospitals and physicians, keeping drug costs at the forefront of national health policy discussions.[4] The slowdown in the rate of drug expenditure increases in the US is suggested to be due to a continued trend toward higher prescription drug cost sharing for insured consumers, a decrease in the release of new "blockbuster" drugs in recent years, and the growing availability of generic drugs. Similarly, in 2006 it is anticipated that there will be fewer costly new drugs reaching the market and that an increased concern over product safety will also play a role in slowing the rate of drug expenditure increases.[4]

Perhaps partly as a result of the re-organization and integration of acute care, community-based care, and home care services that has been occurring across Canada, there has been little consistency between provincial jurisdictions, with respect to how drugs are expensed. This is particularly true of certain drugs that are administered in hospital outpatient settings, such as oncology treatments that may be expensed to individual hospitals, a provincial cancer agency, private third party payers, or a public third party payer (e.g. provincial Pharmacare programs). This, coupled with a change in the way that we have classified teaching versus non-teaching hospitals in the 2005/06 Hospital Pharmacy in Canada survey, necessitates that caution be taken when comparing 2005/06 drug expenditure data with that from earlier Hospital Pharmacy in Canada surveys, or when comparing data from different parts of the country.

- The average annual drug costs reported by our respondents in the 2005/06 survey was $9,229,221(Table E-1), which was $1.27 million higher than the average of $7,963,681 reported in 2003/04. This represents a 15.9% increase over the two-year period between surveys.

- Increases in the average annual drug costs were reported for all hospital sizes and types, except 100-200 bed facilities.

- The average acute care inpatient drug costs in the 2005/06 survey were reported to have increased by 17.3% per acute patient day and 16.2% per acute care admission when compared to the 2003/04 survey results. An increase in drug costs per acute patient day was reported for all hospital sizes and types with the most marked change reported in teaching hospitals, where reported costs rose 31.6%, from $40.35 in 2003/04 to $53.11 in 2005/06. This upward shift is most likely attributed to the change in the definition for teaching hospitals in the 2005/06 survey. In 2003/04, 56 sites self-identified themselves as teaching hospitals whereas in the 2005/06 report only 37 sites met the new "teaching hospital" definition, based on the facility's membership in the Association of Canadian Academic Health Care Organizations (ACAHCO).

- The average drug costs per acute care admission increased 16% from 2003/04, which represents an acceleration of the upward trend that has been documented in the past 4 surveys.

- The average drug costs per non-acute patient day reported in the 2005/06 survey were slightly lower at $9.12, compared to $9.30 in 2003/04. However, the average drug costs per non-acute admission increased 20.6% to $1,509 in 2005/06 from $1,251 in 2003/04. The increase was most significant in organizations with 100-200 beds, where the average increased from $889 per non-acute admission in 2003/04 to $1,758 in 2005/06, a 98% increase. This may be linked to increased lengths of stay due to scarce community resources for alternate levels of care (i.e. long-term care facilities and alternative residences) and increased pressure from large acute care sites to transfer low-acuity patients to local community hospitals in an effort to address emergency room congestion and long surgical wait lists.

- The average clinical/medical day unit drug costs per visit were reported at $30.89 in 2005/06, down from $53.83 in the 2003/04, a 46% decrease from the last survey. However, as noted above, the lack of consistency in how drugs are expensed across the country makes it difficult to draw any conclusions between survey years. The decrease in drug costs per visit might be related in some way to the 23% increase in the number of visits reported since the 2003/04 survey.

- The average emergency room drug costs per visit continue to increase from survey to survey, from $4.22 per visit in 1999/2000 to $6.48 in 2001/2002 to $8.01 in 2003/04 to $ 8.33 in 2005/06.

Table E-1 Inventory and Drug Costs 2005/06

	All	Bed Size			Teaching	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Inventory Turnover Rate	10.9 124	7.0 23	11.6 66	12.2 35	12.4 35	10.3 89
Drug Expenses by Patient Care Area						
Total Drug Costs	$9,229,221 122	$1,896,809 20	$6,009,208 68	$19,982,432 34	$20,161,626 35	$4,831,127 87
Inpatient Acute Care	$4,442,880 91	$1,127,562 17	$3,263,786 47	$8,582,802 27	$9,056,544 29	$2,284,876 62
Inpatient Long-Term Care	$359,084 65	$142,134 12	$221,710 34	$741,931 19	$552,229 15	$301,140 50
Clinical/Medical Day Unit	$2,898,046 77	$393,986 13	$2,397,456 42	$5,333,389 22	$4,975,159 24	$1,957,466 53
Emergency Room	$474,176 84	$284,288 15	$383,216 44	$748,201 25	$599,004 27	$415,048 57
Ambulatory (Take Home)	$1,529,655 43	$34,282 3	$421,487 21	$2,990,584 19	$3,332,622 17	$350,793 26
Ambulatory (Retail Pharmacy)	$4,019,623 14	$501,570 1	$682,883 6	$7,382,265 7	$5,843,979 9	$735,782 5
Acute Care Inpatient Costs:						
Drug Costs/ Acute Patient Day	$36.68 85	$28.97 17	$34.14 43	$46.30 25	$53.11 28	$28.62 57
Drug Costs/ Acute Admission	$267 88	$196 17	$250 45	$345 26	$395 28	$208 60
Non-Acute Care Costs						
Drug Costs/ Non-acute Patient Day	$9.12 56	$9.94 11	$8.49 30	$9.80 15	$8.84 12	$9.20 44
Drug Costs/ Non-acute Admission	$1,509 59	$1,759 10	$1,576 32	$1,237 17	$1,709 14	$1,447 45
Other Drug Costs						
Clinic Medical Day Unit Costs / Outpatient Visit (Clinic and Day Unit)	$30.89 73	$16.28 13	$33.43 39	$35.22 21	$16.98 23	$37.29 50
Emergency Room Costs / Emergency Visit	$8.33 82	$8.41 15	$7.92 43	$9.03 24	$8.38 27	$8.31 55

Inventory

- The average reported inventory turnover rate for 2005/06 was 10.9, up from 10.3 in 2003/04. The most significant improvement was seen in sites with 201-500 beds, increasing from 10.8 in 2003/04 to 11.6 in 2005/06.

Changes in Drug Costs

- The number of respondents (n=30) reporting an increase in total drug costs in the one year period from 2004/05 to 2005/06 (Table E-2) was lower than the number reporting an increase in 2003/04 (n=59). However, the average reported percentage increase in total drug costs of 11.8% in 2005/06 was very similar to previous surveys, which reported an increase of 12.9% in 2003/04 and 13.4% in 2001/02. It is interesting to note that the average percentage increase in total drug costs of 11.8% reported in the 2005/06 survey very closely mirrors the 11% increase reported for total spending on drugs in Canada in 2005 by CIHI.

- The number of respondents (n=7) who provided information on the extent of the decrease in total drug costs in 2005/06 was the same as the 2003/04 and 2001/02 surveys. However the average reported decrease in total drug costs in 2005/06 was lower at 3.9%, compared to the 10.1% decrease reported in 2003/04, but similar to the 3.8% decrease reported in 2001/02. This wide variation from survey to survey is most likely due to the small sample size reporting data on drug cost decreases.

Table E-2 Changes in Drug Expenses by Patient Care Area - Percent Change Between Fiscal 2004/05 and 2005/06

	All	Bed Size			Teaching	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Inpatient Acute Care, increase	9.3%	12.7%	9.0%	7.7%	8.2%	9.9%
	52	9	31	12	17	35
Inpatient Acute Care, decrease	5.3%	2.0%	5.0%	7.5%	6.8%	4.5%
	17	3	8	6	6	11
Inpatient Non-acute Care, increase	12.0%	20.7%	11.3%	6.7%	5.8%	14.9%
	31	7	14	10	10	21
Inpatient Non-acute Care, decrease	11.9%	21.7%	11.0%	11.7%	17.1%	10.6%
	16	1	11	4	3	13
Clinical/Medical Day Unit, increase	22.8%	32.2%	26.4%	10.2%	11.3%	28.3%
	49	8	27	14	16	33
Clinical/Medical Day Unit, decrease	5.2%	3.1%	5.3%	7.1%	7.2%	4.4%
	7	2	3	2	2	5
Emergency Room, increase	15.0%	19.1%	13.7%	14.0%	10.5%	17.7%
	37	8	15	14	14	23
Emergency Room, decrease	11.9%	11.8%	12.4%	8.6%	7.6%	13.0%
	24	3	18	3	5	19
Ambulatory (Take Home), increase	29.8%	.	40.3%	12.9%	8.2%	33.7%
	13	0	8	5	2	11
Ambulatory (Take Home), decrease	16.2%	35.0%	11.0%	15.0%	15.1%	16.9%
	13	2	6	5	5	8
Ambulatory (Retail Pharmacy), increase	7.8%	2.0%	10.0%	8.6%	7.8%	8.0%
	7	1	1	5	6	1
Ambulatory (Retail Pharmacy), decrease	15.3%	.	15.3%	.	.	15.3%
	1	0	1	0	0	1
Total Drug Costs, increase	11.8%	11.6%	13.7%	7.5%	8.1%	13.4%
	30	6	17	7	9	21
Total Drug Costs, decrease	3.9%	3.0%	3.6%	6.0%	2.6%	4.1%
	7	1	5	1	1	6

Drug Expense s

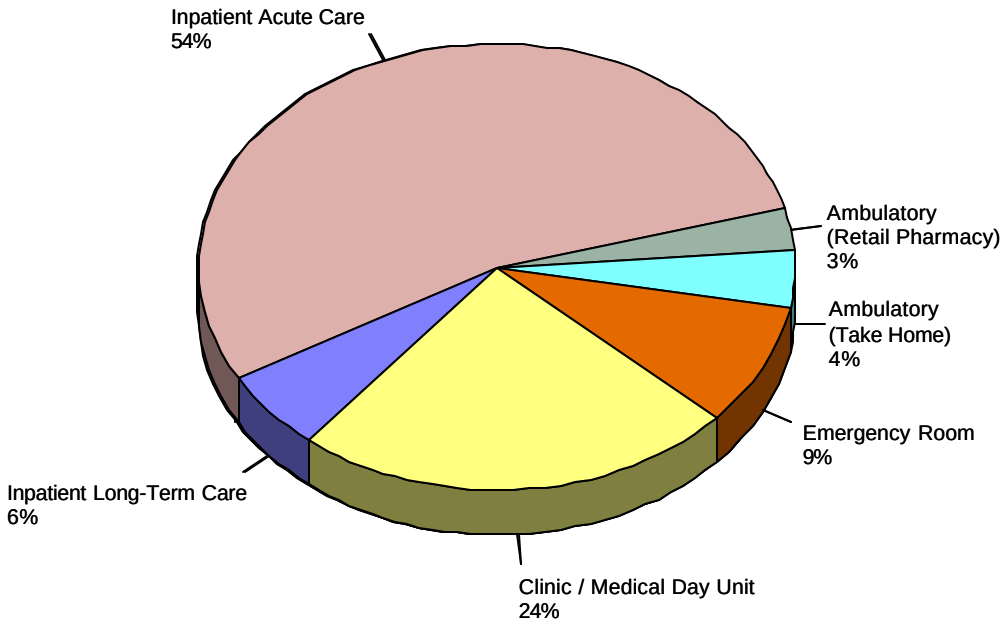
- The average drug expenses for inpatient acute care, as a percentage of the facility's total drug costs, (Table E-3) continued the downward trend that has been reported over the last six year period, from 65% of total drug expenses in 1999/2000, to 53.6% in 2005/06.

- Clinical/Medical Day Unit drug expenses experienced a marked increase between 1999/2000 and 2003/04 surveys, growing from 13% of total drug expenditures in 1999/2000 to 25% in 2003/04. In 2005/06, Clinical/Medical Day Unit drug expenses were 24.4% of total drug expenditures, similar to the 2003/04 results. It should be noted that provincial financing for some clinic/medical day unit drugs (i.e. oncology, nephrology, etc.) varies across provinces and commencing with the 2003/04 survey respondents have been directed to ensure these drug costs were included and reported, even if they are charged out to other payers, to enhance comparability across survey reports. However, some respondents are unable to provide costs for some drugs as the procurement is handled centrally by the province/cancer agency/etc, and the drugs are shipped to the hospitals at no charge.

- The average percentage of emergency room drug expenses was reported at 8.5% of total drug expenses in the 2005/06 survey, up from 7.6% in 2003/04 and 6% in 1999/2000. The adoption of pathways/protocols to support enhanced standards of care and patient safety, coupled with new novel drugs released in the last 6 years may contribute to the continued increase in this area.

- The average percentage of drug expenses for ambulatory (take home) drugs was the only other area, other than emergency room, with a noteworthy increase over the 2003/04 survey results. The average percentage of drug expenses for ambulatory (take home) drugs reported for 2005/06 was 3.6% compared to 2.4% reported in 2003/04.

Figure E-1 Percentage of Drug Expenses by Patient Care Area 2005/06



Base: All respondents who provided relevant drug cost information (91)

Table E-3 Percentage of Drug Expenses by Patient Care Area 2005/06

	All	Bed Size			Teaching	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(142)	(27)	(78)	(37)	(37)	(105)
Inpatient Acute Care (n=91)	53.6%	60.5%	53.4%	49.7%	55.6%	52.7%
Inpatient Long-Term Care (n=91)	5.7%	7.9%	4.3%	6.8%	3.0%	7.0%
Clinical/Medical Day Unit (n=91)	24.4%	13.1%	29.0%	22.7%	21.4%	25.5%
Emergency Room (n=91)	8.5%	15.6%	7.3%	5.6%	3.3%	10.7%
Ambulatory (Take home) (n=91)	3.6%	0.3%	2.3%	8.2%	7.9%	1.6%
Ambulatory (Retail Pharmacy) (n=91)	2.5%	1.0%	1.7%	4.8%	4.8%	1.4%

1 Drug Expenditures in Canada 1985 - 2005. Canadian Institute for Health Information. Ottawa: May 10, 2006. http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=PG_570_E&cw_topic=570&cw_rel=AR_80_E. Accessed 2006 December 16.

2 Dickson, Michael. Benefits Canada. Toronto: Feb 2006. Vol. 30, Iss. 2; p. F2, 1 pgs. http://proquest.umi.com/pqdweb?did=998920231&sid=1&Fmt=3&clientId=48310&RQT=309&VName=PQD. Accessed 2006 December 16.

3 Morgan, Steven G. Prescription drug expenditures and population demographics. Health Services Research. 2006 Apr; 41(2):411-28. ProQuest document ID: 1159980301 http://proquest.umi.com/pqdweb?did=1159980301&sid=1&Fmt=2&clientId=48310&RQT=309&VName=PQD. Accessed 2006 December 16.

4 Lee C.; Schumock, Glen T.; Grim, Penny; Hunkler, Robert J.; Hontz, Karrie M. Projecting Future Drug Expenditures 2006. American Journal of Health-System Pharmacy, 1/15/2006, Vol. 63 Issue 2, p123-38.

Human Resources

Michele Babich

Human resource shortages continue to be a major issue in a number of healthcare professions. These ongoing shortages are reflected in the data for hospital pharmacists, and may have a significant impact on the provision of a wide variety of pharmacy services. The data from this survey indicate that there has been only a slight decline in the total number of pharmacist vacancies, compared to the results reported in the 2003/2004 survey.

With the aging workforce, the number of retirements is expected to increase over the next few years. In this survey the number of pharmacists expected to retire is almost equal to the number of current pharmacist vacancies. This will be a trend that needs to be monitored over time.

Staffing

Several changes were made, in this year's survey, that readers should be aware of as they review the results reported in this chapter. In the 2005/06 survey report, we are reporting staffing ratios as "budgeted hours per patient day", whereas in past surveys we used the term "paid hours per patient day". The methodology we use to determine this ratio has not changed. We have always used budgeted full-time equivalent (FTE) positions to calculate this ratio. We decided to change the name of this ratio to insure that the ratio is properly understood. In earlier years, when positions did not remain vacant for any significant period of time, there was very little difference between "paid" hours per patient day and "budgeted" hours per patient day. "Paid hours per patient day" was a descriptor that was often used interchangeably to describe the resources allocated to, and used by, the pharmacy department. In today's era of manpower shortages, we thought it was important to clarify that the ratio we calculate, budgeted hours per patient day, is an indicator of the human resources that the organization has committed for use by the pharmacy department; a ratio that is not affected by manpower shortages. Low "budgeted hours per patient day" cannot be attributed to manpower shortages, whereas "paid hours per patient day" could reflect either a low staffing allocation to a pharmacy department, or an inability to fill vacant positions. Knowing both the "budgeted hours per patient day" and the vacancy data that is also provided in this report allows the reader to assess both the resources that are committed to the pharmacy department and the pharmacy department's ability to actually acquire and use those human resources. The worst case scenario is one where low budgeted hours per patient day co-exist with high vacancy rates, which appears to be the case for several provincial jurisdictions in this year's report.

For teaching versus non-teaching hospital comparisons, please note that the teaching hospital definition has changed for the 2005/06 survey. The definition of a teaching hospital used in the 2005/06 survey (membership in the Association of Canadian Academic Healthcare Organizations) is more precise than the self-declared method used in 2003/04. As a result, the higher staffing inputs reported for teaching hospitals in the 2005/06 survey are believed to be a more accurate reflection of the human resources required by teaching hospitals. However, the difference between the reported 2003/04 staffing for teaching hospitals (0.89 budgeted hours per patient day) and the reported 2005/06 staffing (1.05 budgeted hours per patient day) may be due to true staffing increases and/or due to the change in the way that teaching hospitals were defined in 2005/06, which moved a number of facilities from the teaching to the non-teaching category.

- Overall, the average of reported budgeted hours per acute care patient day (excluding residents) has increased from 0.74 in 2003/04 to 0.81 in 2005/06 (Table F-1). It had remained constant between the 2001/02 and 2003/04 surveys, but has now resumed the upward trend that was reported in the surveys from 1997/98 through to 2001/02.

- Teaching hospitals reported higher budgeted hours per acute patient day (average of 1.05) than non-teaching hospitals (average of 0.72), as shown in Table F-2. Hospitals with more than 500 beds also reported higher budgeted hours per acute patient day (average of 0.95) than hospitals with 100 to 200 beds (average of 0.76) and hospitals with 201 to 500 beds (average of 0.77). These differences likely reflect the pharmacy resource needs associated with high-acuity, complex clinical programs (e.g. organ transplant programs, high-level critical care, etc.) that are most commonly found in larger/teaching hospitals.

- At the provincial level, the highest level of staffing was in Ontario at 0.96 budgeted hours per acute patient day and the lowest level was in BC at 0.65 (Table F-1). Compared to the 2003/04 survey results, gains in budgeted hours per acute patient day were made in Atlantic Canada (9% in New Brunswick/Prince Edward Island) and in Nova Scotia/Newfoundland (over 20%). Note: Results for Nova Scotia and Newfoundland were reported separately in 2003/04, but were combined in 2005/06 because of the low response rate from Newfoundland and Labrador in 2005/06. Budgeted hours per acute patient day increased in Ontario (14%) and Quebec (14%) whereas BC showed a decrease (8.4%). The Prairie Provinces remained fairly similar to the previous survey. Hospitals greater than 500 beds had an increase in budgeted hours per acute care patient day of 10% and hospitals with 100-200 beds showed an increase of 15%.

- Increases in budgeted hours per acute patient day were reported across all types of drug distribution systems with the largest increases reported in traditional systems (26%) and in the combination of traditional and CIVA systems (35%), as shown in Table F-2. Fewer hospitals in this survey were using traditional systems, in comparison to the last survey (16 vs. 28), and more hospitals were using unit dose systems, in comparison to the last survey (54 vs. 45). This may suggest that a number of hospitals converted to unit dose drug distribution between the two surveys, contributing to staffing increases since the last survey. With medication safety being a high priority nationally and provincially, resources added to facilitate safe practice could also be a driving force behind the increased staffing levels in 2005/06 versus 2003/04.

The above staffing data, presented as "budgeted hour per patient day", allows for a department's overall human resource allocation to be compared to other organizations, using a proxy workload denominator (patient days). However, it does not provide information that allows the staff composition of a pharmacy department to be compared to other departments. 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, and differences in staff composition between different provinces, teaching versus non-teaching respondents, and hospitals of different sizes.

- Management positions have increased from a mean of 1.9 to 2.3 positions per respondent over the past survey. Alberta had the highest average number of management positions at 5.2, likely as a result of the fact that some large health regions in that province reported as a single organization, rather than as individual hospitals.

- The average number of pharmacist positions reported per respondent increased to 17.6 from 16.1 in 2003/04. Alberta reported the highest average number of pharmacists at 26.6, again probably as a result of the regional reporting that occurred in that province. All provinces reported an increase over 2003/04 except BC, which reported a decrease from 13.3 to 11.3 pharmacist positions per respondent.

- The number of technician positions increased from a mean of 18.4 in 2003/04 to 20.6 in 2005/06. Teaching hospitals showed the greatest increase in technician positions from 29.6 to 42.3 over the last survey, a result that may again be partly related to the shift from facility-specific to regional reporting.

- Support personnel showed no significant change except in Alberta, which reported an increase from a reported average of 10 FTEs in 2003/04 to 15.6 FTEs in 2005/06. Alberta has a category of support personnel (Pharmacy Assistants) that would be classified as technicians in many other provinces. This anomaly in Alberta should be considered when comparing technician and support staff resources across provinces.

- As expected, average budgeted pharmacy staffing rises with increased bed size and teaching status. The more labor-intensive drug distribution systems (UD and CIVA) also have higher budgeted pharmacy staffing. This holds true across all categories of staff. Staffing increases from the last survey could be related to more hospitals having UD and CIVA distribution systems. However, as more pharmacies take advantage of automation, the upward trend may not continue, or may even begin to reverse, since automated UD and CIVA systems require less manual labor.

Table F-1 Average Budgeted Pharmacy Staffing by Province 2005/06

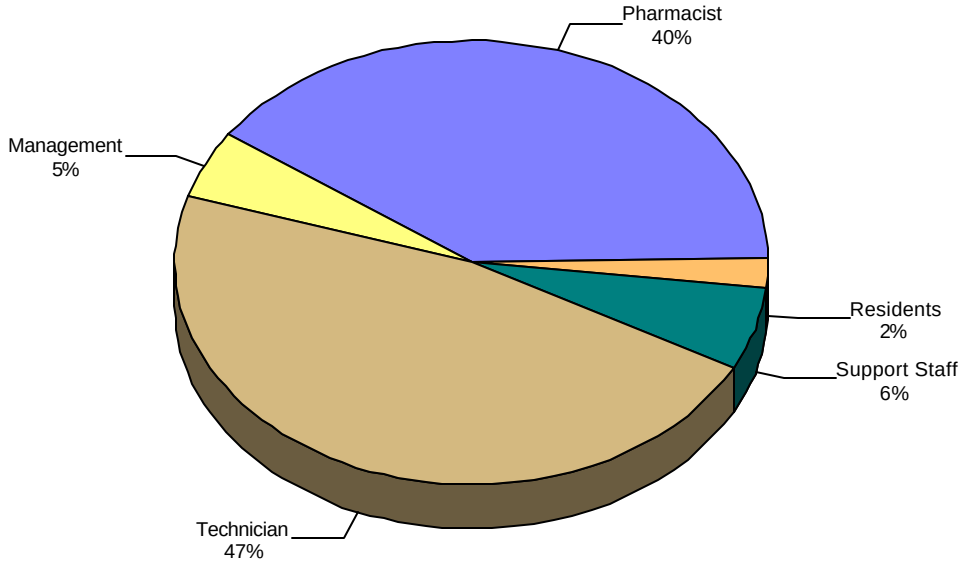
	All	Province							
		BC	AB	SK	MB	ON	QC	NB/ PE	NS/NL
Hospitals (n=)	(142)	(20)	(9)	(4)	(7)	(45)	(42)	(8)	(7)
Pharmacist	17.6	11.3	26.6	22.5	20.8	20.8	15.9	11.9	14.6
Management	2.3	1.9	5.2	3.3	1.7	3.1	1.4	1.6	1.8
Technician	20.6	14.5	28.3	23.5	18.8	26.9	17.0	15.4	15.3
Support Staff	2.8	0.8	15.6	1.7	1.6	2.6	2.0	1.5	1.2
Residents	0.7	0.5	0.7	1.1	0.0	0.7	1.0	0.3	0.4
Total FTE	44.0	29.0	76.5	52.0	42.9	54.1	37.4	30.6	33.3
Total Beds	423	382	582	482	352	439	441	317	276
Budgeted hours/ Acute Patient Day (excluding residents)	0.81	0.65	0.78	0.75	0.74	0.96	0.75	0.73	0.91

Table F-2 Average Budgeted Pharmacy Staffing 2005/06

	All	Bed Size			Teaching Status		Unit Dose	Traditional	CIVA	CIVA & UD	CIVA & Trad
		100- 200	201- 500	>500	Teaching	Non-Teaching	»90%	»90%	»90%	»90%	»90%
Hospitals (n=)	(142)	(27)	(78)	(37)	(37)	(105)	(54)	(16)	(88)	(39)	(9)
Pharmacist	17.6	5.7	13.6	34.4	38.1	10.4	19.1	16.1	20.5	22.7	12.9
Management	2.3	0.8	1.7	4.7	4.6	1.6	2.5	2.0	2.9	3.0	1.8
Technician	20.6	7.2	15.4	40.7	42.3	12.9	22.7	17.0	25.0	27.3	14.6
Support Staff	2.8	0.6	1.5	7.0	7.8	1.1	3.6	1.9	3.4	4.5	2.2
Residents	0.7	0.0	0.4	1.9	2.4	0.1	0.7	0.9	0.9	0.9	0.4
Total FTE	44.0	14.3	32.6	88.6	95.2	26.0	48.5	37.9	52.7	58.4	31.9
Total Beds	423	157	345	781	677	333	478	328	487	548	285
Budgeted hours/ Acute Patient Day (excluding residents)	0.81	0.76	0.77	0.95	1.05	0.72	0.88	0.83	0.87	0.93	0.92

Overall staff composition of pharmacy departments has changed very little from the previous two surveys. The proportions of technicians, pharmacists, management staff, support staff and residents were almost identical to 2003/04 (Figure F-1). The increase in the proportion of technicians reported in the last survey was attributed to expansion of the role of technicians in supporting pharmacy operations. No increase in this report suggests that technicians may be currently practicing near the full scope of their practice.

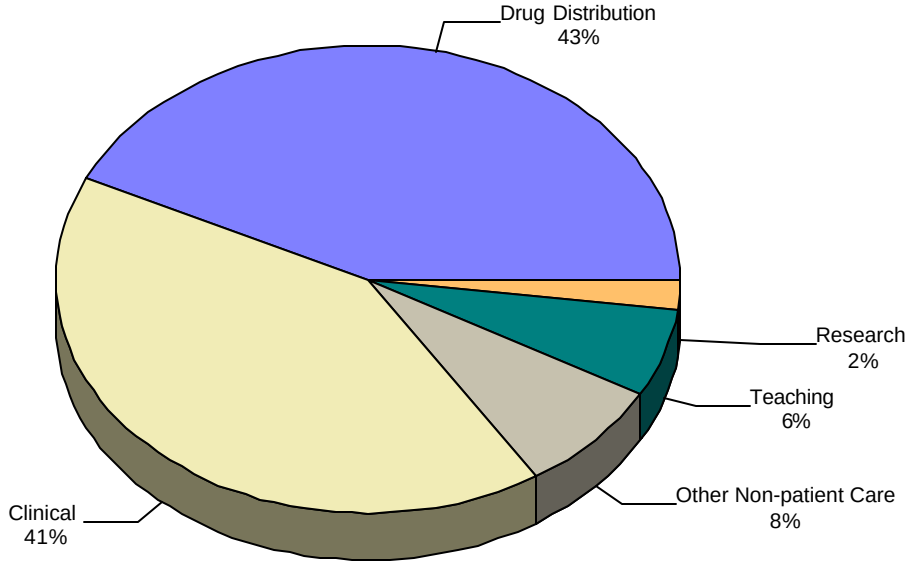
Figure F-1 Staff Composition of Average Hospital Pharmacy Department 2005/06



Base: All respondents (142)

Overall, the proportion of time that pharmacists spend in various functional areas has remained fairly consistent. Respondents reported that pharmacists spent approximately 41% of their time in clinical activities in 2005/06 (Figure F-2, Table F3), compared to 38% in 2003/04. This was offset by less time spent in drug distribution, 43% in 2005/06 compared to 48% in 2003/04. There has been a slow but steady increase in time spent on clinical activities. (Table F-3) The highest proportion of pharmacist time in drug distribution activities was in BC (50%) and Atlantic Canada (49%). Conversely, clinical activities were lowest in BC, Quebec and Atlantic Canada (all less than 40%).

Figure F-2 Proportion of Time Spent by Pharmacists in Each Category 2005/06



Base: All respondents (142)

Table F-3 Proportion of Time Spent by Pharmacists in each Category 1999/00-2005/06

	All	Bed Size			Teaching Status		Previous Surveys		
		100- 200	201- 500	>500	Teaching	Non-Teaching	2003/04	2001/02	1999/00
Hospitals (n=)	(142)	(27)	(78)	(37)	(37)	(105)	(144)	(123)	(115)
Drug distribution (including investigational drugs)	43%	49%	43%	38%	32%	46%	48%	46%	49%
Clinical activities	41%	35%	42%	44%	49%	38%	38%	39%	38%
Teaching	6%	6%	5%	7%	8%	5%	5%	6%	6%
Pharmacy research	2%	1%	2%	2%	2%	2%	1%	2%	1%
Other non-patient care activities	8%	9%	8%	8%	9%	8%	8%	7%	6%

Salaries

In the 2005/06 survey questionnaire dealing with pharmacy salaries, two new staff classifications were added - Practice Leader and Technician Manager. Previous comparisons for these two categories are not available.

- The salaries reported in the 2005/06 report (Table F-4) reflect those that were paid as of March 31, 2006. The average salary per FTE was reported as $57,315 compared to $54,959 for 2003/04 representing a 4.3% (2.1% annual) increase. This is substantially less than the 11.5% (5.6% annual) increase reported in the 2003/04 survey.

- Average salary increases at the top level for all staff ranged from 4.1% (2% annual) to 8.0% (3.9% annual) with the largest increase being reported for Pharmacist Managers at 8% (3.9% annual) and Pharmacy Staff Technicians at 7.8% (3.8% annual).

- Respondents reported staff pharmacists as having an overall salary increase at the top level of 5.6% (2.8% annual). This indicates a downward trend from the previous survey when an increase of 14% (6.7% annual) was reported, which may indicate that hospitals were more reluctant to raise salaries substantially as a means of attracting and retaining pharmacists, despite ongoing pharmacist shortages. The largest salary increases, for staff pharmacists at the top level were in Alberta at 11.3%(5.5% annual) and Nova Scotia/ Newfoundland at 10.3% (5% annual). All other provinces reported changes of less than 9% (4.4% annual). There were no notable differences in staff pharmacist salaries based on bed size or teaching status. Advanced practice pharmacists showed an increase in salary at the top level of 5.1% (2.5% annual) over the last survey.

- Technician salaries at the top level rose by 7.8% (3.8% annual) compared to 5.3% (2.6% annual) in the last survey. Senior technician salaries at the top level rose by only 4.1% (2% annual). Average start and top salaries for Senior Technician are lower than average start and top salaries for Staff Technician because of the high Alberta Staff Technician salaries in the absence of corresponding Senior Technician positions in Alberta.

- The Technician Manager category is new. Respondents reported an average salary at the top level of $55,359 for this category of staff. There was a wide range of average salaries at the top level reported for Technician Managers, ranging from $40,514 in Manitoba to $68,511 in Alberta.

- The mean residency stipend rose considerably by 32% (14.7% annual) to $35,198. Most provinces offered stipends at fairly similar rates to 2003/04, while Alberta, Ontario and Quebec reported marked increases in residency stipends.

Table F-4 Average Annual Salary by Position by Province 2005/06

	All	Province							
		BC	AB	SK	MB	ON	QC	NB/ PE	NS/NL
Hospitals (n=)	**(142)**	**(20)**	**(9)**	**(4)**	**(7)**	**(45)**	**(42)**	**(8)**	**(7)**
Pharmacist Manager									
Start Salary (n=91)	75,471	77,124	97,193	80,750	93,879	80,568	63,573	67,574	64,652
Top Salary (n=98)	91,436	94,948	104,540	87,801	105,360	97,797	84,623	74,095	78,834
Technician Manager									
Start Salary (n=31)	47,930	43,637	58,583	.	33,335	51,012	38,825	.	49,719
Top Salary (n=32)	55,359	45,941	68,511	.	40,514	60,429	51,215	.	52,825
Practice Leader (Pharmacist)									
Start Salary (n=31)	70,560	67,523	95,000	.	.	76,741	54,691	64,360	60,995
Top Salary (n=31)	84,704	84,204	.	78,095	.	90,229	80,050	69,238	70,297
Coordinator / Supervisor (Pharmacist)									
Start Salary (n=52)	67,470	68,583	79,393	72,503	92,815	72,576	53,491	68,222	77,999
Top Salary (n=55)	83,217	87,631	95,089	78,176	92,815	90,297	75,515	71,630	71,539
Staff Pharmacist (B.Sc.)									
Start Salary (n=118)	64,820	59,204	71,946	69,568	86,005	69,919	53,133	62,440	60,865
Top Salary (n=121)	77,969	71,828	89,806	73,669	88,440	83,827	71,784	69,036	68,161
Advanced Practice Pharmacist (Pharm.D. / M.Sc.)									
Start Salary (n=59)	66,663	65,530	81,632	84,435	97,275	73,175	52,866	66,024	74,457
Top Salary (n=61)	80,993	80,922	98,568	84,382	97,275	88,350	72,201	69,238	78,128
Technician - Level 2, Senior									
Start Salary (n=77)	34,969	40,072	.	36,388	37,573	43,241	27,124	32,679	33,922
Top Salary (n=80)	39,862	41,148	.	38,980	40,000	50,588	33,202	35,959	39,477
Technician - Level 1, Staff									
Start Salary (n=100)	36,390	37,761	43,578	33,402	32,188	39,801	27,368	30,954	31,264
Top Salary (n=103)	41,174	39,114	54,567	35,704	37,320	46,437	29,900	32,431	35,617
Resident Stipend, Average (n=40)	35,198	46,997	36,582	37,270	30,000	32,914	32,219	32,325	30,200
Average Salary (Salary budget/ total FTE without residents) (n=127)	57,315	60,693	58,391	60,797	65,215	63,222	50,259	48,543	46,559

- Respondents indicated that 89% of Pharmacy Directors earned over $80,000 in 2005/06 compared to 76% who earned over that amount in 2003/04. (Table F-5). Forty-two percent of Directors reported earning over $100,000 in 2005/06, compared to 15% in the previous survey. The trend of higher salaries for Directors of Pharmacy in teaching hospitals and larger facilities continues with this survey. Overall, Alberta and Ontario provided the highest Directors' salaries.

Table F-5 Distribution of Director Salary Ranges 2005/06

	All	Bed Size			Province							
		100- 200	201- 500	>500	BC	AB	SK	MB	ON	QC	NB/ PE	NS/NL
Hospitals (n=)	(142)	(27)	(78)	(37)	(20)	(9)	(4)	(7)	(45)	(42)	(8)	(7)
under $70,000	1%	0%	1%	3%	5%	0%	0%	0%	2%	0%	0%	0%
$70,000 - $79,999	4%	15%	3%	0%	0%	0%	25%	0%	0%	7%	13%	14%
$80,000 - $89,999	27%	44%	26%	19%	35%	0%	25%	0%	9%	45%	63%	43%
$90,000 - $99,999	20%	15%	23%	19%	35%	0%	25%	29%	18%	19%	25%	14%
$100,000- $109,999	25%	15%	23%	35%	20%	44%	25%	57%	27%	19%	0%	29%
$110,000- $119,999	10%	4%	13%	8%	0%	33%	0%	14%	18%	5%	0%	0%
$120,000- $130,000	6%	0%	5%	14%	5%	22%	0%	0%	13%	0%	0%	0%
$130,000+	1%	0%	0%	3%	0%	0%	0%	0%	2%	0%	0%	0%
no answer	5%	7%	6%	0%	0%	0%	0%	0%	11%	5%	0%	0%

Human Resource Shortages

Both this report and the 2003/04 report present vacancy rates on a weighted basis. These two reports can be compared but comparisons with reports previous to 2003/04 are not being presented in this report, due to that change in methodology.

- Seventy-three percent (103/142) of respondents reported having pharmacist position vacancies at March 31, 2006. (Table F-6) This was somewhat greater than in 2003/04, when 63% of respondents reported that they had pharmacist vacancies.

- Overall, respondents reported a total of 270 pharmacist position vacancies across Canada (Table F-7), which is slightly lower than the reported total of 331 from the 2003/04 survey. This number underestimates the actual number of vacancies in Canada as not all hospitals participated in the survey. British Columbia and New Brunswick/PEI reported the largest increases in pharmacist vacancies compared to the last survey. BC has one of the lowest starting and lowest top level salaries for pharmacists, and has one of the highest costs of living, which may contribute to the high pharmacist vacancy rate in that province.

- Positional vacancy rate for residents this year dropped to 6.2% from 13.8% in 2003/04, with the majority of vacancies in Alberta (21.4%) and Quebec (7.3%). All other provinces reported no residency vacancies. This is generally a favorable trend as the availability of skilled practitioners with post-graduate hospital based education is very important. Hiring of new graduates and pharmacists with only community pharmacy experience, in an effort to reduce vacancy rates, has reduced the proportion of hospital pharmacists with experience and/or postgraduate education. Experienced, well-trained hospital pharmacists, such as those with residency training, are necessary to mentor and train students and less experienced hospital pharmacists.

- There is no one province or region that is clearly in the worst or best position for overall labor shortages. Atlantic Canada has the longest duration of vacancies for pharmacists and BC has the highest average vacancy rate per respondent.

Table F-6 Percent Positions Vacant as of March 31, 2006 (Weighted Averages)

	All	Bed Size			Teaching Status		Province							
		100-200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals (n=)	(142)	(27)	(78)	(37)	(37)	(105)	(20)	(9)	(4)	(7)	(45)	(42)	(8)	(7)
Pharmacists (n=103)	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%
Management (n=97)	7.0%	0.0	11.1%	4.8%	5.0%	9.4%	12.7%	5.4%	0.0	0.0	8.0%	2.6%	8.5%	33.3%
Technicians (n=103)	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%
Support Staff (n=85)	2.6%	0.0	4.4%	2.1%	1.9%	4.7%	0.0	4.4%	0.0	0.0	1.9%	1.8%	0.0	0.0
All positions (without residents) (n=103)	7.0%	9.9%	8.0%	6.0%	5.8%	8.5%	11.3%	8.6%	4.9%	3.5%	5.5%	7.9%	8.7%	6.1%

Table F-7 Total Number of Positions Vacant as of March 31, 2006

	All	Bed Size			Teaching Status		Province							
		100- 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals (n=)	(142)	(27)	(78)	(37)	(37)	(105)	(20)	(9)	(4)	(7)	(45)	(42)	(8)	(7)
Pharmacists (n=103)	270	23	122	124	127	143	40	26	6	10	91	77	19	2
Management (n=97)	19	0	12	7	7	12	4	2	0	0	10	1	1	1
Technicians (n=103)	49	1	18	30	30	19	8	21	4	0	14	2	0	1
Support Staff (n=85)	9	0	4	5	5	4	0	6	0	0	2	1	0	0
All positions (without residents) (n=103)	347	24	156	167	170	177	52	55	9	10	117	81	20	4

Pharmacists

- The average reported vacancy rate for pharmacists in 2005/06 was 13.3%, compared to 12.9% reported in 2003/04. British Columbia and New Brunswick/PEI respondents reported the highest pharmacist vacancy rates (21.7% and 21% respectively). It is interesting to note that these three provinces reported some of the lowest salaries at both the start and top levels of their salary ranges. High vacancy rates are likely primarily due to salaries but may not be related to salary alone. While Manitoba has the highest reported pharmacist salary at the top level, Saskatchewan offers salaries that are mid range, but both provinces reported a 7% pharmacist vacancy rate.

- Nova Scotia/Newfoundland reported the lowest (4.8%) vacancy rate, but this may not be truly representative due to the small number of respondents from these provinces who provided vacancy information.

- The average duration of pharmacist vacancies declined somewhat from 222 days in 2003/04 to 182 days in 2005/06. The average duration reported by respondents from hospitals with greater than 500 beds was 228 days compared to 267 days in 2003/04. The teaching hospital vacancy duration increased to 238 days from 193 days in 2003/04.

Technicians

- The reported vacancy rate for technicians has increased from 0.9% to 2.1% since 2003/04. This is still low compared to pharmacists but the upward trend may be of concern. The increased demand for technicians, due to the pharmacist shortage, could be difficult to meet if this trend continues. The highest vacancy rate for technicians was in Alberta at 9% while Manitoba and New Brunswick/PEI reported no vacancies.

Management

- Management vacancy rates were reported as 7.0% of total management positions, similar to that in 2003/04. The highest reported management vacancy rate was in Nova Scotia/Newfoundland (33.3%) and the lowest was in Saskatchewan and Manitoba (0%).

Retirements in the Next Five Years

- Projection of staff retirements is a new reporting parameter in this survey so there are no comparators from previous surveys. In total, 113 respondents indicated that 252 pharmacists (11.8% of all pharmacists) are expected to retire in the next 5 years. (Tables F-8 and F-9) Retirements may add to the overall vacancy rate that hospitals are now facing and it will be important to address this issue over the next few years. The highest average expected retirements were in the Prairie Provinces (2.9 pharmacists per reporting facility) and the lowest were in Atlantic Canada (1.4 pharmacists per reporting facility). This might be the result of a younger workforce in Atlantic Canada, or could be due to differences in the size of responding facilities in different parts of the country. Demographics of the workforce suggest that a significant percentage of the workforce will reach retirement age in the next 10-15 years.

- A total of 46 (16.2%) management staff are expected to retire in the next 5 years, which is higher than the percentage of pharmacists that is expected to retire during the same time period. This would be expected as more senior individuals usually occupy management positions. This group of managers may be challenging to replace, as it is becoming more difficult to attract pharmacists into leadership positions. More attention needs to be focused on mentoring, coaching and encouraging pharmacists to take on these roles. This particular trend needs to be carefully monitored and acted upon to insure that there are adequate numbers of future pharmacy managers.

- The pharmacy technician workforce is considerably younger than the rest of the pharmacy workforce. The total number of pharmacy technicians expected to retire in the next five years was reported to be 210 (8.4%). Nova Scotia/Newfoundland reported the highest percentage of expected retirements (24.1%) and BC and Alberta reported the lowest percentage (3.6%). As the technician workforce ages, this rate will rise over time.

Table F-8 Percent of Expected Retirements in the Next 5 Years (Weighted), as of March 31, 2006

	All	Bed Size			Teaching Status		Province							
		100-200	201-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals (n=)	(113)	(21)	(57)	(35)	(33)	(80)	(15)	(6)	(4)	(7)	(35)	(34)	(6)	(6)
Pharmacists (n=113)	11.8%	21.0%	13.0%	10.1%	9.2%	15.7%	12.6%	8.5%	21.1%	8.6%	11.1%	13.3%	8.4%	13.1%
Management (n=103)	16.2%	35.9%	12.8%	16.3%	15.7%	16.8%	17.9%	11.8%	61.5%	16.7%	12.5%	8.1%	36.4%	28.6%
Technicians (n=113)	8.4%	15.2%	7.6%	8.2%	7.8%	9.2%	3.6%	3.6%	6.4%	8.4%	9.0%	9.4%	5.6%	24.1%
Total retirements(n=113)	10.3%	18.9%	10.2%	9.5%	8.8%	12.4%	8.3%	6.5%	16.8%	8.8%	10.1%	11.1%	8.5%	19.8%

Table F-9 Total Number of Expected Retirements in the Next 5 Years, as of March 31, 2006

	All	Bed Size			Teaching Status		Province							
		100- 200	201- 500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals (n=)	**(113)**	**(21)**	**(57)**	**(35)**	**(33)**	**(80)**	**(15)**	**(6)**	**(4)**	**(7)**	**(35)**	**(34)**	**(6)**	**(6)**
Pharmacists (n=113)	252	26	103	122	119	133	25	18	19	13	84	76	7	10
Management (n=103)	46	6	13	27	25	21	6	5	8	2	14	4	4	3
Technicians (n-113)	210	23	69	118	113	97	9	8	6	11	89	58	6	23
Total retirements (n=113)	508	55	185	267	257	251	40	31	33	26	187	138	17	36

Summary

This year's survey illustrates that the problem of human resource shortages in Canadian hospital pharmacies is far from over. Based on trends from previous reports, the pharmacist shortage continues and may soon be exacerbated by retirements. A pharmacy technician shortage could be a future manifestation of the pharmacist shortage. Hospital pharmacy continues to struggle to provide appropriate, patient oriented professional practice with limited resources. With anticipated retirements, especially in pharmacy leadership positions, the profession could be faced with a different but equally difficult human resource problem. It will be important to monitor these trends in the next few reports and prepare pharmacists to assume future leadership roles.

Medication Safety

Patricia Lefebvre

In 2005, the Canadian Council on Health Services Accreditation (CCHSA) developed and released six Patient / Safety Goals and 21 Required Operational Practices (ROPs) related to patient safety which are now part of the accreditation program. The Patient / Safety Goals, and the related ROPs[1], are divided into five patient safety domains; culture, communication, medication use, work life / workforce, and infection control. The CCHSA document entitled *Evaluation of Implementation and Evidence of Compliance*, details how surveyors assess compliance with the Patient / Safety Goals and the ROPs.

The results of the 2005/06 Hospital Pharmacy in Canada survey provide a snapshot of current practices related to medication safety. The survey also helps identify initiatives that hospital pharmacists, in collaboration with health care providers and the leaders of their organizations, will need to implement in order to comply with CCHSA's Patient/Client Safety Goals and medication related ROPs.

Medication Incident Reporting System

CCHSA required organizational practices, that fall under the culture domain of patient safety, include:

- establish a reporting system for actual and potential adverse events, including appropriate follow-up;

- implement a formal (transparent) policy and process of disclosure of adverse events to patients/families, including support mechanisms for patients, family and care/service providers.

- Ninety-six percent of all respondents reported use of a medication incident reporting system within their facilities (Table G-1).

The presence of reporting systems in organizations will facilitate future reporting to the national database, the *Canadian Medication Incident Reporting and Prevention System (CMIRPS),* that is currently being developed through a collaborative partnership between the Institute for Safe Medication Practices-Canada (ISMP Canada), the Canadian Institute for Health Information, and Health Canada. The design of CMIRPS is intended to result in a system that embodies the 7 characteristics of successful incident reporting systems, as identified by Leape[2]: non-punitive, confidential, independent of any authority with power to punish, expert analysis, timely, systems-oriented and responsive.

- Seventy-seven percent of those respondents with a medication incident reporting system reported that strategies have been implemented to increase reporting of medication incidents, compared to 67% in 2003/04. Among the respondents who had implemented strategies, reported initiatives included: in-service to promote reporting (90%, compared to 74% in 2003/04), communication of improvements resulting from reporting to general staff (66%, compared to 57% in 2003/04), incident reports made non-discoverable (36%, compared to 27% in 2003/04), incentives to staff for reporting (33%, compared to 33% in 2003/04), and modified performance appraisal instruments to reward, rather than penalize, incident reporting (7%, compared to 11% in 2003/04). A number of respondents commented on the recent implementation of an on-line incident reporting program at their facility, intended to increase reporting by front line healthcare workers. The upward trend in the percentage of respondents reporting that incident reports were made non-discoverable (36% in 2005/06, compared to 27% in 2003/04 and 7% in 2001/02) suggests that the concept of a just culture, with protection for staff who report medication incidents, is taking root in Canadian health care facilities.

- Forty-six percent of respondents (including those who answered "yes" or "partial") indicated that incidents occurring during prescribing, and detected in pharmacy before dispensing, are reported. This is a notable increase from 28% in 2003/04.

- The percentage of respondents who report incident that occurred in pharmacy but were detected before the medication left the pharmacy has almost doubled since 2003/04 (64% in 2005/06, compared to 34% in 2003/04). Results indicate that reporting of this type of "near-miss" (including those who answered "yes" or "partial".) was highest in Atlantic Canada (85%, 11/13), followed by the Prairies (80%, 16/20), Ontario (79%, 35/44), BC (53%, 10/19), and Quebec (38%, 15/40). Among the respondents who reported having a formal process for reporting medication incidents that occurred in pharmacy but did not leave the department, more than half (52%) indicated that those incidents were only reported within pharmacy, and were not submitted to the hospital's incident reporting system. Reporting of "near-misses" provides valuable information that helps to identify and prioritize actions that can be taken to improve the medication-use system.

- Incidents detected on the patient care units, but before administration to the patient, are reported most of the time (≥ 90%) by 75% of respondents, as compared to 66% of respondents in 2003/04. Regional differences are worth noting; in Atlantic Canada 100% of respondents (13/13) reported having a formal process in place for reporting such incidents (>90%), compared to 68% (13/19) in BC and 60% (24/40) in Quebec.

- The percentage of respondents who reported that medication incidents reports can be used during an individual healthcare provider's performance assessment was 12%, compared to 21% in 2003/04 and 32% in 2001/02. None of the teaching hospital respondents reported that medication incident reports can be used during individual performance assessments. This positive change reflects the adoption of a non-punitive "just culture" that has been strongly encouraged by patient safety organizations and many professional associations.

- Eighty percent of all respondents reported having a policy on the disclosure of incidents to patients and/or their families, compared to 63% in 2003/04. Of the 113 respondents with a disclosure policy, 91% document the disclosure of incidents in the health record. The number of respondents reporting that a disclosure policy existed in their facility was highest in the Prairies (95%, 19/20) followed by Ontario (91%, 41/45), Quebec (86%, 36/42), Atlantic Canada (80%, 12/15) and BC (25%, 5/20).

Table G-1 Reporting Systems for Medication Incidents 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
A medication incident reporting system is in use	136	26	74	36	36	100
	96%	96%	95%	97%	97%	95%
Strategies have been implemented, with the goal of increasing the reporting of medication incidents	(136)	(26)	(74)	(36)	(36)	(100)
	105	19	54	32	32	73
	77%	73%	73%	89%	89%	73%
Incidents that occur during prescribing and are detected in the pharmacy before dispensing are reported						
Yes (>=90%)	27	6	15	6	10	17
	20%	23%	20%	17%	28%	17%
Partial (< 90%)	35	4	18	13	10	25
	26%	15%	24%	36%	28%	25%
Incidents that occur in pharmacy but are detected prior to the medication leaving the pharmacy are reported						
Yes (>=90%)	48	10	24	14	14	34
	35%	38%	32%	39%	39%	34%
Partial (< 90%)	39	8	19	12	11	28
	29%	31%	26%	33%	31%	28%
Incidents that occur before medication is administered to patient and are detected in patient care area are reported						
Yes (>=90%)	102	19	57	26	26	76
	75%	73%	77%	72%	72%	76%
Partial (< 90%)	23	4	10	9	8	15
	17%	15%	14%	25%	22%	15%
Medication incident reports can be used during an individual healthcare provider's performance assessment	(142)	(27)	(78)	(37)	(37)	(105)
	17	6	10	1	0	17
	12%	22%	13%	3%	0%	16%
Hospital has a policy on the disclosure of incidents to patients and/or their families	113	21	59	33	35	78
	80%	78%	76%	89%	95%	74%
Disclosure is documented in the health record	(113)	(21)	(59)	(33)	(35)	(78)
	103	21	53	29	34	69
	91%	100%	90%	88%	97%	88%

Medication Incident Review

- Eighty percent of all respondents reported having a designated committee responsible for medication incident review (Table G-2), showing no change from 2003/04. The Prairies lead with 95% (19/20), followed by Ontario (87%, 39/45), Quebec (81%, 34/42), Atlantic Canada (80%, 12/15) and BC (50%, 10/20).

- Among the 114 respondents who reported that a designated committee is responsible for medication incident review, the committees named as responsible for this function (Note: more than one committee could be selected) included the Pharmacy and Therapeutics Committee (48%), Medication Safety/Quality Committee (44%), Risk Management Committee (38%), General Quality Committee (37%), Pharmacy & Nursing Committee (32%), Medical Advisory Committee (18%) and other committees (24%). Results indicate a significant increase in the number of respondents (44% in 2005/06 vs. 17% in 2003/04) who have designated a Medication Safety/Quality Committee to oversee the review of medication incidents.

- A Medication Safety Self Assessment tool was reported to have been completed by 71% of all respondents, compared to 51% in 2003/04. Eighty-six percent of teaching hospitals, compared to 66% of non teaching hospitals reported completing a self-assessment tool. The completion of a self-assessment tool was highest in the Prairies (100%, 20/20), followed by Ontario (87%, 39/45), BC (85%, 17/20), Atlantic Canada (60%, 9/15) and Quebec (38%, 16/42). Of the respondents who reported completing a self-assessment, 91% used the ISMP Hospital Medication Safety Self-Assessment™ tool (ISMP MSSA).

- Thirty-seven percent of all respondents reported that they broadly communicate information regarding the institution's medication incidents to hospital staff and physicians. This practice was more commonly reported by teaching hospital respondents (49%) than by non-teaching hospital respondents (32%).

- Nearly half of all respondents (47%) reported that they broadly communicate information regarding published medication incidents to hospital staff and physicians.

Table G-2 Medication Safety Review and Assessment 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Designated committee responsible for the review of medication incidents	114 80%	23 85%	61 78%	30 81%	33 89%	81 77%
Information regarding the institution's medication incidents is broadly communicated to general staff/ healthcare providers	52 37%	14 52%	28 36%	10 27%	18 49%	34 32%
Information regarding published medication incidents is broadly communicated to general staff/ healthcare providers	67 47%	14 52%	38 49%	15 41%	17 46%	50 48%
A medication safety self assessment has been completed	101 71%	20 74%	56 72%	25 68%	32 86%	69 66%
Type of medication safety self assessment	(101)	(20)	(56)	(25)	(32)	(69)
ISMP	92 91%	19 95%	51 91%	22 88%	30 94%	62 90%
Other	6 6%	0 0%	4 7%	2 8%	2 6%	4 6%

Medication Incident Reduction Strategies - Prescribing, Transcribing and Administration

The Canadian Society of Hospital Pharmacists and the American Society of Health System Pharmacists have both published guidelines on preventing medication errors in hospitals.[3 4]

CCHSA has also identified required organizational practices related to verification and other checking systems for high risk care/service activities, including medication use. ROPs that fall under the medication use domain of patient safety include:

- Remove concentrated electrolytes (including, but not limited to, potassium chloride, potassium phosphate, sodium chloride > 0.9%) from patient/client care units;

- Standardize and limit the number of drug concentrations available in the organization.

Tables G-3 and G-4 provide data on a number of strategies that are recommended to prevent medication incidents.

- Thirty-eight percent of all respondents, compared to 49% in 2003/04, reported that they do not have a policy requiring checking of two patient identifiers before a medication is administered. This percentage was consistent across hospital status and size.

- Sixty-eight percent of all respondents reported that the patient's allergy status is known in =90% of cases prior to a medication order being dispensed, compared to 72% in 2003/04.

- Only 75% of all respondents (including "yes" and "partial" responses) reported that verbal and telephone orders are limited to situations in which the patient is at risk for harm and the physician is unable to physically write the order. This is similar to 2003/04 when 76% of respondents reported that this error reduction strategy was in place. To improve communication among caregivers and enhance patient safety, hospitals should clearly establish limitations on the use of verbal or telephone orders.

- Forty-four percent of all respondents reported that most of the time (= 90%), medication orders remain conditional until reviewed by a pharmacist. Medication order review by a pharmacist prior to the medication being administered, including the evaluation of the appropriateness of the order against the current medication profile for a specific patient, is a key element of safe medication practices. Fifty-six percent of respondents reported a double check procedure was in place (= 90% of time) to validate medication orders entered into the Pharmacy information system against the paper, fax or electronic physician order. An additional 19% reported that a partial verification system (<90%) was in place.

- Eighty-seven percent of all respondents reported a formal process was in place to review and approve pre-printed medication orders and 77% of all respondents reported having a process to review and approve infusion charts and guidelines. Less than half of the respondents (42%) reported that a formal process was in place to review and approve physician order sets. The implementation of physician order sets requires validation by a formal committee within the organization, to ensure safe practices.

- Establishment of a designated list of dangerous abbreviations that are not accepted in the institution was reported by 58% of all respondents, a notable increase from the 40% reported in 2003/04. The use of nonstandard or ambiguous abbreviations has lead to medication incidents. Hospitals are encouraged to establish a list of abbreviations that should not be used. JCAHO[5] and ISMP[6] have published lists of abbreviations that have been associated with incidents, to assist hospitals in establishing their lists.

Table G-3 Medication Safety Strategies - Prescribing, Ordering, Transcribing 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Policy requiring that two patient identifiers (neither to be the patient's room number) are checked before administering medications						
Yes (>=90%)	57 40%	12 44%	30 38%	15 41%	18 49%	39 37%
Partial (< 90%)	23 16%	5 19%	12 15%	6 16%	4 11%	19 18%
The patient's allergy status is know prior to a medication order being dispensed						
Yes (>=90%)	97 68%	18 67%	57 73%	22 59%	23 62%	74 70%
Partial (< 90%)	39 27%	8 30%	16 21%	15 41%	14 38%	25 24%
Verbal and telephone orders are limited to situations in which the patient is at risk for harm and physician is unable to physically write an order						
Yes (>=90%)	60 42%	15 56%	30 38%	15 41%	15 41%	45 43%
Partial (< 90%)	47 33%	5 19%	28 36%	14 38%	15 41%	32 30%
A medication order remains conditional (i.e. no labels printed or drug dispensed, no update of profile or MARs, or access to automated dispensing units) until reviewed by a pharmacist						
Yes (>=90%)	63 44%	13 48%	33 42%	17 46%	15 41%	48 46%
Partial (< 90%)	43 30%	5 19%	27 35%	11 30%	15 41%	28 27%
When medication orders are entered into the Pharmacy information system (PIS) from a paper, fax or electronic copy, there is a double check to verify the accuracy of the computer order entry						
Yes (>=90%)	80 56%	18 67%	39 50%	23 62%	17 46%	63 60%
Partial (< 90%)	27 19%	3 11%	18 23%	6 16%	10 27%	17 16%
There is a formal process to review and approve						
Pre-printed medication orders	124 87%	25 93%	67 86%	32 86%	35 95%	89 85%
Physician order sets (i.e. for computer order entry)	60 42%	8 30%	36 46%	16 43%	16 43%	44 42%
Infusion dosage charts and guidelines	109 77%	18 67%	61 78%	30 81%	31 84%	78 74%
There is a list of dangerous abbreviations that are not accepted in the institution	83 58%	18 67%	41 53%	24 65%	27 73%	56 53%

- Sixty-one percent of all respondents reported that they have identified a list of high-alert medications, a notable increase over the 38% in 2003/04 who reported that they had such a list. Of the 87 respondents with a list, 80% have developed a policy describing the safety procedures that are to be used within the organization for high-alert medications. High-alert medications are ones that have frequently been associated with medication incidents that result in patient harm. The list of the most commonly reported products by level of harm, extracted from the MEDMARX report: (*A Chartbook of 2000-2004 Findings*[7]) and the ISMP list of high-alert medicines[8] can assist hospitals in establishing their list of high-alert medications. (Table G-4)

- All respondents in BC and the Prairies have removed concentrated KCl, compared to 93% in Ontario (42/45) and Atlantic Canada (14/15) and 60% (25/42) in Quebec. Sixty-five percent of all respondents reported that they have removed concentrated narcotics from patient care units. This percentage reaches 85% (17/20) in the Prairies and 79% (33/42) in Quebec where incidents leading to narcotic related deaths lead to formal reviews and province-wide implementation of safety strategies intended to prevent the recurrence of similar incidents. ISMP Canada, in collaboration with the Ontario Hospital Association and the Ontario Ministry of Health and Long Term Care, conducted a Medication Safety Initiative that resulted in the publication of a document entitled 'System Safeguards to Prevent Error-Induced Injury with Narcotics (Opioids)'[9]. This is a very useful tool for helping organizations to review their processes related to the use of narcotics.

- More than half of the respondents (53%) reported that they have removed all other concentrated electrolytes (e.g., hypertonic saline) from patient care units.

- Seventy-five percent of all respondents reported that they have standardized and limited the number of available heparin infusion concentrations, compared to 81% in 2003/04. Standardization of infusion concentrations for morphine was reported by 57% of all respondents, compared to 47% in 2003/04. For hydromorphone, 53% of all respondents reported standardization of infusion concentrations, compared to 41% in 2003/04. Forty-eight percent of all respondents indicated that they had standardized insulin infusion concentrations, compared to 47% in 2003/04.

Table G-4 Medication Incident Reduction Strategies - Preparing, Dispensing, Administration 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
The hospital has identified a list of high-alert medications	87 61%	17 63%	44 56%	26 70%	29 78%	58 55%
Policy that describes the safety procedures for specific high-alert medications that are used	(87)	(17)	(44)	(26)	(29)	(58)
Yes	70 80%	14 82%	34 77%	22 85%	27 93%	43 74%
No	17 20%	3 18%	10 23%	4 15%	2 7%	15 26%
The hospital has removed one or more of the following concentrated medications from patient care units in at last 90% of cases	(142)	(27)	(78)	(37)	(37)	(105)
KCl	121 85%	26 96%	64 82%	31 84%	35 95%	86 82%
All other concentrated electrolytes (hypertonic saline)	75 53%	17 63%	41 53%	17 46%	19 51%	56 53%
Concentrated narcotics	92 65%	16 59%	50 64%	26 70%	22 59%	70 67%
The hospital has standardized and limited the number of available infusion concentrations for the following high-alert medications, and these standardized concentrations are used in at least 90% of cases for						
Heparin	106 75%	18 67%	60 77%	28 76%	28 76%	78 74%
Morphine	81 57%	12 44%	46 59%	23 62%	23 62%	58 55%
Hydromorphone	75 53%	10 37%	45 58%	20 54%	21 57%	54 51%
Insulin	68 48%	11 41%	40 51%	17 46%	18 49%	50 48%

Medication Reconciliation

Medication reconciliation is a practice designed to prevent medication errors at transition points in care such as admission to, or discharge from, a hospital. It has been identified as a key component of the seamless care process in the Canadian Society of Hospital Pharmacists/Canadian Pharmacist Association Joint Statement on Seamless Care[10] and is one of the six interventions in the *Safer Healthcare Now!* Campaign that is underway across Canada.

CCHSA has identified two required organizational practices relating to Medication Reconciliation. They are:

- Reconcile the patient's/client's medications upon admission to the organization, with the involvement of the patient/client

- Reconcile medications with the patient/client at referral or transfer, and communicate the patient's/client's medications to the next provider of service at referral or transfer to another setting, service, service provider, or level of care within or outside the organization.

The Institute for Healthcare improvement defines Medication Reconciliation as *"a formal process of obtaining a complete and accurate list of each patient's current home medications – including name, dosage, frequency and route - and comparing the physician's admission, transfer, and/or discharge orders to that list. Discrepancies are brought to the attention of the prescriber and, if appropriate, changes are made to the orders. Any resulting changes in orders are documented."*[11].

The Massachusetts Coalition for the Prevention of Medical Errors identified medication reconciliation as a three-step process[12]:

1. Creating the most complete and accurate list possible of all pre-admission medications for each patient;

2. Using that list when writing medication orders, and;

3. Comparing the list against the physician's admission, transfer, and/or discharge orders, identifying and bringing any discrepancies to the attention of the physician and, if appropriate, making changes to the orders.

A *"Getting-started kit: Medication Reconciliation - How-to-Guide"* has been published as part of the Safer Healthcare Now Campaign to support organizations in their implementation of the medication reconciliation process [13]. (www.saferhealthcarenow.ca)

- Nearly half of the respondents (45%) reported conducting a comprehensive medication history of all home medications when a patient visits the Emergency Department (Table G-5). Of the 64 respondents conducting comprehensive medication histories in the ER, 94% reported that nurses conducted medication histories, 80% reported that physicians conducted medication histories, and 47% reported that pharmacists conducted medication histories. The conducting of a comprehensive medication history in the Emergency Department was highest in Quebec (52%, 22/42) followed by Ontario (49%, 22/45), Atlantic Canada (47%, 7/15), the Prairies (40%, 8/20) and BC (25%, 5/20). Among those respondents who reported that a medication history was conducted, the medication history was created using information provided by the patient/family (100%), information contained on prescription containers (98%), information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies (64%) and information obtained from the patient's primary care physician (52%). All respondents in BC who obtain a medication history in the ER (5/5), reported using the information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies, followed by Ontario (91%, 20/22), the Prairies (88%, 7/8), Quebec (36%, 8/22) and Atlantic Canada (14%, 1/7).

- Forty-five percent of the respondents who conducted medication histories in the Emergency Department reported reconciling the patient's medication history with medication orders written at the time of the ER visit.

Table G-5 Medication Incident Reduction Strategies - Comprehensive medication history 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
When a patient visits the Emergency Department:						
A comprehensive medication history of all home medications for each patient is conducted	64 45%	11 41%	38 49%	15 41%	18 49%	46 44%
Medication history is carried out by:	(64)	(11)	(38)	(15)	(18)	(46)
Nurse	60 94%	11 100%	36 95%	13 87%	15 83%	45 98%
Physician	51 80%	11 100%	29 76%	11 73%	16 89%	35 76%
Pharmacist	30 47%	5 45%	19 50%	6 40%	8 44%	22 48%
Other	3 5%	0 0%	1 3%	2 13%	1 6%	2 4%
Medication history is created using:						
Information provided by the patient/family	64 100%	11 100%	38 100%	15 100%	18 100%	46 100%
Information contained on prescription containers brought to the ER	63 98%	11 100%	38 100%	14 93%	17 94%	46 100%
Information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies	41 64%	6 55%	23 61%	12 80%	11 61%	30 65%
Information obtained from the patient's primary care physician	33 52%	7 64%	23 61%	3 20%	9 50%	24 52%
The patient's medication history is reconciled with medication orders written at the timeof admission or ER visit	29 45%	4 36%	18 47%	7 47%	10 56%	19 41%

- Almost half of the respondents (42%) who reported that they conducted a comprehensive medication history of all home medications when a patient is admitted to the organization. Atlantic Canada led with 60% (9/15), followed by Ontario (44%, 20/45), the Prairies (40%, 8/20), Quebec (38%, 16/42) and BC (30%, 6/20). Of the 59 respondents conducting a comprehensive medication history when a patient is admitted, 93% reported that medication histories were carried out by nurses, 68% by physicians, and 59% by pharmacists. Physicians (88%) and pharmacists (81%) were more likely to conduct medication histories in teaching hospitals than in non teaching hospitals (physicians 60% and pharmacists 51%). Having a pharmacist complete the medication history has been shown to improve the accuracy of the information. One respondent mentioned the piloting of a program to involve pharmacy technicians in the medication reconciliation process.

- Among the respondents who reported that a medication history was conducted upon admission to the hospital, the medication history was created using information provided by the patient/family (95%), information contained on prescription containers (95%), information obtained from the patient's primary care physician (56%) and information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies (53%). All respondents in BC (6/6) reported using the information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies, followed by the Prairies (88%, 7/8), Ontario (65%, 13/20), Atlantic Canada (22%, 2/9) and Quebec (19%, 3/16). Having access to an electronic database providing a complete list of current medications facilitates the reconciling process.

- The patient's medication history was reconciled with medication orders written at the time of admission by 46% of the respondents. This practice was more common in Quebec (63%, 10/15), followed by Ontario (50%, 2/8), Atlantic Canada (44%, 4/9), the Prairies (25%, 2/8) and BC (17%, 1/6). One of the ways in which Medication Reconciliation has been implemented involves using the reconciliation form as an order sheet. This ensures that the prescribing physician has access to the list of medications taken at home while writing the admission order. It also eliminates transcription errors, as well as streamlines the ordering process.

Table G-6 Medication Incident Reduction Strategies - Comprehensive medication history 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
When a patient is admitted to the organization:						
A comprehensive medication history of all home medications for each patient is conducted	59 42%	14 52%	32 41%	13 35%	16 43%	43 41%
Medication history is carried out by:	(59)	(14)	(32)	(13)	(16)	(43)
Nurse	55 93%	14 100%	29 91%	12 92%	15 94%	40 93%
Physician	40 68%	11 79%	17 53%	12 92%	14 88%	26 60%
Pharmacist	35 59%	8 57%	18 56%	9 69%	13 81%	22 51%
Other	6 10%	2 14%	1 3%	3 23%	2 13%	4 9%
Medication history is created using:						
Information provided by the patient/family	56 95%	13 93%	30 94%	13 100%	16 100%	40 93%
Information contained on prescription containers brought to the ER	56 95%	13 93%	30 94%	13 100%	16 100%	40 93%
Information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies	31 53%	7 50%	15 47%	9 69%	8 50%	23 53%
Information obtained from the patient's primary care physician	33 56%	9 64%	16 50%	8 62%	11 69%	22 51%
The patient's medication history is reconciled with medication orders written at the time of admission or ER visit	27 46%	6 43%	15 47%	6 46%	9 56%	18 42%

- Thirty-eight percent of all respondents reported reconciling the patient's medications and communicating that information to the next provider of care when the patient is transferred between levels of care within the facility. This practice was more commonly reported by non-teaching hospital respondents (40%) than by teaching hospital respondents (32%). Respondents who conduct medication reconciliation when the patient is transferred reported that the pharmacist was the health professional most frequently responsible (39%), followed by the nurse (33%) and the physician (26%). Of the respondents who reported reconciling the patient's medication history when the patient is transferred, 20% had implemented the process throughout the hospital and another 78% had implemented the process for selected patient groups.

Table G-7 Medication Incident Reduction Strategies - Comprehensive medication history 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
When the patient is transferred between levels of care within the facility:						
The facility reconciles the patient's medications and communicates that information to the next provider of care	54 38%	11 41%	28 36%	15 41%	12 32%	42 40%
Health professional most frequently responsible for this medication reconciliation:	(54)	(11)	(28)	(15)	(12)	(42)
Pharmacist	21 39%	2 18%	13 46%	6 40%	6 50%	15 36%
Nurse	18 33%	6 55%	7 25%	5 33%	2 17%	16 38%
Physician	14 26%	3 27%	8 29%	3 20%	3 25%	11 26%
Other	1 2%	0 0%	0 0%	1 7%	1 8%	0 0%
The facility has implemented the process of reconciliation:						
Throughout the hospital	11 20%	3 27%	5 18%	3 20%	1 8%	10 24%
For selected patient groups	42 78%	8 73%	22 79%	12 80%	11 92%	31 74%

- At discharge time, 32% of all respondents reported that they provide a printed, reconciled list of the patient's medications to the next provider, while another 3% of all respondents were providing an electronic copy of the reconciled medication list. When medication reconciliation occurred at discharge time, the service was most frequently provided by a pharmacist (70%, 35/50), followed by a physician (18%, 9/50) and by a nurse (10%, 5/50). Of the 50 respondents who reported communicating a reconciled medication list at discharge time, 90% of the respondents were providing the service for selected patient groups only. It is worth noting that a reconciled medication list was not provided by 54% of all respondents upon transfer between levels of care and by 60% of all respondents at discharge time. When asked what are the most significant barriers to doing so, 43% of all respondents reported implementation of medication reconciliation at the time of transfer/discharge is planned or underway, 34% indicated the facility has examined the desirability and feasibility but additional resources would be required, 22% have not yet examined the desirability and feasibility and 13% have examined the desirability and feasibility but there are not enough other supports to implement it (e.g. access to inpatient and outpatient electronic prescription records).

Participating hospitals in the Massachusetts Reconciling Medications Collaborative identified the following ingredients for success:

1. Leadership support
2. Multidisciplinary team: strong representation from the leadership of the three key stakeholder groups – physicians, nursing, and pharmacy
3. Data feedback to motivate change and to measure whether changes are leading to improvement
4. Start small
5. Embed into existing workflow
6. Don't let perfection be the enemy of the good.

Table G-8 Medication Incident Reduction Strategies - Comprehensive medication history 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
When patient is discharged from the facility:						
The facility communicates a reconciled list of the patient's medications to the next provider with:						
A printed copy of the reconciled medication list	46 32%	7 26%	23 29%	16 43%	19 51%	27 26%
An electronic copy of the reconciled medication list	4 3%	2 7%	1 1%	1 3%	0 0%	4 4%
Health professional most frequently responsible for this medication reconciliation at discharge time:	(50)	(9)	(24)	(17)	(19)	(31)
Pharmacist	35 70%	5 56%	18 75%	12 71%	14 74%	21 68%
Nurse	5 10%	2 22%	3 13%	0 0%	2 11%	3 10%
Physician	9 18%	2 22%	2 8%	5 29%	3 16%	6 19%
The facility implemented the process of medication reconciliation for:						
All discharged patients	4 8%	2 22%	0 0%	2 12%	1 5%	3 10%
Selected patient groups	45 90%	7 78%	24 100%	14 82%	18 95%	27 87%
Upon transfer between levels of care and/or at the time of discharge, the most significant barriers to provide a reconciled list of the patient's medication are:	(142)	(27)	(78)	(37)	(37)	(105)
Implementation of medication reconciliation is planned or underway	61 43%	14 52%	29 37%	18 49%	18 49%	43 41%
The facility has examined the desirability and feasibility…, but… additional… resources would be required	48 34%	7 26%	27 35%	14 38%	14 38%	34 32%
The facility has not yet examined the desirability and feasibility…	31 22%	4 15%	21 27%	6 16%	6 16%	25 24%
The facility has examined the desirability and feasibility…, but… there are not enough other supports	19 13%	4 15%	7 9%	8 22%	13 35%	6 6%

Inform and Educate Patients/Clients and or Family

Patients play an important role in patient safety – there is proven value in teaching patients about their medication therapy to allow them to partner with healthcare providers to help improve the safety of the medication-use-system. CCHSA has identified ROPS related to informing and education patients/clients and/or family about their role in patient safety, using both written and verbal communication.

- Thirty percent of all respondents reported providing selected patient groups with a copy of a medication record (e.g. MAR) as part of their patient education program. (Table G-9) Only 1 respondent reported providing this service for all patients. Viewing of the medication record by the patient/patient's family was reported to be allowed by 21% of all respondents for selected patient groups and by 5% of respondents for all patients.

- Counseling pamphlets for each prescribed medication were reported to be provided by 65% of all respondents for selected patients groups and by 1% of respondents for all patients.

- A pharmacist's consultation during the hospital stay was reported to be provided for selected patient groups by 78% of all respondents. Three respondents from Ontario reported providing a pharmacist's consultation for all patients.

- Sixty-two percent of all respondents reported providing selected patient groups with contact information for other available sources of drug information. This practice is more common in teaching hospitals when compared to non teaching hospitals (76% versus 57%).

Table G-9 Medication Incident Reduction Strategies - Patient Education Program 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Process to facilitate patient teaching with regards to their medication therapy:						
Provide patient with a copy of the MAR or similar medication record						
for selected patient groups only	42 30%	13 48%	18 23%	11 30%	12 32%	30 29%
for all patients	1 1%	0 0%	1 1%	0 0%	0 0%	1 1%
Allow viewing of the MAR by the patient / patient's family						
for selected patient groups only	30 21%	10 37%	13 17%	7 19%	3 8%	27 26%
for all patients	7 5%	0 0%	6 8%	1 3%	2 5%	5 5%
Provide counseling pamphlets for each prescribed medication						
for selected patient groups only	92 65%	19 70%	48 62%	25 68%	26 70%	66 63%
for all patients	2 1%	0 0%	1 1%	1 3%	1 3%	1 1%
Provide a pharmacist's consultation during in hospital stay						
for selected patient groups only	111 78%	21 78%	60 77%	30 81%	32 86%	79 75%
for all patients	3 2%	0 0%	2 3%	1 3%	1 3%	2 2%
Provide contact information for other available sources of drug information						
for selected patient groups only	88 62%	18 67%	43 55%	27 73%	28 76%	60 57%
for all patients	3 2%	0 0%	2 3%	1 3%	2 5%	1 1%

Monitoring

In the Canadian Adverse Events Study, an adverse event (AE) has been defined as '"*an unintended injury or complication that results in disability at the time of discharge, death or prolonged hospital stay and that is caused by health care management rather than by the patient's underlying disease process Health care management includes the actions of individual hospital staff as well as the broader systems and care processes and includes both acts of omission (failure to diagnose or treat) and acts of commission (incorrect diagnosis or treatment, or poor performance)"* This study judged 36.9% of AEs to be preventable, and 23.6% of the factors contributing to AEs were drug or fluid related[14]. A previous publication by Leape & al, *The Harvard Medical Practice Study*, estimated that 20% of all adverse events were medication related[15]. In most studies, adverse drug events (ADEs) are among the most common type of AEs, accounting for 20 to 30% of all AEs.

The Canadian Adverse Drug Reaction Monitoring Program defines an adverse drug reaction (ADR) as "*a harmful and unintended response to a health product. This includes any undesirable patient effect suspected to be associated with health product use. Unintended effect, health product abuse, overdose, interaction (including drug-drug, and drug-food interactions) and unusual lack of therapeutic efficacy are all considered to be reportable ADRs.*"

Definitions of adverse drug events (ADEs) and adverse drug reactions (ADRs) were not provided to the respondents in our survey. In the interpretation of the results, we have assumed that the strategies used to detect, document the occurrence and report ADEs and ADRs did not vary based on the definition.

- Forty-one percent of all respondents reported implementation of strategies to monitor the occurrence of adverse drug events. (Table G-10). Teaching hospital respondents (65%) were more likely than non-teaching respondents (32%) to have implemented strategies to monitor the occurrence of ADEs. Strategies used to monitor the occurrence of ADEs included:

  - 79% reported that they perform chart reviews of patients who experience critical clinical events (mortalities & morbidities)

  - 26% reported that they perform chart reviews of patients with orders for known antidotes

  - 48% reported that they investigate cases where computer rules detect that laboratory abnormalities occurred in the presence of certain drugs (e.g. high serum creatinine in a patient receiving an aminoglycoside)

  - 31% reported that they investigate cases where computer rules detect that there had been an override of a drug-drug interaction alert

  - 29% of respondents reported that they investigate cases where computer rules detect that there had been an override of a drug allergy alert

  - 19% reported that they investigate cases where computer rules detect that there had been an override of a maximum dosage alert

- Implementation of strategies to improve reporting of ADEs was reported by 41% of all respondents. Larger hospitals with 500 or more beds were more likely (57%) to report implementation of strategies to improve internal reporting of ADEs than smaller hospitals, where 30% of respondents from hospitals with 100-200 beds and 37% of respondents from hospitals with 201-500 beds indicated that they had implemented such strategies. The strategies identified by the 58 respondents were: in-service meetings to promote voluntary reporting (78%), development of protocols to facilitate reporting (60%), sharing reports with staff (41%) and providing incentives to staff for reporting (12%). It is worth mentioning that more than half of all respondents (54%) reported that they had not implemented strategies to improve internal reporting of ADE's.

The internal and external reporting of ADEs has become increasingly important and relevant to organizations in their efforts to improve patient safety.

The survey did not include a question on strategies to improve the external reporting of ADRs. With the increasing number of new drugs being approved, the increased use of Special Access Drugs, and the withdrawal from the market of recently commercialized drugs, Canadian hospitals are strongly encouraged to report ADRs which are unexpected or serious, and ADRs involving recently marketed drugs, to Health Canada. (http://www.hc-sc.gc.ca/dhp-mps/medeff/advers-react-neg/index_e.html)

Table G-10 Medication Safety - Use of Strategies Related to Adverse Drug Events (ADEs) 2005/06

	All	Bed Size			Teaching Status	
		100-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Strategies have been implemented to improve internal reporting of ADEs	58 41%	8 30%	29 37%	21 57%	20 54%	38 36%
Types of strategies implemented	(58)	(8)	(29)	(21)	(20)	(38)
Inservice meetings to promote voluntary reporting	45 78%	5 63%	20 69%	20 95%	17 85%	28 74%
Developing protocol to facilitate reporting	35 60%	5 63%	18 62%	12 57%	12 60%	23 61%
Sharing report rates with staff	24 41%	2 25%	10 34%	12 57%	9 45%	15 39%
Providing incentives to staff	7 12%	1 13%	2 7%	4 19%	3 15%	4 11%
Strategies have been implemented to trace and document the occurrence of adverse drug events (ADEs)	58 41%	8 30%	30 38%	20 54%	24 65%	34 32%
Types of strategies implemented	(58)	(8)	(30)	(20)	(24)	(34)
Critical clinical events (mortality & morbidities)	46 79%	8 100%	22 73%	16 80%	20 83%	26 76%
Laboratory abnormalities occurring in the presence of certain drugs	28 48%	3 38%	16 53%	9 45%	7 29%	21 62%
Override of drug-drug interaction	18 31%	2 25%	9 30%	7 35%	5 21%	13 38%
Override of drug-allergies interaction	17 29%	2 25%	9 30%	6 30%	4 17%	13 38%
Patients with medication orders for known antidotes	15 26%	1 13%	11 37%	3 15%	7 29%	8 24%
Override of drug-maximum dosage alert	11 19%	2 25%	6 20%	3 15%	3 13%	8 24%

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4 American Society of Hospital Pharmacists. ASHP Guidelines on Preventing Medication Errors in Hospitals,. Am J Hosp Pharm. 1993;50:305-14.
5 JCAHO list of prohibited abbreviations at http://www.jointcommission.org/PatientSafety/DoNotUseList/
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7 Santell JP, Hicks RW, Cousins DD. MEDMARX Data Report: A chart-book of 2000/2004 Findings from Intensive Care Units and Radiological Services. Rockville, MD: USP Center for The Advancement of Patient Safety; 2005.
8 The Institute for Safe Mediction Practices – ISMP's list of High-Alert Medications at www.ismp.org/Tools/highalertmedications.pdf accessed February 4, 2007.
9 ISMP Canada. Medication Safety Support Service Narcotics (opiods) Project. System Safeguards to prevent Error-Induced Injury with Narcotivs (Opioids). January 2005.
10 Seamless Care Task Force of the Canadian Pharmacists Association and the Canadian Society of Hospital Pharmacists. Statement on Seamless Care. Ottawa (On): Canadian Society of Hospital Pharmacists, 2004.
11 The Institute for Healthcare Improvement – Medication Safety Reconciliation Toolkit athttp://www.ihi.org/IHI/Topics/PatientSafety/MedicationSystems/Tools/MedicationSafetyReconciliationToolKit.htm accessed February 4, 2007
12 The Massachusettes Coalition for the Prevention of Medical Errors – Medication Reconciliation at http://www.macoalitionorg/Initiatives/RecMeds/PDSA.doc - accessed February 4, 2007.
13 Safer Healthcare Now ! Getting Started Kit: Medication Reconciliation – Prevention of Adverse Drug Events, How-to Guide at http://www.saferhealthcarenow.ca accessed February 4, 2007
14 Baker, G.R., Norton. P.G.and al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. JAMC, 2004;170 (11) : 1678-86.
15 Leape LL, Brennan TA and al. The nature of adverse events in hospitalized patients. Results of the Harvard Medical Practice Study II. N Engl J Med 1991;324 (6):377-84.

Technology

Patricia Macgregor

The technology section was introduced to the Hospital Pharmacy in Canada Survey in 2003/04, at a time when public and government expectations of the healthcare system were beginning to focus on several major areas of concern. These included patient safety, timely access to needed care, greater efficiency in delivering healthcare, system accountability, and optimization of outcomes. These issues continue to be the focus of many efforts to improve Canada's healthcare system. Healthcare managers, including those responsible for pharmacy services, recognize that the key to addressing these issues lies in the appropriate use of technology. Fortunately, medication systems technology has progressed significantly in the past decade, and its cost-effectiveness has reached the point where many hospitals can now justify the acquisition of these technologies. Pharmacy information systems, combined with automation technologies, offer substantial opportunities for improving the safety and efficiency of the medication system, and hospital pharmacy is now poised on the cusp of a major technological change. The current survey results indicate that hospitals are only slowly beginning to embrace this change.

Pharmacy Information Systems - Clinical Decision Support

The 2005/06 survey included a number of new questions that were intended to provide a more comprehensive picture of the types of clinical decision support functionality that are built into the pharmacy information systems used in Canadian hospitals. Consequently, it was possible to compare some, but not all, of the 2005/06 survey results with those from the 2003/04 survey. Even those comparisons that are made between the 2005/06 and the 2003/04 survey results must be interpreted cautiously, since the number of respondents to this part of the survey increased significantly in 2005/06 (from 57 respondents in 2003/04 to 118 respondents in 2005/06). We provided a definition of what constituted a "clinical decision support system" in the 2005/06 survey, and this may have helped to improve the response rate for the questions in this section of the survey.

- Eighty-three percent of respondents reported that their pharmacy information system had clinical decision support functionality in 2005/06, compared with 40% in 2003/04. (Table H-1) However, as noted above, we provided a definition of a "clinical decision support system" in the 2005/06 survey, and this may have affected the response rate for this question.

Of those respondents with clinical decision support functionality as a part of their pharmacy information system:

- Ninety-nine percent of respondents reported that drug allergy alerts were part of the decision support functionality that was available in the pharmacy information system, and 95% of those who had the option to use drug allergy alerts were using that functionality. The results were similar in all geographical areas except the Prairies, where only 80% reported use of the drug allergy functionality, compared to 94-100% of the respondents in other regions of the country.

- Ninety-seven percent of respondents reported that drug interaction alerts were part of the functionality available to them, and 97% of those who had the option to use drug interaction alerts were doing so. Again, the results were similar for all regions of the country, with the exception of the Prairies, where a smaller percentage of respondents (80%) reported that the functionality was in use.

- Despite the 59% to 69% of respondents who reported that the functionality for computer generated maximum dose alerts was available to them, only 21-31% of those respondents with the functionality reported that they were using it in their departments for adult drug orders, pediatric/neonatal drug orders, oncology drug orders, or other types of drug orders (Table H-1).

- The percentage of teaching hospitals that reported using maximum dosage alerts for adults, oncology drugs, and other drugs was approximately twice that of non-teaching hospitals. In contrast pediatric/neonatal maximum dose alerts were reported as being used by 28% of non-teaching hospitals, compared to only 18% of teaching hospitals who were using that functionality.

- Forty-six percent of respondents reported that the functionality to provide dosage modification alerts for patients with renal dysfunction was available to them and 59% of those respondents reported that it was in use. Dosage modification alert functionality for patients with hepatic dysfunction was reported to be available by 33% of respondents, but only 28% of those were actually using that functionality.

These results raise the question of why available patient-safety functionality is frequently not being used by hospitals across the country, particularly following the awareness created by the Institute of Medicine's "To Err is Human" report[1] and The Canadian Adverse Event study.[2]

Table H-1 Pharmacy Information Systems – Clinical Decision Support 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Pharmacy Information System includes a clinical decision support system	118 83%	24 89%	65 83%	29 78%	27 73%	91 87%
Types of Clinical Decision Support Functionality	(118)	(24)	(65)	(29)	(27)	(91)
Drug allergy alerts -- available	117 99%	23 96%	65 100%	29 100%	27 100%	90 99%
Drug allergy alerts -- in use	111 95%	22 96%	61 94%	28 97%	26 96%	85 94%
Drug interaction alerts – available	115 97%	22 92%	64 98%	29 100%	27 100%	88 97%
Drug interaction alerts – in use	111 97%	22 100%	61 95%	28 97%	27 100%	84 95%
Maximum dose alerts for adults – available	82 69%	16 67%	44 68%	22 76%	21 78%	61 67%
Maximum dose alerts for adults – in use	22 27%	5 31%	11 25%	6 27%	9 43%	13 21%
Maximum dose alerts for pediatrics / neonates – available	71 60%	13 54%	37 57%	21 72%	17 63%	54 59%
Maximum dose alerts for pediatrics / neonates – in use	18 25%	3 23%	9 24%	6 29%	3 18%	15 28%
Maximum dose alerts for cytotoxic oncology drugs -- available	73 62%	13 54%	39 60%	21 72%	20 74%	53 58%
Maximum dose alerts for cytotoxic oncology drugs -- in use	15 21%	4 31%	6 15%	5 24%	7 35%	8 15%
Maximum dose alerts for other selected drugs -- available	70 59%	13 54%	36 55%	21 72%	15 56%	55 60%
Maximum dose alerts for other selected drugs -- in use	22 31%	4 31%	7 19%	11 52%	7 47%	15 27%
Dosage modification alerts for patients with renal dysfunction – available	54 46%	7 29%	31 48%	16 55%	7 26%	47 52%
Dosage modification alerts for patients with renal dysfunction – in use	32 59%	6 86%	16 52%	10 63%	5 71%	27 57%
Dosage modification alerts for patients with hepatic dysfunction -- available	39 33%	7 29%	20 31%	12 41%	5 19%	34 37%
Dosage modification alerts for patients with hepatic dysfunction – in use	11 28%	5 71%	3 15%	3 25%	2 40%	9 26%
Drug therapy guidance, using evidence-based guidelines – available	21 18%	2 8%	12 18%	7 24%	3 11%	18 20%
Drug therapy guidance using evidence-based guidelines -- in use	12 57%	1 50%	6 50%	5 71%	3 100%	9 50%
Ability to input patient-specific variables used to assess drug therapy and dosing – available	58 49%	7 29%	33 51%	18 62%	9 33%	49 54%
Ability to input patient-specific variables used to assess drug therapy and dosing– in use	46 79%	5 71%	24 73%	17 94%	8 89%	38 78%

- The majority of hospitals, (82%), reported that their pharmacy information system did not have evidence-based guidelines or clinical pathways integrated into its clinical decision support systems. Of the 18% of respondents that reported having this functionality, only 57% reported that the functionality was being used.

- The ability to input patient specific variables that are then used to calculate patient-specific dosages, or are used to enable the provision of patient-specific clinical recommendations, was reported to be available by 49% of respondents, and 79% of those reported using it.

There appears to be a gap in the ability of facilities to integrate evidence-based guidelines into the electronic systems that pharmacists are, or should be, using to help them make decisions about the appropriateness of prescribed drug therapy.

Pharmacist Access to Laboratory Test Results

The pharmacist's ability to assess the appropriateness of many medication orders depends to a great extent on the pharmacist's ability to easily retrieve relevant test results. Those results are often needed in order to assess the appropriateness of the medication, and the medication dosage, that have been ordered for the patient.

Unfortunately, pharmacists often find themselves working in areas where they do not have ready access to the patient's chart. Electronic health records, (EHRs), available electronically to the pharmacist at the point in time when they are reviewing medication orders, are the preferred solution to this problem. However, few hospitals in Canada have yet implemented EHRs and the best option for providing pharmacist access to laboratory results lies in the creation of a seamless interface between the lab and pharmacy systems. Though less efficient for pharmacists to use, view-only access to laboratory values on all pharmacy computer terminals is an alternative for facilities that cannot implement an interface between the lab and pharmacy systems.

- There was only a modest increase in the percentage of respondents who reported having an interface between the lab system and the medication order entry system, (34% in 2005/06 compared to 25% in 2003/04).

- Similarly, survey respondents reported only a slight increase in view-only access to lab test results, (63% in 2005/06 versus 59% in 2003/04).

- However, it was encouraging to note that only three respondents, (2%), reported that access to lab test values was still paper based. (Table H-2).

- British Columbia, Ontario and Atlantic Canada were more likely to report lab systems interfaced with medication order entry systems.

For future surveys, an interesting follow-up to these results might be to ask respondents if they have a pharmacy information system that is part of an integrated, corporate-wide system or if it is a stand-alone "best of breed" pharmacy information system. It would be helpful to know if there is any difference in how lab data is accessed within hospitals that have opted for the integrated or "best of breed" approaches to pharmacy information systems.

Table H-2 Pharmacist Access to Laboratory Test Results 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Pharmacists are provided with access to laboratory test results through						
Paper-based medical record only	3 2%	3 11%	0 0%	0 0%	0 0%	3 3%
View-only access available from pharmacy terminals	90 63%	14 52%	53 68%	23 62%	27 73%	63 60%
Lab system interfaced with medication order entry system	48 34%	9 33%	25 32%	14 38%	10 27%	38 36%

Computerized Prescriber Order Entry Systems (CPOE)

- The number of respondents, (eight respondents), that reported an operational CPOE system is essentially unchanged compared to the 2003/04 survey results, (seven respondents). There has been a slight increase in the percentage of respondents that reported an approved plan to implement CPOE in 2005/06, (23% , 33/142), compared to the 2003/04 survey, (18% , 26/144)

- Teaching hospitals and hospitals with more than 500 beds were again most likely to report a functional CPOE system, or an approved plan to implement one. (Table H-3).

The number of respondents reporting that a CPOE system has been implemented at their facility has remained fairly static over the last few years. The presence of an approved plan to implement CPOE that was reported by 26 facilities in 2003/04 did not seem to lead to implementation of CPOE in almost any of those facilities within the two year period between the 2003/04 and 2005/06 surveys. Several factors may have contributed to this, including the large financial and human resource investment that is actually required to implement CPOE systems. It is also possible that the maturity of the available technology, the ability to effectively meet user needs, and/or the ability of organizations to effectively reorganize and integrate the new clinical and organizational workflows may have delayed CPOE implementation.

Although some published studies indicate that CPOE systems reduce medication errors,[3] other studies report increased medication risks associated with a CPOE implementation. One such study by Koppel et al reports 22 different medication error risks that could be introduced by CPOE implementation within a typical hospital environment.[4]

- Of the eight respondents that reported using a functional CPOE system, four reported a unidirectional or bi-directional interface with the pharmacy information system, while the remaining four respondents reported that there was no interface between their CPOE and pharmacy information systems. This represents little change in the number of respondents who reported that there was an interface between the two systems in 2003/04.

- Five of eight respondents that reported having a CPOE system were from Ontario, with only one having an interface to the pharmacy information system. This presents an interesting observation as to the value gained, compared with the opportunities missed, by implementing a non-interfaced prescriber order entry system.

- There was an increase in the number of respondents in the 2005/06 survey who reported that their CPOE system includes clinical decision support functionality (6/8 respondents in 2005/06, compared to 1/7 in 2003/04). This functionality was reported to include prescriber alerts for unsafe orders, (6/8 respondents in 2005/06 compared to 3/7 in 2003/04), and guidance related to formulary drug use, (7/8 respondents in 2005/06, compared to 4/7 in 2003/04.)

The implementation of clinical decision support systems presents an interesting opportunity for pharmacist involvement in the selection, development and ongoing maintenance of CPOE systems, particularly considering the reports of increased medication error risks associated with CPOE implementations and its associated organizational workflow changes. [3 4 5 6]

- Pharmacist verification of orders entered by prescribers, prior to the dispensing of medications from the pharmacy, was reported to be a requirement by all respondents with CPOE systems in both 2003/04 (7/7) and in 2005/06 (8/8).

- There was little change in the small number of respondents that reported pharmacist verification of CPOE orders was necessary prior to the drug appearing on the nursing medication administration record, the drug becoming accessible from decentralized automated medication cabinets, or the drug becoming accessible from ward stock, as compared to the 2003/04 survey. (Table H-3)

The implementation of CPOE does not reduce the need for pharmacist verification of medication orders or reduce the need for robust pharmacy information systems with integrated decision support to support the pharmacist's medication order review. Some unpublished surveys suggest that only 50 to 60% of medication orders are actually entered into CPOE systems by the prescriber, which further emphasizes the need for pharmacists to perform a final review of medication orders before they become activated.

Table H-3 Computerized Prescriber Order Entry 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Computerized prescriber order entry (CPOE)						
Operational	8 6%	1 4%	3 4%	4 11%	4 11%	4 4%
Approved plan to implement	33 23%	7 26%	18 23%	8 22%	13 35%	20 19%
No CPOE plan approved	100 70%	18 67%	57 73%	25 68%	20 54%	80 76%
CPOE/Pharmacy Information System (PIS) Integration	(8)	(1)	(3)	(4)	(4)	(4)
CPOE is interfaced to PIS (unidirectional)	2 25%	1 100%	1 33%	0 0%	1 25%	1 25%
CPOE is interfaced to PIS (bidirectional)	2 25%	0 0%	1 33%	1 25%	1 25%	1 25%
Medication orders are re-entered into the Pharmacy system	4 50%	0 0%	1 33%	3 75%	2 50%	2 50%
Clinical Decision Support for CPOE						
Is integrated with a clinical decision support system	6 75%	0 0%	2 67%	4 100%	3 75%	3 75%
Is interfaced with the lab system to alert practitioners	3 38%	0 0%	2 67%	1 25%	1 25%	2 50%
Alerts prescribers to unsafe orders during order entry	6 75%	1 100%	2 67%	3 75%	2 50%	4 100%
Guides the use of formulary drugs	7 88%	1 100%	3 100%	3 75%	3 75%	4 100%
Guides the use of weight-based or surface area based dosing	6 75%	0 0%	3 100%	3 75%	3 75%	3 75%
Guides the dosing in special populations	5 63%	0 0%	3 100%	2 50%	2 50%	3 75%
Pharmacists verify CPOE orders before						
Dispensing medications from the central or satellite pharmacy	8 100%	1 100%	3 100%	4 100%	4 100%	4 100%
Medications are accessed from decentralized automated cabinets	1 13%	0 0%	0 0%	1 25%	1 25%	0 0%
Ward stock medications are accessed	1 13%	0 0%	1 33%	0 0%	1 25%	0 0%
Medications are entered on the Medication Administration Record (MAR)	3 38%	0 0%	0 0%	3 75%	1 25%	2 50%

Wireless Networks

Hospitals appear to be embracing the use of wireless networks for the enhancement of patient care, as well as for their potential to increase organizational efficiency and effectiveness.

- Twenty-six percent of respondents reported that an operational wireless network was in place at their facility. Percentages reported were similar for teaching hospitals, non-teaching hospitals, hospitals of all bed sizes, and hospitals with all drug distribution models. (Table H-4)

- Ontario respondents reported a higher availability of operable wireless networks, at 53% of respondents, (24/45), than did other regions. Atlantic Canada reported 33% availability, (5/15), and other provinces reported approximately 10% availability of wireless networks.

- Of the 37 respondents that reported the availability of a wireless network, 38% reported that pharmacists use portable devices to access the wireless network. Interestingly, the smaller non-teaching institutions reported almost double the percentage use of wireless networks by pharmacy than the large (more than 500 bed) and/or teaching hospitals.

- The Prairies were the only region that reported no use by pharmacy of portable devices to access the wireless network.

- The most commonly reported reason for accessing the wireless network by pharmacy was for accessing drug information databases, (93%, 13/14). (Table H-4). Using the wireless network to access drug profiles and health records was reported by nine of 14 respondents and using the wireless network for decentralized order entry by pharmacists was reported by six of 14 respondents.

Table H-4 Wireless Network Systems 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Wireless system installed and operable	37	9	19	9	9	28
	26%	33%	24%	24%	24%	27%
To access wireless network, pharmacy uses portable computers or handheld devices	(37)	(9)	(19)	(9)	(9)	(28)
	14	3	9	2	2	12
	38%	33%	47%	22%	22%	43%
Wireless network is accessed by pharmacy for	(14)	(3)	(9)	(2)	(2)	(12)
Decentralized order entry on patient care units	6	1	3	2	1	5
	43%	33%	33%	100%	50%	42%
Access to patient drug profiles from the Pharmacy Information System (PIS)	9	1	6	2	1	8
	64%	33%	67%	100%	50%	67%
Access to electronic health records	9	1	6	2	1	8
	64%	33%	67%	100%	50%	67%
Access to drug information databases	13	3	8	2	2	11
	93%	100%	89%	100%	100%	92%

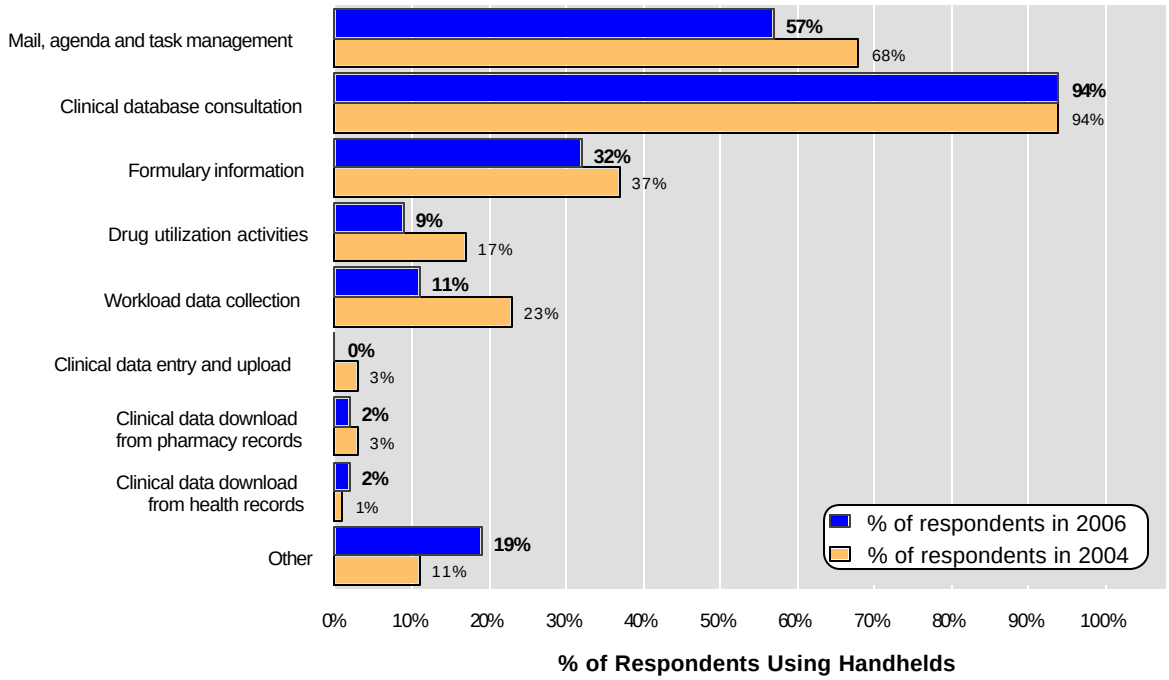
Handheld Devices

- Eighty percent of the 142 respondents reported use of handheld devices by pharmacy.
- Since the 2003/04 report, the reported use of handheld devices by pharmacy has remained the same for clinical database consultation, (94%). The use of handhelds for clinical data download from computerized pharmacy or health records remains unchanged, at just 2 respondents. (Figure H-1)
- The reported use of handheld devices for mail, agenda, and task management was 57% in 2005/06, a bit lower than the 68% who reported the use of handhelds for this purpose in 2003/04.
- The reported use of handheld devices for access to formulary information was similar to that in the previous survey, (32% in 2005/06, compared to 37% in 2003/04).
- The reported use of handheld devices for workload data collection, (11% in 2005/06, compared to 23% in 2003/04), and drug utilization, (9% in 2005/06, compared to 17% in 2003/04), was lower than that reported in the previous survey.

Table H-5 Hand Held Devices 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Handheld devices are used in department	113 80%	21 78%	61 78%	31 84%	34 92%	79 75%
Handheld de vices are used for	(113)	(21)	(61)	(31)	(34)	(79)
Clinical data download from computerized pharmacy records	2 2%	0 0%	2 3%	0 0%	0 0%	2 3%
Clinical data download from computerized health records	2 2%	0 0%	1 2%	1 3%	0 0%	2 3%
Clinical database consultation (Micromedex, Lexicomp)	107 94%	19 90%	57 93%	31 97%	33 94%	74 94%
Drug utilization activities	10 9%	2 10%	4 7%	4 13%	4 11%	6 8%
Formulary information	36 32%	5 24%	24 39%	7 23%	10 29%	26 33%
Workload data collection	13 11%	0 0%	7 11%	6 19%	4 11%	9 11%
Mail, agenda and task management (Outlook, Lotus Notes)	64 57%	15 71%	26 43%	23 74%	25 74%	39 49%
Other	21 19%	1 5%	12 20%	8 26%	9 26%	12 15%

Figure H-1 Functions for which handheld devices are used



Base: Respondents reporting the use of handheld devices (71 in 2004, 113 in 2006)

Bar Coding

The focus on patient safety within the healthcare system has continued since the last survey and there has been a corresponding interest in the adoption of technology, such as bar coding, as a means of improving the safety of patient care.

- The current survey results indicate an increase in the number and percentage of hospitals adopting bar code technology in the medication system, continuing the trend of past surveys (50/142 or 35% in 2005/06 versus 32/144 or 22% in 2003/04).

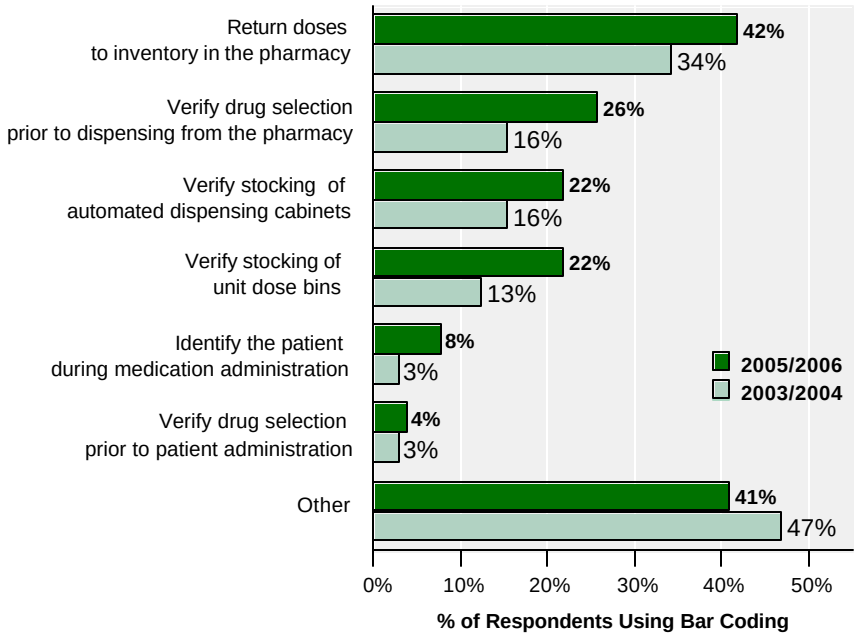
- Increased usage of bar coding occurred in the following areas: drug selection prior to dispensing from pharmacy (26% in 2005/06, compared to 16% in 2003/04); returning doses to pharmacy inventory (42% in 2005/06, compared to 34% in 2003/04); verifying unit dose stocking (22% in 2005/06, compared to 13% in 2003/04); and verifying the stocking of automated dispensing cabinets (22% in 2005/06), compared to 16% in 2003/04. (Figure H-2)

- The reported use of bar coding in teaching hospitals and hospitals with more than 200 beds was greater than in non-teaching facilities or hospitals with 100 to 200 beds.

Table H-6 Bar Coding 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Bar Coding is used in the Medication System	50	3	29	18	19	31
	35%	11%	37%	49%	51%	30%
Bar Coding is used in the Medication System to	(50)	(3)	(29)	(18)	(19)	(31)
Verify drug selection prior to dispensing from the pharmacy	13	1	7	5	5	8
	26%	33%	24%	28%	26%	26%
Verify drug selection prior to patient administration	2	0	2	0	0	2
	4%	0%	7%	0%	0%	6%
Identify the patient during medication administration	4	1	2	1	0	4
	8%	33%	7%	6%	0%	13%
Return doses to inventory in the pharmacy	21	1	14	6	8	13
	42%	33%	48%	33%	42%	42%
Verify stocking of unit dose bins	11	0	6	5	4	7
	22%	0%	21%	28%	21%	23%
Verify stocking of automated dispensing cabinets	11	0	8	3	5	6
	22%	0%	28%	17%	26%	19%
Other	21	2	11	8	7	14
	41%	67%	37%	44%	37%	44%

Figure H-2 Uses of Bar Coding



Base: Respondents reporting use of bar coding in medication system (32 in 2004, 50 in 2006)

It is well understood and reported in the literature that a large percentage of medication errors, estimated at 34% of all medication errors[7 8], occur at the bedside during administration. Bedside bar code verification systems are significantly more successful at reducing these incidences than currently used practices. Despite this evidence, the adoption of bedside barcode verification systems in Canada has been very slow.

- Only 8% (4/50) of the 50 respondents that reported using bar code technology reported they used point-of-care bar code systems to identify the patient during the medication administration process. This is only a small change from the single respondent in 2003/04 that reported the use of point-of-care bar code verification systems.

- Two respondents reported that they verified the drug selection, using bar code technology, prior to administration to the patient, compared to one respondent who reported doing so in 2003/04.

Conclusion

The slow progress in the implementation and utilization of advanced medication systems technology is perhaps indicative of the challenges facing organizations as they strive to move forward in very challenging times. The introduction of technology is complex and the implications are far-reaching. Many systems and processes are inter-related, interdependent, and reliant on good implementation processes to achieve their full potential. However, the potential patient safety gains are significant and all healthcare managers, including hospital pharmacy managers, should strive for a healthcare system which takes full advantage of the opportunities that technology offers.

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Education and Research

Patricia Macgregor

Types of Student Training Provided by Pharmacy Department

The current survey results indicate that student training is now part of the mandate of almost all hospitals that participate in the Hospital Pharmacy in Canada survey.

- Training was reported to be provided for undergraduate pharmacy students by 90% of respondents in the 2005/06 survey, compared to 83% in the 2003/04 survey. (Table I-1)

- Training for pharmacy technician students was reported to be provided by 89% of respondents in 2005/06, compared to 84% in 2003/04.

- Training for pharmacy residents was reported to be provided by 29% of respondents in 2005/06, compared to 26% in the 2003/04 survey.

- M. Sc and Pharm. D student training remained fairly similar in the current survey, (9% and 19% respectively), compared to the 2003/04 survey results, (11% and 17% respectively). Of the 13 respondents that reported Masters level training placements, 11 were in Quebec, reflecting the unique Masters/Residency program that exists in that province.

- A similar trend was observed with Pharm. D student placements. More than half of the respondents, (15/27), that indicated they were involved in the training of Pharm. D students were from Ontario, which represents 33% of the Ontario respondents and another five respondents were from BC, representing 25% of the BC respondents. These results are not surprising, given that Canada's only Doctor of Pharmacy programs are located in these two provinces.

Student Days

The results of this year's survey indicate that there has been an increase in the reported number of training days provided to all categories of students, compared to the results from the 2003/04 survey.

- The average number of undergraduate pharmacy student training days provided by the 124 hospitals that reported they participated in this training activity was 246 days in the 2005/06 year, compared to 228 in 2003/04. There was a broad range of reported days of training, (1 to 4260 days).

- Twenty nine percent of respondents reported that they had provided more than 200 undergraduate pharmacy student training days per year. Of the hospitals that reported providing more than 200 days of training, the majority were teaching hospitals, (79%). Fifty percent of hospitals with more than 500 beds reported that they had provided more than 200 days of undergraduate pharmacy student training. In the Prairies, (40%), Quebec, (38%) and Atlantic Canada, (31%), a larger percentage of hospitals reported that they had provided more than 200 training days than did the responding hospitals from B.C, (10%), and Ontario, (24%).

- Respondents that provide training for M. Sc students reported that the average number of training days they provided for these students was 629, compared to 489 days in 2003/04. For those that reported they provided residency training, the average number of training days provided was 515 days, compared to 411 days in 2003/04. For Pharm. D student training the average number of training days reported was 112, compared to 82 days in 2003/04, and for those participating in pharmacy technician student training the average number of training days reported was 98, compared to 95 days in 2003/04.

These results not only indicate an increase in the average teaching workload associated with each type of student, but also point out that facilities involved in M. Sc and residency training programs are making a very significant teaching commitment in support of those programs. It will also be interesting to track any future change in the number of pharmacy technician student training days being provided by facilities, as the role and scope of practice of pharmacy technicians continues to evolve.

Table I-1 Education and Research 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(142)**	**(27)**	**(78)**	**(37)**	**(37)**	**(105)**
Respondents involved in the training of each type of student:						
Undergraduate pharmacy students	90%	81%	92%	92%	92%	90%
Pharmacy Residents	29%	4%	27%	51%	65%	16%
M.Sc. Hospital Pharmacy Students	9%	0%	12%	11%	30%	2%
Pharm. D. students	19%	4%	18%	32%	41%	11%
Pharmacy Technician Students	89%	85%	90%	89%	89%	89%
Average number of student days for:						
Undergraduate Pharmacy Students (n=124)	246	87	201	452	613	113
Pharmacy Residents (n=39)	515	60	302	777	731	203
M.Sc. Hospital Pharmacy Students (n=12)	629	.	565	755	668	432
Pharm. D. students (n=23)	112	.	118	103	124	92
Pharmacy Technician Students (n=116)	98	49	79	174	168	75
Stipend received by department for training:						
Undergraduate Pharmacy Students (n=128)	54%	45%	57%	53%	71%	48%
Pharmacy Residents (n=41)	12%	100%	14%	5%	17%	6%
M.Sc. Hospital Pharmacy Students (n=13)	23%	0%	22%	25%	9%	100%
Pharm. D. students (n=27)	48%	100%	29%	67%	47%	50%
Pharmacy Technician Students (n=126)	17%	13%	15%	23%	20%	16%
Stipend received by pharmacy staff for training:						
Undergraduate Pharmacy Students (n=128)	12%	14%	11%	12%	15%	11%
Pharmacy Residents (n=41)	2%	0%	0%	5%	4%	0%
M.Sc. Hospital Pharmacy Students (n=13)	15%	0%	11%	25%	9%	50%
Pharm. D. students (n=27)	4%	0%	0%	8%	7%	0%
Pharmacy Technician Students (n=126)	3%	0%	6%	0%	0%	4%
University supports positions within department to provide dedicated time for student training	8%	4%	12%	3%	16%	5%
Average number of FTE's supported (n=10)	0.6	.	0.6	0.2	0.7	0.4
% of respondents with staff involved in conducting original research (n=142)	35%	7%	37%	51%	84%	18%
Average number of active research projects, respondents with at least 1 active project (n=47)	5.9	4.5	3.0	10.3	8.2	1.8
Number of peer-reviewed papers, respondents with at least 1 reported paper (n=43)	4.5	1.5	3.6	6.1	6.0	1.7

Financial Support for Student Education

The results of this year's survey indicate that there are regional differences in the compensation provided to both pharmacy departments and pharmacy staff that participate in the training of different types of students.

- Fifty-four percent of respondents reported that the pharmacy department received a stipend for training undergraduate pharmacy students and 12% reported that pharmacy staff received a stipend for training this category of student. (Table I-1)

- Pharmacy departments in Ontario were more likely to report that they received stipends for training undergraduate pharmacy students, (76%), than were pharmacy departments in other Provinces, where those that reported receiving stipends ranged from 35% to 50% of respondents.

- Of the 12% of respondents that reported stipends were received by pharmacy staff for training undergraduate pharmacy students, 14 of the 15 respondents were from Ontario, representing 34% of the Ontario respondents, (14/41 hospitals). The only other facility to report that pharmacy staff received a stipend was located in Atlantic Canada.

- Stipends were less commonly reported for resident training. Only five respondents providing residency training days reported that their pharmacy department received a stipend, and only one respondent reported that pharmacy staff received a stipend for resident training.

- Of the 13 respondents that reported they provided training for M Sc students, three respondents indicated that a stipend was received by the pharmacy department while two respondents reported that pharmacy staff received a stipend.

- Pharm D student placements continue to be well supported with stipends. Forty-eight percent of respondents involved in the training of Pharm D students indicated that the pharmacy department received a stipend, while only one respondent reported that a stipend was received by their pharmacy staff.

- Pharmacy department stipends for pharmacy technician student training were reported by 17% of the respondents that reported they provided technician student training days. Four respondents indicated that pharmacy staff received stipends for training pharmacy technician students.

- Overall, compared with the previous survey in 2003/04, the percentage of respondents reporting that departmental or personal stipends were received for training students remained similar

University Supported Positions for Student Training

Respondents to the 2005/06 survey reported an increase in training days for each type of student category. (Table I-1) This is consistent with the increased emphasis that Faculties of Pharmacy and the Canadian Council for the Accreditation of Pharmacy Programs have placed on the experiential component of pharmacy training programs. The 2005/06 survey included questions that provide information on whether or not the increase in experiential training is accompanied by an increase in the personnel support that universities provide to facilities to assist in providing experiential training.

- There was an increase since the previous survey in the number of respondents that reported an increase in university funded positions within their department to provide dedicated time for student training. Eleven respondents, (8%), reported that the university provided support for positions within their department, compared to six respondents (4%), in 2003/04. (Table I-1) Despite the increased number of respondents with university-supported positions in their department in 2005/06, the average number of FTEs supported in each respondent's facility was only 0.6 FTE in 2005/06, compared to 1.2 FTEs in 2003/04.

These results suggest that universities may be providing direct personnel support to more hospitals, but doing so by providing smaller amounts of personnel support to each hospital.

Research

- Thirty-five percent of respondents reported that their pharmacy staff members were involved in conducting original research, similar to the results from 2003/04.

- In 2005/06, 84% of the respondents from teaching hospitals reported that members of their staff were engaged in original research, compared to 70% in 2003/04. The change in the definition of teaching hospitals in the 2005/06 survey may have contributed to this difference.

- Involvement in original research was reported by 51% of hospitals with greater than 500 beds, compared to 63% in 2003/04. In contrast, 37% of respondents from hospitals with 201-500 beds reported participation in original research, compared to 26% of hospitals in this size range that reported research participation in 2003/04.

- In the 2005/06 survey, two respondents from hospitals with 100-200 beds reported that members of their pharmacy staff were involved in original research compared to eight respondents in 2003/04.

- The average number of active research projects reported by hospitals participating in original research was 5.9, compared to 4.9 in 2003/04.

- Although the average number of projects reported by hospitals with 100-200 beds was 4.5 in the current survey, compared to 2.4 in 2003/04, there were only two hospitals in this size range that were involved in research during 2005/06, which must be considered when interpreting these results.

- Hospitals in the 200-500 bed category reported a slight decrease in the average number of research projects, to 3.0 from 3.9 in 2003/04, while hospitals with greater than 500 beds reported an average of 10.3 research projects in 2005/06, compared to 6.7 projects for the same group in 2003/04.

- Of the 43 respondents that reported the publication of at least one paper, the average number of published papers per department is 4.5, compared to 7.1 published papers per respondent for the 49 respondents whose departments published at least one paper in 2003/04. Teaching hospitals reported an average of 6.0 published papers, compared to 9.5 papers per respondent in 2003/04. Non-teaching hospitals reported an average of 1.7 published papers, compared to 2.4 papers in 2003/04. The reasons for the apparent decline in publications by respondents in 2005/06, compared to 2003/04, is not known, but the staffing shortages of the last few years may have resulted in less staff time being available to undertake research and publish papers.

Ethics – Special Interest Section

Thomas W. Paton

In this year's Hospital Pharmacy in Canada Survey, the special interest topic dealt with the subject of ethics in healthcare. Within that broad subject area, the survey gathered information concerning the organizational policies, structures, and processes that hospitals have in place to support ethical decision-making. The survey also looked at these issues within three separate healthcare domains - research, clinical care and business.

Research Ethics

- Seventy-three percent of respondents (103/142) reported that a Research Ethics Board (REB), also known as an Institutional Review Board (IRB), was in place in their institution. A higher percentage of teaching hospitals (81%) than non-teaching hospitals (70%) reported having a functional REB. The larger hospitals (>500 beds) were more likely to have a REB (81%) than the smaller hospitals with 100-200 beds (56%). The only notable regional difference was reported in the Prairie Provinces where only 35% of reporting hospitals indicated that a hospital-based REB was in place.

- Most organizations without a hospital-based REB (23%, 32/142) reported that a university-based REB (47%, 15/32) or an external REB (34%, 11/32) fulfilled this role. Not unexpectedly, teaching hospitals were more likely to take advantage of their university affiliation (83%, 5/6) to fulfill this role than non-teaching hospitals (38%, 10/26).

- In those hospitals with a hospital-based REB (103 respondents), 81% indicated that a pharmacist was an integral member of the committee. This appeared to be independent of the hospital teaching status or bed size. Fewer of the hospital-based REBs in the Prairies and Atlantic Canada (57%, 4/7 and 67%, 8/12 respectively) had a pharmacist on the committee.

- For those hospitals with a hospital-based REB, 98% (101/103) reported that all clinical trials had to be reviewed and approved by that committee. This was consistent irrespective of teaching status, bed size or regional distribution. Most respondents with a hospital-based REB also reported that practice-based research had to be reviewed and approved by their REB (87%, 90/103), with no notable differences reported based on teaching status, bed size or regional distribution. In contrast, quality improvement initiatives were only required to be reviewed and approved by the REB in 19% (20/103) of hospitals.

Clinical Care Ethics

- Seventy percent (99/142) of respondents indicated that their hospital had a bioethics/ethics advisory committee in place. This was consistent irrespective of teaching status or bed size. The percentage of respondents from BC that reported such a committee was in place (50%, 10/20) was somewhat lower than the percentages reported by respondents from other regions.

- Forty-one percent (14/34) of hospitals without a bioethics/ethics advisory committee, reported that this role was assumed by another hospital committee such as their REB, Medical Advisory Committee, Professional Advisory Committee or Interprofessional Patient Care Committee.

- Of the 113 respondents that indicated such a committee was present in their hospital, only 32% (36/103) indicated that a pharmacist was a member of the committee. This was independent of teaching status or bed size. Regionally, Ontario respondents (44%, 16/36) were most likely to report that a pharmacist was a member of the bioethics committee.

- The scope of issues dealt with by bioethics/ethics advisory committees is summarized in table J-1. Not surprisingly, 81% of respondents reported that quality of patient care was a part of the mandate of this committee. Of note, 73% of respondents reported that the committee had developed an ethical framework for clinical decision-making. Thirty-four percent of respondents reported that the committee provided guidance to senior management on budgetary issues affecting patient care. Policy development by the committee, on issues related to patient care, education, research and business, was reported by 75%, 51%, 60% and 32% of respondents, respectively. The bioethics committee was reported to provide educational programs, on a range of bioethics topics, by 71% of respondents. A somewhat higher percentage of hospitals with more than 500 beds (83%) reported that educational programs were provided, compared to 67% of respondents from hospitals in the 100-200 and 201-500 bed range. The promotion of ward-specific bioethics rounds was reported to be an activity of the bioethics committee by 26% of respondents. Ward-specific rounds were more frequently an initiative of this committee in hospitals with a bed size exceeding 500 (45%, 13/29), than in hospitals with 100-200 beds (24%, 5/21) or 201-500 beds (17%, 11/63). For all the elements listed in Table J-1, the main reported difference across the regions is a notably lower percentage of respondents from BC that reported their bioethics committee's involvement in these activities, compared to other regions.

- An institutional policy dealing with disclosure of adverse events was reported by 83% (118/142) of all respondents and by 95% (35/37) of teaching hospitals and 79% (83/105) of non-teaching hospitals. Sixty percent (12/20) of respondents from BC reported that such a disclosure policy exists, compared to 80-90% of respondents from other regions. Of the 118 respondents with a disclosure policy, 92% (109/118) reported that such events had to be disclosed to senior management and 90% (106/118) reported that disclosure of such events to patients and family was required. There were no notable differences in these results based on teaching status, bed size or region. Only 58% (68/118) of respondents reported that disclosure to a third party was required by their adverse event reporting policy, and there were again no notable differences based on teaching status, bed size, or region.

- A bioethicist was reported to be on staff by 39% (56/142) of respondents. Teaching hospitals reported a higher rate than non-teaching hospitals (68% compared to 30%). Only 15% (3/20) of BC respondents reported that a bioethicist was available for clinical consultation.

- Only two percent (3/142) of respondents reported that a bioethicist sits on their Pharmacy and Therapeutics (P&T) Committee, and only 6% (8/142) of respondents reported that a patient representative sits on that Committee.

- Of 142 respondents, 32% (45/142) reported that their institution had an end of life committee. There were no notable differences based on teaching status, bed size or region.

Table J-1 Responsibilities of the Bioethics Advisory Committee 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	**(113)**	**(21)**	**(63)**	**(29)**	**(30)**	**(83)**
Quality of patient care issues	81%	81%	81%	79%	83%	80%
Provision of an ethical framework for decision making	73%	81%	70%	76%	77%	72%
Provide guidance to senior management on budgetary issues that affect patient care	34%	33%	30%	41%	47%	29%
Develop ethics related policies dealing with:						
Patient Care	75%	81%	73%	76%	80%	73%
Education	51%	48%	46%	66%	67%	46%
Research	60%	67%	56%	66%	77%	54%
Business	32%	43%	24%	41%	50%	25%
Provide educational programs on a range of bioethics topics	71%	67%	67%	83%	70%	71%
Promote ward-specific bioethics rounds	26%	24%	17%	45%	33%	23%

Business Ethics

- Sixty-eight percent (97/142) of respondents reported that their institution has a conflict of interest policy, with no notable differences reported based on teaching status or bed size. However there were differences based on region, with 85% (17/20) of BC respondents and 100% (20/20) of respondents from the Prairies reporting that such a policy was in place in their institutions, compared to only 62% (28/45), 55%(23/42), and 60%(9/15) of respondents from Ontario, Quebec and Atlantic Canada respectively.

- For those organizations that reported having a conflict of interest policy, 99% (96/97) reported that their conflict of interest policy applied to management staff, 92% (89/97) reported that the policy applied to other hospital staff, and seventy-seven percent (75/97) reported that the policy applied to the medical/dental staff. For all three groups of staff there were no notable differences reported based on teaching status, bed size or region.

- The scope of the conflict of interest policies is summarized in Table J2. Issues most commonly reported to be dealt with in the conflict of interest policies were the employee as a supplier of goods and services (85%), the receipt of gifts (89%), the use of confidential information for personal gain (82%), and the inappropriate use of hospital resources (74%). Issues less likely to be included in such policies included the referral of clients to private practice (35%), educational program content and choice of speakers (31%), sponsorship to attend educational events (47%) and relationships with the pharmaceutical industry (46%). Fifty-nine percent of respondents from teaching hospitals reported that their policies addressed relationships with the pharmaceutical industry, compared to 41% of respondents from non-teaching hospitals. It is noteworthy that 63% of respondents reported that conflict of interest policies addressed the selling of data to external parties. A small majority of respondents reported that their institutions have addressed the complex issues of staff employment by other organizations (55%), outside remuneration (54%), and the receipt of outside honoraria (54%). There was considerable regional variation but no remarkable consistencies in the scope of conflict of interest policies.

Table J-2 Issues Addressed in the Institution's Conflict of Interest Policies 2005/06

	All	Bed Size			Teaching Status	
		100- 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(97)	(18)	(51)	(28)	(27)	(70)
The employee as a supplier of goods and services to the institution	85%	89%	80%	89%	81%	86%
Relationships of family members with other member of the organization	65%	78%	57%	71%	59%	67%
Referral of clients to private practice	35%	44%	31%	36%	41%	33%
Solicitation of donations to your Foundation	52%	72%	47%	46%	56%	50%
Solicitation of sponsorship funds, grants or gifts	67%	72%	59%	79%	85%	60%
Educational program content and choice of speakers	31%	44%	22%	39%	22%	34%
Sponsorship to attend educational events	47%	56%	45%	46%	37%	51%
Acceptance of sponsorship for research grants	54%	50%	57%	50%	67%	49%
Receipt of gifts	89%	78%	90%	93%	89%	89%
Outside employment	55%	72%	45%	61%	63%	51%
Outside remuneration	54%	72%	55%	39%	44%	57%
Outside honoraria	54%	67%	53%	46%	56%	53%
Use of institutional resources for self-employment	71%	83%	67%	71%	70%	71%
Use of confidential information for personal gain	82%	83%	84%	79%	89%	80%
The selling of data to external parties	63%	61%	61%	68%	70%	60%
Inappropriate use of hospital resources	74%	67%	78%	71%	70%	76%
Relationships with the pharmaceutical industry	46%	50%	47%	43%	59%	41%

- Forty-five percent (64/142) of respondents reported that there was a conflict of interest policy, supporting the activities of P&T, that addresses the need for disclosure by employees involved in purchasing/contract decisions. There were no differences reported based on teaching status or bed size. Regional differences did exist with 85% (17/20) of BC respondents, compared to 21% (9/42) of Quebec respondents reporting the inclusion of this issue in their P&T conflict of interest policies.

- The requirement for disclosure of medical and pharmacy involvement with pharmaceutical companies whose drugs are being considered for the formulary was reported by 51% (73/142) of respondents. There were no notable differences reported based on teaching status and bed size. Regional differences did exist with 85% (17/20) of BC respondents, compared to 19% (8/42) of Quebec respondents, reporting the inclusion of this issue in their P&T conflict of interest policies.

- Only 39% (56/142) of respondents reported that their hospital's orientation program for new staff dealt with the issue of conflict of interest. There were no notable differences reported based on teaching status and bed size. Respondents in BC (60%, 12/20) and the Prairies (65%, 13/20) most frequently reported the inclusion of this item in their new staff orientation. Only 17% (7/42) of respondents from Quebec reported the inclusion of this item in their staff orientation program. New staff orientation addressing the code of professional conduct and confidentiality of patient information was reported by 73% (104/142) and 89% (127/142) of respondents respectively. The disclosure of medical error was reported to be addressed in the orientation program by 65% (92/142) of respondents. There were no notable differences reported based on teaching status, bed size or region. The requirement for an annual statement of disclosure regarding conflict of interest was reported by 15% (21/142) of respondents. Twenty-seven percent (10/37) of respondents from teaching hospitals compared to 10% (11/105) of respondents from non-teaching hospital reported this requirement. No notable differences were reported based on bed size or region.

- When asked what areas were perceived to be the institution's greatest risk for conflict of interest, the most frequently reported issue was the sponsorship of educational programs. (25%, 35/142), followed by drug formulary decisions (20%, 29/142), research (17%, 24/142) and clinical decision-making (17%, 24/142). Other areas less frequently perceived to be a risk by the respondents were the use of hospital resources for personal gain (7%, 10/142) and drug purchasing/contract decisions (2%, 3/142). There were no notable differences based on bed size. Thirty-five percent of respondents from teaching hospitals, compared to 10% of respondents from non-teaching hospitals, reported that research was an area at risk for conflict of interest. This is not surprising, given the large amount of clinical research conducted in teaching hospitals, compared to a much lower level of research activity in non-teaching hospitals.

Pharmacy Staffing and Drug Costs for Specific Clinical Programs and Pharmacy Services – Acute Care Hospitals

Kevin Hall

In the last three Hospital Pharmacy in Canada Surveys, we have reported the results of our efforts to identify the pharmacy staffing and drug costs incurred by hospitals:

- in the delivery of drug distribution and clinical pharmacy services to specific patient care programs (e.g. medicine, surgery, oncology, mental health, etc.)
- in the provision of certain other pharmacy services (e.g. IV admixture services, TPN admixture, investigational drug services, etc.), that are usually difficult to charge/allocate to specific patient care programs

The objectives of this exercise were two-fold:

i) to create more detailed benchmark data for those who are called upon 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

In past years, the benchmark survey was quite demanding to complete, since it requested a detailed departmental breakdown of all pharmacy staffing and drug costs. As a result, it was distributed to a subset of larger hospitals that were felt to be more likely to have that type of detailed data breakdown for their department. However, the response rate was low, even for those larger hospitals. Many of those asked to complete the benchmarking survey commented that their financial reporting systems were not designed to easily capture drug costs and/or labour inputs at the level of detail required to fully complete this part of the survey.

For this year's survey the benchmarking section was simplified and rolled into the main survey. All respondents were encouraged to provide any program specific data that they could, even if they weren't able to complete all sections of the benchmark survey. 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 breakdown by clinical program. 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. This year's survey methodology resulted in a much larger number of responses for most of the individual indicators, but readers should understand that the respondents are drawn from a much larger and less uniform pool of facilities than was the case with past benchmarking surveys. However the results of this year's benchmarking survey, with a much larger number of respondents, are remarkably consistent with the benchmarking data from earlier survey reports. This lends considerable credibility to the reliability of the data.

Staffing Indicators for Specific Inpatient Clinical Programs

In Table K–1, data on staffing and drug costs for 8 inpatient clinical programs, typically found in many Canadian hospitals, are presented. Again, readers are reminded that the 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 (for any given clinical program in the table) are added up, the result may not be exactly the same as the total paid hours per patient day, reported for that program. That is because the respondents who provided data for each of those three indicators may be different.

The data can be summarized as follows:

- High acuity/high complexity clinical programs, such as critical care and oncology/bone marrow transplant, 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 distributive staffing indicators. Pediatrics programs also consume relatively higher resources compared to low acuity/low complexity programs within a common general hospital setting.

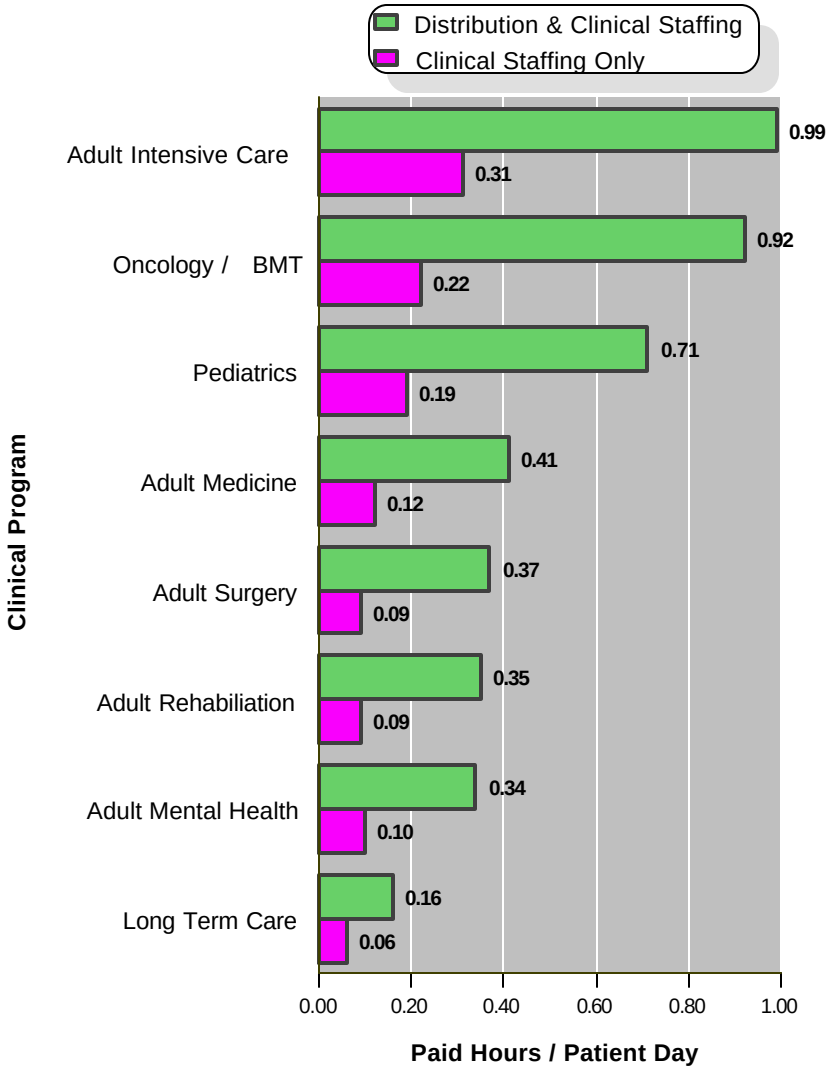
- When the staffing figures were looked at for teaching versus non-teaching hospitals, there are some interesting findings. For the high-acuity services (intensive care, oncology/BMT, and pediatrics) the staffing resources utilized by non-teaching hospitals are as high, or higher, than those reported by teaching hospitals. For the lower acuity programs (medicine, surgery, mental health, rehabilitation and long-term care), the staffing resources utilized by the teaching hospitals appeared to be slightly higher than those utilized by non-teaching hospitals for some programs (e.g. medicine, surgery, mental health, long term care) or similar to those utilized by other programs (e.g. rehabilitation, pediatrics). Given the small number of respondents in some of the cells, this data needs to be interpreted cautiously. However, it does suggest that the differences in overall staffing for teaching versus non-teaching hospitals, as reported in the Human Resources chapter of this survey, may be related primarily to the concentration of high-acuity clinical programs in many teaching hospitals, since on a program by program basis it does not appear that the pharmacy resources used by teaching hospitals are necessarily higher than those used by non-teaching hospitals.

Table K-1 Pharmacy Benchmarking Data For Selected Clinical Programs 2005/06

	Intensive Care	Oncology/ Bone Marrow Transplant	Medicine	Surgery	Mental Health	Rehab	Long Term Care	Pediatrics (in a general hospital)
Mean Indicator Values - All Hospitals								
Total Paid Hours per Patient Day	0.99 (n=26)	0.92 (n=11)	0.41 (n=23)	0.37 (n=19)	0.34 (n=20)	0.35 (n=13)	0.16 (n=15)	0.71 (n=10)
Drug Distribution Paid Hours Per Patient Day	0.68 (n=29)	0.69 (n=11)	0.29 (n=24)	0.37 (n=19)	0.23 (n=24)	0.25 (n=15)	0.11 (n=16)	0.47 (n=14)
Clinical Services Paid Hours Per Patient Day	0.31 (n=53)	0.22 (n=20)	0.12 (n=49)	0.09 (n=40)	0.10 (n=37)	0.09 (n=28)	0.06 (n=31)	0.19 (n=22)
Drug Costs Per Patient Day	$113.64 (n=62)	$133.15 (n=20)	$20.83 (n=55)	$22.69 (n=45)	$11.27 (n=56)	$9.60 (n=34)	$8.15 (n=39)	$16.83 (n=36)
Mean Indicator Values - Teaching versus Non-Teaching Hospitals								
Total Paid Hours Per Patient Day – Teaching	0.99 (n=9)	1.17 (n=4)	0.46 (n=7)	0.43 (n=6)	0.42 (n=7)	0.36 (n=2)	0.35 (n=2)	0.64 (n=2)
Total Paid Hours Per Patient Day – Non-Teaching	0.99 (n=17)	0.77 (n=7)	0.39 (n=16)	0.36 (n=13)	0.29 (n=13)	0.35 (n=11)	0.13 (n=13)	0.71 (n=8)
Drug Costs Per Patient Day – Teaching	$153.90 (n=17)	$99.47 (n=8)	$27.74 (n=14)	$21.07 (n=9)	$13.12 (n=14)	$10.92 (n=4)	$9.23 (n=7)	$21.36 (n=3)
Drug Costs Per Patient Day – Non-Teaching	$98.43 (n=45)	$155.60 (n=12)	$18.46 (n=41	$23.10 (n=36)	$10.65 (n=42)	$9.43 (n=30)	$7.92 (n=32)	$16.42 (n=33)

- Comparison of the staffing for distribution and clinical services reveals a trend that is very similar to that reported in the 2003/04 survey. (Figure K-1). The paid hours per patient day for clinical services are between 25% and 30% of the paid hours per patient day required for both distributive and clinical services, suggesting that 70% to 75% of the total paid hours for pharmacists and technicians are utilized to provide drug distribution services.

Figure K-1 Mean Pharmacy Staffing



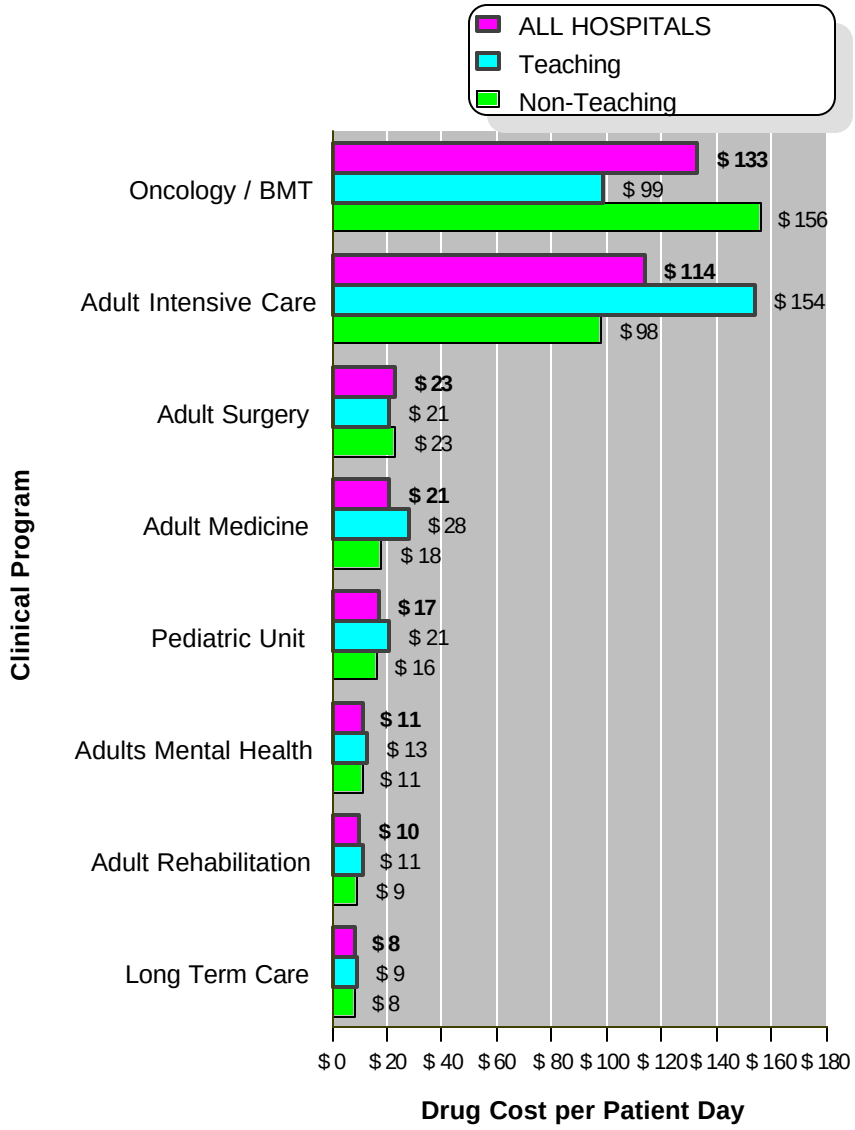
Drug Costs for Specific Inpatient Clinical Programs

In Table K-1, and in Figure K-2, mean drug cost data are provided for specific inpatient clinical programs.

- Like the staffing data provided above, the drug cost data are very consistent with the data provided in the benchmarking chapter of the 2003/04 survey report. Given the larger number of respondents, from the broader range of hospitals that provided drug cost data in the 2005/06 survey, the mean drug cost data by clinical program appear to be quite reliable.

- With the exception of oncology/BMT and surgery, drug costs for each clinical program are higher in teaching hospitals than in non-teaching hospitals. This may reflect greater use of new, more expensive drugs in the teaching hospital environment. The much higher oncology/BMT drug costs for non-teaching hospitals is an interesting finding that may warrant further investigation, but the results must be interpreted cautiously given the relatively small number of respondents who provided data for oncology/BMT drug costs.

Figure K-2 Mean Drug Costs



Staffing and Drug Cost Indicators for Other Programs and Services

In Table K-2, mean staffing indicators are provided for a number of programs and services where the workload denominator is something other than patient days (e.g. OR cases, concurrent studies managed, admixtures prepared, etc.). The denominator that appears in Table K-2 was chosen because it intuitively seems to have a relationship to the staffing input, and because many facilities would be able to measure and track it.

The methodology used in the 2005/06 survey resulted in greater numbers of respondents, allowing us to report indicators for a number of services where there were insufficient numbers of respondents in past surveys to do so (e.g. home IV admixture service, TPN service, renal dialysis service).

Table K-2 Mean Pharmacy Staffing and Drug Cost Indicators for Other Programs and Services 2005/06

Program or Service	All hospitals	Teaching Status	
		Teaching	Non-Teaching
Oncology Admixture			
Total paid hours per admixture	0.85 (n=22)	0.80 (n=4)	0.86 (n=18)
Clinical paid hours per admixture	0.21 (n=31)	0.20 (n=6)	0.21 (n=25)
Drug costs per admixture	$219.74 (n=29)	$109.16 (n=6)	$248.58 (n=23)
Centralized IV admixture			
Total paid hours per admixture	0.13 (n=7)	0.09 (n=3)	0.15 (n=4)
Drug cost per admixture	$4.42 (n=4)		
Home IV admixture			
Total paid hours per admixture	1.64 (n=10)	0.67 (n=3)	2.06 (n=7)
Clinical paid hours per admixture	0.95 (n=11)	0.19 (n=3)	1.23 (n=8)
Drug distribution paid hours per admixture	0.80 (n=12)	0.88 (n=4)	0.76 (n=8)
Drug cost per admixture	$33.39 (n=17)	$31.17 (n=5)	$34.32 (n=12)
TPN Admixture			
Total paid hours per admixture	1.0 (n=23)	0.86 (n=11)	1.13 (n=12)
Clinical paid hours per admixture	0.19 (n=28)	0.18 (n=12)	0.20 (n=16)
Drug distribution paid hours per admixture	0.83 (n=29)	0.69 (n=13)	0.94 (n=16)
Drug cost per admixture	$39.46 (n=37)	$37.47 (n=13)	$40.54 (n=24)
Investigational Drug Studies			
Total paid hours per concurrent study managed	56.3 (n=9)	61.5 (n=5)	49.79 (n=4)
Renal Dialysis			
Total paid hours per patient year	26.3 (n=8)	13.8 (n=2)	30.4 (n=6)
Clinical paid hours per patient year	18.8 (n=22)	7.2 (n=6)	23.1 (n=16)
Drug distribution paid hours per patient year	13.7 (n=8)	3.9 (n=2)	17.0 (n=6)
Drug cost per patient year	$6,454 (n=22)	$8,771 (n=6)	$5,585 (n=16)
Emergency Room			
Drug cost per visit	$7.43 (n=10)		$7.43 (n=10)
Operating Room			
Drug cost per case	$35.65 (n=35)	$47.53 (n=10)	$30.90 (n=25)

- The total paid hours per oncology admixture was 0.85 hours in the 2005/06 survey, compared to 0.65 hours per admixture in the 2003/04 survey. The number of respondents was substantially higher in the present survey (n=22), compared to the 2003/04 survey (n=9), so it is difficult to assess if there has been a real change in the resource requirements for this service. However, the results from both surveys indicate that the manpower requirements for oncology admixture services are substantial.

- The drug cost per oncology admixture was substantially higher in non-teaching hospitals ($249) than in teaching hospitals ($109). This difference in drug costs was also seen in inpatient oncology services for teaching and non-teaching hospitals, but the reasons for this difference are unclear. Again, the number of respondents is not large, but the difference is notable.

- Although the number of respondents is quite small, the mean paid hours per admixture for centralized IV (non-oncology) admixtures in this survey (0.13 hours) was similar to the result of 0.15 hours reported in the 2003/04 survey.

- The results for home IV admixture services must be interpreted in light of the relatively small number of respondents in each sub-group. The results suggest that a mean of 1.64 paid hours per admixture are utilized in the provision of this service, but there is quite a striking difference between teaching hospitals (0.67 hours per admixture) and non-teaching hospitals (2.06 hours per admixture). The difference seems to be caused by a much greater clinical time commitment for home IV admixture services in non-teaching hospitals (1.23 hours per admixture) versus teaching hospitals (0.19 hours per admixture). A possible explanation for this difference may be that teaching hospitals tend to have multidisciplinary teams involved in this service, often with an infectious disease physician and home care nurses, whereas non-teaching hospitals may rely more heavily on pharmacy to manage these patients.

- The data for total parenteral nutrition (TPN) services represents both inpatient and home TPN services. The results show that TPN production is also quite labor intensive, with a mean of 1.0 paid hours per TPN admixture reported by the responding hospitals. The staffing resource requirements were lower per admixture in teaching hospitals (0.86 hours per admixture) than in non-teaching hospitals (1.13 hours per admixture).

- The paid hours per concurrent investigational drug study that is managed by the pharmacy department was 56.3 hours in 2005/06, compared to 43.8 hours in 2003/04. It is possible that the increasing complexity of drug studies may be increasing the time that pharmacy departments must commit to managing this service.

- The data reported for pharmacy services for renal dialysis patients suggests that this service involves a substantial commitment of pharmacy manpower. The mean drug costs associated with this patient population ($6454 per patient per year) were also very high, presumably as a result of the expensive erythropoietic agents used in these patients.

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.

Pharmacy Staffing and Drug Costs for Specific Clinical Programs and Pharmacy Services – Pediatric Hospitals

Jean-François Bussières, Kevin Hall

In past years, the benchmark survey was sent to a small group of pediatric teaching hospitals in Canada. The Canadian Association of Pediatric Health Centers (CAPHC) has 41 members in the country but the number of dedicated pediatric teaching facilities is much smaller. It was primarily the latter group that was sent the benchmarking survey in the past, while in the present survey all pediatric facilities were given the opportunity to contribute whatever data they could regarding the staffing inputs and drug costs associated with providing service to specific patient care programs.

While the approach for the 2005/06 benchmarking survey had the impact of increasing the overall number of responses from pediatric facilities, the number of respondents from stand-alone pediatric hospitals (well-organized pediatric programs, operated relatively autonomously from adult programs) has stayed about the same (e.g. 7 in 2005/06, 4 in 2003/04 and 7 in 2001/02). Hospitals that primarily provide service to adult acute patients were also able to report data for specific pediatric programs (e.g. neonatal ICU) that were provided by their facility.

As in the acute care adult hospital section, specific clinical programs (i.e. pediatric oncology, pediatric intensive care, neonatal intensive care, and pediatric medicine/surgery) were identified in the survey and respondents were asked to provide information on the pharmacy staffing resources committed to those programs, and the drug costs incurred in managing the patients in that program. Some facilities were not able to provide data for all indicators; ratios were only calculated when sufficient data were available.

In Table L-1, data on staffing and drug costs for 4 inpatient clinical programs are presented, along with a geographic breakdown. The stand-alone pediatric hospitals were classified as teaching hospitals, whereas data from adult facilities, with a pediatric service component, were classified as non-teaching. In almost all cases, calculated means were higher than median values, suggesting that the data is not evenly distributed. For each pediatric clinical program area, there were a few hospitals that reported very large pharmacy resource inputs, resulting in an upward skewing of the data.

The data suggest that:

- High acuity/high complexity pediatric clinical programs consume significantly larger amounts of pharmacy staffing, on a paid hour per patient day basis, than did similar adult clinical programs. For instance, total paid hours per patient day were almost four times larger in pediatric oncology (3.77) than adult oncology/BMT (0.92) clinical programs, and were more than two times higher for pediatric intensive care (2.39) than adult intensive care (0.99) clinical programs. The survey was not designed to capture the reasons for any differences in the resources consumed by adult versus pediatric programs. However, a significant proportion of marketed drugs in Canada have not been studied in children prior to their market release, requiring much more care and diligence when they are used in children. In addition, for many drugs used in children, pharmacists have to compound, monitor and adjust theses drugs taking into account the weight, height, and/or body surface area of the child. These processes are inherently labour-intensive.

- Notwithstanding the new methodology used this year, total paid hours per patient day were relatively similar in the last two surveys for pediatric oncology (3.77 in 2005/05 vs 3.4 in 2003/04), pediatric intensive care (2.39 in 2005/05 vs 3.1 in 2003/04) and neonatal intensive care (1.06 in 2005/05 vs 1.2 in 2003/04).

- When comparing the total paid hours per patient day for medicine and surgery clinical programs in pediatric teaching hospitals, to the total paid hours per day for pediatric programs in adult hospitals, the ratios were similar (0.81 vs 0.71 paid hours per patient day).

- Drug cost comparisons between pediatric and adult programs suggest that drug costs per patient day are much higher in pediatric oncology programs ($311.34) than in adult oncology programs ($133.15). However, drug costs per patient day were similar for pediatric and adult intensive care programs ($102.47 and $113.64, respectively).

- Drug costs per patient day for neonatal intensive care (NICU) programs were lower ($19.44) than pediatric medicine-surgery clinical programs ($21.81). Given the acuity of neonatal intensive care patients, it may be surprising to have a lower/similar drug cost per patient day than for medicine-surgery patients. This can be partly explained by the lower doses required for the neonatal population, and the limited arsenal of drugs used in neonates.

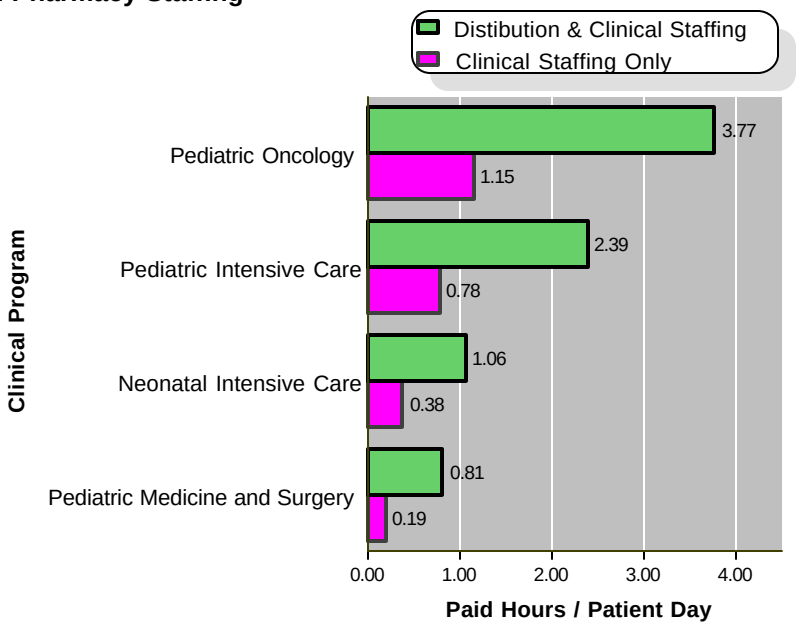
Table L-1 Mean Pharmacy Benchmarking Data for Selected Pediatric Clinical Programs

	Pediatric teaching hospitals				All hospitals
	Pediatric Oncology	**Pediatric Intensive Care**	**Neonatal Intensive Care**	**Pediatric Medicine-Surgery**	**Pediatrics (from Table K-1)**
Geographic distribution of respondents considered in the calculations	Prairies (1) Ontario (2) Quebec (3)	Prairies (2) Ontario (2) Quebec (3) Atlantic (1)	BC (1) Prairies (2) Ontario (6) Quebec (1) Atlantic(1)	BC (2) Prairies (3) Ontario (3) Quebec (2)	BC (3) Prairies (5) Ontario (17) Quebec (9) Atlantic (2)
Total Paid Hours per Patient Day	3.77 (n=5)	2.39 (n=6)	1.06 (n=7)	0.81 (n=7)	0.71 (n=10)
Drug Distribution Paid Hours Per Patient Day	2.57 (n=5)	1.55 (n=6)	0.65 (n=7)	0.63 (n=7)	0.47 (n=14)
Clinical Services Paid Hours Per Patient Day	1.15 (n=6)	0.78 (n=8)	0.36 (n=10)	0.19 (n=10)	0.19 (n=22)
Drug Costs Per Patient Day	$311.34 (n=4)	$102.47 (n=6)	$19.44 (n=11)	$21.81 (n=9)	$16.83 (n=36)

In Figure L-1, a comparison of the data for distributive and clinical services is presented. The data suggest that:

- Paid hours per patient day for clinical are between 23% and 33% of the total paid hours per patient day required for both distributive and clinical services, suggesting that 67% to 77% of the total paid hours for pharmacists and technicians are utilized to provide drug distribution services. A similar trend was reported in the adult benchmarking chapter.

Figure L-1 Mean Pharmacy Staffing



Mental Health Hospitals

Nancy Roberts

Introduction

Prior to 2005/06, the Hospital Pharmacy in Canada survey was only distributed to "acute care" hospitals with at least 50 acute care beds and at least 100 beds in total. Mental health facilities, long-term care facilities, and other "non-acute care" hospitals were excluded from the survey distribution. Like pediatric hospitals, mental health hospitals are believed to be different than adult acute care hospitals with respect to their pharmacy staffing resources, drug costs, drug distribution systems, and other aspects of their pharmacy services. However, there is little data available from mental health facilities to quantify, or otherwise describe, any differences that do exist. In 2005/06, a decision was made by the editorial board, based on consultations with pharmacy managers in mental health facilities, to distribute the Hospital Pharmacy in Canada survey to mental health hospitals. A separate analysis of data returned by those facilities was subsequently conducted. In this chapter we present the data reported by 10 Canadian mental health hospitals that responded to the 2005/06 survey, and compare those results to data reported by the 142 "acute care" hospitals that also participated in the survey.

Demographics

- Hospital demographic information is reported in Table M-1 for the 10 respondents who indicated that they had at least 100 beds, of which at least 50 were "acute mental health care" beds. Two mental health respondents were from the Prairies, 3 from Ontario, 4 from Quebec and 1 from Atlantic Canada. Fifty percent (50%, 5/10) of the respondents reported that they were part of a multi-site organization and 40 % (4/10)) indicated that they were independent, stand-alone facilities. Only one respondent met the criteria for being classified as a teaching hospital – membership in the Association of Canadian Academic Healthcare Organizations.

- The mean reported number of "acute" mental health care beds was 253, compared to a mean of 296 "non-acute" mental health care beds. In comparison, the 142 acute care hospitals reported a mean of 320 acute and 136 non-acute care beds. However, caution must be taken when making comparisons between the two groups, due to the small mental health sample size. In addition, the distinction between "acute" and "non-acute" mental health beds is somewhat ambiguous and may need to be more explicitly defined for future surveys.

- The average reported number of hours the pharmacy department was open in mental health hospitals was 47 hours, compared to 79 hours per week for acute care hospitals.

Clinical Pharmacy Services

Readers are encouraged to refer to the Clinical Pharmacy Services Section of the 2005/06 Annual Report – Hospital Pharmacy in Canada, for a complete picture of the national trends in clinical pharmacy practice and outcomes.

- The average reported percentage of mental health beds serviced with the pharmaceutical care model was 35%, which is identical to the results for the 142 acute care hospitals that participated in the survey (35%).

- The average reported percentage of mental health beds serviced with the traditional model, (52% for mental health hospitals versus 49% for acute care hospitals), or receiving no clinical service at all (39% for mental health hospitals versus 34% for acute care hospitals), was very similar.

- Seventy percent (70%, 7/10) of mental health respondents reported the provision of clinical pharmacy services to mental health outpatients. In contrast, only 27% (30/110) of acute care hospitals with outpatient mental health programs reported that they provide clinical pharmacy services to their outpatient mental health program.

- Admission drug histories and medical rounds participation - clinical pharmacy services identified by Bond et al.[1] as having a positive effect on health outcomes and a reduction in adverse effects - received a higher priority ranking, on a ten-point scale (one being the highest priority and 10 being the lowest), by mental health hospitals (4.6 and 4.0 respectively) than was given to those services by the acute care hospitals (each 5.1). Other clinical services receiving a higher ranking from mental health respondents than from acute care hospitals, were medication counselling (4.1 vs. 5.0) and patient education programs programs (5.2 vs. 6.7).

- The establishment of a policy for seamless care, identified as a required organizational practice by the Canadian Council on Health Facilities Accreditation (CCHSA), was only reported to be in place by 20% (2/10) of respondents for mental hospitals, compared to 37% (53/142) for acute care hospitals. This may be related to a higher proportion of long-term care patients in mental health facilities.

Drug Distribution

- Seventy percent (70%, 7/10) of respondents from mental health hospitals reported the use of unit dose systems in at least some parts of their hospital, similar to the 69% (98/142) of acute care hospitals that reported the use of unit dose systems.

- The percentage of mental health respondents reporting the use of total ward stock systems, in at least some parts of their hospital, was lower (10%, 1/10) than that reported by acute care hospitals (25%, 36/142). However, mental health hospitals reporting the use of traditional systems in at least some parts of their hospital was slightly higher, at 70% (7/10), compared to 56% (79/142) for acute care hospitals.

- Medication order entry in mental health hospitals is reported to be most frequently performed by pharmacists and technicians, as is the case for acute care hospitals. Orders entered by pharmacists were verified by another pharmacist at a much higher percentage, 67% (6/9) in mental health hospitals, compared to 34% (43/126) for acute care hospitals.

- Certification processes for technicians checking the work of other technicians were reported by 70% (7/10) of mental health hospitals compared to 85% (121/142) for acute care hospitals. A consistently applied process for technician recertification was reported to be fully implemented by 43% (3/7) of mental health hospitals, which was very similar to the 46% (56/121) figure reported for acute care hospitals.

- Thirty-three percent (33%, 3/9) of respondents from mental health hospitals reported the use of manually prepared medication tickets for >= 90% of beds compared to only 8% (12/142) for acute care hospitals.

The high use of medication tickets raises cause for concern. The manual production of tickets or cards places the patient at risk from errors caused by transcription, and the large quantity and small size of medication tickets predisposes the tickets to be easily lost or misplaced.

- Medication profiles were reported to include all medications prescribed, for >=90% beds, by 100% (10/10) of the mental health hospitals compared to 88% (125/142) reported for acute care hospitals.

Drug Purchasing

Total spending on drugs in Canada increased by 11% in 2005, according to the Canadian Institute of Health Information's (CIHI) annual drug expenditures report. Drugs represented 17.5% of the health care dollar spending in 2005. [2]

- Respondents from mental health hospitals reported an 11% increase in total drug costs in the one year period from 2004/05 to 2005/06.

- The annual mean drug expenditure reported by respondents from mental health hospitals was $1,903,752.

- The average drug cost per patient day for mental health hospitals, inclusive of acute and non-acute beds, was reported to be $16.00. However, due to the small sample size (n=7), caution should be taken when using this value for benchmarking/comparison purposes. For mental health programs that operate within an acute care hospital, the mean reported drug cost per patient day was reported to be $11.27 (see adult benchmarking chapter), a figure that is substantially less than that reported by the mental health facilities.

Human Resources

Human resource shortages continue to be a major issue in a number of healthcare professions and with the aging workforce, the number of retirements is expected to increase over the next few years.

- The average budgeted hours per patient day, acute plus non-acute, reported for mental health hospitals was 0.3, compared to 0.81 for acute care hospitals. The lower number of budgeted hours in mental health hospitals may be attributed to a number of factors identified previously, such as reduced hours of pharmacy operations and higher use of traditional drug distribution systems. In comparison, a figure of 0.34 budgeted hours per acute patient day was reported for mental health programs operated within acute care hospitals (see adult benchmarking chapter).

- The average total pharmacy full time equivalents (FTE) in mental health hospitals was 17.5 FTE compared to 44 FTE for acute care hospitals. A breakdown in the staffing composition of mental health hospitals compared to acute care hospitals can be found in Table M-1.

- The proportion of pharmacists' time spent on clinical activities in mental health hospitals is 43%, similar to 41% for acute care hospitals. Pharmacists' time spent in drug distribution was also similar to that reported for acute care hospitals (39% for mental health facilities versus 43% for acute care facilities).

- The average duration of pharmacist vacancies in mental health hospitals was 196 days, just slightly higher than the 182 days reported for acute care hospitals.

- The average expected pharmacist retirements per facility in the next 5 years was 2.0 versus a range of 1.4 to 2.9 for acute care hospitals.

Medication Safety Information

Readers are encouraged to refer to the Medication Safety chapter of the 2005/06 Annual Report – Hospital Pharmacy in Canada, for a complete picture of the national trends in medication safety practices.

- Ninety percent (90%, 9/10) of mental health respondents reported that a medication incident reporting system was in place within their hospital, compared to 96% (136/142) for acute care hospitals.

The majority of results in the medication safety information section for the respondents for mental health hospitals were very similar to the results from acute care hospitals, except for the following:

- Seventy-seven percent (77%, 7/9) of respondents (including those who answered "yes" or "partial") indicated that incidents occurring during drug prescribing, and detected in the pharmacy before dispensing, are reported, compared to 46% (62/136) for acute care hospitals.

- Incidents detected on the patient care units, but before administration to the patient, are reported >=90% of the time by 89% (8/9) of respondents compared to 75% (102/136) in acute care hospitals.

- A Medication Safety Self assessment tool was reported to have been completed by only 50% (5/10) of mental health respondents compared to 71% (101/142) for acute care hospitals.

- Seventy percent (70%, 7/10) of respondents reported that most of the time (>=90%), medication orders remain conditional until reviewed by a pharmacist, compared to 46% (63/142) for acute care hospitals. This is a noteworthy difference considering the significantly lower operational hours for mental health pharmacy services. However it is likely, in the mental health practice setting, that fewer new medication orders are written during evenings, nights and weekends, when the pharmacy is closed. It is also likely, in the mental health practice setting, that fewer new medications would need to be started immediately, as compared to acute care hospitals.

- Only 20% (2/10) of mental health respondents reported that they conducted a comprehensive medication history of all home medication when a patient is admitted to the mental health organization, compared to 42% (59/142) for acute care hospitals.

- Twenty percent (20%, 2/10) of respondents reported reconciling the patient's medications and communicating that information to the next provider of care when the patient is transferred between levels of care within the mental health facility, compared to 38% (54/142) for acute care hospitals.

Mental health organizations are encouraged to evaluate current policies and practices, in relation to the results shared above, to help identify the changes that hospital pharmacists, in collaboration with other health care providers and the leaders of their organizations, will need to implement in order to comply with the CCHSA's Patient/Client Safety Goals and medication related ROPs.

Technology

Pharmacy information systems, combined with automation technologies, offer substantial opportunities for improving the safety and efficiency of the medication system. Results from the 2005/06 Annual Report – Hospital Pharmacy in Canada indicate that acute care hospitals are only slowly beginning to embrace this change. Areas of note where mental health institutions are either leading, or lagging, when compared to acute care hospitals, are as follows:

- The percentage of respondents from mental health hospitals who reported an approved plan to implement a computerized prescriber order entry system (CPOE) was 40% (4/10), compared to 23% (33/142) of respondents from acute care hospitals.

- Eighty-eight percent (88%, 7/8) of respondents from mental health hospitals, who had the option to use drug allergy alerts, were using that functionality, compared to 95% (111/117) of respondents from acute care hospitals.

- Thirty-eight percent (38%, 3/8) of mental health respondents reported that they had the functionality in their pharmacy software to provide dosage modification alerts for both renal and hepatic dysfunction, compared to 33% (39/118) for hepatic function and 46% (54/118) for renal function, for acute care hospitals. Only 13% (1/8) of mental health respondents reported that they are actually using the functionality for renal dysfunction dose checking, compared to 59% (32/54) for acute care hospitals, and only 13% (1/8) were using the functionality for hepatic dysfunction dose checking, compared to 28% (11/39) of acute care hospitals.

These results again raise the question of why available patient-safety functionality is frequently not being used by hospitals across the country, particularly following the awareness created by the Institute of Medicine's "To Err is Human" [3] report and The Canadian Adverse Event Study.[4]

Table M-1 Comparison of Key Indicators for Mental Health & Acute Care Respondents 2005/06

Key Indicators	Mental Health Hospitals (n=10, unless otherwise indicated)	Acute Care Respondents (n=142, unless otherwise indicated)
Demographics		
Number of beds – "acute" care	253 (n=7)	320
Number of beds – "non acute care"	296 (n=6)	136
Staffing & Compensation		
Pharmacists	7.3	17.6
Management	0.9	2.3
Technicians	7.5	20.6
Support Staff	1.8	2.8
Residents	-	0.7
Total approved FTE	17.5	44
Proportion of time spent by pharmacists in		
- drug distribution	39%	43%
- clinical activities	43%	41%
- teaching	9.30%	6%
- pharmacy research	3.60%	2%
- other	9.30%	8%
Budgeted hours/patient day (excluding residents)	0.3 (acute plus non-acute) (n=6)	0.81 (acute) (n=127)
Drug Purchasing & inventory		
Drug costs/patient day	$16.00 (acute plus non-acute) (n=7)	$36.80 (acute) (n=122)
Drug Distribution		
Pharmacy open hours per week	47	79
Drug distribution System (all beds or some beds)		
- unit dose	70%	69%
- central automated	10%	25%
- traditional	70%	56%
- total wardstock	10%	25%
- controlled dose card	20%	29%
Manually prepared medication tickets (>=90% beds)	33% (n=9)	8%
Clinical Pharmacy Services		
PC Model		
% beds serviced	35% (n=7)	35% (n=116)
Traditional clinical pharmacy services		
% beds serviced	52% (n=8)	49% (n=127)
No patient oriented clinical pharmacy services		
% beds serviced	34% (n=6)	39% (n=114)
Established policy for seamless care	20%	37%
Medication Safety		
Medication incident reporting system	90%	96%
Medication self-assessment tool completed	50%	71%
Comprehensive admission medication history of home meds.	20%	42%
Technology		
Approved Plan to implement CPOE	40%	23%

Education and Research

- In reviewing the Education and Research section survey results for mental health hospitals (n=10), compared to acute care hospitals (n=142,) the most noteworthy observation was that respondents from mental health hospitals reported significantly more time was committed to supporting the training of pharmacy technicians (an average of 220 days for the 2005/06 year), compared to acute care hospitals (an average of 98 days).

- The involvement of mental health hospitals in training all categories of pharmacy students is similar to the results for acute care hospitals, except for pharmacy residents (10%, 1/10, of the mental health facilities compared to 29%, 41/142, of acute care hospitals) and M.Sc. Hospital Pharmacy Students (20% , 2/10, of the mental health facilities, compared to 9%, 13/142, of acute care hospitals).

- Thirty-eight percent (38%, 3/8) of respondents from mental health hospitals reported that pharmacy staff members were involved in conducting original research, similar to 35% (49/142) of respondents from acute care hospitals.

Ethics

In the 2005/06 Annual Report – Hospital Pharmacy in Canada, the special interest topic dealt with the subject of ethics in healthcare. The survey addressed ethical issues within three healthcare domains – research, clinical care, and business. The following are a few highlights of areas where mental health hospitals results differ from those for acute care hospitals:

- In those mental health hospitals (7/10) with a hospital based Research Ethics Board (REB), also known as an Institutional Review Board (IRB), only 57% (4/7) indicated that a pharmacist was an integral member of the committee, compared to 81% (103/142) for acute care hospitals.

- Quality improvement initiatives were required to be reviewed and approved by the REB by 57% (4/7) of the respondents from mental health hospitals, compared to 19% (20/103) of respondents from acute care hospitals.

- An institutional policy dealing with the disclosure of adverse events was reported by 90% (9/10) of mental health hospitals compared to 83% (118/142) of acute care hospitals. However only 67% (6/9) of respondents from mental health hospitals reported that disclosure of such events to patient and family was required, compared to 90% (106/118) of respondents from acute care hospitals.

- Seventy percent (70%, 7/10) of respondents from mental health hospitals reported that their institution had a conflict of interest policy, similar to 68% (97/142) of respondents from acute care hospitals. However, a higher percentage of the mental health hospitals' conflict of interest policies addressed the following issues, when compared to acute care hospitals: referral of clients to private practice (57% vs. 35%), solicitation of sponsorship funds, grants or gifts (100% vs.67%), educational content and choice of speakers (57% vs.31%) and selling of data to external parties (100% vs. 63%).

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[1] Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing, and adverse drug reactions in US hospitals. Pharmacotherapy 2006;26:735-47.

[2] Drug Expenditures in Canada 1985 - 2005. Canadian Institute for Health Information. Ottawa: May 10, 2006. http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=PG_570_E&cw_topic=570&cw_rel=AR_80_E. Accessed 2006 December 16.

[3] Kohn L.T. Corrigan J.M, Donaldson M.S. To Err is Human-Building a Safer Health System. Committee on Quality of Health Care in America, Institute of Medicine, National Academy Press, Washington DC, 1999

[4] Baker G.R. Norton P.G. et al. The Canadian Adverse Events Study the incidence of adverse events among hospitalized patients in Canada. CMAJ. 2004; 170 (11): 1678-86

Respondent List 2005/06

Respondents from hospitals in the following list participated, or attempted to participate, in the 2005/06 survey. Please note that not all of the listed respondents were included in the data analysis. Only responses received before September 15th, 2006, from hospitals with a minimum size of 100 total beds (and 50 acute care beds), were included. However, we wish to recognize all of those in the list below for their willingness to contribute to the success of the 2005/06 Hospital Pharmacy in Canada Survey.

Hospitals <201 Beds

Brockville General Hospital
Kootenay Boundary Regional Hospital
Riverview Hospital **
C.H. et de soins de longue durée Fleury
Cambridge Memorial Hospital
Campbell River Hospital
Central Newfoundland Regional Health Center
Children's Hospital of Eastern Ontario*
Colchester East Hants Health Authority
Concordia Hospital
Cornwall Community Hospital
Cowichan District Hospital
CSSS Maria-Chapdelaine
Dartmouth General Hospital
East Kootenay Regional Hospital
Edmundston Regional Hospital
Guelph General Hospital
Guysborough Antigonish Strait Health Authority
Hôpital de Montréal pour enfants*
Mental Health Centre Penetanguishene **
Miramichi Regional Health Authority
Moose Jaw Union Hospital
Northern Lights Regional Health Centre
Nova Scotia Hospital **
Pembroke General Hospital
Pictou County Health Authority
Restigouche Health Services Corporation
St. Mary's General Hospital
St. Thomas - Elgin General Hospital
Timmins & District Hospital
Victoria Hospital
Wetaskiwin Hospital & Health Center

Hospitals 201-500 Beds

Alberta Hospital, Edmonton **
Alberta Hospital, Ponoka **
Atlantic Health Sciences Corporation*
Bluewater Health
Brandon Regional Health Centre
Burnaby Hospital
Centre hospitalier régional de Trois-Rivières
Centre hospitalier St. Mary's
Centre hospitalier universitaire Sainte-Justine*
CHAQ - Hôpital de l'Enfant-Jésus*
CHAQ - Hôpital Saint-Sacrement*
Chilliwack General Hospital
CSSS de la Haute-Yamaska
CSSS de la région de Thetford
CSSS des Aurores-Boréales
CSSS Domaine-du-Roy
CSSS Haut Richelieu / Rouville
CSSS Jardins-Roussillon
CSSS l'Ouest-de-l'Île
CSSS Lac-Saint-Jean-Est
CSSS Laval
CSSS Manicouagan
CSSS Pommeraie
CSSS Rimouski-Neigette
CSSS Rivière-du-Loup
CSSS Sorel-Tracy
CSSS Sud-Ouest-Verdun
CSSS Suroît
CSSS Vallée-de-l'Or
Dr. Georges-L. Dumont Regional Hospital
Grace General Hospital
Grey Bruce Health Services
Grey Nuns Community Hospital
Oakville Trafalgar Memorial Hospital
Hôpital Charles-LeMoyne
Hôpital général de Montréal*
Hôpital Laval*
Hôpital Royal-Victoria*
Hôtel-Dieu de Lévis
Hôtel-Dieu Grace Hospital - Windsor
Institut Philippe Pinel de Montreal **
Institut Univ. en Sante Mentale du Reseau McGill**
IWK Health Centre*

Hospitals 201-500 Beds (continued)

Joseph Brant Memorial Hospital
Langley Memorial Hospital
Markham Stouffville & Uxbridge Cottage Hospital
Misericordia Community Hospital
Montfort Hospital
Mount Sinai Hospital*
Nanaimo Regional General Hospital
North York General Hospital
Northern Health Authority
Peace Arch Hospital
Peace Country Health Region
Penticton Regional Hospital
Peterborough Regional Health Centre
Queen Elizabeth Hospital & Hillsborough Hospital
Quinte Health Care Corporation
Ridge Meadows Hospital
Royal Columbian Hospital
Royal Inland Hospital
Royal Jubilee Hospital
Sault Area Hospital
Seven Oaks General Hospital
South-East Regional Health Authority*
SouthLake Regional Health Centre
St. Boniface General Hospital*
St. Joseph's Health Care, Hamilton*
St. Joseph's Health Centre, Toronto
St. Michael's Hospital*
The Board of Governors of Kingston Hospital*
The Credit Valley Hospital
The Hospital for Sick Children*
The Royal Victoria Hospital of Barrie
The Scarborough Hospital, General Campus
The Scarborough Hospital, Grace Campus
Thunder Bay Regional Health Sciences Centre
Toronto East General Hospital
Vernon Jubilee Hospital
Victoria General Hospital, Victoria
Victoria General Hospital, Winnipeg
Whitby Mental Health Centre **
York Central Hospital

Hospitals >500 Beds

C.H. de l'Université de Montréal*
Calgary Health Region*
Capital District Health Authority*
Centre for Addiction & Mental Health* **
CH universitaire de Sherbrooke*
CHUQ - C.H. de l'Université Laval*
CSSS Beauce
CSSS Chicoutimi
CSSS du Coeur de l'Ile
CSSS l'Énergie
CSSS Richelieu-Yamaska
CSSS Rivière-du-Nord / Nord-de-Mirabel
Grand River Hospital
Hamilton Health Sciences Corporation*
Hôpital général juif Sir Mortimer B. Davis*
Hopital Louis-H Lafonaine **
Hôpital Maisonneuve-Rosemont*
Hopital Robert Giffard **
Hôpital Sacré-Cœur de Montréal*
Humber River Regional Hospital
Kelowna General Hospital
Lakeridge Health Corporation
London Health Sciences Centre*
MSA General Hospital
Providence Health Care*
Red Deer Regional Hospital
Regina Qu'Appelle Health Region*
River Valley Health
Royal Alexandra Hospital*
Saskatoon Regional Health Authority*
St. Joseph's Health Care, London*
Sunnybrook Health Sciences Centre*
Surrey Memorial Hospital
The Ottawa Hospital*
Trillium Health Centre
University Health Network*
University of Alberta Hospital*
William Osler Health Centre
Windsor Regional Hospital
Winnipeg Regional Health Sciences Centre*

**** Teaching Hospital (ACAHO)***
***** Mental Health Facilities***

2005/06 Annual Report

Hospital Pharmacy in Canada

Worksheet 2005/06

	Your Facility	All Hospitals	Bed Size			Teaching Status	
			100- 200	201- 500	>500	Teaching	Non-Teaching
1. Acute Inpatient Drug Costs/ Acute Admissions		$267	$196	$250	$345	$395	$208
2. Acute Inpatient Drug Costs/ Acute Patient Day		$37	$29	$34	$46	$53	$29
3. Nonacute Inpatient Drug Costs/ Nonacute Admission		$1,509	$1,759	$1,576	$1,237	$1,709	$1,447
4. Nonacute Inpatient Drug Costs/ Nonacute Patient Day		$9.12	$9.94	$8.49	$9.80	$8.84	$9.20
5. Inventory Turnover Rate		10.9	7.0	11.6	12.2	12.4	10.3
6. IV Production/ Acute Patient Day (for Respondents Providing IV Admixture to >= 90% of Patients)		0.93	0.99	0.86	1.06	1.23	0.75
7. Budgeted Hours (excluding resident)/ Acute Patient Day		0.81	0.76	0.77	0.95	1.05	0.72

1. Acute Inpatient Drug Costs / Admissions (Acute Care) **[F.2a / A.4a]**

2. Acute Inpatient Drug Costs / Acute Patient Day **[F.2a / A.5a]**

3. Nonacute Inpatient Drug Costs / Admissions (Nonacute Care) **[F.2b / A.4b]**

4. Nonacute Inpatient Drug Costs / Nonacute Patient Day **[F.2b / A.5b]**

5. Inventory Turnover Rate **[F.1]**

6. Total IV Admixture Product / Acute Care Patient Days for >= 90% CIVA
   [H.6 / A.5a for >= 90% of IV Admixture Service (H.2)]

7. Total Number of Budgeted FTE (Excluding Residents) x 1950 hours / Acute Care Patient Days
   [(D.1a total * 1950) / A.5a]