

Hospital Pharmacy in Canada 2009 / 2010 Report

Published by the Hospital Pharmacy in Canada Editorial Board



New Sections:

- Current Topics
- CSHP 2015 update
- Pharmacy Technicians
- Evaluating Pharmacy Services

Lilly

2009/10 HOSPITAL PHARMACY IN CANADA REPORT

TABLE OF CONTENTS

- Click on the red bullets below or on PDF Bookmarks to navigate

•	Acknowledgements	ii	
•	Editorial Board	iii	
•	Foreword	iv	
•	Introduction	v	
•	Data Collection Methodology	vii	
•	A - Demographics	1	
•	B - Clinical Pharmacy Services	3	
•	C - Drug Distribution Systems	21	
•	D - Human Resources	36	
•	E - Medication Safety	49	
•	F - Technology	64	
•	G - Benchmarking: Acute Care Hospitals - Pharmacy Staffing and Drug Costs for Specific Clinical Programs and Pharmacy Services	77	
•	H - Benchmarking: Pediatric Hospitals - Pharmacy Staffing for Specific Clinical Programs and Pharmacy Services	82	
•	I - CSHP 2015	84	
•	J - Current Topics	96	
•	K - Pharmacy Technicians	110	
•	L - Evaluating Pharmacy Services	120	
•	Recognition List	125	
•	Worksheet	127	

ACKNOWLEDGEMENTS

The Editorial Board wishes to acknowledge and thank the support team of the 2009/10 Hospital Pharmacy in Canada Report.

Managing Editors

Kevin Hall, Edmonton, AB
khall@pharmacy.ualberta.ca

Chuck Wilgosh, Edmonton, AB
cwilgosh@shaw.ca

Research Analyst

Dr. Paul Oeltjen, Montreal, QC
paul@pdora.com

Executive Assistant

Marjorie Robertson, Vancouver, BC
marjorie@therobertsons.ca

Website scripting and report cover design

George Horne, George Horne Associates, Vancouver, BC
gha@shaw.ca

Cover Photo

Michael Wong, Toronto Western Hospital, University Health Network

Translation services

Les Traductions Tessier S.C.C.

350, rue Sparks, Bureau 508
Ottawa ON K1R 7S8
Tel. (613) 594-8008 - Fax (613) 594-5882 - www.ttessier.ca

SPECIAL THANKS

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

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

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



EDITORIAL BOARD

Michele Babich, BSc Pharm, MHSA

Director of Pharmacy Services,
Vancouver Island Health Authority
Victoria, BC



Guest Editor

**Carolyn Bornstein, BScPhm, RPh,
ACPR, FCSHP**

Pharmacist, The Arthritis Program,
Southlake Regional Health Centre
Medication Management Support
Services, CCAC



**Jean-François Bussi eres, B Pharm
MSc MBA FCSHP**

Chef, d epartement de pharmacie et
unit e de recherche en pratique
pharmaceutique, CHU Sainte-Justine
Professeur titulaire de clinique,
Facult e de pharmacie, Universit e de
Montr eal
Montr eal, QC



Managing Editor

Kevin Hall, BSc Pharm, Pharm. D.

Clinical Associate Professor – Social
and Administrative Pharmacy
Faculty of Pharmacy and
Pharmaceutical Sciences
University of Alberta
Edmonton, AB



Janet Harding, BSP, MBA

Director, Regional Pharmacy
Services
Saskatoon Regional Health Authority
Saskatoon, SK



**Patricia Lefebvre, BPharm, MSc.,
FCSHP**

Chef du d epartement de pharmacie,
Centre universitaire de sant e McGill
Montr eal, QC



**Patricia Macgregor, RPh, BSc Pharm
(Hons), MHSc, CHE**

Director of Pharmacy
The Scarborough Hospital
Scarborough, ON



Executive Editor

**Emily Musing, RPh, BScPhm, MHSc,
ACPR, FCSHP, CHE, FACHE**

Executive Director of Pharmacy,
Clinical Risk and Quality
Patient Safety Officer
University Health Network
Toronto, ON



Iain Smith, BSc Pharm, ACPR, CHE

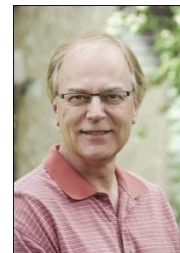
Pharmacy Manager
Queen Elizabeth Hospital &
Hillsborough Hospital
Charlottetown, PE



Managing Editor

Chuck Wilgosh, BSc Pharm, MBA

Pharmacy Consultant
Edmonton, AB



FOREWORD

D. TERRANCE MCCOOL

Eli Lilly Canada is pleased to support the 18th *Hospital Pharmacy in Canada Report* available at www.lillyhospitalsurvey.ca.

Thanks to all the hospital pharmacists across the country who completed the survey, there was an impressive 72% response rate. We are pleased that there were 160 organization respondents to the survey, which collectively represent approximately 62,814 inpatient beds across Canada. The information contained in this survey report continues to be a reliable reference due to a high participation rate by hospital pharmacy managers in all parts of the country.

This year's report again contains a special section measuring hospital pharmacy's progress towards the goals of the Canadian Society of Hospital Pharmacists 2015 Initiative. Carolyn Bornstein, CSHP's 2015 Project Coordinator is our guest editor for this chapter. Patient safety also continues to be a major issue for health professionals, health administrators and policy makers in Canada. This is the fifth consecutive survey in which we have included a major section on 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. Administrative support was provided by Marjorie Robertson.

Also, thank you to this year's Editorial Board who interpreted the data and authored the report – Michele Babich, Jean-François Bussi eres, Janet Harding, Patricia Lefebvre, Patricia Macgregor, Emily Musing, and Iain Smith.

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

EMILY MUSING

The Canadian healthcare system faces many challenges and it is probable that this will continue to characterize the environment within which hospital pharmacy operates. A look back at the history of Canada's health care system over the past 100 years suggests that challenge and change have been near-constant themes that governments, the public, and health care professions have had to address. (Ref: "Making Medicare: The History of Health Care in Canada 1914-2007" (<http://www.civilisations.ca/cmce/exhibitions/hist/medicare>). In retrospect, however, many of those challenges turned out to be opportunities to strengthen and improve our health care system. We can only hope that the challenges we currently face, including many of those that are explored in this report, will also lead to improvements in Canada's health care system.

This year's Hospital Pharmacy in Canada Report addresses many of the current challenges that face both hospital pharmacy and our health care system as a whole. With the heightened consciousness of patient safety concerns in the hospital setting, as well as increased awareness of avoidable hospitalizations and re-admissions, health care organizations are being tasked by provincial governments to improve the quality of patient care. At the same time, a continuing public concern regarding the sustainability of Canada's healthcare system has focused attention on the issues of accessibility and cost. Healthcare organizations must balance sometimes conflicting demands for quality and affordability, while operating within a societal context that increasingly expects accountability and transparency in the planning and delivery of health care services.

This year's Hospital Pharmacy in Canada Report summarizes many important aspects of hospital pharmacy practice in the 160 participating organizations, which collectively represent some 62,814 inpatient beds across Canada. This year's report repeats our special interest topic from the 2007/08 report, dealing with CSHP's 2015 initiative. The data from the previous report established a baseline of how well Canadian hospitals measured up against CSHP's 2015 goals and objectives for hospital pharmacy practice. Carolyn Bornstein, CSHP's 2015 Project Coordinator, is our guest editor for this chapter. Her analysis of the data from this year's survey allows us to assess hospital pharmacy's progress over the last 2 years, with respect to the targets set by CSHP's 2015 initiative. Readers are encouraged to review this analysis in detail to identify opportunities for improvement within their own institutions.

The report contains our standard array of chapters related to clinical pharmacy, drug distribution, human resources, medication safety and technology. It also continues to build on the benchmarking sections dealing with both adult and pediatric hospital pharmacy services. This year's report contains new sections focused on pharmacy technicians and evaluation of pharmacy services, as part of the board's ongoing effort to expand the report to include topics that are timely and useful for our readership. Another enhancement in this year's report is the addition of "highlights" to emphasize points of interest within each of the sections which allow the reader to easily note new and emerging trends. Finally another new chapter, focused on emerging or high-priority topics in hospital pharmacy practice, provides information on certain issues that many institutions and pharmacy departments are currently addressing, such as waste disposal, cold-chain management, and the handling and disposal of hazardous pharmaceuticals. While this new chapter will likely be repeated in future years, the topics highlighted will change to reflect the current issues of the day.

Jean-Francois Bussieres' section on clinical pharmacy services provides a thoughtful and comprehensive overview of patient oriented pharmacy services. Jean-Francois compares the data collected in this year's survey with recommendations/standards for clinical practice that have appeared in a number of papers, published by organizations such as the American College of Clinical Pharmacy, American Medical Association, American Society of Health-System Pharmacists and Canadian Society of Hospital Pharmacists. This chapter provides data on the types of inpatient and outpatient clinical pharmacy services that are being offered in Canadian hospitals, as well as the evolving types of clinical practice models that are being used to deliver those services. This section also looks at how these clinical pharmacy services are evaluated and the clinical pharmacist competencies that are felt to be necessary to provide quality clinical services.

The review of pharmacy technician services, by Iain Smith and Chuck Wilgosh, addresses the evolving role of the pharmacy technician. This section includes information on the changing landscape regarding technician certification, regulation and remuneration. They also discuss the context within which these changes are

occurring, specifically the entry to practice technician competencies that have been developed by the National Association of Pharmacy Regulatory Authorities, and the accreditation standards for pharmacy technician training programs that have been established by the Canadian Council for the Accreditation of Pharmacy Programs.

Well-designed 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 the data collected on drug distribution systems shows an increase in the use of decentralized unit dose systems, especially as it relates to the use of automated dispensing cabinets. Janet also explores key issues arising from the data collected on medication order review by pharmacists, medication order entry, medication order entry verification, and medication administration records. Of note, while hospitals in the United States are moving towards twenty-four hour service, such an around-the-clock, on-site service is still limited to only a handful of hospitals in Canada. That raises questions concerning whether or not a pharmacist's involvement in the review of medication orders is essential or not. If it is essential, what options are there for insuring that it occurs for all new orders, regardless of when they are written? Janet's analysis of the data dealing with the handling and administration of cytotoxic and hazardous drugs indicates that there is need for improvement in many hospitals.

Janet also provides a review of drug purchasing, which shows that drugs continue to take up a substantial share of the total healthcare expenditure compared to other types of products and services. Janet also highlights several important factors that complicate the analysis of this data, including the regionalization of healthcare and provincial differences in the way that certain drugs, such as oncology and renal drugs, are expensed. An increase in the frequency and severity of drug shortages, combined with the pandemic preparedness initiatives that occurred in the past year may have resulted in increased stockpiling of product, which in turn may have affected inventory management practices. The survey data also shows that there has been an increase in the outsourcing of drug preparation, particularly sterile product preparation, and the repackaging of pharmaceutical products. This may be a reflection of staffing and space limitations in many facilities, or may be the result of concerns related to the ability of the pharmacy department to meet the more rigorous standards that are being expected, particularly for the preparation of sterile products.

Michele Babich's review of pharmacy human resources highlights the improvement that has occurred with respect to the pharmacist manpower shortage that has existed for the past 5 to 10 years. Respondents reported a total of 235 vacant pharmacist positions, down from 292 reported in 2007-08 and 270 reported in 2005-06. This improvement may be related to a number of developments that have taken place over the past few years, such as an increase in the enrolment at most pharmacy schools and increases in the scope of practice for pharmacy technicians, which might have led to a need for fewer pharmacists. While the vacancy rate for technicians is low compared to that of pharmacists, this is an issue that requires ongoing monitoring. There was an upward trend in technician vacancies and, following the expansion in technician roles that most hospital pharmacies have pursued, there is an increasing reliance on this category of staff. This chapter also provides the results for a number of staffing ratios that facilities can use to compare against their own staffing ratios. This chapter also provides information on compensation rates for a number of different categories of pharmacy staff.

Hospital pharmacists are increasingly providing leadership in patient safety, whether this is related to the development and implementation of effective medication distribution systems, provision of clinical services, or helping their hospital to meet Accreditation Canada's Required Organizational Practices. Patricia Lefebvre's review of the medication safety data provides a snapshot of the many areas in which pharmacists currently play a role in ensuring that medication safety is given a high priority in Canadian hospitals. Topic areas addressed in this chapter include medication incident reduction strategies, medication reconciliation, and patient education. Results show a decreasing variation in patient safety practices, regardless of hospital size, province, or teaching status of the facility. This likely reflects the impact that accreditation bodies and regulatory authorities are having on the implementation of specific medication safety practices, such as medication reconciliation, restrictions on the availability of concentrated electrolytes, and the management of other high-alert drugs.

Patricia Macgregor reports on the progress that hospitals are making in the adoption of information technology as a key component of their efforts to enhance safety and efficiency. This section reviews the data showing that more facilities have established interfaces between their pharmacy information systems and their lab systems. There has also been an increase in the number of facilities indicating that they have computerized prescriber order entry systems, and a notable increase in the use of wireless networks for managing smart pumps.

With respect to the use of clinical decision support systems, Patricia notes that there appears to be an enhanced accountability for the appropriate use of these systems with respect to having override policies and requirements to document a reason for selected high-risk overrides. However, most facilities still do not perform

audits of the overrides that have been performed by their staff. There has been little change in the number of respondents who indicate that their pharmacy information systems provide drug therapy guidance alerts, based on the integration of evidence-based guidelines or clinical pathways into the clinical decision support system.

Iain Smith and Chuck Wilgosh report on the indicators and measures currently used to audit the quality of pharmacy services. These include the assessment of clinical services, the assessment of sterile compounding facilities and procedures, the carrying out of retrospective medication incident-related root cause analysis, and the carrying out of prospective failure modes and effects analysis. This new chapter will help provide a better understanding of how well the quality of pharmacy services is being assessed in Canadian hospitals.

The adult and pediatric benchmarking chapters, authored by Kevin Hall and Jean-Francois Bussieres provide data on the pharmacy staff input and medication costs that are associated with the provision of pharmacy services to specific types of clinical programs, including critical care, medicine, surgery, and long term care. These detailed benchmarking analyses provide pharmacy managers with important information that can be used to benchmark existing program performance, or to plan new pharmacy services.

Kevin Hall reports on current topics of interest including waste handling, the impact that the current economic environment is having on hospital pharmacy practice, cold chain management, technician certification, compliance with accreditation standards and involvement in experiential undergraduate training. These topics were chosen to reflect timely issues pertinent to current practice.

As Executive Editor, 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 Linda Chow and France Dube 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 insight and dedication to this project is appreciated by all hospital 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 provided ongoing leadership as Managing Editors. Their attention to detail and oversight of both the survey process and report development are invaluable.

The Editorial Board would also like to extend special thanks to Andrew Merrick who, on behalf of Eli Lilly Canada Inc., has provided key support for the Hospital Pharmacy in Canada Report over the past five years. In addition, we extend our thanks to Janet Harding who will be retiring from the board in June 2011. Janet has been a valuable contributor to the board's work since 2001, authoring a variety of chapters in the past 5 surveys. Both of these individuals have contributed to the ongoing success of the report to help make 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 identified by the members of the Editorial Board of the Hospital Pharmacy in Canada Annual Report, hospital pharmacies on the mailing list of the Hospital Pharmacy in Canada Annual Report, and the membership list of the Association of Canadian Academic Healthcare Organizations (ACAHO). The Editors were responsible for verifying the current name and e-mail address of the Director of Pharmacy and the hospital's Chief Executive Officer for each facility on the list from the province(s) that they represent. At this point, the Editors also attempted to confirm each hospital's eligibility to participate in the survey, based on the qualifying criteria of 50 or more acute beds.

A final list of 224 hospitals was then prepared, based on the information collected. It was later learned that 2 of these hospitals had fewer than 50 acute beds and therefore did not qualify. Among the 222 potentially qualified hospitals there were 47 teaching hospitals that were members of the ACAHO.

The Hospital Pharmacy in Canada survey was announced in e-mails sent to Directors of Pharmacy and to CEOs of the initial selection of hospitals on May 7 and May 13, 2010. A second e-mail was sent only to the Directors of Pharmacy on May 18, 2010 and May 25, 2010. This e-mail contained the identification code and the password required to log on to the survey web site. During the following weeks, the editors followed up with potential respondents to ensure that the identification codes and passwords were received, and to encourage the potential respondents to participate in the 2009/10 survey. On June 10, June 23, July 6 and July 12, reminder notices were emailed to Directors of Pharmacy who had not completed the on-line survey, asking them to participate in the survey. In addition, in early July the editors (listed on Page iii of this report) contacted hospital pharmacies that had not yet responded, in order to explain the importance of participation in this national survey.

The respondent identification code and the password enabled a respondent to log on to the survey website at any time and to complete any part of the questionnaire in English or in French. The first page of the website contained instructions for completing the survey. The survey questions were distributed over 15 web pages. From any page a respondent was able to move to any other page of the online survey. At the beginning of every webpage there was a list of definitions of terms used in the questions on that page. These definitions also popped up when the mouse cursor was moved over one of these terms in the text of the question. Online survey completion was interactive. If a follow-up question was applicable because of the answer to a screening question, the on-line program presented a modified version of the questionnaire page that included additional questions. After saving their responses for the current page, the program warned respondents if they had entered non-numeric information in fields that required numeric answers. To avoid problems resulting from an inconsistent use of periods or commas for decimal indicators, numeric information requiring a decimal place had to be entered in two fields, one for the whole number part and another one for the decimal part of the number.

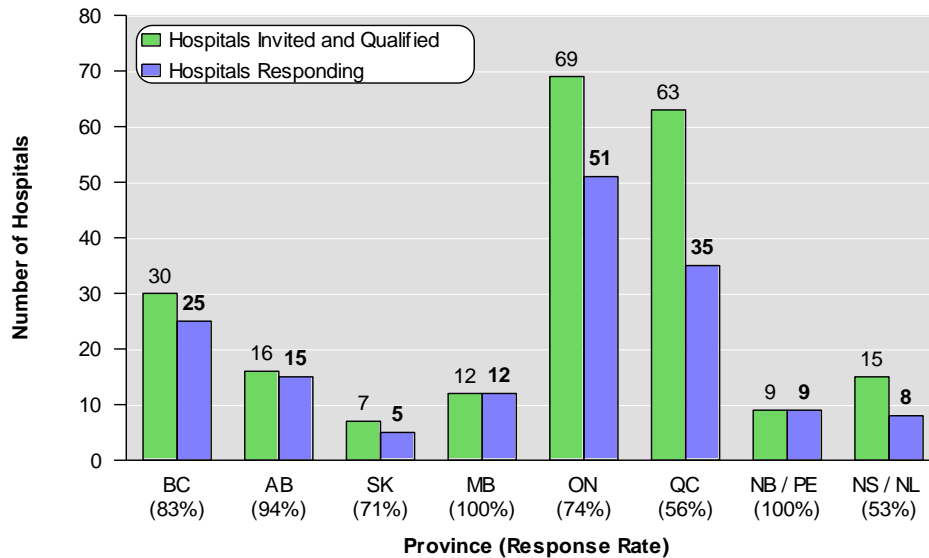
After the survey website was closed for survey participation, a new site was created, for the exclusive use of the Managing Editors. This review site included all data that had been entered by the 164 respondents who had logged on, entered, and saved responses to questions on more than two of the 15 web pages by July 23, 2010. After selecting a responding hospital pharmacy for review, a managing editor was presented with a summary page showing 26 different ratios (for example: calculated occupancy rate, calculated length of stay, budgeted staff hours per inpatient day). If a ratio looked unreasonable the responding hospital was contacted for an explanation, or the corresponding answers were excluded from the analysis. After the review was completed, four hospitals were excluded from the analysis because there were not enough answers (fewer than 30% of the number of answers provided by the respondent with the most answers) or too many of their answers were inconsistent or outside a reasonable range. The remaining 160 hospital pharmacies were considered qualified respondents. Using the 222 potentially qualified hospitals who were invited to participate in the survey, the resulting response rate was then 72%. The response rate for teaching hospitals was 85% (43/47) and the response rate for non-teaching hospitals was 67% (117/175). The actual response rate may be higher because it is not known if those hospitals who never logged on to the survey website or who never answered any question were hospitals with fewer than 50 acute beds, who were not qualified to participate in the survey.

A - DEMOGRAPHICS

EMILY MUSING

The 2009/10 survey response rate of 72% (160/222) was similar to the 2007/08 rate of 74% (166/223). In looking at the proportion of respondents in each of the three bed size categories (50 to 200 beds, 201 to 500 beds, and greater than 500 beds), the breakdown was similar to that of the last two surveys, with a slight decrease in the number of respondents from facilities with greater than 500 beds. This may be a reflection of our request to respondents to answer the survey based on individual facilities whenever possible, rather than as a region. While the qualifying criteria for participation in the Hospital Pharmacy in Canada Survey were changed in 2007/08, to allow for participation of smaller hospitals with as few as 50 acute care beds, the number of beds from smaller hospitals (50 to 200 bed hospitals) continues to represent only a small percentage of the total beds captured by this survey. Hospitals of 50 to 200 beds accounted for 8% of the overall acute care bed total in 2009/10, compared to 7% in 2007/08. There was also little change in the mix of teaching versus non-teaching facilities, which has remained fairly consistent since the report adopted the use of membership in the Association of Canadian Academic Healthcare Organizations (ACAHO) to define teaching hospitals. This year, 73% of respondents were from non-teaching organizations and 27% were from teaching facilities, compared to 76% and 24% respectively in the 2007/08 report.

Figure A-1. Response to the Survey by Province 2009/10



The proportion of respondents from each province or region, as shown on Figure A-1, was very similar to previous surveys, with the exception of Ontario (ON) which rose from 28% (46/166) of total respondents in 2007/08 to 32% (51/160) of total respondents in 2009/10, and Quebec (QC), which fell from 31% (51/166) of total respondents in 2007/08 to 22% (35/160) of total respondents in 2009/10.

As noted in previous Hospital Pharmacy in Canada Reports, the facilities that responded to the current survey are not exactly the same group that responded to previous surveys. When analyzing the results from this survey, the reader should remember that changes between this survey and earlier surveys may be the result of multiple factors, including differences in the group of respondents who participated in the survey in any given year.

Several demographic questions asked in previous surveys were eliminated this year. For example, respondents were not asked whether they belonged to a multi-site health organization (MSHO). With the advent of regionalization across Canada, this has become common and is no longer a relevant distinguishing factor. In the 2007/08 report, fifty percent of ON respondents reported belonging to MSHO, while all other jurisdictions reported MSHO rates of over 75%.

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

- The average reported number of acute care beds was 294, which is virtually identical to the data included in the 2007/08 report.
- The total number of beds included in this survey was 62,814, of which 47,004 were acute care beds and 25,882 were in teaching hospitals. The Canadian Institute for Health Information¹ reported that there were 115,120 beds staffed and in operation in Canada in 2002/03, of which 29,237 beds were in teaching hospitals. This provides the reader with some perspective on the comprehensiveness of the sample included in this survey.
- Acute care admissions were 3.6% higher than the previous survey and acute care patient days were 1.3% higher. Average length of stay of 7.1 remained very similar to that reported in the 2007/08 survey (7.2). Note that this year's survey did not include questions regarding clinic/medical day unit visits nor emergency department visits.

Table A-1. Hospital Demographic Data – Acute and Non-acute Care 2009/10

	—	Bed Size			Teaching Status		Region				
		All	50 - 200	201- 500	>500	Teach	Non-Teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	(160)	(34)	(94)	(32)	(43)	(117)	(25)	(32)	(51)	(35)	(17)
Beds - acute care	47,004	3,737	23,228	20,039	22,376	24,628	5,758	9,952	15,420	11,563	4,311
Beds - non-acute care	15,810	902	7,532	7,376	3,506	12,304	2,450	1,663	4,336	5,668	1,693
Inpatient Days - acute care (n=)	(155)	(33)	(91)	(31)	(43)	(112)	(23)	(30)	(51)	(35)	(16)
	15,286,302	1,109,579	7,477,308	6,699,415	7,444,307	7,841,995	2,029,707	3,291,787	5,086,679	3,592,086	1,286,043
Inpatient Days - non-acute care (n=)	(108)	(18)	(66)	(24)	(23)	(85)	(19)	(13)	(36)	(27)	(13)
	4,867,716	273,763	2,408,784	2,185,169	1,069,999	3,797,717	778,415	494,438	1,371,981	1,814,413	408,469
Annual admissions - acute care (n=)	(155)	(33)	(91)	(31)	(43)	(112)	(23)	(30)	(51)	(35)	(16)
	2,149,188	166,472	1,119,288	863,428	1,000,876	1,148,312	274,689	447,689	796,637	457,778	172,395
Average length of inpatient stay - acute care (n=)	(151)	(32)	(89)	(30)	(42)	(109)	(21)	(30)	(50)	(34)	(16)
	7.1	6.7	7.1	7.5	7.4	6.9	6.8	7.3	6.2	8.1	7.5

Another decision that was made for the 2009/10 survey was to focus questions related to annual admissions and average length of stay on acute care beds, as previous survey data on non-acute annual admissions and length of stay were inconsistent. This may be the result of differences in how lengths of stay are calculated and reported, given that patients may spend prolonged periods of time, often a number of years, in a non-acute bed.

With regards to palliative care beds, respondents were asked to classify these as acute or non-acute based on how they are designated within their facility. A question in previous surveys that was related to whether a pharmacist was the head of the department was eliminated from the 2009/10 survey, given that the results had remained consistent across a considerable number of survey cycles. Questions and results concerning the number of hours of pharmacy operations have now been incorporated into the Drug Distribution Systems section of this report.

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

B – CLINICAL PHARMACY SERVICES

JEAN-FRANÇOIS BUSSIÈRES

INTRODUCTION

The profession of pharmacy continues to evolve and nowhere is the evidence of that more clear than in the changes that are occurring in the role that pharmacists play in providing direct patient care services. Whether those services are described as clinical pharmacy services, pharmaceutical care, or medication management services is probably less important than the understanding that these services involve a direct relationship between a patient and a pharmacist who is committed to helping that patient achieve the best possible drug therapy outcomes. Since our last report there have been a number of developments in clinical pharmacy practice.

In 2008, the American College of Clinical Pharmacists (ACCP) published a new strategic plan, a revised definition of clinical pharmacy, and a new set of core competencies of a clinical pharmacist¹. Subsequently, ACCP published a proposed revision of the existing specialty and specialist certification framework for pharmacy practitioners². In November 2008 ACCP, the American Pharmaceutical Association (APhA), in collaboration with the American Society of Health-System Pharmacists (ASHP), petitioned the Board of Pharmaceutical Specialties requesting recognition of ambulatory care pharmacy practice as a specialty³. ACCP also published several white papers and commentaries dealing with interprofessionalism⁴, the value of pharmacy residency training^{5, 6}, student professionalism⁷ and pharmacy practice in patient-centered primary-care medical homes⁸.

The Canadian Society of Hospital Pharmacists (CSHP) has also published documents dealing with different aspects of clinical pharmacy practice. In 2009, CSHP released a guideline on Drug Information⁹ and a statement on medication reconciliation and the role of pharmacists¹⁰. In 2010, CSHP released a guideline on journal clubs¹¹, an information paper on direct patient care and beyond¹², and an information paper on enhancing quality and safety in medication use¹³.

In 2010, the American Medical Association (AMA) published a commentary concerning the scope of practice of pharmacists, that generated a strong reaction from various groups within the pharmacy profession, including ACCP¹⁴, APhA and ASHP¹⁵. ASHP responded to this publication asking the AMA “to retract the document, or, at minimum, correct the inaccuracies and mischaracterizations.” Of particular concern was the repeated characterization of pharmacists as having inadequate education and training, suggesting that their patient care roles should be limited. The ASHP stated that “The AMA document lacks the more mainstream views of physician-pharmacist and health-care team collaboration supported by numerous medical specialty societies, the Institute of Medicine, National Quality Forum, and others. The document also includes a number of inaccurate depictions about the education and training of pharmacists for which ASHP provided corrections”. Although practice change is happening at a rapid pace in many parts of the pharmacy profession, the AMA incident points out that there are still obstacles to be overcome before the medication management role of the pharmacist is firmly established within all sectors of the health care system. Fortunately, the results of the 2009/10 Hospital Pharmacy in Canada Survey suggest that in Canada the pharmacist’s role as a clinical practitioner is clearly established in most hospital settings. The American Society of Health-System Pharmacists (ASHP) also conducts and publishes survey data on health-system pharmacy practice, which shows a similar trend in the expansion of the pharmacist’s direct patient care role. The entire ASHP survey is not conducted at one time. Different parts are conducted each year, with most sections being repeated in each 3-year cycle. With respect to the sections that primarily address clinical practice, the section on monitoring and patient education¹⁶ was published in 2010 while the section on prescribing and transcribing was published in 2008¹⁷. In addition to the Hospital Pharmacy in Canada Report, readers are encouraged to consult those ASHP survey publications to get an idea of the issues and trends in clinical pharmacy practice in the United States.

STRUCTURED PATIENT CARE PROGRAMS

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

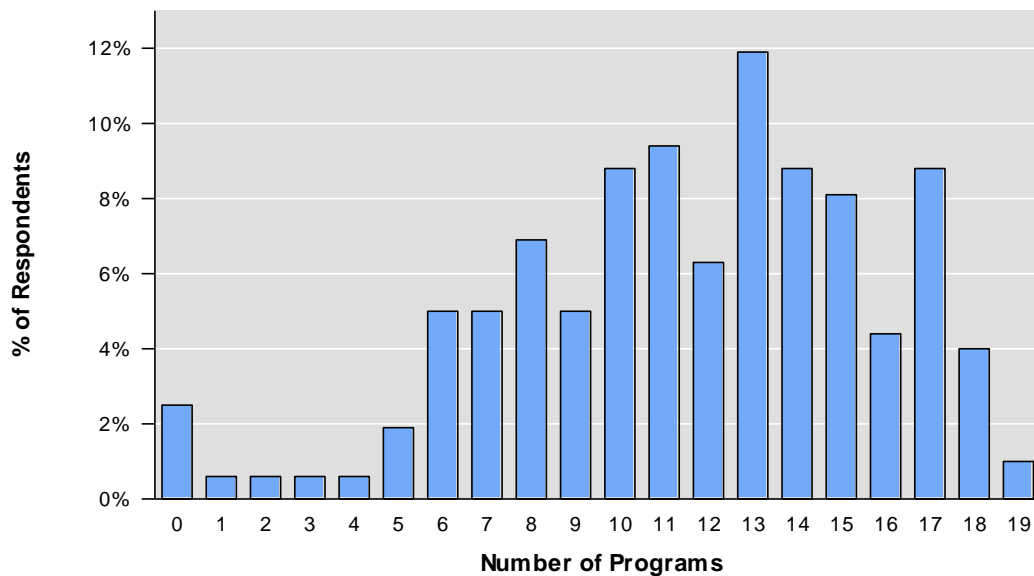
“a healthcare delivery system that is formally structured around a group of patients with similar healthcare needs (e.g. child health program, mental health program, critical care program, etc.). There is usually a physician and/or nurse leader/director for a formal patient care program.”

Respondents to the 2009/10 survey were asked to review this definition and then indicate if their facility had, or did not have, a formal patient care program for each of a number of patient groupings (e.g. general medicine patients, cardiology patients, dialysis patients, etc.). Because of this change, caution is required when comparing the actual results with previous surveys (e.g. 2005/06 and earlier), dealing with patient care programs and pharmacist involvement in these programs.

- Out of a total of 19 patient care programs, the average number of patient care programs that respondents reported having at their facility was 11.5 ± 4.2 programs [range – 0-19] with an average of 10.1 programs in BC, 10.2 programs in the Prairies, 12.5 programs in Ontario (ON), 12.0 programs in QC (QC) and 12.4 programs in the Atlantic Provinces.

Figure B-1 summarizes the distribution of respondents providing formal patient care programs in 2009/10. The distribution is similar to the one observed in 2007/08. Only 2.5% (4/160) of respondents reported no formal patient care programs.

Figure B-1. Respondents Providing Formal Patient Care Programs 2009/10



Base: All respondents (n=160)

After respondents had indicated that they had a specific formal patient care program at their hospital, they were then asked to indicate if they had a pharmacist(s) assigned to that program for inpatient and/or outpatient services. Formal assignment of a pharmacist to a patient care program is felt to be a good indicator that a reasonable level of clinical pharmacy support is being provided to a patient care program.

PROFILE OF OUTPATIENT CLINICAL PHARMACY SERVICES

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

- The average number of outpatient programs with an assigned pharmacist was reported by respondents to be 3.0 ± 2.6 programs [range – 0 to 11 programs] with an average of 2.6 programs in BC, 2.2 programs in the Prairies, 3.4 programs in ON, 3.4 programs in QC and 3.2 programs in the Atlantic Provinces.
- The percentage of hospitals that reported having a pharmacist assigned to a particular outpatient program ranged from a low of 4% for rehabilitation and gynecology/obstetrics to 79% for hematology-oncology. (Table B-1) The distribution of outpatient programs with an assigned pharmacist is similar to 2007/08 except for diabetes that decreased from 46% (44/96) in 2007/08 to 29% in the 2009/10 survey.
- Among the respondents who reported that they had a pharmacist assigned to a particular outpatient care program, the percentage doing so was usually higher for respondents with teaching affiliation than for non-teaching hospitals, except for haematology/anticoagulation, cardiovascular/lipid, mental health and general surgery.
- Among the respondents who reported that they had a pharmacist assigned to the outpatient component of a patient care program, the percentage doing so was usually higher for respondents from larger bed-size hospitals (i.e. > 500 beds vs. 50-200 beds). This was particularly true for the following outpatient programs: haematology-oncology, haematology/anticoagulation, infectious disease/AIDS, renal/dialysis, emergency, diabetes, cardiovascular/lipid, mental health, general medicine and general surgery.
- Regional differences were noted for outpatient pharmacist assignment to particular outpatient care programs. Examples where there was a lower percentage of respondents in a particular region who reported having an outpatient pharmacist assigned to particular patient care programs included: haematology/oncology – 47% of respondents in the Prairies, and 67% of respondents in BC, vs. 79% nationally; haematology/anticoagulation 50% in QC and 58% in ON, vs. 63% nationally; renal/dialysis - 56% of respondents in the Prairies vs. 71% nationally; emergency - 35% of respondents in the Prairies, vs. 60% nationally; transplantation - 38% of respondents in ON, vs. 59% nationally; and diabetes – 0% in the Prairies and 13% in BC, vs. 29% nationally.

Table B-1 summarizes the profile of pharmacist assignment to outpatient care programs in 2009/10.

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

Figure B-2. Respondents Providing Outpatient Clinical Pharmacy Services 2009/10

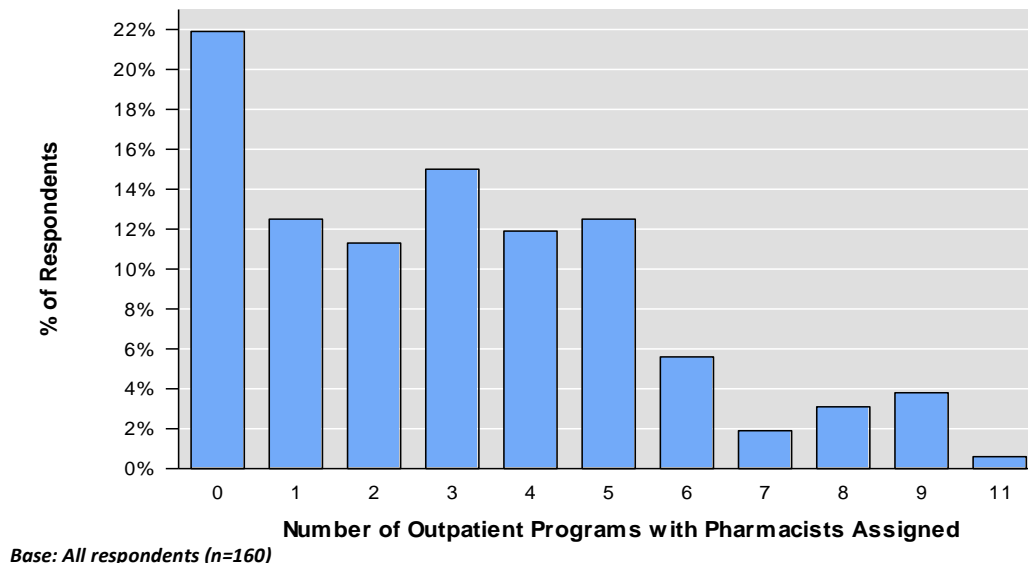


Table B-1. Profile of Pharmacist Assignment to Outpatient Programs 2009/10

(Base: all respondents)

Hospitals (n=)	All	50-200	201-500	> 500	Teaching	Non-Teaching	BC	Prai	ON	QC	Atl
	(156)	(33)	(91)	(32)	(43)	(113)	(24)	(31)	(50)	(34)	(17)
Hematology-oncology											
program exists	107	14	65	28	35	72	12	19	35	29	12
pharmacists assigned	85 79%	5 36%	58 89%	22 79%	28 80%	57 79%	8 67%	9 47%	31 89%	28 97%	9 75%
Renal / Dialysis											
program exists	91	11	52	28	32	59	9	18	30	22	12
pharmacists assigned	65 71%	1 9%	41 79%	23 82%	23 72%	42 71%	9 100%	10 56%	23 77%	16 73%	7 58%
Hematology/anticoagulation											
program exists	72	6	44	22	28	44	13	11	24	20	4
pharmacists assigned	45 63%	1 17%	31 71%	13 59%	17 61%	28 64%	10 77%	8 73%	14 58%	10 50%	3 75%
Emergency											
program exists	138	28	79	31	41	97	19	26	46	34	13
pharmacists assigned	83 60%	8 29%	53 67%	22 71%	29 71%	54 56%	11 58%	9 35%	31 67%	25 74%	7 54%
Transplantation											
program exists	27	2	11	14	26	1	3	7	8	7	2
pharmacists assigned	16 59%	0 0%	7 64%	9 64%	15 58%	1 100%	3 100%	4 57%	3 38%	4 57%	2 100%
Infectious Disease / AIDS											
program exists	54	4	27	23	32	22	6	8	23	12	5
pharmacists assigned	31 57%	1 25%	16 59%	14 61%	22 69%	9 41%	3 50%	5 63%	13 57%	6 50%	4 80%
Cardiovascular / lipid											
program exists	78	5	46	27	33	45	13	13	28	18	6
pharmacists assigned	31 40%	1 20%	18 39%	12 44%	10 30%	21 47%	4 31%	7 54%	9 32%	7 39%	4 67%
Diabetes											
program exists	89	10	53	26	30	59	15	8	31	24	11
pharmacists assigned	26 29%	1 10%	16 30%	9 35%	10 33%	16 27%	2 13%	0 0%	9 29%	12 50%	3 27%
Geriatrics											
program exists	97	9	61	27	28	69	14	14	31	27	11
pharmacists assigned	21 22%	2 22%	12 20%	7 26%	8 29%	13 19%	2 14%	3 21%	8 26%	2 7%	6 55%
Asthma / Allergy											
program exists	55	5	31	19	23	32	6	6	19	19	5
pharmacists assigned	11 20%	1 20%	8 26%	2 11%	5 22%	6 19%	1 17%	3 50%	3 16%	2 11%	2 40%
General Surgery											
program exists	130	25	75	30	37	93	19	27	43	29	12
pharmacists assigned	19 15%	0 0%	14 19%	5 17%	3 8%	16 17%	2 11%	2 7%	11 26%	2 7%	2 17%
Pain / palliative care											
program exists	104	15	62	27	35	69	16	16	31	25	16
pharmacists assigned	14 14%	2 13%	9 15%	3 11%	5 14%	9 13%	5 31%	1 6%	3 10%	1 4%	4 25%
Mental Health											
program exists	123	20	73	30	38	85	18	23	38	30	14
pharmacists assigned	14 11%	0 0%	9 12%	5 17%	4 11%	10 12%	3 17%	3 13%	7 18%	1 3%	0 0%
General Medicine											
program exists	133	25	79	29	39	94	20	26	46	28	13
pharmacists assigned	12 9%	0 0%	8 10%	4 14%	4 10%	8 9%	1 5%	3 12%	7 15%	0 0%	1 8%
Neurology											
program exists	47	3	22	22	29	18	5	7	17	13	5
pharmacists assigned	4 9%	0 0%	4 18%	0 0%	3 10%	1 6%	1 20%	2 29%	1 6%	0 0%	0 0%
Gynecology / Obstetrics											
program exists provided	107	19	61	27	28	79	16	20	38	22	11
pharmacists assigned	4 4%	0 0%	3 5%	1 4%	3 11%	1 1%	0 0%	1 5%	1 3%	1 5%	1 9%
Rehabilitation											
program exists	77	12	45	20	20	57	13	13	27	10	11
pharmacists assigned	3 4%	1 8%	1 2%	1 5%	2 10%	1 2%	0 0%	1 7%	0 0%	2 17%	0 0%

PROFILE OF INPATIENT CLINICAL PHARMACY SERVICES

- In the 2009/10 survey, 89% (143/160) of respondents indicated that they had a pharmacist assigned to at least one of the 18 inpatient programs included in the survey. This is somewhat lower than the 92% (152/166) reported in the 2007/08 report.
- The average number of inpatient care programs with an assigned pharmacist was reported by respondents to be 7.0 programs [range of 0-16 programs] with an average of 6.1 in BC, 6.1 in the Prairies, 9.2 in ON, 4.9 in QC and 5.1 in the Atlantic Provinces.
- The proportion of hospitals that reported having a pharmacist assigned to a particular inpatient program (Table B-2) ranged from a low of 20% for diabetes, to a high of 83% for geriatrics and for transplantation. The distribution of inpatient programs with an assigned pharmacist is similar to 2007/08.
- Among the respondents who reported that they had a pharmacist assigned to particular patient care programs, the proportion offering this service was usually higher for respondents from teaching facilities than for non-teaching facilities. This was particularly true for the following clinical pharmacy services: geriatrics, transplantation, adult critical care, general medicine, haematology-oncology, paediatric/neonatal critical care, mental health, neurology and asthma/allergy. More non-teaching hospitals (48%) than teaching hospitals (35%) reported pharmacist supported hematology/anticoagulation programs. Pharmacist supported diabetes programs were also more common in non-teaching hospitals (23%) than teaching hospitals (13%).
- Among the respondents who reported that they had a pharmacist assigned to particular patient care programs, the proportion offering this service was usually higher for respondents from larger bed-size hospitals (e.g. > 500 beds vs. 50-200 beds). This was particularly true for the following clinical pharmacy services: geriatrics, transplantation, adult critical care, general medicine, pediatric/neonatal critical care, general surgery, mental health, neurology and renal / dialysis. More small hospitals (50-200 beds) reported pharmacist supported hematology/anticoagulation programs (67%) than large hospitals (36%).
- Regionally, there was usually a lower proportion of respondents in the Atlantic Provinces and QC who reported that pharmacists were assigned to inpatient care programs. That QC trend might be related to the higher vacancy rates for pharmacists. In addition, there were regional differences in the percentage of respondents that reported having pharmacists assigned to certain inpatient programs: transplantation – 67 % in BC and the Atlantic Provinces vs. 83% nationally; geriatrics - 62% in Atlantic Provinces vs. 83% nationally; adult critical care – 56% in the Atlantic Provinces vs. 82% nationally; general medicine – 44% in Atlantic Provinces and 52% in QC vs. 76% nationally, haematology-oncology – 46% in BC vs. 72% nationally; cardiovascular/lipid – 50% in QC vs. 72% nationally; pediatrics/neonatal critical care – 30% in the Atlantic Provinces vs. 79% nationally; general surgery – 27 % in QC and Atlantic Provinces vs. 62% nationally.

Table B-2 summarizes the profile of pharmacist assignment to inpatient programs in 2009/10.

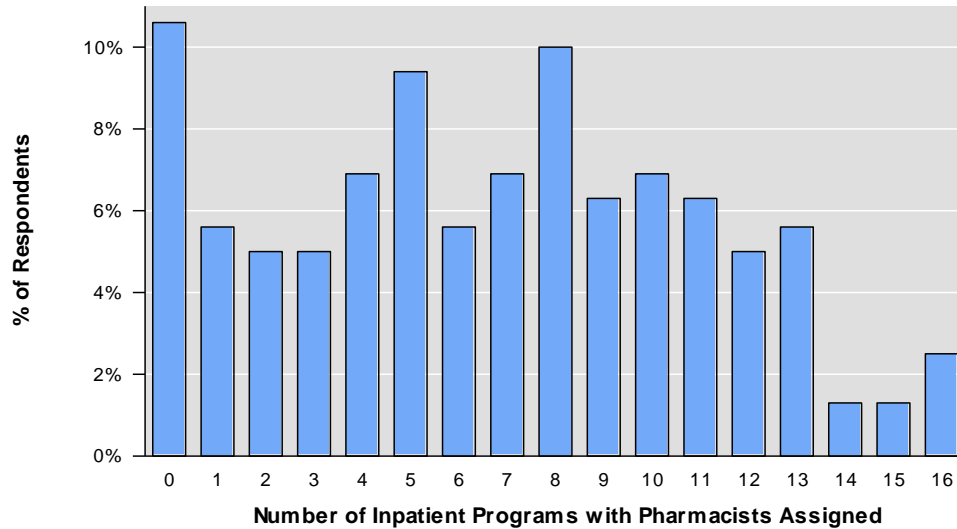
Further evidence of the value of pharmacist involvement in patient care programs has been published since our last report, including for pharmacist services provided in the areas of cardiovascular/lipid management¹⁸,¹⁹, general medicine²⁰, emergency²¹, neonatology²², and geriatrics²³.

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

Table B-2. Profile of Pharmacist assignment to Inpatient Programs 2009/10

(Base: all respondents)

	Hospitals (n=)	Bed size			Teaching Status		Regions					
		All (156)	50-200 (33)	201-500 (91)	> 500 (32)	Teaching (43)	Non-Teaching (113)	BC (24)	Prai (31)	ON (50)	QC (34)	Atl (17)
Geriatrics												
program exists	107	12	67	28	29	78	15	16	35	28	13	
pharmacists assigned	89 83%	7 58%	56 84%	26 93%	28 97%	61 78%	13 87%	14 88%	31 89%	23 82%	8 62%	
Transplantation												
program exists	29	3	12	14	28	1	3	7	8	8	3	
pharmacists assigned	24 83%	1 33%	10 83%	13 93%	24 86%	0 0%	2 67%	6 86%	8 100%	6 75%	2 67%	
Adult Critical Care												
program exists	136	23	83	30	33	103	20	25	45	30	16	
pharmacists assigned	112 82%	15 65%	68 82%	29 97%	33 100%	79 77%	17 85%	22 88%	42 93%	22 73%	9 56%	
Cardiovascular / lipid												
program exists	85	5	53	27	34	51	13	14	33	18	7	
pharmacists assigned	69 81%	4 80%	43 81%	22 82%	29 85%	40 78%	11 85%	13 93%	31 94%	9 50%	5 71%	
Ped/Neonatal Critical care												
program exists	79	10	48	21	29	50	10	14	36	9	10	
pharmacists assigned	62 79%	7 70%	37 77%	18 86%	25 86%	37 74%	8 80%	11 79%	34 94%	6 67%	3 30%	
General Medicine												
program exists	145	30	85	30	39	106	21	30	49	29	16	
pharmacists assigned	110 76%	21 70%	63 74%	26 87%	37 95%	73 69%	17 81%	27 90%	44 90%	15 52%	7 44%	
Hematology-oncology												
program exists	106	14	64	28	34	72	11	19	34	29	13	
pharmacists assigned	76 72%	11 79%	42 66%	23 82%	29 85%	47 65%	5 46%	13 68%	26 77%	22 76%	10 77%	
Infectious disease / AIDS												
program exists	56	4	29	23	33	23	6	8	25	12	5	
pharmacists assigned	38 68%	1 25%	24 83%	13 57%	23 70%	15 65%	6 100%	4 50%	23 92%	2 17%	3 60%	
Rehabilitation												
program exists	84	12	51	21	21	63	13	15	31	13	12	
pharmacists assigned	53 63%	6 50%	34 67%	13 62%	13 62%	40 64%	7 54%	8 54%	26 84%	6 46%	6 50%	
Renal / dialysis												
program exists	94	13	53	28	32	62	10	20	29	22	13	
pharmacists assigned	59 63%	7 54%	33 62%	19 68%	22 69%	37 60%	8 80%	13 65%	24 83%	9 41%	5 39%	
General Surgery												
program exists	142	29	82	31	38	104	19	30	48	30	15	
Pharmacists assigned	88 62%	15 52%	50 61%	23 74%	26 68%	62 60%	13 68%	20 67%	43 90%	8 27%	4 27%	
Pain / palliative care												
program exists	113	17	68	28	37	76	16	19	34	27	17	
pharmacists assigned	68 60%	9 53%	42 62%	17 31%	21 57%	47 62%	11 69%	11 58%	22 65%	15 56%	9 53%	
Neurology												
program exists	50	4	23	23	30	20	5	9	18	13	5	
pharmacists assigned	29 58%	0 0%	15 65%	14 61%	19 63%	10 50%	3 60%	6 67%	15 83%	3 23%	2 40%	
Mental Health												
program exists	133	20	82	31	40	93	18	24	44	31	16	
pharmacists assigned	76 57%	4 20%	47 57%	25 81%	31 78%	45 48%	9 50%	13 54%	35 80%	11 36%	8 50%	
Gynecology / obstetrics												
program exists	119	22	69	28	28	91	16	22	44	23	14	
pharmacists assigned	58 49%	8 36%	37 54%	13 46%	15 54%	43 47%	8 50%	9 41%	36 82%	3 13%	2 14%	
Hematology/anticoagulation												
program exists	75	6	47	22	29	46	14	12	24	20	5	
pharmacists assigned	32 43%	4 67%	20 43%	8 36%	10 35%	22 48%	8 57%	3 25%	12 50%	7 35%	2 40%	
Asthma / allergy												
program exists	55	4	32	19	22	33	6	6	19	19	5	
pharmacists assigned	15 27%	1 25%	9 28%	5 26%	9 41%	6 18%	3 50%	2 33%	7 37%	2 11%	1 20%	
Diabetes												
program exists	90	10	54	26	30	60	14	8	31	25	12	
pharmacists assigned	18 20%	0 0%	12 22%	6 23%	4 13%	14 23%	4 29%	1 13%	9 29%	3 12%	1 8%	

Figure B-3. Respondents Providing Inpatient Clinical Pharmacy Services 2009/10

Base: All respondents (n=160)

CLINICAL PRACTICE MODELS

In November, 2010, ACCP published a task force report on optimal medication therapy prescribing and management.²⁴ The task force proposed a vision for the pharmacist's ultimate role in patient-specific drug therapy decision-making. The questions addressed in the report included whether or not the pharmacist's role will evolve to the point where prescribing is primarily a pharmacist responsibility. In other words, will the current Collaborative Drug Therapy Management model (CDTM) change to one where there is a physician diagnostician and a pharmacist prescriber? In the US the Institute of Medicine (IOM) has been critical of how pharmacists are used and not used in the current US health care system. These are just a few of the recent developments that challenge the pharmacy profession to move forward with future practice models that will make the most effective use of pharmacists' training and abilities.

ASHP and the ASHP Foundation have established a Pharmacy Practice Model Initiative (PPMI) that has included a consensus summit in November 2010, a marketing campaign, a website and program evaluations²⁵. *"The goal of this initiative is to significantly advance the health and well being of patients by developing and disseminating a futuristic practice model that supports the most effective use of pharmacists as direct patient care providers"*. The initiative has five goals:

- 1) Create a framework for ensuring the provision of safe, effective, efficient, accountable, and evidence-based care for all hospital/health-system patients
- 2) Determine patient care-related services that should be consistently provided by departments of pharmacy in hospitals and health systems and increase demand for pharmacy services by patients/caregivers, health care professionals, health care executives, and payers
- 3) Identify the available technologies to support implementation of the practice model, and identify emerging technologies that could impact the practice model
- 4) Support the optimal use and deployment of hospital and health-system pharmacy resources through development of a template for a practice model which is operational, practical, and measurable
- 5) Identify specific actions that pharmacists should take to implement practice model change including determination of the necessary staff skills and competencies that are required to implement this model"²⁶.

The PPMI website includes examples of innovative practice models that have been implemented models²⁷ as well as other relevant resources²⁸.

At the international level, an executive summary of a Global Conference on the Future of Hospital Pharmacy, conducted by the hospital pharmacy section of the International Pharmaceutical Federation was also published in 2009²⁹.

In Canada, the *Moving Forward: Pharmacy Human Resources for the Future* initiative conducted a series of research studies to investigate and understand the pharmacy human resources challenges facing the Canadian healthcare system. In late 2008, the final report and recommendations of this 3 year study were released. Among the research projects conducted by *Moving Forward*, one report identified and described innovative models of pharmacy practice that have been emerging in the Canadian health system and comparable jurisdictions. In the retail pharmacy sector there are also practice model initiatives underway. In Alberta, where pharmacists have more advanced prescribing rights than in most jurisdictions throughout the world, a pharmacy practice model initiative was undertaken in collaboration with the provincial health ministry.³⁰ Hospital pharmacists should monitor and keep abreast of these PPMI initiatives.

As Zellmer stated, the “transformation of pharmacy practice will not march in a straight line toward some ultimate perfection. Rather, it is likely to follow a haphazard course, leading to a variety of practice models that have core traits in common with the early concept of clinical pharmacy. The pace of change may fluctuate between exhilarating advances and disappointing setbacks, depending on the forces in the environment and the quality of the profession’s leadership.”³¹

In the US, the Council on Credentialing in Pharmacy (CCP) has published its scope of contemporary pharmacy practice³². In that document it is noted that patient-centred pharmacy practice now occurs in a variety of practice settings where different training and credentialing needs exist. As a result, it is unlikely that a single practice model will come out of the various initiatives that are underway. However, the core principles are likely to be similar, regardless of the practice model.

In order to capture the evolution of pharmacy practice models in Canada, respondents were asked a number of new questions in the 2009/10 survey. Different practice models were defined and respondents were asked to indicate the practice model or models that were being used by their department, the percentage of inpatient beds served by each model, and the percentage of pharmacists in their hospital that were practicing under each model. Four model definitions were used. Those four models have replaced the “pharmaceutical care”, “traditional clinical pharmacy services” and “absence of clinical pharmacy services” options that were used in previous surveys. The practice model definitions were:

- **Drug distribution centred model** - Pharmacists largely function in a drug distribution role, with limited clinical services being provided. Clinical activities are largely limited to pharmacy interventions that occur as a result of drug order review in the central pharmacy.
 - **Separate clinical and distributive practice model** - Pharmacists are divided into two groups. One group largely provides distributive services while the second group largely functions in clinical roles. Those pharmacists who largely function in clinical roles have little or no distributive responsibilities, either in the central pharmacy or in satellite pharmacies.
 - **Clinical practice centred model**– Nearly all pharmacists function largely in clinical roles, with less than 20% of their time spent in a distributive role. Pharmacy technicians and/or automation are largely responsible for distributive activities.
 - **Integrated drug distribution/clinical practice model** - Nearly all pharmacists have a balance of both distributive and clinical responsibilities. It may include a balanced mix of both distributive and clinical responsibilities during each shift, or a rotation through distributive and clinical shifts.
- In the 2009/10 survey, 95% (152/160) of respondents provided information on the clinical practice models in place within their hospital.
 - Not surprisingly, many hospitals use more than one practice model. The percentage of respondents that use each pharmacy practice model, either for all beds or for a portion of all beds in their facility, varied from 74% (113/152) for an integrated drug distribution/clinical practice model, 38% (57/152) for a drug distribution centred model, 30% (46/152) for a clinical practice centred model and 11% (17/152) for a separate clinical and drug distribution practice model.
 - The percentage of inpatient beds covered by the drug distribution model is higher in smaller hospital (31% in 50-200 beds vs. 18 % in 201-500 beds vs. 12 % in > 500 beds), and in non-teaching hospitals (24 % in non-teaching vs. 9% in teaching).
 - Regional differences were noted, with a lower proportion of inpatient beds covered by integrated drug distribution/clinical practice model in QC vs. nationally (38% vs. 62%) and the Atlantic Provinces vs.

nationally (45% vs. 62%). The percentage of inpatient beds covered by a clinical practice centred model is higher in ON (17%) and QC (22%) vs. nationally (13%).

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

Table B-3. Clinical Pharmacy Services – Clinical Practice Models 2009/10

	All	Bed Size			Teaching Status		Region				
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	Prai	ON	QC	Atl
(n=) for % of beds	(152)	(32)	(90)	(30)	(42)	(110)	(25)	(32)	(47)	(32)	(16)
(n=) for % of pharmacists	(143)	(28)	(86)	(29)	(38)	(105)	(24)	(30)	(43)	(32)	(14)
Drug distribution centred model											
% beds	20%	31%	18%	12%	9%	24%	18%	18%	10%	28%	37%
% pharmacists	17%	34%	15%	5%	3%	22%	14%	15%	12%	20%	36%
Separate clinical and drug distribution practice model											
% of beds	5%	3%	4%	8%	5%	4%	3%	3%	0%	12%	8%
% pharmacists	6%	4%	5%	10%	5%	6%	5%	4%	0%	14%	7%
Integrated drug distribution / clinical practice model											
% of beds	62%	54%	64%	66%	65%	61%	70%	75%	72%	38%	45%
% of pharmacists	63%	54%	65%	69%	69%	61%	70%	78%	71%	43%	43%
Clinical practice centred model											
% of beds	13%	12%	14%	14%	22%	10%	9%	4%	17%	22%	11%
% of pharmacists	14%	8%	15%	16%	23%	11%	10%	4%	16%	23%	14%

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

EVALUATION OF CLINICAL PHARMACY SERVICES

Research-based initiatives, using rigorous scientific methods provide the evidence that specific therapies, interventions or services, including those provided by pharmacists, actually improve outcomes. The evaluation of pharmacy services, by pharmacy clinicians and their managers, insures that what is taking place in the practice setting is congruent with the best available evidence that has been generated through research studies. Since the last Hospital Pharmacy in Canada Report, ACCP has published a number of documents dealing with pharmacy practice research. These include documents that address the role of the clinical pharmacist as a principal investigator³³, ACCP's clinical pharmacy-based research network,³⁴ the training of clinical pharmacy scientists,³⁵ and a document about pharmacy practice research careers³⁶. In addition, several important research reports have been published concerning the impact of pharmacy services.

One of those examines the economic effect of pharmacists on health outcomes in the US. Of the 56,573 citations considered, a total of 126 studies met the criteria for inclusion in a systematic review. Results favouring pharmacist-provided care were found in 20 studies (16%), mixed results were seen in 53 studies (42%), no effect was found in 6 studies (5%), and unclear results were found in 47 studies (37%)³⁷. In another paper, the effect of outpatient pharmacists' direct patient care role (i.e. non-dispensing role) on patient and health professional outcomes was examined. Four types of randomized controlled trials were included comparing: "1. Pharmacist services targeted at patients versus services delivered by other health professionals; 2. Pharmacist services targeted at patients versus the delivery of no comparable service; 3. Pharmacist services targeted at health professionals versus services delivered by other health professionals; 4. Pharmacist services targeted at health professionals versus the delivery of no comparable service. Forty-three studies were included; 36 studies involved pharmacist interventions targeting patients and seven studies involved pharmacist interventions targeting health professionals³⁸.

The evaluation of pharmacy services is increasingly being recognized as a necessary component of the practice of Pharmacy. Many external standard-setting organizations (e.g. Accreditation Canada, certification boards, regulatory authorities, professional associations, etc.) are driving evaluation through their standards, accreditation processes and licensing requirements. The high response rate and participation in this Canadian hospital pharmacy survey shows the willingness of the majority of directors of pharmacy to document, benchmark, and evaluate the level of their practice. The 2009/10 survey results provide information on the current evaluation practices that are being applied to clinical pharmacy services in Canadian hospitals.

- There was no change in the percentage of respondents who reported that they were conducting evaluations of the provision of direct patient care pharmacy services in their hospitals. Thirty-one percent

of respondents (51/163) in 2007/08 and 31% of respondents (50/160) in 2009/10 reported that they were evaluating the direct patient care services provided by pharmacists in their hospital. (Table B-4)

- For hospitals reporting that they evaluate the provision of direct patient care pharmacy services in their facility, four aspects of clinical practice were evaluated by respondents: documentation (82%), patient assessment (67%), implementation of objectives and development of a monitoring plan (61%), and medication/drug counselling and understanding (41%). The results were similar in 2007/08.
- Three methods for conducting the evaluation were reported by respondents: retrospective chart review (67%), direct observation (57%) and self-evaluation by pharmacists (55%).
- For hospitals reporting the evaluation of the provision of direct patient care pharmacy services, the proportion of pharmacists who were evaluated was 60%, vs. 63% in 2007/08.
- The evaluation of direct patient care pharmacy services was reported more often by respondents in teaching hospitals than non-teaching hospitals (44% vs. 27%) and larger bed-size hospitals (38% in hospitals with more than 500 beds and 38% in hospitals with 201-500 beds, vs. 6% in hospitals with 50-200 beds).

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

Table B-4. Evaluation of Clinical Pharmacy Services 2009/10

	All (160)	Bed size			Teaching Status	
		50-200 (34)	201-500 (94)	>500 (32)	Teaching (43)	Non-Teaching (117)
Hospitals (n=)	(160)	(34)	(94)	(32)	(43)	(117)
Evaluation of direct care services by auditing a sample of clinical activities	50 31%	2 6%	36 38%	12 38%	19 44%	31 27%
Evaluation is done by: (n=)	(50)	(2)	(36)	(12)	(19)	(31)
Pharmacy managers	25 50%	2 100%	16 44%	7 58%	8 42%	17 55%
Pharmacy practice leaders	36 72%	1 50%	29 81%	6 50%	14 74%	22 71%
Peers (e.g. other pharmacists)	17 34%	0 0%	11 31%	6 50%	8 42%	9 29%
Physicians	6 12%	0 0%	3 8%	3 25%	4 21%	2 7%
The pharmacists themselves	16 32%	1 50%	12 33%	3 25%	8 42%	8 26%
Others	8 16%	0 0%	4 11%	4 33%	5 26%	3 10%
Method for evaluation : (n=)	(49)	(2)	(35)	(12)	(18)	(31)
Chart review – retrospective	33 67%	1 50%	21 60%	11 92%	14 78%	19 61%
Direct observation	28 57%	1 50%	20 57%	7 58%	10 56%	18 58%
Self-evaluation by pharmacists	27 55%	1 50%	22 63%	4 33%	11 61%	16 52%
Other	10 20%	0 0%	8 23%	2 17%	4 22%	6 19%
Evaluated aspects of clinical practice: (n=)	(49)	(2)	(35)	(12)	(18)	(31)
Patient assessment	33 67%	2 100%	25 71%	6 50%	11 61%	22 71%
Implementation of objectives and monitoring plan	30 61%	1 50%	21 60%	8 67%	11 61%	19 61%
Medication / drug counselling and understanding	20 41%	0 0%	15 43%	5 42%	8 44%	12 39%
Documentation	40 82%	1 50%	27 77%	12 100%	16 89%	24 77%
Other	10 20%	0 0%	6 17%	4 33%	5 28%	5 16%
Proportion of pharmacists evaluated	60% ± 36	52% ± 69	68% ± 34	39% ± 32	43% ± 37	71% ± 32

Base: all respondents

CLINICAL PHARMACY COMPETENCIES

In 2008, The American College of Clinical Pharmacy (ACCP) published a strategic plan that summarizes their core ideology, envisioned future, core purpose and mission, and critical issues for the the profession³⁹. One of the key goals identified by ACCP is the appropriate education of the clinical pharmacy workforce. To attain that goal, the College has established five key competencies for clinical pharmacists that are consistent with their revised definition of clinical pharmacy.

In Canada, the Canadian Council for Accreditation of Pharmacy Programs (CCAPP) has the responsibility for evaluating the quality of pharmacy professional degree programs in Canadian universities and for promoting the continued improvement of such programs. CCAPP has developed accreditation standards for the first professional degree in pharmacy, awarded as either the baccalaureate or doctor of pharmacy degree⁴⁰. In 2009, CSHP published an information paper on the potential impact of entry-level doctor of pharmacy degree on pharmacy services⁴¹. In March 2009, the Canadian Pharmacists Association (CPhA) published its position statement that supports a doctor of pharmacy degree as the entry-to-practice degree in Canada⁴². In February 2010, the Association of Faculties of Pharmacy of Canada published its position statement and a joint resolution with the Association of Deans of Pharmacy of Canada for replacing current baccalaureate pharmacy curricula with a comprehensive doctor of pharmacy curricula, and to make a significant effort to ensure that all pharmacy schools have an entry-to-practice Doctor of Pharmacy program in place by 2020. In 2011, only one Faculty of pharmacy has an entry to practice Pharm.D program. The first cohort started in 2007 at the University of Montreal). The University of Laval in Quebec City is planning to start its entry-to-practice program in September 2011. Other faculties are at various stages with respect to the implementation of an entry-to-practice Pharm.D program. The transition to an entry-to-practice Pharm D program is a significant challenge both for faculties of pharmacy and hospital pharmacy departments that provide clinical rotations and contribute to academic teaching. However, there is little doubt that the future patient-centred role of the pharmacist requires a different kind of curriculum; one that involves a much greater emphasis on clinical practice rotations and clinical skills development.

Even with entry-to-level Pharm. D. programs, hospital pharmacy practice is likely going to require additional clinical skills development in order to achieve the competencies that are felt to be necessary in the future. Both ASHP and CSHP have developed vision documents that describe what pharmacy practice, particularly health-system pharmacy practice, should ideally look like in the year 2015. Both documents include an objective which states that, by 2015, 100% of new pharmacists entering practice in hospitals and related healthcare settings will have completed an accredited a residency program. Knapp et al. evaluated the current situation in the USA and concluded that to fulfill the objective of hiring pharmacists in hospitals with at least a PGY1 residency, the annual growth of residency places would have to be 17% while it is actually 8.3%.⁶⁷ While our report does not capture the gap that exists between actual residency capacity in Canada and the required number of places to fulfill the CSHP 2015 objective, it is probable that the gap in Canada is as large, or larger, than that in the US. While the introduction of entry-level Pharm.D. programs is increasing clinical exposure (e.g. from 15 to 40 weeks at l'Université de Montréal since 2007 with the first graduates in August 2011,) the need for a post-graduate degree or residency is expected to become a pre-requisite to hospital clinical practice¹.

Based upon the clinical pharmacist competencies proposed by ACCP, respondents to the 2009/10 survey were asked, for the second time, to rank in descending order (with 1 being the highest priority and 5 being the lowest priority) the importance that their pharmacy department attaches to each of the clinical pharmacist competencies.

- The 26% (42/160) of respondents who evaluate the provision of pharmacy direct patient care services by auditing a sample of clinical activities, provided a complete ranking of competencies.
- Respondents reported a higher priority (with 1 being the highest priority and 5 being the lowest priority) for clinical problem solving, judgment and decision making (average 1.1 ± 0.4), therapeutic knowledge (2.6 ± 0.9) and communication and education (2.9 ± 0.9), three competencies that are relevant to direct patient care activities. Respondents reported a lower priority (higher average) for the management of patient populations (4.0 ± 1.2) and for medical information evaluation and management (4.3 ± 0.7), two competencies that relate more to indirect patient care activities. Respondents reported the same ranking order in 2007/08.
- Regional differences were noted with different scores from QC where respondents reported more emphasis on therapeutic knowledge (1.5 ± 0.7 in QC vs. 2.6 ± 0.9 nationally) and on medical information evaluation and management (3.5 ± 0.7 in QC vs. 4.3 ± 0.7 nationally).

- No major differences were observed between hospitals of different bed size or teaching vs. non-teaching status.

Table B-5 summarizes the ranking of clinical pharmacist competencies.

Table B-5. Ranking of Clinical Pharmacy Competencies 2009/10

	All	Bed size			Teaching Status	
		50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	(42)	(2)	(31)	(9)	(17)	(25)
Clinical problem solving, judgment and decision making	1.1 ± 0.4	1.0 ± 0.0	1.1 ± 0.3	1.2 ± 0.7	1.1 ± 0.2	1.2 ± 0.5
Therapeutic knowledge	2.6 ± 0.9	3.0 ± 0.0	2.6 ± 0.9	2.3 ± 0.9	2.9 ± 0.9	2.5 ± 0.8
Communication and education	2.9 ± 0.9	3.0 ± 1.4	2.9 ± 0.9	2.9 ± 0.9	2.8 ± 0.8	3.0 ± 1.0
Management of patient populations	4.0 ± 1.2	3.5 ± 2.1	3.9 ± 1.3	4.7 ± 0.7	4.3 ± 1.2	3.9 ± 1.2
Medical information evaluation and management	4.3 ± 0.7	4.5 ± 0.7	4.4 ± 0.6	3.9 ± 0.8	4.1 ± 0.7	4.4 ± 0.6

Base: Respondents who evaluate the provision of pharmacy direct patient care services by auditing a sample of clinical activities and who provided complete rankings of competencies [scoring: top rank = 1, lowest rank = 5]

PRESCRIBING RIGHTS

In Canada, the *Food and Drug Act* and provincial pharmacy acts define the licensed practitioners that can prescribe drugs. Pharmacists are drug experts and their right to prescribe independently or dependently has changed and evolved in the last decade. In 2009, CSHP published an information paper on prescribing by pharmacists⁴³.

Independent prescribing rights refer to prescribing rights that are granted to a healthcare provider by the legislation governing their own profession, with or without restrictions on the extent of those prescribing rights (i.e. the legislated right for a pharmacist to prescribe, often involving a set of requirements that a pharmacist must meet in order to be able to do so). Generally speaking, independent prescribing rights for pharmacists cover drugs contained in Schedule F of the *Food and Drug Act*.

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

In October, 2009, CPhA published an update on the status of pharmacist prescribing authority in the various provincial jurisdictions across Canada⁴⁴. Pharmacy practice continues to change as various provincial jurisdictions have gradually expanded the prescribing rights of pharmacists. Pharmacists in BC and Alberta already have a relatively high level of prescribing rights in place, while those in New Brunswick, Newfoundland & Labrador, and QC are in the process of acquiring new prescribing rights. Saskatchewan and Manitoba are awaiting recently passed legislation to take effect. In May 2010, Marie Berry⁴⁵ published an update on that topic in her Canadian Pharmacy Law book.

The 2009/10 survey included a number of questions related to pharmacist prescribing rights.

- There was a decrease in the number of respondents reporting that pharmacists have prescribing rights approved within their hospital, from 61% (99/163) in 2007/08 to 55% (88/159) in 2009/10.
- Regional differences were noted. Overall, the percentage of respondents reporting prescribing rights approved within their hospital was lower in the Atlantic Provinces (35%, 6/17), QC (50%, 17/34), and the Prairies (50%, 16/32), while the percentage reporting prescribing rights was higher in ON (57%, 29/51) and BC (80%, 20/25).
- For hospitals reporting that prescribing rights had been approved for pharmacists within their hospitals, there was a decrease for dependent prescribing rights approved for pharmacists and an increase for independent prescribing rights. As the legal framework is evolving in most provinces to allow more pharmacists prescribing, this trend toward independent prescribing rights is likely to increase, assuming that pharmacy managers advocate effectively for this role for pharmacists within their facility. Dependent prescribing for dosage adjustment was reported by 67% of respondents, down from 79% (78/99) of respondents in 2007/08. This is by far the most common prescribing right that has been granted to

pharmacists in the hospital setting. Dependent prescribing for lab tests was reported by 57% of respondents, down from 68% (67/99) in 2007/08. Dependent prescribing for new therapy was reported by 34% of respondents, down from 49% (48/99) in 2007/08.

- The decrease in dependent prescribing rights has been offset by a notable increase in independent prescribing rights. Independent prescribing rights for lab tests was reported by 50% of respondents in 2009/10, up from 33% (33/99) in 2007/08. Independent prescribing rights for dosage adjustment was reported by 43% of respondents, up from 24% (24/99) in 2007/08. Independent prescribing rights for new therapy was reported by 25% (of respondents, up from 6% (6/99) in 2007/08.

Independent prescribing rights for pharmacists, including prescribing of new therapy, has increased considerably.

- Regional differences were noted for dependent pharmacist prescribing rights with the highest percentages reported by respondents in ON for lab tests (84%, 16/19), dosage adjustments (74%, 14/19) and for new therapy (38% 11/29).
- Regional differences were noted for independent pharmacist prescribing rights with the highest percentages reported by respondents in BC for lab tests (86%, 25/29) and for dosage adjustments (97%, 28/29). For new therapy, the Prairies reported the highest independent prescribing at 53% (10/19).
- For hospitals reporting dependent prescribing rights approved for pharmacists, the average number of arrangements/protocols for pharmacists was 6.0 ± 14.8 (range 0-100, median 3.0) vs. 3.7 ± 2.8 (range 0-15, median 3.0) per respondent in 2007/08.

Table B-6 summarizes the prescribing rights for pharmacists.

Table B-6. Prescribing rights for pharmacists 2009/10

	Bed size			Teaching Status		
	All	50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	(159)	(33)	(94)	(32)	(43)	(116)
Prescribing rights have been approved for pharmacists within the hospital	88	13	54	21	26	62
	55%	39%	57%	66%	61%	53%
Type of prescribing rights approved for pharmacists within the hospital : (n=)	(88)	(13)	(54)	(21)	(26)	(62)
Independent, for lab tests	42 (49%)	7 54%	17 51%	8 40%	11 44%	31 51%
Independent, for dosage adjustment	36 42%	7 54%	22 42%	7 35%	9 36%	27 44%
Independent, for new therapy	18 21%	5 39%	9 17%	4 20%	9 36%	9 15%
Dependent, for lab tests	49 57%	7 54%	32 60%	10 50%	11 44%	38 62%
Dependent, for dosage adjustment	59 69%	6 46%	37 69%	16 80%	16 64%	43 71%
Dependent, for new therapy	29 34%	2 15%	16 30%	11 55%	11 44%	18 30%
Average number of arrangements/protocols for pharmacists approved within the hospital (n=78) (avg ± sd)	78 (6.0±14.8)	11 (11.1±29.5)	47 (5.7±12.9)	20 (3.8±3.6)	23 (4.3±5.6)	55 (6.7±17.3)
Prescribing rights have been approved for pharmacists OUTSIDE the hospital	57	7	37	13	20	36
	36%	21%	39%	41%	47%	32%
Type of prescribing rights approved for pharmacists OUTSIDE the hospital : (n=)	(57)	(7)	(37)	(13)	(20)	(36)
Independent, for lab tests	28 50%	4 67%	20 54%	4 31%	6 30%	22 61%
Independent, for dosage adjustment	24 43%	4 67%	15 41%	5 39%	8 40%	16 44%
Independent, for new therapy	9 16%	3 50%	3 8%	3 23%	6 30%	3 8%
Dependent, for lab tests	29 52%	1 17%	21 57%	7 54%	10 50%	10 53%
Dependent, for dosage adjustment	40 71%	2 33%	28 76%	10 77%	13 65%	27 75%
Dependent, for new therapy	14 25%	1 17%	9 24%	4 31%	3 15%	11 31%

Base : All respondents

SUPPORT FROM PHARMACY TECHNICIANS FOR CLINICAL PHARMACY SERVICES

The responses to questions regarding the support from pharmacy technicians for clinical pharmacy services are covered in the Pharmacy Technicians chapter of the report this year.

PRIORITY AND SERVICE LEVEL OF CLINICAL SERVICES

Numerous other studies have been published in the last 40 years that describe and document the impact of clinical pharmacy services. This chapter section focuses on the priority that the 2009/10 survey respondents placed on different clinical pharmacy services, and the level of service that these respondents provide for those same clinical pharmacy 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, medication errors and adverse drug reactions. These studies contributed to the emergence of evidence-based data on clinical pharmacy practice and can be used to help prioritize clinical services^{46, 47, 48, 49, 50, 51, 52, 53}.

In Canada, hospital pharmacists represent a workforce of about 4100 individuals (Note: This survey encompasses more than 2867 full-time equivalent pharmacists who work at the 160 facilities that participated in the 2009/10 survey)⁵⁴. In contrast, nurses represent a workforce of more than 250,000 individuals, according to the latest Canadian Institute of Healthcare Information (CIHI) publication. While both professions have a distinct scope of practice, there are potential overlaps in some patient care activities (e.g. medication reconciliation, patient counselling), especially with nurse practitioners. Hospital pharmacists and hospital pharmacy managers will have to make choices with respect to the areas where they focus their available pharmacist resources, based on considerations related to the limited number of pharmacy practitioners, the growing demand for clinical pharmacy services and the published evidence that documents the relative impact of different clinical pharmacy services on patient outcomes and healthcare costs.

In this survey, we asked respondents to indicate whether pharmacists participated in ten direct patient care activities (P.C.), three committee participation activities (C.P.), four drug information/drug use management activities (D.I.), three clinical research activities (C.R.), and two patient safety/quality improvement activities (P.S.). The responses provide a profile of the level of clinical pharmacy services provided in Canadian hospitals. Definitions were provided to respondents and are included below, in order to help readers to better understand the level of service and the priority ranking. The ten direct patient care activities are defined below.

- **Admission drug histories** – Pharmacists provide admission histories including documentation of allergy/intolerance status.
- **Rapid response (Cardiopulmonary resuscitation) team/ participation** – Pharmacists are an active member of the CPR team.
- **Drug therapy evaluation/monitoring** – Pharmacists periodically review patients' health records with verbal or written follow-up. (Does not apply if only drug orders are reviewed).
- **Lab test ordering/Drug dosage adjustment** - Pharmacists request laboratory tests as necessary and initiate or adjust drug dosage to obtain the desired therapeutic outcome (e.g. aminoglycoside or heparin dosing).
- **Medication/drug counselling** - Pharmacists provide counselling on drugs either during hospitalization or at discharge. (Does not apply if counselling solely involves review of label directions).
- **Medical rounds participation** - Pharmacists round actively and regularly (e.g. minimum of 3 days/week in acute care - minimum of 3 days/month in long term care) with the medical team, providing patient specific input.
- **Patient education program** - Pharmacists participate actively in education programs for specific clients.
- **Pharmacokinetic consultations/monitoring** - Pharmacists review drug regimen, serum levels and patient's medical record, with verbal or written follow-up when required.
- **Seamless care services** - Pharmacists provide a pharmaceutical care plan to the patient at time of discharge; the care plan is transmitted to the patient's community pharmacist and physician.
- **Total parenteral nutrition (TPN) team participation** - Pharmacists review patient's medical record and evaluate nutritional needs, with verbal or written follow-up when required.

The three committee participation activities and four drug information/drug use management activities are defined below.

- **Participation on the Pharmacy and Therapeutics (P&T) Committee** - Pharmacists are involved in drug evaluation and addition/deletion of drugs to/from the hospital formulary.
- **Participation on the infection control committee** - Pharmacists are involved in the analysis of nosocomial infections, antibiotic use and resistance patterns.
- **Participation on the Medication Safety Committee** - Pharmacists are involved in a multidisciplinary committee that focuses its activities on improving medication safety in the facility.
- **Drug information** - A formal drug information service, staffed by trained pharmacists, is provided by the facility.
- **In-service education to other health professionals** – Pharmacists provide continuing education on a regular basis.
- **Drug use evaluation program** - Pharmacists are assigned to the analysis of drug use patterns which are reported to a hospital committee.
- **Formulary compliance program** – Pharmacists evaluate compliance to hospital formulary and analyse non-formulary use.

The three clinical research activities and the two patient safety/quality improvement activities are defined below.

- **Clinical research** - Pharmacists are involved as a principal investigator or co-investigator and/or author or co-author.
- **Support for Clinical Trials** - Pharmacists are involved in drug distribution and record keeping.
- **Participation on the ethical review committee /institutional review board** - Pharmacists are involved in the review of research protocols including ethical and/or scientific aspects.
- **Medication incident reporting and prevention program** - Pharmacists are involved in the coordination of the program, analysis of medication incidents and development of corrective measures.
- **Adverse drug reaction (ADR) monitoring** - Pharmacists evaluate potential ADRs with follow-up to patient, physician, manufacturer and Health Canada.

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 provided.

The lower the average of the level of service results, the more comprehensive the level of service that the respondents reported at their sites. Almost all respondents (99%, from 158/160 to 159/160) were able to indicate the level of clinical pharmacy service provided.

Table B-7 summarizes the 2009/10 average level of service of 22 clinical pharmacy activities, in descending order, broken down by 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, medication incident reporting and prevention program, and infection control committee).

- There were very few differences in average scores calculated for each clinical activity in 2009/10 vs. 2007/08.
- The mean score reported by teaching hospital respondents was lower (i.e. a more comprehensive level of service offered), by at least 0.5 points or more than the score of non-teaching respondents, for the following 12 clinical services : drug information (difference of 1.8), clinical trials support (difference of 1.6), clinical research (difference of 1.2), ethics review committee participation (difference of 1.1), medical rounds participation (difference of 0.9), formulary compliance (difference of 0.9), inservice education (difference of 0.8), drug use evaluation (difference of 0.7), infection control committee (difference of 0.7), admission drug histories (difference of 0.6), patient education program (difference of 0.6), cardiopulmonary resuscitation team participation (difference of 0.6)

Table B-7. Average Level of Service 2009/10

[Types**] Clinical activities (base for 2009/10)	2007/08	2009/10						Expected favourable outcomes of clinical pharmacy services on different indicators according to Bond's studies *					
	All Average \pm SD	All Average \pm SD	Bed Size			Teaching Status		T C C	D C	M R	L O S	M E	A D R
			50-200	201-500	>500	Teaching	Non-Teaching						
[C.P.] P&T Committee (n = 159)	1.2 \pm 0.6	1.3 \pm 0.8	1.5	1.4	1.0	1.1	1.4						
[C.P.] Medication Safety Committee (n = 159)	1.6 \pm 0.9	1.6 \pm 1.0	1.7	1.5	1.6	1.3	1.6						
[P.S.] Med Incident Reporting/ prevention (n = 159)	1.7 \pm 0.9	1.7 \pm 0.8	2.0	1.6	1.5	1.3	1.8						
[P.C.] Pharmacokinetic consultations / monitoring (n = 158)	1.9 \pm 0.7	1.9 \pm 0.7	2.2	1.9	1.8	1.6	2.0						
[P.C.] Lab test ordering / Drug dosage adjustment (n = 159)	2.0 \pm 0.7	2.1 \pm 0.8	2.3	2.1	2.1	1.9	2.2						
[C.P.] Infection Control Committee (n= 158)	2.0 \pm 1.1	2.0 \pm 1.1	2.4	2.0	1.5	1.5	2.2						
[P.C.] Drug therapy evaluation / monitoring (n = 162)	2.2 \pm 0.8	2.1 \pm 0.7	2.3	2.1	1.8	1.7	2.2						
[C.R.] Ethics Review Cte participation (n= 159)	2.4 \pm 1.4	2.5 \pm 1.4	3.2	2.5	1.9	1.7	2.8						
[C.R.] Clinical trials support (n= 159)	2.5 \pm 1.3	2.4 \pm 1.3	3.3	2.4	1.6	1.3	2.9						
[P.S.] ADR monitoring (n = 159)	2.3 \pm 0.8	2.3 \pm 0.8	2.6	2.2	2.0	2.0	2.4	+					+
[P.C.] Medication counselling (n = 159)	2.4 \pm 0.6	2.4 \pm 0.7	2.7	2.4	2.1	2.0	2.5						
[P.C.] Patient education program (n= 159)	2.5 \pm 0.7	2.4 \pm 0.8	2.8	2.4	2.1	2.0	2.6						
[P.C.] TPN team participation (n = 159)	2.5 \pm 1.2	2.5 \pm 1.2	2.7	2.5	2.4	2.2	2.6						+
[P.C.] Medical rounds participation (n= 158)	2.6 \pm 1.0	2.4 \pm 1.1	2.8	2.3	2.0	1.7	2.6	+		+			+
[P.C.] Admission drug histories (n = 159)	2.6 \pm 0.8	2.4 \pm 0.8	2.9	2.4	2.2	2.0	2.6	+	+	+	+		+
[D.I.] Inservice education (n = 159)	2.5 \pm 0.7	2.6 \pm 0.8	2.9	2.6	2.2	2.0	2.8	+	+	+	+		+
[D.I.] Formulary compliance (n= 159)	2.6 \pm 1.0	2.4 \pm 1.1	2.8	2.4	1.8	1.7	2.6						
[D.I.] Drug Use Evaluation (n = 159)	2.8 \pm 0.9	2.5 \pm 1.1	2.9	2.5	2.0	2.0	2.7	+					
[P.C.] Seamless care services (n = 159)	2.9 \pm 0.8	3.0 \pm 0.8	3.2	3.0	2.8	2.6	3.1						
[D.I.] Drug information (n = 159)	3.0 \pm 1.2	3.1 \pm 1.2	3.5	3.2	2.3	1.8	3.6	+	+	+			+
[C.R.] Clinical Research (n = 159)	3.4 \pm 0.8	3.4 \pm 0.8	3.8	3.4	3.0	2.5	3.7	+		+			
[P.C.] Cardiopulmonary resuscitation (CPR) team participation (RCR) (n = 159)	3.8 \pm 0.6	3.7 \pm 0.7	3.8	3.7	3.6	3.3	3.9			+			+
Drug protocol management		not applicable to this survey						+	+		+		+
Increased pharmacy staffing/occupied beds		not applicable to this survey						+	+		+		+
Affiliation with a teaching program		not applicable to this survey										+	
Decentralized pharmacists		not applicable to this survey										+	

Base: all respondents

* 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.)

- The mean score reported by respondents from larger bed size hospitals (i.e. > 500 beds) was lower (i.e. a more comprehensive level of service offered), by at least 0.5 points or more than the score of smaller hospitals (i.e. 50-200 beds), for the following 14 clinical services: clinical trials support (difference of 1.7), seamless care services (difference of 1.4), ethics review committee participation (difference of 1.3), drug information (difference of 1.2), formulary compliance (difference of 1.0), drug use evaluation (difference of 0.9), infection control committee (difference of 0.9), medical rounds participation (difference of 0.8), clinical research (difference of 0.8), admission drug histories (difference of 0.7), inservice education (difference of 0.7), patient education program (difference of 0.7), adverse drug monitoring (difference of 0.6), medication counselling (difference of 0.6).

As identified and discussed in several previous surveys 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 et al. 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, despite this, 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 the Accreditation Canada Required Organizational Practices.

These results should cause pharmacy managers to reflect on optimal practice models and prioritization of clinical programs and clinical activities within their hospital.

¹ American College of Clinical Pharmacy. The Definition of Clinical Pharmacy. *Pharmacotherapy* 2008;28:816–817.

² ACCP white paper. Blair MM, Freitag RT, Keller DL, Kiser TH, Marrs JC, Somma McGivney M, Mohammad RA, Twedt EL. Proposed revision of the existing specialty and specialist certification framework for pharmacy practitioners. *Pharmacotherapy* 2009;29(2):3e-13e.

³ ACCP – A petition to the BPS requesting recognition of ambulatory care pharmacy practice as a specialty. [quoted on Nov. 30th, 2008]; http://www.accp.com/docs/positions/petitions/BPS_Ambulatory_Care_Petition.pdf (site visited on Nov. 11th, 2010).

⁴ ACCP white paper. Lee Page II R, Hume AL, Trujillo JM, Leader WG, Vardeny O, Neuhauser MM, Dang D, Nesbit S, Cohen LJ. Interprofessional education: principles and application. A framework for clinical pharmacy.

⁵ ACCP Position statement. Pharmacy residency (PGY1) equivalency. *Pharmacotherapy* 2009;29(12):1493-4

⁶ ACCP White paper. Smith KM, Sorensen T, Connor KA, Dobesh PP, Hoehns JD, Marcus KB, Pass SE, Seybert AL, Shapira NL. Value of conducting pharmacy residency training – the organizational perspective. *Pharmacotherapy* 2010;30(12):490-e-510e.

⁷ ACCP student commentary. Tenets of professionalism for pharmacy students. *Pharmacotherapy* 2009;29(6):757-9.

⁸ American College of Clinical Pharmacy. Integration of Pharmacists' Clinical Services in the Patient-Centered Primary Care Medical Home. [en ligne depuis mars 2009]; <http://www.accp.com/docs/positions/misc/IntegrationPharmacistClinicalServicesPCMHModel3-09.pdf> (site visité le 10 novembre 2010).

⁹ CSHP. Guidelines on Drug Information. [quoted in 2009]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).

¹⁰ CSHP. Statement. Medication reconciliation: statement of the role of the pharmacist. [quoted on 2009]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).

¹¹ CSHP. Guidelines. Journal club. [quoted in 2010]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).

¹² CSHP. Information paper. Hospital pharmacists: information paper on direct patient care and beyond. [quoted in 2010]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).

¹³ CSHP. Information Paper. Hospital pharmacists: information paper on enhancing quality and safety in medication use. [quoted in 2010]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).

¹⁴ Menighan TE et al. American Medical Association (AMA) Scope of practice data series: pharmacists. [quoted on April 16th, 2010]; <http://www.accp.com/docs/positions/commentaries/AMA%20Scope%20of%20Practice%20Response%20Letter%20Final%20Joint%20Pharmacy%20Organization%20Letter.pdf> (site visited on Nov. 12th, 2010).

¹⁵ Manasse HR. ASHP Comments on AMA Scope of practice data series – compendium on pharmacists. [quoted on March 25th, 2010]; <http://www.ashp.org/DocLibrary/News/NewsCapASHPlettertoAMAScopeofPractice032510.aspx> (site visited on Nov 11th, 2010).

¹⁶ Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Monitoring and patient education--2009. *Am J Health Syst Pharm* 2010;67(7):542-58.

¹⁷ Pedersen C, Schneider PJ, Scheckelhoff DJ. ASHP National survey of pharmacy practice in hospital settings: prescribing and transcribing – 2007. *Am J Health-Syst Pharm* 2008;65:827-43.

¹⁸ Lee VW, Fan CS, Li AW, Chau AC. Clinical impact of a pharmacist-physician co-managed programme on hyperlipidaemia management in Hong Kong. *J Clin Pharm Ther* 2009;34(4):407-14.

¹⁹ Eggink RN, Lenderink AW, Widdershoven JW, van den Bemt PM. The effect of a clinical pharmacist discharge service on medication discrepancies in patients with heart failure. *Pharm World Sci*. 2010 Sep 1.

²⁰ Clemente-Martí M, García-Mañón ER, Artero-Mora A, Jiménez-Torres NV. Potential risk of medication discrepancies and reconciliation errors at admission and discharge from an inpatient medical service. *Ann Pharmacother* 2010;44(11):1747-54.

²¹ Acquisto NM, Hays DP, Fairbanks RJ, Shah MN, Delehanty J, Nobay F, Guido J, Haas CE. The Outcomes of Emergency Pharmacist Participation during Acute Myocardial Infarction. *J Emerg Med* 2010 Aug 31.

²² Bussièrès JF, Tollec S, Martin B, Malo J, Tardif L, Thibault M. Démarche pour la mise à niveau d'un secteur de soins pharmaceutiques : le cas de la néonatalogie. (IMPACTNEONAT) *Ann Pharm Fr* 2010;68(3):178-94.

²³ Gizzi LA, Slain D, Hare JT, Sager R, Briggs F 3rd, Palmer CH. Assessment of a safety enhancement to the hospital medication reconciliation process for elderly patients. *Am J Geriatr Pharmacother* 2010;8(2):127-35.

- ²⁴ Zarowitz BJ, Miller WA, Helling DK, Nappi J, Wells BG, Nahata MC. Medication Therapy Prescribing and Management: Meeting Patients' Needs in an Evolving Health Care System. *Pharmacotherapy* 2010;30(11):350e–359e
- ²⁵ Pharmacy Practice Model Initiative. [quoted on 2010]; <http://www.ashp.org/ppmi> (site visited on Nov. 11th, 2010).
- ²⁶ Pharmacy Practice Model Initiative. [quoted on 2010]; <http://www.ashp.org/PPMI/AboutPPMI/Objectives.aspx> (site visited on Nov. 11th, 2010).
- ²⁷ Pharmacy Practice Model Initiative. [quoted on 2010]; <http://www.ashp.org/PPMI/Spotlight.aspx> (site visited on Nov. 11th, 2010).
- ²⁸ Pharmacy Practice Model Initiative. [quoted on 2010]; <http://www.ashp.org/PPMI/Resources.aspx> (site visited on Nov. 11th, 2010).
- ²⁹ Executive summary. *Am J Health Syst Pharm* 2009;66(5 Suppl 3):S1-6.
- ³⁰ Alberta Pharmacists' Association. Leading the way in community-based pharmacy practice change. Alberta pharmacy practice models initiative. [quoted on July 22, 2009]; <http://www.rxa.ca/PharmacyGrants/PPMI.aspx> (site visited on Jan 20th, 2011).
- ³¹ Zellmer WA. Pharmacy's future: Transformation, diffusion, and imagination. *Am J Health Syst Pharm* 2010;67(14):1199-204.
- ³² Paolini N, Rouse MJ. Scope of contemporary pharmacy practice: Roles, responsibilities, and functions of pharmacists and pharmacy technicians Executive summary. *Am J Health Syst Pharm* 2010;67(12):1030-1.
- ³³ Burton ME et al. ACCP White paper. Update: the clinical pharmacist as a principal investigator. *Pharmacotherapy* 2010;30(12):485e-89e.
- ³⁴ Marinac JS, Kuo GM. Characterizing the american college of clinical pharmacy practice-based research network. *Pharmacotherapy* 2010;30(8):865.
- ³⁵ ACCP White paper. Recommended Education for Pharmacists as Competitive Clinical Scientists *Pharmacotherapy* 2009;29(2):236–244
- ³⁶ American College of Clinical Pharmacy, Smith JA, Olson KL, Sowinski KM. Pharmacy practice research careers. *Pharmacotherapy* 2009;29(8):1007-11.
- ³⁷ Chisholm-Burns MA, Graff Zivin JS, Lee JK, Spivey CA, Slack M, Herrier RN, Hall-Lipsy E, Abraham I, Palmer J. Economic effects of pharmacists on health outcomes in the United States: A systematic review. *Am J Health Syst Pharm* 2010;67(19):1624-34.
- ³⁸ Nkansah N, Mostovetsky O, Yu C, Chheng T, Beney J, Bond CM, Bero L. Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. *Cochrane Database Syst Rev* 2010 Jul 7;(7):CD000336.
- ³⁹ Burke JM, Miller WA, Spencer AP, Crank CW, Adkins L, Bertch KE, Ragucci DP, Smith WE, Valley AW. ACCP, Clinical Pharmacist Competencies. *Pharmacotherapy* 2008;28:806–815.
- ⁴⁰ Canadian Council on accreditation of Pharmacy Program. Accreditation standards – [quoted on 20080131]; <http://www.ccapp-accredit.ca/standards/> visited on 20081118.
- ⁴¹ CSHP. Information paper. Entry-level doctor of pharmacy degree in Canada: information paper on the potential impact on pharmacy services. [quoted on 2009]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).
- ⁴² CPhA Position Statement on a doctor of pharmacy degree as an entry-level to practice. [quoted on March 2009]; http://www.pharmacists.ca/content/about_cpha/who_we_are/policy_position/pdf/PharmD%20Entry%20Level.pdf (site visited on Jan 20th, 2011).
- ⁴³ CSHP. Information paper. Prescribing by pharmacists. [quoted 2009]; http://www.cshp.ca/productsServices/officialPublications/type_e.asp (site visited on Nov. 12th, 2010).
- ⁴⁴ CPhA. Summary. Pharmacist prescribing authority status across Canada. [quoted on Oct 30th, 2009];
- ⁴⁵ Berry M. Comparison of the practice of pharmacy – prescribing authority – 8.490. *Canadian Pharmacy Law*. Canada Law Book. Release No 27. Aug 2008.
- ⁴⁶ Bond CA, Raehl CL, Franke T. Clinical pharmacy services, pharmacy staffing and the total cost of care in US hospitals. *Pharmacotherapy* 2000;20:609-21.
- ⁴⁷ Bond CA, Raehl CL, Franke T. Interrelationships among mortality rates, drug costs, total cost of care and length of stay in US hospitals: summary and recommendations for clinical pharmacy services and staffing. *Pharmacotherapy* 2001; 21:129-41.
- ⁴⁸ Bond CA, Raehl CL, Franke T. Medication errors in US hospitals. *Pharmacotherapy* 2001;21:1023-36
- ⁴⁹ Bond CA, Raehl CL, Franke T. Clinical pharmacy services, hospital pharmacy staffing and medication errors in US Hospitals. *Pharmacotherapy* 2002;22:134-47.
- ⁵⁰ Bond CA, Raehl CL, Patry RP. The feasibility of implementing an evidence-based core set of clinical pharmacy services in 2020: manpower, marketplace factors and pharmacy leadership. *Pharmacotherapy* 2004;24:441-52.
- ⁵¹ Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing, and adverse drug reactions in US hospitals. *Pharmacotherapy* 2006;26:735-47.
- ⁵² Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing, and hospital mortality rates. *Pharmacotherapy* 2007;27(4):481-93.
- ⁵³ Bond CA, Raehl CL. 2006 national clinical pharmacy services survey: clinical pharmacy services, collaborative drug management, medication errors, and pharmacy technology. *Pharmacotherapy* 2008;28(1):1-13.
- ⁵⁴ Peartree Solutions Inc. A situational analysis of human resources Issues in the pharmacy profession in Canada. Executive Summary. January 2004 [quoted on 20040131]; <http://www.pharmacyhr.ca/Articles/Eng/67.pdf> visited on 20081229.

C – DRUG DISTRIBUTION SYSTEMS

JANET HARDING

ORAL MEDICATION SYSTEMS

Hospital pharmacy departments are expected to operate drug distribution systems which are safe for the patient, efficient and economical, and make the best use of professional resources. Improving the quality and efficiency of preparation and dispensing, through the use of technology and automation, can diminish the time spent on product-oriented activities and contribute to decreased medication errors. The importance of pharmacists developing, implementing and monitoring improvements in these core elements of the medication use system cannot be overstated, as they remain fundamental to the overall practice of pharmacy.

The unit dose system reduces the incidence of medication errors, decreases medication related activities for nursing, makes efficient use of pharmacy and nursing personnel, improves drug monitoring, reduces drug inventories, enables activity-based costing, reduces waste and pilferage, is adaptable to computerized procedures, and improves job satisfaction for healthcare professionals. For these reasons, The Canadian Society of Hospital Pharmacists has endorsed the unit dose system as the drug system of choice in organized healthcare settings in Canada.¹

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

In previous years, decentralized unit dose systems were considered as a whole and were not separated into satellite pharmacy and automated dispensing models. In this year's survey these two types of decentralized models were separately addressed.

- Decentralized unit dose systems, in which unit dose medications are dispensed from a satellite pharmacy, for each patient, were reported to be in use by 8% of all respondents.
- Decentralized unit dose systems, in which unit dose medications are dispensed from automated dispensing cabinets located in patient care areas, were reported to be in use by 53% (84/159) of all respondents. In 2007/08, 36% (59/162) of respondents reported that they used automated dispensing cabinets.
- Of the 84 respondents in 2009/10 who reported using automated dispensing cabinets to deliver a decentralized unit dose system, 57 respondents provided data on the percentage of beds that were receiving the majority of their scheduled doses through the automated dispensing cabinet system, while 27 respondents did not provide that information. In 2007/08, of the 59 respondents who reported using automated dispensing cabinets, 43 respondents provided information on the percentage of beds serviced by the cabinets, while 16 did not. The respondents in both 2007/08 and 2009/10 who did not provide information on the percentage of beds serviced may only be using the cabinets in areas like the emergency room and operating room, where there are no "inpatient beds".
- The reported location of automated dispensing cabinets is shown in Table C-2. Use in emergency departments was reported by 94% of respondents who used automated dispensing cabinets in their facility, compared to 80% (41/51) of respondents in 2007/08.
- Respondents who reported that they used automated dispensing cabinets were asked if patient-specific medication profiles were used to control access to medications contained in their automated dispensing cabinets. No respondents reported that patient-specific medication profiles were used to control access to medications in automated dispensing cabinets located in operating rooms. Only 7% of respondents who used automated dispensing cabinets in recovery rooms reported that patient-specific medication profiles were used. In contrast, more than 80% of respondents reported that patient-specific profiles were used to control medication access from automated dispensing cabinets that were located in pediatric medical and surgical units, adult medical and surgical units, and mental health units.

Significant uptake in Automated Dispensing Cabinets has occurred.

Table C-1. Drug Distribution Systems 2009/10*(Percentage of facilities using drug distribution systems)*

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
(n for facilities with acute beds =)	(158)	(34)	(92)	(32)	(43)	(115)
(n for facilities with non-acute beds =)	(105)	(18)	(63)	(24)	(20)	(85)
Unit dose system - centralized	111	12	73	26	31	80
	70%	35%	79%	81%	72%	70%
used for acute beds	105	11	70	24	31	74
	66%	32%	76%	75%	72%	64%
used for non-acute beds	68	6	44	18	15	53
	65%	33%	70%	75%	75%	62%
Unit dose system - decentralized, from pharmacy satellites	13	2	4	7	10	3
	8%	6%	4%	22%	23%	3%
used for acute beds	10	1	4	5	9	1
	6%	3%	4%	16%	21%	1%
used for non-acute beds	3	1	0	2	1	2
	3%	6%	0%	8%	5%	2%
Unit dose system - decentralized, from automated dispensing	57	9	35	13	21	36
	36%	26%	38%	41%	49%	31%
used for acute beds	57	9	35	13	21	36
	36%	26%	38%	41%	49%	31%
used for non-acute beds	13	1	12	0	2	11
	12%	6%	19%	0%	10%	13%
Traditional drug distribution system	55	14	29	12	14	41
	35%	41%	32%	38%	33%	36%
used for acute beds	52	14	27	11	13	39
	33%	41%	29%	34%	30%	34%
used for non-acute beds	21	5	10	6	4	17
	20%	28%	16%	25%	20%	20%
Total wardstock system	30	6	17	7	6	24
	19%	18%	18%	22%	14%	21%
used for acute beds	29	5	17	7	6	23
	18%	15%	18%	22%	14%	20%
used for non-acute beds	13	3	7	3	1	12
	12%	17%	11%	13%	5%	14%
Controlled/carded system	24	7	13	4	2	22
	15%	21%	14%	13%	5%	19%
used for acute beds	7	3	2	2	0	7
	4%	9%	2%	6%	0%	6%
used for non-acute beds	22	6	12	4	2	20
	21%	33%	19%	17%	10%	24%

Base: all respondents

- Respondents who reported that they used automated dispensing cabinets indicated that approximately 50% of medications were located in carousel, matrix or similar storage drawers where the nurse must select the correct drug from a number of drugs that were stored in the same drawer, and 50% of medications were located in storage drawers that only gave the nurse access to a single medication.

Safety recommendations for profiled automated dispensing cabinets include pharmacist validation of new orders prior to administration.

The growth of automated dispensing cabinets in Canada parallels the growth of their use in the United States. The percentage of American hospitals that reported the use of automated dispensing cabinets increased from 49% in 1999 to 83% in 2008.² When used appropriately, automated dispensing cabinets provide more timely access to medications, increased accountability for drug usage, and a more efficient use of human resources.^{3,4} However, when not used appropriately, undesirable effects and compromised patient safety can be the result.⁵ The Institute for Safe Medication Practices^{6,7} has published guidelines for the use of automated dispensing cabinets. These include recommendations for the use of patient-specific profiles, pharmacist validation of new medication orders before medications can be accessed from automated dispensing cabinets, and drawer configurations which limit access to a single medication.

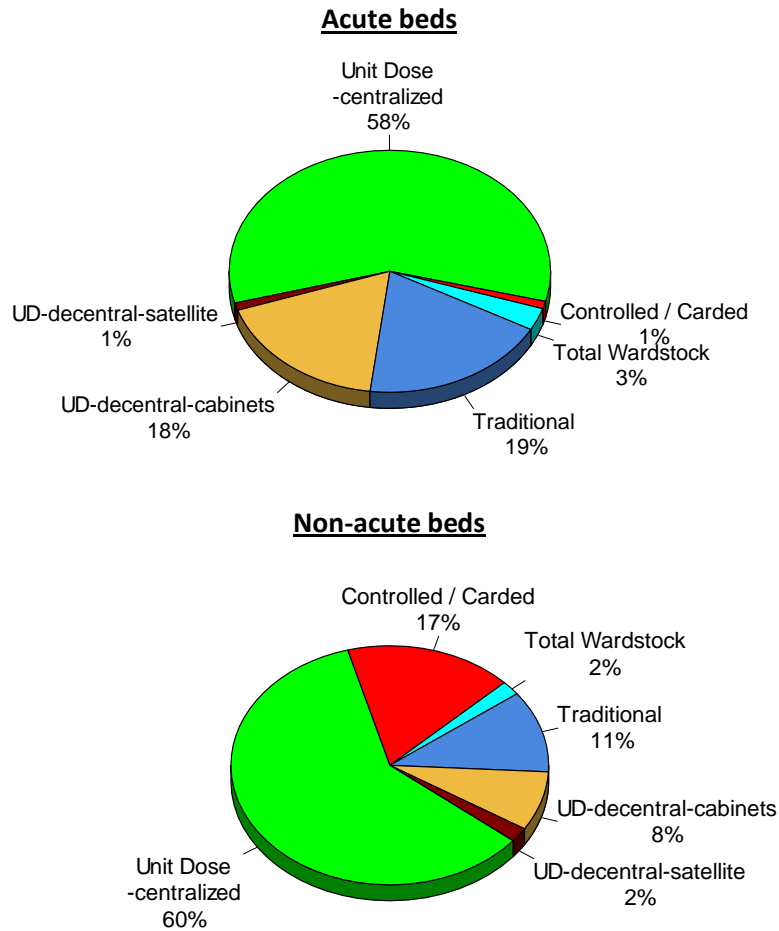
Table C-2. Automated Dispensing Cabinets Use and Access 2009/10

	A	B
Location where Automated Cabinets are in Use	Use of Automated Dispensing Cabinets	Patient Specific Profiles Used to Control Access
	(n= 84)	(n= A)
General adult medical / surgical units	47 56%	40 85%
Adult critical care units	59 70%	46 78%
Operating rooms	42 50%	0 0%
Recovery rooms	44 52%	3 7%
Labor and Delivery units	25 30%	6 24%
Ante / Post Partum units	22 26%	17 77%
Mental health units	33 39%	27 82%
Emergency departments	79 94%	25 32%
General pediatric medical / surgical units	24 29%	20 83%
Pediatric critical care units	18 21%	12 67%

Base for use of cabinets (A): Facilities with automated dispensing cabinets (at any location)

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

- Combined data from all respondents indicated that 78% of acute care beds within the hospitals captured by this survey receive the majority of their scheduled oral doses via a centralized or decentralized unit dose system, or a controlled /carded dose system. The remaining 22% of acute care beds were serviced with traditional or total wardstock drug distribution systems (Figure C-1).
- The average percentage of acute care beds that received the majority of their scheduled oral doses via a centralized or decentralized unit dose system, or a controlled /carded dose system, was reported to be 51% in BC, 78% in the Atlantic Provinces, 80% in the Prairies, 84% in QC and 85% in ON.
- Combined data from all respondents indicated that 87% of non-acute beds within the hospitals captured by this survey received the majority of their scheduled oral doses via a centralized or decentralized unit dose system, or a controlled /carded dose system. The remaining 13% of non-acute care beds were serviced with traditional or total wardstock drug distribution systems. (Figure C-1)
- For non-acute care beds, there is greater use of controlled /carded systems and lower use of automated dispensing cabinets.
- Of the 125 respondents using a unit dose or controlled/carded drug distribution system, 58% (72/125) reported that 95% or more of all oral doses administered are provided in a package that is ready to administer to patients without further manipulation by nursing staff. Thirty-two percent (40/125) reported that nursing staff are required to perform tablet splitting or individualization of liquid doses. Ten percent (13/125) reported that a risk assessment is performed, on a drug by drug basis, to determine if tablet splitting and individualization of liquid doses will be performed by nurses or if the pharmacy will provide nursing staff with a package that is ready to administer without further manipulation.
- The estimated percentage of all oral doses administered through the unit dose and or controlled /carded system, that are in a true unit dose form (i.e. require no further manipulation by nursing staff prior to patient administration), was reported to be 87%.
- The use of automation for repackaging of medications was reported by 82% (131/159) of respondents. Basic strip packaging equipment was reported to be used by 54% (85/159) of respondents. Canister type packaging in which the patient's name appears on the label was reported to be used by 40% (63/159) of respondents. Canister type packaging in which the patient's name does not appear on the label was reported to be used by 36% (57/159) of respondents. Robots were reported to be used by 8.8% (14/159) of respondents (two respondents in B.C., six in ON, five in QC and one in the Atlantic Provinces).

FIGURE C-1. Drug Distribution Systems Percentage of Beds 2009/10

Base: Facilities providing complete distribution data. (158 for acute beds, 105 for non-acute beds)

Medication Order Entry and Verification

- Pharmacists and pharmacy technicians continue to be reported as the categories of personnel who most frequently perform medication order entry (Table C-3). The percentage of respondents reporting that pharmacy technicians enter medication orders into the pharmacy information system was reported to be 73%, vs. 81% (134/166) in 2007/08 and 78% (111/142) in 2005/2006.
- Medication order entry by pharmacy technicians was reported by 100% (35/35) of respondents in QC, 92% (23/25) of respondents in B.C., 71% (12/17) of respondents in the Atlantic Provinces, 57% (29/51) of respondents in ON and 53% (17/32) of respondents in the Prairies. The regional variation may be linked to the availability of pharmacists as well as to the stage of pharmacy technician regulation in each region.
- Medication order entry by prescribers was reported by 7% of respondents; eight respondents in ON, two in the Prairies, and one in the Atlantic Provinces. Four respondents reported that 50% to 90% of all orders were entered by prescribers, and two respondents reported that 100% of all orders were entered by prescribers.

Verification of medication order entry confirms that the entry in the pharmacy information system matches the intended medication order and ensures that transcription and/or key-punching was performed accurately.

- Among respondents who reported that medication orders were entered by pharmacy technicians, 88% reported that technician-entered orders were verified only by a pharmacist; 5% reported that either a pharmacist or a second pharmacy technician verified technician-entered orders, 3% reported that a

second technician only was involved in verifying technician-entered orders, and 4% reported that no verification was required for technician-entered orders.

- Among respondents who reported pharmacist medication order entry, 16% reported that pharmacist-entered orders were verified only by a second pharmacist; 11% reported that either a second pharmacist or a pharmacy technician verified pharmacist-entered orders, 5% (6/120) reported that a pharmacy technician only was involved in verifying pharmacist-entered orders, and 68% reported that verification of a pharmacist's order entry was not required. (Table C-3) Regional responses varied with 80% (20/25) of respondents from BC indicating that verification of a pharmacist-entered order is not required, vs. 76% (13/17) in QC, 67% (8/12) in the Atlantic Provinces, 63% (15/24) in the Prairies and 62% (26/42) in ON.

Table C-3. Medication Order Entry 2009/10

	All	Bed Size			Teaching Status		
		50 - 200	201- 500	>500	Teach	Non-Teaching	
Orders entered by pharmacist	Hospitals (n=)	(160)	(34)	(94)	(32)	(43)	(117)
		125	28	75	22	34	91
		78%	82%	80%	69%	79%	78%
Verified by	(n=)	(120)	(27)	(72)	(21)	(34)	(86)
A second pharmacist only		19	3	15	1	7	12
		16%	11%	21%	5%	21%	14%
A pharmacy technician only		6	1	4	1	0	6
		5%	4%	6%	5%	0%	7%
Either a second pharmacist or a pharmacy technician		13	2	8	3	4	9
		11%	7%	11%	14%	12%	10%
Verification of a pharmacist order entry is not required		82	21	45	16	23	59
		68%	78%	63%	76%	68%	69%
Orders entered by technician		116	26	65	25	29	87
		73%	76%	69%	78%	67%	74%
Verified by	(n=)	(113)	(26)	(63)	(24)	(28)	(85)
A pharmacist only		99	22	58	19	23	76
		88%	85%	92%	79%	82%	89%
A second pharmacy technician only		3	2	1	0	0	3
		3%	8%	2%	0%	0%	4%
Either a pharmacist or a second pharmacy technician		6	0	4	2	2	4
		5%	0%	6%	8%	7%	5%
Verification of a pharmacy technician's order entry is not required		5	2	0	3	3	2
		4%	8%	0%	13%	11%	2%
Orders entered by prescribers		11	0	11	0	5	6
		7%	0%	12%	0%	12%	5%

Base: all respondents

Pharmacist Review of Medication Orders for Therapeutic Appropriateness

The absence of a pharmacist's review of all medication orders for therapeutic appropriateness, prior to administration to the patient, should be of concern to pharmacists, other healthcare providers and the public. The Accreditation Canada Qmentum Program for 2010 includes a set of Managing Medications Standards, in which the need for a pharmacist review of medication orders prior to dispensing is addressed.⁸ The review is to include the appropriateness of the medication, dose, frequency, and route of administration; any therapeutic duplication; actual or potential allergies or sensitivities; actual or potential interactions; variations from the medication's intended use; and other medication related issues or concerns. In emergency situations or when there is no pharmacist available, the organization is to establish and follow a process to ensure a review occurs as soon as a pharmacist is available to do so.

- Ninety-eight percent (155/158) of all respondents reported that the pharmacy was closed for a period of hours each day. This is essentially unchanged from 2007/08. One respondent in B.C., one in the Prairies and one in ON reported that the pharmacy was open 24 hours a day.
- During the hours that the pharmacy is open, 94% of respondents reported that a pharmacist reviews at least 95% of all

Limited pharmacist review of medication orders prior to the medication being administered, when the pharmacy is closed.

routine medication orders for therapeutic appropriateness before a medication is dispensed from the central or satellite pharmacy, 48% reported this review occurs before medication is accessed from wardstock, and 62% of respondents who have automated cabinets on the patient care units reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before medication is accessed from an automated cabinet. (Table C-4)

Table C-4. Pharmacist Review of Medication Orders when the Pharmacy is Open or Closed 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
During the hours that the pharmacy is open, a pharmacist reviews at least 95% of medication orders before:						
Medications are dispensed from the central or satellite pharmacy (n=)	(158)	(34)	(92)	(32)	(43)	(115)
	149	29	89	31	42	107
	94%	85%	97%	97%	98%	93%
Medications are accessed from automated cabinets on the patient care units (n=)	(84)	(14)	(51)	(19)	(31)	(53)
	52	6	31	15	24	28
	62%	43%	61%	79%	77%	53%
Medications are accessed from wardstock (n=)	(155)	(33)	(90)	(32)	(42)	(113)
	74	15	44	15	21	53
	48%	45%	49%	47%	50%	47%
Medication order appears on the Medication Administration Record (n=)	(156)	(34)	(90)	(32)	(43)	(113)
	102	21	59	22	29	73
	65%	62%	66%	69%	67%	65%
During the hours that the pharmacy is closed, a pharmacist reviews at least 95% of medication orders before:						
Medications being accessed from a night cupboard or similar after hours medication supply mechanism (n=)	(153)	(34)	(89)	(30)	(39)	(114)
	13	3	8	2	2	11
	8%	9%	9%	7%	5%	10%
Medications being accessed from automated cabinets on the patient care units (n=)	(80)	(14)	(48)	(18)	(29)	(51)
	6	0	4	2	3	3
	8%	0%	8%	11%	10%	6%
Medications being accessed from wardstock (n=)	(151)	(34)	(87)	(30)	(39)	(112)
	10	2	4	4	3	7
	7%	6%	5%	13%	8%	6%
Medication order appearing on the Medication Administration Record (n=)	(150)	(34)	(86)	(30)	(38)	(112)
	21	6	9	6	7	14
	14%	18%	10%	20%	18%	13%

Base: all respondents

- During the hours that the pharmacy is open, 65% of respondents reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication order appears on the Medication Administration Record (MAR)
- During the hours that the pharmacy is closed, 8% of respondents reported that a pharmacist, either on call or working off site, reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication is accessed from a night cupboard or similar after hours medication supply, 7% reported this review occurs before medication is accessed from wardstock, and 8% of respondents using automated cabinets on the patient care units reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before medication is accessed from an automated cabinet.
- During the hours that the pharmacy is closed, 14% of respondents reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication order appears on the MAR.

An estimated 36% of hospitals in the United States provided 24 hour inpatient services in 2008.⁹ Of the hospitals that were not open 24 hours a day, 20.7% utilized an off-site pharmacist when the pharmacy was closed. The percentage of hospitals providing 24 hour service in the United States has steadily increased over the past three survey cycles. With an increasing awareness of the important contribution of pharmacists to medication safety and quality patient care, it may be time for Canadian hospital pharmacy managers to question the limited review of medication orders by pharmacists during certain hours of the 24 hour day.

Medication Profiles and Medication Administration Records

- The manual preparation of some or all MARs was reported by 39% of all respondents, 71% reported that some or all MARs were generated in hard copy through the Pharmacy Information System (PIS), and 10%

reported that some or all MARs are electronic, share a common database with the PIS, and documentation occurs on line. (Table C-5)

Table C-5. Medication Profiles and Medication Administration Records 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Prescribers, when writing medication orders for inpatients, have access to a complete inpatient medication profile (n=)	(158)	(33)	(93)	(32)	(43)	(115)
Yes, for all patients	102 65%	17 52%	61 66%	24 75%	32 74%	70 61%
Yes, ...for most patients (50% to 99%) in the facility	44 28%	12 36%	26 28%	6 19%	8 19%	36 31%
Yes, for some patients (<50%) in the facility	2 1%	2 6%	0 0%	0 0%	1 2%	1 1%
Pharmacists, when writing medication orders for inpatients, have access to a complete inpatient medication profile (n=)	(159)	(34)	(93)	(32)	(43)	(116)
Yes, for all patients	126 79%	24 71%	76 82%	26 81%	34 79%	92 79%
Yes, for most patients (50% to 99%) in the facility	32 20%	10 29%	16 17%	6 19%	9 21%	23 20%
Medication Administration Records (MARs) : (n=)	(157)	(34)	(91)	(32)	(42)	(115)
Are manually prepared	61 39%	17 50%	37 41%	7 22%	11 26%	50 43%
Are generated in hard copy through the PIS and documentation of administered doses is manual	111 71%	22 65%	62 68%	27 84%	27 64%	84 73%
Are electronic, share a common database with the PIS and documentation is on line	16 10%	2 6%	11 12%	3 9%	8 19%	8 7%

Base: all respondents

From 2004 to 2008, the percentage of respondents reporting the use of manually prepared MARs decreased from 44% to 32%, with a corresponding increase in the respondents reporting the use of computer generated MARs (from 56% to 71%). Electronic MARs were reported by 10% of respondents in 2004 and 7% of respondents in 2008. The up-take of computer generated MARs or electronic MARs seems to have leveled off. Computer generated MARs or electronic MARs decrease the opportunities for medication error associated with manual transcription. Current Pharmacy Information Systems should have the functionality to generate MARs and there is still significant progress to be made in the replacement of manually prepared MARs.

There is still significant progress to be made in the replacement of manually prepared MARs.

- Sixty-five percent of all respondents reported that prescribers have easy and reliable access to a complete medication profile for all patients when writing medication orders.
- Seventy-nine percent of all respondents reported that pharmacists have easy and reliable access to a complete medication profile for all patients when reviewing medication orders.

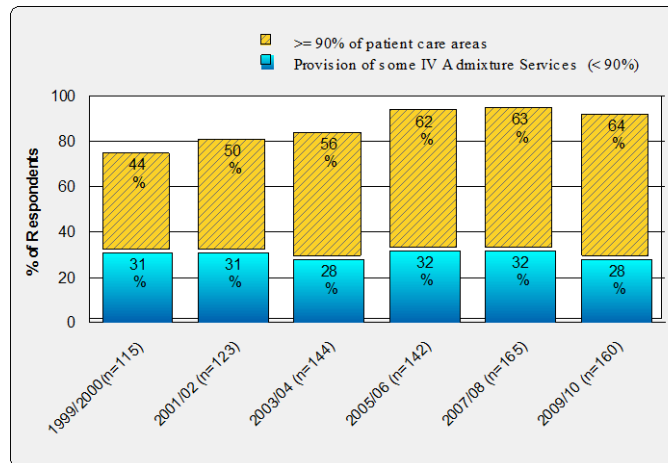
PARENTERAL ADMIXTURE SERVICES

When parenteral doses of medication are not available in a ready-to-administer form from the manufacturer, the preparation of admixtures by the pharmacy department is the recommended method for ensuring that these products are therapeutically appropriate, free from microbial/pyrogenic/particulate contaminants, properly prepared and labeled, and stored and distributed in conformance with accepted standards.¹⁰ This recommendation has been in place for the last 3 decades.

- Ninety-two percent (147/160) of respondents reported the provision of a parenteral admixture service. The percentage of respondents reporting a parenteral admixture service has not changed since the 2005/06 survey. (Figure C-2)
- A comprehensive parenteral admixture service, provided to 90% or more of patients or patient care areas, was reported by 88% of respondents in teaching hospitals, and by 55% of respondents in non-teaching hospitals (Table C-6). A comprehensive parenteral admixture service was also more commonly reported by respondents in larger hospitals. Seventy-eight percent of respondents with more than 500 beds, 69%

of respondents with 201-500 beds, and 35% of respondents with 50 to 200 beds reported that they had a comprehensive parenteral admixture service.

Figure C-2. Percentage of parenteral Admixture Service Providers 1999/00 to 2009/10



Base: Respondents providing relevant information

- Respondents providing a parenteral admixture service estimated that an average of 50% of total parenteral doses (intravenous, intramuscular, subcutaneous and epidural) administered in their institutions were either prepared through the parenteral admixture service or provided as commercially available, ready to use admixtures.
- Of the respondents who reported that they had a parenteral admixture service, 35% reported that automated compounding devices were used in the preparation process and 35% reported that automated syringe filling devices were used. These types of technology were more common in teaching hospitals than in non-teaching hospitals and were more common in hospitals with more than 500 beds (Table C-6). No respondent reported that they were using a stand-alone robotic device for preparing parenteral admixtures. In the 2007/08 report, 46% (71/156) of respondents reported the use of automated compounding devices to prepare parenteral admixtures. In the 2009/10 survey we asked more specifically for different types of automated devices.

Table C-6. IV Admixture Services Provision and Automation 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201 - 500	>500	Teach	Non-Teaching
Hospitals (n=)	(160)	(34)	(94)	(32)	(43)	(117)
Provision of Some Parenteral Admixture Services	147 92%	27 79%	88 94%	32 100%	43 100%	104 89%
Provision of IV Admixture Services to >= 90% of patient care areas	102 64%	12 35%	65 69%	25 78%	38 88%	64 55%
Provision of IV Admixture Services to <= 90% of patient care areas	45 28%	15 44%	23 24%	7 21%	5 12%	40 34%
Percentage of inpatients receiving parenteral admixture service (for facilities serving < 90%) (n=)	(36) 28%	(11) 23%	(19) 23%	(6) 53%	(5) 61%	(31) 23%
Percentage of the total parenteral admixture doses prepared through the admixture service or provided as commercially available ready-to-use admixture (n=)	(145) 50%	(27) 45%	(87) 49%	(31) 57%	(43) 63%	(102) 44%
Types of automation used to prepare parenteral admixtures (n=)	(144)	(26)	(87)	(31)	(43)	(101)
Automated syringe filling device	50 35%	8 31%	26 30%	16 52%	17 40%	33 33%
Automated compounding device	51 35%	6 23%	29 33%	16 52%	31 72%	20 20%

Base: all respondents

Patients are dependent on the pharmacy to provide sterile products that will not harm them. This is especially critical for drugs administered by the intravenous, epidural, spinal or intrathecal routes. A sterile products gap analysis is a tool used to identify potential deficiencies in the compounding of sterile preparations. It involves comparing standards for compounding parenteral admixtures, such as those that have been developed by

the United States Pharmacopeial Convention (USP Chapter 797), against a hospital's current procedures, equipment and facilities. Chapter 797 provides relevant practice and quality standards for compounding sterile preparations. Practice standards are provided for personnel garbing and gloving, personnel training, competency assessment, environmental control, quality assurance, storage, handling, and beyond-use dating.¹¹

TABLE C-7. Admixture Services Quality Assurance Activities 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Employees preparing parenteral admixtures are observed for validation of aseptic technique at least once a year (n=)	(146)	(27)	(88)	(31)	(43)	(103)
	85	14	51	20	28	57
	58%	52%	58%	65%	65%	55%
Validation includes verification of product sterility by laboratory testing (n=)	(85)	(14)	(51)	(20)	(28)	(57)
	35	3	21	11	13	22
	41%	21%	41%	55%	46%	39%
Surface sampling in sterile product preparation areas is completed on a regular basis (n=)	(146)	(27)	(88)	(31)	(43)	(103)
	38	4	24	10	12	26
	26%	15%	27%	32%	28%	25%
Parenteral admixture preparation occurs in an ISO Class 5 environment (n=)	(145)	(27)	(87)	(31)	(43)	(102)
	121	22	71	28	39	82
	83%	81%	82%	90%	91%	80%
The equipment used to provide an ISO Class 5 environment is located in an ISO Class 7 buffer area / cleanroom (n=)	(121)	(22)	(71)	(28)	(39)	(82)
	63	10	37	16	20	43
	52%	45%	52%	57%	51%	52%
Expiry dates of parenteral admixtures have been assigned based on chemical stability AND product sterility (n=)	(144)	(27)	(86)	(31)	(43)	(101)
	89	14	58	17	25	64
	62%	52%	67%	55%	58%	63%

Base: respondents preparing IV admixtures

It is imperative that pharmacists and pharmacy technicians involved in parenteral admixture services be aware of these practice and quality standards and use them to evaluate how well their own practices match up against those standards.

- Of the respondents reporting the provision of an IV admixture service, 49% (72/147) reported that a gap analysis had been completed, compared to 38% (60/156) of respondents in 2007/08 who reported that a gap analysis had been completed.

Table C-7 provides responses related to parenteral admixture quality assurance activities.

Completion of a sterile products gap analysis was reported by only half of the respondents.

It is positive to note that the majority of respondents reported that parenteral admixture products are being prepared in an ISO Class 5 environment. However, improvements are required in other areas of quality assurance. Surface sampling and validation of an employee's aseptic technique with laboratory testing are valuable in ensuring the quality of product prepared, and hence the safety of the patient.

CYTOTOXIC ADMIXTURE AND HAZARDOUS DRUGS

As well as the obligation to ensure that patients are provided with safe parenteral admixtures, pharmacists are required to be familiar with the appropriate measures to protect workers from the dangers associated with cytotoxic and hazardous drugs.

- Ninety-two percent of all respondents reported that IV cytotoxic drugs were prepared and administered in their facility (Table C-8). Of those respondents, 97% reported that IV cytotoxic doses were prepared in the pharmacy department.
- Among respondents reporting the preparation of IV cytotoxic drugs, 93% have written policies and procedures to ensure the health and safety of employees who prepare, transport, administer and dispose of cytotoxic drugs. Over 90% of respondents reported that they have policies and procedures in place that deal with a variety of topics including waste handling,

There is low implementation of closed system transfer devices for cytotoxic drugs .

personal protective equipment and safe practices for administering cytotoxic drugs. Eighty-eight per-cent of respondents indicated that they have policies and procedures in place for equipment maintenance and 33% of respondents reported policies and procedures are in place for environmental sampling.

Table C-8. Cytotoxic Drugs – Safety Practices and Chemotherapy Preparation Systems 2009/10

		Bed Size			Teaching Status		
		All	50 - 200	201- 500	>500	Teach	Non-
IV cytotoxic drugs prepared and administered by hospital (n=)		160	34	94	32	43	117
		147	25	90	32	43	104
		92%	74%	96%	100%	100%	89%
IV cytotoxic drugs prepared by Pharmacy (n=)		147	25	90	32	43	104
		142	23	87	32	42	100
		97%	92%	97%	100%	98%	96%
Written policies and procedures are in place to insure employee health and safety (n=)		147	25	90	32	43	104
		137	22	85	30	40	97
		93%	88%	94%	94%	93%	93%
Definition of cytotoxic drugs (n=)		135	20	85	30	40	95
		126	18	81	27	36	90
Handling of cytotoxic drugs		93%	90%	95%	90%	90%	95%
		134	20	85	29	39	95
Personal protective equipment		99%	100%	100%	97%	98%	100%
		134	20	84	30	40	94
Safe practices for administering cytotoxic drugs		99%	100%	99%	100%	100%	99%
		126	19	77	30	37	89
Equipment maintenance		93%	95%	91%	100%	93%	94%
		119	17	76	26	34	85
Decontamination and cleaning		88%	85%	89%	87%	85%	89%
		132	20	84	28	38	94
Waste handling		98%	100%	99%	93%	95%	99%
		132	19	83	30	40	92
Response to spills		98%	95%	98%	100%	100%	97%
		133	20	84	29	40	93
Environmental sampling		99%	100%	99%	97%	100%	98%
		44	4	30	10	13	31
Medical surveillance program in place for employees who handle cytotoxic drugs (n=)		33%	20%	35%	33%	33%	33%
		146	24	90	32	43	103
Cytotoxic drugs prepared using a closed system (n=)		21	5	11	5	4	17
		14%	21%	12%	16%	9%	17%
		143	22	89	32	42	101
yes, for all drugs		7	2	4	1	1	6
		5%	9%	4%	3%	2%	6%
yes, for some drugs		27	3	18	6	5	22
		19%	14%	20%	19%	12%	22%
Types of Biological Safety Cabinets for cytotoxic drugs (n=)		139	22	88	29	38	101
		17	2	14	1	3	14
Class II Type A		12%	9%	16%	3%	8%	14%
		18	3	11	4	8	10
Class II Type B1		13%	14%	13%	14%	21%	10%
		104	17	62	25	26	78
Class II Type B2		75%	77%	70%	86%	68%	77%
		1	0	1	0	0	1
Class III		1%	0%	1%	0%	0%	1%
		5	0	4	1	1	4
Other		4%	0%	5%	3%	3%	4%
		140	22	88	30	41	99
Biologic Safety Cabinet in an ISO Class 7 room that is physically separated from other sterile product preparation areas (n=)		72	7	46	19	24	48
		51%	32%	52%	63%	59%	48%
		72	7	46	19	24	48
Negative pressure maintained in this separate room? (n=)		63	5	42	16	21	42
		88%	71%	91%	84%	88%	88%

Base: Respondents preparing cytotoxic drugs

Recommendations for medical surveillance of workers handling cytotoxic drugs are not consistent between agencies. The United States Department of Labour, Occupational Safety and Health Administration, provides a clear summary of the frequency and type of medical surveillance recommended.¹² The ASHP Guidelines on Handling Hazardous Drugs state that all workers who handle hazardous drugs should be routinely monitored in a medical surveillance program, which involves the collection and interpretation of data for the purpose of detecting changes in the person's health status.¹³ A 2007 report from Cancer Care Ontario does not recommend

medical surveillance because adequate tests are not available for monitoring exposure to cytotoxics or assessing the level of risk associated with exposure.”¹⁴

- Among respondents reporting the preparation of IV cytotoxic drugs, 14% reported that there is a medical surveillance program in place for employees who handle cytotoxic drugs. This is a decrease from the 27% (39/146) of respondents who reported having a medical surveillance system in place in 2007/08.
- In 2007/2008, 83% (121/146) of respondents reported that a designated separate chemotherapy preparation area was in place. In this report, 51% of respondents indicated that the Biologic Safety Cabinet was in an ISO Class 7 buffer area / cleanroom that was physically separated from other sterile product preparation areas. Of the respondents indicating this separation, 88% reported that negative pressure was maintained in this separate room.

TABLE C-9. Hazardous Drugs - Safety Practices 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
There is a list of hazardous drugs (n=)	159	34	93	32	43	116
	111	21	66	24	31	80
	70%	62%	71%	75%	72%	69%
There are written policies and procedures related to preparing, transporting, administering and disposing of hazardous drugs (n=)	110	21	65	24	30	80
	89	18	51	20	25	64
	81%	86%	78%	83%	83%	80%
Definition of hazardous drugs (n=)	91	19	51	21	26	65
	81	17	46	18	24	57
	89%	89%	90%	86%	92%	88%
Handling of hazardous drugs	88	19	49	20	25	63
	97%	100%	96%	95%	96%	97%
Personal protective equipment	90	19	50	21	26	64
	99%	100%	98%	100%	100%	98%
Procedures for crushing tablets, opening capsules, preparing	75	12	43	20	22	53
	82%	63%	84%	95%	85%	82%
Use of equipment for repackaging	74	11	44	19	21	53
	81%	58%	86%	90%	81%	82%
Safe practices for administering hazardous drugs	83	16	47	20	25	58
	91%	84%	92%	95%	96%	89%
Containment, deactivation and disinfection of equipment used to compound non-sterile hazardous drugs	65	12	39	14	15	50
	71%	63%	76%	67%	58%	77%

Base: all respondents

- Seventy percent of all respondents reported that they had created a list of hazardous drugs. Among these respondents, 81% (89/110) reported that there are written policies and procedures related to preparing, transporting, administering and disposing of hazardous drugs.
- Among respondents reporting that written policies and procedures were in place regarding hazardous drugs, over 80% reported that they have policies and procedures in place that deal with a variety of topics including handling of hazardous drugs, personal protective equipment, and procedures for crushing tablets, opening capsules and preparing compounded mixtures. Seventy-one per cent of respondents indicated they have policies and procedures in place for containment, deactivation and disinfection if the compounding of non-sterile forms of hazardous drugs occurs in equipment designed for sterile products.

New and continuing concerns for healthcare workers handling cytotoxic and hazardous drugs have led to revisions in the recommended practices for personnel protection. Although recommendations exist for environmental sampling and closed-system, drug transfer devices for workers who handle hazardous drugs, there appears to be modest implementation in Canada. Pharmacists and pharmacy technicians need to be aware of the existing recommendations and guidelines in order to evaluate their own work environments and to insure practices are in place to minimize the risk associated with the handling of cytotoxic and hazardous drugs. The ASHP Guidelines on Handling Hazardous Drugs provide clear recommendations and explanations for improving practice.¹⁵

DRUG PURCHASING & INVENTORY CONTROL

Drug Costs

Total spending on drugs in Canada was forecasted by the Canadian Institute for Health Information (CIHI) to have reached \$30 billion in 2009, an increase of 5.1% over the previous year.¹⁶ Between 1985 and 2007, the drug component of total health expenditure increased from 9.5% to 16.5%. It is forecast to be 16.4% in 2009. Since 1997, drugs have represented the second largest component of total health expenditure, with hospitals being the largest single component. Drug prices have been relatively stable over the past 10 years, indicating that the volume of drug use and the availability of new, expensive drugs are the major factors affecting increased drug expenditures in Canada.

The 2007/08 Hospital Pharmacy in Canada Report identified that the reorganization and integration of acute care, community based care, and home care services, which had been occurring across Canada, had contributed to inconsistencies between provincial jurisdictions with respect to how drugs were expensed. This continues to be a factor in this report. For example, certain drugs that are administered in hospital outpatient settings may be expensed to individual hospitals, a provincial agency, private third party payers or a public payer. This is also the case with oncology treatments administered in acute care settings. Because of these inconsistencies, caution is required when comparing drug expenditure data from different provinces.

- The average drug cost per acute patient day in the 2009/10 survey (\$43.40) was 17% higher than the cost of \$37.16 that was reported in the 2007/08 Hospital Pharmacy in Canada Report. Regional variation was noted with QC respondents reporting the highest cost, at \$46 per acute patient day, followed by ON at \$45.44, BC at \$43.09, the Prairies at \$40.81, and the Atlantic Provinces at \$35.98.
- The average drug cost per acute care admission (\$313) was 12% higher than the \$279 per acute care admission reported in 2007/08. Regional variation was noted with QC respondents reporting the highest cost, at \$365 per acute care admission, followed by BC at \$330, ON at \$294, the Prairies at \$289, and the Atlantic Provinces at \$259.
- The average drug cost per non-acute patient day was \$8.11 in the 2009/10 survey, compared to \$10.16 in 2007/08; a decrease of 20%.

Average acute care drug costs rose by a much higher percentage in the 2009/10 report than in the 2007/08 report.

Table C-10. Inventory and Drug Costs 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Inventory Turnover Rate (n=)	138	27	83	28	38	100
	10.2	8.0	10.0	12.9	12.1	9.5
Drug Expenses by Patient Care Area:						
Inpatient Acute Care Drug Costs	131	25	80	26	37	94
	\$4,865,637	\$1,426,763	\$3,682,878	\$11,811,506	\$9,927,356	\$2,873,259
Inpatient Non-Acute Care Drug Costs	77	12	48	17	14	63
	\$572,899	\$117,045	\$603,886	\$807,185	\$531,855	\$582,020
Drug Cost Ratios						
Acute Drug costs / Acute Admission	129	25	78	26	37	92
	\$313	\$261	\$302	\$395	\$419	\$270
Acute Drug Costs/ Acute Patient Day	129	25	78	26	37	92
	\$43.40	\$40.25	\$42.40	\$49.42	\$56.55	\$38.11
Non-acute Drug Costs/ Non-acute Patient Day	69	11	42	16	13	56
	\$8.11	\$7.04	\$8.22	\$8.56	\$8.56	\$8.01

Base: All respondents

The percent increase in the average drug cost per acute patient day was notably higher between the 2007/08 and 2009/10 reports (17%) than it was between the 2005/06 and 2007/08 reports (1.3%). It is possible that H1N1 influenza pandemic planning may have had an effect on reported drug costs in the 2009/10 fiscal year. Some hospitals may have been left with expired antivirals and other unusable stock that had to be written off and included under drug costs. In some jurisdictions, it is possible that some types of pandemic-related drug stocks,

which had been held in provincial warehouses, were charged out to hospitals as those drugs were distributed, and subsequently expensed to hospitals, even if they were not used.

The average drug cost per non-acute patient day was reported to have increased by 11.4% annually in the 2009/10 report and to have decreased by 20% in the 2007/08 report. These variations may be due to changes in the way organizations reported acute and non-acute patient days and drug costs. It is also possible that changes in the availability of certain generic drug products may have affected non-acute drug costs.

This high level comparison of drug costs, by hospital size and type, has been reported to be useful to many hospitals. More detailed drug cost comparisons are included in the benchmarking chapters of this report and should also be referred to for benchmarking purposes and/or for projecting the costs associated with new or expanding programs.

Inventory

Inventory management is a balancing act which involves insuring that there is enough stock on hand to meet patient needs, while minimizing the cost of holding unnecessary inventory. Typically pharmacies in smaller hospitals will have a lower drug inventory turnover (8 to 10 turns per year) than the pharmacies of larger hospitals (12 to 18 turns per year).¹⁷ In addition, hospitals which are located in close proximity to large wholesalers are usually able to maintain smaller inventories of drugs, because they can quickly acquire additional stock in the event that it is needed on short notice. As a result, hospitals in large urban centres where a wholesaler is based will be able to achieve higher inventory turnover rates than hospitals that would experience a longer delay in acquiring replacement stock. Hospitals that are located further from their source of pharmaceutical supplies must hold larger stocks as a buffer against unexpected fluctuations in drug use.

- The average reported inventory turnover rate for 2009/2010 was 10.2, compared to 10.6 in 2007/2008. Regional differences were noted, with ON respondents reporting an inventory turnover rate of 11.5, compared to 10.8 in QC, 10.4 in BC, 8.7 in the Prairies, and 8.1 in the Atlantic Provinces.

A number of respondents noted that their inventory turnover rate was impacted in 2009/10 by the stockpiling of certain medications as part of their H1N1 pandemic planning. The increased frequency and severity of drug shortages may also have led some organizations to increase the amount of stock that they keep on hand. As organizations are forced to deal with the current budgetary constraints, careful attention to inventory management may provide one area where hospital pharmacies can help their organizations to better manage their financial resources.

Outsourcing

Outsourcing the preparation and/or repackaging of pharmaceutical products is reported to be a common practice in Canadian hospitals, as it is in the United States. Overall, 41.8% of hospitals in the United States outsource some drug preparation activities.¹⁸ In January 2009, the Health Products and Food Branch Inspectorate of Health Canada issued the Policy on Manufacturing and Compounding of Drug Products in Canada (POL-0051). This policy describes the federal/provincial/territorial jurisdiction in this area. It also defines the differences between compounding and manufacturing. Organizations need to be familiar with these issues, as well as the benefits and risks associated with outsourcing, in order to determine whether outsourcing is applicable to their own needs and circumstances. The American Society of Health System Pharmacists has issued guidelines which can be helpful to organizations as they analyze their situation and make decisions concerning the outsourcing of drug preparation and repackaging.¹⁹

- Forty-eight percent of respondents reported that they outsourced the preparation and/or repackaging of certain pharmaceutical products (Table C-11), compared to 40% (67/166) of respondents who did so in 2007/08.

Organizations need to be familiar with the benefits and risks associated with outsourcing, and apply those in the context of their own needs and circumstances.

- A higher percentage of hospitals with greater than 500 beds, compared to smaller hospitals, reported that they outsourced the preparation/repackaging of some products. In addition, a higher percentage of teaching hospitals, compared to non-teaching hospitals, reported that they were involved in outsourcing these functions.

- Regionally, 59% (30/51) of respondents in ON reported that they outsourced some preparation/repackaging of pharmaceuticals, compared to 51% (18/35) in QC, 50% (16/32) in the Prairies, 38% (6/16) in the Atlantic Provinces and 25% (6/24) in B.C.
- Small volume parenterals were outsourced more than any other product across all types of hospitals.
- Staffing limitations were identified as a reason for outsourcing a number of products, with the top three dosage forms in this category being oral solids, TPN solutions and IV syringes.
- The top three dosage forms for which respondents identified space and facility limitations as a reason for outsourcing were TPN solutions, oncology admixtures and small volume IV admixtures.
- The top three dosage forms for which respondents identified quality control as a reason for outsourcing were TPN solutions, IV syringes and large volume IV solutions.

TABLE C-11. Facilities that Outsource Preparation/ Repackaging 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital pharmacy was involved in outsourcing the production or repackaging of products	(n=) 158 76 48%	34 9 26%	92 47 51%	32 20 63%	43 31 72%	115 45 39%
Dosage forms outsourced	(n=) 73	9	45	19	29	44
Oral Solids	4 5%	0 0%	3 7%	1 5%	1 3%	3 7%
Oral Liquids	25 34%	3 33%	13 29%	9 47%	11 38%	14 32%
IV Syringes	20 27%	3 33%	11 24%	6 32%	8 28%	12 27%
Small Volume IV admixtures (<100mL)	47 64%	4 44%	31 69%	12 63%	21 72%	26 59%
Large Volume IV admixtures (>100mL)	36 49%	2 22%	25 56%	9 47%	19 66%	17 39%
Oncology admixtures	10 14%	2 22%	7 16%	1 5%	3 10%	7 16%
TPN Solutions	8 11%	0 0%	7 16%	1 5%	5 17%	3 7%

Base: all respondents

¹ Canadian Society of Hospital Pharmacists. Drug Distribution:statement on unit dose and intravenous admixture. Ottawa (ON): Canadian Society of Hospital Pharmacists; 2008.

² Pederson C, Schneider P, Scheckelhoff D. ASHP National Survey of Pharmacy Practice in Hospital Settings: Dispensing and Administration-2008. Am J Health-Syst Pharm – Vol 66 May 15, 2009.

³ Medication Safety and Drug use Management Enhanced by Drug Distribution. Canadian Society of Hospital Pharmacists, June 2008.

⁴ Perras, C, Jacobs P, Boucher M, Murphy G, Hope J, Lefebvre P, McGill S, Morrison A, Technologies to Reduce Errors in Dispensing and Administration of Medication in Hospitals: Clinical and Economic Analysis [Technology report number 121]. Ottawa: Canadian Agency for Drugs and Technologies in health; 2009.

⁵ American Society of Health-System Pharmacists. ASHP guidelines on the safe use of automated medication storage and distribution devices. Am J health-Syst Phar. 1998; 55:1403-7.

⁶ Institute for Safe Medication Practices (ISMP). Guidance on the Interdisciplinary Safe Use of Automated Dispensing Cabinets. 2008

⁷ Institute for Safe Medication Practices Canada (ISMP Canada). Automated Dispensing Cabinets in the Canadian Environment. ISMP Canada Safety Bulletin. Volume 7 Number 3 June 29, 2007.

⁸ Managing Medications Standards. QMentum Program 2010. Accreditation Canada. Available for purchase at <http://www.accreditation.ca>

⁹ Pederson C, Schneider P, Scheckelhoff D. ASHP National Survey of Pharmacy Practice in Hospital Settings: Dispensing and Administration-2008. Am J Health-Syst Pharm – Vol 66 May 15, 2009

- ¹⁰ American Society of Hospital Pharmacists. ASHP Technical Assistance Bulletin on Hospital Drug Distribution and Control. *Am J Hosp Pharm.* 1980;37:1097-103.
- ¹¹ Mullakey T. Pharmacy Compounding of High Risk Level Products and Patient Safety. *Am J Health-Syst Pharm* Vol 66 Sep 1, 2009 Suppl 5.
- ¹² United States Department of Labour, Occupational Safety and Health Administration, Section VI: Chapter 2. Controlling Occupational Exposure to Hazardous Drugs.
- ¹³ American Society of Health-System Pharmacists. ASHP guidelines on handling hazardous drugs. *Am J Health-Syst Pharm.* 2006;63, 1172-93.
- ¹⁴ Green E, Johnston M, Macartney G., Milliken D, Poirier S, Reynolds P, Savage T, Schwartz L Trudeau M. Safe Handling of Parenteral Cytotoxics, Program in Evidence Based Care. *Cancer Care Ontario.* April 13, 2007.
- ¹⁵ American Society of Health-System Pharmacists. ASHP guidelines on handling hazardous drugs. *Am J Health-Syst Pharm.* 2006;63, 1172-93.
- ¹⁶ Drug Expenditure in Canada 1985 to 2009. Canadian Institute for Health Information. Ottawa CIHI 2010
- ¹⁷ American Society of Health-System Pharmacists. ASHP Guidelines on Medication Cost Management Strategies for Hospitals and Health Systems. *Am J health-Syst Pharm* 2008;65:1368-84.
- ¹⁸ Pederson C, Schneider P, Scheckelhoff D. ASHP National Survey of Pharmacy Practice in Hospital Settings: Dispensing and Administration-2008. *Am J Health-Syst Pharm – Vol 66* May 15, 2009
- ¹⁹ American Society of Health-System Pharmacists. ASHP Guidelines on Outsourcing Sterile Compounding Services. *Am J Health-Syst Pharm.* 2010;67:757-65.

D – HUMAN RESOURCES

MICHELE BABICH

In the 2007/08 Hospital Pharmacy in Canada Report it was noted that the Health Council of Canada Report had stated that human resource shortages are perhaps the most serious challenge facing Canada's healthcare system.¹ Between 2005 and 2008, a national manpower study of pharmacists and pharmacy technicians was funded by the Government of Canada. The study was carried out under the guidance of a coalition of eight national pharmacy organizations. The report of that initiative, known as *"Moving Forward: Pharmacy Human Resources for the Future"* was released in the fall of 2008.² The report contained 36 recommendations that addressed issues such as the future roles of pharmacists and pharmacy technicians, the education of the pharmacy workforce, the regulation of the pharmacy workforce, and the integration into the workforce of foreign-trained pharmacy graduates who immigrate to Canada. The recommendations were ultimately intended to insure that the profession of pharmacy has the right individual, with the right training, in the right place, at the right time, to deliver the pharmacy services that are needed to meet the present and future healthcare needs of Canadians.

Some of the Moving Forward recommendations have already been acted upon, and others are in the process of being implemented. Technician regulation has been introduced in Ontario, and a number of other provinces are moving in a similar direction. Formal recognition of pharmacy technicians is expected to eventually formalize their scope of practice. The regulatory recognition of the tasks that a pharmacy technician can perform will be accompanied by increased technician accountability for the performance of those tasks. With that change, pharmacists will no longer be ultimately responsible for all of the drug distribution tasks that pharmacy technicians perform, which has often been used as the justification, or excuse, for having pharmacists continue to be directly involved in a large number of drug distribution activities. This presents a strategic opportunity to free pharmacists from technical drug distribution activities and redirect their activities to higher value activities that are encompassed under the terms "clinical pharmacy services", "pharmaceutical care", and "medication therapy management services".

The accreditation of pharmacy technician programs, which was addressed in the Moving Forward report, is now a reality. The Canadian Council for the Accreditation of Pharmacy Programs (CCAPP) offers an accreditation program for pharmacy technician programs.³ Many training programs across the country are now accredited, providing assurance that the extent and quality of those programs is adequate to meet the training needs of pharmacy technicians. At the same time, a number of technician training programs that could not meet the accreditation standards have chosen to close down their programs. Although the program accreditation changes are necessary to insure the quality of technicians graduating from those programs, there is also concern that the reduction in the number of training programs may, at least in the short term, lead to a shortage of pharmacy technicians.

In addition to the accreditation of pharmacy technician training programs, the certification of individual pharmacy technicians is also underway. For many years, the Pharmacy Examining Board of Canada (PEBC) has offered an examination process that has led to PEBC certification of individual pharmacists. With the exception of Quebec, PEBC certification is a requirement for licensure as a pharmacist in all provinces. Graduates from Faculties of Pharmacy in Canada and foreign-trained pharmacists must all become PEBC certified before entering practice. PEBC has developed a similar certification process for pharmacy technicians and the first cohort of pharmacy technicians have written the examinations. It is likely that PEBC certification will eventually become a requirement for registration or licensure as a pharmacy technician.

Changes have also been taking place in the university training programs for pharmacists. In response to the severe shortage of pharmacists that developed in the late 1990s and early 2000s, university enrollment has increased in almost all Faculties of Pharmacy in Canada. Overall enrollment has increased by 50% in the past 10 years and the number of graduates has increased by 36% over the past 9 years.⁴ There was a large increase in enrollment at a number of universities in the early to mid-2000s and in 2007 there was another substantial increase when the new Faculty of Pharmacy at the University of Waterloo admitted their first class of 93 students. According to the Canadian Institute for Health Information, there was an increase of 13.9% in pharmacist numbers between 2006 and 2009.⁵ In the United States there is concern that the large increases in enrollment in US Faculties of Pharmacy, which have occurred over the past decade, have already led to a surplus of pharmacists in some parts of the country and will shortly lead to a nation-wide surplus.⁶ The American Society of Health-System

Pharmacists and the American Pharmacists Association recently released a discussion paper in which they raised their concerns about both the growing number of pharmacy graduates each year, and the quality of those graduates, given the shortage of experiential training sites that many Faculties are dealing with.⁷

There have also been changes in the community pharmacy sector that are affecting the demand for pharmacists. In Ontario, the changes that have occurred in the reimbursement for generic drugs, combined with the abolition of the rebates that many pharmacies were receiving from generic companies (sometimes referred to as professional allowances), have adversely affected the profitability of the community pharmacy sector in that province. Similar initiatives are occurring in other provinces. These changes are expected to reduce the demand for pharmacists in the community pharmacy sector. The changes in pharmacy technician roles may also be having an impact on the demand for pharmacists.

A surplus of pharmacists appears to be developing in the United States.

Finally, there are changes occurring in the education of pharmacists that will soon affect the pharmacy profession. In February 2010, the Association of Faculties of Pharmacy of Canada (AFPC) released a position statement and a joint resolution with the Association of Deans of Pharmacy of Canada (ADPC) that calls for replacing the current baccalaureate pharmacy curricula with a comprehensive doctor of pharmacy curricula.⁸ AFPC and ADPC also agreed to make a significant effort to ensure that all pharmacy schools have an entry-to-practice Doctor of Pharmacy program in place by 2020. In 2011, only one Faculty of Pharmacy has an entry-to-practice Pharm.D. program. The first cohort of that program started in 2007 at the University of Montreal. The University of Laval in Quebec City is planning to start its entry-to-practice program in September 2011. Other faculties are at various stages with respect to the implementation of this program. The transition to an entry-to-practice Pharm.D. program will be a significant challenge, both for faculties of pharmacy and for hospital pharmacy departments which provide clinical rotations and contribute to academic teaching. However, there is little doubt that the future patient-centered role of the pharmacist requires a different kind of curriculum; one that involves a much greater emphasis on clinical practice rotations and clinical skills development.

In the 2007/08 Hospital Pharmacy in Canada report, pharmacist shortages remained problematic and hospitals were still having difficulty recruiting and retaining pharmacists. Over the past two years, the human resource shortage appears to be diminishing. Vacancies for pharmacists still exist but the 2009/10 survey data suggest that the pharmacist manpower situation has improved considerably since the last report.

HUMAN RESOURCE SHORTAGES – PHARMACISTS

- Fifty-eight percent (93/159) of respondents reported having pharmacist position vacancies on March 31, 2010, which is about the same as in 2007/08 when 60% (98/163) reported having pharmacist vacancies. The average reported vacancy rate for pharmacists in 2009/10 was 8.2% (Table D-1) which was lower than the vacancy rate reported in the 2007/08 report (10.4%). In the 2005/06 report the vacancy rate was 13.3% (Table D-2)
- Overall, respondents reported a total of 235 pharmacist position vacancies nationally (Table D-1). This is down from 292 pharmacist position vacancies in 2007/08 and 270 vacancies in 2005/06. As noted in past reports, this number underestimates the total national number of vacancies as not all hospitals participated in the survey. The average number of pharmacist vacancies per respondent is down from 1.8 (292/163) in 2007/08 to 1.5 (235/159) in 2009/10.
- In the 2009/10 survey, Quebec (QC) again reported the highest number of pharmacist vacancies of all provinces, with 105 vacancies in that province on March 31, 2010. This represented a vacancy rate of 16.4%. (Table D-1) QC is the only province that has not shown a notable decrease in its pharmacist vacancy rate since 2006. The QC vacancy rate was 17.4% in 2005/2006 and 17.2% in 2007/2008. (Table D-2) Salaries in QC are still the lowest in the country which may contribute to the higher vacancy rate.
- The lowest pharmacist vacancy rate was reported in Nova Scotia/Newfoundland (NS/NL) with only 4 vacancies and a vacancy rate of 3.1%.

Pharmacist manpower shortage is abating in all regions except Quebec.

The average duration of vacancies was not included in the 2009/10 survey as many respondents in past surveys had indicated that this information was not readily available.

HUMAN RESOURCE SHORTAGES – TECHNICIANS

The data from the 2009/10 report indicate that pharmacy technician shortages were much less of an issue than pharmacist shortages were but, unlike the pharmacist shortage which appears to be abating, the pharmacy technician shortage remains about the same as reported in the 2007/08 report. Now that the Pharmacy Examining Board of Canada has begun to certify pharmacy technicians, and pharmacy technician regulation has occurred in some provinces, we should see technicians taking a greater role in the drug distribution system. As a result, the demand for pharmacy technicians may increase.

With the transition to accredited programs through The Canadian Council for Accreditation of Pharmacy Programs (CCAPP), the number of institutions offering technician training programs is expected to decrease. As of July, 2010 there are 38 programs that have achieved either qualifying or provisional status.⁽³⁾ Fifty percent of the programs are located in Ontario (ON), and 34% in British Columbia (BC) and Alberta (AB). This regional concentration of accredited technician training programs may be related to the pharmacy technician regulatory initiatives that are underway in those provinces. The role of regulated technicians varies between provinces and until this is clearly established, the impact of regulated technicians on the supply/demand in the hospital sector remains unclear.

There is an upward trend in pharmacy technician vacancy rates.

- The overall reported vacancy rate for technicians was 1.5% in 2009/10 (Table D-1), compared to 1.4% in 2007/08. This vacancy rate is low when compared to the pharmacist vacancy rate, but the trend is upward. There were a total of 56 vacancies reported, with almost half of those (21) reported by respondents in QC. This represented a 2.8% vacancy rate in QC. Across the country there is a wide range in technician vacancy rates, from 0.3% in NS/NL to 4.7% in Manitoba (MB).

Table D-1. Percent and Number of Positions Vacant as of March 31, 2010

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Pharmacists (n=)	(159)	(33)	(94)	(32)	(43)	(116)	(25)	(15)	(5)	(11)	(51)	(35)	(9)	(8)
vacant positions	235	23	119	93	119	116	23	14	6	9	64	105	11	4
vacancy rate	8.2%	12.5%	8.6%	7.2%	7.4%	9.2%	7.1%	4.3%	4.9%	5.4%	6.0%	16.4%	8.8%	3.1%
Pharmacist Managers (n=)	(151)	(31)	(89)	(31)	(41)	(110)	(24)	(15)	(5)	(11)	(48)	(33)	(7)	(8)
vacant positions	20	1	10	9	11	9	1	1	0	1	12	2	1	2
vacancy rate	7.2%	3.3%	7.4%	7.9%	7.5%	6.8%	3.0%	4.1%	0.0%	6.7%	11.6%	3.2%	6.9%	15.9%
Pharmacy Technician Managers (n=)	(73)	(9)	(48)	(16)	(25)	(48)	(15)	(9)	(1)	(6)	(20)	(11)	(5)	(6)
vacant positions	0	0	0	0	0	0	0	0	0	0	0	0	0	0
vacancy rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pharmacy Technicians (Technicians + Assistants) (n=)	(157)	(33)	(94)	(30)	(43)	(114)	(25)	(15)	(5)	(11)	(51)	(33)	(9)	(8)
vacant positions	56	7	26	24	40	16	4	5	2	9	15	21	1	0
vacancy rate	1.5%	2.5%	1.5%	1.4%	2.0%	0.9%	0.9%	1.0%	1.9%	4.7%	1.0%	2.8%	0.5%	0.3%
Pharmacy Technicians (facilities without Assistants) (n=)	(90)	(20)	(53)	(17)	(19)	(71)	(6)	(1)	(3)	(7)	(32)	(27)	(7)	(7)
vacant positions	23	3	19	1	9	14	2	0	0	1	11	9	0	0
vacancy rate	1.3%	1.9%	2.2%	0.1%	1.2%	1.4%	1.1%	0.0%	0.0%	1.8%	1.4%	1.7%	0.0%	0.4%
Total (Pharmacists, Managers, Technicians) (n=)	(159)	(33)	(94)	(32)	(43)	(116)	(25)	(15)	(5)	(11)	(51)	(35)	(9)	(8)
vacant positions	311	30	155	126	170	141	28	19	8	19	91	128	13	6
vacancy rate	4.5%	6.3%	4.7%	4.0%	4.5%	4.5%	3.5%	2.3%	3.2%	5.0%	3.5%	8.8%	3.9%	2.2%

Base: all respondents

HUMAN RESOURCE SHORTAGES – MANAGEMENT

- The total number of vacant pharmacist management positions reported in 2009/10 was 20 (Table D-1). This has not changed from the 2007/08 report. The 2009/10 management vacancy rate was reported as 7.2% of total management positions (Table D-1), somewhat higher than the rate of 5.3% that was

reported in 2007/08. The highest reported management vacancy rate was in NS/NL (15.9%) and the lowest in Saskatchewan (SK) (0%). In this report, for the first time, the vacancy rate for pharmacy technician managers was also included in the survey, with no vacancies reported in this category. If the two categories are combined (Pharmacist and Technician Managers) the overall management vacancy rate becomes 5.5%.

Table D-2. Pharmacist Vacancy Rates 2006 to 2010

	All	Bed Size			Teaching		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
2006	(n=) 13.3%	(15) 22.7%	(56) 14.7%	(32) 11.4%	(30) 10.7%	(73) 16.9%	(13) 21.7%	(6) 11.6%	(3) 6.9%	(6) 7.0%	(38) 11.0%	(28) 17.4%	(7) 21.0%	(2) 4.8%
2008	(n=) 10.4%	(32) 9.8%	(90) 13.0%	(41) 8.2%	(40) 9.6%	(123) 11.2%	(22) 6.6%	(12) 10.0%	(7) 2.8%	(10) 1.0%	(45) 8.3%	(51) 17.2%	(8) 14.3%	(8) 6.0%
2010	(n=) 8.2%	(33) 12.5%	(94) 8.6%	(32) 7.2%	(43) 7.4%	(116) 9.2%	(25) 7.1%	(15) 4.3%	(5) 4.9%	(11) 5.4%	(51) 6.0%	(35) 16.4%	(9) 8.8%	(8) 3.1%

Vacancy rates were calculated from data provided by 159 facilities in 2010, (163 in 2008 and 103 in 2006.

RETIREMENTS IN THE NEXT FIVE YEARS

The 2009/10 survey did not gather information on retirements. In past surveys, most respondents based their retirement estimates on the age of their staff, assuming that retirement would occur at about age 65. However, given the wide range of ages at which pharmacists now choose to retire, those estimates were not considered to be very reliable. On one hand there is currently no mandatory retirement age so pharmacists may decide to continue working beyond the age of 65, as many pharmacists in the community pharmacy practice setting do. On the other hand, pharmacists in the hospital setting, with better pension plans than many in the private sector, may choose earlier retirement. It is therefore difficult to estimate future retirement dates with any accuracy.

PHARMACY STAFFING

Readers are asked to note that prior to the 2007/08 report, the Hospital Pharmacy in Canada Report had reported a budgeted hours per ACUTE patient day ratio, which hospitals could use to compare their own pharmacy staffing to the staffing reported by other hospitals of a similar size and teaching status. Non-acute patient days were not included in the denominator and were essentially ignored in the calculation of the staffing ratio that appeared in all of the reports previous to 2007/08.

The original editorial decision to calculate the ratio in this way, made many years ago, was based on a number of considerations. Most hospitals operate a single central pharmacy, serving both acute and non-acute patients. Few respondents are able to provide a breakdown of their acute versus non-acute staffing, as evidenced by the relatively small number of hospitals that were able to provide data of this nature for the benchmarking section of this survey. The report's editorial board members also believed that the resources used to service acute care beds were generally much higher than the resources used for non-acute beds, and the number of acute care beds in most hospitals was a much larger proportion of total beds than were the non-acute beds. As a result, it was concluded that a ratio that used only the acute patient days in the denominator would provide the most reliable staffing indicator. That assumption may remain valid for many of the hospitals that participate in our survey. However, during the planning for the 2007/08 survey, the editors were informed that during the 2005/06 data analysis there were a number of hospitals that had an unexpectedly high "budgeted hours per acute patient day" ratio. As the data for these hospitals was analyzed in more detail, it became clear that ignoring the non-acute patient days was problematic if a large proportion of a hospital's patient days were non-acute patient days. In extreme cases the calculated budgeted hours per acute patient day ratio is artificially elevated to a substantial degree, because of the exclusion of the non-acute patient days. For example in one large hospital with about 10% acute beds and 90% non-acute beds, the staffing ratio was 3.29 budgeted hours per acute patient day, which decreased dramatically to 0.25 budgeted hours per total patient day, when both acute and non-acute days were included in the denominator.

In order to better understand the impact of non-acute beds, a decision was made in 2007/08 to conduct a second staffing analysis which would take the non-acute patient days into consideration.

In the first staffing analysis, the calculation of staffing ratios was carried out in the same way as had been done in previous years, using only the acute patient days in denominator. These results are therefore comparable to the results from previous reports.

- Overall, the average of reported total budgeted hours per acute care patient day (excluding residents) has changed only slightly from 0.85 in 2007/08 to 0.87 in 2009/10. (Table D-3a) At the provincial level, the highest reported level of staffing was in ON and NS/NL at 0.97 total budgeted hours per acute patient day and the lowest was in BC at 0.69 total budgeted hours per acute patient day. (Table D-3b)
- Teaching hospitals continue to report higher total budgeted hours per acute patient day (1.07) than non-teaching hospitals (0.8), as shown in Table D-3a. Hospitals with more than 500 beds also reported higher total budgeted hours per acute patient day (0.90) than hospitals with 201-500 beds (0.88) and hospitals with 50 to 200 beds (0.83).

In the second analysis, the staffing ratio was calculated using total patient days (acute plus non-acute) in the denominator. As would be expected, for hospitals with non-acute patient days, adding those days to the denominator resulted in a staffing ratio that is lower than when the non-acute patient days were excluded from the denominator. In addition, the analysis looked at five hospital subgroups, to determine if the ratio of acute to non-acute beds was related to hospital staffing patterns. The five subgroups were hospitals with 10 -39% acute beds, 40-59% acute beds, 60-79% acute beds, 80-99% acute beds, and 100% acute beds.

In examining the total patient days, hospitals with non-acute patient days have staffing ratios that are lower than when the non-acute patient days are excluded from the denominator. The higher the proportion of non-acute days, the lower the ratio was. As with the 2007/08 report the 2009/10 analysis looked at the same five hospital subgroups with varying percentages of acute beds.

- For all hospitals the average total budgeted hours per total patient day was 0.68, similar to the 0.63 reported in the 2007/08 report. This compares to 0.87 when only acute patient days are used in the denominator (0.85 in 2007/08).
- For the 5 subgroups of hospitals, using total patient days as the denominator, the staffing ratios increase in each subgroup as the percentage of acute beds increases. This is a similar trend to what was reported in the 2007/08 report. For hospitals with 10-39% acute beds the staffing ratio was 0.24 (0.30 in 2007/08) total budgeted hours per total patient day, which rose to 0.48 (0.36 in 2007/08) for hospitals with 40-59% acute beds, 0.61 (0.58 in 2007-08) for hospitals with 60-79% acute beds, 0.78 (0.80 in 2007/08) for hospitals with 80-99% of acute beds and 0.89 (0.81 in 2007/08) for hospitals with 100% acute beds.
- The same analysis was completed for the 5 subgroups of hospitals using only acute patient days in the denominator. Very little difference based on percent of acute beds is noted in the ratios using this analysis although the ratio for hospitals with 40-59% of acute beds (0.88) was higher than that for hospitals with 60-79% of acute beds (0.84). This result is hard to explain, as it was in the last report, but most likely arises from a small number of large facilities with 40-59% acute beds.
- There were 45 hospitals in this year's report that reported having 100% acute beds. Of these, 21 were teaching hospitals and 24 were non-teaching hospitals. These 45 hospitals reported a 0.89 total budgeted hours per acute patient day ratio vs. 0.81 in the last report. For the teaching hospitals with 100% acute beds, the respondents reported having an average of 1.03 total budgeted hours per acute patient day, vs. 1.04 in the last report. For non-teaching hospitals with 100% acute beds the respondents reported having an average of 0.77 total budgeted hours per patient day vs. 0.65 in the last report. As these hospitals have 100% acute beds, these ratios are true "budgeted hours per acute patient day".
- When hospitals were broken down into teaching and non-teaching hospitals, the staffing ratios were higher for teaching hospitals (0.97) than non-teaching hospitals (0.56) and were fairly consistent within groupings of hospitals based on percentage of acute beds. Note that there were no teaching hospitals with 10-39% acute beds and the number of teaching hospitals with 40-59% and 60-79% acute beds was too small to include their ratios in this analysis. As noted in the last report, the mix of acute to non-acute beds has a significant impact on the staffing ratios, as measured by the ratio of total budgeted hours per total patient day.

The staffing ratio "total budgeted hours per total patient day" increases as the proportion of acute beds increases.

A third analysis was undertaken for the first time in the 2009/10 report where outpatient staff were excluded from the total staffing budget in order to accurately reflect budgeted hours that are directly related to inpatient services. As a greater number of hospitals and health authorities move services to an outpatient setting, increased staffing in this area will skew the staffing ratio by increasing it when it in fact the increase reflects a greater emphasis on outpatient services rather than increased staffing to service inpatient units. The new ratio, inpatient budgeted hours per total patient day, removes the distortion that is created when resources committed to outpatient care are included in the numerator of the ratio.

The ratio “inpatient budgeted hours per total patient day” eliminates the distortion created by including outpatient staffing in the ratio.

- When the outpatient staff are excluded, the staffing ratio for all hospitals decreases, as expected, from 0.68 (total budgeted hours per total patient day) to 0.62 (inpatient budgeted hours per total patient day). (Table D-3a) Bed size does not appear to influence this ratio.
- Teaching hospitals have a higher ratio at 0.88 inpatient budgeted hours per total patient day compared to non-teaching hospitals with a ratio of 0.52 inpatient budgeted hours per total patient day.
- The lowest staffing ratio by region when using this analysis was in BC at 0.47 inpatient budgeted hours per total patient day, which is consistent with BC reporting the lowest staffing ratios in the other analyses described earlier. The highest staffing ratio occurred in NS/NL at 0.75 followed by ON and AB at 0.72 inpatient budgeted hours per total patient day (Table D-3b).
- When the hospitals were grouped by percent of acute beds, the staffing ratios increase as the percent of acute beds increases. This makes sense, given that acute care beds are associated with higher workloads. This trend was seen with both of the staffing ratios that were calculated using total patient days.

Table D-3a. Staffing Ratios – budgeted hours/patient day 2009/10 (By hospital size, teaching status, and percentage of acute beds)

	All	Bed Size			Teaching Status		Percent of acute beds				
		50 - 200	201 - 500	>500	Teach	Non-Teaching	10-39%	40-59%	60-79%	80-99%	100%
ALL HOSPITALS											
(n=)	(154)	(33)	(91)	(30)	(42)	(112)	(19)	(16)	(32)	(42)	(45)
Total budgeted hours/ acute patient day	0.87	0.83	0.88	0.90	1.07	0.80	0.82	0.88	0.84	0.89	0.89
(n=)	(149)	(31)	(89)	(29)	(42)	(107)	(18)	(16)	(30)	(39)	(45)
Total Budgeted hours/ total patient day	0.68	0.70	0.66	0.72	0.97	0.56	0.24	0.48	0.61	0.78	0.89
(n=)	(149)	(31)	(89)	(29)	(42)	(107)	(18)	(16)	(30)	(39)	(45)
Inpatient budgeted hours/ total patient day	0.62	0.67	0.60	0.65	0.88	0.52	0.21	0.43	0.57	0.72	0.82
TEACHING HOSPITALS											
(n=)	(42)	(4)	(19)	(19)	(42)	(0)	(0)	(2)	(1)	(18)	(21)
Total budgeted hours/ acute patient day	1.07	1.33	1.07	1.02	1.07	.	.	.	.	1.06	1.03
(n=)	(42)	(4)	(19)	(19)	(42)	(0)	(0)	(2)	(1)	(17)	(21)
Total Budgeted hours/ total patient day	0.97	1.33	1.01	0.87	0.97	.	.	.	.	0.94	1.03
(n=)	(42)	(4)	(19)	(19)	(42)	(0)	(0)	(2)	1)	(17)	(21)
Inpatient budgeted hours/ total patient day	0.88	1.26	0.92	0.77	0.88	.	.	.	.	0.85	0.95
NON-TEACHING HOSPITALS											
(n=)	(112)	(29)	(72)	(11)	(0)	(112)	(19)	(14)	(31)	(24)	(24)
Total budgeted hours/ acute patient day	0.80	0.76	0.82	0.70	.	0.80	0.82	0.78	0.83	0.76	0.77
(n=)	(107)	(27)	(70)	(10)	(0)	(107)	(18)	(14)	(29)	(22)	(24)
Total Budgeted hours/ total patient day	0.56	0.61	0.56	0.44	.	0.56	0.24	0.39	0.61	0.65	0.76
(n=)	(107)	(27)	(70)	(10)	(0)	(107)	(18)	(14)	(29)	(22)	(24)
Inpatient budgeted hours/ total patient day	0.52	0.58	0.51	0.41	.	0.52	0.21	0.36	0.56	0.62	0.70

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

Base: all respondents

Note that budgeted hours exclude pharmacy residents

Table D-3b. Staffing Ratios – budgeted hours /patient day 2009/10 (By teaching status and by province)

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
ALL HOSPITALS														
(n=)	(154)	(33)	(91)	(30)	(42)	(112)	(23)	(14)	(5)	(11)	(50)	(35)	(9)	(7)
Total budgeted hours/ acute patient day	0.87	0.83	0.88	0.90	1.07	0.80	0.69	0.78	0.80	0.85	0.97	0.88	0.91	0.97
(n=)	(149)	(31)	(89)	(29)	(42)	(107)	(22)	(11)	(5)	(11)	(50)	(34)	(9)	(7)
Total Budgeted hours/ total patient day	0.68	0.70	0.66	0.72	0.97	0.56	0.48	0.74	0.64	0.64	0.79	0.61	0.73	0.76
(n=)	(149)	(31)	(89)	(29)	(42)	(107)	(22)	(11)	(5)	(11)	(50)	(34)	(9)	(7)
Inpatient budgeted hours/ total patient day	0.62	0.67	0.60	0.65	0.88	0.52	0.47	0.72	0.61	0.57	0.72	0.52	0.71	0.75
TEACHING HOSPITALS														
(n=)	(42)	(4)	(19)	(19)	(42)	(0)	(2)	(6)	(2)	(2)	(12)	(14)	(2)	(2)
Total budgeted hours/ acute patient day	1.07	1.33	1.07	1.02	1.07	.	.	0.78	.	.	1.28	0.97	*	*
(n=)	(42)	(4)	(19)	(19)	(42)	(0)	(2)	(6)	(2)	(2)	(12)	(14)	*	*
Total Budgeted hours/ total patient day	0.97	1.33	1.01	0.87	0.97	.	.	0.78	.	.	1.16	0.91	*	*
(n=)	(42)	(4)	(19)	(19)	(42)	(0)	(2)	(6)	(2)	(2)	(12)	(14)	*	*
Inpatient budgeted hours/ total patient day	0.88	1.26	0.92	0.77	0.88	.	.	0.76	.	.	1.04	0.78	*	*
NON-TEACHING HOSPITALS														
(n=)	(112)	(29)	(72)	(11)	(0)	(112)	(21)	(8)	(3)	(9)	(38)	(21)	(7)	(5)
Total budgeted hours/ acute patient day	0.80	0.76	0.82	0.70	.	0.80	0.65	0.77	0.66	0.79	0.87	0.81	0.92	0.77
(n=)	(107)	(27)	(70)	(10)	(0)	(107)	(20)	(5)	(3)	(9)	(38)	(20)	(7)	(5)
Total Budgeted hours/ total patient day	0.56	0.61	0.56	0.44	.	0.56	0.42	0.68	0.59	0.54	0.67	0.40	0.71	0.59
(n=)	(107)	(27)	(70)	(10)	(0)	(107)	(20)	(5)	(3)	(9)	(38)	(20)	(7)	(5)
Inpatient budgeted hours/ total patient day	0.52	0.58	0.51	0.41	.	0.52	0.41	0.67	0.58	0.47	0.62	0.33	0.69	0.59

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

Base: all respondents

Note that budgeted hours exclude pharmacy residents

STAFF COMPOSITION OF THE AVERAGE HOSPITAL PHARMACY DEPARTMENT

The Hospital Pharmacy in Canada report collects and reports data on the several different types and numbers 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 such as pharmacist to technician ratios, and differences in staff composition between different provinces, teaching versus non-teaching respondents, and hospitals of different bed sizes.

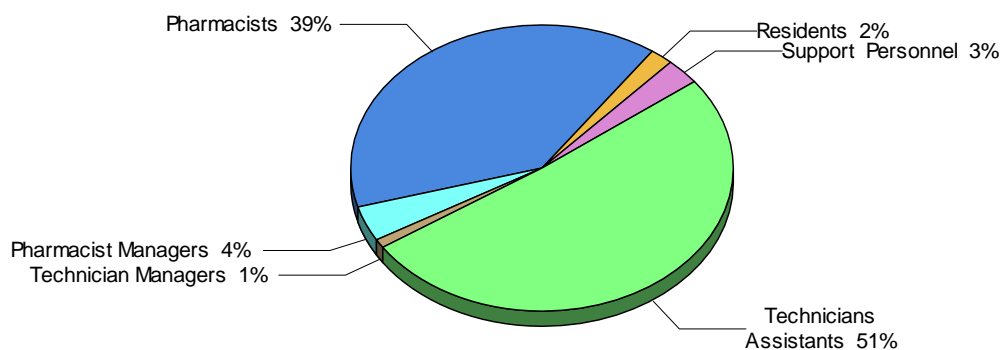
- The average number of pharmacist positions reported represents 40% of total pharmacy staffing. The percentage of pharmacists is highest in SK (46%) and lowest in New Brunswick and Prince Edward Island (35%)
- Management positions represent 4% of total pharmacy staffing, similar to the previous report (5%), when looking at all management positions combined.
- Technician/Assistant positions represent 51% (49% in 2007/08) of total pharmacy staffing.
- Support personnel represents 3.4% (3.8% in 2007/08) of total pharmacy staffing.

Overall, the staff composition of pharmacy departments has slowly changed over the years. The proportion of each category of staff is similar to that of both the 2007/08 report and the 2005/06 report, although the technician percentage has increased from 47% in 2005/06 to 51% in 2009/10. Technician regulation is still in its infancy, but we may see a further change in the composition of pharmacy departments as regulated technicians assume their full scope of practice and hospitals implement the new practice models that regulated technicians will make possible.

Table D-4. Average Budgeted Pharmacy Staffing (FTE's) 2009/10

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
(n=)	(159)	(33)	(94)	(32)	(43)	(116)	(25)	(15)	(5)	(11)	(51)	(35)	(9)	(8)
Pharmacists	18.0	5.5	14.8	40.5	37.4	10.9	13.1	20.8	22.4	15.3	20.8	18.3	13.4	16.0
Pharmacist Managers	1.8	.9	1.4	3.5	3.4	1.1	1.3	1.6	2.6	1.4	2.0	1.8	1.6	1.6
Pharmacy Technician Managers	.5	.2	.5	.9	.8	.4	.6	1.0	.2	.8	.4	.3	.6	.7
Pharmacy Manager (neither pharmacist technician)	.1	.0	.1	.4	.2	.1	.0	.0	.0	.0	.2	.2	.6	.0
Pharmacy Technicians and Pharmacy Assistants (both)	23.2	7.9	18.3	53.4	46.2	14.7	17.5	31.4	21.6	16.4	27.8	21.3	20.4	18.8
Support Personnel (clerical / porter / aide)	1.5	.4	1.2	3.7	3.6	.8	.9	1.6	1.6	.8	1.9	1.8	1.5	1.1
Residents	.7	.1	.5	1.9	2.0	.2	.9	.3	1.0	.0	.7	1.1	.2	.3
Total FTE	45.8	14.9	36.4	102.5	91.5	28.0	33.5	56.4	48.4	34.6	53.1	43.6	38.0	38.1

Base: all respondents

Figure D.1 Staff Composition of Average Hospital Pharmacy Department 2009/10

Base: Respondents providing relevant data (159)

Overall, the proportion of time that pharmacists spend performing different functions has changed slowly over the past 4 reports.

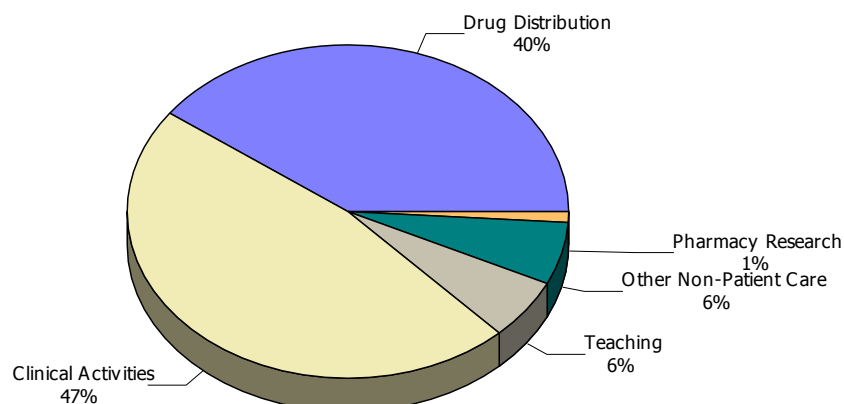
- Respondents reported that pharmacists spent approximately 47% of their time performing clinical activities in 2009/10 (Table D-5), compared to 45% in 2007/08, while spending correspondingly less time in drug distribution. When the historical trend is examined since 1997/98, the time spent on clinical activities has slowly but steadily increased from 33% to 47%.
- The highest proportion of pharmacist time spent performing drug distribution activities was reported by respondents from NB/PEI (55%), SK (47%) and BC (46%), while the lowest proportions were reported by NS/NL (30%) and ON (35%). The scope of practice for pharmacists is expanding in most provinces and, supported by the changes in the role of technicians, one would expect that the trend towards increased clinical activities would continue.

Pharmacist time spent on clinical activities has slowly increased from survey to survey.

Table D-5. Proportion of Pharmacist Time Spent Performing Different Activities 2009/10

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
(n=)	(159)	(33)	(94)	(32)	(43)	(116)	(25)	(15)	(5)	(11)	(51)	(35)	(9)	(8)
Drug distribution	40%	45%	41%	31%	32%	43%	46%	42%	47%	40%	35%	39%	55%	30%
Clinical activities	47%	43%	46%	55%	53%	45%	46%	49%	44%	48%	49%	47%	31%	53%
Teaching	6%	4%	6%	8%	8%	5%	5%	5%	4%	4%	7%	7%	3%	7%
Pharmacy research	1%	1%	1%	2%	2%	1%	1%	1%	2%	0%	1%	1%	1%	2%
Other non-patient care	6%	7%	6%	5%	5%	6%	2%	2%	4%	8%	8%	6%	9%	7%

Base: all respondents

Figure D.2 Proportion of Pharmacist Time Spent Performing Different Activities 2009/10

Base: Respondents providing relevant data (159)

SALARIES

In the 2007/08 survey, two new staff classifications were added – Pharmacy Manager (non-pharmacist) and Pharmacy Assistant. Previous comparisons for these two categories were not available prior to the 2007/08 survey. The 2009/10 survey is the first survey where the trend for these 2 categories can be examined. Throughout this section, the salary increases that occurred over the two year period between the 2007/08 and the 2009/10 reports have been **annualized**. When a percentage increase is referred to in the points below, the percentage reported applies to each of the two years between the 2007/08 and the 2009/10 report.

- Average salary increases at the top level for all staff ranged from 1.0% for Pharmacy Supervisor/Coordinators to 7.1% for Pharmacy Technicians Level 1.
- Respondents reported that staff pharmacists had an overall salary increase of 4.0% at the top level on their scale. This is down from the 4.8% increase reported in the 2007/08 report, but is higher than the reported increase of 2.8% in 2005/06. The largest salary increases for staff pharmacists at the top level were in AB (8.3%) and QC (5.9%). All other provinces reported changes of 2.7% or less. There were no notable differences in staff pharmacist salaries based on teaching status but there was a trend towards higher salaries in the hospitals with smaller numbers of beds.
- Staff technician salaries at the top level rose by 7.1%, compared to 4.4% in the last report. Senior technician salaries at the top level rose by 4.8% compared to 4.6% in the last report. Salaries for technicians were fairly consistent across the country with the notable exceptions of QC and MB where salaries were lower, and AB where salaries were considerably higher. (Table D-6b and D-6b) Pharmacy assistant salaries at the top level rose by 4.0%. Pharmacy technician manager salaries at the top level rose by 2.8%.

Top level staff pharmacist salaries increased at an annualized rate of 4.0% while technician salaries increased 7.1%.

Table D-6a. Average Annual Salary by Position 2009/10

		Bed Size			Teaching Status		Province								
		All	50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Start \$ - Pharmacist Manager	(n=)	(110)	(19)	(63)	(28)	(36)	(74)	(20)	(12)	(3)	(11)	(24)	(28)	(6)	(6)
	mean	90,843	92,895	91,703	87,514	85,177	93,599	100,223	87,899	106,348	105,192	88,905	83,207	86,062	79,566
Top \$ - Pharmacist Manager	(n=)	(115)	(19)	(67)	(29)	(39)	(76)	(22)	(11)	(3)	(11)	(27)	(28)	(6)	(7)
	mean	108,293	109,557	108,096	107,921	107,003	108,955	118,940	118,477	110,445	117,168	107,287	100,569	93,616	91,315
Start \$ - Pharmacy Technician Manager	(n=)	(55)	(7)	(37)	(11)	(19)	(36)	(14)	(9)	(1)	(5)	(12)	(5)	(5)	(4)
	mean	53,464	49,391	51,206	63,651	58,394	50,861	48,557	65,581	.	37,619	64,554	41,814	41,952	45,892
Top \$ - Pharmacy Technician Manager	(n=)	(61)	(7)	(42)	(12)	(21)	(40)	(16)	(9)	(1)	(6)	(16)	(5)	(5)	(3)
	mean	64,440	63,597	59,944	80,666	77,724	57,465	50,136	97,256	.	48,824	77,048	44,157	45,094	57,482
Start \$ - Pharmacy Manager (neither pharmacist nor technician)	(n=)	(10)	(0)	(6)	(4)	(4)	(6)	(0)	(0)	(0)	(0)	(4)	(4)	(2)	(0)
	mean	67,611	.	75,101	56,376	56,376	75,101	.	.	.	.	83,266	52,032	.	.
Top \$ - Pharmacy Manager (neither pharmacist nor technician)	(n=)	(11)	(0)	(7)	(4)	(4)	(7)	(0)	(0)	(0)	(0)	(4)	(4)	(3)	(0)
	mean	85,784	.	90,415	77,681	77,681	90,415	.	.	.	.	106,202	70,365	79,120	.
Start \$ - Staff Pharmacist	(n=)	(138)	(30)	(81)	(27)	(36)	(102)	(21)	(14)	(5)	(11)	(49)	(24)	(6)	(8)
	mean	76,784	80,519	75,836	75,479	76,232	76,979	72,361	82,594	78,960	86,989	78,129	68,530	83,643	74,213
Top \$ - Staff Pharmacist	(n=)	(142)	(29)	(85)	(28)	(37)	(105)	(23)	(15)	(5)	(11)	(49)	(24)	(8)	(7)
	mean	92,724	95,723	92,372	90,684	92,541	92,788	91,487	108,880	89,124	95,771	94,914	83,697	87,712	81,299
Start \$ - Advanced Practice Pharmacist	(n=)	(46)	(3)	(28)	(15)	(21)	(25)	(14)	(1)	(1)	(3)	(12)	(12)	(1)	(2)
	mean	81,099	77,263	82,305	79,615	79,619	82,343	82,569	.	.	99,183	85,019	70,878	.	.
Top \$ - Advanced Practice Pharmacist	(n=)	(50)	(3)	(31)	(16)	(24)	(26)	(15)	(1)	(1)	(3)	(14)	(12)	(2)	(2)
	mean	98,223	95,756	99,465	96,279	97,852	98,565	103,240	.	.	109,874	99,635	89,323	.	.
Start \$ - Practice Leader / Coordinator	(n=)	(55)	(9)	(32)	(14)	(20)	(35)	(15)	(6)	(2)	(2)	(13)	(7)	(6)	(4)
	mean	84,897	85,238	84,304	86,034	83,387	85,760	87,546	89,099	.	.	83,502	73,545	86,414	83,512
Top \$ - Practice Leader / Coordinator	(n=)	(59)	(9)	(35)	(15)	(22)	(37)	(17)	(6)	(2)	(2)	(16)	(7)	(6)	(3)
	mean	104,150	106,711	102,554	106,336	104,427	103,985	110,064	124,667	.	.	103,705	87,599	92,915	96,081
Start \$ - Pharmacy Supervisor / Coordinator	(n=)	(39)	(3)	(25)	(11)	(17)	(22)	(13)	(0)	(2)	(3)	(8)	(12)	(1)	(0)
	mean	81,247	74,961	81,069	83,364	80,410	81,893	84,354	.	.	97,086	74,023	76,806	.	.
Top \$ - Pharmacy Supervisor / Coordinator	(n=)	(41)	(3)	(26)	(12)	(18)	(23)	(14)	(0)	(2)	(3)	(8)	(12)	(2)	(0)
	mean	98,705	91,899	96,211	101,437	97,130	97,596	108,904	.	.	101,148	92,960	91,932	.	.
Start \$ - Pharmacy Assistants	(n=)	(27)	(8)	(14)	(5)	(10)	(17)	(3)	(11)	(0)	(3)	(6)	(3)	(1)	(0)
	mean	35,359	34,814	35,790	35,026	36,034	34,962	41,496	33,863	.	31,590	39,883	29,959	.	.
Top \$ - Pharmacy Assistants	(n=)	(30)	(10)	(15)	(5)	(10)	(20)	(4)	(13)	(0)	(3)	(6)	(3)	(1)	(0)
	mean	41,243	41,452	42,499	37,057	40,054	41,837	41,747	40,795	.	35,432	47,126	37,363	.	.
Resident Stipend	(n=)	(55)	(4)	(30)	(21)	(33)	(22)	(17)	(4)	(2)	(0)	(13)	(14)	(3)	(2)
	mean	38,783	43,750	40,248	35,746	34,898	44,612	51,941	45,181	.	.	34,757	29,143	24,577	.

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

Base: all respondents providing relevant data

- The average residency stipend decreased by 1.1%, which varied widely by province. Some large decreases were noted in NB/PEI (-15%) and NS/NL (-8.8%) with increases in AB (8.1%) and ON (4.0%). Stipends ranged from a low \$24,577 in NB/PEI to a high of \$51,941 in BC.

Table D-6b. Technician salaries from facilities with two technician salary scales 2009/10

		All	Bed Size			Teaching Status		Province							
			50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Start \$ - Pharmacy Technician - Level 2 / Senior	(n=)	(37)	(5)	(21)	(11)	(13)	(24)	(8)	(1)	(2)	(0)	(17)	(1)	(4)	(4)
	mean	45,745	44,355	46,262	45,390	46,554	45,307	43,868	.	.	.	49,308	.	38,147	39,551
Top \$ - Pharmacy Technician - Level 2 / Senior	(n=)	(41)	(4)	(25)	(12)	(15)	(26)	(10)	(0)	(2)	(0)	(19)	(1)	(6)	(3)
	mean	50,549	50,141	51,107	49,524	53,248	48,992	45,481	.	.	.	58,634	.	38,862	44,583
Start \$ - Pharmacy Technician - Level 1 / Staff	(n=)	(39)	(5)	(23)	(11)	(14)	(25)	(8)	(1)	(2)	(0)	(19)	(1)	(4)	(4)
	mean	41,859	40,384	42,508	41,174	41,874	41,851	41,982	.	.	.	44,595	.	36,321	35,632
Top \$ - Pharmacy Technician - Level 1 / Staff	(n=)	(42)	(4)	(26)	(12)	(15)	(27)	(10)	(1)	(2)	(0)	(19)	(1)	(6)	(3)
	mean	47,148	45,188	48,544	44,775	48,398	46,453	43,166	.	.	.	53,698	.	37,384	40,248

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

Base: all respondents providing relevant data.

Table D-6c. Technician salaries from facilities with only one technician salary scale 2009/10

		All	Bed Size			Teaching Status		Province							
			50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Start \$ - Pharmacy Technician - (one level)	(n=)	(95)	(23)	(57)	(15)	(21)	(74)	(14)	(12)	(3)	(11)	(27)	(22)	(2)	(4)
	mean	41,013	41,359	41,029	40,422	40,106	41,270	44,989	52,066	37,955	34,016	45,184	32,485	.	36,338
Top \$ - Pharmacy Technician - (one level)	(n=)	(97)	(24)	(58)	(15)	(21)	(76)	(14)	(13)	(3)	(11)	(28)	(22)	(2)	(4)
	mean	47,522	48,997	47,055	46,968	47,861	47,428	45,882	66,004	42,833	39,690	51,931	38,485	.	40,837

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

Base: all respondents providing relevant data.

- Respondents indicated that 98% of pharmacy directors earned over \$80,000 in 2009/10, similar to 2007/08 (Table D-7). Eighty-four percent of directors reported earning over \$100,000 in 2009/10 compared to 65% in 2007/08 and 42% in 2005/06. Forty-four percent of directors reported earning over \$120,000 per year. BC and ON reported the highest proportion of directors with salaries over \$130,000 per year.

Table D-7. Distribution of Director Salary Ranges 2009/10

		All	Bed Size			Teaching Status		Province							
			50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
\$ 70,000 - \$ 79,999	(n=)	(155)	(32)	(91)	(32)	(42)	(113)	(25)	(14)	(5)	(11)	(48)	(35)	(9)	(8)
		2%	3%	2%	0%	0%	3%	4%	0%	0%	0%	0%	0%	22%	0%
\$ 80,000 - \$ 89,999		4%	0%	7%	0%	5%	4%	4%	0%	0%	0%	0%	11%	11%	0%
\$ 90,000 - \$ 99,999		10%	19%	8%	6%	5%	12%	0%	0%	40%	0%	2%	17%	33%	38%
\$100,000 - \$109,999		19%	28%	16%	16%	7%	23%	12%	7%	20%	27%	23%	14%	33%	25%
\$110,000 - \$119,999		22%	25%	23%	16%	21%	22%	16%	36%	20%	27%	25%	23%	0%	13%
\$120,000 - \$129,000		19%	19%	12%	41%	38%	12%	12%	29%	20%	27%	15%	29%	0%	25%
\$130,000+		25%	6%	32%	22%	24%	25%	52%	29%	0%	18%	35%	6%	0%	0%

Base: all respondents

CREDENTIALS OF PHARMACISTS

All hospital pharmacists in Canada must have the minimum academic credential for licensure as a pharmacist, (e.g. a baccalaureate degree), but many hospital pharmacists have additional academic credentials. In order to better understand the types of academic credentials that hospital pharmacists across Canada do have, the 2009/10 survey collected information related to both undergraduate and post-graduate credentials. Respondents were asked to provide the approximate percentage of their pharmacist staff members who possessed a number of different types of credentials.

- With respect to the entry-to-practice degree that their staff members possessed, 2% of all pharmacists were reported to have an entry-to-practice Pharm.D. degree. Ontario respondents reported the highest percentage of staff with an entry-to practice Pharm.D. degree, at 4% of all staff pharmacists. Respondents from most other provinces reported that none of their staff had an entry-to-practice Pharm. D. degree. The remaining hospital pharmacists in Canada, approximately 98%, have a Baccalaureate degree in Pharmacy (e.g. B.Sc. Pharmacy, Bachelor of Pharmacy, etc.)

Since, at the time this survey was conducted, there had not been any graduates from the University of Montreal's entry-to-practice Pharm. D. program, it had been expected that there would be only a small number of pharmacists who possessed that degree. The estimated 2% of hospital pharmacists who possess the entry-to-practice Pharm.D. degree would be individuals who graduated from programs in other countries, primarily the United States, where the entry-to-practice Pharm.D. degree is offered. Other universities in Canada (e.g. University of Laval, University of Toronto) are moving forward with plans to implement an entry-to-practice Pharm. D. degree. It is probable that the percentage of hospital pharmacists with this degree will increase in future surveys.

- The overall average percentage of pharmacists who had a CSHP Accredited Residency was 32%. This ranged from a high of 70% in QC, followed by BC with 37%. At 8%, Manitoba had the lowest percentage of hospital pharmacists with a residency. Teaching hospitals reported that 57% of their pharmacists had completed a residency program, compared to 23% of pharmacists in non-teaching hospitals. Hospitals with greater than 500 beds reported that 50% of their pharmacists had completed a residency program.

The survey did not ask the question “Is a residency required for employment?” but some hospitals, particularly teaching hospitals and larger hospitals, require or give preference to, hospital residency trained pharmacists. Non-teaching and smaller hospitals may have difficulty in competing with those facilities for residency-trained pharmacists, even if they had a preference for pharmacists with that credential. It should be noted that the residency programs in QC are university-affiliated programs that confer a M.Sc. degree to individuals who successfully complete their program.

- The average percentage of M.Sc.Pharm trained pharmacists was 3% with little variability except for QC where respondents reported that 7% of their pharmacists have this qualification. Respondents in QC were asked to not include their hospital pharmacy residents (who receive a M.Sc. designation) in this category, but it is possible that some respondents did so.

D-8. Average Percentage of Pharmacist Staff with Various Credentials 2009/10

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
(n=)	(156)	(32)	(92)	(32)	(42)	(114)	(25)	(14)	(5)	(10)	(50)	(35)	(9)	(8)
Bachelor degree in pharmacy	98%	100%	98%	100%	99%	98%	98%	100%	100%	99%	96%	100%	100%	100%
Entry Level Pharm.D.	2%	0%	2%	1%	1%	2%	2%	0%	0%	1%	4%	0%	0%	0%
CSHP Accredited Residency Program	32%	19%	31%	50%	57%	23%	37%	13%	27%	8%	21%	70%	13%	13%
Other M.Sc.Pharm	3%	1%	3%	4%	2%	3%	1%	0%	1%	1%	2%	7%	3%	0%
Post Graduate Pharm.D.	5%	2%	6%	5%	7%	4%	12%	2%	7%	2%	6%	1%	5%	5%

Base: All Respondents

- Nationally, pharmacists with a postgraduate Pharm.D degree were reported to represent approximately 5% of hospital pharmacists. The percentages varied between provinces, ranging from 1% in QC to 12% in BC. The 2 provinces that offer a post-graduate Pharm.D program are BC and ON, which may explain the

higher percentages of pharmacists with that credential in those provinces. There are also still a few US universities that offer Pharm. D. degrees by distance education, and some of those universities are geographically located in close proximity to both BC and ON. The close proximity may also make those programs more attractive to pharmacists in BC and ON.

SUMMARY

This year's report illustrates that there are still human resource shortages in pharmacy but, based on the trend in vacancies, the shortage appears to be diminishing. With the increased enrollment at the University of British Columbia that will occur in 2012, the additional graduates that are now entering the workforce from the new pharmacy school in Waterloo, the increased scope of practice of technicians that is underway in many jurisdictions, and a diminished demand for pharmacists in the retail sector, the pharmacist shortage could be coming to an end. However, other trends such as an increased demand for the patient-centred services that pharmacists can provide (e.g. medication therapy management) may create an offsetting demand for pharmacists. Failure of the pharmacy profession to seize upon the opportunities associated with the expanded scope of practice that is becoming available to pharmacists in many jurisdictions could potentially lead to a situation where the pharmacist shortage becomes a pharmacist surplus. Monitoring of the emerging trends will be important in determining what impact all of these factors will have on the pharmacy human resources situation in pharmacy.

¹ Health Council of Canada: Modernizing the Management of Health Human Resources in Canada: Identifying Areas for Accelerated Change Report from a National Summit - June 23, 2005 Accessed on Feb 11, 2011, at: http://healthcouncilcanada.ca/docs/papers/2005/HCC_HHRsummit_2005_eng.pdf

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

³ The Canadian Council for Accreditation of Pharmacy Programs (CCAPP) - accessed on March 1, 2011, at http://www.ccapp-accredit.ca/obtaining_accreditation/technician/

⁴ Personal Communication – Harold Lopatka, Executive Director, AFPC/ADPC – November 18, 2010

⁵ Pharmacists in Canada, 2009, Canadian Institute for Health Information accessed on December 12, 2010 at http://secure.cihi.ca/cihiweb/products/Pharmacists_Report_112010_Eng.pdf

⁶ Brown, D., "From Shortage to Surplus: The Hazards of Uncontrolled Academic Growth", American Journal of Pharmaceutical Education 2010; 74 (10) Article 85

⁷ Concerns about the accelerating expansion of Pharmacy education: Time for reconsideration Accessed on Feb 12, 2011 at: <http://www.ashp.org/DocLibrary/News/Accelerating-Expansion-of-Pharmacy-Education.aspx>

⁸ Position Statement and Joint Resolution on the Doc Accessed on Feb 12, 2011 at: http://www.afpc.info/downloads/1/AFPC_ADPC_PharmD_Position_Statement_Resolution_Sept_2010.pdf

E – MEDICATION SAFETY

PATRICIA LEFEBVRE

The Accreditation Canada Qmentum Program includes standards for the safe use and effective management of medications (Standards for Managing Medications).¹ In addition, organizations seeking accreditation are required to comply with 31 “Required Organizational Practices” related to patient safety, and 4 new ROPs will come into effect in 2011.^{2,3} The Accreditation Canada document entitled *2010 Report on Required Organizational Practices: Results from Canadian Health Organizations*, details the national ROP compliance averages, based on the assessment of the surveyors during their on-site visit of 236 Canadian healthcare organizations in 2009.⁴

The results of the 2009/10 Hospital Pharmacy in Canada survey provide a snapshot of current practices related to medication safety in Canadian hospitals. The survey also helps identify initiatives that hospital pharmacists, in collaboration with other healthcare providers and leaders of their organizations, will need to implement in order to comply with Accreditation Canada’s Patient/Client Safety Goals and medication-related, Required Organizational Practices. Although compliance with these accreditation requirements is important to hospitals from an accreditation perspective, the most important objective should be the creation of safe, effective and efficient systems for managing medications in each of our hospitals.

MEDICATION INCIDENT REVIEW

Accreditation Canada’s Required Organizational Practices, which fall under the culture domain of patient safety, include:

- having patient safety as a strategic priority/goal of the organization
- preparation and dissemination of quarterly reports on the progress the organization has made in advancing patient safety
- having a reporting system in place for adverse events, including appropriate follow-up
- having a policy and process in place for the disclosure of adverse events to the affected patient and/or family
- conducting prospective analysis of the safety risks associated with various processes of care.

ISMP Canada has published a bulletin entitled “*Failure Mode and Effects Analysis (FMEA): Proactively Identifying Risk in Healthcare*”⁵ to introduce new users to the purpose and goals of failure mode and effects analysis; a *prospective*, analytical process for identifying potential failure points in the delivery of healthcare services. ISMP Canada also provides tools to help conduct a failure mode and effects analysis. Although failure mode and effects analysis is not the only method of conducting a prospective, analytical review of medication management systems, it is probably the most widely used.

- Forty-eight percent of respondents reported that they had conducted, in the last year, at least one prospective medication safety-related analytical process, such as a failure mode and effects analysis. Accreditation Canada reports a compliance rate of 81% with this ROP in 2009, suggesting that almost half of the analysis may have been medication-related. The completion of this process was more commonly reported by respondents from BC (68%, 17/25) followed by Ontario (ON) (58%, 29/50), the Prairies (41%, 13/32) the Atlantic Provinces (41%, 7/17) and Quebec (QC) (29%, 10/34). Most of the respondents who had conducted a prospective analysis (81%) reported that they had implemented improvements that were recommended as a result of the analysis (100% of teaching hospitals and 75% of non-teaching hospitals)

In the preceding year, 48% of respondents had conducted at least one failure mode and effects analysis and 61% had completed at least one root cause analysis.

Root Cause Analysis (RCA) is another analytical tool that is used to *retrospectively* identify the underlying causes of incidents that have occurred within an organization. “*The Canadian Root Cause Analysis Framework – A Tool for Identifying and Addressing the Root Causes of Critical Incidents in Healthcare*”⁶ was created by the Canadian Patient Safety Institute, the Institute for Safe Medication Practices Canada, and Saskatchewan Health. Workshops on root cause analysis have been provided across Canada by the Canadian Patient Safety Institute. ISMP Canada also conducts training workshops on both root cause analysis and failure mode and effects analysis.

- A medication safety-related root cause analysis was reported to have been completed, in the last year, by 61% of respondents. Almost all of the respondents (98%) who had conducted a root cause analysis reported that they had implemented improvements that were recommended as a result of the root cause analysis.

Both types of analysis, retrospective (root cause analysis) and prospective (failure mode and effects analysis), can assist organizations in the development of strategies to improve patient safety.

- Of respondents who indicated that a Medication Safety Self-Assessment tool had been completed, 42% had completed the assessment within the last two years, and 58% had completed the assessment more than two years ago. The latter group was made up of similar percentages of teaching and non-teaching hospitals. However regional differences did exist. BC respondents were most likely to have conducted an assessment within the past two years, 81% (17/21), followed by the Atlantic Provinces (70%, 7/10) the Prairies (68%, 19/28), ON (46%, 21/46) and QC (38%, 6/16).

With the implementation of the new Managing Medications Standards, the results of the Medication Safety Self-Assessment can be used as evidence in the team’s roadmaps and action plan, which is shared with Accreditation Canada surveyors at the time of the survey.

Table E-1. Medication Safety Review and Assessment 2009/10

		Bed Size			Teaching Status		
		All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Your facility has conducted at least one prospective, medication safety-related, analytical process in the last year.	(n=)	(158)	(34)	(92)	(32)	(43)	(115)
		76	16	44	16	19	57
		48%	47%	48%	50%	44%	50%
Your facility implemented suggested improvements / changes.	(n=)	(75)	(15)	(44)	(16)	(19)	(56)
		61	14	33	14	19	42
		81%	93%	75%	88%	100%	75%
Your facility conducted at least one retrospective, medication safety-related, RCA (Root Cause Analysis) in the last year.	(n=)	(158)	(34)	(93)	(31)	(42)	(116)
		96	17	57	22	29	67
		61%	50%	61%	71%	69%	58%
Your facility implemented suggested improvements / changes.	(n=)	(95)	(16)	(57)	(22)	(29)	(66)
		93	16	56	21	28	65
		98%	100%	98%	95%	97%	98%
The hospital completed a Medication Safety Self-Assessment, using a recognized assessment tool.	(n=)	(159)	(34)	(93)	(32)	(43)	(116)
		121	28	67	26	36	85
		76%	82%	72%	81%	84%	73%
The medication safety self-assessment was completed....	(n=)	(121)	(27)	(68)	(26)	(36)	(85)
in the last year		17	3	9	5	6	11
		14%	11%	13%	19%	17%	13%
between 1 and 2 years ago		34	8	19	7	9	25
		28%	30%	28%	27%	25%	29%
more than 2 years ago		70	16	40	14	21	49
		58%	59%	59%	54%	58%	58%

Base: All respondents

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.^{7,8} Accreditation Canada has identified

Required Organizational Practices for high risk care/service activities, including medication use. Required Organizational Practices that fall under the medication use domain of patient safety include:

- Remove concentrated electrolytes from patient/client care units
- Standardize and limit the number of drug concentrations available in the organization
- Provide training on the use of infusion pumps
- Evaluate and limit the availability of heparin products and remove high-dose formats from patient care areas
- Evaluate and limit the availability of narcotic products and remove high-dose, high-potency formats from patient care areas

Tables E-2 and E-3 provide data on a number of strategies that are recommended to prevent medication incidents.

- Seventy-nine percent of respondents reported that the patient’s allergy status is known, 90% or more of the time, before a medication order is dispensed, which is similar to the 2007/08 results. This percentage was highest in hospitals with 201-500 beds (86%), followed by hospitals with 50-200 beds (74%) and hospitals with more than 500 beds (61%). All respondents from BC reported that the patient’s allergy status is known before a medication is dispensed, followed by ON (86%, 44/51) the Prairies (78%, 25/32), QC (62%, 21/34), and the Atlantic Provinces (59%, 10/17).
- Establishment of a designated list of dangerous abbreviations that are not accepted in the institution was reported by 87% of respondents, compared to 73% (117/161) of respondents in 2007/08. All respondents from ON (51) reported that their facility had a list of prohibited abbreviations.

Significant regional differences exist in the pharmacist’s ability to access a patient’s allergy status prior to a medication being dispensed.

Accreditation Canada reported a national compliance rate of 66% with this ROP in 2009. The use of nonstandard or ambiguous abbreviations has led to many medication incidents. ISMP has published a “do not use” list of abbreviations, symbols and dose designations to assist hospitals in establishing their own lists.⁹

- All respondents reported a formal process was in place to review and approve pre-printed medication orders. Eighty-eight percent of respondents reported having a process in place to review and approve infusion charts and guidelines. Sixty-four percent of respondents reported that a formal process was in place to review and approve physician order sets. This percentage was lowest in hospitals with 50-200 beds (39%).
- Only nine percent of respondents reported that they do not have a policy requiring checking of two patient identifiers before a medication is administered, a considerable improvement compared to 36% (62/161) of respondents in 2007/08. The use of at least two patient identifiers before administering medications is one of Accreditation Canada’s Required Organizational Practices.
- Seventy percent of respondents reported using TALLman lettering to reduce errors caused by confusion between drug products with look-alike drug names, compared to 58% (92/159) respondents in 2007/08. Only 20% (7/35) of the QC respondents reported the use of TALLman lettering, compared to 71% (12/17) in the Atlantic Provinces, 81% (26/32) in the Prairies, 86% (43/50) in ON, and 92% (22/24) in BC. Among the 108 respondents who reported using TALLman lettering, it was most often used on: pharmacy generated labels (87%), pharmacy unit dose packaging (82%), pharmacy information system

Over 90% of respondents reported that they have a policy in place that requires the checking of two patient identifiers before a medication is administered.

The use of TALLman lettering is increasing.

drop down drug selection menus (80%), pharmacy generated medication administration records (58%), pharmacy shelf labels (58%), and in the medication rooms on patient care units - e.g., shelf labels - (38%).

In the new Managing Medication Standards, organizations are expected to identify a list of look-alike/sound-alike drugs used in the organization. The US Food and Drug Administration's list, and the Institute for Safe Medication Practices' list of "Look-Alike Drug Name Sets with Recommended TALLman Letters" are available at <http://www.ismp.org/Tools/tallmanletters.pdf>.¹⁰

Table E-2. Medication Incident Reduction Strategies – Prescribing, Ordering, Transcribing, Administering 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The patient's allergy status is known prior to a medication order being dispensed from pharmacy. (n=)	(159)	(34)	(94)	(31)	(42)	(117)
yes, for >= 90% of all orders	125 79%	25 74%	81 86%	19 61%	33 79%	92 79%
yes, but for < 90% of all orders	32 20%	8 24%	12 13%	12 39%	9 21%	23 20%
There is a list of dangerous abbreviations that ARE NOT accepted in the institution. (n=)	(160)	(34)	(94)	(32)	(43)	(117)
	139 87%	32 94%	79 84%	28 88%	41 95%	98 84%
There a policy that two patient identifiers are checked before administering medications. (n=)	(157)	(32)	(93)	(32)	(43)	(114)
	143 91%	28 88%	86 92%	29 91%	40 93%	103 90%
There is a formal process to review and approve the following: (n=)	(154)	(31)	(91)	(32)	(43)	(111)
pre-printed medication orders	154 100%	31 100%	91 100%	32 100%	43 100%	111 100%
Physician order sets	99 64%	12 39%	66 73%	21 66%	27 63%	72 65%
infusion dosage charts and guidelines	136 88%	24 77%	84 92%	28 88%	38 88%	98 88%
Your facility uses TALLman Lettering to reduce errors caused by confusion between drug products (n=)	(158)	(32)	(94)	(32)	(43)	(115)
	110 70%	22 69%	66 70%	22 69%	32 74%	78 68%
Tallman lettering is used: (n=)	(108)	(21)	(65)	(22)	(32)	(76)
In the Pharmacy Information System (PIS)	86 80%	16 76%	52 80%	18 82%	26 81%	60 79%
On Pharmacy-generated labels	94 87%	17 81%	57 88%	20 99%	27 84%	67 88%
On Pharmacy unit dose packaging	88 82%	15 71%	55 85%	18 82%	30 94%	58 76%
On Pharmacy-generated Medication Administration Records (MARs)	63 58%	13 62%	37 57%	13 59%	16 50%	47 62%
In Pharmacy, on shelf labels	63 58%	10 48%	39 60%	14 64%	23 7%	40 53%
In the medication rooms on patient care units (e.g., shelf labels)	41 38%	6 29%	24 37%	11 50%	15 47%	26 34%

Base: All respondents. Note: multiple mentions permissible

- Removing concentrated potassium chloride from at least 90% of patient care units was reported by all respondents in BC, the Prairies and ON, compared to 94% (16/17) in the Atlantic Provinces and 91%(32/35) in QC. Overall, 96% percent of respondents reported that they have removed potassium phosphate from at least 90% of patient care units. This practice has been implemented in all teaching hospitals for both potassium chloride and potassium

Almost all respondents indicate that concentrated potassium products have been removed from at least 90% of patient care units.

phosphate. Eighty-nine percent of respondents reported that they have removed concentrated narcotics from at least 90% of patient care units. Ninety-seven percent of respondents reported that they have removed concentrated sodium chloride from at least 90% of patient care units. This practice, for all of the above concentrated electrolytes, was reported to be in place by 100% of the respondents in BC and 98%-100% of by respondents from ON.

Table E-3. Medication Incident Reduction Strategies - Removal of Concentrated Medications from Patient Care Units 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital has removed the following from at least 90% of patient care units:						
Concentrated Potassium Chloride (n=)	(158)	(32)	(94)	(32)	(43)	(115)
	154	31	92	31	43	111
	97%	97%	98%	97%	100%	97%
Concentrated Potassium Phosphate (n=)	(158)	(32)	(94)	(32)	(43)	(115)
	152	28	92	32	43	109
	96%	88%	98%	100%	100%	95%
Concentrated Narcotics (n=)	(157)	(31)	(94)	(32)	(43)	(114)
	140	25	86	29	40	100
	89%	81%	91%	91%	93%	88%
Concentrated Sodium Chloride (n=)	(157)	(31)	(94)	(32)	(43)	(114)
	152	29	92	31	42	110
	97%	94%	98%	97%	98%	96%

Base: All respondents

- Standardization of infusion concentrations was reported by 97% of respondents for unfractionated heparin, 94% of respondents for potassium chloride for injection, 85% of respondents for sodium chloride for injection, 78% of respondents for insulin IV, 78% of respondents for morphine IV, 76% of respondents for potassium phosphate for injection, 73% of respondents for hydromorphone, 40% of respondents for vincristine intrathecal, 36% of respondents for neuromuscular blocking agents and, 27% of respondents for insulin SC.
- Limiting the number of concentrations of high-alert medication available on wardstock was reported by 90% or more of respondents for potassium chloride (94%), unfractionated heparin (92%), morphine (92%), hydromorphone (90%) and sodium chloride – hypertonic (90%). There were no significant differences across teaching status.
- Dispensing the medication in a ready-to-be-administered form was reported by 94% of respondents for potassium chloride for injection, 88% of respondents for sodium chloride hypertonic, 82% of respondents for unfractionated heparin, 77% of respondents for low molecular weight heparin, 73% of respondents for potassium phosphate for injection, and 51% of respondents for vincristine intrathecal. Less than half of the respondents reported dispensing the medication in a ready-to-be-administered form for morphine (37%), magnesium sulfate for injection (36%), hydromorphone (32%), insulin IV (18%), insulin SC (11%), and neuromuscular blocking agents (6%).
- Sixty percent of respondents reported dispensing oral warfarin doses in ready to be administered form.
- Implementation of an independent double-check policy was reported by 76% of respondents for insulin IV, 75% of respondents for unfractionated heparin, 68% of respondents for hydromorphone, 65% of respondents for morphine, 64% of respondents for insulin SC, 56% of respondents for potassium chloride for injection, 49% of respondents for potassium phosphate for injection, 49% of respondents for sodium chloride hypertonic, 48% of respondents for low molecular weight heparin, 45% of respondents for vincristine intrathecal, 40% of respondents for magnesium sulfate for injection, and 39% of respondents for neuromuscular blocking agents.
- Only 27% of respondents reported having implemented an independent double-check policy for warfarin.

The implementation of an independent double check policy, and the dispensing of insulin and narcotics in a ready-to-be-administered form, remain a challenge.

Table E-4. Medication Incident Reduction Strategies – Standardizing Infusions of High-Alert Medications 2009/10

	Bed Size			Teaching Status		
	All	50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital has standardized infusion concentrations for: (n=)	(157)	(32)	(93)	(32)	(43)	(114)
Heparin, unfractionated IV	152 97%	31 97%	91 98%	30 94%	41 95%	111 97%
Hydromorphone	114 73%	17 53%	73 78%	24 75%	32 74%	82 72%
Insulin, IV	123 78%	22 69%	75 81%	26 81%	36 84%	87 76%
Insulin, SC	42 27%	7 22%	27 29%	8 25%	16 37%	26 23%
Magnesium sulfate for injection	86 55%	12 38%	57 61%	17 53%	20 47%	66 58%
Morphine	123 78%	20 63%	76 82%	27 84%	35 81%	88 77%
Potassium chloride for injection	148 94%	30 94%	87 94%	31 97%	42 98%	106 93%
Potassium phosphate for injection	119 76%	18 56%	77 83%	24 75%	36 84%	83 73%
Sodium chloride, hypertonic	134 85%	27 84%	79 85%	28 88%	40 93%	94 82%
Vincristine intrathecal	63 40%	4 13%	37 40%	22 69%	22 51%	41 36%
Neuromuscular blocking agents	57 36%	11 34%	30 32%	16 50%	20 47%	37 32%

Base: All respondents. Note: multiple mentions permissible

Table E-5. Medication Incident Reduction Strategies – Limiting Concentrations of High-Alert Medications Available as Ward Stock 2009/10

	Bed Size			Teaching Status		
	All	50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital has limited the number of (n=)	(158)	(32)	(94)	(32)	(43)	(115)
Heparin, unfractionated IV	145 92%	30 94%	85 90%	30 94%	42 98%	103 90%
Heparin, low molecular weight	114 72%	23 72%	66 70%	25 78%	35 81%	79 69%
Hydromorphone	142 90%	26 81%	86 91%	30 94%	42 98%	100 87%
Insulin, IV	87 55%	14 44%	50 53%	23 72%	26 60%	61 53%
Insulin, SC	75 47%	12 38%	48 51%	15 47%	21 49%	54 47%
Magnesium sulfate for injection	124 78%	25 78%	77 82%	22 69%	30 70%	94 82%
Morphine	146 92%	25 78%	90 96%	31 97%	42 98%	104 90%
Potassium chloride for injection	148 94%	29 91%	88 94%	31 97%	43 100%	105 91%
Potassium phosphate for injection	132 84%	25 78%	83 88%	24 75%	35 81%	97 84%
Sodium chloride, hypertonic	142 90%	30 94%	83 88%	29 91%	41 95%	101 88%
Vincristine intrathecal	37 23%	3 9%	22 23%	12 38%	14 33%	23 20%
Warfarin	60 38%	9 28%	39 41%	12 38%	18 42%	42 37%
Neuromuscular blocking agents	94 59%	21 66%	55 59%	18 56%	27 63%	67 58%

Base: All respondents. Note: multiple mentions permissible

Table E-6. Medication Incident Reduction Strategies – Preparing High-Alert Medications in a Ready to be Administered form 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital provides ready-to-administer doses for: (n=)	(157)	(32)	(94)	(31)	(42)	(115)
Heparin, unfractionated IV	128 82%	25 78%	75 80%	28 90%	38 90%	90 78%
Heparin, low molecular weight	121 77%	24 75%	71 76%	26 84%	36 86%	85 74%
Hydromorphone	50 32%	8 25%	34 36%	8 26%	18 43%	32 28%
Insulin, IV	29 18%	5 16%	17 18%	7 23%	9 21%	20 17%
Insulin, SC	17 11%	5 16%	12 13%	0 0%	3 7%	14 12%
Magnesium sulfate for injection	56 36%	10 31%	35 37%	11 35%	14 33%	42 37%
Morphine	58 37%	9 28%	37 39%	12 39%	23 55%	35 30%
Potassium chloride for injection	147 94%	29 91%	88 94%	30 97%	41 98%	106 92%
Potassium phosphate for injection	114 73%	17 53%	76 81%	21 68%	31 74%	83 72%
Sodium chloride, hypertonic	138 88%	27 84%	84 89%	27 87%	36 86%	102 89%
Vincristine intrathecal	80 51%	5 16%	52 55%	23 74%	30 71%	50 43%
Warfarin	94 60%	19 59%	53 56%	22 71%	29 69%	65 57%
Neuromuscular blocking agents	9 6%	3 9%	4 4%	2 6%	3 7%	6 5%

Base: All respondents. Note: multiple mentions permissible

Table E-7. Medication Incident Reduction Strategies – Independent Double Check Policy for High-Alert Medications 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital has implemented an independent double check policy for: (n=)	(122)	(25)	(70)	(27)	(37)	(85)
Heparin, unfractionated IV	91 75%	21 84%	53 76%	17 63%	21 57%	70 82%
Heparin, low molecular weight	59 48%	15 60%	31 44%	13 48%	10 27%	49 58%
Hydromorphone	83 68%	19 76%	48 69%	16 59%	20 54%	63 74%
Insulin, IV	93 76%	20 80%	56 80%	17 63%	21 57%	72 85%
Insulin, SC	78 64%	18 72%	44 63%	16 59%	23 62%	55 65%
Magnesium sulfate for injection	49 40%	14 56%	26 37%	9 33%	9 24%	40 47%
Morphine	79 65%	19 76%	45 64%	15 56%	20 54%	59 69%
Potassium chloride for injection	68 56%	16 64%	40 57%	12 44%	14 38%	54 64%
Potassium phosphate for injection	60 49%	14 56%	36 51%	10 37%	13 35%	47 55%
Sodium chloride, hypertonic	60 49%	15 60%	34 49%	11 41%	11 30%	49 58%
Vincristine intrathecal	55 45%	4 16%	34 49%	17 63%	24 65%	31 36%
Warfarin	33 27%	8 32%	19 27%	6 22%	6 16%	27 32%
Neuromuscular blocking agents	47 39%	14 56%	25 36%	8 30%	9 24%	38 45%

Base: All respondents. Note: multiple mentions permissible

MEDICATION RECONCILIATION

Medication reconciliation is a practice designed to prevent medication errors from occurring at transition points in care, such as admission to, or discharge from, a hospital. Medication Reconciliation is also one of the ten interventions in the *Safer Healthcare Now Campaign* that is currently underway across Canada.¹¹

Accreditation Canada has identified two Required Organizational Practices related 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”*.¹²

- When a patient visits the Emergency Department, 49% of respondents reported the presence of a formal process to obtain a complete and accurate list of the patient’s current home medications for selected patient groups. (Table E-8) A further 27% reported that this process was in place for all patients (Table E-8). On average, 76% (121/159) of respondents reported that they obtain a complete and accurate list of the patient’s medication for all or some patients who visit the ER.
- When a patient is admitted to the organization, 57% of respondents reported having a formal process to obtain a complete and accurate list of the patient’s current medications for all patients and 31% of respondents reported doing so for selected patient groups (Table E-8). Noticeable differences exist, based on hospital size, with respect to whether or not the process is in place for all patients. The highest percentage of respondents who reported that the process was in place for all patients was from hospitals with 50-200 beds (71%), followed by hospitals with 201-500 beds (56%) and hospitals with more than 500 beds (44%).
- When the patient is transferred between levels of care within the facility, 38% of respondents reported having a formal process in place to obtain a complete and accurate list of the patient’s current medications for selected patient groups. A further 31% of respondents reported that this practice was in place for all patients (Table E-8). This is the ROP with the lowest compliance rates (44%) in 2009, as reported by Accreditation Canada.

Medication reconciliation at the time when a patient is transferred within a facility is the Accreditation Canada ROP with the lowest compliance rate.
- At the time of discharge, 51% of respondents reported that they have a formal process in place to obtain a complete and accurate list of the patient’s current medications for selected patient groups, while 20% of respondents reported that this practice was in place for all patients (Table E-8).
- When a patient visits the Emergency Department, 70% of respondents reported that nurses were the health professional responsible for obtaining the complete and accurate list of the patient’s current medications, followed by pharmacy technicians (13%), pharmacists (8%) and physicians (6%). (Table E-9) Pharmacy technicians were more likely to obtain the medication list in teaching hospitals than in non-teaching hospitals (27% vs. 7%). A pharmacy technician performing this function was reported in QC (33%, 11/33), the Atlantic Provinces (15%, 2/13) and ON (8%, 3/36), but no respondents from the Prairies or BC reported that a pharmacy technician performed this function in their facility.

Pharmacy technicians are used in some hospitals to obtain the medication list when a patient comes to the ER, but not in any hospitals in the Prairies or BC

Table E-8. Medication Incident Reduction Strategies – Comprehensive Medication History – Obtaining a List of Medications 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
There is a formal process to obtain a complete and accurate list of the patient's current medications.						
When a patient visits the ER (n=)	(159)	(34)	(94)	(31)	(42)	(117)
Yes, for all patients	43 27%	8 24%	26 28%	9 29%	12 29%	31 26%
Yes, but for selected patient groups only	78 49%	14 41%	50 53%	14 45%	25 60%	53 45%
When a patient is admitted (n=)	(160)	(34)	(94)	(32)	(43)	(117)
Yes, for all patients	91 57%	24 71%	53 56%	14 44%	28 65%	63 54%
Yes, but for selected patient groups only	50 31%	5 15%	30 32%	15 47%	13 30%	37 32%
When a patient is transferred (n=)	(159)	(33)	(94)	(32)	(43)	(116)
Yes, for all patients	49 31%	10 30%	29 31%	10 31%	13 30%	36 31%
Yes, but for selected patient groups only	60 38%	10 30%	37 39%	13 41%	20 47%	40 34%
When a patient is discharged (n=)	(160)	(34)	(94)	(32)	(43)	(117)
Yes, for all patients	32 20%	7 21%	17 18%	8 25%	10 23%	22 19%
Yes, but for selected patient groups only	82 51%	14 41%	52 55%	16 50%	26 60%	56 48%

Base: All respondents

- When a patient is admitted, more than half of the respondents (57%) reported that nurses were the health professional responsible for obtaining the complete and accurate list of the patient's current medications. Pharmacists (21%), pharmacy technicians (11%) and physicians (9%) were less likely to be responsible for obtaining the medication list. The percentage of respondents who reported that physicians were responsible for this function was higher in teaching hospitals than in non-teaching hospitals (20% vs. 5%). The reverse trend was noted for nurses, where 67% of respondents from non-teaching hospitals vs. 34% of respondents from teaching hospitals reported that nurses were responsible for this function.
- When the patient is transferred between levels of care within the facility, 43% of respondents reported that nurses were the health professional responsible for obtaining the complete and accurate list of the patient's current medications, followed by pharmacists (35%), physicians (16%) and pharmacy technicians (4%). The situation is different according to the teaching status of the facility: 31% of respondents in teaching hospitals identified physicians to be the health care professional responsible for this practice, compared to 9% of respondents in non-teaching hospitals.
- At discharge time, the responsibility for obtaining a complete and accurate list of the patient's current medications is reported to be shared more evenly amongst health care providers. Thirty-four percent of respondents reported that nurses were responsible, 34% reported that pharmacists were responsible, and 28% of respondents identified physicians as being responsible. Again, physicians are more likely to be responsible for this practice in teaching hospitals (56%) than in non-teaching hospitals (15%).
- When writing medication orders, the list of medications is reported to be used to reconcile the patient's medication, for all patients, by: 20% of respondents when a patient visits the ER; 45% of respondents when a patient is admitted; 35% of respondents when a patient is transferred and 24% of respondents when a patient is discharged. (Table E-10) When respondents were asked if reconciliation occurred for selected patient groups only, the percentages are higher: 69% when a patient visits the ER, 51% when a patient is admitted, 48% when a patient is transferred, and 59% when a patient is discharged.

Table E-9. Medication Incident Reduction Strategies - Comprehensive Medication History Who is Responsible for Obtaining the list 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The health professional responsible for obtaining the list is:						
When a patient <u>visits</u> the ER (n=)	(121)	(22)	(76)	(23)	(37)	(84)
Pharmacist	10 8%	0 0%	10 13%	0 0%	1 3%	9 11%
Pharmacy Technician	16 13%	3 14%	7 9%	6 26%	10 27%	6 7%
Physician	7 6%	0 0%	4 5%	3 13%	4 11%	3 4%
Nurse	85 70%	19 86%	54 71%	12 52%	21 57%	64 76%
Other	3 2%	0 0%	1 1%	2 9%	1 3%	2 2%
When a patient is <u>admitted</u> (n=)	(140)	(29)	(83)	(28)	(41)	(99)
Pharmacist	29 21%	2 7%	22 27%	5 18%	11 27%	18 18%
Pharmacy Technician	16 11%	4 14%	7 8%	5 18%	7 17%	9 9%
Physician	13 9%	4 14%	3 4%	6 21%	8 20%	5 5%
Nurse	80 57%	19 66%	49 59%	12 43%	14 34%	66 67%
Other	2 1%	0 0%	2 2%	0 0%	1 2%	1 1%
When a patient is <u>transferred</u> (n=)	(107)	(21)	(64)	(22)	(32)	(75)
Pharmacist	37 35%	3 14%	27 42%	7 32%	12 38%	25 33%
Pharmacy Technician	4 4%	1 5%	2 3%	1 5%	1 3%	3 4%
Physician	17 16%	5 24%	5 8%	7 32%	10 31%	7 9%
Nurse	46 43%	11 52%	28 44%	7 32%	9 28%	37 49%
Other	3 3%	1 5%	2 3%	0 0%	0 0%	3 4%
When a patient is <u>discharged</u> (n=)	(114)	(21)	(69)	(24)	(36)	(78)
Pharmacist	39 34%	7 33%	26 38%	6 25%	10 28%	29 37%
Pharmacy Technician	2 2%	1 5%	0 0%	1 4%	0 0%	2 3%
Physician	32 28%	4 19%	18 26%	10 42%	20 56%	12 15%
Nurse	39 34%	9 43%	24 35%	6 25%	5 14%	34 44%
Other	2 2%	0 0%	1 1%	1 4%	1 3%	1 1%

Base: All respondents

- When a patient visits the Emergency Department, respondents reported that physicians (39%) were the health professional most frequently responsible for reconciling the patient's medication, followed by pharmacists (27%), nurses (26%) and pharmacy technicians (9%) (Table E-11). When a patient is admitted, 41% of respondents reported that pharmacists were most often responsible, followed by physicians (36%), nurses (17%) and pharmacy technicians (6%). Physicians (40%) and pharmacists (37%) were reported to be most likely to be responsible for reconciling the patient's medication when a patient is transferred. The same trend is noted at discharge time; 48% of respondents identified physicians and 32% of respondents identified pharmacists as being responsible for reconciling the patient's medications at discharge.

Table E-10. Medication Incident Reduction Strategies - Comprehensive Medication History - the list is used when writing medication orders to reconcile the patient's medication 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The list is used when writing medication orders to reconcile the patient's medication:						
When a patient visits the ER (n=)	(108)	(20)	(68)	(20)	(35)	(73)
Yes, for all patients	22 20%	2 10%	17 25%	3 15%	4 11%	18 25%
Yes, but for selected patient groups only	74 69%	16 80%	42 62%	16 80%	24 69%	50 68%
When a patient is admitted (n=)	(134)	(28)	(80)	(26)	(39)	(95)
Yes, for all patients	60 45%	17 61%	34 43%	9 35%	20 51%	40 42%
Yes, but for selected patient groups only	68 51%	11 39%	40 50%	17 65%	17 44%	51 54%
When a patient is transferred (n=)	(102)	(19)	(62)	(21)	(30)	(72)
Yes, for all patients	36 35%	8 42%	21 34%	7 33%	11 37%	25 35%
Yes, but for selected patient groups only	49 48%	8 42%	28 45%	13 62%	19 63%	30 42%
When a patient is discharged (n=)	(108)	(20)	(66)	(22)	(34)	(74)
Yes, for all patients	26 24%	5 25%	15 23%	6 27%	9 26%	17 23%
Yes, but for selected patient groups only	64 59%	13 65%	36 55%	15 68%	24 71%	40 54%

*Base: All respondents***Table E-11. Medication Incident Reduction Strategies - Comprehensive Medication History - who is responsible to reconcile the patient's medication 2009/10**

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The health professional responsible for reconciling the patient's medication is:						
When a patient visits the ER (n=)	(98)	(20)	(59)	(19)	(28)	(70)
Pharmacist	26 27%	2 10%	18 31%	6 32%	9 32%	17 24%
Pharmacy Technician	9 9%	4 20%	3 5%	2 11%	3 11%	6 9%
Physician	38 39%	6 30%	25 42%	7 37%	8 29%	30 43%
Nurse	25 26%	8 40%	13 22%	4 21%	8 29%	17 24%
When a patient is admitted (n=)	(132)	(29)	(77)	(26)	(38)	(94)
Pharmacist	54 41%	9 31%	35 45%	10 38%	16 42%	38 40%
Pharmacy Technician	8 6%	2 7%	3 4%	3 12%	2 5%	6 6%
Physician	48 36%	11 38%	27 35%	10 38%	15 39%	33 35%
Nurse	22 17%	7 24%	12 16%	3 12%	5 13%	17 18%
When a patient is transferred (n=)	(103)	(20)	(62)	(21)	(32)	(71)
Pharmacist	38 37%	4 20%	24 39%	10 48%	15 47%	23 32%
Pharmacy Technician	3 3%	0 0%	2 3%	1 5%	0 0%	3 4%
Physician	41 40%	9 45%	24 39%	8 38%	11 34%	30 42%
Nurse	20 19%	7 35%	11 18%	2 10%	6 19%	14 20%
Other	1 1%	0 0%	1 2%	0 0%	0 0%	1 1%
When a patient is discharged (n=)	(108)	(20)	(66)	(22)	(35)	(73)
Pharmacist	35 32%	7 35%	23 35%	5 23%	10 29%	25 34%
Pharmacy Technician	2 2%	1 5%	0 0%	1 5%	0 0%	2 3%
Physician	52 48%	8 40%	31 47%	13 59%	21 60%	31 42%
Nurse	18 17%	4 20%	11 17%	3 14%	4 11%	14 19%
Other	1 1%	0 0%	1 2%	0 0%	0 0%	1 1%

Base: All respondents

- The health professional most frequently responsible for communicating the reconciled list of medications to the next provider of care is the nurse in all four situations: 43% when a patient visits the ED, 40% when a patient is admitted, 38% when a patient is transferred and 33% when a patient is discharged. (Table E-12). In all four situations, physicians are more frequently responsible in teaching hospitals vs. non-teaching hospitals and nurses are more frequently responsible in non-teaching hospitals vs. teaching hospitals.

Table E-12. Medication Incident Reduction Strategies - Comprehensive Medication History - the health professional responsible for communicating the reconciled list of medications to the next provider of care 2009/10

		Bed Size			Teaching Status		
		All	50 - 200	201- 500	>500	Teach	Non-Teaching
The health professional responsible for communicating the reconciled list of medications to the next provider of care is:							
When a patient <u>visits</u> the ER	(n=)	(92)	(20)	(56)	(16)	(24)	(68)
Pharmacist		23 25%	2 10%	15 27%	6 38%	9 38%	14 21%
Pharmacy Technician		4 4%	2 10%	2 4%	0 0%	1 4%	3 4%
Physician		13 14%	3 15%	6 11%	4 25%	5 21%	8 12%
Nurse		40 43%	12 60%	23 41%	5 31%	9 38%	31 46%
Other		12 13%	1 5%	10 18%	1 6%	0 0%	12 18%
When a patient is <u>admitted</u>	(n=)	(123)	(29)	(72)	(22)	(32)	(91)
Pharmacist		40 33%	6 21%	26 36%	8 36%	11 34%	29 32%
Pharmacy Technician		6 5%	2 7%	2 3%	2 9%	2 6%	4 4%
Physician		16 13%	4 14%	9 13%	3 14%	8 25%	8 9%
Nurse		49 40%	16 55%	25 35%	8 36%	11 34%	38 42%
Other		12 10%	1 3%	10 14%	1 5%	0 0%	12 13%
When a patient is <u>transferred</u>	(n=)	(99)	(20)	(60)	(19)	(28)	(71)
Pharmacist		30 30%	3 15%	19 32%	8 42%	11 39%	19 27%
Pharmacy Technician		1 1%	0 0%	1 2%	0 0%	0 0%	1 1%
Physician		18 18%	5 25%	8 13%	5 26%	8 29%	10 14%
Nurse		38 38%	11 55%	22 37%	5 26%	9 32%	29 41%
Other		12 12%	1 5%	10 17%	1 5%	0 0%	12 17%
When a patient is <u>discharged</u>	(n=)	(102)	(21)	(62)	(19)	(31)	(71)
Pharmacist		25 25%	5 24%	17 27%	3 16%	7 23%	18 25%
Physician		30 29%	5 24%	17 27%	8 42%	17 55%	13 18%
Nurse		34 33%	10 48%	18 29%	6 32%	7 23%	27 38%
Other		13 13%	1 5%	10 16%	2 11%	0 0%	13 18%

Base: all respondents

Respondents were asked to identify barriers to implementing medication reconciliation (Note: more than one reason could be identified as a barrier).

- Eighty-two percent of respondents in 2009/10 vs. 74% (88/117) in 2007/08 reported that implementation of medication reconciliation is planned or underway. (Table E-13)
- Forty-six percent of respondents in 2009/10 vs. 47% (55/117) in 2007/08 indicated that their facility had examined the desirability and feasibility of implementing medication reconciliation, but additional resources would be required.
- Fifteen percent of respondents in 2009/10 vs. 11% (13/117) in 2007/08 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).
- Only 2% of respondents in 2009/10 vs. 15% (17/117) in 2007/08 have not yet examined the desirability and feasibility of implementing medication reconciliation.

Table E-13. Medication Incident Reduction Strategies - barriers to creating a reconciled list of the patient's medication 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201 - 500	>500	Teach	Non-Teaching
(n=)	(123)	(24)	(71)	(28)	(31)	(92)
Implementation of medication reconciliation is planned or underway	101 82%	20 83%	58 82%	23 82%	27 87%	74 80%
The facility has not yet examined the feasibility of implementing medication reconciliation	3 2%	2 8%	0 .0%	1 4%	0 .0%	3 3%
The facility has examined the feasibility of implementing medication reconciliation, but additional resources would be required	56 46%	7 29%	38 56%	11 39%	11 36%	45 49%
The facility has examined the feasibility of medication reconciliation, but there are not enough other supports to implement it	18 15%	3 13%	11 16%	4 14%	5 16%	13 14%

Base: All respondents

- Eighty-one percent of respondents reported that their facility was participating in the “Safer Healthcare Now!” medication reconciliation initiative, compared to 71% (112/158) in 2007/08. Noticeable differences exist between QC and the other regions: participation was reported by 87% (27/31) of the respondents in the Prairies, 83% of respondents in ON (40/48), 83% of respondents in BC (20/24), 82% (14/17) of respondents in the Atlantic Provinces and 69% (24/35) of respondents in QC.

Participation in this campaign may facilitate and accelerate the implementation of medication reconciliation. 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.^{11,12}

- Among the 125 respondents who reported participating in the Safer Healthcare Now! Initiative, 68% reported submitting their data to the initiative. This percentage is consistent across teaching status -teaching hospitals (69%) and non-teaching hospitals (67%). The Atlantic Provinces and BC led with 86% (12/14) and 85% (17/20) respectively, followed by QC (67%, 16/24), ON (60%, 24/40) and the Prairies (59%, 16/27).

Medication reconciliation remains one of the greatest patient safety challenges facing healthcare organization

In its 2010 Report on Required Organizational Practices, Accreditation Canada reports that conducting medication reconciliation at admission and at transfer has the lowest compliance rates (46% and 44%) among all ROPs.

Table E-14. Medication Incident Reduction Strategies - "Safer Healthcare Now!" 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
The hospital is registered in the "Safer Healthcare Now!" medication reconciliation initiative (n=)	(155)	(32)	(92)	(31)	(42)	(113)
no	30 19%	10 31%	15 16%	5 16%	6 14%	24 21%
yes	125 81%	22 69%	77 84%	26 84%	36 86%	89 79%
The facility submits its data to "Safer Healthcare Now!" (n=)	(125)	(22)	(77)	(26)	(36)	(89)
no	40 32%	9 41%	19 25%	12 46%	11 31%	29 33%
yes	85 68%	13 59%	58 75%	14 54%	25 69%	60 67%

Base: All respondents

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. Accreditation Canada has identified Required Organizational Practices related to informing and educating patients/clients and/or family about their role in patient safety. In the Accreditation Canada ROP Handbook³, the section on safely administering medications to clients lists the criteria related to educating clients about their medications.

- Twenty-eight percent of respondents reported providing a copy of the medication record to some or all patients, compared to 41% (65/158) in 2007/08. Twenty-five percent of respondents reported that they provide a copy of a medication record to all patients, a notable increase from the 6% (9/158) of respondents in 2007/08. A copy of the medication administration record is provided to selected patient groups by 25% of the respondents, compared to 35% (56/158) in 2007-08.
- Viewing of the medication record by the patient/patient's family was reported to be allowed, for selected patient groups, by 10% of respondents and for all patients by 9% of respondents.
- Half of the respondents (51%) reported providing a pharmacist's consultation, at the time of admission, for selected patient groups and 3% reported doing so for all patients. This practice, for selected patient groups, was more commonly reported by teaching hospitals (74%) than by non-teaching hospitals (43%). It is worth noting that almost half of the respondents in 2009/10 (46%) do not provide this service, compared to 35% (56/158) in 2007/08.
- A pharmacist's consultation during the hospital stay was reported to be provided, for selected patient groups, by 70% of respondents, and for all patients by 6% of respondents. This is similar to the results in 2007/08 (76% and 5%). The percentage of respondents reporting this practice for selected patient groups was highest in hospitals with bed size greater than 500 beds (81%) followed by hospitals with less than 200 beds (69%) and by hospitals with bed size between 201-500 (66%). This percentage is also higher in teaching hospitals (84%) than in non-teaching hospitals (64%).
- A pharmacist's consultation at the time of discharge was reported to be provided for selected patient groups by 75% of respondents and for all patients by 3% of respondents. This practice – for selected patient groups - was more common in teaching hospitals, compared to non-teaching hospitals (91% vs. 69%).

Only 6% of respondents reported that all patients receive a pharmacist's consultation during their hospital stay.

In summary, improvements in medication safety practices have occurred since the last survey in 2007/08. The required organizational practices that have been established by Accreditation Canada may have provided the impetus for more facilities to implement these evidence-informed practices. However, organizations should not only concentrate on ROPs but should also dedicate resources and efforts to implementing improvements in other areas identified by their self-assessment.

Table E-15. Medication Incident Reduction Strategies – Patient Education Program 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Processes in place to facilitate patient teaching about their medication						
Provide the patient with a copy of the MAR or a similar (n=)	(157)	(32)	(93)	(32)	(43)	(114)
yes, but for selected patient groups only	40 25%	8 25%	25 27%	7 22%	9 21%	31 27%
yes, for all patients	4 3%	1 3%	3 3%	0 0%	0 0%	4 4%
Allow viewing of the MAR by the patient / patient's family (n=)	(156)	(31)	(93)	(32)	(43)	(113)
yes, but for selected patient groups only	15 10%	4 13%	9 10%	2 6%	4 9%	11 10%
yes, for all patients	14 9%	2 6%	10 11%	2 6%	1 2%	13 12%
Provide a pharmacist's consultation at the time of admission (n=)	(158)	(32)	(94)	(32)	(43)	(115)
yes, but for selected patient groups only	81 51%	13 41%	45 48%	23 72%	32 74%	49 43%
yes, for all patients	5 3%	0 0%	4 4%	1 3%	3 7%	2 2%
Provide a pharmacist's consultation during their hospital stay (n=)	(158)	(32)	(94)	(32)	(43)	(115)
yes, but for selected patient groups only	110 70%	22 69%	62 66%	26 81%	36 84%	74 64%
yes, for all patients	9 6%	1 3%	6 6%	2 6%	4 9%	5 4%
Provide a pharmacist's consultation at the time of discharge (n=)	(158)	(32)	(94)	(32)	(43)	(115)
yes, but for selected patient groups only	118 75%	23 72%	68 72%	27 84%	39 91%	79 69%
yes, for all patients	5 3%	1 3%	2 2%	2 6%	2 5%	3 3%

Base: All respondents

¹ Accreditation Canada, Qmentum Program 2009 – Standards for Managing Medications (<http://accreditation-canada.ca>, accessed December 17, 2010)

² Accreditation Canada, New Required Organizational Practices for 2011 (<http://accreditation-canada.ca/default.aspx?page=364>, accessed December 17, 2010)

³ Accreditation Canada, Required Organizational Practices Handbook April 2010, (<http://www.accreditation.ca/uploadedFiles/ROP-Handbook-April-2010-EN.pdf>) accessed December 17, 2010)

⁴ Accreditation Canada, 2010 Report on Required Organizational Practices: Results from Canadian Health Organizations (<http://www.accreditation.ca/news-and-publications/publications/report-on-rops/>) accessed December 17, 2010)

⁵ ISMP Canada. ISMP Canada Safety Bulletin, December 23, 2006, Volume 6, Issue 8. (www.ismp-canada.org/download/ISMPCSB2006-08FMEA.pdf, accessed December 17, 2010)

⁶ Canadian Patient Safety Institute. Canadian Root Cause Analysis Framework – A tool for identifying and addressing the root of causes of critical incidents in healthcare. (<http://www.patientsafetyinstitute.ca/English/toolsResources/rca/Pages/default.aspx>, accessed December 17, 2010)

⁷ Canadian Society of Hospital Pharmacists. Guidelines for Medication Incident Reporting and Medication Incident/Discrepancy Prevention. Official Publications 2004

⁸ American Society of Hospital Pharmacists. ASHP Guidelines on Preventing Medication Errors in Hospitals. Am J Hosp Pharm. 1993;50:305-14.

⁹ Institute for Safe Medication Practices – do not use list of abbreviations, symbols, and dose designations. At www.ismp.org/Tools/highalertmedications.pdf, accessed December 17, 2010.

¹⁰ Institute for Safe Medication Practices US. FDA and ISMP Lists of Look-Alike Drug Name Sets with Recommended Tall Man Letters. (<http://www.ismp.org/Tools/tallmanletters.pdf>, accessed December 17, 2010).

¹¹ Safer Healthcare Now ! Getting Started Kit: Medication Reconciliation – Prevention of Adverse Drug Events, How-to Guide at http://www.saferhealthcarenow.ca/EN/Interventions/medrec_acute/Pages/gsk.aspx accessed December 17, 2010

¹² The Institute for Healthcare Improvement – Medication Safety Reconciliation Toolkit at <http://www.ihl.org/IHI/Topics/PatientSafety/MedicationSystems/Tools/MedicationSafetyReconciliationToolKit.html> accessed December 17, 2010.

F - TECHNOLOGY

PATRICIA MACGREGOR

Over the past decade, hospitals across Canada have implemented a wide range of initiatives in an effort to meet the expectations of the public and the respective Ministry of Health for a safer, more efficient and accountable healthcare system. When properly implemented, there is a growing body of evidence that supports the proposition that technologies such as computerized prescriber order entry (CPOE) systems, automated dispensing cabinets, point-of-care barcode systems, and electronic medication reconciliation systems can reduce medication errors and improve the quality of care.^{1, 2, 3, 4, 5, 6} Technology also plays an important role in collecting and managing information, lowering the costs associated with certain labour-intensive activities and increasing the efficiency of a wide range of other activities.

This section of the Hospital Pharmacy in Canada Report provides information on the implementation and use of various types of technology that are now being used as part of the medication systems in many Canadian hospitals.

PHARMACY INFORMATION SYSTEMS: USE OF CLINICAL DECISION SUPPORT SYSTEMS (CDSS)

A “Clinical Decision Support System” (CDSS) was defined in the 2009/10 Survey as:

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

As reported in this section in prior survey reports, pharmacy information systems with built-in clinical decision support functionality are in place in most Canadian hospitals. However, despite the evidence that these systems improve the quality and safety of the medication management system, the actual level of adoption and use of specific CDSS functionality continues to be less than optimal.^{2, 3} Although there has been an increase in the use of certain CDSS safety features over the last few years, many hospitals continue to report that they do not utilize, or fully utilize, the CDSS functionality that is available in their pharmacy information system. The reasons for this anomaly need to be explored. If the functionality is not well-designed, work needs to be done with the providers of the software to resolve that problem. If the CDSS is well-designed, but is not being used by pharmacy staff, pharmacy managers should explore the reasons why and attempt to maximize the patient safety benefits that the CDSS was intended to provide.

Several CDSS functionalities have not been fully implemented.

- Almost all respondents (99%, 158/160) across all sectors and all sizes of hospitals reported that they have a pharmacy information system (PIS). (Table F-1) Eighty percent (125/156) reported that the pharmacy information system includes clinical decision support functionality, vs. 91% (150/164) of respondents in the 2007/08 report, 83% (118/142) in the 2005/06 report and 40% (58/144) in the 2003/04 report. Caution should be exercised in trying to compare these responses since “clinical decision support systems” were defined differently in the earlier surveys. The reported availability of a pharmacy information system with clinical decision support functionality was similar across most provinces and hospitals, with the exception of the Prairie region, and small hospitals with 50-200 beds, where the availability of such systems was lower.

In the 2009/10 survey we again attempted to determine if hospital pharmacy staff were using the clinical decision support functionality that was available in their pharmacy information system. Among the 125 respondents that reported having clinical decision support within their pharmacy information system:

- All respondents indicated that their pharmacy information system includes both drug allergy and drug interaction alerts, and that they are using that functionality. In previous surveys, respondents had reported similar results with respect to the widespread use of these two clinical decision support functionalities.

- Although 85% of respondents reported that their pharmacy information system included maximum dose alert functionality, only 54% of respondents reported that they were using that functionality. Differences in usage of this functionality were reported in different parts of the country. Quebec hospitals were most likely to report that they were using this functionality (78%, 18/23), followed by the Prairies at 60% (6/10), and respondents in the Atlantic Provinces were least likely to use that functionality (33%, 4/12). Note that these results are not comparable to the 2007/08 report as the structure of the survey question was changed in 2009/10,
- Seventy-five percent of respondents reported that their pharmacy information system had dosage modification alert functionality for drugs used in patients with renal or hepatic dysfunction. Of these, 64% reported that they used this functionality. Non-teaching hospitals were more likely to report the availability of this functionality than teaching hospitals (83% vs. 54%). Sixty-five percent of non-teaching hospitals reported that they were using this functionality, vs. 58% of teaching facilities. Quebec respondents reported the highest uptake for the use of this particular safety feature. Eighty-nine percent (17/19) of QC respondents with access to the functionality reported that they use it. In contrast, the Atlantic Provinces reported the highest availability of the functionality (92%, 12/13), but only 42% (5/12) reported that they were using it. Note that these results are not comparable to the 2007/08 report as the structure of the survey question was changed in 2009/10,

The availability of pharmacy information systems with clinical decision support functionality, based on evidence-based guidelines or clinical pathways, remains low. Although the percentage of respondents reporting they had access to this functionality has increased somewhat since previous surveys, the percentage of respondents who are actually using the functionality is similar to previous years.

- Thirty percent of respondents reported that their CDSS includes drug therapy guidance alerts based on evidence-based guidelines or clinical pathways. Of those, 43% reported that they are using the functionality. In the 2007/08 survey, 24% (36/148) of respondents reported that this clinical decision support functionality was available in their pharmacy information system and 49% (17/35) of those reported that they were using the functionality. In the 2005/06 survey, 18% (21/118) reported that this functionality was available and 57% (12/21) reported that they were using it. Over the last three surveys the numbers indicate that more respondents have access to this functionality, but only about half of all respondents are using that functionality. More than half (5/7) of respondents from QC who had access to this functionality reported that they were using it, compared with 50% or less in other provinces.
- Twenty-six percent of teaching hospital respondents reported that they had access to drug therapy guidance alerts based on evidence-based guidelines or clinical pathways but only three (9%) of those reported that they were using it. In contrast, 32% of non-teaching respondents reported that the functionality was available to them and 46% of those respondents reported that this functionality was being used in their facility. Once again QC reported considerably greater adoption of this functionality compared with other provinces.
- Fifty-four percent of respondents reported they had the ability to input patient-specific variables (e.g. renal function), that can then be used by the pharmacy information system to calculate patient-specific dosages or to enable the provision of patient-specific clinical recommendations. Seventy-three percent of these respondents reported that they were using this functionality.
- Thirty-seven percent of teaching hospitals reported the ability to input patient-specific variables to assess drug therapy, with 8 of these 13 hospitals (62%) reporting that were using that functionality. In comparison, 60% of respondents from non-teaching facilities reported that they had this functionality, and 75% of those reported that they were using it. In the Atlantic Provinces, the availability and use of this particular functionality appears to lag a bit behind that of other regions. Only 21% (3/14) of respondents from the Atlantic Provinces reported that they had access to this functionality and only one of those three respondents reported that they were using it.

As with many automated systems, pharmacy information systems generally allow users to override, or ignore, the alerts that are provided by an automated clinical decision support system. This ability to override an alert is necessary, given that automated alerts are based on imperfect assumptions that may not apply to a particular clinical situation. However, it is incumbent on hospitals to insure that alerts are being critically reviewed

by pharmacy staff and sound clinical judgments are being made when automated clinical decision support alerts are being overridden.

Table F-1. Clinical Decision Support System (CDSS) 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Does your hospital have a Pharmacy Information System (PIS)? (n=)	(160)	(34)	(94)	(32)	(43)	(117)
	158	33	93	32	42	116
	99%	97%	99%	100%	98%	99%
<i>Base: all respondents</i>						
The Pharmacy Information System includes a Clinical Decision Support System (CDSS) (n=)	(156)	(32)	(92)	(32)	(42)	(114)
	125	21	77	27	35	90
	80%	66%	84%	84%	83%	79%
<i>Base: respondents with a PIS</i>						
Clinical Decision Support System's patient-specific alerts and use						
Drug allergy alerts (n=)	(125)	(21)	(77)	(27)	(35)	(90)
Available	125	21	77	27	35	90
	100%	100%	100%	100%	100%	100%
in use	(124)	(21)	(76)	(27)	(35)	(89)
	124	21	76	27	35	89
	100%	100%	100%	100%	100%	100%
Drug interaction alerts (n=)	(125)	(21)	(77)	(27)	(35)	(90)
Available	125	21	77	27	35	90
	100%	100%	100%	100%	100%	100%
in use	(125)	(21)	(77)	(27)	(35)	(90)
	125	21	77	27	35	90
	100%	100%	100%	100%	100%	100%
Maximum dose alerts (n=)	(124)	(20)	(77)	(27)	(35)	(89)
Available	106	15	69	22	28	78
	85%	75%	90%	81%	80%	88%
in use	(105)	(15)	(68)	(22)	(28)	(77)
	57	7	37	13	13	44
	54%	47%	54%	59%	46%	57%
Dosage modification alerts for certain drugs used in patients with renal or hepatic dysfunction... (n=)	(122)	(21)	(75)	(26)	(35)	(87)
Available	91	14	59	18	19	72
	75%	67%	79%	69%	54%	83%
in use	(91)	(14)	(59)	(18)	(19)	(72)
	58	7	39	12	11	47
	64%	50%	66%	67%	58%	65%
Drug therapy guidance alerts based on evidence-based guidelines or clinical pathways ... (n=)	(125)	(21)	(77)	(27)	(35)	(90)
Available	38	4	24	10	9	29
	30%	19%	31%	37%	26%	32%
in use	(37)	(3)	(24)	(10)	(9)	(28)
	16	1	13	2	3	13
	43%	33%	54%	20%	33%	46%
Ability to input patient-specific variables for use by the PIS... (n=)	(125)	(21)	(77)	(27)	(35)	(90)
available	67	11	41	15	13	54
	54%	52%	53%	56%	37%	60%
in use	(66)	(10)	(41)	(15)	(13)	(53)
	48	6	33	9	8	40
	73%	60%	80%	60%	62%	75%

Base: respondents with a CDSS

- Twenty-one percent (26/125) of respondents reported that their hospital has a policy dealing with the overriding of clinical decision support alerts that are generated by their pharmacy information system. This is similar to the response to this question in the 2007/08 survey (23%, 35/150). Teaching hospitals were slightly more likely to report having such a policy (26%, 9/35) than non-teaching hospitals

There is little increase in the number of respondents reporting use of an override policy.

(19%, 17/90). Regionally, BC (4%, 1/23) and the Prairies (7%, 1/15) were less likely than other regions to have a policy governing overrides.

- Of those hospitals with override policies, 52% (13/25) reported that their override policy includes identification of specific alerts that do not permit overrides, requiring that the order be changed. In comparison, only twenty-nine percent (8/28) of respondents in the 2007/08 report indicated that their policy included specific alerts that do not permit overrides.
- Seventy three percent of respondents (19/26) with an override policy reported that their policy includes a requirement to document a reason for selected high-risk overrides, vs. 54% (15/28) of respondents in 2007/08 who reported that they had this requirement in place. In addition, 58% (15/26) of respondents reported that their override policy includes a requirement for electronic tracking of overrides, vs. 36% (10/28) who reported this in 2007/08. Finally, 31% (8/26) of respondents reported that their override policy includes a requirement for a regular audit, review and follow up of overrides, usually by a medication safety committee or by a group within pharmacy. This compares to 14% (4/28) of respondents in 2007/08 who reported having this requirement in place. These increases between the two surveys suggest that pharmacy departments are recognizing the need for an enhanced level of accountability with respect to how clinical decision support alerts are dealt with by pharmacists.
- Of the eight respondents that reported their override policy included a requirement for audit and review, six reported that the review of appropriateness of overrides was conducted by pharmacy personnel; five in ON and one in the Atlantic Provinces. Appropriateness of the review was verified by a medication safety committee in three of those hospitals.
- Forty-six percent (Table F-2) of respondents reported they had implemented all of the clinical decision making functionalities that were available in their pharmacy information system. Regionally, respondents from QC were most likely to report the use of all clinical decision support functionality (73%, 22/10), followed by the Prairies at 63%, (10/16).

Facilities increasingly require documentation of a reason for high-risk overrides and auditing of their use.

The survey also attempted to identify the reasons why some organizations had decided not to make use of some of the clinical decision support functionality that was available in their pharmacy information system. Twenty-six respondents provided reasons (Table F-2).

- Forty-six percent (12/26) of respondents reported that the clinical significance of many of the alerts is questionable.
- Thirty-one percent (8/26) of respondents reported that there is insufficient staff time available to deal with all the alerts.
- Twenty-three percent (6/26) reported that the database that drives the alerts is out of date.
- One respondent reported that physicians rarely make changes to the order when contacted regarding the alert, so the cost-benefit is too low.
- Ten respondents provided other reasons why the functionality was not being used, including:
 - insufficient data was available to utilize the functionality (e.g. patient weight, renal function, lab tests, etc)
 - staff were not aware that the functionality was available
 - there was a lack of resources and/or expertise to implement the functionality
 - the functionality was not user friendly (requires manual activation, inappropriate alert level options leading to a choice of either alert fatigue or lack of alerts)
 - use of the functionality was a low priority in relation to other needs,
 - lack of confidence in the quality of alerts

The use of automated, computer-driven alerts can be a useful tool, both for improving patient safety and for enhancing evidence-based care. However, the results of this survey suggest that the full potential of computerized decision support systems is not being realized. The barriers to achieving the full benefits of these systems need to be examined and addressed.

Table F-2. Reasons for not using Functionality of the Pharmacy Information System 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Use of available clinical decision support functionalities listed in Table F.1 (n=)	(127)	(22)	(78)	(27)	(35)	(92)
all functionalities are in use	59 46%	11 50%	35 45%	13 48%	14 40%	45 49%
not all functionalities are in use	68 54%	11 50%	43 55%	14 52%	21 60%	47 51%
Reasons for not using clinical decision support functionalities (n=)	(26)	(3)	(14)	(9)	(5)	(21)
The clinical significance of many of the alerts is questionable	12 46%	3 100%	5 36%	4 44%	3 60%	9 43%
There is insufficient staff pharmacist time to deal with all the alerts	8 31%	1 33%	4 29%	3 33%	0 0%	8 38%
The database that drives the alerts is out of date	6 23%	0 0%	4 29%	2 22%	1 20%	5 24%
Physicians rarely make changes to the order when contacted re the alert	1 4%	0 0%	1 7%	0 0%	0 0%	1 5%
Other	10 38%	1 33%	7 50%	2 22%	2 40%	8 38%

Base: respondents with a CDSS. Note: multiple mentions permitted

Systems integration: Availability of laboratory test results and other patient information

Failure of clinical laboratory and pharmacy information systems to effectively exchange data through an effective, real-time interface is a problem that continues to plague many hospitals. Overcoming this obstacle has the potential to significantly improve the quality of patient care and clinical outcomes.¹ Where computerized prescriber order-entry systems have been implemented, the failure to establish bi-directional laboratory and pharmacy interfaces represents a lost opportunity for achieving a significant improvement in the communication of health information to those at the front line of patient care.¹ Benefits of establishing such interfaces include the availability of better information to support:

- the selection of the most appropriate drug (laboratory-based indications and contraindications),
- drug dosing (renal or hepatic impairment, blood level-guided adjustments),
- laboratory monitoring for toxicity (both baseline and ongoing monitoring)
- laboratory result interpretation (drug-test interaction)

Table F- 3. Pharmacy Access to Lab Results 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
How are pharmacists provided with access to laboratory test results? (n=)	(160)	(34)	(94)	(32)	(43)	(117)
View-only access available from pharmacy terminals (interface or separate log-in)	87 54%	19 56%	53 56%	15 47%	27 63%	60 51%
Lab system is interfaced with medication order entry system ... alert about need for potential drug therapy changes	68 43%	12 35%	39 41%	17 53%	16 37%	52 44%
Through paper-based medical record only	5 3%	3 9%	2 2%	0 0%	0 0%	5 4%

Base: all respondents

The survey results indicate that some progress has been achieved with respect to pharmacists' ability to access laboratory data at the point of care, which is an important enabler for the provision of high-quality pharmacy services and the avoidance adverse drug events.¹

- Forty-three percent of respondents reported that their laboratory system is interfaced with the medication order entry system. In the 2007/08 survey 35% (57/165) of respondents had indicated that an interface between these two systems was in place.
- Only three percent of respondents (5/160), all of which were in the Prairies, reported that they relied on paper-based lab data, compared to 5% (8/165) who reported that they relied on paper-based access to lab data in 2007/08.
- Fifty-four percent of respondents reported that they accessed lab data through view-only terminals.
- Respondents with larger bed size, teaching hospital status, and location in ON, or the Atlantic Provinces, were more likely to report having an interfaced lab-pharmacy system.

COMPUTERIZED PRESCRIBER ORDER ENTRY SYSTEMS (CPOE)

Medication errors can occur at all steps of the medication management process. Common prescribing errors include wrong drug or dosage form, incorrect dose calculation, failure to consider allergies or lab results and failure to adjust dosages in patients with renal or hepatic dysfunction.² CPOE is a technology that has the potential to improve the efficiency and quality of care, yet the uptake of this technology has been slow across North America.³ High cost, implementation resource intensity, and low user satisfaction are all factors that have delayed the adoption of this technology. However, there continues to be a strong belief that CPOE technology has the potential to improve patient safety, improve the quality of care, and ultimately to reduce the cost of care, particularly when CPOE is part of a larger strategy to create a technology-enabled, closed-loop, medication use system. Such a strategy would include CPOE, automated drug packaging, automated drug identification labeling using barcode or similar electronic identification technology, automated drug distribution technologies, bed-side barcoding systems and electronic medication administration records.

- The 2009/10 survey results indicate that there has been some progress in the implementation of CPOE systems. Eight percent (13/160) of respondents reported they had an operational CPOE system in place, compared with 5% (9/165) in 2007/08 and 6% (8/142) in 2005/06. (Table F-4)
- Teaching hospitals were more likely than non-teaching hospitals to report an operational CPOE (23% vs. 3%). Mid-sized facilities (200-500) beds were more likely to report that a CPOE system was in place (12%) than small hospitals with 50 to 200 beds (3%), and large facilities with more than 500 beds (3%). Hospitals in ON were most likely to report a CPOE system in place 16% (8/51). There were no facilities in BC that reported having a CPOE system in operation.
- Not much change was reported since the last survey in the percentage of hospitals with an approved implementation plan for CPOE. Twenty-four percent of respondents reported they have an approved plan to implement a CPOE system, compared with 22% (37/165) in 2007/08 and 23% (33/142) in 2005/06. Despite the 22% of respondents in the 2007/08 who reported that their facility had an approved plan to implement CPOE, the increase in the percentage of those who have actually implemented a CPOE system in the last two years was actually less than 2%.
- Sixty-eight percent of respondents in the 2009/10 survey reported that they had no approved plan for CPOE, emphasizing that this important patient safety functionality is still not high on the priority list of many Canadian hospitals.
- Of the 13 facilities that reported an operational CPOE, five reported that the CPOE system was not interfaced to the pharmacy information system. This is the same number of facilities that reported the lack of an interface in the 2007/08 survey. Six respondents reported that their facility had a bi-directional interface with the pharmacy information system vs. three respondents who reported having a bi-directional interface in 2007/08. Two respondents reported a unidirectional

There is slow progress in the implementation of CPOE systems

Information systems integration has improved

interface from the CPOE system to the pharmacy information system, vs. one respondent who reported this configuration in 2007/08.

- Of the 12 respondents with CPOE systems that completed the CPOE integration section of the survey, seven reported that their CPOE system was integrated with a clinical support system that guides the user through established protocols and clinical pathways, a considerable improvement over the one respondent with this functionality in 2007/08.
- Only four respondents reported that their CPOE system is interfaced with the lab system vs. five respondents who reported this in 2007/08 and three who reported this in 2005-06.
- Most respondents (11/12) reported that their CPOE system alerts prescribers to unsafe orders during order entry and guides the use of formulary drugs
- Nine respondents reported that their CPOE system includes weight-based or surface area based dosing for selected drugs and/or patient populations, while five respondents reported that the CPOE system includes functionality that assists with the dosing of medications in special populations (renal impairment, hepatic impairment, etc.)

Table F-4. Computerized Prescriber Order Entry System (CPOE) 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Existence of CPOE (n=)	(160)	(34)	(94)	(32)	(43)	(117)
No, and no CPOE plan approved	109 68%	27 79%	67 71%	15 47%	16 37%	93 79%
No, but approved plan to implement CPOE	38 24%	6 18%	16 17%	16 50%	17 40%	21 18%
Yes, CPOE operational	13 8%	1 3%	11 12%	1 3%	10 23%	3 3%
CPOE and PIS interface (n=)	(13)	(1)	(11)	(1)	(10)	(3)
CPOE is interfaced to PIS (unidirectional)	2 15%	0 0%	2 18%	0 0%	1 10%	1 33%
CPOE is interfaced to PIS (bidirectional)	6 46%	0 0%	6 55%	0 0%	5 50%	1 33%
CPOE is NOT interfaced to PIS	5 38%	1 100%	3 27%	1 100%	4 40%	1 33%
Integration and use of a CPOE (n=)	(12)	(0)	(11)	(1)	(9)	(3)
Is integrated with a clinical decision support system	7 58%	0 0%	6 55%	1 100%	4 44%	3 100%
Is interfaced with the lab system to alert practitioners	4 33%	0 0%	3 27%	1 100%	3 33%	1 33%
Alerts prescribers to unsafe orders during order entry	11 92%	0 0%	10 91%	1 100%	8 89%	3 100%
Guides the use of formulary drugs	11 92%	0 0%	10 91%	1 100%	9 100%	2 67%
Guides the use of weight-based or surface area based dosing for selected drugs and/or patient populations	9 75%	0 0%	8 73%	1 100%	7 78%	2 67%
Guides the dosing of medications in special populations	5 42%	0 0%	4 36%	1 100%	5 56%	0 0%

Base: Facilities with CPOE

COMPUTER ACCESS ON PATIENT CARE UNITS

In the 2009/10 survey, a number of questions were asked in an effort to determine if pharmacy staff had access to computers on patient care units for the purpose of carrying out their patient care responsibilities while working there. (Table F-5)

- The majority of respondents, 89%, reported that pharmacy staff had the ability to access patient care information at the patient care unit level, via either a portable computer or a fixed desktop computer.
- Forty-seven percent of these respondents reported that they used portable wireless computers to access patient information and 99% reported that fixed computers on the patient care units could be used by their staff while they were working in those locations. Ninety-eight percent of respondents with access to

patient information reported that they could access patient drug profiles and electronic data bases from the pharmacy information system while working on patient care units.

- Approximately half the respondents with access to patient information reported that their staff used computers on patient care units for decentralized order entry and 93% can access a drug information database while on the patient care unit. Seventy-seven percent of respondents reported that they can access electronic health records when using computers on patient care units
- The ability to perform clinical documentation/monitoring using computers on the patient care units was reported by 66% of respondents
- Using computers on the patient care unit for medication reconciliation documentation was reported by 44% of respondents

Table F-5. Computer Access on Patient Care Units 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Ability to access patient care information at the patient care unit level via a portable or a fixed location desktop computer (n=)	(160)	(34)	(94)	(32)	(43)	(117)
	143	29	85	29	41	102
	89%	85%	90%	91%	95%	87%
Computer location for accessing patient care information: (n=)	(139)	(28)	(85)	(26)	(38)	(101)
Fixed location (wired)	137	28	83	26	38	99
	99%	100%	98%	100%	100%	98%
Portable location (wireless)	66	9	42	15	24	42
	47%	32%	49%	58%	63%	42%
Computers on patient care units are used for (n=)	(143)	(29)	(85)	(29)	(41)	(102)
decentralized order entry on patient care units	73	10	44	19	26	47
	51%	34%	52%	66%	63%	46%
accessing patient drug profiles from the pharmacy information system	140	27	84	29	41	99
	98%	93%	99%	100%	100%	97%
accessing electronic health records	110	20	69	21	31	79
	77%	69%	81%	72%	76%	77%
accessing Drug information database	133	23	82	28	40	93
	93%	79%	96%	97%	98%	91%
clinical documentation/ monitoring	95	12	66	17	27	68
	66%	41%	78%	59%	66%	67%
medication reconciliation documentation	63	10	38	15	20	43
	44%	34%	45%	52%	49%	42%
Other	9	2	4	3	3	6
	6%	7%	5%	10%	7%	6%

Base: Facilities where patient care units have computer access. Note: multiple mentions permissible

SMART PUMPS

When properly programmed, set up, and used, smart pumps have the potential to significantly reduce the risk of adverse events associated with the administration of medications via the parenteral route. According to the literature, approximately 39% of medication errors occur during drug administration and this is typically the phase of the medication system where errors are least likely to be intercepted before reaching the patient.^{2,5} Some of the most serious medication errors on patient care units involve the incorrect programming of infusion pumps. Those types of errors can be reduced through the use of smart pump drug libraries and barcode enabled automated dose/rate programming.

- Sixty-eight percent of respondents in the 2009/10 survey reported that smart pumps were being used in their hospital, vs. 61% (101/165) in 2007/08. (Table F-6) In the 2007/08 survey, teaching hospitals were less likely to have implemented smart pumps than non-teaching hospitals. In 2009/10, a similar percentage of teaching and non-teaching hospitals reported that they were using smart pumps (65% and 68% respectively). There were regional differences in smart pump use, with BC at 80% (20/25), the Prairies at 72% (23/32), ON at 76% (39/51), the Atlantic Provinces at 53% (9/17) and QC at 49% (17/35).
- Thirty percent (32/108) of respondents using smart pumps reported that they used a wireless network to upload or download data to smart pumps. The Atlantic Provinces reported the highest use of wireless systems for transferring information to and from smart pumps (56% 5/9) while BC reported the lowest

rate of use of wireless networks (10%, 2/20). The reported use of wireless networks to upload or download data to smart pumps represents considerable growth since the 2007/08 survey where only nine percent (9/101) of respondents reported the use of wireless systems for this purpose.

- Sixty-two percent of respondents reported they review and update the pumps' libraries at least annually, an increase from 43% (43/99) in 2007/08.
- Forty-eight percent of respondents reported they download and review quality control data from pumps at least annually, an increase from the 36% (35/98) of respondents in the previous survey who reported doing this. Seventy-six percent of these respondents reported that they had made changes to policies, procedures, or pump programming following the review of the pumps' quality control data, compared with 71% (22/31) in 2007/08.

There is increased use of wireless networks for updating smart pumps.

Table F-6. Smart Pumps 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Hospital uses IV Smart pumps (n=)	(160) 108 68%	(34) 19 56%	(94) 69 73%	(32) 20 63%	(43) 28 65%	(117) 80 68%
Use of a wireless network to upload or download data to smart pumps (n=)	(108) 32 30%	(19) 5 26%	(69) 20 29%	(20) 7 35%	(28) 10 36%	(80) 22 28%
Annual review of smart pumps' libraries (n=)	(107) 66 62%	(18) 10 56%	(69) 43 62%	(20) 13 65%	(28) 19 68%	(79) 47 59%
Annual review of smart pumps' quality control data (n=)	(106) 51 48%	(18) 10 56%	(69) 27 39%	(19) 14 74%	(27) 16 59%	(79) 35 44%
Facility made changes following the review of the pumps' quality control data (n=)	(51) 39 76%	(10) 9 90%	(27) 20 74%	(14) 10 71%	(16) 14 88%	(35) 25 71%

Base: Facilities using smart pumps

BARCODING

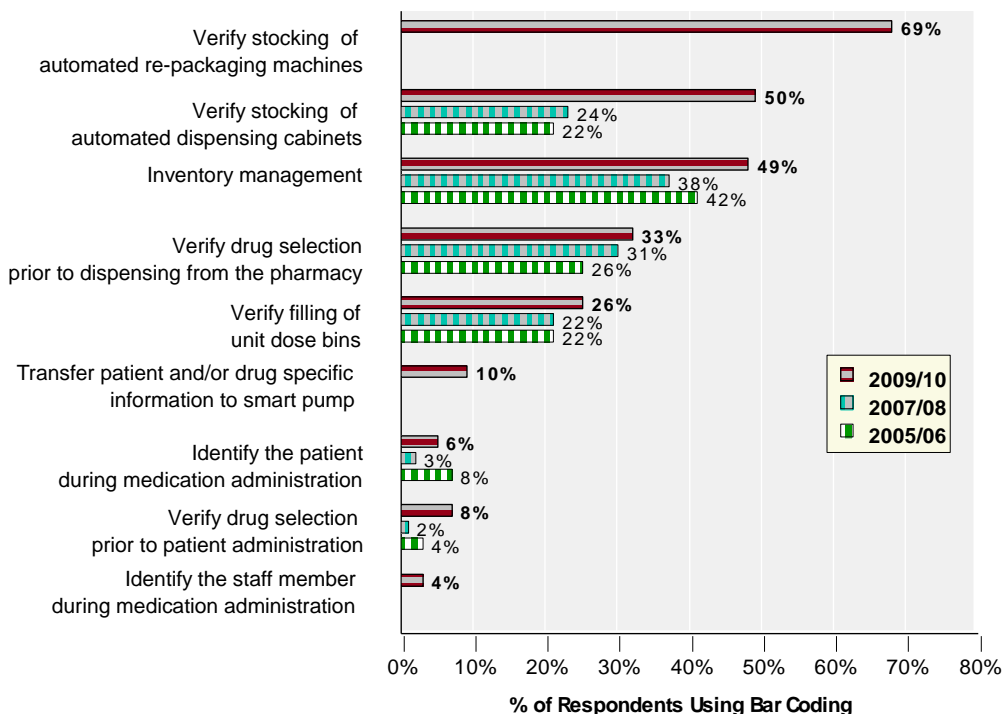
Barcode systems are used in a number of technologies to ensure the correct identification of medications, blood products, lab samples, staff and patients. Within the medication use system barcode technologies have been shown to reduce medication errors.^{2,7} Literature reports indicate that the use of barcoding applications within hospital pharmacies can reduce the dispensing error rate by over 30% and the potential rate of adverse events by more than 60%.⁸ Other reports indicate that the implementation of bedside medication verification using barcode scanning may reduce medication administration errors by over 40%, the rate of potential adverse drug events by over 50%, and reduce the rate of medication administration timing errors by almost 30%.⁶ This represents a significant safety improvement over traditional medication administration processes which are estimated to catch no more than 2% of the errors occurring at the time of medication administration. Typically, approximately 39% of medication related errors occur at the administration phase. The potential to reduce errors at this point in the medication use system therefore represents a major medication safety improvement opportunity.

The use of barcoding continues to slowly increase.

The use of barcode systems in U.S. hospitals is much more common than in Canadian hospitals. However, the implementation of barcode systems presents many challenges, in part because of the lack of a universally accepted barcode standard. The Canadian Pharmaceutical Barcoding Project Team,⁹ has recognized this issue as a major obstacle and has joined the Global Barcode Initiative for the adoption of standards for automated identification of medications. This pan-Canadian initiative promotes standardized barcode use in healthcare, using the Global Standard (GS1) for automated identification of pharmaceuticals. This system uses a 14 digit, Global Trade Identification Number (GTIN) linear barcode, or a matrix multidimensional barcode.¹⁰ The Canadian Pharmaceutical Barcode Project⁹ was initiated

jointly by the Canadian Patient Safety Institute and the Institute for Safe Medication Practices Canada (ISMP Canada) and is led by a national implementation committee of approximately 40 medication system stakeholders, including pharmaceutical manufacturers, institutional pharmacy, retail pharmacy, professional practice organizations, healthcare solution providers, supply chain organizations and purchasing organizations. The current survey did not solicit information from respondents regarding the barcode standard being used by respondents. Those questions will be introduced in future surveys.

Figure F-1. Uses of Barcoding 2009/10



Base: Respondents reporting use of bar coding in medication system (50 in 2005/06, 58 in 2007/08, 78 in 2009/10)

- The use of barcode applications in the medication management systems of Canadian hospitals is slowly increasing. Forty-nine percent of respondents in the 2009/10 survey reported that they were using barcoding vs. 37% (60/164) of respondents in the 2007/08 report and 35% (50/142) in the 2005/06 report.
- The reported use of barcode applications in medication systems was higher in teaching hospitals (72%) than in non-teaching hospitals (40%). In teaching hospitals the use of barcode systems has increased from 56% (22/39) of respondents in 2007/08 to 72% of respondents in 2009/10. In non-teaching hospitals, the use of barcode applications increased to 40% of respondents in 2009/10, from 30% (38/125) of respondents in 2007/08. Reported use was higher in larger hospitals with more than 500 beds (63%) and in QC at 63% (22/35), compared with usage by 38% to 51% of respondents in other provinces.
- Of the 78 respondents who reported that they were using barcodes in their medication management systems, the most common use was for verifying the stocking of automated repackaging machines. Sixty-nine percent of those respondents reported that they used barcode systems for this purpose, with an additional 8% of respondents reporting that they had an approved plan to implement barcoding systems for that purpose.
- The next most commonly used purpose was verifying the stocking of automated dispensing cabinets. Fifty-percent of respondents reported that they used barcode systems for this purpose, with an additional 22% of respondents reporting that they had an approved plan to implement barcoding systems for that purpose. This represents a notable increase when compared to the 24% (14/58) of respondents who reported using barcode systems for stocking dispensing cabinets in 2007/08 and the 22% of respondents (11/50) in 2005/06 who reported using this type of barcode system. In 2003/04, only five respondents were using barcode systems for this purpose.

- Use of barcodes for inventory management was reported by 45% of respondents, with a further 10% reporting they had an approved and funded plan to implement this type of barcode system.
- Thirty-three percent of respondents reported they use barcoding to verify drug selection before dispensing from pharmacy, with a further 17% having an approved and funded plan to do so.
- Twenty-six percent of respondents reported the use of barcode technology to verify the stocking of unit dose bins vs. 22% (13/58) in 2007/08 and 22% (11/50) in 2005/06.
- Eight of 78 respondents reported they had implemented barcode scanning to transfer patient and/or drug specific information to smart pumps, compared with only one respondent in 2007/08. Nine respondents reported they had approved and funded plans to implement barcode systems for this purpose.

Table F-7. Barcoding 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Bar Coding is used in the medication system (n=)	(160)	(34)	(94)	(32)	(43)	(117)
	78	9	49	20	31	47
	49%	26%	52%	63%	72%	40%
Bar Coding is used to						
Verify drug selection prior to dispensing from the pharmacy (n=)	(78)	(9)	(49)	(20)	(31)	(47)
not used yet, but there is an approved and funded plan to do so	13	1	8	4	7	6
	17%	11%	16%	20%	23%	13%
used for this activity	26	3	16	7	7	19
	33%	33%	33%	35%	23%	40%
Verify drug selection prior to patient administration (n=)	(78)	(9)	(49)	(20)	(31)	(47)
not used yet, but there is an approved and funded plan to do so	11	0	7	4	6	5
	14%	0%	14%	20%	19%	11%
used for this activity	6	0	6	0	2	4
	8%	0%	12%	0%	6%	9%
Identify the patient during medication administration (n=)	(78)	(9)	(49)	(20)	(31)	(47)
not used yet, but there is an approved and funded plan to do so	7	0	3	4	3	4
	9%	0%	6%	20%	10%	9%
used for this activity	5	0	5	0	2	3
	6%	0%	10%	0%	6%	6%
Identify the staff member during medication administration (n=)	(77)	(9)	(48)	(20)	(30)	(47)
not used yet, but there is an approved and funded plan to do so	7	0	3	4	3	4
	9%	0%	6%	20%	10%	9%
used for this activity	3	1	2	0	3	0
	4%	11%	4%	0%	10%	0%
Manage Inventory (n=)	(78)	(9)	(49)	(20)	(31)	(47)
not used yet, but there is an approved and funded plan to do so	8	0	6	2	4	4
	10%	0%	12%	10%	13%	9%
used for this activity	35	3	20	12	12	23
	45%	33%	41%	60%	39%	49%
Verify filling of unit dose bins (n=)	(76)	(9)	(49)	(18)	(29)	(47)
not used yet, but there is an approved and funded plan to do so	5	0	3	2	2	3
	7%	0%	6%	11%	7%	6%
used for this activity	20	3	11	6	7	13
	26%	33%	22%	33%	24%	28%
Verify stocking of automated dispensing cabinets (n=)	(76)	(9)	(48)	(19)	(30)	(46)
not used yet, but there is an approved and funded plan to do so	17	0	12	5	5	12
	22%	0%	25%	26%	17%	26%
used for this activity	(38)	(7)	(22)	(9)	(19)	(19)
	50%	78%	46%	47%	63%	41%
Verify stocking of automated repackaging machines (n=)	(77)	(9)	(48)	(20)	(31)	(46)
not used yet, but there is an approved and funded plan to do so	6	0	5	1	5	1
	8%	0%	10%	5%	16%	2%
used for this activity	53	7	33	13	21	32
	69%	78%	69%	65%	68%	70%
Transfer patient and/or drug specific information to smart pumps (n=)	(78)	(9)	(49)	(20)	(31)	(47)
not used yet, but there is an approved and funded plan to do so	9	0	6	3	5	4
	12%	0%	12%	15%	16%	9%
used for this activity	8	1	5	2	7	1
	10%	11%	10%	10%	23%	2%

Base: Facilities using barcoding

- The use of barcode scanning for patient identification during drug administration was reported by 5 respondents in 2009/10, compared with two respondents in 2007/08. In the 2009/10 survey, a further seven respondents reported an approved and funded implementation plan for this use of barcode technology.
- The use of barcode scanning for drug identification verification prior to administration to the patient was reported by six respondents in 2009/10 and a further 11 respondents reported that they had an approved and funded plan to implement such a barcode system.
- Only three respondents in 2009/10 reported that they identify staff using barcodes and a further seven reported an approved and funded plan to do so.

Progress is being made in the reported use of barcode scanning in hospitals. The slow adoption of this technology may be a symptom of the difficulty in both implementing and maintaining these systems. Some of these issues include the financial cost of implementation, the human resources required to maintain the barcode data within the hospital computer system and software incompatibility with Canadian barcodes. A recent study on technology in the U.S reported that over 25% of doses need to be re-packaged in order to apply the necessary, readable barcodes, which represents a considerable workload burden for organizations.¹¹ However, the Canadian Pharmaceutical Bar Code Project, with its carefully designed stakeholder involvement, intends to minimize this impact.⁹

Differences between data in this chapter and data in the CSHP 2015 chapter

Astute readers may notice that there are a few similar questions in the Technology and CSHP 2015 chapters of this report, and that the responses sometimes appear to be different in the two chapters of the report. There are sometimes differences in the exact wording of the questions in the two chapters that explains the different results. The technology chapter often drills down further than the CSHP 2015 chapter, which leads to the separation of features that remain combined in the CSHP 2015 questions. The respondent base is also different in some of the related questions. For example, in the Technology chapter, 33% (26/78) of respondents who use barcoding use it for identifying the drug before dispensing vs. in the CSHP chapter 17% (27/151) of all respondents use barcoding for identifying the drug before dispensing.

CONCLUSION:

This section of the report indicates that the rate of adoption of certain important technologies, such as CPOE and barcode applications, is slowly increasing. However, the data also suggests that the full patient safety potential of many technologies is not being fully realized. Even when technologies have been adopted, the evidence suggests that the full functionality of the technology is often not being used. The reason for this sometimes appears to be that the design of the software is less than ideal, leading to frustration and a sense that the benefits of the functionality are minimal in comparison to the time and effort that staff have to expend in order to use a particular functionality. In other situations, pharmacy managers and their staff may need to ask themselves if they have done all that they should do in order to realize the full patient safety features of the technology, while ensuring that the system does not create unnecessary additional work for staff.

The results suggest that a small number of respondents are recognizing the need for pharmacy departments and their staff to accept greater accountability for how new technologies are used, or not used. Those respondents reported that they have policies in place that require their staff to document a reason for selected high-risk overrides. In addition, some facilities have audit systems in place to review override records and insure that pharmacy staff are responding appropriately to the automated alerts that are built into the technologies that they are using. However, it appears that most facilities have not implemented these types of review procedures to ensure that the patient safety features of their technology are being appropriately used.

This section also suggests that progress is being made in the area of systems integration. More respondents now report that their pharmacy information system is interfaced with the laboratory information system and with their CPOE system. There has also been an increase in the use of wireless networks to support the updating of drug libraries in smart pumps and to download audit information related to staff overrides of automated smart-pump alerts.

There were a number of additional respondents this year who reported that they now have a functional CPOE system in place. However, the adoption rate of this technology changes very little from survey to survey.

The use of barcoding continues to increase, but at a slow pace from survey to survey. Notable increases were reported this year in the use of barcode systems for verifying the stocking of automated medication distribution cabinets. However, the use of barcode systems for bedside verification of medication identification and patient identification remains very low. Hospitals are encouraged to review the Canadian Pharmaceutical Barcoding Project Technical Statement⁹ and to align technology and barcoding activities accordingly. The use of barcodes to identify products, patients and healthcare personnel has the potential to yield significant patient safety benefits. The more consistent we are as a nation in the adoption and use of barcoding and the more aligned we are with the Global Community, the more successful we will be in the improvement of patient care and safety in Canadian hospitals.

The 2010 survey asked respondents to indicate if they have approved plans to implement a number of barcode applications. A significant percentage reported affirmatively in all areas. It will be of interest to review future surveys to determine if this projected growth in the use of barcode systems is realized.

The implementation and use of technology still represents a major challenge for Canadian hospitals. Specifically, the level of funding required to enhance existing medication systems for patient safety far exceeds historical funding patterns for this area of practice. On the positive side, the standard for new hospitals and newly developed pharmacy departments generally includes a comprehensive suite of medication systems technology. There is also encouraging growth in adoption and use of technology, particularly in the areas of systems integration and barcode applications. Hopefully this growth in the use of these and other technologies will accelerate, supported by national initiatives, global standards and a commitment to patient safety and continuity of care.

¹ Schiff, G.D., Klass, D., Peterson, J., Shah, G., W. Bates, D.W. Linking Laboratory and Pharmacy. Opportunities for Reducing Errors and Improving Care. *ARCH INTERN MED.* 2003;163:893-900. . <http://archinte.ama-assn.org/cgi/content/full/163/8/893>

² Agrawal, A Medication errors: prevention using information technology systems. *Br J Clin Pharmacol.* 2009 June; 67(6): 681–686

³ Bates, D.W., Teich, J.M., et al. The impact of computerized physician order entry on medication error prevention *J. Am. Medical Association* 1999, 6:313-321

⁴ Bates, D.W., Cohen, M, Leape, L...L. et al. Reducing the frequency of errors in medicine using information technology *J. Am. Med. Inform Assoc* 2001;*:299-308

⁵ Jerrard J. Robot Pharm. Drug dispensing robots drastically decrease medication errors. *Hospitalist.* 2006:24.

⁶ Poon EG, Keohane CA, Yoon CS, Ditmore M, Bane A, Levtzion-Korach O, Moniz T, Rothschild JM, Kachalia AB, Hayes J, Churchill WW, Lipsitz S, Whittemore AD, Bates DW, Gandhi TK. Effect of barcode technology on the safety of medication administration. *N Engl J Med.* 2010 May 6;362(18):1698-707.

⁷ 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

⁸ Poon EG, Cina JL, Churchill W, Patel N, Featherstone E, Rothschild JM, Keohane CA, Whittemore AD, Bates DW, Gandhi TK. Medication dispensing errors and potential adverse drug events before and after implementing barcode technology in the pharmacy. *Ann Intern Med.* 2006;145:426–34.

⁹ Canadian Pharmaceutical Barcoding Project. Joint Technical Statement on Pharmaceutical Automated Identification and Product Database Requirements http://www.ismp-canada.org/barcoding/download/CanPharmBarcode_JointTechnicalStatement.pdf

¹⁰ Weaver P.. Random sampling for quality assurance of the RxOBOT dispensing system. *American Society of Health Systems Pharmacists Mid-Year Clinical Meeting.* Las Vegas, Nevada: 1998

¹¹ Pederson, C. A., Dumpper, K. F. ASHP national survey on informatics: Assessment of the adoption and use of pharmacy informatics in U.S. hospitals. *Am. J. Health-Syst. Pharm.* 2007; 65: 2244-2264

G - PHARMACY STAFFING AND DRUG COSTS FOR SPECIFIC CLINICAL PROGRAMS AND PHARMACY SERVICES – ACUTE CARE HOSPITALS

KEVIN HALL AND JEAN-FRANÇOIS BUSSIÈRES

Benchmarking has been defined as “... the ongoing activity of comparing one’s own processes, products or services against the best-known similar activity, so that challenging but attainable goals can be set and a realistic course of action implemented to become and remain the best of the best.”¹ Based on this definition, it could be argued that the entire Hospital Pharmacy in Canada Survey, and resulting Report, represents a benchmarking exercise for all those involved in hospital pharmacy practice.

Benchmarking systems have their champions, as well as their critics. Benchmarking can be of great value when the process being benchmarked is very similar at all of the sites in the comparison group. However, many hospitals and hospital departments have been subjected to benchmarking exercises which have involved a comparison group that is not appropriate. For example, comparing overall pharmacy costs in a large teaching hospital with a comparator group that includes very different types of hospitals (non-teaching, long-term care, etc) is a seriously flawed exercise. Unfortunately, that type of inappropriate benchmarking has occurred and has sometimes led to inappropriate adjustments in the funding that a hospital or hospital unit, like the pharmacy department, receives. Not surprisingly, these types of inappropriate benchmarking exercises have resulted in considerable criticism of benchmarking. The House of Delegates of the American Society of Health-System Pharmacists (ASHP) recently adopted a policy resolution on workload monitoring and reporting that directed ASHP to:

*“...strongly discourage the use of pharmacy workload and productivity measurement systems (pharmacy benchmarking systems) that are based solely upon dispensing functions (e.g. doses dispensed or billed) or a variant of patient days, because such measures do not accurately assess pharmacy workload, staffing effectiveness, clinical effectiveness, clinical practice contributions to patient care, or impacts on costs of care, and therefore these measurement systems are not valid and should not be used...”*²

The reality is that both the champions and the critics have valid arguments. Hospital administrators, and hospital pharmacy managers, want to know if their pharmacy resources are being appropriately allocated and used. In his paper on effective use of workload and productivity monitoring tools, Rough stated that “*Through effective benchmarking, pharmacy departments should be able to identify areas for improving workflow efficiency, patient care services, and financial performance, thereby improving the department’s overall value to the organization.*”³

For a number of survey cycles, there has been a section in the Hospital Pharmacy in Canada Survey that was designed to provide data on the pharmacy staffing and drug costs associated with the delivery of drug distribution and clinical pharmacy services to a number of specific patient care programs (e.g. medicine, surgery, oncology, mental health, etc.). This was done in an attempt to provide data at a level that would be more comparable (e.g. services delivered to the critical care patient population, the mental health population, the pediatric population, etc.), rather than at the overall hospital level where the pooling of a wide range of different patient populations increases the variability in the data.

The data collected in past surveys for clinical program-specific groupings (critical care, mental health, etc.) has remained quite similar from survey to survey, suggesting that the data is providing a reasonable estimate of the average drug costs and labour costs associated with the provision of pharmacy services to each of those clinical programs. However, the standard deviations have been quite high in some cases, suggesting that either there is considerable variability in the resources that different facilities are using, or that the data that is being provided by some facilities may be inaccurate. In addition, there were a number of ratios where the number of respondents who provided data was quite small.

For the 2009/10 survey, several changes were made to the questions that were asked in the benchmarking section. Some data was no longer requested, if the number of respondents who had been able to provide the data in past surveys was very small,

Both the value and the limitations of benchmarking data need to be understood.

raising concerns about the reliability of the calculated ratios. As a result, comparison of the 2009/10 data to that from earlier surveys is not always possible. In other cases, data was collected in a similar manner to previous surveys, but calculated ratios that fell at the upper and lower extremes were examined more carefully to determine if the calculated ratios should be excluded from the calculation of mean values for the ratio in question. In doing so, we identified a number of situations where there appeared to be problems with either the numerator or denominator for the calculated ratios and the questionable data was excluded from the calculation of mean ratios. In the final analysis, the numbers of responses that were excluded was quite small, and the mean calculated ratios were, with a few exceptions, very similar to the results from previous years. In a few situations it was clear that the inclusion of extreme outliers in previous years had skewed the average somewhat for some ratios, usually those that were based on a small number of respondents.

The objectives of generating this benchmarking data are 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

Few respondents were able to provide data for 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 allocated to specific clinical programs. Respondents were encouraged to provide any data that they could, and that data was used for calculation of the mean ratio. There are advantages and disadvantages of such an approach. As can be seen in a number of the tables, the “n” is quite high for many of the benchmark ratios that are provided, which helps to improve the quality of the reported data. On the other hand, the facilities that are included in the calculation of each ratio are somewhat different, which means that the generalizability of the data to all hospitals has to be approached with that limitation in mind. Nonetheless, the data has been reasonably consistent from survey to survey, suggesting that the data provides a reasonable estimate of the workload intensity of the pharmacy services provided to different clinical programs, as well as the drug costs associated with different types of patient populations.

Readers should note that the criteria for participation in the survey were modified in the 2007/08 survey allowing hospitals with as few as 50 acute beds to participate in the survey. Overall, there were a larger number of hospitals that participated in the 2007/08 survey and the 2009/10 survey, compared to the 2005/06 and earlier surveys. Comparisons to the benchmarking data in previous Hospital Pharmacy in Canada Reports should be done with the recognition that the hospitals that provided benchmarking data prior to the 2007/08 might be a somewhat different group than those who provided benchmarking data in the 2007/08 and the 2009/10 survey.

STAFFING INDICATORS FOR SPECIFIC INPATIENT CLINICAL PROGRAMS

In Table G–1, data on staffing and drug costs for 8 inpatient clinical programs, typically found in many Canadian hospitals, are presented. Readers are reminded that the number of respondents in each cell may be different from those in other cells. As a result, there are some anomalies in the data. For example if the budgeted hours per patient day for clinical services and the budgeted 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 budgeted 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 budgeted hour per patient day basis, than did low acuity/low complexity programs. This was true for both the clinical and distributive staffing indicators.
- When the staffing figures were looked at for teaching versus non-teaching hospitals, there are some interesting findings. For high acuity programs, like critical care, medicine, and surgery, the reported staffing resources (budgeted hours per patient day) utilized by teaching hospitals are generally higher, than those reported by non-teaching hospitals. For lower acuity programs like mental health, rehabilitation, and long term care, the staffing ratios of non-teaching hospitals are usually higher than the staffing ratios reported by teaching hospitals. Given the small number of respondents in some of the cells this data needs to be interpreted cautiously. However, it may suggest that teaching hospitals focus their resources on higher acuity

programs, perhaps at the expense of less acute services. Non-teaching hospitals may view the lower acuity programs as a more important part of their mandate, and perhaps do a better job at acquiring resources to support those programs

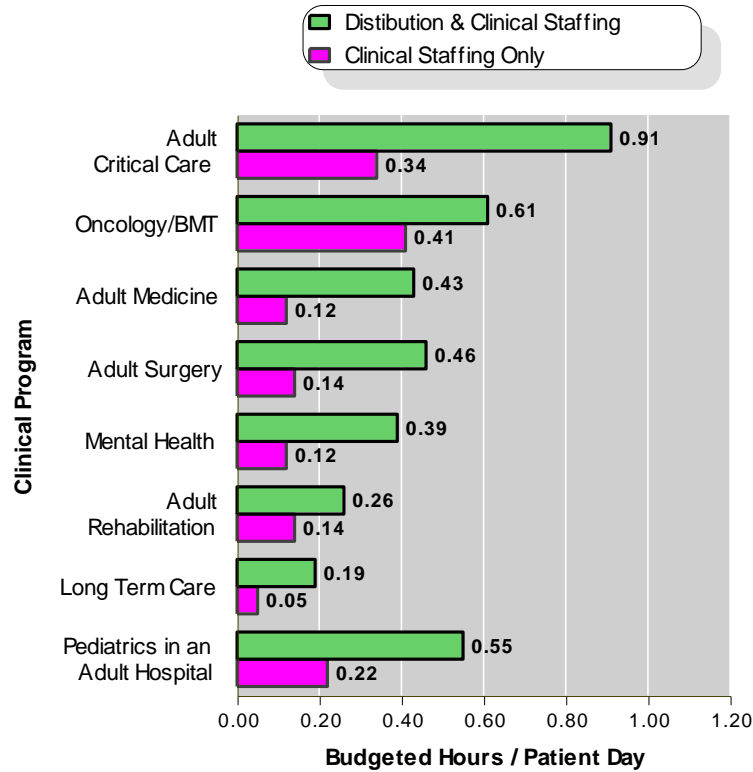
- Comparison of the staffing for distribution and clinical services (Figure G-1) indicates that the budgeted hours per patient day for clinical services represents between 26% to 67% of the total budgeted hours per patient day that are required for both distributive and clinical services. The clinical time component appears to be higher in the 2009/10 survey, compared to the 2007/08 survey, when the clinical component represented between 26% and 38% of the total budgeted hours. However, the 2009/10 and 2007/08 numbers were quite similar, except for two programs, adult oncology/bone marrow transplant, where the clinical component was reported to represent 67% of the total staffing, and rehabilitation, where the clinical component was reported to represent 54% of the total staffing. There isn't an obvious explanation for why those two programs seem to have had a significant increase in their clinical component, and it may be an artifact of the relatively small numbers of respondents who reported data for these clinical areas. For all of the other programs, the data suggest that between 60% and 75% of the total combined budgeted hours for pharmacists and technicians are utilized to provide drug distribution services.
- Human resource and drug cost data for most programs is remarkably consistent with data from previous surveys.*
- Like the staffing data provided above, the drug cost data are quite consistent with the data provided in the benchmarking chapter of the 2007/08 survey report. Reported costs have gone up somewhat but the relative cost patterns between the different programs remains remarkably consistent. The reproducibility of this data suggests that it can be used to estimate the approximate pharmacy staffing and drug costs that are required to service these different programs.

Table G-1. Pharmacy Benchmarking Data For Selected Clinical Programs 2009/10

	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 Budgeted Hours per Patient Day								
Mean	0.91	0.61	0.43	0.46	0.39	0.26	0.19	0.55
(n=)	(33)	(13)	(30)	(26)	(20)	(9)	(14)	(12)
Drug Distribution Budgeted hours Per Patient Day								
Mean	0.57	0.39	0.31	0.33	0.31	0.26	0.14	0.48
(n=)	(36)	(16)	(33)	(31)	(27)	(15)	(17)	(19)
Clinical Services Budgeted hours Per Patient Day								
Mean	0.34	0.41	0.12	0.14	0.12	0.14	0.05	0.22
(n=)	(62)	(22)	(57)	(42)	(38)	(21)	(22)	(23)
Drug Costs Per Patient Day								
Mean	\$111	\$112	\$22	\$32	\$9	\$11	\$8	\$20
(n=)	(76)	(24)	(76)	(74)	(57)	(38)	(43)	(46)
Mean Indicator Values - Teaching versus Non-Teaching Hospitals								
Total Budgeted hours Per Patient Day – Teaching								
	0.94	0.61	0.48	0.5	0.33	0.13	0.07	0.59
(n=)	(10)	(13)	(10)	(8)	(8)	(2)	(1)	(3)
Total Budgeted hours Per Patient Day – Non-Teaching								
	0.89	0.61	0.41	0.44	0.42	0.3	0.2	0.53
(n=)	(23)	(6)	(20)	(18)	(12)	(7)	(13)	(9)
Drug Costs Per Patient Day – Teaching								
	\$134	\$157	\$24	\$33	\$10	\$13	\$10	\$27
(n=)	(23)	(13)	(22)	(24)	(18)	(10)	(8)	(10)
Drug Costs Per Patient Day – Non-Teaching								
	\$101	\$58	\$21	\$31	\$9	\$11	\$8	\$19
(n=)	(53)	(11)	(54)	(50)	(39)	(28)	(35)	(36)

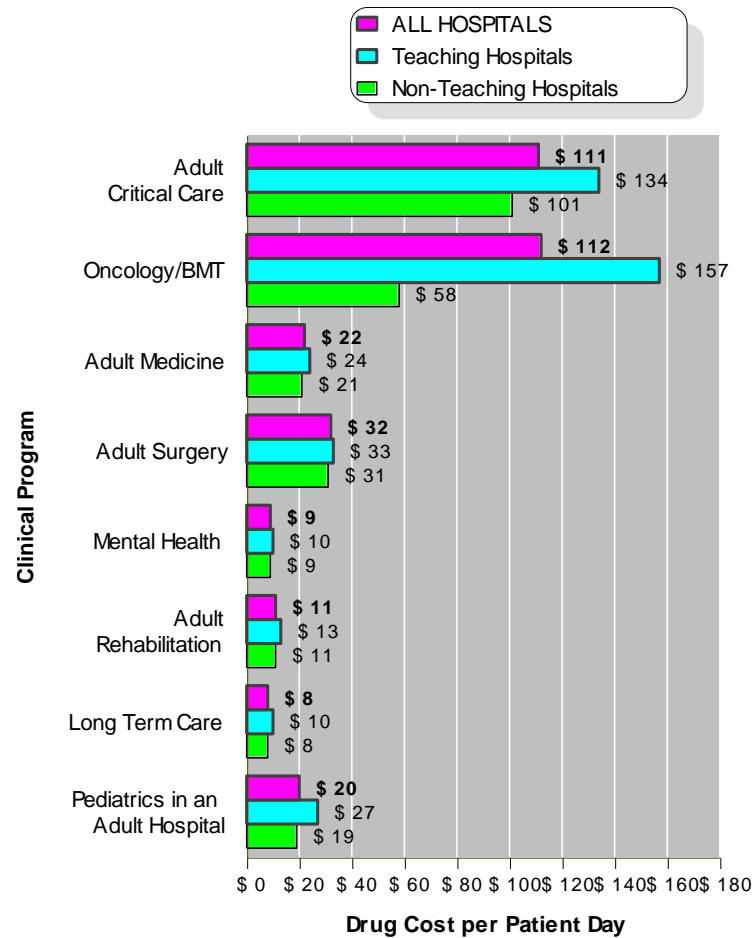
Base: Facilities providing relevant data (9 to 62)

Figure G-1. Mean Pharmacy Staffing 2009/10



Base: Facilities providing relevant data (9 to 62)

Figure G-2. Mean Drug Costs 2009/10



Base: Facilities providing relevant data (24 to 76)

STAFFING AND DRUG COST INDICATORS FOR OTHER PROGRAMS AND SERVICES

In Table G-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. number of concurrent studies managed, admixtures prepared, etc.). The denominator that appears in Table G-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.

Table G-2 Mean Pharmacy Staffing and Drug Cost Indicators for Other Programs and Services 2009/10

	—	Bed Size			Teaching Status		
		All	50 - 200	201- 500	>500	Teach	Non-Teaching
ONCOLOGY ADMIXTURE	(n=)	(51)	(2)	(32)	(17)	(19)	(32)
Total Hrs/ Admixture	Mean	.57	.	.57	.51	.49	.62
CENTRALIZED PARENTERAL ADMIXTURE	(n=)	(37)	(2)	(26)	(9)	(16)	(21)
Total Hrs/ Admixture	Mean	.13	.21	.14	.08	.10	.15
HOME IV ADMIXTURE	(n=)	(5)	(0)	(2)	(3)	(2)	(3)
Total Hrs/ Admixture	Mean	.52	.	.	.56	.	.32
TPN ADMIXTURE	(n=)	(21)	(0)	(13)	(8)	(11)	(10)
Total Hrs/ Admixture	Mean	.43	.	.46	.38	.42	.44
INVESTIGATIONAL DRUG	(n=)	(240)	(1)	(13)	(10)	(20)	(4)
Total Hrs/ Study	Mean	54	.	52	55	58	35
Total student days precepted /	(n=)	(103)	(19)	(59)	(25)	(33)	(70)
Total FTE	Mean	16	16	15	19	25	12
RENAL DIALYSIS	(n=)	(10)	(0)	(10)	(0)	(2)	(8)
Total Hours / Patient	Mean	41	.	41	.	.	50

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

Base: Facilities providing relevant data

- In 2009/10, respondents reported 0.57 total budgeted hours per oncology admixture, compared to 0.85 hours per admixture in 2007/08 and 0.85 hours per admixture in the 2005/06 report.
- In 2009/10, respondents reported 0.13 total budgeted hours per admixture in centralized IV admixture programs, compared to 0.20 hours per admixture in 2007/08 and 0.13 hours per admixture in the 2005/06 report.
- In 2009/10, respondents reported 0.52 total budgeted hours per Home IV, compared to 1.07 hours per admixture in 2007/08 and 1.64 hours per admixture in the 2005/06 report.
- In 2009/10, respondents reported 0.43 total budgeted hours per TPN admixture, compared to 0.93 hours per admixture in 2007/08 and 1.0 hours per admixture in the 2005/06 report.

For those facilities that reported data on their investigational drug study service, the total hours per concurrent study being managed was 54 hours, compared to 71 hours in 2007/08 and 56 hours in 2005/06.

In 2009/10, Renal Dialysis budgeted hours per concurrent patient (41) were similar to 2007/08 (46). Annual drug costs per concurrent patient, excluding erythropoietic agents, were reported to be \$4330 in 2009/10 vs. \$3734 in 2007/08. Erythropoietic-only drug costs per concurrent patient were reported to be \$7466 in 2009/10 vs. \$15,338 in 2008/09.

As was explained in the introduction to this chapter, we excluded some data from the benchmarking analysis when the data fell well outside of what we considered to be a reasonable range of values. This likely explains a large part of the difference between the results in the 2009/10 vs the results reported in earlier surveys for ratios such as budgeted hours per oncology admixture, budgeted hours per TPN admixture, and budgeted hours per home IV admixture. However, the ratios reported for this survey have smaller standard deviations and are probably more reliable than those reported in previous surveys for those particular ratios.

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.

¹ Gerald J. Balm; Benchmarking: A practitioners guide to becoming and staying the best of the best" (Schaumburg,IL: QPMA Press, 1992

² American Society of Health-System Pharmacists. ASHP policy statement on workload monitoring and reporting (0901) Accessed February 22 2011 at:

<http://www.ashp.org/Import/PRACTICEANDPOLICY/PolicyPositionsGuidelinesBestPractices/BrowsebyTopic/PharmacyManagement.aspx>

³ Rough RS, McDaniel M , Rinehart JR "Effective use of workload and productivity monitoring tools in health-system pharmacy, part 1" Am J Health-Syst Pharm. 67:300-311 Feb 15, 2010

H - PHARMACY STAFFING AND DRUG COSTS FOR SPECIFIC CLINICAL PROGRAMS AND PHARMACY SERVICES - PEDIATRIC HOSPITALS 2009/10

KEVIN HALL AND JEAN-FRANÇOIS BUSSIÈRES

In this section of the survey, respondents from pediatric facilities were asked to provide the following information for the 2009/10 fiscal year:

- pharmacy staffing resources committed to specific pediatric clinical programs (i.e. pediatric oncology, pediatric intensive care, neonatal intensive care, and pediatric medicine/surgery),
- drug costs incurred in managing the patients in each of the above programs.

Data for this section was collected only from “stand-alone” pediatric facilities. Although the pediatric facility did not necessarily have to be based in its own separate building, we were interested in capturing data from organizations that were providing a fairly comprehensive set of pediatric services, as opposed to data from a single general pediatric unit that was part of a larger adult facility. As a general rule, if the facility operated a pediatric and neonatal ICU, in addition to other inpatient clinical programs, it was likely that it met our criteria for inclusion in this part of the survey.

Some facilities were not able to provide data for all indicators but they were encouraged to complete as many sections of the benchmarking survey as they could. For example, some respondents were able to provide a breakdown of drug costs by clinical program, but were not able to supply data on the staffing allocated to specific clinical programs. Readers are reminded that the number of respondents in each cell may be different from those in other cells. As a result, there are some anomalies in the data. For example, for any given clinical program in Table H-1, the sum of the budgeted hours per patient day for clinical services plus the budgeted hours per patient day for drug distribution services may not be exactly the same as the total budgeted hours per patient day that appear in the table for that program. That is a result of the fact that the respondents who provided data for each of those three indicators may be different. In addition, when evaluating the pediatric benchmarking data, readers should bear in mind that the number of “stand-alone” pediatric facilities in Canada is quite small. As a result, the mean data are more likely to be affected by “outlier” data. For this year’s report, we excluded a few pieces of data that we felt were so far removed from the mean that they were almost certainly erroneous. Including that data would have skewed the mean considerably.

In Table H-1, data on staffing and drug costs for 4 pediatric inpatient clinical programs are presented. It should be noted that total budgeted hours per patient day and drug distribution budgeted hours per patient day include both pharmacist and technician hours, whereas clinical budgeted hours per patient day are pharmacist hours only.

Table H-1. Mean Pharmacy Benchmarking Data for Selected Pediatric Clinical Programs 2009/10

Pediatric hospitals				
	Pediatric Oncology	Pediatric Intensive Care	Neonatal Intensive Care	Pediatric Medicine Surgery
Total Budgeted Hours per Patient Day	1.74 (n=5)	2.47 (n=5)	1.16 (n=7)	1.19 (n=5)
Drug Distribution Budgeted Hours Per Patient Day	1.28 (n=5)	2.79 (n=6)	0.83 (n=7)	0.95 (n=5)
Clinical Services Budgeted Hours Per Patient Day	0.52 (n=9)	0.72 (n=10)	0.30 (n=10)	0.22 (n=8)
Drug Costs Per Patient Day	\$144 (n=9)	\$90 (n=10)	\$31 (n=10)	\$34 (n=9)

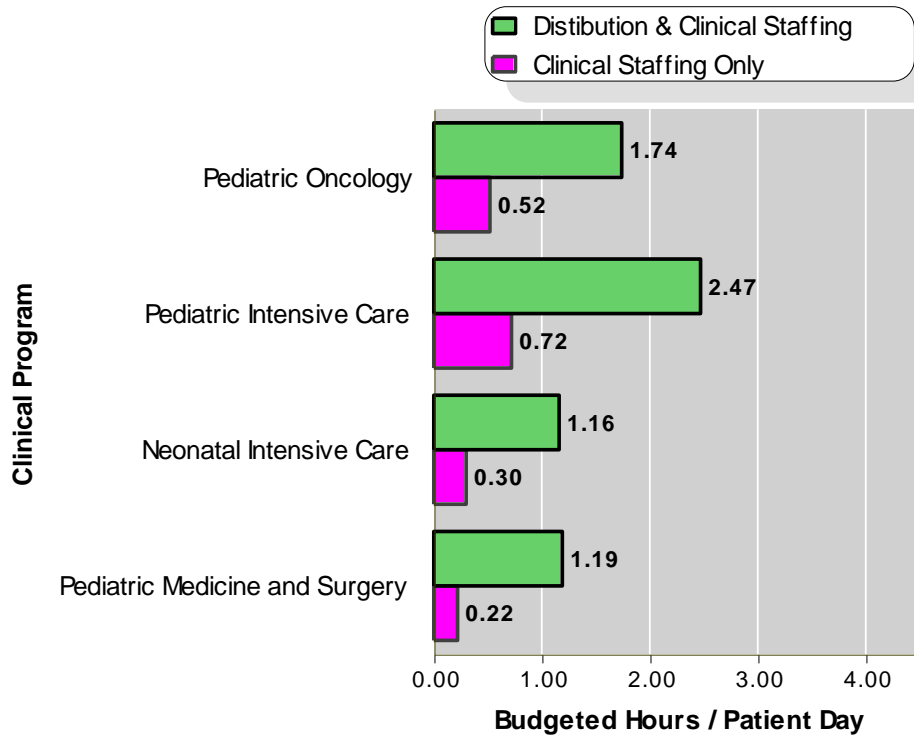
Base: stand-alone pediatric hospitals providing relevant data (5 to 10).

The data suggest that:

- As was noted in the last few Hospital Pharmacy in Canada Reports, high acuity/high complexity pediatric clinical programs were reported to require significantly larger amounts of pharmacy staffing, on a budgeted hour per patient day basis, than did similar adult clinical programs. For instance, total budgeted hours per patient day for pediatric oncology patients were more than twice that reported for adult oncology patients, 1.74 and 0.61, respectively. Pediatric intensive care utilized 2.47 total budgeted pharmacy hours per patient day, compared to 0.91 for adult patients.
- Budgeted hours per patient day for clinical services are between 18% and 30% of the total budgeted hours per patient day for both distributive and clinical services, suggesting that 70% to 82% of the total budgeted hours for pharmacists and technicians are utilized to provide drug distribution services. These results, as well as drug costs per patient day, are similar to those reported in the 2007/08 Hospital Pharmacy in Canada Report.

Staffing resources for pediatric programs are 2 to 3 times greater than those for similar adult programs.

Figure H-1. Mean Pharmacy Staffing (budgeted hours per patient day) by Clinical Program 2009/10



Base: stand-alone pediatric hospitals providing relevant data (5 to 10).

The reasons for these differences in staffing requirements between pediatric and adult patient groups are likely related to a number of factors that are unique to the pediatric population. For many drugs used in children the pharmacy service must assess the dosage, prepare/compound the medication, and monitor these drugs, while taking into account the weight, height, and/or body surface area of each child. In addition, 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. These processes are inherently labour-intensive. In addition there are sometimes differences in the way pediatric care is organized. For example, the organization of cancer treatments in children is different than that for adult patients. Almost all children receiving oncology treatments are treated as part of a research protocol (Children’s Oncology Group protocols), which requires a greater amount of data collection and documentation than would be the case if the patients were not part of a research study. In the adult population, a much smaller percentage of patients are enrolled in research studies when they are receiving chemotherapy.

Pediatric drug therapy is highly individualized and the risks associated with medication errors are significant

I – CSHP 2015

CAROLYN BORNSTEIN

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

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

The results of this year's survey provide information on the progress that Canadian hospitals have made in achieving the CSHP 2015 targets, compared to the baseline data that was presented in the 2007/08 report.

GOAL 1: INCREASE THE EXTENT TO WHICH PHARMACISTS IN HOSPITALS AND RELATED HEALTHCARE SETTINGS HELP INDIVIDUAL HOSPITAL INPATIENTS ACHIEVE THE BEST USE OF MEDICATIONS.

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

- Medication reconciliation during transitions across the continuum of care (admission, transfer and discharge) is a new CSHP 2015 objective that was not included in the 2007/2008 report. The 2009/10 results therefore represent the baseline data for this objective. Respondents indicated that medication reconciliation occurred more often upon hospital admission (69%, 109/157) than upon transfer between levels of care (41%, 64/156) or discharge (36%, 57/157).
- Medication reconciliation upon admission was highest in hospitals of 50 to 200 beds (79%, 26/33) and in teaching hospitals (74%, 31/42). Medication reconciliation upon transfer between levels of care was highest in hospitals with more than 500 beds (48%, 15/3). Hospitals with more than 500 beds also reported the highest rate of medication reconciliation upon discharge (52%, 16/31). Teaching hospitals also reported high rates upon transfer between levels of care (46%, 19/41) and upon discharge (50%, 21/42).
- Regionally, the highest level of medication reconciliation activity was reported in Ontario (ON) (admission: 88%, 44/50, transfer: 70%, 35/50; and discharge: 56%, 28/50) and the lowest rates were reported in BC (admission: 25%, 6/24; transfer: 17%, 4/24; and discharge: 4%, 1/24). The responses for medication reconciliation in this Chapter are higher than the responses in Chapter E, Medication Safety, where the question asked if medication reconciliation was provided for "all" patients or "specific groups of patients".

Medication reconciliation across the continuum of care is still far from the CSHP target.

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

- Only 5% (8/157) of respondents reported that 100% of their inpatients with complex and high-risk medication regimens had their medication therapy monitored by a pharmacist. This falls far short of the goal of having all hospitals provide this service to 100% of the targeted population. However, in the 2007/08 report, only 18% (29/156) of respondents provided this service to 75% or more of their inpatients with complex and high-risk medication regimens, compared to 33% (52/157) of respondents in this report. This suggests that some progress is being made towards the CSHP 2015 objective. The results varied little between hospitals of different bed size, and were only slightly higher in teaching hospitals (41%, 17/42) than in non-teaching hospitals (30%, 35/115) when comparing the answer range of 75 to 100% of inpatients. The highest response rate for providing this service to 75% or more of inpatients was from ON (58%, 29/50) and the lowest was from QC (11%, 4/35).

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

- In the 2009/10 survey respondents were asked if pharmacists “were managing medication therapy for inpatients with complex and high-risk medication regimens” while in the 2007/08 survey they were asked if their pharmacists had “organizational authority to manage medication therapy”. This revision of the wording unfortunately means that it is not possible to compare the 2009/10 survey results with those from 2007/08. The 2009/10 results are the new baseline. The majority of 2009/10 respondents (87%, 136/157) reported that pharmacists were managing medication therapy in collaboration with other members of the healthcare team. The above data show that the target of having 90% or more of hospitals providing this service is within reach. Teaching hospitals (100%, 42/42) and hospitals in BC (92%, 22/24) were most likely to report that they were providing this service. Hospitals with 50 to 200 beds (76%, 25/33) and hospitals in the Atlantic Provinces (76%, 13/17) were least likely to report that they were providing this service.

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

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

- Only 2% (3/157) of respondents indicated that they met the target of providing discharge counselling, managed by a pharmacist to 75% or more of inpatients with complex and high-risk medication regimens. Regardless of bed size, teaching status or region, 74% to 94% of respondents indicated that this service was provided to less than 50% of their inpatients. In Chapter E, Medication Safety, 75% (118/158) of respondents reported that they provided a pharmacist’s consultation at the time of discharge, but for “selected groups of patients only.”

Medication counselling by a pharmacist for inpatients with complex and high-risk medication regimens on discharge is practically non-existent.

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

- Of the 112 respondents who reported conducting client satisfaction surveys, only 25% (27/112) reported that a question about speaking to a pharmacist while in hospital was included in the survey. All of those 27 respondents indicated that less than 50% of patients recalled speaking to a pharmacist while in the hospital. No hospital met the CSHP target of having 50% of recently hospitalized patients, or their caregivers (family members for example) recall speaking with a pharmacist while in the hospital.

No hospital met the CSHP 2015 target for patients recalling that they had spoken to a pharmacist during a recent hospitalization.

Overall these results suggest that considerable work is needed to realize the CSHP targets in the areas of medication reconciliation across the continuum of care, which is an Accreditation Canada Required Organizational Practice, and discharge counseling by a pharmacist for patients with complex and high-risk medication regimens. Are these shortcomings the result of inadequate resources in the pharmacy department or are these activities not being given a high priority by pharmacy departments? If hospitals improve their compliance with providing medication reconciliation across the continuum of care, will the pharmacist be part of the process? Will more patients then recall speaking to a pharmacist while in hospital?

TABLE I-1. Results for Goal 1 - 2009/10

Goal 1: Increase the extent to which pharmacists help individual hospital inpatients achieve the best use of medications.											
Objective	CSHP 2015 target	% achievement 2010	% achievement 2008	2009/10 Hospital pharmacy in Canada responses							
				(n=)	yes						no
1.1 In 100% of hospitals and related healthcare settings, pharmacists will ensure that medication reconciliation occurs during transitions across the continuum of care (admission, transfer and discharge).											
	admission	100%	69%	n/a	(157)	69%					31%
	transfer	100%	41%	n/a	(156)	41%					59%
	discharge	100%	36%	n/a	(157)	36%					64%
1.2 The medication therapy of 100% of hospital inpatients with complex and high-risk medication regimens will be monitored by a pharmacist.	100%	5%	≤18%	(157)		100%	75- 99%	50- 74%	25- 49%	0- 24%	
						5%	28%	23%	23%	21%	
1.3 In 90% of hospitals, pharmacists manage medication therapy for inpatients with complex and high-risk medication regimens in collaboration with other members of the healthcare team.	90%	87%		(158)	87%						13%
1.4 75% of hospital inpatients discharged with complex and high-risk medication regimens will receive medication counselling managed by a pharmacist.	75%	2%	3%	(157)		75-100%	50- 74%	25- 49%	0- 24%		
						2%	11%	25%	61%		
1.5 50% of recently hospitalized patients or their caregivers (family members for example) will recall speaking with a pharmacist while in the hospital.	50%	<50%	11%	(27)		50-100%		25- 49%	0- 24%		
						0%		15%	85%		

■ CSHP 2015 target achieved ■ CSHP target not achieved

GOAL 2: INCREASE THE EXTENT TO WHICH PHARMACISTS HELP INDIVIDUAL NON-HOSPITALIZED PATIENTS ACHIEVE THE BEST USE OF MEDICATIONS.

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

- Objective 2.1 was revised since the previous survey. In the 2009/10 survey respondents were asked if pharmacists in ambulatory and specialized care clinics were “managing medication therapy” while in the 2007/08 survey they were asked if their pharmacists had “organizational authority to manage medication therapy”. The 2009/10 results are the new baseline. Ninety-one percent of respondents (133/146) reported having ambulatory and specialized clinics with pharmacist involvement. This is an increase from 78% (125/161) of respondents in the previous report. The percentage of respondents who reported having ambulatory clinics with pharmacist involvement was similar, regardless of teaching status or hospital size. Of the respondents with pharmacist involvement in clinics, only 11%

The involvement of hospital pharmacists in the medication management of ambulatory clinic patients with complex and high-risk medication regimens falls far short of the CSHP 2015

(14/133) indicated that pharmacists were managing medication therapy for patients with complex and high-risk medication regimens in 70% or more of these clinics. The percentage of respondents who achieved the 70% target was highest in hospitals of 201 to 500 beds (13%, 11/83), non-teaching hospitals (12%, 11/93) and ON hospitals (16%, 7/45).

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

- Only 12% (16/134) of respondents overall met the objective. Even when looking at respondents who provided this service to just 50% or more of ambulatory care clinics, only 29% (39/134) of respondents reported that they achieved this in their hospital, compared to 53% (63/118) in the previous report. Forty percent (16/40) of teaching hospitals provided this service to 50% of their clinics, compared to 25% (23/94) of non-teaching hospitals. Regionally, QC (51%, 16/31) respondents were more likely to report that they provided this service to 50% or more of their clinics.

TABLE I-2. Results for Goal 2 - 2009/10

Goal 2: Increase the extent to which pharmacists help individual non-hospitalized patients achieve the best use of medications.										
Objective		CSHP 2015 target	% achieve ment 2010	% achieve ment 2008	2009/10 Hospital pharmacy in Canada responses					
					(n=)	yes	70-100%	50-69%	25-49%	0-24%	no
2.1	In 70% of ambulatory and specialized care clinics providing clinic care, pharmacists will manage medication therapy for clinic patients with complex and high-risk medication regimens, in collaboration with other members of the healthcare team.	70%	11%	n/a	(133)					
								11%	13%	15%	62%
2.2	In 95% of ambulatory and specialized care clinics, pharmacists will counsel clinic patients with complex and high-risk medication regimens.	95%	12%	≤41%	(134)					
								12%	17%	11%	60%
2.3	In 85% of home care services, pharmacists will manage medication therapy for patients with complex and high-risk medication regimens, in collaboration with other members of the healthcare team.	85%	48%	n/a	(40)	48%				52%

 CSHP 2015 target achieved  CSHP target not achieved

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

- Objective 2.3 was revised from the previous survey. In the 2009/10 survey respondents were asked if pharmacists who were providing home care services were “managing medication therapy” while in the 2007/08 survey they were asked if their pharmacists had “organizational authority to manage medication therapy”. The 2009/10 results are the new baseline. Thirty-eight percent (59/156) of respondents indicated that their hospital provided home care services. Of those respondents, 48% (19/40) indicated that pharmacists were managing medication therapy for home care

In almost 50% of hospitals with a home care program, pharmacists participated in the medication management of patients with complex or high-risk medication regimens.

patients with complex and high-risk regimens, in collaboration with other members of the healthcare team. The provision of this service was highest in teaching hospitals (53%, 8/15) and in ON (88%, 7/8). The provision of this service was lower in hospitals with 50 to 200 beds (25%, 1/4) and in QC (11%, 1/9).

The increase in pharmacist involvement in ambulatory and specialized care clinics is encouraging. However the pharmacist's role in managing medication therapy is very limited in this practice setting and the provision of medication counselling to clinic patients by pharmacists has decreased from the previous report. Perhaps in this rapidly expanding area of patient care, the role of the hospital pharmacist in providing services to ambulatory clinic patients is still being defined. Legislative changes in many provinces are expanding the scope of practice for pharmacists, which should lead to an increased role for pharmacists in managing this patient population. However, it is unclear if that will occur within, and/or outside, the hospital setting. As home care services expand, perhaps so will the role that pharmacists play, but again it is unclear if this will be the responsibility of hospital pharmacists or pharmacists in the community setting.

GOAL 3: INCREASE THE EXTENT TO WHICH HOSPITAL AND RELATED HEALTHCARE SETTING PHARMACISTS ACTIVELY APPLY EVIDENCE-BASED METHODS TO THE IMPROVEMENT OF MEDICATION THERAPY.

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

- This objective was revised from the 2007/08 survey, where respondents were asked if pharmacists were “actively involved in ensuring patients receive evidence-based medication therapy”. In the 2009/10 survey the question asked if “pharmacists are actively involved in providing care to individual patients that is based on evidence”. The 2009/10 results are the new baseline. Ninety percent of respondents (142/157) reported that pharmacists were actively involved in providing this type of service. All teaching hospitals reported that they provided this service. In hospitals with 50 to 200 beds, 82% (27/33) reported that they provided this service.

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

- This objective was modified slightly from the 2007/08 survey. The previous question “In your hospital are pharmacists actively involved in the development and implementation of evidence-based *therapeutic protocols involving medication use*” was changed to “...evidence-based *drug therapy protocols and/or order sets*”. Eighty-five percent of respondents (133/157) reported that they were involved in this activity. This result approaches CSHP 2015's target of having 100% of all hospitals involved in this activity. This is slightly less than the previous report response of 91% (145/160). Responses did not vary significantly with bed size, but teaching hospitals (98%, 41/42) reported higher rates than non-teaching hospitals (80%, 92/115). ON respondents reported 100% achievement of this objective, while 43% (15/35) of QC respondents indicated they were not involved with this activity.

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

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

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

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


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

- Of the respondents whose patient population included adults with acute myocardial infarction and/or congestive heart failure (91%, 142/156), more than half of those respondents reported that pharmacists were involved in insuring that patients hospitalized for acute myocardial infarction received, on discharge, either an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker (59%, 83/141), a beta-blocker (59%, 83/140), aspirin (59%, 83/141) and lipid-lowering therapy (59%, 83/140). For patients with congestive heart failure, 54% (76/141) of respondents indicated that pharmacists actively participated in ensuring that they received either an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker. Teaching hospitals reported higher participation in these activities (range 81% to 94%) compared to non-teaching hospitals (range 46% to 50%). Hospitals with 50 to 200 beds reported participation rates ranging from 30 to 37%. The Prairie respondents reported 71% to 81% involvement, while 45% (9/20) of BC respondents reported involvement in these activities. QC also reported low levels of involvement (range 32% to 40%).

Pharmacist involvement in insuring that MI patients receive appropriate, evidence-based therapy on discharge was significant but falls short of the CSHP 2015 target.

TABLE I-3. Results for Goal 3 - 2009/10

Goal 3: Increase the extent to which hospital and related healthcare setting pharmacists actively apply evidence-based methods to the improvement of medication therapy.							
Objective		CSHP 2015 target	% achievement 2010	% achievement 2008	2009/10 Hospital pharmacy in Canada responses		
					(n=)	yes	no
3.1	In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in providing care to individual patients that is based on evidence, such as the use of quality drug information resources, published clinical studies or guidelines, and expert consensus advice.	100%	90%	n/a	(157)	90%	10%
3.2	In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in the development and implementation of evidence-based drug therapy protocols and/or order sets.	100%	85%	n/a	(157)	85%	15%
3.3	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive angiotensin-converting enzyme inhibitors or angiotensin receptor blockers at discharge.	90%	59%	53%	(141)	59%	41%
3.4	90% of hospital pharmacies will participate in ensuring that patients hospitalized for congestive heart failure will receive angiotensin-converting enzyme inhibitors or angiotensin receptor blockers at discharge.	90%	54%	50%	(141)	54%	46%
3.5	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive beta-blockers at discharge.	90%	59%	52%	(140)	59%	41%
3.6	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive aspirin at discharge.	90%	59%	52%	(141)	59%	41%
3.7	90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive lipid-lowering therapy at discharge.	90%	59%	51%	(140)	59%	41%
3.8	In 90% of hospitals and related healthcare settings providing clinic care, pharmacists will participate in ensuring that non-hospitalized patients who are receiving medications to decrease blood glucose levels will be assessed at least annually with a HbA1c test.	90%	28%	23%	(58)	28%	72%
3.9	In 70% of hospitals and related healthcare settings, pharmacists will be actively involved in medication- and vaccination-related infection control programs.	70%	45%	n/a	(155)	45%	55%

 CSHP 2015 target achieved

 CSHP target not achieved

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

- In those hospitals that provide outpatient care to diabetes patients (74%, 116/157), only 50% (58/116) have a pharmacist involved in the diabetes clinic. Of those respondents 72% (42/58) indicated that it was not current practice for pharmacists to ensure that diabetes patients have an HbA1C test performed at least annually. This was independent of teaching status, bed size or region.

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

- Pharmacist involvement in medication- and vaccination-related infection control programs was a new objective in this survey. While 71% (112/157) of respondents indicated that their pharmacists are actively involved in *medication-related* infection control programs, only 45% (71/157) reported having a pharmacist actively involved in *vaccination-related* infection control programs. When asked about pharmacist participation in both programs, the response was 45% (69/155). Teaching hospitals (79%, 33/42) surpassed the CSHP 2015 target of 70% compared to non-teaching hospitals at only 32% (36/133). Involvement in providing these services was lowest in BC (21%, 5/24).

The data indicates that pharmacists are actively involved in providing care that is evidence-based, and in the development and implementation of evidence-based drug therapy protocols and/or order sets. The CSHP 2015 targets for these two objectives are within reach! However it appears pharmacists are less involved in ensuring compliance with the described drug therapy objectives. Could it be that once the drug therapy protocols are developed, other healthcare professionals become responsible for their use? Could this be due to a lack of pharmacist resources to take on that responsibility? Could the lack of pharmacist involvement in smaller and non-teaching hospitals again be due to limited pharmacist resources?

GOAL 4: INCREASE THE EXTENT TO WHICH PHARMACY DEPARTMENTS IN HOSPITALS AND RELATED HEALTHCARE SETTINGS HAVE A SIGNIFICANT ROLE IN IMPROVING THE SAFETY OF MEDICATION USE.

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

- The 2009/10 survey data indicate that 62% (98/157) of respondents have such a medication safety quality improvement program in place. This is essentially unchanged from the previous report. Teaching hospitals (71%, 30/42) and respondents from BC (71%, 17/24) and ON (68%, 34/50) were most likely to have such a program in place.

An annual assessment of the quality of the sterile products service is conducted by less than a third of all respondents, far short of the CSHP 2015 target of 80%.

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

- Only 29% (45/156) of respondents indicated that they conduct such an annual sterile products quality improvement process, with no notable differences based on teaching status, bed size or region. This is a small improvement on the baseline of 24% (39/161) in 2007/08.

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

- Nearly 40% (61/157) of respondents indicated that they did not achieve this performance target for the review of routine medication orders. This is similar to the baseline data from 2007/08. Teaching hospitals (79%, 33/42) were more likely to achieve this target than non-teaching hospitals (55%, 63/115), as were larger hospitals (more than 500 beds: 74%, 23/31; 201 to 500 beds: 63%, 59/93; 50 to 200 beds: 42%, 14/33). Regionally, a notably lower percentage of respondents from BC (46%, 11/24) and a higher

percentage from QC (80%, 28/35) reported that they met the CSHP 2015 target. In Chapter C, Drug Distribution, when this same question was asked but included the proviso “during the hours that the Pharmacy is open” the response was 94% (149/158).

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

Before administration to the patient, a pharmacist’s review occurs for at least 95% of all routine medication orders... except when the pharmacy is closed.

- Review by a pharmacist, within 24 hours, of some or all of the medication orders written in the emergency department, was reported by 67% (105/156) of all respondents. Respondents with 50 to 200 beds (59%, 19/32), those from the Prairies (55%, 17/31), and those from the Atlantic Provinces (53%, 9/17) were least likely to report that this was their practice. In comparison, 77% (24/31) of hospitals with more than 500 beds and 97% (33/34) of QC respondents indicated that this practice was in place. Seventy-seven percent (84/109) of respondents who reported that medication orders written in the emergency department were reviewed by pharmacists within 24 hours specified that they did so for 75% to 100% of the orders. This is an improvement on the 2007/08 baseline data of 59% (61/103). The CSHP 2015 target is that 100% of medication orders written in the emergency department are reviewed within 24 hours by pharmacists. Only 27% (29/109) of respondents achieved the target, but in QC 48% (16/33) of respondents achieved the target.

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

- Forty-five percent (70/156) of respondents indicated that this practice was in place, compared to CSHP 2015’s target of 90%. The 2009/10 result is an increase from the 2007/08 baseline data of 39% (62/159). Teaching hospitals were more likely to report that they had this practice in place (64%, 27/42), compared to non-teaching hospitals (38%, 43/114). Sixty percent (30/50) of ON respondents reported having this in place.

After many years of slow progress, over 75% of survey respondents utilize a unit-dose system for 90% or more of their total beds.

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

- Sixty-three percent (98/155) of respondents reported that 85% or more of their pharmacy technician workforce had either completed a provincial certification program or a college training program. This is a small increase compared to the 2007/08 baseline data of 59% (94/159). Seventy-seven percent (24/31) of respondents from the Prairies met the 85% target but only 25% (4/16) of Atlantic region respondents did so.

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

- Seventy-six percent (119/157) of all respondents indicated that they had achieved this objective. This surpasses the CSHP 2015 target of 75%. Higher rates were reported in hospitals with 201 to 500 beds (84%, 78/93), in teaching hospitals (86%, 36/42), in ON hospitals (86%, 43/50) and in QC hospitals (83%, 29/35). The lowest percentages of respondents that achieved the target were reported by hospitals with 50 to 200 beds (52%, 17/33) and respondents in the BC region (46%, 11/24). These responses are similar to Chapter C, Drug Distribution where 71% (111/158) reported centralized unit dose systems and 8% (13/158) reported decentralized unit dose systems that met the target of servicing 90% or more of their total beds.

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

- A new CSHP 2015 objective is that 100% of all newly hired pharmacists will have completed a Canadian Hospital Pharmacy Residency Board (CHPRB) accredited residency program. Of those respondents who hired pharmacists in the 12 months preceding the survey, 29% (37/128) hired only pharmacists who had completed accredited residency programs. The target was reached by 40% (16/40) of teaching hospital respondents and 86% (25/29) of QC respondents.

Despite modest increases from baseline data it is concerning that the results continue to show a lack of well-developed organizational programs to review safe medication use and sterile compounding. The revised standards in USP General Chapter <797> Pharmaceutical Compounding - Sterile Preparations^{1,2}, do not appear to have had a significant impact on the compliance of Canadian hospital pharmacies with the objective relating to the annual assessment of sterile compounding processes. It is disappointing that such a low percentage of hospitals met the targets for pharmacist review of routine medication orders prior to administration of first doses, pharmacist review of orders written in the emergency department within 24 hours, and pharmacist participation in discontinuation of post-surgical prophylactic antibiotic therapy. Could the absence of significant improvement be due to a lack of resources or limited hours of operation? The ability to hire only pharmacists who have completed an accredited hospital pharmacy residency program will continue to be a challenge as long as we have more pharmacist vacancies to fill than residency program positions available. It is encouraging that QC had such a high success rate with this new CSHP 2015 target.

TABLE I- 4. Results for Goal 4 - 2009/10

Goal 4: Increase the extent to which pharmacy departments in hospitals and related healthcare settings have a significant role in improving the safety of medication use.												
Objective		CSHP 2015 target	% achievement 2010	% achievement 2008	2009/10 Hospital pharmacy in Canada responses							
					(n=)	yes						no
4.1	90% of hospitals and related healthcare settings will have an organizational program, with appropriate pharmacy involvement, to achieve significant annual, documented improvement in the safety of all steps in medication use.	90%	62%	64%	(157)	62%						38%
4.2	80% of pharmacies in hospitals and related healthcare settings will conduct an annual assessment of the processes used for compounding sterile medications, consistent with established standards and best practices.	80%	29%	24%	(156)	29%						71%
4.3	80% of hospitals have at least 95% of routine medication orders reviewed for appropriateness by a pharmacist before administration of the first dose.	80%	61%	59%	(157)	61%						39%
4.4	100% of medication orders in a hospital's emergency department will be reviewed by hospital pharmacists within 24 hours.	100%	27%	≤59%	(109)		100%	75-99%	50-74%	25-49%	0-24%	
							27%	50%	11%	7%	5%	
4.5	90% of hospital pharmacies will participate in ensuring that patients receiving antibiotics as prophylaxis for surgical infections will have their prophylactic antibiotic therapy discontinued within 24 hours after the surgery end time.	90%	45%	39%	(156)	45%						55%
4.6	85% of pharmacy technicians in hospitals and related healthcare settings will be certified by a clearly identifiable and recognized training program.	85%	63%	≤59%	(155)		85-100%	50-84%	25-49%	0-24%		
							63%	16%	3%	18%		
4.7	75% of pharmacies in hospitals utilize a unit-dose system for drug distribution for 90% or more of their total beds.	75%	76%	62%	(157)	76%						34%
4.8	100% of new pharmacists entering hospital and related healthcare setting practice will have completed a Canadian Hospital Pharmacy Residency Board (CHPRB)-accredited residency.	100%	29%	n/a	(128)		100%	75-99%	50-74%	25-49%	0-24%	
							29%	8%	5%	11%	47%	

■ CSHP 2015 target achieved

■ CSHP target not achieved

GOAL 5: INCREASE THE EXTENT TO WHICH HOSPITALS AND RELATED HEALTHCARE SETTINGS APPLY TECHNOLOGY EFFECTIVELY TO IMPROVE THE SAFETY OF MEDICATION USE.

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

- Only 17% (27/157) of respondents reported that they routinely used machine-readable coding in the inpatient pharmacy to verify medications before dispensing, with no difference between teaching and nonteaching hospitals. This is a modest increase from the baseline data of 13% (20/158).

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

- Machine-readable coding to verify the identity of the patient and the accuracy of medication administration at the point-of-care was reported by only 5% (8/157) of respondents.

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

- Only 6% (10/157) of respondents indicated that a CPOE system with clinical decision support was in place at their facility. Higher implementation rates were reported in teaching hospitals (19%, 8/42) and the Atlantic Provinces (18%, 3/17). None of the small hospitals (50 to 200 beds), BC hospitals, or QC hospitals reported having a CPOE system.

The adoption of bar-code systems for the positive identification of medications, patients, and caregivers is proceeding very slowly.

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

- The results indicate that 77% of respondents (120/155) have this in place. This is an increase from the 2007/08 baseline of 69%. In the Prairies only 53% (16/30) of respondents reported using such a system. Of note, in Chapter F, Technology the response to this question was similar at 80% (125/156).

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

- Of the 52% (81/156) of respondents who reported that their hospital had an electronic medical record (EMR), 89% (71/80) indicated that pharmacists used the medication-relevant portions of the record to manage patients' medication therapy. The CSHP target of 75% has been surpassed. Both the availability of the EMR and the use of the EMR by pharmacists have increased since the last report.

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

- Thirty-seven percent (57/156) of respondents indicated that their pharmacists had this capability compared to the CSHP 2015 target of 75%.

In general, adoption of technology remains slow within the hospital setting but it is growing. Chapter F, Technology reported that 49% (78/160) of respondents use bar coding in their medication use system. The use of computerized

In those hospitals with electronic medical records (EMR), the pharmacists' use of the EMR surpassed the CSHP 2015 target.

prescriber order entry systems with clinical decision support has increased over the 2007/08 baseline. The EMR has expanded into more hospitals and it is well utilized by pharmacists.

TABLE I-5. Results for Goal 5 - 2009/10

Goal 5: Increase the extent to which hospitals and related healthcare settings apply technology effectively to improve the safety of medication use.							
Objective		CSHP 2015 target	% achievement 2010	% achievement 2008	2009/10 Hospital pharmacy in Canada responses		
					(n=)	yes	no
5.1	75% of hospitals will use machine-readable coding to verify medications before dispensing.	75%	17%	13%	(157)	17%	83%
5.2	75% of hospitals will use machine-readable coding to verify all medications before administration to a patient.	75%	5%	1%	(157)	5%	95%
5.3	For routine medication prescribing for inpatients, 75% of hospitals will use computerized prescriber order entry systems that include clinical decision support.	75%	6%	7%	(157)	6%	94%
5.4	100% of hospital pharmacists will use computerized pharmacy order entry systems that include clinical decision support.	100%	77%	69%	(155)	77%	23%
5.5	In 75% of hospitals and related healthcare settings, pharmacists will use medication-relevant portions of patients' electronic medical records for managing patients' medication therapy.	75%	89%	81%	(80)	89%	11%
5.6	In 75% of hospitals and related healthcare settings, pharmacists will be able to electronically access pertinent patient information and communicate across settings of care (e.g. hospitals, clinics, home care operations, and chronic care operations) to ensure continuity of pharmaceutical care for patients with complex and high-risk medication regimens ³ .	75%	37%	39%	(156)	37%	63%

■ CSHP 2015 target achieved ■ CSHP target not achieved

GOAL 6: INCREASE THE EXTENT TO WHICH PHARMACY DEPARTMENTS IN HOSPITALS AND RELATED HEALTHCARE SETTINGS ENGAGE IN PUBLIC HEALTH INITIATIVES ON BEHALF OF THEIR COMMUNITIES.

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

- Seventeen percent (26/154) of respondents reported that their pharmacy had specific ongoing initiatives that target community health.

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

- Thirty percent (47/155) of respondents indicated that they had a process in place for both vaccinations, compared to the 2007/08 baseline of 23% (36/159). The reported performance for influenza vaccination alone was slightly higher (42%, 65/156), especially in teaching hospitals (55%, 23/42) and within ON hospitals (55%, 27/49). For pneumococcal vaccination alone 31% (49/156) of all respondents reported pharmacy involvement.

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

Only 22% (35/157) of respondents reported having a process in place for ensuring that hospitalized patients who smoke receive smoking cessation counselling. This was independent of teaching status or bed size. This is only marginally better than the 2007/08 baseline of 19% (30/160). Respondents from the Atlantic region reported greater participation of pharmacy departments in this process (35%, 6/17). For pharmacy departments that did not participate in the process, 59% (72/122) of respondents indicated that a smoking cessation program was provided by another healthcare professional in their hospital. When the 22% of respondents who have pharmacists involved in their smoking cessation program is combined with the 59% of respondents who have

other healthcare providers delivering the smoking cessation program the total (81% of respondents) indicates that most hospitals have smoking cessation programs in place.

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

- Seventy-eight percent (121/155) of respondents indicated that they had such a program in place. This is a substantial increase over the 2007/08 baseline of 54% (86/160) and close to the CSHP 2015 target of 90%. There was no notable difference between hospitals of different bed sizes and teaching hospitals reported only slightly better results (85%, 35/41) than non-teaching hospitals (75%, 86/114). The Atlantic Provinces and ON reported the highest rates with 100% (17/17) and 88% (44/50) of respondents, respectively, reporting that they had such a program QC reported the lowest rate at 45% (15/33).


It is encouraging to see that hospital pharmacies in certain regions (e.g., Atlantic Provinces and ON) have made strides in the implementation of initiatives that target community health. Participation of hospital pharmacists in vaccination and smoking cessation programs has increased modestly. Smoking cessation programs appear to be provided by other healthcare disciplines within the hospital setting. The increase in the number of respondents indicating availability of an integrated emergency preparedness program could be related to the H1N1 influenza pandemic of 2009/10. The CSHP 2015 target of 90% for this latter objective is within reach!


Although pharmacist participation in smoking cessation counselling is far short of the CSHP 2015 target, a combined 81% of respondents provide this program for their patients by either a pharmacist or other health care professional.

There was a substantial increase in the percentage of respondents who reported having an emergency-preparedness program in place.

TABLE I-6. Results for Goal 6 - 2009/10

Goal 6: Increase the extent to which pharmacy departments in hospitals and related healthcare settings engage in public health initiatives on behalf of their communities.							
Objective		CSHP 2015 target	% achievement 2010	% achievement 2008	2009/10 Hospital pharmacy in Canada responses		
					(n=)	yes	no
6.1	60% of pharmacies in hospitals and related healthcare settings will have specific ongoing initiatives that target community health.	60%	17%	21%	(154)	17%	83%
6.2	85% of hospital pharmacies will participate in ensuring that high risk patients in hospitals and related healthcare settings receive vaccinations for influenza and pneumococcus.	85%	30%	23%	(155)	30%	70%
6.3	80% of hospital pharmacies will participate in ensuring that hospitalized patients who smoke receive smoking-cessation counselling.	80%	22%	19%	(157)	22%	78%
6.4	90% of pharmacy departments in hospitals and related healthcare settings will have formal up-to-date emergency preparedness programs integrated with their hospitals and related healthcare settings' and their communities' emergency preparedness and response programs.	90%	78%	54%	(155)	78%	22%

 CSHP 2015 target achieved

 CSHP target not achieved

¹ Pharmaceutical compounding – sterile preparations (general information chapter 797). In: The United States Pharmacopoeia, 27th rev., and The National Formulary, 22nd ed. Rockville, MD: United States Pharmacopeial Convention; 2004:2350-70.

² Revision Bulletin. <797> Pharmaceutical Compounding – Sterile Preparations. The United States Pharmacopeial Convention. 2008.

J – CURRENT TOPICS

KEVIN HALL

Most of the sections in the Hospital Pharmacy in Canada survey contain questions that are repeated for a number of survey cycles. The rationale underlying this practice has been that the readers of the report are interested in tracking trends over time. For example, many readers want to know how quickly certain technologies, such as computerized prescriber order entry systems (CPOE), are being adopted throughout the country. However, there are other questions that address topics of current interest that might be worthwhile asking once, but not necessarily repeating in future surveys. During the development of the 2009/10 survey questionnaire, a number of questions of that nature were identified and a decision was made to include those questions in a new “current topics” chapter. The questions in the 2009/10 current topics chapter are not likely to be repeated in future surveys but provide useful information on issues of current interest to many hospital pharmacists.

IMPACT OF THE RECESSION ON FUNDING FOR STAFF, SERVICES AND SUPPLIES

The global economic challenges that began in 2008 have had a profound impact in many countries throughout the world. Although Canada has fared well in comparison to many other countries, the initial infusion of stimulus funding was expected to be followed shortly thereafter by deficit reduction initiatives that could be expected to constrain or reduce the funding provided to health care facilities. We asked a number of questions in the 2009/10 survey in order to determine if pharmacy-related funding was being affected by the current economic environment (Table J-1).

- When asked if the current economic environment had affected their staffing budget, 61% of the respondents indicated that there had been no change in their staffing budget and an additional 17% indicated that their staffing budget had actually increased in 2009/10. Twenty percent of respondents indicated that they had experienced a 1% to 10% decrease in their staffing budget, while only 2% indicated that they had experienced a staffing budget reduction of 11% to 50%. Regionally, 97% (33/34) of Quebec (QC) respondents indicated that they had experienced no reduction, or an actual increase, in their staffing budget. Ontario (ON) respondents were most likely to report a decrease in their staffing budget, with 48% (24/50) reporting that they had experienced a 1% to 10% reduction in their staffing budget. Overall, the impact on staffing budgets was relatively minor.
- Most respondents indicated that their capital equipment budgets were not reduced. Fifty-seven percent of all respondents reported no impact on their equipment budget, while 9% reported an actual increase in their equipment budget. However, 9% of respondents indicated that there had been a 51% to 100% reduction in their equipment budget and a further 9% reported an 11% to 50% reduction in their budget. QC respondents indicated that the economic environment had little impact on their capital equipment budget, with 90% (29/32) reporting either no impact or an increase in their equipment budgets. ON respondents reported the greatest impact on their equipment budgets with 20% (10/49) reporting a 1 to 10% decrease, 10% (5/49) reporting an 11 to 50% decrease, and 18% (9/49) reporting a 51 to 100% decrease. Supply budgets showed similar trends both nationally and regionally to those for equipment budgets.
- A majority of all respondents reported that their educational travel budgets had been reduced. Nationally, 14% of respondents reported a 1% to 10% reduction in funding, 17% reported an 11% to 50% reduction, and 22% reported a 51% to 100% reduction. Regionally, QC fared better than the rest of the country, with 73% (24/33) reporting no impact and 9% (3/33) reporting an increase in their budgets. In BC and the Prairies, 61% (14/23) and 52% (16/31) of respondents respectively reported that they had experienced a 51% to 100% reduction in their educational budgets.

Educational budgets represent a very small percentage of a pharmacy department’s overall budget, yet there was a substantial reduction in

It appears that hospital administrators and/or government funding agencies place educational funding low on their list of funding priorities.

funding for educational travel in many Canadian hospitals. Although health care is a knowledge-based industry, and the health care industry already lags well behind other knowledge-based industries in the proportion of its budget that goes towards education, it appears that hospital administrators and/or government funding agencies place a low priority on educational funding. Without the ability to learn from others through participation in educational conferences and seminars, innovation and diffusion of change within our health care system is likely to suffer.

Table J-1 Impact of the current fiscal environment on areas of the department's 2009/10 budget

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Impact on Staffing budget (n=)	(155)	(33)	(91)	(31)	(42)	(113)
No impact	94 61%	25 76%	53 58%	16 52%	20 48%	74 65%
1-10% reduction	31 20%	5 15%	17 19%	9 29%	14 33%	17 15%
11-50% reduction	3 2%	0 0%	3 3%	0 0%	1 2%	2 2%
Budget increase	27 17%	3 9%	18 20%	6 19%	7 17%	20 18%
Impact on Capital equipment budget (n=)	(152)	(32)	(90)	(30)	(41)	(111)
No impact	86 57%	20 63%	51 57%	15 50%	22 54%	64 58%
1-10% reduction	24 16%	4 13%	13 14%	7 23%	9 22%	15 14%
11-50% reduction	14 9%	5 16%	7 8%	2 7%	1 2%	13 12%
51-100% reduction	14 9%	1 3%	11 12%	2 7%	2 5%	12 11%
Budget increase	14 9%	2 6%	8 9%	4 13%	7 17%	7 6%
Impact on Supplies budget (n=)	(154)	(33)	(90)	(31)	(42)	(112)
No impact	88 57%	21 64%	49 54%	18 58%	25 60%	63 56%
1-10% reduction	40 26%	10 30%	24 27%	6 19%	10 24%	30 27%
11-50% reduction	4 3%	0 0%	4 4%	0 0%	0 0%	4 4%
Budget increase	22 14%	2 6%	13 14%	7 23%	7 17%	15 13%
Impact on Educational travel budget (n=)	(152)	(32)	(90)	(30)	(41)	(111)
No impact	65 43%	13 41%	38 42%	14 47%	20 49%	45 41%
1-10% reduction	22 14%	6 19%	12 13%	4 13%	9 22%	13 12%
11-50% reduction	26 17%	6 19%	16 18%	4 13%	5 12%	21 19%
51-100% reduction	34 22%	7 22%	22 24%	5 17%	5 12%	29 26%
Budget increase	5 3%	0 0%	2 2%	3 10%	2 5%	3 3%
Impact on Drug Budget (n=)	(155)	(33)	(91)	(31)	(42)	(113)
No impact	78 50%	23 70%	45 49%	10 32%	18 43%	60 53%
1-10% reduction	37 24%	6 18%	25 27%	6 19%	8 19%	29 26%
11-50% reduction	2 1%	1 3%	1 1%	0 0%	1 2%	1 1%
Budget increase	38 25%	3 9%	20 22%	15 48%	15 36%	23 20%

Base: All respondents

Table J-2. Projected Impact of the current fiscal environment on the department's 2010/11 budget

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Impact on Staffing budget (n=)	(153)	(33)	(90)	(30)	(42)	(111)
No impact	55 36%	16 48%	26 29%	13 43%	19 45%	36 32%
1-10% reduction	43 28%	6 18%	29 32%	8 27%	9 21%	34 31%
11-50% reduction	3 2%	2 6%	1 1%	0 0%	1 2%	2 2%
Budget increase	31 20%	3 9%	23 26%	5 17%	10 24%	21 19%
Unknown impact	21 14%	6 18%	11 12%	4 13%	3 7%	18 16%
Impact on Capital equipment budget (n=)	(153)	(33)	(91)	(29)	(41)	(112)
No impact	58 38%	9 27%	37 41%	12 41%	19 46%	39 35%
1-10% reduction	22 14%	5 15%	12 13%	5 17%	10 24%	12 11%
11-50% reduction	16 10%	6 18%	8 9%	2 7%	0 0%	16 14%
51-100% reduction	11 7%	2 6%	7 8%	2 7%	1 2%	10 9%
Budget increase	10 7%	1 3%	6 7%	3 10%	2 5%	8 7%
Unknown impact	36 24%	10 30%	21 23%	5 17%	9 22%	27 24%
Impact on Supplies budget (n=)	(154)	(33)	(91)	(30)	(42)	(112)
No impact	61 40%	12 36%	37 41%	12 40%	16 38%	45 40%
1-10% reduction	53 34%	12 36%	31 34%	10 33%	17 40%	36 32%
11-50% reduction	8 5%	2 6%	6 7%	0 0%	0 0%	8 7%
Budget increase	11 7%	1 3%	7 8%	3 10%	3 7%	8 7%
Unknown impact	21 14%	6 18%	10 11%	5 17%	6 14%	15 13%
Impact on Educational travel budget (n=)	(154)	(33)	(91)	(30)	(42)	(112)
No impact	31 20%	7 21%	16 18%	8 27%	13 31%	18 16%
1-10% reduction	27 18%	8 24%	11 12%	8 27%	7 17%	20 18%
11-50% reduction	39 25%	7 21%	29 32%	3 10%	9 21%	30 27%
51-100% reduction	19 12%	4 12%	11 12%	4 13%	3 7%	16 14%
Budget increase	7 5%	1 3%	5 5%	1 3%	1 2%	6 5%
Unknown impact	31 20%	6 18%	19 21%	6 20%	9 21%	22 20%
Impact on Drug Budget (n=)	(154)	(33)	(91)	(30)	(42)	(112)
No impact	43 28%	14 42%	24 26%	5 17%	12 29%	31 28%
1-10% reduction	43 28%	7 21%	30 33%	6 20%	12 29%	31 28%
11-50% reduction	3 2%	2 6%	1 1%	0 0%	1 2%	2 2%
51-100% reduction	1 1%	0 0%	1 1%	0 0%	0 0%	1 1%
Budget increase	40 26%	4 12%	23 25%	13 43%	11 26%	29 26%
Unknown impact	24 16%	6 18%	12 13%	6 20%	6 14%	18 16%

Base: All respondents

- Seventy-five percent (116/155) of all respondents, and 94% (32/34) of respondents in QC, reported that there was no impact or an increase in their drug budget.
- When asked what impact the economic environment would have on their upcoming budget (2010/2011 fiscal year), the responses suggested that most respondents believed that the budget trends experienced in 2010/11 would be similar to those seen in 2009/10. (Table J-2) QC respondents were most optimistic, expecting that budgets would remain unchanged or would increase. Respondents in ON and BC were most likely to expect that there would be reductions in their budgets for staffing, capital equipment, supplies, educational travel and drugs.

WASTE MANAGEMENT

With the increased awareness of the impact that human activity has had on the environment, both private individuals and organizations are being challenged to improve their waste management practices. This is an important issue for hospitals to address, since the waste that hospitals produce includes toxins (e.g. pharmaceutical waste) and potentially infectious biological material. In addition, hospitals produce large amounts of waste, such as cardboard and paper, that could be recycled.

- With respect to the recycling of cardboard and paper waste, 90% of respondents reported that this practice occurs in the pharmacy department. When asked if their facility had formal policies in place for the handling of pharmaceutical waste, 85% of respondents indicated that they did. Ninety-five percent of teaching hospitals and 81% of non-teaching hospitals indicated that they had such policies in place. Regionally, the lowest percentage of respondents with such policies in place was reported by QC (69%, 24/35).

While the percentage of respondents with waste policies in place is quite high, a good argument can be made that all hospitals should be required to have policies in place for the handling of pharmaceutical waste.

Some hospitals do not have policies in place for the handling of pharmaceutical and other waste.

- Fifteen percent of respondents reported that some of their pharmaceutical waste is disposed of via the sewer system. Those respondents indicated that, on average, they disposed of 9% of their pharmaceutical waste via the sewer.

Efforts should be made to find ways to reduce and, if possible, eliminate the disposal of pharmaceuticals via the sewer. There are a few situations where there is conflicting guidance concerning the disposal of certain drugs, such as narcotic patches. The placement of used patches in sharps containers and other disposal containers may provide drug-seeking individuals with an opportunity for drug diversion. Needle-stick injuries, with the potential for disease transmission, have been reported when such individuals have gone through sharps containers looking for used narcotic patches, which still retain a reasonable portion of their initial narcotic load.¹ As a result, some sources recommend that narcotic patches be disposed of via the sewer.

- Twelve percent of respondents reported that they used a landfill to dispose of pharmaceutical waste. The average amount of their pharmaceutical waste disposed of in this manner was reported to be 41%.

The disposal of pharmaceutical waste in landfills is prohibited in many jurisdictions. Efforts should be made to find more acceptable alternatives for the disposal of pharmaceutical waste.

Waste disposal practices are not always consistent throughout the hospital.

- Respondents were asked if the disposal of pharmaceutical waste was conducted in a similar manner on patient care units as it was conducted in the pharmacy. The majority of respondents (66%) reported that the disposal methods were similar in the two areas. Nineteen percent reported that the disposal methods were different on the patient care units than in the pharmacy. The remaining 15% indicated that they did not know what disposal methods were being used on patient care units.

Hospitals should establish waste disposal policies that minimize the impact of hazardous hospital waste on the environment, and should insure that those policies are applied consistently throughout all areas of the facility.

Table J-3. Waste Management Practices 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Formal policies and procedures are in place for the handling of pharmaceutical waste (n=)	(157) 133 85%	(33) 28 85%	(93) 77 83%	(31) 28 90%	(42) 40 95%	(115) 93 81%
Some pharmaceutical waste is disposed of via the sewer system. (n=)	(157) 23 15%	(33) 4 12%	(93) 15 16%	(31) 4 13%	(42) 8 19%	(115) 15 13%
Percent of pharmaceutical waste that is disposed of via the sewer system. (n=)	(21) 9%	(3) 14%	(15) 8%	(3) 8%	(6) 10%	(15) 8%
Some pharmaceutical waste disposed of in a landfill. (n=)	(154) 19 12%	(33) 3 9%	(92) 10 11%	(29) 6 21%	(41) 3 7%	(113) 16 14%
Percent of pharmaceutical waste that is disposed of in a landfill (n=)	(16) 41%	(2) 88%	(10) 30%	(4) 43%	(1) 30%	(15) 41%
The manner in which pharmaceutical waste is disposed of in patient care areas is: (n=)	(157)	(33)	(93)	(31)	(42)	(115)
Similar to the manner it is disposed of in pharmacy	104 66%	24 73%	56 60%	24 77%	35 83%	69 60%
Different to the manner it is disposed of in pharmacy	30 19%	4 12%	21 23%	5 16%	6 14%	24 21%
Not aware of how it is disposed of on patient care areas	23 15%	5 15%	16 17%	2 6%	1 2%	22 19%
In the pharmacy department, cardboard and paper waste are separated for recycling. (n=)	(157) 141 90%	(33) 31 94%	(93) 84 90%	(31) 26 84%	(42) 34 81%	(115) 107 93%

Base: All respondents

COLD CHAIN MANAGEMENT

The maintenance of appropriate cold storage conditions for certain pharmaceutical and biological products received considerable attention during the H1N1 flu pandemic. When hospitals examined their cold chain management practices, many found that there were deficiencies in their existing policies and equipment. In the 2009/10 survey a number of questions were asked to determine if appropriate cold chain policies and equipment were in place in the surveyed hospitals.

Expect a heightened emphasis on the maintenance of cold chain storage requirements.

- When asked if purchasing standards were in place for refrigerators used in the pharmacy department, 76% of respondents reported that they had such standards. Hospitals in the 50-200 bed range were less likely to have standards in place (64%) than hospitals in the 201-500 bed range (79%) and greater than 500 bed hospitals (80%). Regionally, lower percentages of hospitals in QC (63%, 22/35) and the Atlantic Provinces (65%, 11/17) reported that they had such standards in place. When asked if there were purchasing standards in place for refrigerators used in patient care areas, the percentages were considerably lower, with only 44% of respondents reporting that such standards existed in their facility.
- Respondents were also asked if all of the existing refrigerators in the pharmacy and on the patient care units met the same standards that would be required if a new refrigerator was purchased. Overall 80% of respondents indicated that all of their existing pharmacy refrigerators were compliant with the standards. Teaching hospitals reported a slightly higher degree of compliance (88% of respondents) than non-teaching hospitals (77%). Regionally, BC (65%; 15/23) and the Atlantic Provinces (63%; 10/16) reported the lowest level of compliance between their existing pharmacy refrigerators and the standards that they had established for the purchase of new refrigerators. With respect to patient care units, only 24% of respondents reported that all existing refrigerators on those units complied with the standards that would be required for new refrigerators. These results suggest that capital funding for replacing substandard refrigerators has not been made available in many hospitals.

Table J-4. Cold Chain Management 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Cold Chain Management in Pharmacy Departments:						
Purchasing standards have been developed for Pharmacy refrigerators to insure that cold chain requirements are maintained. (n=)	(155)	(33)	(92)	(30)	(42)	(113)
	118	21	73	24	36	82
	76%	64%	79%	80%	86%	73%
All refrigerators used in your Pharmacy meet the standards that have been established. (n=)	(155)	(32)	(92)	(31)	(42)	(113)
	124	23	75	26	37	87
	80%	72%	82%	84%	88%	77%
Pharmacy refrigerator temperatures are monitored on an ongoing basis, and the results are documented. (n=)	156	(33)	(92)	(31)	(42)	(114)
	142	26	86	30	41	101
	91%	79%	93%	97%	98%	89%
Remote temperature monitoring is in place 24 hours a day for Pharmacy refrigerators and a Pharmacy staff member is notified immediately when a temperature failure is detected. (n=)	156	(33)	(92)	(31)	(42)	(114)
	125	21	76	28	36	89
	80%	64%	83%	90%	86%	78%
If Pharmacy refrigerator temperatures fall outside the required range, there is a process for assessing if products are safe to use. (n=)	(155)	(33)	(91)	(31)	(42)	(113)
	111	20	67	24	32	79
	72%	61%	74%	77%	76%	70%
Cold Chain Management in Patient Care areas:						
Purchasing standards have been developed for refrigerators to be used in patient care areas. (n=)	(155)	(33)	(91)	(31)	(41)	(114)
	68	12	41	15	23	45
	44%	36%	45%	48%	56%	39%
All refrigerators used in patient care areas of your hospital meet the standards. (n=)	(155)	(32)	(92)	(31)	(42)	(113)
	37	9	22	6	11	26
	24%	28%	24%	19%	26%	23%
The temperature in the refrigerators used in patient care areas is monitored on an ongoing basis, and the results are documented. (n=)	(156)	(33)	(92)	(31)	(42)	(114)
	54	12	35	7	15	39
	35%	36%	38%	23%	36%	34%
Remote temperature monitoring is in place 24 hours a day for refrigerators in patient care areas and a hospital staff member is notified immediately when a temperature failure is detected. (n=)	(155)	(32)	(92)	(31)	(42)	(113)
	18	2	15	1	3	15
	12%	6%	16%	3%	7%	13%
If the temperature in a refrigerator in patient care areas is outside the required range, there is a process for assessing if products are safe to use. (n=)	(156)	(33)	(92)	(31)	(42)	(114)
	68	13	42	13	17	51
	44%	39%	46%	42%	40%	45%

Base: All respondents

- With respect to the monitoring of refrigerators in the pharmacy department, 91% of all respondents reported that temperatures are monitored and documented on a regular basis. Respondents in BC were least likely (74%; 17/23) to report that pharmacy refrigerator temperatures were monitored and documented on a regular basis, while respondents in ON were most likely to report that this procedure was in place (98%; 49/50). In a related question, 80% of all respondents reported that there is remote, 24 hour monitoring of the temperature in pharmacy refrigerators, and that a pharmacy staff member is notified immediately when a temperature failure is detected. Again, a lower percentage of BC respondents (61%; 14/23) reported that a remote temperature monitoring system was in place.
- When asked about temperature monitoring of refrigerators on patient care units, only 35% of all respondents reported that the temperatures were monitored and recorded for those refrigerators and just 12% reported that remote 24 hour monitoring was in place for refrigerators on patient care units.
- In the event that temperatures are found to have fallen outside the acceptable range, 72% of all respondents reported that there is a process in place in the pharmacy for assessing if the products are safe to use, and 44% reported such a process was in place in the patient care areas. Ontario respondents were most likely to report that this process was in place in pharmacy (88%) and in the patient care areas (60%).

It is likely that there will be a heightened emphasis on the maintenance of cold chain storage requirements in the years ahead. Vaccines, biological products, and other temperature sensitive preparations are growing in both importance and cost. Some mandatory cold chain storage requirements, intended to preserve the potency and safety of these products, are already in place in some provinces and it can be anticipated that similar requirements will eventually be mandated across the country.

TECHNICIAN CERTIFICATION AND REGULATION

There are many questions related to how hospital pharmacy managers will handle the changes that are occurring in Canada with respect to the certification and regulation of pharmacy technicians. In the 2009/10 survey, we posed a number of those questions.

Certification and regulation of Pharmacy Technicians is at various stages in different regions of the country.

- When asked if their department had held educational sessions to inform their existing pharmacy technicians of the changing environment with respect to certification and regulation, 72% of all respondents reported that they had done so. Not surprisingly, the regions that are farthest along in the process of regulating technicians, ON and BC, were most likely to report that they had provided educational sessions; 100% (24/24) in BC and 92% (46/50) in ON. Only 17% (6/35) of QC respondents reported that they had held such educational sessions, which again is not surprising, given that the certification and regulation of pharmacy technicians has not progressed very far yet in that province.
- While only 32% of respondents overall reported that they were providing financial support to their technicians who wished to pursue certification through the Pharmacy Examining Board of Canada (PEBC) or a similar accrediting body, 80% (39/49) of respondents in ON reported that they were doing so.
- When asked if all new pharmacy technicians had to have their certification through PEBC, or a similar accrediting body, 27% of all respondents reported that this was required of new hires. In ON, 60% (30/50) reported that this was now required. When asked if pharmacy technicians who were already employed by the pharmacy are, or eventually would be, required to have their certification from PEBC or a similar organization, 55% overall and 92% (46/50) of ON respondents reported that this would be the case. In contrast, only 6% (2/35) of QC respondents thought that this would be required.

For further discussion on Technician Certification, see Chapter K, Pharmacy Technicians.

Table J-5 Technician Certification and Regulation 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Educational sessions have been provided to inform pharmacy technicians of the changing environment related to certification and regulation. (n=)	(157)	(33)	(93)	(31)	(42)	(115)
	113	22	71	20	28	85
	72%	67%	76%	65%	67%	74%
All new hires must have certification by PEBC or a similar recognized accrediting organization. (n=)	(156)	(33)	(93)	(30)	(42)	(114)
	42	9	26	7	10	32
	27%	27%	28%	23%	24%	28%
Existing pharmacy technicians are (/will be) required to have certification by PEBC or a similar accrediting organization. (n=)	(157)	(33)	(93)	(31)	(42)	(115)
	87	19	54	14	20	67
	55%	58%	58%	45%	48%	58%
Financial support is being provided to pharmacy technicians who wish to become certified by PEBC or a similar accrediting organization. (n=)	(156)	(33)	(92)	(31)	(42)	(114)
	50	8	34	8	12	38
	32%	24%	37%	26%	29%	33%

Base: All respondents

COMPLIANCE WITH ACCREDITATION CANADA’S “MANAGING MEDICATION STANDARDS”

The Managing Medication Standards are a relatively new component of Accreditation Canada’s standards for health care organizations in Canada. We first asked respondents if their facility had gone through Accreditation Canada’s accreditation process since the new medication management standards had come into effect. Seventy percent (110/157) of respondents indicated that they had done so. We then asked those 110 respondents a series of questions related to how well their facility complied with the new standards.

Compliance with Accreditation Canada’s medication management standards is less than complete

- For the standards that dealt with the theme of “Working together to promote medication safety”, 70% of respondents who have been accredited reported that they were fully compliant with those standards, 25% reported that they were found to have a minor degree of non-compliance with the standards, and 5% reported a major degree of non-compliance with the standards in this area. ON facilities were most likely to report that they had achieved full compliance (93%; 39/42), versus 67% (12/18) of those in BC, 64% (16/25) of those in QC, 36% (5/14) of those in the Prairies, and 29% (2/7) of those in the Atlantic Provinces.
- For the standards dealing with “Carefully selecting and procuring medications”, 81% of respondents who have been accredited reported that they achieved full compliance, 18% reported a minor degree of non-compliance, and 1% reported a major degree of non-compliance. In ON, 100% (42/42) of respondents reported that they had achieved full compliance in this area, versus 83% (15/18) of those in BC, 80% (20/25) of those in QC, 50% (7/14) of those in the Prairies and 29% (2/7) of those in the Atlantic Provinces.
- For the standards dealing with “Properly labeling and storing medications”, 68% of respondents who have been accredited reported that they were fully compliant, 26% reported a minor degree of non-compliance, and 6% reported a major degree of non-compliance. In ON 81% (34/42) reported that they had achieved full compliance with these standards, versus 78% (14/18) of those in BC, 60% (15/25) of those in QC, 43% (3/7) of those in the Atlantic Provinces, and 43% (6/14) of those in the Prairies.
- For the standards dealing with “Appropriately ordering and transcribing medications”, 67% of respondents who have been accredited reported that they were fully compliant, 26% reported a minor degree of non-compliance, and 6% reported a major degree of non-compliance. In ON, 83% (35/42) of respondents reported that they had achieved full compliance with these standards, versus 72% (13/18) of those in BC, 64% (16/25) of those in QC, 43% (3/7) of those in The Atlantic Provinces, and 29% (4/14) of those in the Prairies.
- For the standards dealing with “Accurately preparing and dispensing medications”, 70% of respondents who have been accredited reported that they were fully compliant, 22% reported a minor degree of non-compliance, and 8% reported a major degree of non-compliance. In ON, 81% (34/42) of respondents reported that they had achieved full compliance with these standards, versus 78% (14/18) in BC, 76% (19/25) in QC, 43% (3/7) in the Atlantic Provinces, and 29% (4/14) in the Prairies.
- For the standards dealing with “Safely administering medications to clients”, 58% of respondents who have been accredited reported that they were fully compliant, 32% reported a minor degree of non-compliance, and 9% reported a major degree of non-compliance. In ON, 79% (33/42) of respondents reported that they had achieved full compliance with these standards, versus 72% (13/18) in BC, 48% (12/25) in QC, 21% (3/14) in the Prairies, and 14% (1/7) in the Atlantic Provinces.
- For the standards dealing with “Monitoring quality and achieving positive results” 65% of respondents who have been accredited reported that they were fully compliant, 29% reported a minor degree of non-compliance, and 6% reported a major degree of non-compliance. In ON, 86% (36/42) of respondents reported that they had achieved full compliance with these standards, versus 72% (13/18) in BC, 60% (15/25) in QC, 43% (3/7) in The Atlantic Provinces, and 14% (2/14) in the Prairies.

Overall, these results suggest that there is considerable opportunity for improving the systems that fall under each of these medication management areas. Some of the theme areas, such as “Carefully selecting and procuring medications” and “Accurately preparing and dispensing medications”, are ones which pharmacy plays a very large role in administering. Hospital pharmacy managers whose facilities have achieved full compliance with the accreditation standards should be encouraged to share their success stories with others. Sharing sessions at pharmacy conferences might be an effective strategy to achieve this.

Table J-6 Accreditation Canada's "Managing Medication Standards" 2009/10

	----- All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Facility has been accredited (n=)	(157) 110 70%	(33) 20 61%	(93) 72 77%	(31) 18 58%	(42) 23 55%	(115) 87 76%
Degree of Compliance Reported by Accreditation Canada						
Working together to promote medication safety (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	74 70%	10 59%	50 70%	14 78%	20 87%	54 65%
Minor degree of non-compliance	27 25%	6 35%	17 24%	4 22%	3 13%	24 29%
Major degree of non-compliance	5 5%	1 6%	4 6%	0 0%	0 0%	5 6%
Carefully selecting and procuring medications (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	86 81%	12 71%	59 83%	15 83%	20 87%	66 80%
Minor degree of non-compliance	19 18%	5 29%	11 15%	3 17%	3 13%	16 19%
Major degree of non-compliance	1 1%	0 0%	1 1%	0 0%	0 0%	1 1%
Properly labeling and storing medications (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	72 68%	8 47%	50 70%	14 78%	18 78%	54 65%
Minor degree of non-compliance	28 26%	7 41%	18 25%	3 17%	4 17%	24 29%
Major degree of non-compliance	6 6%	2 12%	3 4%	1 6%	1 4%	5 6%
Appropriately ordering and transcribing medications (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	71 67%	8 47%	50 70%	13 72%	15 65%	56 67%
Minor degree of non-compliance	29 27%	8 47%	17 24%	4 22%	7 30%	22 27%
Major degree of non-compliance	6 6%	1 6%	4 6%	1 6%	1 4%	5 6%
Accurately preparing and dispensing medications (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	74 70%	7 41%	53 75%	14 78%	19 83%	55 66%
Minor degree of non-compliance	23 22%	8 47%	12 17%	3 17%	2 9%	21 25%
Major degree of non-compliance	9 8%	2 12%	6 8%	1 6%	2 9%	7 8%
Safely administering medications to clients (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	62 58%	7 41%	45 63%	10 56%	15 65%	47 57%
Minor degree of non-compliance	34 32%	7 41%	20 28%	7 39%	6 26%	28 34%
Major degree of non-compliance	10 9%	3 18%	6 8%	1 6%	2 9%	8 10%
Monitoring quality and achieving positive results (n=)	(106)	(17)	(71)	(18)	(23)	(83)
Fully compliant	69 65%	8 47%	49 69%	12 67%	16 70%	53 64%
Minor degree of non-compliance	31 29%	8 47%	17 24%	6 33%	7 30%	24 29%
Major degree of non-compliance	6 6%	1 6%	5 7%	0 0%	0 0%	6 7%
Process for achieving compliance with Accreditation Canada's Managing Medication Standards						
(n =)	(152)	(32)	(89)	(31)	(42)	(110)
Pharmacy insures progress. Each discipline is responsible for addressing any deficiencies in their area	43 28%	9 28%	28 32%	6 19%	10 24%	33 30%
A multidisciplinary team (physicians, nurses, pharmacists...) insures that progress is being made towards compliance	102 67%	21 66%	59 66%	22 71%	31 74%	71 65%
Other	15 10%	3 9%	6 7%	6 19%	5 12%	10 9%

Base: All respondents. Note: multiple mentions permissible

STRUCTURED PRACTICAL EXPERIENTIAL PROGRAMS

The experiential training programs that pharmacy departments provide to students-in-training are an important part of the educational programs for undergraduate pharmacy students, post-graduate pharmacy students, hospital pharmacy residents, and pharmacy technicians. However, many hospital pharmacy departments have been struggling with the teaching workloads associated with experiential training programs. The increase in undergraduate enrolment, which occurred over the past decade in response to the pharmacist manpower shortage, has substantially increased the demand for experiential placements. As the role of the pharmacy technician changes, and regulation of pharmacy technicians progresses, the demand for experiential training opportunities for technicians is increasing. Future demand for experiential training for pharmacists is expected to grow in response to the need for more advanced clinical skills as the profession evolves, and in response to the momentum that is building for a change to the Doctor of Pharmacy as the entry-to-practice degree. In the 2009/10 survey, we included a number of questions that were intended to provide a better understanding of the experiential training challenges that are facing hospital pharmacy in Canada.

Many hospital pharmacy departments have been struggling with the teaching workloads associated with experiential training programs.

The first set of questions explored the type and extent of experiential training that was being provided by Canadian hospital pharmacies. It should be noted that “Teaching Hospitals” are defined as hospitals that belong to the Association of Canadian Academic Healthcare Organizations (ACAHO). They tend to be the large university-affiliated hospitals that are based in close physical proximity to a university with a Faculty of Medicine, Faculty of Pharmacy, and other health programs. As the information that follows will show, these are not the only hospitals that provide training to students in the health sciences.

- Structured practical experiential program (SPEP) training for undergraduate pharmacy students was reported to be provided by 90% of all respondents. One hundred percent of teaching hospitals provided this type of SPEP training, as well as 87% of non-teaching hospitals. Even most small hospitals, those with 50 to 200 beds, provided SPEP training for undergraduate pharmacy students, with 82% reporting that they did so.
- SPEP training for graduate pharmacy students, such as the post-graduate Pharm.D. programs at the University of Toronto and the University of British Columbia, was reported to be provided by 36% of all respondents. Sixty-two percent of teaching hospitals and 26% of non-teaching hospitals provided this type of SPEP training. Not surprisingly, given the location of the two Pharm. D. programs, this type of SPEP training was provided by a larger percentage of respondents in BC (63%; 15/24) and ON (45%; 22/49) than in other regions.
- SPEP training for hospital pharmacy residents, and M.Sc. hospital residents in QC, was reported to be provided by 40% of all respondents (85% of teaching hospitals and 22% of non-teaching hospitals). Many hospitals in BC and QC have traditionally required a residency to practice in their hospital, which is reflected in the fact that 67% (16/24) of hospitals in BC and 41% (13/32) of hospitals in QC reported that they provide SPEP training for hospital pharmacy residents. Approximately one-third of hospitals in other regions provide this type of SPEP training.
- SPEP training for pharmacy technicians was reported to be provided by 92% of all hospitals. The lowest percentage of hospitals providing this type of training was reported in QC, but 85% (28/33) of hospitals there were also involved in providing this type of SPEP program.

These results indicate that most hospitals in Canada that participated in this survey are actively involved in the provision of SPEP training. There appears to be little opportunity to expand experiential training by increasing the number of hospitals that provide SPEP training. Increases in SPEP training provided by hospitals would have to be achieved primarily by increasing the number of training spots within those hospitals that are already offering SPEP training.

Questions were also asked concerning the models that each hospital used to manage their SPEP training. For undergraduate pharmacy student SPEP training, the following was reported:

- The majority of respondents (55%; 78/142) reported that they assign only one student to each preceptor. In ON 82% (36/44) of respondents reported that this was the case, versus 50% (15/30) in QC, 42% (13/31) in the Prairies, 38% (8/21) in BC and 38% (6/16) in the Atlantic Provinces. The other respondents in each region sometimes assign more than one student to a given preceptor.

SPEP training opportunities could be expanded by adopting a model with more than one student assigned to a preceptor. Based on the data described above, this is already happening in some Canadian hospitals. SPEP models in other disciplines, like medicine, often involve the assignment of a group of students to a single preceptor. However, disciplines like medicine often have funding arrangements that provide dedicated preceptor time, whereas pharmacy preceptors are usually expected to carry out all of their normal responsibilities while precepting students.

SPEP training capacity might be expanded by adopting models used in medicine and other health disciplines.

- Peer assisted learning and mentoring, where senior pharmacy students participate in the training of junior students, was reported to be used by 28% (39/142) of all respondents. BC respondents most frequently reported that this model was in use (57%; 12/21).

Peer assisted models have traditionally been used in medicine, where more senior medical residents participate in the training of students who are junior to them. This model has the potential to significantly increase the capacity for SPEP training of undergraduate pharmacy students, but would require a major change in the way that SPEP training is designed and scheduled throughout the undergraduate pharmacy program.

- The participation of pharmacy faculty members as preceptors for undergraduate pharmacy student SPEP training programs was reported by 11% (15/142) of all respondents. This was reported most frequently by respondents in the Prairies (19%; 6/31).

Overall the participation of faculty members in SPEP training is low and the limited number of clinical faculty members in Canadian Faculties of Pharmacy suggests that there are limited opportunities for expanding SPEP training through an increase in the use of faculty members as SPEP preceptors.

- The use of preceptors from other disciplines (nursing, medicine, etc) was reported by 25% (36/142) of all respondents. In BC, this practice was reported by 67% (14/21) of respondents. This model may offer the potential in other regions to expand SPEP capacity by placing more undergraduate pharmacy SPEP students with preceptors from other disciplines.

The interdisciplinary nature of this approach has merit. However, it could be argued that primary responsibility for precepting pharmacy students should rest with members of the pharmacy profession. It is also possible that other disciplines would resist taking on the greater responsibility for precepting pharmacy students without being compensated for doing so.

With a few exceptions, the SPEP models for graduate pharmacy students, hospital pharmacy residents, and pharmacy technicians were generally consistent with the models used to provide SPEP training to undergraduate pharmacy students. The most notable differences were:

- Overall the percentage of facilities that used preceptors from other disciplines was much lower for pharmacy technician SPEP training (3%; 4/129) than it was for undergraduate pharmacy student SPEP training (25%; 36/142). This finding is not surprising, given that individuals from disciplines other than pharmacy would generally not have much to contribute to the technical, drug distribution system-related training of pharmacy technicians. British Columbia, which reported the highest use of preceptors from other disciplines for undergraduate pharmacy students (67%; 14/21 vs. 25% nationally), used this model less frequently for graduate pharmacy students (13%; 2/15), which was closer to the national average of 18%; 9/51).

For a more detailed discussion of SPEP for pharmacy technician students, see chapter K, Pharmacy Technicians.

The final SPEP question posed 12 possible enablers that respondents were asked to rank from 1 to 12, with 1 representing the most useful enabler and 12 representing the least useful enabler. The responses were averaged and the enablers are presented in Table J-8, with the most useful at the top and the least useful at the bottom. The most useful enablers were ones that would insure that preceptors had dedicated time and fewer competing demands when they are serving as preceptors.

Table J-7a. Structured Practical Experiential Programs (SPEP) for Categories of Students 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Facility has SPEP for various categories of students (n=)	(157)	(33)	(93)	(31)	(42)	(115)
SPEP for Undergraduate pharmacy students	142 90%	27 82%	85 91%	30 97%	42 100%	100 87%
SPEP for Graduate pharmacy students (n=)	(145)	(28)	(89)	(28)	(39)	(106)
SPEP for Pharmacy residents (Clinical Masters in Quebec) (n=)	(143)	(28)	(87)	(28)	(40)	(103)
SPEP for Pharmacy technician students (n=)	(153)	(33)	(90)	(30)	(40)	(113)
	141 92%	27 82%	85 94%	29 97%	38 95%	103 91%

Base: All respondents

Table J-7b. Models of SPEP for Undergraduate pharmacy students 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Models of SPEP for Undergraduate Pharmacy Students (n=)	(142)	(27)	(85)	(30)	(42)	(100)
Only one student at a time is assigned to each preceptor.	78 55%	16 59%	46 54%	16 53%	16 38%	62 62%
More than one student at a time are sometimes assigned to each preceptor	59 42%	11 41%	36 42%	12 40%	24 57%	35 35%
Only one preceptor at a time is assigned to each student	35 25%	5 19%	20 24%	10 33%	12 29%	23 23%
More than one preceptor at a time are sometimes assigned to each student.	88 62%	14 52%	57 67%	17 57%	24 57%	64 64%
Peer assisted learning and mentoring is utilized (senior students train junior students)	39 28%	1 4%	29 34%	9 30%	13 31%	26 26%
University or technician college faculty members sometimes serve as preceptors for these students	15 11%	1 4%	10 12%	4 13%	11 26%	4 4%
Preceptors from other disciplines (e.g., medicine, nursing) sometimes serve as preceptors for these students.	36 25%	7 26%	27 32%	2 7%	3 7%	33 33%
Other SPEP models are used in our facility to increase our training capacity.	13 9%	1 4%	11 13%	1 3%	5 12%	8 8%

Base: Facilities with SPEP for Undergraduate pharmacy students. Note: multiple mentions permissible

Table J-7c. Models of SPEP for Graduate pharmacy students 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Models of SPEP for Graduate Pharmacy Students (n=)	(51)	(4)	(31)	(16)	(24)	(27)
Only one student at a time is assigned to each preceptor.	32 63%	2 50%	17 55%	13 81%	18 75%	14 52%
More than one student at a time are sometimes assigned to each preceptor	15 29%	1 25%	12 39%	2 13%	3 13%	12 44%
Only one preceptor at a time is assigned to each student	21 41%	1 25%	10 32%	10 63%	14 58%	7 26%
More than one preceptor at a time are sometimes assigned to each student.	22 43%	3 75%	13 42%	6 38%	7 29%	15 56%
Peer assisted learning and mentoring is utilized (senior students train junior students)	15 29%	1 25%	11 36%	3 19%	1 4%	14 52%
University or technician college faculty members sometimes serve as preceptors for these students	10 20%	1 25%	7 23%	2 13%	8 33%	2 7%
Preceptors from other disciplines (e.g., medicine, nursing) sometimes serve as preceptors for these students.	9 18%	1 25%	5 16%	3 19%	6 25%	3 11%

Base: Facilities with SPEP for Graduate pharmacy students. Note: multiple mentions permissible

Table J-7d. Models of SPEP for Pharmacy residents (Clinical Masters in Quebec) 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Models of SPEP for Pharmacy Residents (Clinical Masters in Quebec) (n=)	(57)	(4)	(33)	(20)	(34)	(23)
Only one student at a time is assigned to each preceptor.	32 56%	2 50%	19 58%	11 55%	20 59%	12 52%
More than one student at a time are sometimes assigned to each preceptor	24 42%	2 50%	13 39%	9 45%	13 38%	11 48%
Only one preceptor at a time is assigned to each student	17 30%	1 25%	9 27%	7 35%	11 32%	6 26%
More than one preceptor at a time are sometimes assigned to each student.	29 51%	1 25%	18 55%	10 50%	16 47%	13 57%
Peer assisted learning and mentoring is utilized (senior students train junior students)	26 46%	1 25%	18 55%	7 35%	12 35%	14 61%
University or technician college faculty members sometimes serve as preceptors for these students	13 23%	1 25%	8 24%	4 20%	11 32%	2 9%
Preceptors from other disciplines (e.g., medicine, nursing) sometimes serve as preceptors for these students.	20 35%	1 25%	16 49%	3 15%	5 15%	15 65%
Other SPEP models are used in our facility to increase our training capacity.	1 2%	0 .0%	0 .0%	1 5%	1 3%	0 .0%

Base: Facilities with SPEP for Pharmacy residents (Clinical Masters in Quebec). Note: multiple mentions permissible

Table J-7e. Models of SPEP for Pharmacy technician students 2009/10

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Models of SPEP for Pharmacy Technician Students (n=)	(129)	(26)	(75)	(28)	(37)	(92)
Only one student at a time is assigned to each preceptor.	90 70%	19 73%	52 69%	19 68%	26 70%	64 70%
More than one student at a time are sometimes assigned to each preceptor	26 20%	3 11%	15 20%	8 29%	10 27%	16 17%
Only one preceptor at a time is assigned to each student	41 32%	6 23%	24 32%	11 39%	14 38%	27 29%
More than one preceptor at a time are sometimes assigned to each student.	72 56%	14 54%	46 61%	12 43%	17 46%	55 60%
Peer assisted learning and mentoring is utilized (senior students train junior students)	20 16%	0 .0%	15 20%	5 18%	7 19%	13 14%
University or technician college faculty members sometimes serve as preceptors for these students	6 5%	0 .0%	5 7%	1 4%	2 5%	4 4%
Preceptors from other disciplines (e.g., medicine, nursing) sometimes serve as preceptors for these students.	4 3%	1 4%	3 4%	0 .0%	1 3%	3 3%
Other SPEP models are used in our facility to increase our training capacity.	11 9%	1 4%	9 12%	1 4%	6 16%	5 5%

Base: Facilities with SPEP for Pharmacy technician students. Note: multiple mentions permissible

Table J-7f. Enablers for Expanding SPEG Programs 2009/10

Proposed Enabler	Mean usefulness ranking (from most useful to least useful)
Fewer competing demands in the workplace (i.e., reduced workloads)	3.7
Funding to provide backfill for preceptors who are providing experiential education	4.2
No pharmacist or technician vacancies in areas where students are being precepted	4.3
More flexibility in timing or scheduling of rotations	5.6
Dedicated university/technical college faculty who would assist with precepting students	6.3
Adequate space and equipment (e.g. computer access) to facilitate experiential education	6.4
Simplified evaluation forms and processes	6.7
Better prepared students	7.4
New or expanded preceptor training programs	7.8
Rotation coordinators/supervisors from the faculties/ colleges that would be based at, or regularly visit, your facility	8.2
Access to electronic resources (e.g., library, journals)	8.5
Academic appointments for preceptors	8.8

Base: Respondents with complete ranking

¹ How to dispose of unused medications. (2009) FDA *Consumer Health Information*, www.fda.gov/consumer, article retrieved Feb 11/11

K – PHARMACY TECHNICIANS

IAIN SMITH AND CHUCK WILGOSH

INTRODUCTION

Based on historical records and artwork depicting the history of the pharmacy profession, it appears that pharmacy “assistants” have played a role in the profession since its earliest beginnings. However, despite their long presence as a part of the pharmacy profession, the training, roles, responsibilities and even the title used to describe these individuals have not been clearly defined and tend to vary significantly between jurisdictions and practice settings. The earliest references in the health literature to “pharmacy technicians” referred to individuals in the pharmaceutical industry who were involved in the mass production of medicinal products.^{1,2} In North America, for at least the past 50 years, the term “pharmacy technician” has been widely used to describe individuals who have on-the-job or technical college training, and who assist pharmacists with the preparation and dispensing of pharmaceutical products. The term “pharmacy assistant” has sometimes been used interchangeably with the term pharmacy technician, but the former is more commonly used to describe individuals, with little or no formal training, who perform basic tasks that require minimal skill or knowledge.

In the past 10 to 20 years a number of initiatives have been undertaken in Canada and the United States (US) in an effort to better define the educational requirements and scope-of-practice of pharmacy technicians. In the United States, a pharmacy technician certification exam was established several decades ago, in an effort to provide a recognized evaluation tool that could be used to assess the training and knowledge of those who wished to identify themselves as a pharmacy technician. In Canada, the final report of a 3 year national study of pharmacy manpower in Canada (“*Moving Forward: Pharmacy Human Resources for the Future*”) was released in the fall of 2008.³ The report contained 36 recommendations, a number of which addressed issues such as the future education and role of pharmacy technicians. In addition, the report recommended that a regulatory framework be established to better define the role and scope-of-practice of this category of pharmacy personnel.

In the past few years, a number of important pharmacy technician initiatives have come to fruition across Canada. In September 2007, NAPRA released the document “Professional Competencies for Canadian Pharmacy Technicians at Entry to Practice”.⁴ Shortly thereafter, the Canadian Council for Accreditation of Pharmacy Programs (CCAPP) produced Standards for Accreditation of Pharmacy Technician Programs.⁵ As of July 2010, there were CCAPP-accredited pharmacy technician programs in every province except PEI and Newfoundland and Labrador.⁶ ON had the largest number of accredited technician training programs, with 18 having achieved either qualifying or provisional status.

During roughly the same time period, the Pharmacy Examining Board of Canada developed a certification exam process for pharmacy technicians, which is similar to that which has been used to manage pharmacist certification in Canada.⁷ It includes both an “evaluating exam” and a “qualifying” exam. Graduates from CCAPP accredited programs are able to bypass the evaluating exam and write the qualifying examination. Pharmacy technicians who have been in the workforce and wish to obtain their certifications will have a limited period of time to go through a separate process to obtain their certification. They will have to first write an “evaluating” exam to establish their eligibility to write the “qualifying” exam. All Canadian pharmacy technicians currently in the profession must write and pass the PEBC Pharmacy Technician Evaluating Examination by December 31, 2015 in order to be eligible to write the PEBC Qualifying Examination. Those who do not meet the 2015 deadline for passing the evaluating examination would likely have to enroll and complete a CCAPP-accredited pharmacy technician training program before they could become a certified pharmacy technician.

Technician regulation is in various stages of implementation in provinces across the country. It has already been introduced in Ontario and British Columbia. The term “Pharmacy Technician” will shortly become a protected title in these two provinces, and only those technicians who have achieved certification through the process that has been established by the PEBC will be able to use the title of “pharmacy technician”.

As the role of the pharmacist becomes increasingly patient-centred and focused on the management of medication therapy, pharmacy technicians are assuming greater responsibility for the drug distribution activities that were once the responsibility of the pharmacist. The 2009/10 Hospital Pharmacy in Canada Survey collected information that provides a good indication of how the role of pharmacy technicians in the hospital setting is

evolving. In past reports, information on the role of pharmacy technicians was scattered throughout a number of the chapters. Although there are still references to pharmacy technicians in other chapters of this report, most of the information related to pharmacy technicians has been consolidated in this chapter. Pharmacy managers should find this information helpful in justifying expanded roles for pharmacy technicians in their own organizations. Pharmacy technicians who review this chapter should be able to get a fairly good idea of the range of tasks that are being performed by their fellow pharmacy technicians across the country, as well as the changes in pharmacy technician certification and regulation that are occurring across the country. Technicians may also find the information helpful in making a case for their hospital's support as they make the transition to becoming a recognized and regulated health profession. That support might take several forms, such as in-house educational sessions to help pharmacy technicians understand the changes that are happening or perhaps even the provision of financial support for the cost of upgrading their skills and writing certification exams.

Articles in the British Medical Journal in 1900/01 referred to concerns about Scottish physicians employing unqualified "Pharmaceutical Assistants" to prepare and dispense medications.⁸

TECHNICIAN ROLES AND VALIDATION REQUIREMENTS

Table K-1 summarizes the functions performed by technicians, indicates whether or not technicians check the work of other technicians who perform these functions, and indicates whether or not a validation program must be completed by the technician prior to performing or checking the specific activity. Validation refers to an internal pharmacy department process designed to ensure that a pharmacy technician is qualified to perform a particular task. Validation is based on a defined policy and/or procedure that describes the training required to perform a task and establishes the objective assessment criteria that are used to confirm a pharmacy technician's ability to repeatedly perform a specific task with a high degree of accuracy. (e.g. accuracy rate).

Table K-1. Functions performed by Technicians, Functions Checked by Technicians, and Validation Requirements 2009/10

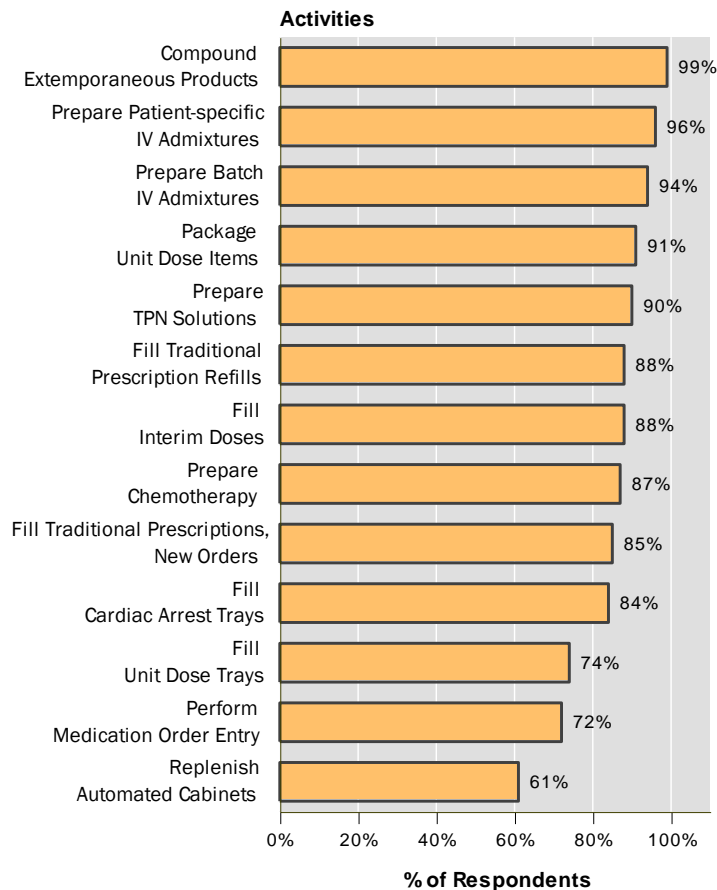
	A	B	C	D	E
	(n=)	Function performed (n=A)	Validation required to perform task (n=B)	Checked by technician (n=B)	Validation required to check (n=D)
(01) Perform Medication Order Entry	(159)	114 72%	60 53%	20 18%	18 90%
(02) Fill Traditional Prescriptions, New Orders	(154)	131 85%	60 46%	67 51%	60 90%
(03) Fill Traditional Prescriptions, Refills	(154)	135 88%	63 47%	93 69%	86 92%
(04) Package Unit Dose Items	(159)	144 91%	74 51%	116 81%	94 81%
(05) Fill Unit Dose Trays	(155)	115 74%	67 58%	101 88%	83 82%
(06) Fill Interim Doses	(156)	138 88%	70 51%	89 64%	79 89%
(07) Prepare patient-specific IV Admixtures	(157)	151 96%	117 77%	78 52%	69 88%
(08) Prepare batch IV Admixtures	(159)	149 94%	117 79%	92 62%	82 89%
(09) Prepare TPN Solutions	(159)	143 90%	111 78%	57 40%	50 88%
(10) Prepare Chemotherapy	(158)	137 87%	111 81%	27 20%	23 85%
(11) Compound Extemporaneous Products	(158)	156 99%	74 47%	84 54%	71 85%
(12) Fill Cardiac Arrest Trays	(159)	133 84%	57 43%	90 68%	67 74%
(13) Replenish Automated Cabinets	(152)	93 61%	50 54%	57 61%	41 72%

Base: all respondents

A validation process, specific to the functions delegated to and performed by pharmacy technicians, is recommended by the Canadian Society of Hospital Pharmacists. In the 2009/10 survey, respondents reported that validation was more often required for technicians who check the work of other technicians than it was for technicians who performed that activity, as illustrated in Figure K-3. In addition, as might be expected, validation is more likely to be applied to those functions which are perceived to involve a greater degree of risk. For example, many hospitals that use cart-fill unit dose drug distribution systems have, for many years, utilized pharmacy technicians to fill unit dose trays. Some hospitals now view the filling of unit dose trays as a routine part of the technician’s job and do not require validation of pharmacy technicians who perform that task. In contrast, technician preparation of chemotherapy is a task that, until recently, few pharmacy departments would allow a pharmacy technician to perform. Some hospitals now allow pharmacy technicians to prepare chemotherapy, but most of those hospitals still view this task as one which carries a high risk, if a mistake was made. As a result, a higher percentage of hospitals require validation of a technician before they can prepare chemotherapy or check the work of other technicians who prepare chemotherapy.

- Of the 115 respondents (74%) who reported that their technicians fill unit dose trays, 58% reported that they require validation of the technicians who perform that function. Of the 101 respondents (88%) who reported that technicians check the work of other technicians who fill unit dose trays, 82% reported that they require validation of technicians who do the checking. This pattern, where a higher percentage of respondents require validation of technicians who check the work of other technicians than require the validation of technicians who perform the task, holds true for all technician functions reported in Table K-1.

Figure K-1. Functions Performed by Pharmacy Technician 2009/10

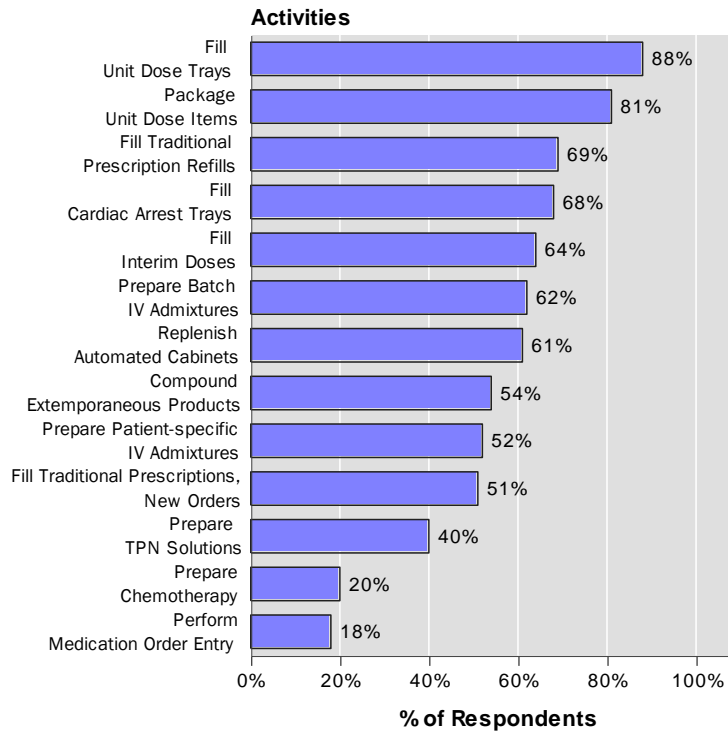


Base: Respondents who answered question about function performed (n=152 to 159)

- Eighty-seven percent of respondents reported that their technicians prepare chemotherapy, but only 20% of these allow technicians to check chemotherapy doses. Of those respondents who reported that their technicians prepared cancer chemotherapy doses, 81% reported that their technicians required validation to perform that function, and 85% reported that their technicians required validation to check the work of technicians who prepared the cancer chemotherapy doses.

- Technician checking of chemotherapy has increased from 7% (11/152) in 2007/08 to 20% in 2009/10. Of respondents who report that technicians prepare chemotherapy, technician checking of those chemotherapy preparations was highest in the Atlantic Provinces (47%, 7/15) and in ON (31%, 14/45), while less than 15% in the rest of the country.

Figure K-2 Technician Functions Checked by other Technicians 2009/10



Base: Respondents reporting that function is performed

- Technician checking of TPN preparation has increased from 23% (34/149) in 2007/08 to 40% in 2009/10. Respondents in ON (54%, 26/48), BC (48%, 10/21) and the Atlantic Provinces (47%, 8/17) were more likely to permit technician checking of TPN than respondents in QC (24%, 8/34) and on the Prairies (22%, 5/23).
- Seventy-two percent of respondents reported that technicians were permitted to enter medication orders into the pharmacy information system, but only 18% of those respondents reported that pharmacy technicians were permitted to check the accuracy of medication orders that had been entered by others. Of the 72% of respondents who permitted their technicians to enter medication orders, 53% of those respondents reported that technicians who did so had to undergo validation. Of the 18% of respondents who permitted technicians to check the accuracy of medication order entry, 90% had a validation program in place for the technicians who do the checking.
- Regionally there were some differences in the tasks that technicians were permitted to perform and check, as well as differences in the validation requirements for performing and checking. In ON, only 52% (26/50) perform order entry vs. 72% nationally, while 42% (11/26) of ON respondents permit technicians to check order entry performed by other technicians vs. 18% nationally. Ontario validation requirements for checking (91%) are similar to the national rate (90%). In BC, 92% of respondents reported that technicians perform order entry vs. 72% nationally, and 13% check order entry (18% nationally). Of the 92% with technicians performing order entry, only 22% (5/18) require validation in BC vs. 53% nationally. Of the 13% with technicians checking the work of others, 100% require validation in BC vs. 90% nationally.

The percentage of respondents reporting that drug distribution functions are performed and checked by pharmacy technicians is increasing.

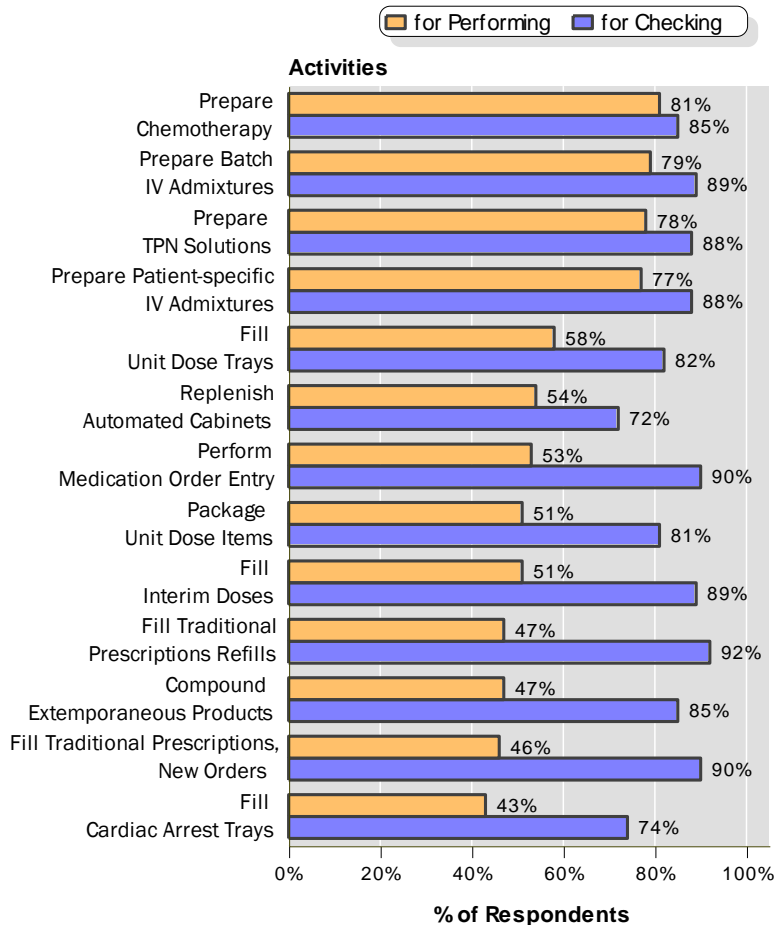
- Technician checking of patient specific IV Admixtures has increased from 33% (51/156) in 2007/08 to 52% in 2009/10. Requirements for validation of technicians who check patient-specific IV Admixtures ranged from 31% (11/35) in QC to 68% (17/25) in BC.

A 2002 study comparing pharmacists with certified technicians checking unit dose cassettes found technicians to be significantly more accurate.⁹

These results seem to suggest that respondents are becoming more comfortable with technicians performing and checking various functions. Overall in 2009/10, survey respondents reported an increase in the functions performed by pharmacy technicians, and particularly in functions performed and checked by pharmacy technicians, as compared to results in the 2007/08 report.

The percentage of respondents reporting that validation is required for technicians who perform each function remains fairly consistent with the 2007/08 report. The percentage of respondents reporting that validation is required for technicians to check each function is increasing modestly.

Figure K-3 Technician Validation Requirements for Performing and Checking 2009/10



Base for Performing: Respondents reporting that technicians perform that activity;

Base for Checking: Respondents reporting that technicians check that activity performed by technicians

PHARMACY TECHNICIAN SUPPORT FOR CLINICAL PHARMACY SERVICES

For decades, hospital pharmacists have relied on pharmacy technicians to support their drug distribution role. By doing so, technicians have enabled pharmacists to redirect a substantial portion of their time to clinical activities. As pharmacists have become increasingly comfortable with the delegation of drug distribution functions to technicians, many pharmacy departments have begun to explore ways in which technicians might support the further evolution of the pharmacist's role, by providing direct support for clinical pharmacy services.

In the 2007-08 survey, a number of questions were asked concerning tasks that technicians were performing in direct support of the pharmacist's clinical role. The non-distribution activities addressed in this section are relatively new ones for pharmacy technicians. They include participation in activities such as taking medication histories and assisting with medication reconciliation.

In addition to their traditional drug distribution role, pharmacy technicians now directly support pharmacists in carrying out their clinical activities

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

Table K-2. Support roles for pharmacy technicians for clinical pharmacy services 2009/10

	All	Teaching Status		Bed Size		
		Teach	Non-Teaching	50 – 200	201- 500	>500
Pharmacy technicians support pharmacists in carrying out their clinical activities (n=)	(159)	(43)	(116)	(33)	(94)	(32)
	113	32	81	23	65	25
	71%	74%	70%	70%	69%	78%
Tasks performed by technicians (n=)	(113)	(32)	(81)	(23)	(65)	(25)
Drug distribution system – serve as the initial Pharmacy liaison for solving drug distribution problems on patient care units	102	28	74	22	59	21
	90%	88%	91%	96%	91%	84%
Medication reconciliation at admission– collection and collaation of information concerning the patient's pre-admission drug therapy	59	22	37	9	31	19
	52%	69%	46%	39%	48%	76%
Medication reconciliation at discharge - initial creation of inpatient therapy documentation and discharge drug therapy plan	8	3	5	1	4	3
	7%	9%	6%	4%	6%	12%
Drug therapy evaluation / monitoring – collection of laboratory test results	20	9	11	2	11	7
	18%	28%	14%	9%	17%	28%
Drug dosage adjustment – use of nomograms and equations to carry out preliminary calculation of appropriate drug dosages (e.g. drug dosage calculations for patients with impaired renal function)	4	1	3	1	2	1
	4%	3%	4%	4%	3%	4%
Medication counseling – assembly of pamphlets and documentation to be given to the patient by the pharmacist	14	6	8	2	10	2
	12%	19%	10%	9%	15%	8%
Total parenteral nutrition team participation – using established protocols and lab values to calculate changes to parenteral nutrition therapy	8	1	7	0	6	2
	7%	3%	9%	0%	9%	8%
Support to P & T Committee – gather and collate information used in the preparation of drug formulary submissions, gather and collate information on non-compliance to formulary rules, etc	16	4	12	4	11	1
	14%	13%	15%	17%	17%	4%
Support to Medication Safety Committee – assist in collection of data for presentation to the committee (e.g. identification and collection of prescriptions containing banned abbreviations)	43	16	27	7	27	9
	38%	50%	33%	30%	42%	36%
Support to drug use evaluation program - data collection for drug utilization review	7	12	21	6	20	7
	29%	38%	26%	26%	31%	28%
Other	25	10	15	3	14	8
	22%	31%	19%	13%	22%	32%
Where pharmacy technicians work when supporting pharmacists in carrying out their clinical activities						
Central pharmacy (n=)	(113)	(32)	(81)	(23)	(65)	(25)
	104	29	75	20	61	23
	92%	91%	93%	87%	94%	92%
Satellite pharmacies	38	20	18	4	20	14
	34%	63%	22%	17%	31%	56%
Wards	59	21	38	9	33	17
	52%	66%	47%	39%	51%	68%
Clinics	30	10	20	2	17	11
	27%	31%	25%	9%	26%	44%
Other	14	5	9	2	6	6
	12%	16%	11%	9%	9%	24%

Base: Hospitals where pharmacy technicians carry out tasks that directly support pharmacists in carrying out their clinical activities

Note: multiple mentions permissible

- In the 2009/10 survey, 71% of respondents reported that pharmacy technicians carried out tasks that directly support pharmacists in carrying out their clinical activities, as compared to 66% (107/163) of respondents in the previous survey. Regional differences were noted with 64% of respondents in BC (16/25), 59% (19/32) of those in the Prairies, 71% (36/51) of those in ON, 85% (29/35) of those in QC and

76% (13/17) of those in the Atlantic Provinces reporting that pharmacy technicians performed these activities in their facility.

Among the 113 respondents who reported that pharmacy technicians carried out tasks that directly support pharmacists in carrying out their clinical activities:

- Ninety percent of respondents reported that their technicians were involved in resolving drug distribution problems on patient care units, and technician support to the TPN team was reported by 7% of respondents.
- Fifty-two percent of respondents reported that their technicians were involved in carrying out medication reconciliation on admission (captured as “admission drug histories” in the last survey), and 7% reported that their technicians were involved in medication reconciliation on discharge. Technician involvement in medication counseling dropped to 12% of respondents in 2009/10, compared to 21% (22/107) in 2007/08. This is likely explained by the addition of medication reconciliation at discharge to the 2009/10 survey. If the percentage of 2009/10 respondents who reported that their technicians were involved in medication reconciliation on discharge (7%) is added to the percentage of respondents who reported that their technicians were involved in medication counseling (12%), the sum of 19% is similar to the 21% of respondents in the 2007/08 survey who reported that their technicians were involved in medication counseling.
- Drug therapy evaluation and monitoring by technicians via collecting data for drug utilization was reported by 18% of respondents. Drug dosage adjustment through the use of nomograms by technicians was reported by 4% of respondents. Technician support to the drug use evaluation program, by collecting drug utilization data for review, was reported by 29% of respondents and support to the P&T committee was reported by 14% of respondents. Technician support to the medication safety committee was reported by 38% of respondents.

Changes in the responses related to the clinical support roles of technicians since the last survey should be interpreted with caution, taking into account the brief task descriptions that were used in the survey and the fact that the facilities that participate in the survey change somewhat from survey to survey.

- The respondents who participated in the 2009/10 survey reported that pharmacy technicians who provide direct support to the pharmacist’s clinical role did so from the central pharmacy (92%), on the wards (52%) in satellite pharmacies (34%) and in clinics (27%).

TECHNICIAN CERTIFICATION AND REGULATION ^{6,7,8}

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

- Overall, 43% of respondents reported that some of their pharmacy technicians were certified by one of the organizations listed above. The responses varied significantly from province to province. Ninety-three percent of respondents in AB, 92% of ON respondents, 80% of SK respondents, and 16% of BC respondents reported that some of their technicians were certified. None of the respondents in Quebec, Manitoba, Nova Scotia, New Brunswick, Prince Edward Island or Newfoundland and Labrador reported that any of their technicians were certified.
- Of respondents reporting that some of their pharmacy technicians were certified, 34% report that 51% to 90% of technicians are certified. This percentage is highest in AB (43%) and ON at 37%.

It is widely seen to be in the best interests of the profession for hospital pharmacy departments to actively support their pharmacy technicians as they work through the changes that are occurring with respect to certification and regulation of pharmacy technicians.

Increasing numbers of pharmacy technicians are becoming certified, especially in provinces where there is a movement toward technician regulation.

Table K-3. Certification of Pharmacy Technicians 2009/10

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Pharmacy technicians are certified through an established program														
(n=)	(159)	(34)	(93)	(32)	(43)	(116)	(25)	(15)	(5)	(12)	(50)	(35)	(9)	(8)
	68	18	38	12	20	48	4	14	4	0	46	0	0	0
	43%	53%	41%	38%	47%	41%	16%	93%	80%	0%	92%	0%	0%	0%
Percentage of pharmacy technicians with certification														
(n=)	(68)	(18)	(38)	(12)	(20)	(48)	(40)	(14)	(4)	(0)	(46)	(0)	(0)	(0)
51 to 90% of pharmacy technicians	23	7	13	3	6	17	0	6	0	0	17	0	0	0
	34%	39%	34%	25%	30%	35%	0%	43%	0%	0%	37%	0%	0%	0%
10 to 50 % of pharmacy technicians	14	5	6	3	5	9	1	3	0	0	10	0	0	0
	21%	28%	16%	25%	25%	19%	25%	21%	0%	0%	22%	0%	0%	0%
Less than 10% of pharmacy technicians	25	6	15	4	7	18	1	4	4	0	16	0	0	0
	37%	33%	39%	33%	35%	38%	25%	29%	100%	0%	35%	0%	0%	0%
None of the pharmacy technicians	6	0	4	2	2	4	2	1	0	0	3	0	0	0
	9%	0%	11%	17%	10%	8%	50%	7%	0%	0%	7%	0%	0%	0%

Base: Facilities with certified technicians

- Overall, 72% of respondents reported that educational sessions have been provided to inform their pharmacy technicians of the changing environment related to certification and regulation. The provision of these educational sessions was reported by 100% (24/24) of respondents in BC, 92% (46/50) of those in ON, 82% (14/17) of those in the Atlantic Provinces, 74% (23/31) of those in the Prairies and 17% (6/35) of those in QC. Interestingly, the numbers are low in QC, yet in that province the survey results indicate that there has been a substantial delegation of responsibility to technicians for both drug distribution and clinical support tasks. On the other hand, there has been little or no movement toward technician regulation in QC, which may explain the low percentage of facilities there that have held educational sessions for their pharmacy technicians.
- Revision of Pharmacy technician job descriptions, requiring that all *new* hires must have certification by PEBC or a similar recognized accrediting organization, was reported by 27% of all respondents. In ON, the province that is farthest ahead with respect to the implementation of pharmacy technician regulation, 60% (30/50) of respondents reported that all new hires must have their certification. The rest of the respondents report much lower numbers; 26 % (8/31) in the Prairies, 9% (3/34) in QC, 6% in the Atlantic Provinces and none in BC.

TABLE K-4. Recognition and Support for Technician Certification 2009/10

	All	Bed Size			Teaching Status		
		50 - 200	201- 500	>500	Teach	Non-Teaching	
Educational sessions have been provided to inform pharmacy technicians of the changing environment related to certification and regulation.	(n=)	(157)	(33)	(93)	(31)	(42)	(115)
		113	22	71	20	28	85
		72%	67%	76%	65%	67%	74%
All new hires must have certification by PEBC or a similar recognized accrediting organization.	(n=)	(156)	(33)	(93)	(30)	(42)	(114)
		42	9	26	7	10	32
		27%	27%	28%	23%	24%	28%
Existing pharmacy technicians are / will be required to have certification by PEBC or a similar accrediting organization.	(n=)	(157)	(33)	(93)	(31)	(42)	(115)
		87	19	54	14	20	67
		55%	58%	58%	45%	48%	58%
Financial support is being provided to pharmacy technicians who wish to become certified by PEBC or a similar accrediting organization.	(n=)	(156)	(33)	(92)	(31)	(42)	(114)
		50	8	34	8	12	38
		32%	24%	37%	26%	29%	33%

Base = all respondents

- Fifty-five percent of respondents indicated that they already do, or shortly will, require that their *existing* pharmacy technicians have certification by PEBC or a similar accrediting organization. The majority of respondents in each region indicated that this will be the case, with the exception of QC, where only 6% (2/36) of respondents indicate that this will be a requirement.
- Thirty-two percent of all respondents reported that financial support is being provided to currently employed pharmacy technicians who wish to become certified by PEBC or a similar accrediting

organization. This was reported to be the case by 80% (39/49) of ON respondents, 29% (5/17) of respondents in the Atlantic Provinces, 10% (3/31) of respondents in the Prairies, 8% (2/24) of respondents in BC and 3% (1/35) of respondents in QC. These differences likely reflect the stage that each region is at, with respect to pharmacy technician regulation. (Table K-4).

RELATIONSHIP BETWEEN TECHNICIAN CERTIFICATION AND REMUNERATION

Regional differences in technician certification largely reflect provincial differences with respect to the availability of, and regulatory requirement for, pharmacy certification. The Ontario College of Pharmacists' technician certification program has been operational for several years. In AB, a Technician Certification Board has been in place for a number of years, even though technician regulation is still not yet fully implemented in that province.

Salaries for certified technicians appear to be considerably higher than for uncertified technicians.

- The two provinces where the largest percentage of respondents indicated that they have certified technicians, AB at 93% and ON at 92%, also reported considerably higher salaries were being paid to their technicians (Table K-5). Overall, the average top of the salary scale salary for certified technicians is approximately \$14,000 per annum higher than for uncertified technicians, and the starting salary is approximately \$9000 higher for certified technicians.

Table K-5. Technician Salaries 2009/10

	All	Bed Size			Teaching Status		Province							
		50 - 200	201- 500	>500	Teach	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Start \$ Level 1 (n=)	(107)	(25)	(61)	(21)	(29)	(78)	(9)	(13)	(5)	(11)	(43)	(12)	(6)	(8)
	41,435	40,726	41,365	42,486	42,332	41,102	41,896	52,133	38,361	34,016	44,890	31,321	36,473	35,985
Top \$ Level 1 (n=)	(112)	(25)	(65)	(22)	(30)	(82)	(11)	(14)	(5)	(11)	(44)	(12)	(8)	(7)
	48,261	48,586	48,355	47,615	49,821	47,691	43,124	66,028	42,343	39,690	52,774	37,308	38,045	40,585
Salaries where there are certified technicians 2009/10														
Start \$ Level 1 (n=)	58	14	32	12	18	40	2	13	4	0	39	0	0	0
	46,098	44,571	46,247	47,483	47,115	45,641	.	52,133	39,142	.	44,978	.	.	.
Top \$ Level 1 (n=)	(58)	(14)	(32)	(12)	(18)	(40)	(2)	(13)	(4)	(0)	(39)	(0)	(0)	(0)
	54,907	53,132	55,695	54,875	57,143	53,900	.	66,022	43,550	.	52,959	.	.	.
. Results not shown because data available for fewer than three facilities.														
Salaries where no technicians are certified 2009/10														
Start \$ Level 1 (n=)	(48)	(11)	(28)	(9)	(11)	(37)	(70)	(0)	(1)	(11)	(3)	(12)	(6)	(8)
	35,754	35,832	35,702	35,823	34,506	36,126	41,683	.	.	34,016	44,151	31,321	36,473	35,985
Top \$ Level 1 (n=)	(53)	(11)	(32)	(10)	(12)	(41)	(9)	(1)	(1)	(11)	(4)	(12)	(8)	(7)
	40,902	42,799	40,874	38,903	38,838	41,505	43,073	66,112	.	39,690	50,941	37,308	38,045	40,585
. Results not shown because data available for fewer than three facilities.														
Salaries for certified vs. non-certified technicians 2009/10														
	no	yes												
Start \$ Level 1 (n=)	(48)	(58)												
	35,754	46,098												
Top \$ Level 1 (n=)	(53)	(58)												
	40,902	54,907												

Base = respondents providing salary information

For more information on pharmacy technician certification in Canada, visit the Pharmacy Examining Board of Canada website at <http://www.pebc.ca/PharmacyTechnicians/index.html>

STRUCTURED PRACTICAL EXPERIENTIAL PROGRAMS (SPEP) FOR TECHNICIAN STUDENTS

The provision of structured practical experiential programs to technicians enrolled in educational programs external to the hospital is something which most hospital pharmacy departments have been involved with for many years.

- Participation in SPEP training for pharmacy technicians was reported by 92% of respondents across all regions. (Table K-6). Seventy percent of respondents who offer SPEP programs indicated that only one student at a time is assigned to each preceptor, while 20% reported that more than one student at a time is assigned to each preceptor. Fifty-six percent of respondents reported that more than one preceptor is assigned to each student. Teaching hospitals report a higher incidence of more than one preceptor assigned to each technician student, at 60%, as compared to non-teaching hospitals, at 46%. The Prairies, at 72% (21/29), have the highest incidence of more than one preceptor assigned to each student.
- Only 16% of respondents indicated that peer assisted learning and mentoring (senior students training junior students) is utilized for the SPEP training of pharmacy technicians. Only 5% of respondents report that faculty members from technician colleges sometimes serve as preceptors. The Atlantic Provinces report the highest level of faculty members from technician colleges serving as preceptors, at 18% (3/17).

TABLE K-6. Structured Practical Experiential Programs (SPEP) for Technician Students 2009/10

	Bed Size			Teaching Status		
	All	50 - 200	201 - 500	>500	Teach	Non-Teaching
SPEP for Pharmacy technician students in your facility (n=)	(149)	(32)	(88)	(29)	(38)	(111)
	137	26	83	28	36	101
	92%	81%	94%	97%	95%	91%
Only one student at a time is assigned to each preceptor. (n=)	(129)	(26)	(75)	(28)	(37)	(92)
	90	19	52	19	26	64
	70%	73%	69%	68%	70%	70%
More than one student at a time sometimes assigned to each preceptor	26	3	15	8	10	16
	20%	12%	20%	29%	27%	17%
Only one preceptor at a time assigned to each student	41	6	24	11	14	27
	32%	23%	32%	39%	38%	29%
More than one preceptor at a time sometimes assigned to each student.	72	14	46	12	17	55
	56%	54%	61%	43%	46%	60%
Peer assisted learning and mentoring is utilized (senior students train junior students)	20	0	15	5	7	13
	16%	0%	20%	18%	19%	14%
Technician college faculty members sometimes serve as preceptors	6	0	5	1	2	4
	5%	0%	7%	4%	5%	4%
Preceptors from other disciplines sometimes serve as preceptors.	4	1	3	0	1	3
	3%	4%	4%	0%	3%	3%
Other SPEP models are used in our facility.	11	1	9	1	6	5
	9%	4%	12%	4%	16%	5%

Base: Facilities with SPEP for Pharmacy technician students. Note: multiple mentions permissible

¹ [Qualifications of pharmacy laboratory technicians]. *Farmaceutski glasnik [Pharmaceutical Bulletin]* 1950;6(6):124-5

² [Examinations for pharmacists and pharmacy assistant.]. *Medika (Zagreb)*. 1950;3(7-8):100.

³ Management Committee, Moving Forward : Pharmacy Human Resources for the Future. Final Report. Ottawa, Ontario. Canadian Pharmacists Association; (2008)

⁴ NAPRA Professional Competencies for Canadian Pharmacy Technicians at Entry to Practice, September 2007 http://www.napra.org/pages/Practice_Resources/pharmacytechniciancompetencies.aspx (accessed 3 March 2011)

⁵ CCAPP - Standards For Accreditation Of Pharmacy Technician Programs, December 2007 http://www.ccapp-accredit.ca/site/pdfs/technician/CCAPP_pharm_tech_accred_standards_dec_2007.pdf (accessed 3 March 2011)

⁶ CCAPP - Pharmacy Technician Programs Current Accreditation Award Status http://www.ccapp-accredit.ca/accredited_programs/technician/history_by_program/ (accessed 3 March 2011)

⁷ PEBC – Pharmacy Technician General Information, April 2010 <http://www.pebc.ca/PharmacyTechnicians/EnglishGraphics/PT%20GeneralInformation%202010.pdf> (accessed 3 March 2011)

⁸ The Employment of Unqualified Pharmaceutical Assistants by Medical Men. *Br Med J* 1901;1(2113):1626-1627.

⁹ Ambrose PJ, Saya FG, Lovett LT, Tan S, Adams DW, Shane R. Evaluating the accuracy of technicians and pharmacists in checking unit dose medication cassettes. *Am J Health-Syst Pharm*. 2002; 59:1183-8.

L – EVALUATING PHARMACY SERVICES

IAIN SMITH AND CHUCK WILGOSH

There is a common and widely attributed maxim that “If you can’t measure it, you can’t manage it”.¹ Increasingly measurement is raised as an important issue in the areas of quality, safety and risk. The Institute of Medicine report in the US in 1999², followed by the Baker/Norton report in Canada in 2004³, showed a pressing need for identifying and mitigating preventable adverse events in Canadian hospitals. Classen wrote:

*As hospitals tackle medication safety more aggressively, measuring safety will prove to be an essential tool in both understanding the problem and tracking success in solving identified problems.*⁴

Five years later, in a paper titled “Is Health Care Getting Safer”, Charles Vincent stated,

*The main problem is that measurement and evaluation have not been high on the agenda. We believe that the lack of reliable information on safety and quality of care is hindering improvement in safety across the world.*⁵

He further stated that:

...unless serious efforts are made to develop reliable indices of safety and quality we will still be unable to answer the question posed by this paper in five years’ time.

At the 2010 Halifax Conference, Ross Baker emphasized three problems:

1. There are growing numbers of patient safety and quality indicators but still limited understanding of what they measure and how they relate.
2. Few organizations have adopted a strategic focus on measurement that helps them determine what to measure.
3. The links between measurement, improvement goals and actions are poorly developed.

Evaluation of pharmacy services is an important tool for improving safety, quality, efficiency and accountability.

Clearly there is work to be done.

The rapidly increasing cost of health care has also put additional focus on efficiency and accountability. Our organizations are attempting to make changes to their organizational behavior through the adoption of LEAN and six sigma “high performance” strategies, balanced scorecards, and other measures.

Hospital pharmacy has a long history of tracking data related to drug distribution, drug compounding, and the preparation of sterile parenteral products. Although some hospital pharmacy departments do measure clinical activities, this is often done primarily from a workload measurement perspective. In hospital pharmacy, pharmacy technicians are assuming more and more of the day to day responsibility for drug distribution. The pharmacist is becoming primarily a clinical practitioner. In this revised practice model, not only is there a need to clearly define the value of the clinical pharmacist, but also to measure it through the use of appropriate indicators. In a healthcare world where limits to available funding are inevitable, the use of resources will need to be justified. Not only will hospital pharmacy managers need to provide data, they will also need to show that what they are measuring are the right things to measure. Indicators which clearly relate clinical activity to the core values of our organizations, such as improved patient outcomes, are what we have to establish, validate and refine.

This new chapter of the Hospital Pharmacy in Canada Report focuses on the audit and evaluation activities that are carried out in Canadian hospitals for the purpose of insuring the quality and safety of pharmacy services and other medication-related activities that occur in the hospital setting. The evaluation data that was captured and reported in various sections of the 2009/10 Hospital Pharmacy in Canada Survey is summarized in this chapter. The 2009/10 survey contained a number of questions, concerning the evaluation of pharmacy services, which had been asked in previous surveys. The results and trends in those areas are presented in this chapter. In addition a number of new service evaluation questions were included in this year’s survey and the results of those questions are also presented and discussed.

EVALUATION OF CLINICAL PHARMACY SERVICES

As reported in the chapter on clinical pharmacy services, Bond and his colleagues, in the 1990s and early 2000s, published a number of studies concerning clinical pharmacy services and their impact on mortality, morbidity, length of stay, drug costs, medication errors and adverse drug reactions. These studies contributed to the emergence of evidence-based data on clinical pharmacy practice and can be used to help prioritize clinical services.^{6,7,8,9,10,11,12,13}

In Table B-7 in the clinical chapter, the 2009/10 average level of service (comprehensiveness) was reported for 22 clinical pharmacy activities. Respondents were asked to select one of 4 rankings that best described the extent of implementation of the service within their hospital. A score of 1 on the rating scale represented a comprehensive service, a score of 2 represented a targeted service delivered to those who most need the service, a score of 3 represented a limited service, and a score of 4 indicated that the service was not offered at the respondent's hospital. Of the clinical pharmacy services identified by Bond et al. as having a positive effect on health outcomes, most were not offered on a comprehensive level by our survey respondents. For example:

- Bond et al. 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), and adverse drug reactions (ADR). However, despite this evidence, the respondents to the 2009/10 survey seemed to place a low priority on the provision of medication histories, with an average comprehensiveness rating of 2.6. In addition to the evidence from the Bond papers that supports the value of medication histories, Accreditation Canada now includes medication reconciliation as one of its Required Organizational Practices.
- The service level rating of 1.9 for pharmacokinetic consultations/monitoring suggests that this service is delivered on a more comprehensive basis than admission histories, which received an average service level score of 2.6. However none of the Bond papers, or other similar studies, have reported that this service is associated with an improvement in patient outcomes.

How evidence-based are our decisions concerning the allocation of resources to programs and services?

The question that the profession must ask itself is why this discrepancy exists between the services to which we give a high priority and the evidence that supports those decisions. We place a high value on evidence-based decisions when it comes to drug therapy, but the decisions we make about the pharmacy services that we offer in our facilities do not seem to be entirely evidence-based.

The clinical services chapter also reported the results of other questions that looked at quality evaluation activities within the pharmacy department.

- Pharmacist participation in drug use evaluation, where drug use patterns are analyzed and reported to a hospital committee for follow up, received a comprehensiveness rating of 2.9. In the 2007/08 survey, the comprehensiveness rating for drug use evaluation was reported to be 2.6. These results suggest that drug use evaluation is not given a high priority by the facilities that participate in this survey, and that the comprehensiveness of this service has actually decreased since the last survey.
- Evaluation of formulary compliance was rated at 2.9, indicating that this activity is carried out at a very limited level of service, in most of the responding hospitals. In the 2007/08 survey, the comprehensiveness rating was 2.4, which again suggests that the service level for this pharmacy activity has actually declined since the last survey.
- Adverse drug reaction (ADR) evaluation and reporting, with a comprehensive rating of 2.2 was very similar to the 2007/08 result of 2.3.
- Medication incident analysis, and the development of corrective actions, was rated at 1.7, again very similar to the 2007/08 result of 1.8. These ratings indicate that these two activities are conducted as a “targeted service” (rating scale = 2), delivered on an as needed basis, presumably dependent on the level of severity of the ADR or the medication incident.

- Thirty-one percent (50/160) of the 2009/10 survey respondents reported that they evaluate the direct patient care services provided by pharmacists in their hospital by auditing a sample of clinical activities. Evaluation was conducted through the use of retrospective chart review, direct observation and self-evaluation by pharmacists.
- Of the respondents who reported that they evaluated clinical services:
 - Eighty-two percent (40/49) evaluated the documentation of clinical services that had been provided by their pharmacists,
 - Sixty-seven percent (33/49) evaluated the patient assessment performed by their pharmacists,
 - Sixty-one percent (30/49) evaluated the development of objectives and the implementation of a monitoring plan,
 - Forty-one percent (20/49) evaluated the medication/drug counselling provided by their pharmacists.

EVALUATION OF DRUG DISTRIBUTION

In the Drug Distribution chapter, several questions dealt with whether or not a pharmacist reviewed all medication orders for therapeutic appropriateness, prior to administration to the patient. The Accreditation Canada Qmentum Program for 2010 includes a set of Managing Medications Standards, in which the need for a pharmacist review of medication orders prior to dispensing is addressed.¹⁴ The review is to include the appropriateness of the medication, dose, frequency, and route of administration; any therapeutic duplication; actual or potential allergies or sensitivities; actual or potential interactions; variations from the medication's intended use; and other medication related issues or concerns. In emergency situations or when there is no pharmacist available, the organization is to establish and follow a process to ensure a review occurs as soon as a pharmacist is available to do so.

The responses to the questions dealing with the review of medication orders, before the patient receives the medication, indicated that during the hours that the pharmacy is open most orders are appropriately reviewed by a pharmacist before the medication can be accessed by nursing staff for administration to the patient. However, when the pharmacy is closed, the situation is quite different.

- During the hours that the pharmacy is closed, only 8% of respondents reported that a pharmacist, either on call or working off site, reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication is accessed from a night cupboard or similar after hours medication supply; only 7% reported this review occurs before medication is accessed from wardstock; and only 8% of respondents using automated cabinets on the patient care units reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before medication is accessed from an automated cabinet.
- During the hours that the pharmacy is closed, 14% of respondents reported that a pharmacist reviews at least 95% of all routine medication orders for therapeutic appropriateness before a medication order appears on the MAR.

How important is the pharmacist's review of medication orders?

This pattern suggests that the pharmacist's role in reviewing medication orders is considered to be vital for insuring the safety and appropriateness of drug therapy... but only during the pharmacy's regular work hours. When the pharmacy is closed, nurses, physicians and patients are on their own. It may be time for Canadian hospital pharmacy managers to question the limited review of medication orders by pharmacists during certain hours of the 24 hour day.

In the drug distribution chapter, the section on parenteral admixture services also includes several questions related to evaluation.

- A sterile products gap analysis to evaluate the hospital's procedures, equipment and facilities, based on accepted standards for compounding parenteral admixtures, had been completed by only 49% (72/147) of respondents.

- Fifty-eight percent (85/146) of respondents indicated that they audit the preparation of parenteral admixtures by observing employees for validation of aseptic technique, at least once a year. Of these, 41% (35/85) indicated that validation includes verification of product sterility by laboratory testing. Twenty-six percent (38/146) of respondents conduct surface sampling in sterile product preparation areas on a regular basis.

These results suggest that only about 50% of hospital pharmacy departments have implemented these quality assurance activities within their sterile product services. Given the serious outcomes that have been reported when a breakdown in process has led to contamination of parenteral products, all hospital pharmacy departments should review their quality assurance practices, with the aim of bringing them in line with current guidelines for insuring the safety of compounded sterile products.

EVALUATION OF MEDICATION SAFETY

The Medication Safety chapter also included a number of questions related to the evaluation of patient safety initiatives within the hospital.

- Forty-eight percent (76/158) of respondents reported that they had conducted a prospective, medication safety assessment process, such as a failure mode and effects analysis (FMEA), within the past year.
- A retrospective medication safety assessment, like root cause analysis (RCA), was completed in the last year by 61% (96/158) of respondents.
- Forty-two percent (51/121) of respondents reported that they had completed a Medication Safety Self-Assessment tool, like the one that has been developed by The Institute for Safe Medication Practices (ISMP), within the last two years

The pattern here is similar to that reported in the sections above, with only about 50% of respondents indicating that they have implemented these important medication safety evaluation processes, despite the heightened emphasis on medication safety over the past decade.

EVALUATION OF THE USE OF TECHNOLOGY

Evaluation and measurement issues addressed in the Technology chapter primarily addressed how pharmacy departments deal with the clinical decision support alerts that are built into their Pharmacy Information Systems.

- Only 21% (26/125) of respondents reported that their hospital has a policy dealing with the overriding of clinical decision support alerts that are generated by their pharmacy information system.
- Of those 26 respondents, 73% (19/26) have an override policy requiring documentation of the reason for high-risk overrides and 58% (15/26) have a requirement for electronic tracking of overrides.
- Thirty-one percent (8/26) of respondents reported that their override policy includes a requirement for a regular audit, review and follow up of overrides, usually by a medication safety committee or by a group within pharmacy.

Are we defeating the purpose of computerized clinical decision support systems?

There is a widely held belief that computerized clinical decision support systems will make health care safer and more effective. These systems have the ability to process large amounts of data and provide practitioners with alerts when potential problems are identified. However, the data suggest that many alerts are overridden and there is little in the way of follow-up done to determine if those overrides are appropriate or not.

In future surveys, additional attention will be paid to what we measure, with a view to developing and applying improved performance indicators.

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

² Kohn LT, Corrigan JM, Donaldson MS, Editors. *To Err Is Human: Building a Safer Health System*. Committee on Quality of Health Care in America, INSTITUTE OF MEDICINE, NATIONAL ACADEMY PRESS, Washington, D.C. 2000 (released in the US in 1999). <http://www.nap.edu/openbook.php?isbn=0309068371>

- ³ Baker GR, Norton PG, Flintoft V, et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *CMAJ* 2004;170(11):1678-86.
- ⁴ Classen DC, Metzger J. Improving medication safety: the measurement conundrum and where to start. *International Journal for Quality in Health Care* 2003; 15(Suppl 1):i41–i47
- ⁵ Vincent C, Aylin P, Franklin BD, et al. Is health care getting safer? *BMJ* 2008;337:a2426
- ⁶ Bond CA, Raehl CL, Franke T. Clinical pharmacy services, pharmacy staffing and the total cost of care in US hospitals. *Pharmacotherapy* 2000;20:609-21.
- ⁷ Bond CA, Raehl CL, Franke T. Interrelationships among mortality rates, drug costs, total cost of care and length of stay in US hospitals: summary and recommendations for clinical pharmacy services and staffing. *Pharmacotherapy* 2001; 21:129-41.
- ⁸ Bond CA, Raehl CL, Franke T. Medication errors in US hospitals. *Pharmacotherapy* 2001;21:1023-36
- ⁹ Bond CA, Raehl CL, Franke T. Clinical pharmacy services, hospital pharmacy staffing and medication errors in US Hospitals. *Pharmacotherapy* 2002;22:134-47.
- ¹⁰ Bond CA, Raehl CL, Patry RP. The feasibility of implementing an evidence-based core set of clinical pharmacy services in 2020: manpower, marketplace factors and pharmacy leadership. *Pharmacotherapy* 2004;24:441-52.
- ¹¹ Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing, and adverse drug reactions in US hospitals. *Pharmacotherapy* 2006;26:735-47.
- ¹² Bond CA, Raehl CL. Clinical pharmacy services, pharmacy staffing, and hospital mortality rates. *Pharmacotherapy* 2007;27(4):481-93.
- ¹³ Bond CA, Raehl CL. 2006 national clinical pharmacy services survey: clinical pharmacy services, collaborative drug management, medication errors, and pharmacy technology. *Pharmacotherapy* 2008;28(1):1-13.
- ¹⁴ Managing Medications Standards. QMentum Program 2010. Accreditation Canada. Available for purchase at <http://www.accreditation.ca>

RECOGNITION LIST

Respondents from hospitals in the following list participated, or attempted to participate, in the 2009/10 survey. They all completed the survey on or before August 1st, 2010, and had a minimum size of 50 acute care beds. Please note that some data from some respondents may not have been used in the analysis if it was incomplete, or if a response was inconsistent with answers to previous questions. However, we wish to recognize all of those in the list below for their willingness to contribute to the success of the 2009/10 Hospital Pharmacy in Canada Survey.

Hospitals 50 - 200 Beds

Bethesda Hospital, Steinbach, MB
 Boundary Trails Health Center, Winkler, MB
 C.H. et de soins de longue durée Fleury, Montréal, QC
 Cambridge Memorial Hospital, Cambridge, ON
 Campbell River Hospital, Campbell River, BC
 Campbellton Regional Hospital, Campbellton, NB
 Chaleur Regional Hospital, Bathurst, NB
 Children's Hospital of Eastern Ontario, Ottawa, ON*
 Chilliwack Hospital / Fraser Canyon Hospital, Chilliwack, BC
 Colchester East Hants Health Authority, Truro, NS
 Concordia Hospital, Winnipeg, MB
 Cowichan District Hospital, Duncan, BC
 CSSS Beauce, Beauceville, QC
 CSSS D'Arthabaska-Érable, Victoriaville, QC
 CSSS de la région de Thetford, Thetford Mines, QC
 CSSS de Papineau, Gatineau, QC
 CSSS des Aurores-Boréales, La Sarre, QC
 CSSS Dorval Lachine LaSalle, LaSalle, QC
 CSSS du Coeur de l'Île, Montréal, QC
 CSSS Lac-Saint-Jean-Est, Alma, QC
 CSSS Montmagny-L'Islet, Montagne, QC
 CSSS Rivière-du-Loup, Rivière-du-Loup, QC
 CSSS Summits, Sainte-Agathe-des-Monts, QC
 Cypress Regional Hospital, Swift Current, SK
 Dartmouth General Hospital, Dartmouth, NS
 Dauphin General Hospital, Dauphin, MB
 Delta Hospital, Langley, BC
 Eagle Ridge Hospital, Port Moody, BC
 Grey Bruce Health Services, Owen Sound, ON
 Guelph General Hospital, Guelph, ON
 Hôpital de Montréal pour enfants, Montréal, QC*
 Institut de cardiologie de Montréal, Montréal, QC*
 Joseph Brant Memorial Hospital, Burlington, ON
 Kootenay Boundary Regional Hospital, Trail, BC
 Lake of the Woods District Hospital, Kenora, ON
 Langley Memorial Hospital, Langley, BC
 Leduc Community Hospital, Leduc, AB
 Markham-Stouffville Hospital, Markham, ON
 Moose Jaw Union Hospital, Moose Jaw, SK
 Niagara Health System - Greater Niagara General Site, Niagara Falls, ON
 Niagara Health System - Welland Hospital Site, Welland, ON
 Norfolk General Hospital, Simcoe, ON
 Northern Lights Regional Health Centre, Fort McMurray, AB
 Orillia Soldiers' Memorial Hospital, Orillia, ON
 Peace Arch Hospital, White Rock, BC
 Pembroke Regional Hospital, Pembroke, ON

Hospitals 50 - 200 Beds (continued)

Penticton Regional Hospital / SO General Hospital, Penticton, BC
 Pictou County Health Authority, New Glasgow, NS
 Portage District General Hospital, Portage la Prairie, MB
 Prince County Hospital, Summerside, PE
 Queen Elizabeth II Hospital, Grande Prairie, AB
 Queen's Park Care Centre, New Westminster, BC
 Ridge Meadows Hospitals, Maple Ridge, BC
 South West Nova District Health Authority, Yarmouth, NS
 St. Joseph's Health Care, London, ON*
 St. Joseph's Hospital, Comox, BC
 St. Mary's General Hospital, Kitchener, ON
 St. Mary's Hospital, Camrose, AB
 Stollery Children's Hospital, Edmonton, AB*
 Sturgeon Community Hospital, St. Albert, AB
 The Brantford General & Willett Hospitals, Brantford, ON
 Thompson General Hospital, Thompson, MB
 Timmins & District Hospital - L'Hopital de Timmins et du district, Timmins, ON
 Vernon Jubilee Hospital, Vernon, BC
 Victoria Hospital, Prince Albert, SK
 West Coast General Hospital, Port Alberni, BC
 Wetaskiwin Hospital & Health Center, Wetaskiwin, AB
 Woodstock General Hospital, Woodstock, ON

Hospitals 201 - 500 Beds

Abbotsford Regional Hospital/ Mission Memorial Hospital, Abbotsford, BC
 Brandon Regional Health Authority, Brandon, MB
 Burnaby Hospital, Burnaby, BC
 CBD Health Authority / Cape Breton Healthcare Complex, Sydney, NS
 Central Health Authority, Grand Falls-Windsor, NL
 Centre hospitalier régional de Trois-Rivières, Trois-Rivières, QC
 Centre hospitalier St. Mary's, Montréal, QC
 Centre hospitalier universitaire Sainte-Justine, Montréal, QC*
 CHAQ - Hôpital de l'Enfant-Jésus, Québec, QC*
 CHAQ - Hôpital Saint-Sacrement, Québec, QC*
 Children's & Women's Health Centre of BC, Vancouver, BC*
 CSSS Chicoutimi, Chicoutimi, QC
 CSSS Gatineau, Gatineau, QC
 CSSS Haut Richelieu / Rouville, St Jean sur Richelieu, QC
 CSSS Pierre-Boucher, Longueuil, QC
 CSSS Rimouski-Neigette, Rimouski, QC
 Doctor Everett Chalmers Hospital, Saint John, NB
 Edmundston Regional Hospital, Edmundston, NB

Hospitals 201 - 500 Beds (continued)

Grace Hospital, Winnipeg, MB
 Grand River Hospital, Kitchener, ON
 Grey Nuns Hospital, Edmonton, AB*
 Hospital Charles-LeMoyne, Greenfield Park, QC
 Hôpital général de Montréal, Montréal, QC*
 Horizon Health Network /Saint John Regional Hospital,
 Saint-John, NB*
 Hôtel-Dieu de Lévis, Lévis, QC
 Hôtel-Dieu Grace Hospital, Windsor, ON
 Humber River Regional Hospital, Toronto, ON
 Institut Universitaire de cardiologie et de pneumologie de
 Québec (Hôpital Laval), Sainte-Foy, QC*
 IWK Health Centre, Halifax, NS*
 Kelowna General Hospital, Kelowna, BC
 Kingston General Hospital, Kingston, ON*
 Lakeridge Health Corporation, Oshawa, ON
 Lethbridge Regional Hospital, Lethbridge, AB
 Medicine Hat Regional Hospital, Medicine Hat, AB
 Misericordia Community Hospital, Edmonton, AB*
 Mount Sinai Hospital, Toronto, ON*
 Nanaimo Regional General Hospital, Nanaimo, BC
 Niagara Health System, St. Catharines, ON
 North York General Hospital, Toronto, ON
 Peterborough Regional Health Centre, Peterborough, ON
 Queen Elizabeth Hospital, Charlottetown, PE
 Quinte Healthcare Corporation, Belleville, ON
 Red Deer Regional Hospital, Red Deer, AB
 Régie régionale de la santé A-Zone 1 Beauséjour,
 Moncton, NB
 Rouge Valley Health System - Centenary/Ajax/Pickering
 Sites, Toronto, ON
 Royal Columbian Hospital, New Westminster, BC
 Royal Inland Hospital, Kamloops, BC
 Royal Victoria Hospital of Barrie, Barrie, ON
 Sault Area Hospital, Sault Ste Marie, ON
 Seven Oaks General Hospital, Winnipeg, MB
 SouthLake Regional Health Centre, Newmarket, ON
 St. Boniface General Hospital, Winnipeg, MB*
 St. Joseph's Health Centre - Toronto, Toronto, ON
 St. Joseph's Health Care, Hamilton, ON*
 St. Michael's Hospital, Toronto, ON*
 Surrey Memorial Hospital, Surrey, BC
 The Credit Valley Hospital, Mississauga, ON
 The Moncton Hospital, Moncton, NB*
 The Scarborough Hospital - Birchmount Campus,
 Scarborough, ON
 The Scarborough Hospital - General Campus, Scarborough, ON
 The Hospital for Sick Children, Toronto, ON*
 Thunder Bay Regional Health Sciences Centre,
 Thunder Bay, ON
 Toronto East General Hospital, Toronto, ON
 Toronto General Hospital (UHN), Toronto, ON*
 Toronto Western Hospital (UHN), Toronto, ON*
 Trillium Health Centre, Mississauga, ON
 University Hospital of Northern BC, Prince George, BC
 Victoria General Hospital, Winnipeg, MB
 William Osler Brampton Civic Hospital, Brampton, ON
 William Osler Etobicoke General Hospital, Etobicoke, ON
 Windsor Regional Hospital, Windsor, ON
 York Central Hospital, Richmond Hill, ON

Hospitals >500

C.H. de l'Université de Montréal, Montréal, QC*
 Calgary Health Region Pharmacy Department, Calgary, AB*
 CH universitaire de Sherbrooke, Sherbrooke, QC*
 CHUQ - C.H. de l'Université Laval, Québec, QC*
 Hamilton Health Sciences Corporation, Hamilton, ON*
 Hôpital du Sacré-Cœur de Montréal, Montréal, QC*
 Hôpital général juif Sir Mortimer B. Davis, Montréal, QC*
 Hôpital Maisonneuve-Rosemont, Montréal, QC*
 Hôpital Royal-Victoria, Montréal, QC*
 London Health Sciences Centre, London, ON*
 Queen Elizabeth II Health Sciences Centre, Halifax, NS*
 Regina Qu'Appelle Health Region, Regina, SK*
 Royal Alexandra Hospital, Edmonton, AB*
 Royal Jubilee Hospital and Victoria General Hospital, Victoria, BC
 Saskatoon Health Region, Saskatoon, SK*
 Sunnybrook Health Sciences Centre, Toronto, ON*
 The Ottawa Hospital, Ottawa, ON*
 University of Alberta Hospital / Mazankowski Heart Institute,
 Edmonton, AB*
 Vancouver General Hospital, Vancouver, BC*
 Winnipeg Regional Health Authority, Health Sciences Centre,
 Winnipeg, MB*

* Teaching Hospitals (ACAHO)

WORKSHEET 2009/10

	Your Facility		All Hospitals	Bed Size			Teaching Status	
				100- 200	201- 500	>500	Teaching	Non-Teaching
1. Acute Inpatient Drug Costs / Acute Admission		(n=)	(129) \$313	(25) \$261	(78) \$302	(26) \$395	(37) \$419	(92) \$270
2. Acute Inpatient Drug Costs / Acute Patient Day		(n=)	(129) \$43	(25) \$40	(78) \$42	(26) \$49	(37) \$57	(92) \$38
3. Non-acute Inpatient Drug Costs / Non-acute Patient Day		(n=)	(69) \$8.11	(110) \$7.04	(42) \$8.22	(16) \$8.56	(13) \$8.56	(56) \$8.01
4. Inventory Turnover Rate		(n=)	(138) 10.2	(27) 8.0	(83) 10.0	(28) 12.9	(38) 12.1	(100) 9.5
5. Total Budgeted Hours (excluding residents) / Acute Patient Day		(n=)	(154) .87	(33) .83	(91) .88	(30) .90	(42) 1.07	(112) .80
6. Total Budgeted Hours (excluding residents) / Total Patient Day		(n=)	(149) .68	(31) .70	(89) .66	(29) .72	(42) .97	(107) .56
7. Inpatient Budgeted Hours / Total Patient Day		(n=)	(149) .62	(31) .67	(89) .60	(29) .65	(42) .88	(107) .52
8. Total Student Days Precepted / Total FTE		(n=)	(103) 16	(19) 16	(59) 15	(25) 19	(33) 25	(70) 12

1. Acute Inpatient Drug Costs / Acute Care Admissions
2. Acute Inpatient Drug Costs / Acute Care Patient Day
3. Non-acute Care Inpatient Drug Costs / Non-acute Care Patient Days
4. Inventory Turnover Rate
5. Total Number of Budgeted FTEs (Excluding Residents) x Hours per FTE / Acute Care Patient Days
6. Total Number of Budgeted FTE (Excluding Residents) x Hours per FTE / Acute Care Patient Days+ Non-Acute Care Patient Days
7. Inpatient Budgeted FTEs x Hours per FTE/Acute Care patient Days+ Non-Acute Care Patient Days
8. Total Student Days precepted/Total number of Budgeted FTEs

