2007/08 HOSPITAL PHARMACY IN CANADA REPORT

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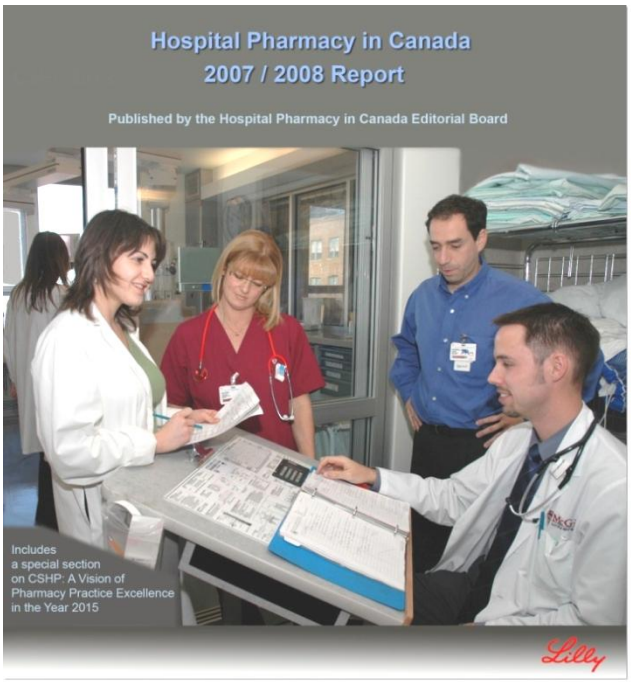

ACKNOWLEDGEMENTS

The Editorial Board wishes to acknowledge and thank the support team of the 2007/08 Hospital Pharmacy in Canada Report.

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SPECIAL THANKS

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

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

CSHP 2015

EDITORIAL BOARD

FOREWORD

D. TERRANCE MCCOOL

Eli Lilly Canada is pleased to support the 17th *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 74% response rate. This survey includes hospitals with more than 50 acute care beds which has expanded the number of qualifying hospitals. 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 contains a special section measuring hospital pharmacy's progress towards the goals of the Canadian Society of Hospital Pharmacists 2015 Initiative. Patient safety also continues to be a major issue for health professionals, health administrators and policy makers in Canada. This is the fourth 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.

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

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

NEIL JOHNSON

The Canadian healthcare system continues to evolve as it deals with technological, political, organizational and human resources issues. Provincial governments have established accountability measures for the delivery of healthcare services, such as surgical wait times, while Accreditation Canada has implemented Required Organizational Practices, like medication reconciliation, which will enhance patient care and safety. Although the Canadian public continues to regard healthcare as a key priority, confidence in the current system has been shaken by reports of cancelled surgeries, lack of timely services, and medication errors. The Canadian healthcare system is being challenged to look at new ways of insuring that needed services are both accessible when needed and meet the quality expectations of the public.

Pharmacy practice is not immune from these influences and this year's Hospital Pharmacy in Canada Report summarizes many important aspects of hospital pharmacy practice in the 166 participating organizations that collectively represent some 69,212 inpatient beds across Canada.

This year's report introduces a change in the qualifying size of hospitals. Previously qualifying hospitals had to be greater than 100 beds with at least 50 acute care beds. The qualifying standard was changed this year to include all hospitals with 50 acute care beds or more. This has raised the number of qualifying hospitals and the Editorial Board hopes that this change will deliver a more complete picture of hospital practice across Canada.

This year's report also brings a special interest chapter that was developed in partnership with the Canadian Society of Hospital Pharmacists (CSHP). This chapter, authored by Emily Musing, focuses on CSHP's 2015 Initiative which is intended to advance hospital pharmacy practice across Canada. Emily's analysis has established a baseline of how well Canadian hospitals currently match up against CSHP's 2015 goals and objectives for hospital pharmacy practice. The CSHP 2015 section of this year's survey will be repeated in future surveys, allowing us to measure hospital pharmacy's progress towards the 2015 goals and objectives. Readers are strongly encouraged to review this analysis in detail to determine if there are opportunities to improve services delivered in their own institutions.

Hospital pharmacists have a keen interest and a strong mandate to contribute to the creation of safe and effective systems for managing medications in each of our hospitals. This topic has been a focus of recent Hospital Pharmacy in Canada reports. Patricia Lefebvre's review of the medication safety issues addressed in the 2007/08 survey provides 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 the 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.

Effective drug distribution systems, from the point of order-writing through to the dispensing and administration of medication, can reduce the rate of occurrence of medication errors. Janet Harding's review of drug distribution systems shows little change in the use of unit dose and intravenous admixture services in Canadian hospital pharmacies. While progress has been made in the deployment of these systems in the past decade, there remains opportunity for significant improvement in many hospitals. Janet also explores key issues in cytotoxic drug preparation, pharmacy technician roles, medication order entry practices, and medication administration.

Nancy Roberts' review of drug purchasing shows that drug expenses in hospitals continue to increase, supporting the view that managing drug expenditures will remain an important issue for hospital pharmacy management. Nancy highlights several important factors that must be taken into account when analyzing the information in this year's report. Drug purchasing practices continue to be highly efficient, as demonstrated by the sustained pattern of high inventory turns, and improvements in performance by smaller facilities that are noted in this year's report.

In another chapter, Nancy also reports on the significant amount of education and training that hospital pharmacies provide. Hospitals reported providing an average of 217 days of student training in 2007/8 and several important trends are discussed in the chapter.

Michele Babich's review of human resources highlights the effect that pharmacist shortages are having on hospital pharmacy staffing. Respondents reported 292 vacant pharmacist positions, which is a slightly higher number of vacancies compared to the previous report. The report identifies a further 257 pharmacists that are eligible to retire within the next five years. This section also shows that the average growth rate of salaries for all pharmacy personnel is similar to annual inflation rates in Canada. This section also includes an important discussion concerning the metric of budgeted hours per patient day. More specific analysis has been undertaken in this year's report to acknowledge the impact of the mix of acute and non-acute beds on this metric. Readers are encouraged to review this section of the report, since it provides new data that may enable better benchmarking of hospitals with similar ratios of acute to non-acute beds.

Patricia Macgregor details the progress that hospitals have made in adopting certain information and automation technologies that can enhance the safety and efficiency of pharmacy practice. This section includes information on the availability and use of computerized decision-support tools (e.g. allergy alerts, maximum dose alerts, etc.), wireless technology, computerized prescriber order entry systems, hand held computing devices, and bar coding. Hospital pharmacies continue to make steady progress in implementing technologies that can improve the outcomes of the medication management systems within their facility.

Jean-Francois Bussieres' section on clinical pharmacy services provides a thoughtful and comprehensive overview of patient oriented pharmacy services. 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 types of clinical practice models that are being used to deliver those services. The survey data on quality assurance activities, pharmacy technician support of clinical practice, and pharmacist prescribing rights will be a useful tool for pharmacy leaders in their planning and program improvement activities. An analysis of the priority that hospital pharmacies place on specific clinical activities, compared to the evidence to support those priorities, provides a revealing summary of how the profession has, or has not, taken an evidence-based approach when deciding which services it should be focusing its time and resources on.

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

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 Andrew Merrick and Linda Chow of Eli Lilly Canada have ensured the ongoing success of the survey. The Editorial Board members continue to meet on a regular basis to identify trends, share information and analyze changes in practice. Their continued support for this project is appreciated by all hospital pharmacy practitioners. Paul Oeltjen collects and analyzes the data for the editors, Marjorie Robertson provides administrative support and designs the final layout of the chapters, and George Horne electronically publishes the results. Without their contributions the report would not be possible. Lastly, Kevin Hall and Chuck Wilgosh joined the team again for this survey as Managing Editors. Their attention to detail and oversight of the survey process from the design of the survey tool to the final writing of the Hospital Pharmacy in Canada Report has proven invaluable to the success of this survey cycle. All of these members of the team have contributed in a major way to the quality of the Hospital Pharmacy in Canada Report.

The Editorial Board would also like to thank Anne Hiltz who left Eli Lilly and had in previous survey's provided tremendous support to the board's work. In addition, we extend our thanks Nancy Roberts who will be retiring from the board in June 2009. Nancy has been a valuable contributor to the board's work since 2001, authoring a variety of chapters in the past four surveys. Both of these individuals have contributed to the ongoing success of the report and have made it a valuable tool for hospital pharmacy leaders across Canada.

DATA COLLECTION METHODOLOGY

PAUL OELTJEN

An initial list of hospital pharmacies was prepared based on respondents to previous surveys, hospital pharmacies 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 230 hospitals was then prepared, based on the information collected. It was later learned that 7 of these hospitals had fewer than 50 acute beds and therefore did not qualify. Among the 223 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 230 hospitals on May 8 and May 15, 2008. A second e-mail was sent only to the Directors of Pharmacy on May 19, 2008. This e-mail contained the identification code and the password required to log on to the survey web site. At the end of May, 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 2007/08 survey.

On June 6, June 23, July 7 and July 11, 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. The first page of the website contained instructions for completing the survey. The survey questions were distributed over 22 web pages. From any page a respondent was able to move to any other page of the online survey. 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. A respondent was also able to change the language of the questionnaire and respond to questions in English or French. Online survey completion was interactive. If secondary questions were to be skipped in the event of a "no" or "yes" answer to the screening question, the on-line program presented a modified version of the questionnaire page, without the non-applicable questions, after a screening question had been answered and saved. The program also warned respondents if they had had entered non-numeric information in fields that required numeric answers. To avoid problems resulting from an inconsistent use of periods or commas for decimal indicators, numeric information requiring a decimal place had to be entered in two fields, one for the whole number part and another one for the decimal part of the number.

After the survey website was closed for survey participation, a new site was created, for the exclusive use of the Managing Editors, that included the data that had been entered by the 176 respondents who had logged on, entered, and saved responses to some or all questions by August 1, 2008. After selecting a responding hospital pharmacy for review a managing editor was presented with a summary page showing 19 different ratios (for example: calculated occupancy rate, calculated length of stay, budgeted staff hours per inpatient day, technician to pharmacist ratio). If a ratio looked unreasonable the responding hospital was contacted for an explanation or the corresponding answers were excluded from the analysis. Three hospitals were excluded from the analysis because too many of their answers were inconsistent or outside a reasonable range. Another 7 hospitals were excluded because they had answered fewer than 25% of the key questions in Sections A to N of the survey questionnaire. The remaining 166 hospital pharmacies were considered qualified respondents. Using the 223 potentially qualified hospitals who were invited to participate in the survey, the resulting response rate was then 74%. The response rate for teaching hospitals was 85% (40/47) and the response rate for non-teaching hospitals was 72% (126/176). 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

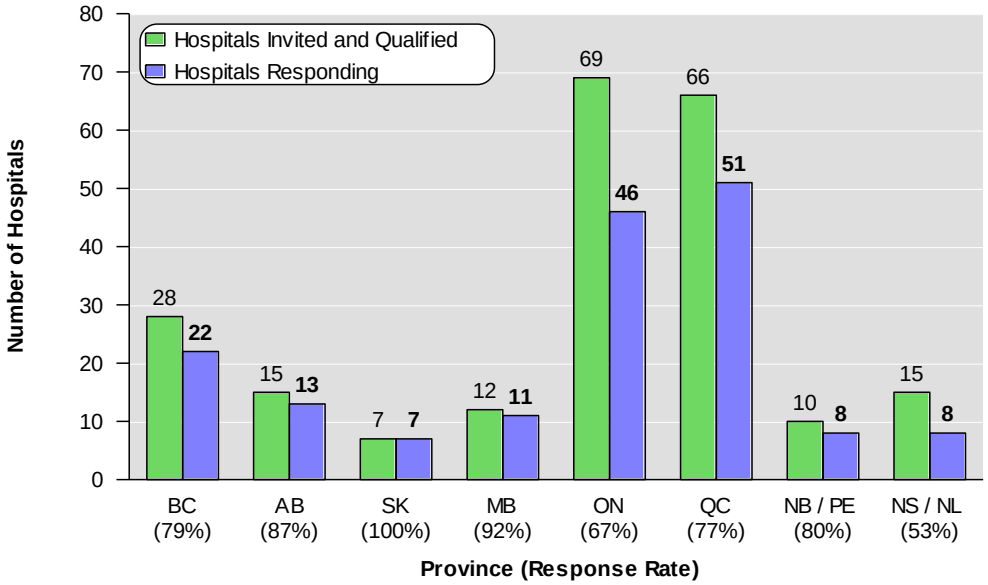
NEIL JOHNSON

In response to requests that the Editorial Board has received over the past number of years, the qualifying criteria for participation in the Hospital Pharmacy in Canada Survey were changed for the 2007/08 survey. In the past, hospitals were only eligible to participate if they had 100 beds or more, at least 50 of which had to be acute care beds. For this year's survey, hospitals were qualified to participate in the survey if they had at least 50 acute care beds. The requirement to have at least 100 beds in total was dropped, allowing a number of smaller hospitals to participate in the survey for the first time in 2007/08. As a result, the number of qualifying hospitals who were invited to participate in the 2007/08 survey was 223, compared to 194 in 2005/06.

The 2007/ 08 survey response rate of 74% (166/223) was unchanged from the 2005/06 response rate of 74% (142/193). Although there were an additional 24 respondents in the 2007/08 survey results, the additional respondents were not exclusively from the 50 to 100 bed size hospitals. In fact the proportion of respondents in each of the three bed size categories (50-200 beds, 201 to 500 beds, and greater than 500 beds) was very similar to that in the 2005/06 survey. There was also little change in the proportions of teaching versus non-teaching hospitals between the 2005/06 and 2007/08 surveys, with 76% of respondents from non-teaching facilities in 2007/08, compared to 74% in 2005/06, and 24% from teaching organizations in 2007/08, compared to 26% in 2005/06. Finally, it should be noted that the proportion of beds from smaller hospitals (50 to 200 bed hospitals) represents only a small percentage of the total beds captured by this survey. Hospitals of 50-200 beds only accounted for 7% of the overall acute care bed total in 2007/08, compared to 5% in 2005/06 for the 100-200 bed category. While this difference likely does not materially affect very many averages or ratios reported in this survey, some variables within the small hospital size category have changed. Where this occurs, editors have noted and discussed this in the relevant chapters.

While the respondents are not exactly the same as those in the 2005/06 survey, and any comparisons between the two surveys must be interpreted with that in mind, the similarities in response rates, bed size breakdown, and teaching status breakdown between the two surveys suggest that data comparisons and trending between this year's survey and earlier surveys are still of value.

Figure A-1. Response to the Survey by Province 2007/08



The proportion of respondents from each province or region were virtually the same in most cases, with the exception of the Prairies which rose from 14% (20/142) of total respondents in 2005/06 to 19% (31/166) of total respondents in 2007/08, and Ontario, which fell from 32% (45/142) of total respondents in 2005/06 to 28%

(46/166) of respondents in 2007/08. Hospital demographic information presented in Table A-1 represents the totals of reported data from hospitals with at least 50 acute care beds. Unlike previous surveys, a decision was made to not report the average beds, admissions, and patient days for all respondents. Given that the data comes from hospitals ranging from 50 beds to over 2000 beds, the standard deviations are very large and the averages are not felt to be very informative or useful.

- Demographic data showed the average reported acute care beds at 295, compared to 320 in the previous survey. This decrease would likely be due to the change in inclusion criteria that permitted the participation of smaller hospitals.

- The total number of beds captured in this survey was 69,212, of which 49,014 were acute care beds and 25,968 were in teaching hospitals. The Canadian Institute for Health Information1 reported that in 2002/03 there were 115,120 beds staffed and in operation in Canada, of which 29,237 beds were in teaching hospitals. This provides the reader with some estimate of the relative comprehensiveness of the sample included in this survey.

- Sixty-three percent of respondents indicated they were part of a multi-site health organization (MSHO), as compared to 66% in the last survey. Fifty percent of Ontario respondents reported being part of a MSHO, compared to 39% in the previous survey, while all other jurisdictions reported MSHO rates over 75%.

- In Quebec, 43.1% of respondents reported being part of a MHSO versus 60% in the previous survey. The decreased rate reported in Quebec is contrary to the known structural changes in hospital governance and organizations that have occurred in the past few years. The aggregation of hospitals under a single governance structure should have lead to a higher proportion of hospitals operating as multi-site health organizations. The reasons for this discrepancy are unclear.

Table A-1a. Hospital Demographic Data - Acute-care beds 2007/08

Acute Care												
	2005 / 06	2007 / 08										
			Bed Size			Teaching Status		Region				
	All	All	50 - 200	201- 500	>500	Teach	Non-Teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	(142)	(166)	(35)	(90)	(41)	(40)	(126)	(22)	(31)	(46)	(51)	(16)
Beds	45,448	49,014	3,630	22,207	23,177	21,619	27,395	5,495	10,194	14,725	14,549	4,051
Annual Admissions (n=154)	2,093,041	2,074,333	146,541	921,238	1,006,554	896,525	1,177,808	247,055	440,087	688,225	551,560	147,406
Patient Days (n=153)	14,901,079	15,082,316	1,019,100	6,747,576	7,315,640	6,682,534	8,399,782	1,933,850	3,230,950	4,400,868	4,333,885	1,182,763
Length Of Stay (average) (n=148)	7.1	7.2	6.6	7.4	7.3	7.3	7.2	7.0	7.4	6.4	7.9	7.3
Clinic / Medical Day Unit Visits (n=142)	21,078,300	21,372,352	1,210,512	8,773,204	11,388,636	12,538,211	8,834,141	1,273,445	4,295,776	9,334,234	4,996,113	1,472,784
Emergency Department Visits (n=152)	8,292,515	8,628,828	957,313	4,218,643	3,452,872	2,494,072	6,134,756	1,330,482	1,367,471	2,807,650	2,313,200	810,025

When analyzing results from this survey, the reader should remember that changes in overall hospital metrics cannot be interpreted as a trend. The data sample from each survey varies based on the respondents who have participated. Therefore the hospital demographic data is presented to provide the contextual framework within which this year's survey results should be interpreted.

Table A-1b. Hospital Demographic Data - Non-acute-care beds 2007/08

Non-Acute Care												
	2005 / 06	2007 / 08										
			Bed Size			Teaching Status		Region				
	All	All	50 - 200	201- 500	>500	Teach	Non-Teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	(107)	(125)	(22)	(68)	(35)	(23)	(102)	(17)	(17)	(37)	(41)	(13)
Beds	14,582	20,198	954	8,722	10,522	4,349	15,849	3,874	2,033	4,476	8,750	1,065
Annual Admissions (=100)	54,371	58,489	3,589	18,312	36,588	9,928	48,561	4,861	4,168	21,915	9,213	18,332
Patient Days (n=107)	4,447,911	5,548,932	298,495	2,329,191	2,921,246	1,364,117	4,184,815	1,180,726	681,200	1,271,667	2,127,434	287,905
Length Of Stay (average) (n=125)	198	197	140	199	222	129	213	340	234	40	306	85

Pharmacy Department data is remarkably consistent with the last survey.

- The average reported number of hours of pharmacy operations was 77.9 hours per week. Teaching hospitals reported an average number of pharmacy operations hours of 96.9 hours per week compared to 71.8 hours for non-teaching hospitals. Hospitals between 50-200 beds reported an average hours of pharmacy operations per week of 59.8 hours.

- With continued demand for increased pharmacy services, especially in medication management and distribution services, pharmacy leaders will be challenged in the future to expand hours of service to meet those needs. A full 31.9% of respondents provided the equivalent of less than 10 hours of service per day (Less than 70 hours per week).

- Ninety-three percent of respondents indicated that a pharmacist was the head of the pharmacy department. This is consistent with the results of the previous survey.

References:

[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-FRANCOIS BUSSIERES

INTRODUCTION

Since our last survey, the American College of Clinical Pharmacy (ACCP) has published a new strategic plan, developed a revised definition of clinical pharmacy, and proposed a new set of core competencies of a clinical pharmacist[1]. ACCP defines clinical pharmacy as:

> *"A health science discipline in which pharmacists provide patient care that optimizes medication therapy and promotes health, wellness, and disease prevention. The practice of clinical pharmacy embraces the philosophy of pharmaceutical care; it blends a caring orientation with specialized therapeutic knowledge, experience, and judgment for the purpose of ensuring optimal patient outcomes. As a discipline, clinical pharmacy also has an obligation to contribute to the generation of new knowledge that advances health and quality of life. Clinical pharmacists care for patients in all health care settings. They possess in-depth knowledge of medications that is integrated with a foundational understanding of the biomedical, pharmaceutical, socio behavioral, and clinical sciences. To achieve desired therapeutic goals, the clinical pharmacist applies evidence-based therapeutic guidelines, evolving sciences, emerging technologies, and relevant legal, ethical, social, cultural, economic, and professional principles. In accordance, clinical pharmacists assume responsibility and accountability for managing medication therapy in direct patient care settings, whether practicing independently or in consultation or collaboration with other health care professionals. Clinical pharmacist researchers generate, disseminate, and apply new knowledge that contributes to improved health and quality of life. Within the system of health care, clinical pharmacists are experts in the therapeutic use of medications. They routinely provide medication therapy evaluations and recommendations to patients and health care professionals. Clinical pharmacists are a primary source of scientifically valid information and advice regarding the safe, appropriate, and cost-effective use of medications."*

The data reported in this chapter provides an indication of how well the practice of hospital pharmacy in Canada conforms to this definition.

Each year, the American Society of Health-System Pharmacists (ASHP) publishes a section of its 3-year cycle survey of hospital pharmacy practice in the United States. In 2007, the section on monitoring and patient education[2] was published and the section on prescribing and transcribing was published in 2008[3]. Readers are invited to consult these publications to benchmark their clinical pharmacy practice against that reported by US hospitals.

Since 1996, The Canadian Society of Hospital Pharmacists (CSHP) has published numerous documents on clinical pharmacy practice. In 2001, guidelines on the optimization of the practice of pharmaceutical care in the hospital setting were published[4]. In 2001 and 2004, CSHP published statements and information papers on pharmaceutical care[5], seamless care[6], continuing competency for hospital pharmacists[7] and directing the pharmacist's practice toward health outcomes and pharmaceutical care[8]. In 2008, CSHP released a revised version of its 2015 vision, which contains six key goals and 38 objectives (http://www.cshp.ca/programs/cshp2015/index_e.asp). The objectives include measurable implementation targets that CSHP believes can be achieved by Canadian hospitals by the year 2015. The majority of these objectives will only be achieved by 2015 if hospital pharmacists succeed in establishing an appropriate set of clinical pharmacy programs and services within their institution. The last chapter of this report provides data on how hospital pharmacy practice in Canada in 2007/08 measures up against the targets that have been set in CSHP's Vision 2015 document[9].

In Canada, the CSHP 2015 document includes an objective which states that, by 2015, 100% of new pharmacists entering practice in hospitals and related healthcare settings will have completed a residency program that has been accredited by the Canadian Hospital Pharmacy Residency Board (CHPRB). While some question the need for such a requirement, others argue that the development of optimal clinical pharmacy services in all hospitals and related health-care settings in Canada is most likely to be achieved if pharmacists entering practice have completed this additional training, following the completion of their undergraduate pharmacy degree[10], [11]. The highest proportion of pharmacists' time in the hospital setting (45% ± 17% in the 2007/08 report) is already being spent in clinical activities vs. 42% ±19% in drug distribution, 6% ± 4%in teaching, 6% ± 6% in other non-patient care activities, and 1% ± 2% in pharmacy research. This suggests that pharmacists practicing in hospitals and related health-care systems are likely to require more experiential training in the clinical setting than the limited amount of such training that is currently provided in undergraduate pharmacy programs. At the present time, it appears that CSHP has taken the position that completion of an accredited residency program is the best way to insure that new practitioners have the type of training that is required to practice optimally in the hospital setting. It is worth noting that in the United States, where the Doctor of Pharmacy degree has been the entry-to-practice degree offered by all Faculties of Pharmacy for the past decade, there is now a debate as to whether board-certified specialists are necessary for the delivery of high quality clinical services[12].

STRUCTURED PATIENT CARE PROGRAMS

During the 2005/06 Hospital Pharmacy in Canada survey, respondents provided feedback indicating that we needed to more clearly define what we meant by a "patient care program". To address this issue a definition of a "patient care program" was developed and included in the 2007/08 survey. 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 this year's 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.). The inclusion of this definition was expected to reduce the number of respondents who reported that they had certain patient care programs, and the survey results suggest that this did in fact occur.

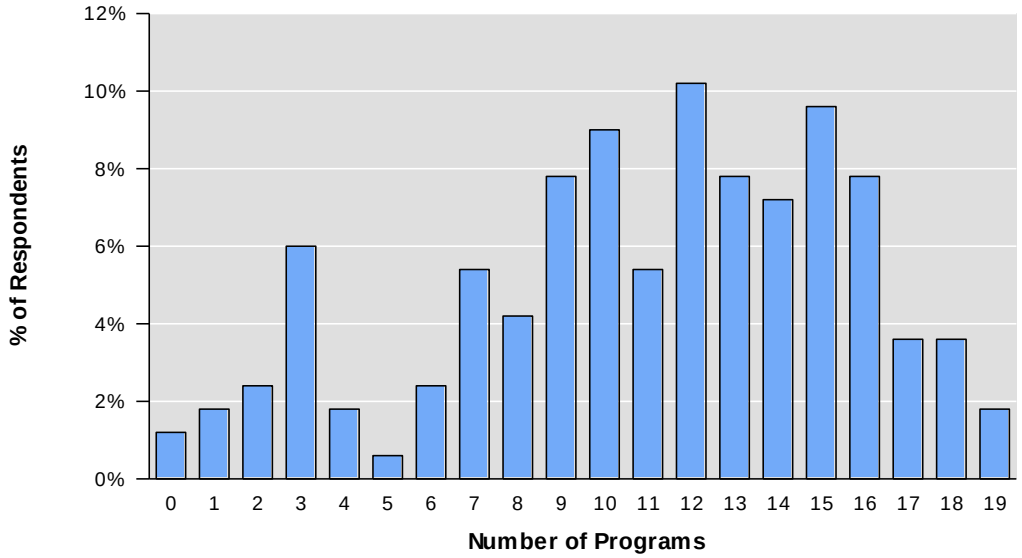
Because of this change in the way we structured the 2007/08 survey, caution is required when comparing the 2007/08 data, dealing with patient care programs and pharmacist involvement in these programs, with the results from the previous survey. There was also a change made in the qualifying criteria for the 2007/08 survey, which allowed a number of smaller hospitals to participate this year for the first time. This change also makes it more challenging to compare the results of this year's survey with the results reported from earlier surveys.

- Out of a total of 19 patient care programs, the average number of patient care programs that respondents reported having at their facility was 11.0 ± 4.6 programs [range – 0-19] with an average of 10.7 programs in BC, 9.8 programs in the Prairies, 12.2 programs in Ontario, 11.5 programs in Quebec and 8.6 programs in the Atlantic Provinces.

Figure B-1 summarizes the distribution of respondents providing formal patient care programs in 2007/08.

After respondents had indicated that they had a specific 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.

Figure B-1. Respondents Providing Formal Patient Care Programs 2007/08



Base: All respondents (n=166)

PROFILE OF OUTPATIENT CLINICAL PHARMACY SERVICES

In this year's survey, 81% (134/166) of respondents indicated that they had a pharmacist assigned to at least one of the 17 outpatient practice areas included in this year's survey. This is lower than the 92% (130/142) reported in 2005/06. The new 50-bed inclusion criteria might have added small hospitals with no dedicated pharmacists assigned to structured patient care programs. It is probable that pharmacists in smaller hospitals do provide clinical pharmacy services, but in a less structured manner, without pharmacists being assigned to specific patient care programs. Also, some hospitals without formal programs may have indicated that they provided clinical services in 2005/06, before the clarifying definition of a formal program was provided.

- The average number of outpatient programs with an assigned pharmacist was reported by respondents to be 3.0 ± 2.6 programs [range – 0 to 14 programs] with an average of 2.6 programs in BC, 2.2 programs in the Prairies, 3.3 programs in Ontario, 3.5 programs in Quebec and 2.6 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 6% for rehabilitation to 78% for haematology-oncology. As described earlier in this chapter, comparisons to earlier survey results must be interpreted cautiously. With that caution in mind, the percentage of respondents who reported that they had a pharmacist assigned to a particular outpatient care program increased from 2005/06 to 2007/08 in the following program areas: emergency increased from 54% (71/132) to 61% (77/126), haematology/anticoagulation increased from 52% (51/99) to 65% (51/78), infectious disease/AIDS increased from 40% (37/92) to 63% (31/49) and transplantation increased from 31% (16/51) to 48% (11/23).

- 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. This was particularly true for clinical pharmacy services to infectious disease/AIDS and emergency.

- 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. This was particularly true for the following outpatient programs: haematology/anticoagulation, infectious disease/AIDS, renal/dialysis, emergency, transplantation, diabetes, cardiovascular/lipid and mental health.

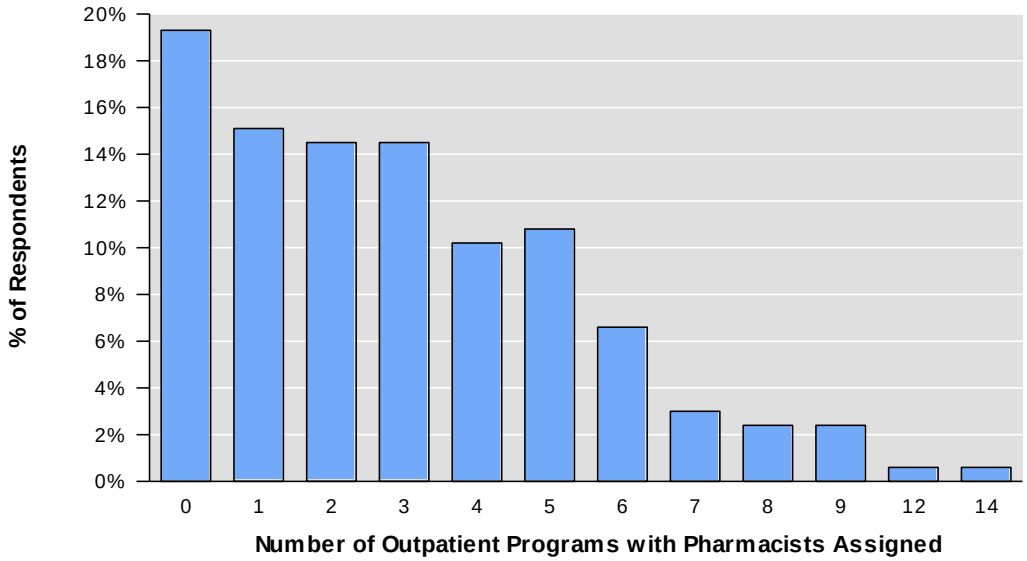
- Regional differences were noted for outpatient pharmacist assignment to particular outpatient care programs. Examples where there was a lower percentage of respondents in a particular region who reported having an outpatient pharmacist assigned to particular patient care programs included:

haematology/oncology - 31% of respondents in the Prairies and 47% of respondents in BC, vs. 78% nationally; renal/dialysis - 39% of respondents in the Prairies vs. 66% nationally; emergency - 40% of respondents in the Prairies, vs. 61% nationally; transplantation - 0% of respondents in the Atlantic provinces, vs. 48% nationally; and diabetes - 13% of respondents in the Prairies and 23% in BC, vs. 46% nationally.

Table B-1 summarizes the profile of pharmacist assignment to outpatient care programs in 2007/08.

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

Figure B-2. Respondents Providing Outpatient Clinical Pharmacy Services 2007/08



Base: All respondents (n=166)

Table B-1 Profile of Pharmacist Assignment to Outpatient Programs 2007/08

		Bed size			Teaching		Regions				
	All	50-200	201-500	> 500	Teaching	Non-Teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	(164)	(34)	(89)	(41)	(40)	(124)	(22)	(31)	(46)	(50)	(15)
Hematology-oncology											
program exists	111	9	68	34	31	80	15	16	29	43	8
pharmacists assigned	87 78%	1 11%	58 85%	28 82%	24 77%	63 79%	7 47%	5 31%	26 90%	41 95%	8 100%
Hematology/anticoagulation											
program exists	78	9	45	24	25	53	11	11	18	34	4
pharmacists assigned	51 65%	6 67%	25 56%	20 83%	15 60%	36 68%	5 46%	9 81%	12 67%	22 65%	3 75%
Infectious Disease / AIDS											
program exists	49	3	25	21	28	21	7	7	21	11	3
pharmacists assigned	31 63%	1 33%	15 60%	15 71%	23 82%	8 38%	6 86%	6 86%	7 33%	9 82%	3 100%
Renal / Dialysis											
program exists	82	9	43	30	29	53	7	18	22	28	7
pharmacists assigned	54 66%	4 44%	28 65%	22 73%	19 66%	35 66%	7 100%	7 39%	16 73%	20 71%	4 57%
Emergency											
program exists	126	19	71	36	32	94	15	20	40	42	9
pharmacists assigned	77 61%	6 32%	39 55%	32 89%	23 72%	54 58%	10 67%	8 40%	26 65%	26 62%	7 78%
Transplantation											
program exists	23	2	8	13	22	1	2	5	6	8	2
pharmacists assigned	11 48%	0 0%	3 38%	8 62%	11 50%	0 0%	1 50%	4 80%	3 50%	3 38%	0 0%
Diabetes											
program exists	96	11	57	28	25	71	13	8	25	41	9
pharmacists assigned	44 46%	2 18%	24 42%	18 64%	10 40%	34 48%	3 23%	1 13%	12 52%	23 56%	4 44%
Cardiovascular / lipid											
program exists	81	2	48	31	29	52	11	12	30	23	5
pharmacists assigned	34 42%	0 0%	20 42%	14 45%	10 35%	24 46%	4 36%	4 33%	9 30%	13 57%	4 80%
Geriatrics											
program exists	99	9	56	34	27	72	12	14	24	44	5
pharmacists assigned	21 21%	3 33%	10 18%	8 23%	6 22%	15 21%	2 17%	5 36%	5 21%	6 14%	3 60%
Asthma / Allergy											
program exists	57	3	35	19	22	35	8	8	15	22	3
pharmacists assigned	12 21%	1 33%	6 17%	5 26%	5 23%	7 20%	1 13%	3 38%	3 19%	4 18%	1 33%
Pain / palliative care											
program exists	107	14	59	34	32	75	16	14	34	33	10
pharmacists assigned	19 18%	3 21%	9 15%	7 21%	6 19%	13 17%	4 25%	3 21%	5 15%	6 18%	1 10%
Mental Health											
program exists	120	12	73	35	33	87	15	19	38	39	9
pharmacists assigned	19 16%	0 0%	9 12%	10 29%	7 21%	12 14%	2 13%	2 11%	9 24%	5 13%	1 11%
General Surgery											
program exists	121	17	70	34	31	90	16	20	39	38	8
pharmacists assigned	14 12%	2 12%	7 10%	5 15%	2 7%	12 13%	2 13%	3 15%	7 18%	1 3%	1 13%
Neurology											
program exists	48	0	27	21	24	24	5	8	16	15	4
pharmacists assigned	4 8%	0 0%	3 11%	1 5%	3 13%	1 4%	0 0%	2 25%	1 6%	1 7%	0 0%
General Medicine											
program exists	123	17	72	34	33	90	17	20	39	39	8
pharmacists assigned	9 7%	2 12%	5 7%	1 3%	2 6%	6 7%	1 6%	1 5%	6 15%	0 0%	0 0%
Gynecology / Obstetrics											
program exists provided	105	11	64	30	27	78	14	13	35	36	7
pharmacists assigned	7 7%	2 18%	4 6%	1 3%	1 4%	6 8%	2 14%	3 23%	2 6%	0 0%	0 0%
Rehabilitation											
program exists	79	9	47	23	15	64	14	8	31	18	8
pharmacists assigned	5 6%	0 0%	4 9%	1 4%	2 13%	3 5%	1 7%	1 13%	2 7%	0 0%	1 13%

PROFILE OF INPATIENT CLINICAL PHARMACY SERVICES

In this year's survey, 92% (152/166) of respondents indicated that they had a pharmacist assigned to at least one of the 18 inpatient programs included in this year's survey. In the 2005/06 report, 99% (140/142) reported having a pharmacist assigned to at least one inpatient program. The new 50-bed inclusion criteria might have added small hospitals with no dedicated pharmacists assigned to structured patient care programs. It is probable that pharmacists in smaller hospitals do provide clinical pharmacy services, but in a less structured manner, without pharmacists being assigned to specific patient care programs. Also, some hospitals without formal programs may have indicated that they provided clinical services in 2005/06, before the clarifying definition of a formal program was provided.

- The average number of inpatient care programs with an assigned pharmacist was reported by respondents to be 6.2 ± 4.2 programs [range of 0-17 programs] with an average of 6.2 in BC, 6.0 in the Prairies, 8.7 in Ontario, 4.4 in Quebec and 5.3 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 21% for diabetes, to 84% for geriatrics. Bearing in mind the earlier caution related to data comparisons between the 2005/06 and 2007/08 reports, the proportion of respondents that reported having a pharmacist assigned to a patient care program increased from 2005/06 to 2007/08 in the following programs: paediatric/neonatal critical care from 56% (51/91) to 70% (54/77), infectious disease/AIDS from 46% (49/106) to 66% (33/50) and transplantation from 45% (22/49) to 83% (19/23).

- 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. This was particularly true for the following clinical pharmacy services: adult critical care, general medicine, haematology-oncology, cardiovascular/lipid, paediatric/neonatal critical care, infectious disease/AIDS, mental health, renal / dialysis and asthma/allergy.

- 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. This was particularly true for the following clinical pharmacy services: adult critical care, general medicine, pediatric/neonatal critical care, mental health, neurology and renal / dialysis.

- Regional differences were noted, with no specific regional trend except a lower proportion of pharmacists assigned to most inpatient care programs in Quebec. That trend might be related to the higher vacancy rates for pharmacists in that province. In addition, there were regional differences in the percentage of respondents that reported having pharmacists assigned to certain inpatient programs: transplantation - 50% in BC and the Atlantic provinces vs. 83% nationally; haematology-oncology - 57% in BC vs. 72% nationally; and general surgery - 33% in the Atlantic provinces, vs. 63% nationally.

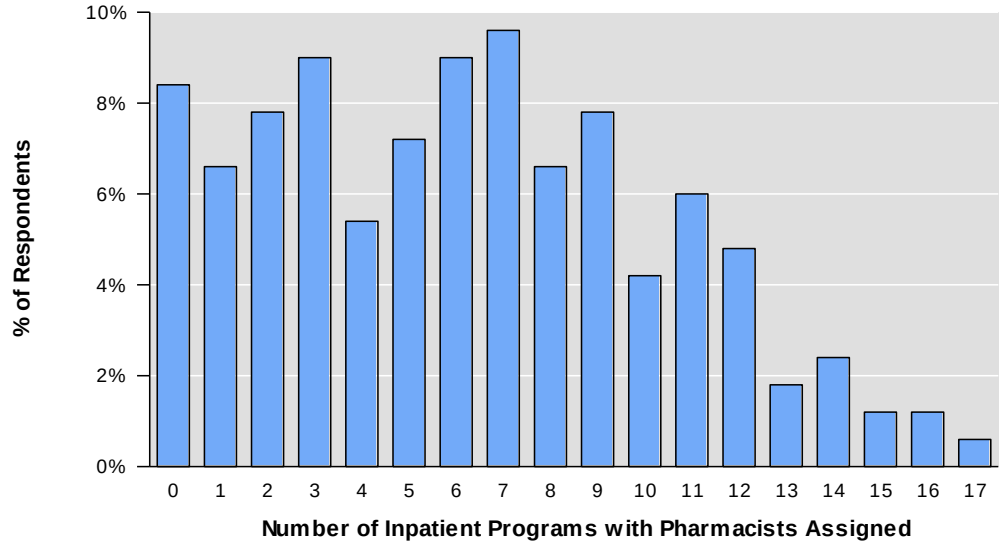
  Table B-2 summarizes the profile of pharmacist assignment to inpatient programs in 2007/08.

Table B-2. Profile of Pharmacist assignment to Inpatient Programs 2007/08

		Bed size			Teaching		Regions				
	All	50-200	201-500	> 500	Teaching	Non-Teaching	BC	Prai	ON	QC	Atl
Hospitals (n=)	(164)	(34)	(89)	(41)	(40)	(124)	(22)	(31)	(46)	(50)	(15)
Geriatrics											
program exists	104	8	61	35	28	76	12	16	25	45	6
pharmacists assigned	87	3	53	31	25	62	9	13	22	37	6
	84%	38%	87%	88%	89%	82%	75%	81%	88%	82%	100%
Transplantation											
program exists	23	2	8	13	22	1	2	5	6	8	2
pharmacists assigned	19	2	7	10	19	0	1	4	6	7	1
	83%	100%	88%	77%	86%	0%	50%	80%	100%	88%	50%
Geriatrics											
program exists	104	8	61	35	28	76	12	16	25	45	6
pharmacists assigned	87	3	53	31	25	62	9	13	22	37	6
	84%	38%	87%	88%	89%	82%	75%	81%	88%	82%	100%
Adult Critical Care											
program exists	133	22	72	39	31	102	16	24	42	42	9
pharmacists assigned	108	16	56	36	31	77	15	22	40	24	7
	81%	73%	78%	92%	100%	76%	94%	92%	95%	57%	78%
General Medicine											
program exists	134	20	77	37	34	100	18	25	42	39	10
pharmacists assigned	103	14	56	33	32	71	15	22	39	19	8
	77%	70%	73%	89%	94%	71%	83%	88%	93%	49%	80%
Hematology-oncology											
program exists	111	10	66	35	32	79	14	18	28	43	8
pharmacists assigned	80	6	47	27	28	52	8	12	23	29	8
	72%	60%	71%	77%	88%	66%	57%	67%	82%	67%	100%
Cardiovascular / lipid											
program exists	89	3	50	36	31	58	13	13	32	24	7
pharmacists assigned	64	3	35	26	26	38	10	12	28	9	5
	72%	100%	70%	72%	84%	66%	77%	92%	88%	38%	71%
Ped/Neonatal Critical care											
program exists	77	5	44	28	31	46	10	15	34	13	5
pharmacists assigned	54	3	29	22	26	28	8	9	28	7	2
	70%	60%	66%	79%	84%	61%	80%	60%	82%	54%	40%
Infectious disease / AIDS											
program exists	50	3	25	22	28	22	8	7	21	11	3
pharmacists assigned	33	2	15	16	21	12	4	4	15	8	2
	66%	67%	60%	73%	75%	55%	50%	57%	71%	73%	67%
Pain / palliative care											
program exists	116	18	62	36	34	82	17	17	35	35	12
pharmacists assigned	75	12	39	24	22	53	13	11	26	15	10
	65%	67%	63%	67%	65%	65%	77%	65%	74%	43%	83%
General Surgery											
program exists	130	20	75	35	31	99	17	23	43	38	9
Pharmacists assigned	82	13	43	26	21	61	12	20	37	10	3
	63%	65%	57%	74%	68%	62%	71%	87%	86%	26%	33%
Mental Health											
program exists	128	16	75	37	34	94	15	23	39	39	12
pharmacists assigned	77	5	41	31	29	48	9	14	30	15	9
	60%	31%	55%	84%	85%	51%	60%	61%	77%	39%	75%
Rehabilitation											
program exists	85	10	52	23	15	70	14	12	33	18	8
pharmacists assigned	50	6	29	15	9	41	6	9	24	6	5
	59%	60%	56%	65%	60%	59%	43%	75%	73%	33%	63%
Neurology											
program exists	49	0	27	22	25	24	7	8	16	14	4
pharmacists assigned	29	0	14	15	16	13	5	5	13	3	3
	59%	0%	52%	68%	64%	54%	71%	63%	81%	21%	75%
Renal / dialysis											
program exists	86	11	44	31	29	57	8	20	23	28	7
pharmacists assigned	48	3	27	18	20	28	6	9	17	11	5
	56%	27%	61%	58%	69%	49%	75%	45%	74%	39%	71%
Gynecology / obstetrics											
program exists	110	13	66	31	26	84	14	13	38	37	8
pharmacists assigned	52	5	31	16	15	37	8	7	29	5	3
	47%	39%	47%	52%	58%	44%	57%	54%	77%	14%	38%
Hematology/anticoagulation											
program exists	76	9	43	24	24	52	10	11	19	32	4
pharmacists assigned	36	7	21	8	10	26	4	6	11	12	3
	47%	78%	49%	33%	42%	50%	40%	55%	58%	38%	75%
Asthma / allergy											
program exists	57	2	36	19	22	35	8	7	16	23	3
pharmacists assigned	17	2	9	6	8	9	2	5	7	2	1
	30%	100%	25%	32%	36%	26%	25%	71%	44%	9%	33%
Diabetes											
program exists	98	12	56	30	26	72	13	11	24	41	9
pharmacists assigned	21	2	11	8	5	16	2	3	6	7	3
	21%	17%	20%	27%	19%	22%	15%	27%	25%	17%	33%

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

Figure B-3. Respondents Providing Inpatient Clinical Pharmacy Services 2007/08



Base: All respondents (n=166)

CLINICAL PRACTICE MODELS

In 2006, a Task Force on a Blueprint for Pharmacy was established to define a vision for pharmacy in Canada and to develop a strategic action plan, or blueprint, for achieving the vision for the profession. Although the Canadian Pharmacists Association played a leadership role in establishing the Task Force, many other pharmacy organizations have joined the effort. The final vision document was published in June 2008[13], and five working groups are now in place to complete the strategic plan for implementing the vision.

A separate initiative, *Moving Forward: Pharmacy Human Resources for the Future* conducted a series of research studies to investigate and understand the pharmacy human resources challenges facing the Canadian healthcare system. A synthesis report was released in mid 2008 which contained the key findings, observations and conclusions arising from all of the individual research studies. In late 2008, the final report and recommendations of this 3 year study were released. The individual research study reports, the synthesis report, and the final report with recommendations can be accessed at http://www.pharmacyhr.ca/AboutMovingForward.aspx.

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.

The *Blueprint for Pharmacy* and *Moving Forward* documents, as well as regulatory changes and other provincial initiatives, are driving changes in the practice of pharmacy. In this section of the report, we examine some of the practice directions that are occurring in hospitals and related healthcare settings across Canada.

Pharmaceutical care refers to an organized model used to deliver comprehensive, patient-specific clinical pharmacy services that are intended to achieve well-defined therapeutic outcomes. Pharmaceutical care involves the design, application and management of a patient-specific care plan by the pharmacist.

- There was a small decrease in the total number of respondents reporting the use of the pharmaceutical care model for the delivery of patient-oriented pharmacy services to inpatients, from 82% (116/142) in 2005/06 to 78% (124/159) in 2007/08. The average reported percentage of inpatient beds serviced with the pharmaceutical care model was 25%. The percentage of hospitals reporting the use of the pharmaceutical care model is higher for teaching hospitals than non-teaching hospitals (97% vs. 72%) and

also higher in hospitals with more than 500 beds than in hospitals with 50-200 beds (95% vs. 59%). The proportion of respondents reporting use of the pharmaceutical care model was highest in Ontario (86%, 38/44) and BC (82%, 18/22).

Traditional clinical pharmacy services refers to the delivery of a range of pharmacy services that are primarily focused on: a) a particular medication (e.g. an anticoagulant management service) or b) a particular pharmaceutical function (e.g. a pharmacokinetic service) that is designed to optimize a given drug therapy result for the patient or c) a particular set of clinical activities (e.g. rounds, medication histories, chart review) designed to provide general pharmacotherapy monitoring and input to the care of all patients or of selected patients within a patient care program.

- The proportion of respondents reporting the use of the traditional clinical pharmacy services model for the delivery of patient-oriented pharmacy services to inpatients has increased from 89% (127/142) in 2005/06 to 94% (149/159) in 2007/08. The average reported percentage of inpatient beds serviced with this model was 44% in 2007/08.

- The proportion of respondents reporting that some patients do not receive any patient-oriented clinical pharmacy services remained essentially the same from the previous survey (80%, 114/142 in 2005/06 compared to 83%, 132/159 in 2007/08). The average reported percentage of inpatient beds not serviced with any clinical service was 31%. The region reporting the highest proportion of beds not serviced (45%) was in the Atlantic Provinces.

Table B-3 summarizes the types of clinical pharmacy services by clinical practice model.

Table B-3 Clinical Pharmacy Services – Clinical Practice Models 2007/08

		Bed size			Teaching	
	All	50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	(159)	(34)	(86)	(29)	(39)	(120)
Pharmaceutical Care model used	124	20	67	37	38	86
	78%	59%	78%	95%	97%	72%
% of beds serviced	25%	18%	26%	30%	45%	19%
Traditional clinical pharmacy services model used	149	30	82	37	34	115
	94%	88%	95%	95%	87%	96%
% of beds serviced	44%	50%	42%	46%	35%	48%
Some patients do not receive any clinical services	132	26	72	34	32	100
	83%	76%	84%	87%	82%	83%
% of beds not serviced with either model	31%	33%	32%	25%	21%	34%

EVALUATION OF CLINICAL PHARMACY SERVICES

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

- There was an increase in the proportion of respondents reporting the evaluation of the provision of direct patient care pharmacy services from 20% (29/142) in 2005/06 to 31% (51/163) in 2007/08

- 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 (84%,41/51), implementation of objectives and development of a monitoring plan (71%,35/51), patient assessment

(51%, 25/51) and patient counselling and understanding (45%,22/51). The proportions were similar in 2005/06.

- Three methods for conducting the evaluation were reported by respondents: retrospective chart review (78%, 40/51), direct observation (57%, 29/51) and self-evaluation by pharmacists (53%, 27/51).
- For hospitals reporting the evaluation of the provision of direct patient care pharmacy services, the proportion of pharmacists who were evaluated was 61% in 2005/06 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 (48% vs. 26%) and larger bed-size hospitals (39% in hospitals with more than 500 beds vs. 32% in hospitals with 201-500 beds, vs. 21% in hospitals with 50-200 beds).

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

Table B-4. Evaluation of Clinical Pharmacy Services 2007/08

		Bed size			Teaching	
	All	50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	(163)	(34)	(88)	(41)	(40)	(123)
Evaluation of direct care services by auditing sample of clinical activities	51 31%	7 21%	28 32%	16 39%	19 48%	32 26%
Evaluation is done by: (n=)	(50)	(7)	(27)	(16)	(19)	(31)
Pharmacy managers	23 46%	4 57%	15 56%	4 25%	9 47%	14 45%
Pharmacy practice leaders	26 52%	3 43%	15 56%	8 50%	13 68%	13 42%
Peers (e.g. other pharmacists)	26 52%	4 57%	15 56%	7 44%	13 68%	13 42%
Physicians	7 14%	2 29%	4 15%	1 6%	5 26%	2 7%
The pharmacists themselves	20 40%	3 43%	12 44%	5 31%	8 42%	12 39%
Others	9 18%	2 29%	3 11%	4 25%	4 21%	5 16%
Method for evaluation : (n=)	(51)	(7)	(28)	(16)	(19)	(32)
Chart review – retrospective	40 78%	6 86%	21 75%	13 81%	15 79%	25 78%
Direct observation	29 57%	57%	17 61%	8 50%	9 47%	20 63%
Self-evaluation by pharmacists	27 53%	5 71%	13 47%	9 56%	9 47%	18 56%
Other	11 22%	0 0%	7 25%	4 25%	2 11%	9 28%
Evaluated aspects of clinical practice: (n=)	(49)	(7)	(28)	(14)	(17)	(32)
Patient assessment	25 51%	4 57%	13 46%	8 57%	10 59%	15 47%
Implementation of objectives and monitoring plan	35 71%	6 86%	18 64%	11 79%	14 82%	21 66%
Patient counselling and understanding	22 45%	3 43%	11 39%	8 57%	8 47%	14 44%
Documentation	41 84%	5 71%	23 82%	13 93%	16 94%	25 78%
Other	6 12%	0 0%	4 14%	2 14%	2 12%	4 13%
Proportion of pharmacists evaluated	63%	55%	68%	55%	59%	65%

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 organization and the profession[14]. 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. An ACCP task force has developed a complete set of competency statements for the clinical pharmacist. This section of the chapter addresses the clinical competencies of pharmacists.

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 degree[15]. In Quebec, the Faculty of Pharmacy at l'Université de Montréal started its new doctor of pharmacy program (Pharm.D.) in August 2007. This new program is based on six overarching competencies - professionalism, communication, team work/interdisciplinary collaboration, scientific reasoning/critical thinking, autonomous learning, and leadership) and three specific competencies (e.g. pharmaceutical care, health promotion and prevention and operational/practice management). While knowledge and skills are important to educate a competent pharmacist, universities now also embrace the teaching and evaluation of a pharmacist's competencies.

In 2003, CSHP adopted and published its professional standards for hospital pharmacists.

> *"Hospital Pharmacy is a unique practice environment for pharmacists. Pharmacy practice in health systems is distinguished by the complexity of the medication-use process, intensity of medication use, close collaboration of pharmacists with other healthcare professionals, focus on improving patient outcomes, pharmacist access to patient information, compliance with professional standards of practice, and specialization. Five standards have been developed: 1) professional accountability and continued competence, 2) provision of quality services, 3) evaluation, application and provision of unique knowledge, 4) patient advocate and 5) educator".*

Again, these competencies should be considered in planning and evaluating clinical pharmacy services.

Based upon the clinical pharmacist competencies proposed by ACCP, respondents to this year's survey were asked, for the first 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 31% (37/163) 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 (lower average) for clinical problem solving, judgment and decision making (average 1.4 ± 0.7), therapeutic knowledge (2.4 ± 1.9) and communication and education (3.2 ±1.2), three competencies that are relevant to direct patient care activities. Respondents reported a lower priority (higher average) for the management of patient populations (3.9 ± 1.3) and for medical information evaluation and management (4.1 ± 0.9), two competencies that relate more to indirect patient care activities.

- Regional differences were noted with different scores from Quebec where respondents reported more emphasis on the management of patient populations (2.6 ± 1.5 in Quebec vs. 3.9 ± 1.3 nationally) and therapeutic knowledge (1.9 ± 1.0 in Quebec vs. 2.4 ± 1.9 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 2007/08

	____	Bed size			Teaching	
	All	50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	37	7	17	13	16	21
Clinical problem solving, judgment and decision making	1.4 ± 0.7	1.0 ± 1.6	1.0 ± 1.3	1.0 ± 1.3	1.0 ± 1.3	1.0 ± 1.4
Therapeutic knowledge	2.4 ± 1.9	2.4 ± 1.0	2.5 ± 0.7	2.3 ± 1.0	2.6 ± 0.8	2.3 ± 0.9
Communication and education	3.2 ± 1.2	3.3 ± 1.3	3.2 ± 1.3	3.2 ± 1.1	3.3 ±1.3	3.2 ± 1.2
Management of patient populations	3.9 ± 1.3	3.9 ± 1.7	4.0 ± 1.4	3.8 ± 1.0	3.7 ± 1.6	4.1 ± 1.0
Medical information evaluation and management	4.1 ± 0.9	3.9 ± 0.7	3.9 ± 0.8	4.4 ± 1.0	4.1 ± 0.8	4.1 ± 0.9

Base: Respondents who evaluate the provision of pharmacy direct patient care services by auditing a sample of clinical activities and provide 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. According to the *Food and Drug Act*, drugs can either be dispensed following a prescription of a licensed practitioner (e.g. depending on provincial legislation- physician, dentist, midwives, podiatrists, optometrists, nurse practitioners, extended-practice nurses, veterinary practitioners) when included in Schedule F of the *Food and Drug Regulations,* or without a prescription when listed in certain other schedules. CSHP's most recent publication on pharmacist prescribing rights within a healthcare facility was published in 2001. This section describes the evolution of prescribing rights for hospital pharmacists in Canada.

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 class of health professional that 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 May 2008, Marie Berry[16] published an update on prescribing authority in Canada in her Canadian Pharmacy Law book. Based on her analysis of the legislation across Canada, she reported that pharmacists can prescribe, once trained and certified, in British Columbia, Alberta, Saskatchewan and Quebec. No details are provided regarding whether this refers to dependent or independent prescribing authority. In November 2008, Sumeet Sidhu published a similar update in the Pharmacist Letter[17]. According to that report, independent prescribing rights were granted to Alberta pharmacists in April 2007. In British Columbia, a new legislative change will allow pharmacists to modify prescriptions starting in January 2009. In Saskatchewan, the College of Pharmacists has drafted a position statement for pharmacist prescribing authority. In Manitoba, legislation has been passed, but not yet proclaimed, that would allow extended-practice pharmacists to prescribe certain drugs independently. In Ontario, an expanded scope of practice for pharmacists is being discussed. In Quebec, pharmacists may prescribe if a physician has written a prescription directing that the pharmacist may do so. In Nova Scotia, pharmacists can prescribe certain drugs independently. Discussions continue in other provinces. Theses updates show that there are important provincial differences in terms of the prescribing rights that have been granted to pharmacists. In the United States, the most recent survey of pharmacist prescribing practices was published in 2006 by Thomas et al[18].

The 2007/08 survey included a number of questions related to pharmacist prescribing rights.

- There was an increase in the number of respondents reporting that pharmacists have prescribing rights approved within their hospital, from 46 % (66/142) in 2005/2006 to 61% (99/163) in 2007/08.

- Regional differences were noted. Overall, the total number of pharmacists having prescribing rights approved within their hospital was lower in the Atlantic Provinces (38%, 6/16) and Prairies (43%, 13/31) and above average in Ontario (63%, 29/46), Quebec (67%, 33/51) and BC (82%, 18/22) in 2007/08. For hospitals reporting prescribing rights approved for pharmacists within their hospitals (61%, 99/163), there was no change or only small variations in the different types of prescribing rights approved for pharmacists. Dependent prescribing for dosage adjustment is by far the most common prescribing right granted to pharmacists and was reported by 79% (78/99) of respondents in 2007/08 and 79% (52/56) of respondents in 2005/2006. Dependent prescribing for lab tests was reported by 68% (67/99) in 2007/08, but was not included in the survey in 2005/06. Dependent prescribing for new therapy was reported by 49% (48/99) in 2007/08, up from 42% (28/66) in 2005/06.

- Independent prescribing rights for lab tests was reported by 33% (33/99) in 2007/08, down from 41% (27/66) in 2005/06. Independent prescribing rights for dosage adjustment was reported by 24% (24/99) in 2007/08, down from 30% (20/66) in 2005/06. Independent prescribing rights for new therapy was reported by 6% (6/99) in 2007/008 and 6% (4/66) in 2005/06. The scope of pharmacist prescribing rights appears to be slowly expanding or consolidating across the country.

- Regional differences were noted for dependent pharmacist prescribing rights with the highest percentage reported by respondents in Ontario.

- Regional differences were noted for independent pharmacist prescribing rights with the highest percentage reported by respondents in BC.

- Among the respondents who reported prescribing rights approved for pharmacists, the proportion of respondents with different types of prescribing rights was higher in teaching hospitals and in larger hospitals.

- For hospitals reporting dependent prescribing rights approved for pharmacists, the average number of arrangements/protocols for pharmacists was 3.7 ± 2.8 (range 0-15, median 3.0) per respondent

- For hospitals reporting prescribing rights approved for pharmacists, the respondents were asked to check each American Hospital Formulary System class where at least one drug in that class has been included in one or more of the arrangements/protocols governing dependent pharmacist prescribing. The most frequently reported AHFS classes in which this occurred were: anti-infective agents (76%,69/91), blood formation, coagulation and thrombosis (66%,60/91), electrolytic, caloric and water balance (45%,41/91), gastrointestinal drugs (43%,39/91), cardiovascular drugs (31%,28/91), and central nervous system agents (28%, 25/91). Regional differences were noted with higher percentages in BC for most drug classes.

  Table B-6 summarizes the prescribing rights for pharmacists.

Table B-6. Prescribing rights for pharmacists 2007/08

		Bed size			Teaching	
	All	50-200	201-500	>500	Teaching	Non-Teaching
Hospitals (n=)	(163)	(34)	(88)	(41)	(40)	(123)
Prescribing rights have been approved for pharmacists within the hospital	99 61%	10 29%	56 64%	33 81%	29 73%	70 57%
Type of prescribing rights approved for pharmacist : (n=)	(163)	(34)	(88)	(41)	(40)	(123)
Independent, for lab tests	33 33%	3 30%	19 34%	11 33%	12 41%	21 30%
Independent, for dosage adjustment	24 24%	1 10%	14 25%	9 27%	6 21%	18 26%
Independent, for new therapy	6 6%	1 10%	1 2%	4 12%	3 10%	3 4%
Dependent, for lab tests	67 68%	6 90%	39 70%	19 58%	16 55%	51 73%
Dependent, for dosage adjustment	78 79%	10 100%	47 84%	21 64%	22 76%	56 80%
Dependent, for new therapy	48 49%	4 40%	24 43%	20 61%	21 72%	27 39%
Average number of arrangements/protocols for pharmacists approved within the hospital (n=) **(avg ± sd)**	(80) 3.7 ± 2.8	(9) 5.0 ± 3.0	(45) 3.6 ± 3.2	(26) 3.2 ± 1.9	(26) 4.8 ± 3.3	(54) 3.1 ± 2.4
American Hospital Formulary System class with dependent pharmacist prescribing (n=)	(91)	(10)	(51)	(30)	(27)	(64)
Anti-infective agents	69 76%	9 90%	40 78%	20 67%	19 70%	50 78%
Blood formation, coagulation and thrombosis	60 66%	7 70%	34 67%	19 63%	19 70%	41 64%
Electrolytic, caloric and water balance	41 45%	4 40%	24 47%	13 43%	15 56%	26 41%
Gastrointestinal drugs	39 43%	6 60%	20 39%	13 43%	10 44%	12 42%
Cardiovascular drugs	28 31%	4 40%	15 29%	9 30%	8 30%	20 31%
Central nervous system agents	25 28%	2 20%	15 29%	8 27%	6 22%	19 30%
Vitamins	20 22%	3 30%	11 22%	6 20%	6 22%	14 22%
Antihistamine drugs	19 21%	3 30%	11 22%	5 17%	9 33%	10 16%
Respiratory tract agents	19 21%	2 20%	8 16%	9 30%	8 30%	11 17%
Eye, ear, nose and throat preparations	17 19%	2 20%	9 18%	6 20%	6 22%	11 17%
Skin and mucous membrane agents	17 19%	2 20%	10 20%	5 17%	6 22%	11 17%
Serum, toxoids and vaccines	14 15%	2 20%	8 16%	4 13%	7 26%	7 11%
Hormones and synthetic substitutes	14 15%	1 10%	7 14%	6 20%	5 19%	9 14%
Antineoplasic agents	11 12%	2 20%	8 16%	1 3%	5 19%	6 9%
Autonomic drugs	11 12%	1 10%	4 8%	6 20%	7 26%	4 6%
Others	7 8%	1 10%	3 6%	3 10%	5 19%	2 3%
Enzymes	6 7%	1 10%	2 4%	3 10%	5 19%	1 2%
Smooth muscle relaxants	3 3%	0 0%	2 4%	1 3%	2 7%	1 2%
Local anesthetics	2 2%	1 10%	1 2%	0 0%	2 7%	0 0%

SUPPORT FROM PHARMACY TECHNICIANS FOR CLINICAL PHARMACY SERVICES

The Blueprint for pharmacy and the synthesis report of the Moving Forward initiative both recognized the need to enhance and expand the role of pharmacy technicians. While there are barriers to improving the use of pharmacy technicians in pharmacy practice (e.g. legislative restrictions, lack of standards for technician training programs, the need for process reengineering, the need for revised technician to pharmacist ratios, etc.), hospital pharmacists do already rely on pharmacy technicians to support their clinical activities.

In the United States, a white paper on pharmacy technicians was published in 2003[19]. In Canada, CSHP published a revised version of its guidelines for the delegation of functions to pharmacy technicians in 2006, but those guidelines do not address the role of technicians in supporting the clinical activities of the pharmacist[20].

- In this year's survey, 66% of respondents reported that pharmacy technicians carried out tasks that directly support pharmacists in carrying out their clinical activities. Regional differences were noted with 46% (10/22) in BC, 57% (17/31) in the Prairies, 71% (35/51) in Quebec, 72% (33/46) in Ontario and 75% (12/16) in the Atlantic Provinces reporting that this occurs.

- Among the respondents who reported that pharmacy technicians carried out tasks that directly support pharmacists in carrying out their clinical activities, respondents reported that the supportive tasks performed by technicians were drug distribution (88%), support to the medication safety committee (45%), admission drug histories (29%), support to the drug use evaluation program (25%), drug therapy evaluation/monitoring (24%), medication counselling (21%), and support to the P&T committee (13%). All these support functions must be interpreted by taking into account the narrow task descriptions provided in the survey (see Table B-7).

- Among the respondents who reported that pharmacy technicians carried out tasks that directly support pharmacists in carrying out their clinical activities, respondents reported that pharmacy technicians doing so work mainly in the central pharmacy (90%) and satellite pharmacies (29%). Interestingly, pharmacy technicians who support clinical pharmacists were reported to be located on the patient care units by 51% of respondents and to be located in clinics by 19% of respondents.

  Table B-7 summarizes the roles that pharmacy technicians fulfill in support of clinical pharmacy services.

Table B-7. Support roles from pharmacy technicians for clinical pharmacy services 2007/08

		Bed size			Teaching	
	All	50-200	201-500	>500	Teaching	Non-teaching
Hospitals (n=)	(163)	(34)	(88)	(41)	(40)	(123)
Pharmacy technicians carry out tasks that directly support pharmacists in carrying out their clinical activities	107	22	57	28	31	76
	66%	65%	65%	68%	78%	62%
Tasks performed by pharmacy technicians (n=)	(107)	(22)	(57)	(28)	(31)	(76)
Drug distribution - serve as the initial Pharmacy liaison for solving drug distribution problems on patient care units	94	21	49	24	26	68
	88%	96%	86%	86%	84%	90%
Admission drug histories - collection and collation of information concerning the patient's pre-admission drug therapy	31	5	15	11	8	23
	29%	23%	26%	39%	26%	30%
Drug therapy evaluation - collection of laboratory test results	26	4	13	9	10	16
	24%	18%	23%	32%	32%	21%
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)	6	1	4	1	0	6
	6%	5%	7%	4%	0%	8%
Medication counseling – assembly of pamphlets and documentation to be given to the patient by the pharmacist	22	5	12	5	9	13
	21%	23%	21%	18%	29%	17%
Seamless care services – initial creation of inpatient drug therapy documentation and discharge drug therapy plan	9	1	5	3	3	6
	8%	5%	9%	11%	10%	8%
Total parenteral nutrition team participation – using established protocols and lab values to calculate changes to parenteral nutrition therapy	9	3	6	0	1	8
	8%	14%	11%	0%	3%	11%
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	14	4	6	4	2	12
	13%	18%	11%	14%	7%	16%
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)	48	14	21	13	16	32
	45%	64%	37%	47%	52%	42%
Support to drug use evaluation program - data collection for drug utilization review	27	7	13	7	11	16
	25%	32%	23%	25%	36%	21%
Others	11	3	7	1	2	9
	10%	14%	12%	4%	7%	12%
Pharmacy technicians work place when supporting pharmacists in carrying out their clinical activities (n=)	(106)	(21)	(57)	(28)	(31)	(75)
Central pharmacy	95	20	51	24	27	68
	90%	95%	90%	86%	87%	91%
Wards	54	12	28	14	17	37
	51%	57%	49%	50%	55%	49%
Satellite pharmacies	31	4	15	12	20	11
	29%	19%	26%	43%	65%	15%
Clinics	20	3	9	8	9	11
	19%	14%	16%	29%	29%	15%
Other	10	1	5	4	2	8
	9%	5%	9%	14%	7%	11%

PRIORITY AND SERVICE LEVEL OF CLINICAL SERVICES

In the 1990s and early 2000s, Bond and his colleagues published a number of studies concerning clinical pharmacy services and their impact on mortality, morbidity, length of stay, drug costs, 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[21, 22, 23, 24, 25, 26]. In 2008, Bond published a survey of 15 hospital-based clinical pharmacy services, 51 different drugs managed under protocol by pharmacists, medication errors, and pharmacy technology in United States hospitals. The study provides continuing evidence of the growth and value of clinical pharmacy services and clinical pharmacists in the USA[21]. 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 respondents place on different pharmacy services, and the level of service provided for those same pharmacy services.

In Canada, hospital pharmacists represent a workforce of about 4100 individuals (Note: This survey encompasses approximately 2800 full-time equivalent pharmacists who work at the 166 facilities that participated in the 2007/08 survey)[27]. 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 persistent shortage of pharmacists, 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, and the previous one conducted in 2005/06, 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 respondents' responses provide a profile of the level of clinical pharmacy services provided in Canadian hospitals. Definitions were provided to respondents and are included in this year's report, 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 offered.

The lower the average of the level of service results, the more comprehensive the level of service that the respondents currently reported at their sites. Almost all respondents (98-100%, from 162 to 166/166) were able to indicate the level of clinical pharmacy service provided.

Table B-8 summarizes the 2007/08 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).

- The mean score reported by respondents was lower (i.e. a more comprehensive level of service offered), by at least 0.5 points or more in favor of teaching vs. non-teaching respondents, for the following clinical services : drug information (difference of 1.7), clinical trials support (difference of 1.5), medical rounds participation (difference of 1.1), clinical research (difference of 1.1), ethics review committee participation (difference of 1.0), drug use evaluation (difference of 0.8), seamless care services (difference of 0.7), inservice education (difference of 0.6), and formulary compliance (difference of 0.6).

- The mean score reported by respondents was lower (i.e. a more comprehensive level of service offered), by at least 0.5 points or more in favour of larger bed size hospitals (e.g. > 500 beds vs. 50-200 beds), for the following clinical services: clinical trial supports (difference of 1.2), drug use evaluation (difference of 1.0), ethics review committee participation (difference of 1.0), clinical research (difference of 0.8), drug information (difference of 0.7), patient education program (difference of 0.6), infection control committee (difference of 0.6), and medical rounds participation (difference of 0.5).

As we discussed in the 2005/2006 report, of the clinical pharmacy services identified by Bond et al. as having a positive effect on health outcomes, most of them, on average, were not offered on a comprehensive level according to our survey respondents. Bond 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 these 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.

Table B-8. Average Level of Service 2007/08

[Types**] Clinical activities (base for 2007/08)	2005/06	2007/08											
	All Average ± SD	All Average ± SD	Bedsize			Teaching		Expected favorable outcomes of clinical pharmacy services on different indicators according to Bond's studies *					
			50-200	201-500	>500	Teaching	Non-Teaching	TCC	DC	MR	LOS	ME	ADR
[C.P.] P&T Committee (n = 163)	1.2 ± 0.7	1.2 ± 0.6	1.1	1.2	1.1	1.1	1.2						
[C.P.] Medication Safety Committee (n = 163)	1.8 ± 1.1	1.6 ± 0.9	1.6	1.6	1.4	1.4	1.6						
[P.S.] Med Incident Reporting/ prevention (n = 166)	1.8 ± 0.9	1.7 ± 0.9	1.8	1.8	1.7	1.5	1.8						
[P.C.] Pharmacokinetic consultations / monitoring (n = 165)	1.8 ± 0.7	1.9 ± 0.7	2.1	1.8	1.8	1.8	1.9						
[P.C.] Lab test ordering / Drug dosage adjustment (n = 164)	2.0 ± 0.8	2.0 ± 0.7	2.2	2.0	2.0	1.9	2.1						
[C.P.] Infection Control Committee (n= 163)	2.2 ± 1.1	2.0 ± 1.1	2.3	2.1	1.7	1.7	2.1						
[P.C.] Drug therapy evaluation / monitoring (n = 162)	2.2 ± 0.8	2.2 ± 0.8	2.4	2.2	2.1	2.0	2.0						
[C.R.] Ethics Review Cte participation (n= 165)	2.2 ± 1.4	2.4 ± 1.4	3.0	2.3	2.0	1.6	2.6						
[C.R.] Clinical trials support (n= 166)	2.3 ± 1.2	2.5 ± 1.3	3.1	2.5	1.9	1.3	2.8						
[P.S.] ADR monitoring (n = 166)	2.3 ± 0.8	2.3 ± 0.8	2.4	2.3	2.1	2.1	2.3	+					+
[P.C.] Medication counselling (n = 164)	2.4 ± 0.6	2.4 ± 0.6	2,5	2,4	2,2	2,1	2,5						
[P.C.] Patient education program (n= 165)	2.4 ± 0.6	2.5 ± 0.7	2,8	2,5	2,2	2.2	2.6						
[P.C.] TPN team participation (n = 164)	2.5 ± 1.2	2.5 ± 1.2	2.5	2.6	2.4	2.3	2.6						+
[P.C.] Medical rounds participation (n= 164)	2.6 ± 0.9	2.6 ± 1.0	2.9	2.6	2.4	1.8	2.9	+		+			+
[P.C.] Admission drug histories (n = 165)	2.7 ± 0.8	2.6 ± 0.8	2.8	2.6	2.4	2.4	2.7	+	+	+	+		+
[D.I.] Inservice education (n = 163)	2.6 ± 0.9	2.5 ± 0.7	2.6	2.5	2.4	2.1	2.7	+	+	+	+		+
[D.I.] Formulary compliance (n= 162)	2.4 ± 1.1	2.6 ± 1,0	2.8	2.7	2.4	2.2	2.8						
[D.I.] Drug Use Evaluation (n = 163)	2.6 ± 1.0	2.8 ± 0.9	3.2	2.8	2.2	2.1	2.9	+					
[P.C.] Seamless care services (n = 164)	3.0 ± 0.8	2.9 ± 0.8	3.0	3.0	2.7	2.4	3.1						
[D.I.] Drug information (n = 163)	3.0 ±1.2	3.0 ± 1.2	3.3	3.1	2.6	1.7	3.4	+	+	+			+
[C.R.] Clinical Research (n = 166)	3.3 ± 0.9	3.4 ± 0.8	3.8	3.5	3.0	2.6	3.7	+		+			
[P.C.] Cardiopulmonary resuscitation (CPR) team participation (RCR) (n = 165)	3.8 ± 0.6	3.8 ± 0.6	3.9	3.8	3.7	3.6	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											+	

**** Total costs of care (TCC), drug costs (DC), mortality rates (MR), length of stay (LOS), medication errors (ME), adverse drug reactions (ADR)***
*****Committee participation (C.P.), clinical research (C.R.), patient safety/quality improvement activities (P.S.), drug information/drug use management activities (D.I.), patient care activities (P.C.)***

While almost all respondents provided data on the level of clinical pharmacy service provided by their facility, a smaller number (77%, 127/166) chose to provide a ranking of direct patient care services in the 2007/08 survey (1 being the highest priority and 10 being the lowest priority). Only small differences were observed between the average level of services scores and the average priority ranking scores between 2005/06 and 2007/08 for most direct patient care pharmacy services. However, the relative position of certain clinical services has changed, especially for seamless care (moved up from 9 to 7 on the priority ranking) and admission histories

(moved up from 5 to 4 for priority ranking). These changes may have occurred because of the inclusion of medication reconciliation in the required organisational practices of Accreditation Canada.

Table B-9 summarizes the average level of service and the average ranking priority of 10 direct patient care pharmacy services.

Table B-9. Comparison of Average Level of Service and the Average Ranking Priority of 10 Direct Patient Care Pharmacy Services 2007/08

Direct Patient Care Pharmacy Services are sorted by priority ranking	Average level of services (score 1, 2, 3 or 4)		Average priority ranking (score 1 to 10)	
	Avg ± SD	Rank 2007/08 (Rank 2005/06)	Avg ± SD	Rank 2007/08 (Rank 2005/06)
[P.C.] Drug therapy evaluation (DTM)/monitoring	2.1 ± 0,6	1 (2)	2.8 ± 2.2	1 (1)
[P.C.] Pharmacokinetic consultations /monitoring	1.9 ± 0.7	3 (1)	4.1 ± 2.3	2 (2)
[P.C.] Lab test ordering / drug dosage adjustment	2.0 ± 0.7	2 (3)	4.2 ± 2.3	3 (3)
[P.C.] Admission drug histories	2.6 ± 0.7	8 (8)	4.5 ± 2.6	4 (5)
[P.C.] Medical rounds participation	2.5 ± 0.9	6 (7)	4.8 ± 2.4	5 (6)
[P.C.] Medication / drug counselling	2.3 ± 0.6	4 (4)	4.8 ± 1.9	6 (4)
[P.C.] Seamless care services	2.8 ± 0,8	9 (9)	6.5 ± 2,1	7 (9)
[P.C.] Patient education program	2.5 ± 0.7	5 (6)	6.7 ± 1.9	8 (8)
[P.C.] TPN team participation	2.6 ± 1.2	7 (5)	7.3 ± 2.6	9 (7)
[P.C.] Cardiopulmonary resuscitation (CPR) team participation	3.8 ± 0.6	10 (10)	9.5 ± 1.3	10 (10)

(Base =127: who provided both level of service and priority ranking) SD = standard deviation

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

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D - DRUG DISTRIBUTION SYSTEMS

JANET HARDING

ORAL MEDICATION SYSTEMS

Drug distribution systems in the hospital setting should ideally prevent medication errors from occurring. When errors do occur, the system should facilitate their early detection, enabling corrective steps to be taken to prevent their recurrence and to minimize any adverse effects on the patient. Hospital drug distribution systems should also facilitate the appropriate allocation and use of available resources. The unit-dose drug distribution system is endorsed by The Canadian Society of Hospital Pharmacists as the drug distribution system of choice in organized healthcare settings because it provides improvements in medication safety, overall system efficiency, job satisfaction, and effective use of human resources.[1]

- Centralized unit dose systems, in which unit dose medications are selected and assembled in the pharmacy department, for each patient, were reported to be in use by 64% (103/162) of all respondents (Table D-1). For hospitals with 201-500 beds and for hospitals with more than 500 beds, there was little change in the per cent of respondents reporting use of centralized unit dose systems in 2007/08, compared to the results of the 2005/06 survey. The per cent of respondents reporting the use of centralized unit dose systems in hospitals with 100-200 beds was 48% (13/27) in 2005/06 compared to 36% (12/33) of hospitals with 50-200 beds in 2007/08. The inclusion of smaller hospitals in the 2007/08 survey may have contributed to this change.

- Regional differences in the use of centralized unit dose systems were noted with 48% (10/21) of respondents reporting a unit dose system in B.C., 50% (8/16) in Atlantic Canada, 66% (33/50) in Quebec, 67% (30/45) in Ontario and 73% (22/30) in the Prairies.

- The number of respondents reporting the use of automation in a centralized unit dose system was 66% (65/98) in 2005/06, compared to 75% (77/102) in 2007/08.

- Among respondents who reported using centralized automated dispensing systems, 94% (72/77) use a canister type system and 12% (9/77) use a robotic system (four respondents in Ontario, three in Quebec and one in each of B.C. and Atlantic Canada).

- Decentralized automated unit dose systems were reported by 36% (59/162) of respondents. Of the 59 respondents who reported the use of decentralized automated unit dose systems, 43 respondents indicated the percentage of beds serviced with these cabinets. It is possible that the 16 respondents who did not provide information on the percentage of beds serviced are only using the cabinets in areas like the emergency room and operating room, where there are no “inpatient beds”. Fifty one of the 59 respondents reporting use of decentralized automated unit dose systems provided information on the location where the cabinets are used (e.g. general inpatient units, operating room, etc.) and 8 respondents provided no information on the location or % of beds serviced with these systems.

- Among the 51 respondents reporting the use and location of decentralized, automated unit dose systems, 80% (41/51) reported that they use the technology in the emergency department, 51% (26/51) use it in critical care units for regularly scheduled medications, 49% (25/51) use it in critical care units only for narcotics and/or wardstock, 49% (25/51) use it in the operating room, 28% (14/51) use it in general inpatient units for regularly scheduled medications, 39% (20/51) use it in general inpatient units only for narcotics and/or wardstock, and 43% (22/51) use it in the recovery room.

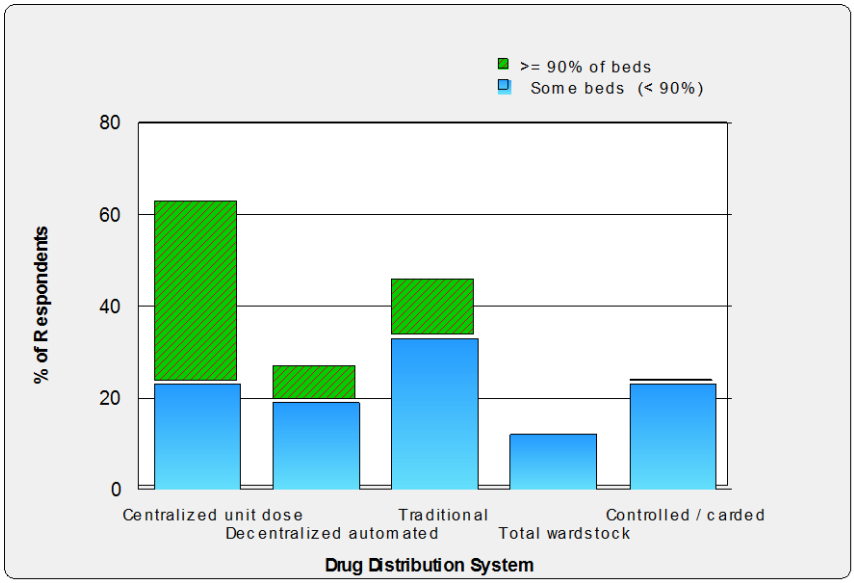
- Forty eight percent (78/162) of respondents reported that they provide unit dose drug distribution to 90% or more of the beds within their hospital, using either centralized or decentralized unit dose systems. These comprehensive unit dose systems continue to be more common in larger hospitals (Table D-1).

- Traditional drug distribution systems were reported to be in use for 90% or more of beds within the hospital by 13% (21/162) of all respondents (Figure D-1).

Table D-1. Drug Distribution Systems 2007/08

		Bed Size			Teaching	
	All	50 - 200	201- 500	>500	Teach	Non-Teaching
Hospitals (n=)	(162)	(33)	(89)	(40)	(40)	(122)
Centralized unit dose	103	12	59	32	29	74
	64%	36%	66%	80%	73%	61%
>= 90% of beds	65	8	38	19	17	48
	40%	24%	43%	48%	43%	39%
Some beds (< 90%)	38	4	21	13	12	26
	23%	12%	24%	33%	30%	21%
Decentralized automated unit dose	43	4	24	15	18	25
	27%	12%	27%	38%	45%	20%
>= 90% of beds	13	4	8	1	4	9
	8%	12%	9%	3%	10%	7%
Some beds (< 90%)	30	0	16	14	14	16
	19%	0%	18%	35%	35%	13%
Traditional	74	17	38	19	18	56
	46%	52%	43%	48%	45%	46%
>= 90% of beds	21	9	9	3	5	16
	13%	27%	10%	8%	13%	13%
Some beds (< 90%)	53	8	29	16	13	40
	33%	24%	33%	40%	33%	33%
Total wardstock	19	5	11	3	3	16
	12%	15%	12%	8%	8%	13%
>= 90% of beds	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%
Some beds (< 90%)	19	5	11	3	3	16
	12%	15%	12%	8%	8%	13%
Controlled/ carded dose	40	12	23	5	3	37
	25%	36%	26%	13%	8%	30%
>= 90% of beds	2	2	0	0	0	2
	1%	6%	0%	0%	0%	2%
Some beds (< 90%)	38	10	23	5	3	35
	23%	30%	26%	13%	8%	29%
One system for oral medication for >= 90% of beds	101	23	55	23	26	75
	62%	70%	62%	58%	65%	61%

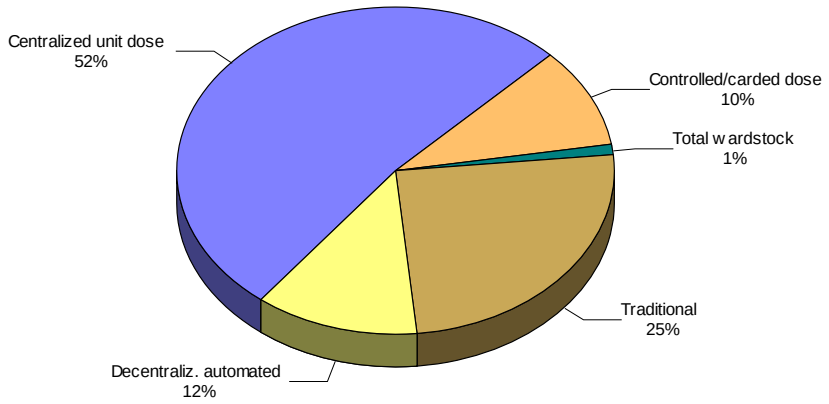
Figure D-1. Drug Distribution Systems 2007/08



Base: Facilities that provided drug distribution system information (162)

- Combined data from all respondents indicated that 74% of beds within the hospitals captured by this survey were serviced with either a centralized unit dose system, a decentralized automated unit dose system, or a controlled/carded dose system, while 26% of beds were serviced with traditional or total wardstock drug distribution systems (Figure D-2).

Figure D-2. Proportion of Beds Serviced by Each Drug Distribution System 2007/08



Base: Facilities that provided drug distribution information (162)

The reported use of centralized unit dose distribution systems and decentralized automated unit dose systems indicates that pharmacists are playing a leadership role in implementing and managing improved drug distribution systems that enhance patient safety and contribute to nursing efficiencies.[2] The use of decentralized automated unit dose systems in emergency departments, critical care areas and operating rooms suggests that some pharmacy departments are primarily employing this type of automation in areas that typically rely on extensive floorstock supplies. Although combined data indicates that 74% of beds overall receive the benefits of unit dose drug distribution, only 49% of respondents indicated that unit dose systems (centralized, decentralized automated, and controlled/carded dose) are being used for equal to or greater than 90% of the beds in their hospital. This indicates that there continues to be an opportunity to improve drug distribution systems in Canadian hospitals.

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 D-2). The percentage of respondents reporting that pharmacy technicians enter medication orders into the pharmacy information system has remained relatively constant at 78% (113/144) in 2003/04, 78% (111/142) in 2005/06, and 81% (134/166) in 2007/08.

- Medication order entry by pharmacy technicians was reported by 100% (51/51) of respondents in Quebec, 91% (20/22) of respondents in B.C., 74% (34/46) of respondents in Ontario, 69% (11/16) of respondents in Atlantic Canada, and 58% (18/31) of respondents in the Prairies.

- Twenty-seven percent (36/132) of respondents reported that pharmacists review and pre-authorize medication orders before a pharmacy technician is permitted to enter the order into the pharmacy information system.

Verification of medication order entry confirms that the entry in the pharmacy information system matches the intended medication order and ensures transcription and/or key-punching accuracy. It is worth noting that in 2003, nearly 15% of the error records (34,740 out of 235,159) reported to the USP MEDMARX program involved the use of a computer system. Computer entry errors, involving the incomplete or incorrect entry of information into a computer system used to support the medication use process, were the 4th leading cause of error in that year, cited in more than 27,000 records."[3] Pharmacists should be aware of the contribution of

computer entry to the errors in their hospitals and should ensure that there are adequate checks in the drug distribution system to prevent these errors from reaching the patient.

- Among respondents who reported that medication orders were entered by pharmacy technicians, 80% (105/131) reported that technician-entered orders were verified only by a pharmacist; 11% (15/131) reported that either a pharmacist or a second pharmacy technician verified technician-entered orders, 2% (3/131) reported that a second technician only was involved in verifying technician-entered orders, and 6% (8/131) reported that no verification was required for technician-entered orders.

- Among respondents who reported pharmacist medication order entry, 23% (25/110) reported that pharmacist-entered orders were verified only by a second pharmacist, 12% (13/110) reported that either a second pharmacist or a pharmacy technician verified pharmacist-entered orders, 5% (5/110) reported that a pharmacy technician only was involved in verifying pharmacist-entered orders, and 61% (67/110) reported that verification of a pharmacist's order entry was not required. (Table D-2).

Table D-2. Medication Order Entry 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(166)	(35)	(90)	(41)	(40)	(126)
Orders entered by pharmacists	115 69%	25 71%	61 68%	29 71%	30 75%	85 67%
Verified by (n=110)						
A second pharmacist only	25 23%	4 16%	18 32%	3 11%	5 17%	20 25%
Either a second pharmacist or a pharmacy technician	13 12%	3 12%	7 12%	3 11%	3 10%	10 13%
A pharmacy technician only	5 5%	1 4%	4 7%	0 0%	2 7%	3 4%
Verification of a pharmacist order entry is not required	67 61%	17 68%	28 49%	22 79%	20 67%	47 59%
Orders entered by technicians (n=166)	134 81%	27 77%	72 80%	35 85%	30 75%	104 83%
Pharmacists review and pre-authorize medication orders (n=132)	36 27%	3 11%	17 24%	16 47%	13 45%	23 22%
Verified by (n=131)						
A pharmacist only	105 80%	20 77%	59 84%	26 74%	22 76%	83 81%
Either a pharmacist or a second pharmacy technician	15 11%	2 8%	7 10%	6 17%	3 10%	12 12%
A second pharmacy technician only	3 2%	1 4%	2 3%	0 0%	1 3%	2 2%
Verification of a pharmacy technician order entry is not required	8 6%	3 12%	2 3%	3 9%	3 10%	5 5%
Orders entered by prescribers, through CPOE (n=166)	7 4%	0 0%	5 6%	2 5%	3 8%	4 3%

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 2010, Managing Medications Standards (11.1) address the need for a pharmacist review of medication orders prior to dispensing.[4] 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. In the U.S., the Joint Commission on the Accreditation of Healthcare Organizations included a similar requirement in

its 2004 Managing Medication Standards that a pharmacist must review all medication orders before dispensing a medication, accessing it from floor stock, or accessing it from an automated storage and distribution device. A number of companies have sprung up in the US that provide remote review of orders when the pharmacy is closed.[5]

- Ninety-six per cent (160/166) of all respondents reported that the pharmacy was closed for a period of hours each day. Two respondents in B.C., 3 in the Prairies, and 1 in Ontario reported that the pharmacy was open 24 hours a day.

- During the hours that the pharmacy is open, 90% (149/165) of respondents reported that a pharmacist reviews all medication orders for therapeutic appropriateness before a medication is dispensed from the central or a satellite pharmacy, 29% (46/159) reported that a pharmacist reviews all medication orders before medication is accessed from wardstock, and 42% (31/73) of respondents using automated cabinets on the patient care units reported that a pharmacist reviews all medication orders before medication is accessed from an automated cabinet. Regional variation occurs for a pharmacist review of medication orders before a medication is dispensed from the central or a satellite pharmacy; 59% (13/22) of respondents in B.C., 91% (42/46) in Ontario, 94% (29/31) in the Prairies, 94% (15/16) in Atlantic Canada and 98% (50/51) in Quebec reported that this occurs.

- During hours that the pharmacy is closed, 6% (9/159) of respondents reported that an on-call pharmacist reviews medication orders for therapeutic appropriateness before a medication is accessed from a night cupboard or similar after-hours system, 3% (5/155) of respondents reported that an on-call pharmacist review takes place before medication is accessed from wardstock, and 3% (2/79) of respondents using automated cabinets on the patient care units reported that an on-call pharmacist review occurs before medication is accessed from an automated cabinet.

Table D-3. Pharmacist Review of Medication Orders when the Pharmacy is Open or Closed 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201-500	>500	Teaching	Non-teaching
During Hours that the Pharmacy is Open, a pharmacist reviews all medication orders before:						
Medications being dispensed from the central or a satellite pharmacy (n=165)	149 90%	30 86%	81 91%	38 93%	40 100%	109 87%
Medications being accessed from automated cabinets on the patient care units (n=73)	31 42%	5 38%	15 39%	11 50%	13 50%	18 38%
Medications being accessed from wardstock (n=159)	46 29%	6 17%	27 31%	13 35%	14 37%	32 26%
During Hours that the Pharmacy is Closed, a pharmacist reviews all medication orders before:						
Medications being dispensed from a night cupboard or similar (n=159)	9 6%	1 3%	5 6%	3 8%	1 3%	8 7%
Medications being accessed from automated cabinets on the patient care units (n=79)	2 3%	0 0%	2 5%	0 0%	0 0%	2 4%
Medications being accessed from wardstock (n=155)	5 3%	0 0%	4 5%	1 3%	1 3%	4 3%

MEDICATION TICKETS, MEDICATION PROFILES AND MEDICATION ADMINISTRATION RECORDS

Manually prepared medication tickets and medication administration records were once widely used in hospitals as a means of scheduling and managing patients' medication therapy. These systems were error-prone and are no longer used by most hospitals. They have largely been replaced by electronic medication profiles and computer-generated medication administration records.

- The use of manually prepared medication "tickets" or "cards" for 90% or more of beds in the facility was reported by 4% of all respondents and their use for less than 90% of beds in the facility was reported by a further 8% of respondents (Table D-4). Regional variation was apparent, with the use of manually prepared tickets reported by 24% (12/51) of respondents in Quebec, 10% (3/31) of respondents in the Prairies, 9% (4/46) of respondents in Ontario, and 6% (1/16) of respondents in Atlantic Canada. None of the respondents in BC reported the use of medication tickets within their facility.

- The manual preparation of medication administration records was reported by 32% of all respondents; 51% (23/45) of respondents in Ontario, 50% (8/16) in Atlantic Canada, 42% (13/31) in the Prairies, 18% (4/22) in B.C. and 10% (5/51) in Quebec.

Access to a complete medication profile is an important tool for prescribers to have when making decisions concerning drug therapy, and for pharmacists to have when reviewing medication orders.

- Fifty-five per cent of all respondents reported that prescribers have easy and reliable access to a complete medication profile for all patients, when writing medication orders. There was little variation across hospitals of differing bed sizes . However there was regional variation, with prescribers reported to have easy and reliable access to a complete medication profile for all patients by 18% (4/22) of respondents in B.C., 44% (7/16) in Atlantic Canada, 61% (19/31) in the Prairies, 63% (32/51) in Quebec and 65% (30/46) in Ontario.

- Seventy-seven per cent of all respondents reported that pharmacists have easy and reliable access to a complete medication profile for all patients, when reviewing medication orders.

Accreditation Canada states that organizations are responsible for obtaining a medication history for each patient upon admission and for maintaining the medication history and ongoing medication profile in a pharmacy information system. The ongoing medication profile is to include a current list of medications and drug therapy records for each episode of care. When prescribing medications, providers must have access to the medication profile.[6] The Institute for Safe Medication Practices also includes the availability of a complete medication profile as one of its self-assessment items in the Medication Safety Self-Assessment for Hospitals.[7] Although all respondents indicated use of a pharmacy information system, it appears that the role of this technology for providing easy and reliable access to a complete patient medication profile, as well as for generation of Medication Administration Records, is not being fully realized.

Table D-4. Medication Tickets, Medication Profiles and Medication Administration Records 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(166)	(35)	(90)	(41)	(40)	(126)
Manually prepared medication 'tickets' or 'cards' used						
yes (for >= 90% of beds in the facility)	6 4%	1 3%	5 6%	0 0%	0 0%	6 5%
partial (for < 90% of beds in the facility)	14 8%	2 6%	5 6%	7 17%	3 8%	11 9%
Prescribers have access to complete medication profiles						
Yes, ...access to ... profile for all patients	92 55%	20 57%	48 53%	24 59%	18 45%	74 59%
Yes, ...access to ... profile for most patients (50% to 99%) in the facility	62 37%	12 34%	35 39%	15 37%	18 45%	44 35%
Yes, ...access to ... profile for some patients (<50%) in the facility	4 2%	0 0%	4 4%	0 0%	1 3%	3 2%
Pharmacists have access to complete medication profiles						
Yes, ...access to ... profile for all patients	128 77%	27 77%	70 78%	31 76%	30 75%	98 78%
Yes, ...access to ... profile for most patients (50% to 99%) in the facility	35 21%	8 23%	17 19%	10 24%	10 25%	25 20%
Yes, ...access to ... profile for some patients (<50%) in the facility	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Medication Administration Records are:						
Manually prepared	53 32%	15 43%	28 31%	10 24%	15 38%	38 30%
Generated in hard copy through the Pharmacy Information System (Documentation is manual)	118 71%	23 66%	63 70%	32 78%	24 60%	94 75%
Electronic, and share a common database with the Pharmacy Information System (Documentation is on line)	11 7%	1 3%	8 9%	2 5%	8 20%	3 2%

TECHNICIAN ROLES

Table D-5 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 required training and establishes the objective assessment criteria (e.g. accuracy rate) that are to be used to validate a pharmacy technician's ability to perform a particular task.

Table D-5. Functions Performed by Technicians, Functions Checked by Technicians, and Validation Requirements 2007/08

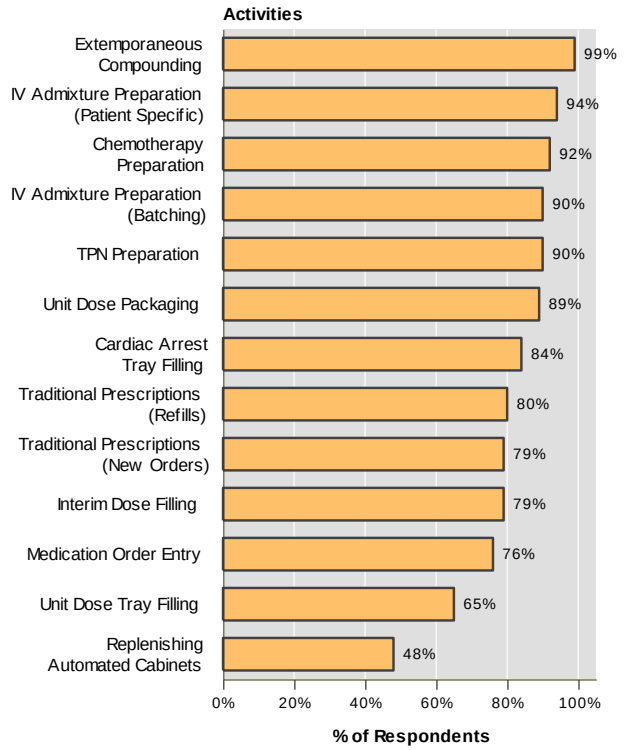
	A Function Performed (n=166)	B Validation required to perform task (n=A)	C Checked by technician (n=A)	D Validation required to check (n=C)
(01) Perform Medication Order Entry	126 76%	72 57%	17 14%	9 53%
(02) Fill Traditional Prescriptions, New Orders	131 79%	61 47%	50 38%	40 80%
(03) Fill Traditional Prescriptions, Refills	132 80%	56 42%	77 58%	67 87%
(04) Package Unit Dose Items	147 89%	73 50%	115 78%	91 79%
(05) Fill Unit Dose Trays	108 65%	56 52%	86 80%	73 85%
(06) Fill Interim Doses	131 79%	66 50%	69 53%	57 83%
(07) Prepare patient-specific IV Admixtures	156 94%	122 78%	51 33%	46 90%
(08) Prepare batch IV Admixtures	150 90%	111 74%	76 51%	69 91%
(09) Prepare TPN Solutions	149 90%	112 75%	34 23%	29 85%
(10) Prepare Chemotherapy	152 92%	121 80%	11 7%	9 82%
(11) Compound Extemporaneous Products	164 99%	80 49%	74 45%	55 74%
(12) Fill Cardiac Arrest Trays	139 84%	67 48%	91 66%	63 69%
(13) Replenish Automated Cabinets	80 48%	38 48%	48 60%	32 67%

A validation process, specific to functions delegated to technicians, is recommended by CSHP.[8,9] Validation ensures technicians are appropriately trained and qualified. It supports the role of technicians checking the work of other technicians and provides a tool for advancing quality in the drug distribution system. In the 2007/08 survey, respondents reported that validation of technicians who check the work of other technicians was more prevalent than validation of technicians who perform that activity, as illustrated in Figure D-5.

- For respondents who indicated that pharmacy technicians performed the functions in Figure D-3, 52% (85/165) indicated that there was a consistently applied policy and procedure for initial validation of pharmacy technicians for 90% or more of the functions performed and a further 31% (51/165) reported this in place for less than 90% of the functions performed. Seventeen per cent (29/165) responded that there was no consistently applied policy and procedure for initial validation for technicians performing these functions.

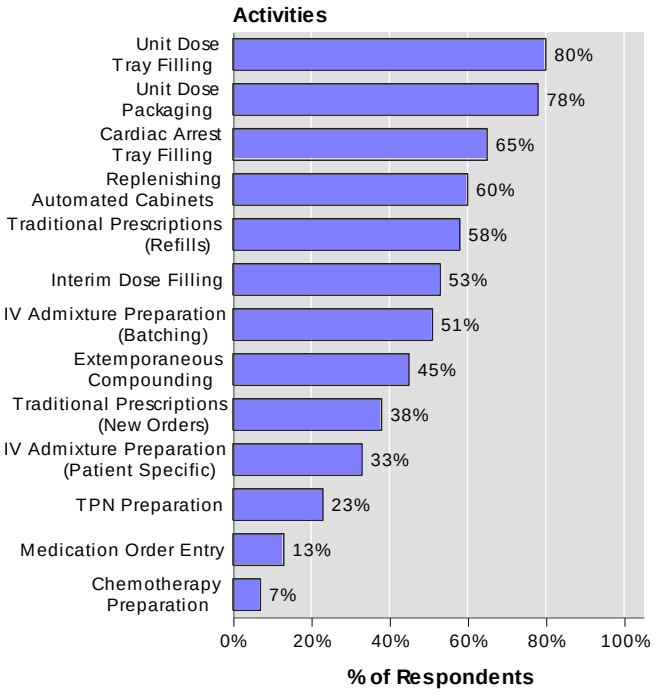
- Of those respondents who reported a consistently applied policy and procedure for initial validation before a technician is permitted to perform a function, 29% (40/136) reported that no re-validation occurs thereafter, 44% (60/136) reported that revalidation occurs for less than 90% of the functions performed and 26% (36/136) reported that revalidation occurs for equal to or greater than 90% of the functions performed.

Figure D-3. Functions Performed by Pharmacy Technicians 2007/08



Base: All respondents (n= 166)

Figure D-4. Technician Functions Checked by Other Technicians 2007/08

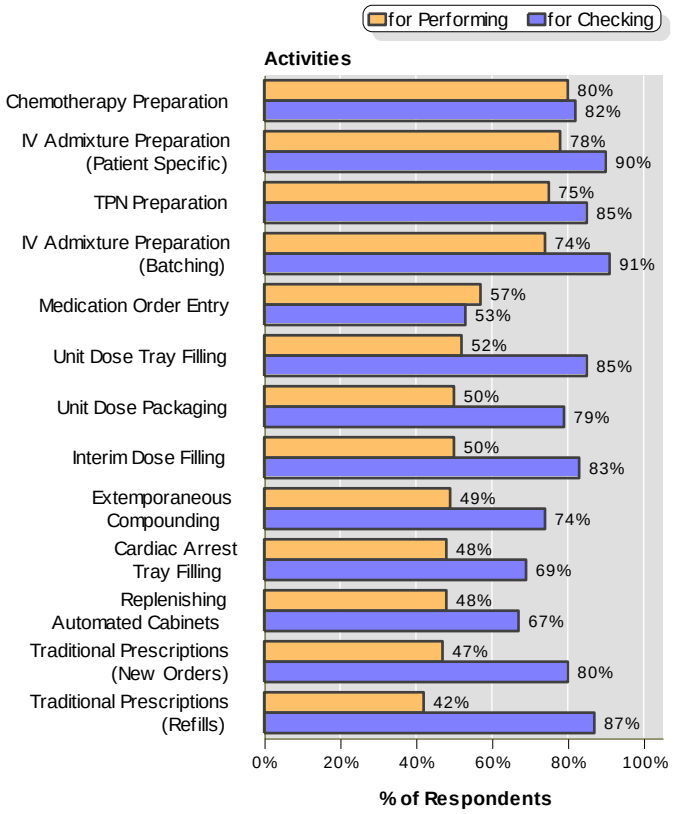


Base: Respondents reporting that function is performed

- For those respondents who reported that pharmacy technicians check the work of other technicians (Figure D-4), 70% (115/165) reported a consistently applied policy and procedure for the initial validation, of pharmacy technicians who check the work of other technicians, for 90% or more of the functions checked, and another 13% (22/165) reported this was in place for less than 90% of the functions checked. Seventeen per cent (28/165) responded that there was no consistently applied policy and procedure for the initial validation of pharmacy technicians who check the work of other technicians.

- Of those respondents who reported a consistently applied policy and procedure for the initial validation of a pharmacy technician checking the work of other pharmacy technicians, 28% (39/137) reported that no revalidation is required, 24% (33/137) reported that revalidation occurs for less than 90% of the checking functions performed and 47% (65/137) reported that revalidation is required for 90% or more of the checking functions performed.

Figure D-5. Technician Validation Requirements for Performing and Checking 2007/08



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

Certification refers to a Pharmacy Technician credential that is conferred by an organization external to the hospital.

- Certification of pharmacy technicians was reported by 98% (45/46) of respondents in Ontario, 58% (18/31) of respondents in the Prairies, 27% (6/22) of respondents in B.C., 8% (4/50) of respondents in Quebec and 6% (1/16) of respondents in Atlantic Canada. Forty-five per cent of respondents indicated that they employed one or more certified pharmacy technicians.

- Of the 74 respondents indicating that one or more of their pharmacy technicians were certified, 12 gave no response regarding the organization that had conferred the certification. Of the 62 respondents who did provide that information, 65% (40/62) reported that some or all of their technicians possessed certification from the Ontario College of Pharmacists (all of these respondents were from Ontario), 31% (19/62) reported that some or all of their technicians possessed certification from the Pharmacy Technician Certification Board of Alberta (all of these respondents were from the Prairies or B.C.), 6.5% (4/62) reported that some or all of their technicians possessed certification from the US Pharmacy Technician Certification Board and 8% (5/62) reported that some or all of their technicians possessed certification from other organizations. These latter 5 respondents named either technician training programs or the hospital itself; which are not organizations that confer technician certification. This indicates that not all respondents understand the meaning of the term "certification".

- Of the 74 respondents who reported that some of their pharmacy technicians were certified, 4 did not indicate the percentage of pharmacy technicians that possessed certification. Of the remaining 70 respondents, 23% (16/70) reported that greater than 90% of their pharmacy technicians possessed certification, 21% (15/70) reported that 51-90% of their pharmacy technicians possessed certification,

47% (33/70) reported that 10-50% of their pharmacy technicians possessed certification and 9% (6/70) reported that less than 10% of their technicians possessed certification.

The regional differences in technician certification largely reflect provincial differences with respect to the availability of, and regulatory requirement for, pharmacy certification. Ontario is in the process of regulating pharmacy technicians and the Ontario College of Pharmacists now operates a technician certification program. In Alberta, a Technician Certification Board is in place, also as part of the movement in that province towards pharmacy technician regulation.

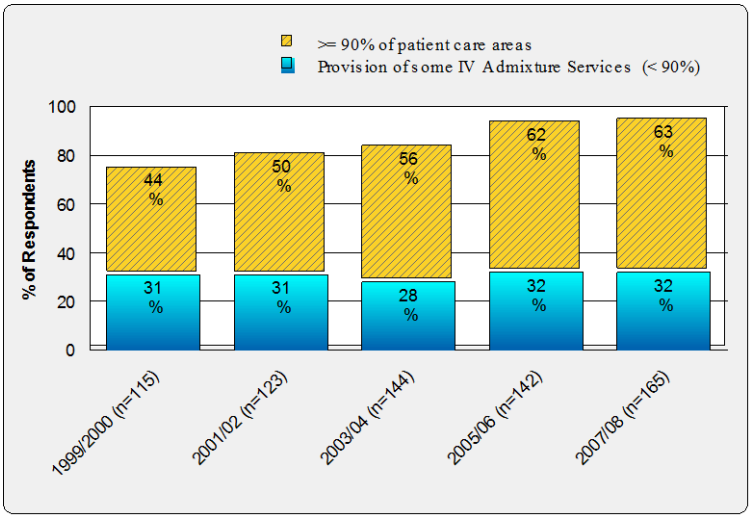
The scope of practise of pharmacy technicians continues to evolve. Making greater use of pharmacy technicians in preparing and delivering drug products is consistent with the profession's move towards having pharmacists focus more of their time on the delivery of direct patient care activities. In the context of a persistent shortage of pharmacists, it is important that technicians be given greater responsibility for the technical aspects of the drug distribution system. The significant number of respondents who reported that technician validation is required for pharmacy technicians who perform a function, and who report that validation is required for technicians who check the work of other technicians, is indicative of an increased awareness of the need to ensure that technicians are adequately trained and prepared for the new functions that they are being assigned. This attention to the changing role of pharmacy technicians is an important step. Ultimately it is anticipated that the accreditation of pharmacy technician training programs, the certification of all technicians by a nationally recognized organization, and the regulation of pharmacy technicians will largely replace the responsibility that individual hospitals now have to test and validate the skills and abilities of their pharmacy technicians.

INTRAVENOUS 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 parenteral products are therapeutically appropriate, free from microbial/pyrogenic/ particulate contaminants, properly prepared and labelled, and stored and distributed in conformance with accepted standards.[10] It is noteworthy that this recommendation has been in place since 1980. Intravenous admixture services, staffed largely by pharmacy technicians, are also a cost effective alternative to nursing preparation of admixtures on the patient care unit. In an era of persistent nurse shortages, this should be a convincing justification for such a system.

- The percent of respondents reporting the provision of an IV admixture service has increased from 75% of all respondents in 1999/2000 to 94% in 2005/06 and 95% in 2007/08. This upward trend has also occurred for IV admixture services offered to 90% or more of patients or patient care areas (Figure D-6).
- A comprehensive IV admixture service, provided to 90% or more of patients or patient care areas, was reported by 90% (36/40) of respondents in teaching hospitals, and by 54% (68/125) of non-teaching hospitals (Table D-6). A comprehensive IV admixture service was also more commonly reported by respondents in larger hospitals; 76% (31/41) of respondents with more than 500 beds, 65% (58/89) of respondents with 201-500 beds, and 43% (15/35) of respondents with 50 to 200 beds.

Figure D-6. Percentage of IV Admixture Service Providers 1999/00 to 2007/08



Base: All Respondents providing data (165)

- Respondents providing an IV admixture service estimated that an average of 46% of total parenteral (IV, IM, SQ, epidural) doses administered in their institutions were either prepared through the IV admixture service or provided as commercially available, ready to use admixtures.

Table D-6. IV Admixture Services and Averages of Reported Annual Productions 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(40)	(125)
Provision of Some IV Admixture Services	156	30	86	40	40	116
	95%	86%	97%	98%	100%	93%
Provision of IV admixture services for >= 90% or more of patient care areas	104	15	58	31	36	68
	63%	43%	65%	76%	90%	54%
Automated Compounding Devices Used in Preparation (n=)	(156)	(30)	(86)	(40)	(40)	(116)
	71	9	33	29	34	37
	46%	30%	38%	73%	85%	32%
Average IV production per acute patient day (for facilities serving >= 90%) (n=)	(79)	(12)	(41)	(26)	(32)	(47)
	.82	.87	.84	.77	1.19	.57

- Of the respondents reporting the provision of an IV admixture service, 46% (71/156) reported that automated compounding devices were used in the preparation process. The use of this type of technology is more common in teaching hospitals than in non-teaching hospitals and is more common in hospitals with more than 500 beds (Table D-6).

- Respondents who reported the use of automated compounding devices, indicated that the technology is used to prepare parenteral nutrition solutions (63%, 42/67), large volume parenterals greater than 100mL (54%, 36/67), epidural infusions (27%, 18/67) and a variety of other preparations such as cardioplegia solutions.

A 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. Although not formally required in Canada, Chapter 797 provides relevant practice and quality standards for compounding sterile preparations. Pharmacists and pharmacy technicians involved in IV admixture services should be aware of these practice and quality standards and make use of them in evaluating their own services.

- Of the respondents reporting the provision of an IV admixture service, 38% (60/156) reported that a gap analysis had been completed. Completion of a gap analysis was more commonly reported by teaching hospitals (60%, 24/40) than non-teaching hospitals (31%, 36/116) and was more commonly reported by hospitals with more than 500 beds (53%, 21/40) than in hospitals with 201-500 beds (34%, 29/86) and in hospitals with 50-200 beds (33%, 10/30).

- Fifty-nine per cent (34/58) of respondents who had completed a gap analysis reported use of the ASHP 797 Compliance Advisor, while a further 8.6% (5/58) had used the USP 797 Gap Analysis Survey from the International Journal of Pharmaceutical Compounding, and another 22% (13/58) of respondents reported that they had made use of an external reviewer or consultant.

CYTOTOXIC ADMIXTURE

Recommendations on the use of biological safety cabinets differ, based on provincial Occupational Health and Safety regulations. Workforce BC Regulations state, "All mixing, preparation and priming of administration sets with a cytotoxic drug must be performed in one centralized area in a specially designated Class II Type B biological safety cabinet that is exhausted to the outside atmosphere in a manner that prevents recirculation into any work area, has exhausts and ventilation systems that remain in operation for a sufficient period of time to ensure that no contaminants escape form the biological safety cabinet into the workplace and is equipped with a

continuous monitoring device to permit confirmation of adequate airflow and cabinet performance." The role of environmental sampling and medical surveillance programs for employees working with cytoxic drugs should be discussed in collaboration with Occupational Health and Safety practitioners. Elements of a medical surveillance program, as well as an overview of biological safety cabinets, can be found in the BCCA Pharmacy Practice Standards for Hazardous Drugs.[11] Pharmacists need to be familiar with the appropriate measures to protect workers from the dangers associated with cytotoxic drugs as well as the standards that exist to insure the safe preparation of these drugs.

Table D-7. Cytotoxic Drugs – Safety Practices and Chemotherapy Preparation Systems 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(40)	(125)
IV cytotoxic drugs prepared and administered by hospital	153 93%	27 77%	87 98%	39 95%	39 98%	114 91%
IV cytotoxic drugs prepared by Pharmacy (n=)	(147) 146 99%	(27) 27 100%	(84) 83 99%	(36) 36 100%	(37) 37 100%	(110) 109 99%
Written policies and procedures to insure employee health and safety (n=)	(138) 95%	(25) 93%	(78) 94%	(35) 97%	(36) 97%	(102) 94%
Definition of cytotoxic drugs	113 82%	24 96%	63 81%	26 74%	32 89%	81 79%
Handling of cytotoxic drugs	131 95%	25 100%	75 96%	31 89%	34 94%	97 95%
Personal protective equipment	132 96%	25 100%	73 94%	34 97%	36 100%	96 94%
Safe practices for administering cytotoxic drugs	123 89%	22 88%	68 87%	33 94%	36 100%	87 85%
Equipment maintenance	113 82%	23 92%	64 82%	26 74%	30 83%	83 81%
Decontamination and cleaning	122 88%	24 96%	70 90%	28 80%	34 94%	88 86%
Waste handling	129 93%	24 96%	73 94%	32 91%	35 97%	94 92%
Response to spills	131 95%	24 96%	73 94%	34 97%	36 100%	95 93%
Environmental sampling	46 33%	6 24%	29 37%	11 31%	9 25%	37 36%
Medical surveillance program in place for employees who handle cytotoxic drugs (n=146)	39 27%	9 33%	19 23%	11 31%	9 24%	30 28%
Cytotoxic drugs prepared using a closed system (n=)	(145)	(27)	(82)	(36)	(37)	(108)
yes, for all drugs	10 7%	1 4%	6 7%	3 8%	3 8%	7 6%
yes, for some drugs	34 23%	8 30%	19 23%	7 19%	7 19%	27 25%
Cytotoxic drugs prepared in an approved Biological Safety Cabinet (n=)	(146)	(27)	(83)	(36)	(37)	(109)
Class II Type A2	25 17%	5 19%	16 20%	4 11%	6 17%	19 17%
Class II Type B1	28 19%	3 11%	18 22%	7 19%	5 14%	23 21%
Class II Type B2	86 59%	16 59%	47 57%	23 64%	20 56%	66 61%
Isolator	1 1%	0 0%	1 1%	0 0%	0 0%	1 1%
Other	5 3%	2 7%	2 2%	1 3%	3 8%	2 2%
Cytotoxic drugs prepared in a separate designated area	121 83%	20 74%	70 85%	31 86%	28 78%	93 85%

- Ninety-three percent (153/165) of all respondents reported that IV cytotoxic drugs were prepared and administered in their facility (Table D-7). Of these respondents, 146 reported that IV cytotoxic doses were prepared in the pharmacy department, one respondent indicated IV cytotoxic doses were not prepared in the pharmacy and 6 respondents did not indicate where IV cytotoxic doses were prepared.

- Among respondents reporting the preparation of IV chemotherapy, 95% (138/146) have written policies and procedures to ensure the health and safety of employees preparing, transporting, administering and disposing of cytotoxic drugs. Between 80 to 95% of respondents reported that they have policies and procedures in place that deal with a variety of topics including waste handling, personal protective equipment and safe practices for administering cytotoxic drugs. A third of respondents reported having policies and procedures that addressed environmental sampling (Table D-7).

- Among respondents reporting the preparation of IV cytotoxic drugs, only 27% (39/146) reported that there is a medical surveillance program in place for employees who handle cytotoxic drugs. There was no appreciable difference in these results between teaching and non-teaching hospitals, or between the 3 groups of small, medium and large hospitals. Regional variation was apparent with 45% (9/20) of respondents in B.C. reporting the presence of such a program, compared to 31% (8/26), in the Prairies, 5% (2/41) in Ontario, 32% (14/44) in Quebec and 40% (6/15) in Atlantic Canada.

- Among respondents reporting the preparation of IV cytotoxic drugs, the use of closed systems for the preparation of some drugs increased from 13% in 2003/04 to 20% in 2005/06 and 23% in 2007/08. The use of closed systems for the preparation of all cytotoxic drugs also increased from 3% in 2003/04 and 2005/06 to 7% in 2007/08.

- A designated separate chemotherapy preparation area was reported by 83% (121/146) of respondents who indicated that their Pharmacy prepared IV cytotoxic doses (Table D-7).

- Among facilities reporting that Pharmacy prepared IV cytotoxic doses, 99% (145/146) reported that these doses were prepared in an approved Biological Safety Cabinet (Table D-7). An isolator intended for asepsis and containment of cytotoxic residue was reported by one respondent in Atlantic Canada.

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E - DRUG PURCHASING AND INVENTORY CONTROL

NANCY ROBERTS

DRUG COSTS

Total spending on drugs in Canada was forecasted, by the Canadian Institute for Health Information (CIHI), to have reached $26.9 billion in 2007, an increase of 7.2% over the previous year[1]. Drug expenses were forecasted to represent 16.8% of total healthcare spending in 2007. Drug expenditure growth was lower in 2007 than the 11% increase reported in 2005 and the 9.1% increase in 2003. CIHI has identified a wide range of factors contributing to drug expenditure increases, including:

- the advent of new drug therapies for once untreatable or under-treated diseases, or for disorders once treated by surgery
- changes in prescribing and dispensing practices
- direct to consumer advertising by the pharmaceutical industry
- demographic changes related to the growth and aging of the population
- epidemics and emerging new diseases.

In the United States, the rate of increase in prescription drug expenditures was 5.9% in the 2004/05 period and 8.7% in the 2005/06 period[2]. Factors identified as having contributed to the increase included the implementation of a new Medicare drug benefit and spending on biologics, especially in the outpatient setting. Drug expenditures in clinics grew more than other settings, with a 20.9% increase reported in the 2005/06 period. Drug expenditures in the clinic setting are projected to increase 12 to 14% in 2008. Hospital inpatient drug expenditures in the 2005/06 period grew by only 3.8% and are projected to increase by 4 to 6% in 2008. The authors of this article identified a number of factors that were expected to have an impact on drug expenditures in the US during 2008, including the availability of generic versions of a number of important and expensive drugs, drug safety concerns, and changes that are occurring in the pharmaceutical supply chain.

There are a number of reasons why caution should be exercised when comparing the 2007/08 drug expenditure data, reported in this chapter, with drug expenditure data from earlier Hospital Pharmacy in Canada reports; or when comparing data from different parts of the country:

- the re-organization and integration of acute care, community-based care, and home care services, that has been occurring across Canada over the past few years, has contributed to a situation where there has been little consistency between provincial jurisdictions with respect to how drugs are expensed. This is particularly true of certain drugs that are administered in hospital outpatient settings, such as oncology treatments that may be expensed to individual hospitals, a provincial cancer agency, private third party payers, or a public third party payer (e.g. provincial Pharmacare programs).

- a change was made in the way that teaching versus non-teaching hospitals were classified in the 2005/06 Hospital Pharmacy in Canada report, making it more difficult to compare data from the last two surveys with data from earlier surveys

- a change was made in the criteria for participation in the 2007/08 survey. This change allowed a number of smaller hospitals, with as few as 50 acute care beds, to participate in the 2007/08 survey for the first time. It should be noted, however, that even with the change in the criteria for participation in the 2007/08 survey, and an associated increase in the number of hospitals that participated in this year's survey, the 50-200 bed hospitals still only represent 7% of the patient days that were captured by the 2007/08 survey.

- The average drug cost per acute patient day in the 2007/08 survey ($37.16) was 1.3% higher than the cost of $36.68 that was reported in the 2005/06 Hospital Pharmacy in Canada Report. The increase in 2007/08, compared to 2005/06, was substantially less than the increase of 17.3% per acute patient day reported when the 2005/06 results were compared to the 2003/04 survey results. An increase in drug cost per acute patient day was reported for most hospital sizes and types. However, respondents from hospitals with more than 500 beds reported a 12% reduction in drug cost per patient day, from $46.30 in 2005/06 to $40.71 in 2007/08.

- The average drug cost per acute care admission ($279) was 4.5% higher than the figure of $ 267 that was reported in 2005/06. This increase was less than the 16.2% increase per acute care admission reported when the 2005/06 results were compared to the 2003/04 survey results, but still represents a continuation of the upward trend that has been documented in the past 4 surveys. Regional variation was noted with Ontario and Quebec respondents reporting the highest cost, both at $306 per acute care admission, while the lowest cost per admission was reported by respondents from the Prairies, at $ 221 per acute care admission.

- The average drug cost per non-acute patient day was $10.16 in the 2007/08 survey, compared to $9.12 in 2005/06, an increase of 11.4%. However, the average drug cost per non-acute admission was reported to be $1,937 in 2007/08, compared to $1,509 in 2005/06, an increase of 28%. The increase was most significant in non-teaching hospitals, where the average increased from $1,447 per non-acute admission in 2005/06 to $2,140 in 2007/08, an increase of 48%. These increases may be linked to longer lengths of stay due to scarce community resources for alternate levels of care (i.e. long-term care facilities and alternative residences) and increased pressure from large acute care sites to transfer low-acuity patients to local community hospitals in an effort to address emergency room congestion and long surgical wait lists. Anecdotally, in some hospitals in the country, more than 20% of acute care beds are occupied by individuals classified as Alternative Level of Care (ALC), who do not require inpatient hospital services, but lack access to appropriate nursing home, specialty home or community based services. Regional variations are also of interest. Not surprisingly, non-acute drug costs per admission were the highest in those provinces where long-term care beds fell under the regional health authorities' jurisdiction, $2,990 in Quebec and $2,251 in the Prairies, compared to provinces in which they did not, such as the Atlantic at $ 933 and Ontario at $429. In Atlantic Canada and Ontario, where the majority of long-term care facilities are privately administered and do not fall under the mandate of the regional health authorities, it is probable that our survey does not capture a significant portion of the non-acute drug costs that are being incurred.

- The average emergency room drug costs per visit continue to increase from survey to survey, rising from $6.48 in 2001/2002 to $8.01 in 2003/04, to $ 8.33 in 2005/06, and to $ 8.51 in 2007/08. Regional variations are noteworthy, with the costs as high as $12.15 per visit in BC compared to $6.52 in the Atlantic Provinces.

This high level comparison of drug costs, by hospital size and type, has been reported to be very useful to many hospitals in the past. However, the more detailed drug cost comparisons that are included in the benchmarking chapters of this report should also be referred to for benchmarking purposes and/or for projecting costs for a new or expanding service.

INVENTORY

- The average reported inventory turnover rate for 2007/08 was 10.6, compared to 10.9 in 2005/06. A significant improvement was seen in smaller hospitals, where the turnover rate increased from 7.0 in 2005/06 (100-200 beds) to 8.5 in 2007/08 (50-200 beds).

It has become apparent, when trending the changes in inventory turnover rates over the last few surveys, that most hospitals appear to have addressed the available opportunities to improve their inventory management practices. A number of factors, such as industry return policies, pharmaceutical depot locations and pandemic planning, affect the organization's ability to further improve inventory management results, but are largely not under the control of individual hospitals.

Table E-1. Inventory and Drug Costs 2007/08

	____	Bed Size			Teaching	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Inventory Turnover Rate (n=149)	10.6	8.5	10.5	12.2	13.1	9.7
Drug Expenses by Patient Care Area:						
Total Drug Costs (n=160)	8,013,044	2,346,004	5,997,566	16,801,908	17,580,725	4,823,817
Inpatient Acute Care (n=134)	4,021,293	1,158,597	2,986,402	8,310,896	9,211,994	2,186,197
Inpatient Long-Term Care (n=99)	490,511	143,079	323,503	1,029,984	1,040,081	368,385
Clinical/ Medical Day Unit (n=94)	3,026,236	985,290	2,677,401	5,370,362	5,489,887	1,927,069
Emergency Room (n=101)	484,842	199,974	350,847	1,030,991	713,938	383,385
Ambulatory (Retail Pharmacy) (n=22)	2,836,033	869,887	447,551	5,070,937	4,691,907	608,983
Drug Cost Ratios						
Acute Care Inpatient Costs:						
Drug Costs / Acute Patient Day (n=127)	$37.16	$34.19	$36.49	$40.71	$56.02	$30.27
Acute Drug Costs/ Acute Admission (n=129)	$279	$254	$270	$313	$432	$224
Non-acute Care Costs:						
Drug Costs / Non-acute Patient Day (n=83)	10.16	9.54	8.81	12.54	11.97	9.72
Non-acute Drug Costs/ Non-acute Admission (n=76)	$1,937	$1,753	$2,118	$1,757	$952	$2,140
Emergency Room Costs / Emergency Visit (n=93)	$8.51	$6.32	$7.99	$11.27	$10.29	$7.78

OUTSOURCING

For the 2007/08 survey, due to the evolving policy and regulatory frameworks governing the manufacturing and compounding of drugs, the survey's Editorial Advisory Board made a decision to include several questions related to the outsourcing of drug preparation and repackaging activities. There are a number of factors that affect the ability and desire of hospitals to outsource this activity:

- compounding is regulated in some provinces such as Quebec, which adds another layer of regulatory issues to those that already exist at the federal level
- geographical location can affect the ability to outsource, since companies that offer drug preparation and repackaging services are most likely to base themselves in large urban centres where the volume of business is likely to be greater
- a region may or may not have the critical volumes that are necessary to set up their own centralized preparation and repackaging service
- future policy decisions by Health Canada regarding the minimum quality control standards for the preparation and repackaging of pharmaceutical products, as well as clarification of the classification of a repackaged product as a drug or device, could have a significant impact on the make vs buy decision that a hospital or healthcare region might make.

- Forty percent (67/166) of respondents (Table E-2) reported outsourcing for the preparation and/or repackaging of pharmaceutical products. A higher percentage of hospitals with 50 - 200 beds, compared to larger hospitals, reported that they outsourced the preparation/repackaging of many of the categories of products that were included in the 2007/08 survey of outsourced products.
- Small volume parenterals were outsourced more than any other product, across all types of hospitals, with 67% of non-teaching hospitals and 59% of teaching hospitals reporting that they outsourced the production of small volume parenterals. Regionally, BC outsourced small volume parenterals at the highest percentage (93%) and the Prairies at the lowest percentage (36%).

- The top three dosage forms for which respondents identified staffing as a reason for outsourcing were oral liquids, oncology admixtures and prefilled IV syringes.
- The top three dosage forms for which respondents identified space limitations as a reason for outsourcing were oral solids, oncology admixtures and total parenteral nutrition (TPN).
- The top three dosage forms for which respondents identified quality control as a reason for outsourcing were oncology admixtures, large volume parenterals and TPN.

Table E-2. Facilities that Outsource Preparation/Prepackaging/Repackaging 2007/08

		Bed Size			Teaching	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(67)	(11)	(38)	(18)	(22)	(45)
Oral Solids	12	3	7	2	0	12
	18%	27%	18%	11%	0%	27%
Oral Liquids	9	1	2	6	5	4
	13%	9%	5%	33%	23%	9%
IV Syringes	19	3	8	8	5	14
	28%	27%	21%	44%	23%	31%
Small Volume IV Admixtures (< 100mL)	43	6	27	10	13	30
	64%	55%	71%	56%	59%	67%
Large Volume IV Admixtures (> 100mL)	34	7	22	5	12	22
	51%	64%	58%	28%	55%	49%
Oncology Admixtures	6	3	1	2	3	3
	9%	27%	3%	11%	14%	7%
TPN Solutions	20	5	8	7	9	11
	30%	45%	21%	39%	41%	24%

References:

[1] Drug Expenditures in Canada 1985 - 2007. Canadian Institute for Health Information. Ottawa CIHI 2008.
[2] Hoffman, JM, Shah ND, Vermeulen LC et al.. Projecting future drug expenditures – 2008. *Am J Health-Syst Pharm*. 2008; 65:234-53.

F - HUMAN RESOURCES

MICHELE BABICH

Human resource shortages are perhaps the most serious challenge facing Canada's healthcare system. In fact, the Health Council of Canada has stated "…without an appropriate health human resources strategy, all other healthcare renewal efforts will fail." [1] A shortage of pharmacists in Canada first began to manifest itself in the late 1990s and persists to the present time, to varying degrees, in all provinces. The pharmacist shortage led to a national study of pharmacists and technicians that was funded by the Government of Canada through Human Resources and Social Development Canada (HRSDC). The final report and recommendations of that study ("Moving Forward: Pharmacy Human Resources for the Future"), have recently been released and can be accessed at www.pharmacyhr.ca.[2] The recommendations are 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 healthcare needs of Canadians. Achieving this goal will require changes in the roles and responsibilities of pharmacists and pharmacy technicians, with pharmacists focusing on their direct patient care role while appropriately trained pharmacy technicians assume greater responsibility for the technical aspects of the drug distribution system.

This chapter reports data that can be very useful to pharmacy managers and hospital administrators who are interested in comparing their hospital's pharmacy human resource indicators to those reported by other hospitals that participated in this survey. These indicators include staffing ratios (i.e. budgeted hours per patient day), pharmacist to technician ratios, vacancy rates and anticipated retirement rates.

As noted in the introduction to the 2007/08 Report, the qualifying criteria for participation in the Hospital Pharmacy in Canada Survey were changed for the 2007/08 survey. For this year's survey, hospitals were qualified to participate in the survey if they had at least 50 acute care beds. The requirement to have at least 100 beds in total was dropped, allowing a number of smaller hospitals to participate in the survey for the first time in 2007/08. Readers should be aware of this change as they review the results reported in this chapter.

HUMAN RESOURCE SHORTAGES - PHARMACISTS

The data from the 2007/08 survey indicate that many hospitals continue to have difficulty recruiting and retaining pharmacists. Human resource shortages have changed little from the last report. Vacancies for pharmacists still appear to be problematic, but have not worsened since the last report.

- Sixty percent (98/163) of respondents reported having pharmacist position vacancies on March 31, 2008. This was somewhat less than in 2005/06, when 73% (103/142) of respondents reported that they had pharmacist vacancies, but about the same as in 2003/04 (63%, 89/142).

- The average reported vacancy rate for pharmacists in 2007/08 (10.4%) (Table F-1) was lower than the vacancy rate reported in the 2005/06 report (13.3%). Quebec had the highest vacancy rate at 17.2% with NB/PE following at 14.3%.

- Overall, respondents reported a total of 292 pharmacist position vacancies across Canada (Table F-2), which is slightly higher than the reported total of 270 from the 2005/06 report. However, as noted above, the number of hospitals included in the 2007/08 survey is greater than in the 2005/06, due to changes in the qualifying criteria that allowed a number of smaller hospitals to participate for the first time. It should also be noted that this number understates the actual number of vacancies in Canada, as not all hospitals participated in the survey.

- It is of note that Quebec, with the highest vacancy rate (Table F-1), reported the lowest salaries for pharmacists (Table F-10). The lowest vacancy rates were reported in Manitoba (1.0%) and Saskatchewan (2.8%). Both provinces had the highest starting salaries for staff pharmacists. British Columbia, which had one of the highest vacancy rates in the 2005/06 report, negotiated a temporary salary market adjustment

in July 2006, which may have assisted in lowering the vacancy rate in that province from 21.7% in 2005/06 to 6.6% in 2007/08.

- The overall average duration of pharmacist vacancies was very similar to that reported in the last report; 178 days in 2007/08 compared to 182 days in 2005/06. The reported duration of vacancies was lower in 2007/08, compared to 2005/06, in British Columbia (147 versus 179 days), Alberta (102 versus 197 days), New Brunswick/Prince Edward Island (313 versus 520 days) and Saskatchewan (65 versus 221 days). Meanwhile, an increased duration of pharmacist vacancies was reported by Manitoba (94 versus 82 days), Ontario (243 versus 200 days), Quebec (152 versus 123 days) and Nova Scotia/Newfoundland (190 versus 72 days).

HUMAN RESOURCE SHORTAGES - TECHNICIANS

The data from the 2007/08 survey indicate that pharmacy technician shortages were much less of an issue than pharmacist shortages were. However, there are a number of reasons why this is likely to change in the years ahead. There is a widespread move underway across Canada to have appropriately trained technicians assume greater responsibility for the drug distribution system. This change will almost certainly increase the demand for pharmacy technicians, and has also prompted a number of provincial governments and regulatory authorities to take steps towards the regulation of pharmacy technicians. This would require the establishment of accreditation processes for technician training programs and a certification system for individual technicians. An accreditation system for pharmacy technician training programs is already being implemented across the country and a national certification exam, similar to the Pharmacy Examining Board of Canada certification system for pharmacists, is also being introduced.

These initiatives may, at least temporarily, reduce the number of pharmacy technicians entering the workforce. It is expected that a number of the existing training programs will have difficulty meeting the new accreditation standards and may cease to operate or require time to upgrade their programs. In addition, it is unlikely that all pharmacy technician graduates will pass the new certification exam, which would further reduce the number of pharmacy technicians entering the workforce. These changes speak to the need for careful monitoring of pharmacy technician vacancy rates.

- The reported vacancy rate for technicians was 1.4% in 2007/08 (Table F-1), compared to 2.1% in 2005/06. This vacancy rate is low compared to the pharmacist vacancy rate. There were only slight differences in vacancy rates across provinces. As noted above, the demand for technicians will likely increase and vacancy trends should be monitored over time.

- The average duration of vacancies for technicians has increased from 31.7 days in 2005/06 to 52.9 days in 2007/08. Quebec experienced the highest duration of technician vacancies, increasing from 55 days in 2005/06 to 97 days in 2007/08.

HUMAN RESOURCE SHORTAGES - MANAGEMENT

- The total number of vacant pharmacy management positions reported in 2007/08 was 20, (Table F-2), similar to the number reported in 2005/06 (19). The management vacancy rate was reported as 5.3% of total management positions (Table F-1), somewhat less than the 7.0% vacancy rate reported in 2005/06. The highest reported management vacancy rate was in British Columbia (12.8%) and the lowest was in Alberta (2.0%).

- The average duration of management vacancies has risen from 37.3 days in 2005/06 to 46.8 days in 2007/08, with the highest average vacancy duration in British Columbia (181 days) and the lowest in Saskatchewan (0 days).

Table F-1. Percent of Positions Vacant as of March 31, 2008

	____	Bed Size			Teaching Status		Province							
	All	50-200	201-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals(n=)	(163)	(32)	(90)	(41)	(40)	(123)	(22)	(12)	(7)	(10)	(45)	(51)	(8)	(8)
Pharmacists	10.4%	9.8%	13.0%	8.2%	9.6%	11.2%	6.6%	10.0%	2.8%	1.0%	8.3%	17.2%	14.3%	6.0%
Management (n=151)	5.3%	10.0%	5.4%	4.3%	3.9%	6.7%	12.8%	2.0%	6.3%	7.1%	3.0%	5.9%	3.0%	4.9%
Technicians /Assistants (n=160)	1.4%	2.3%	1.4%	1.3%	1.5%	1.2%	2.6%	3.0%	0.0%	1.5%	1.2%	0.4%	3.5%	0.0%
all three positions (n=163)	5.4%	6.0%	6.7%	4.3%	5.2%	5.7%	5.0%	5.7%	1.7%	1.5%	4.1%	8.5%	7.8%	2.7%

Table F-2. Total Number of Positions Vacant as of March 31, 2008

	____	Bed Size			Teaching Status		Province							
	All	50-200	201-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals (n=)	(163)	(32)	(90)	(41)	(40)	(123)	(22)	(12)	(7)	(10)	(45)	(51)	(8)	(8)
Pharmacists	292	17	158	118	145	147	20	31	3	2	77	138	16	7
Management	20	4	9	8	8	13	8	1	1	1	4	4	1	1
Technicians / Assistants	48	5	19	24	27	21	10	13	0	2	15	3	6	0
all 3 positions	360	25	185	150	180	181	37	45	4	5	95	145	22	8

RETIREMENTS IN THE NEXT FIVE YEARS

Demographics of the workforce suggest that a significant percentage of pharmacists will reach retirement age in the next 10-15 years. Data for 2006, from the Canadian Institute for Health Information (CIHI), indicate that pharmacists who were 55 years of age or older represented between 11-19% of total pharmacists in Canada, depending on the province.[3] Those aged 45-54 ranged from 18-28% of total pharmacists and those aged 35-44 ranged from 28-37% of total pharmacists.

It may take three to four more survey cycles to see what trends emerge as pharmacists in the 45-54 year age group reach retirement age. Efforts are underway in many jurisdictions to retain older workers in the healthcare workforce and the state of the economy may also affect the age at which pharmacists and other healthcare providers decide to retire. On the supply side, the number of graduates from pharmacy schools has increased from 650 in 1997 to 1014 in 2006. Quebec leads with an increase of 168 graduates. The other provinces showed variable increases.[3]

- Projection of staff retirements was a new reporting parameter in the 2005/06 survey. In the 2007/08 survey, 160 respondents indicated that 257 pharmacists (9.1% of all pharmacists) are expected to retire in the next 5 years (Tables F-3 and F-4). These projected staff retirement results are very similar to the last report (11.8%, 252). The highest expected pharmacist retirement rate was reported by the Saskatchewan respondents (18.5%), with the lowest expected retirement rate reported by respondents in Manitoba (5.4%).

- A total of 60 pharmacy managers (15.8%) are expected to retire in the next 5 years, which is comparable to the 16.2 % who were expected to retire within 5 years in the 2005/06 report. The higher rate of expected pharmacy manager retirements, compared to expected staff pharmacist retirements, is not surprising, given that more senior individuals usually occupy management positions.

- A particularly high percentage of expected pharmacy manager retirements, over the next 5 years, was reported by respondents in Saskatchewan (43.8% of pharmacy managers) and Manitoba (50.0% of pharmacy managers).

The group of pharmacy managers who are expected to retire across Canada in the next 5 years may be challenging to replace, as it is becoming more difficult to attract pharmacists into leadership positions. More attention needs to be focused on mentoring, coaching and encouraging pharmacists to take on these roles. This particular trend needs to be carefully monitored and acted upon to insure that there are adequate numbers of future pharmacy managers.

- The pharmacy technician workforce is considerably younger than the pharmacist workforce. The total number of pharmacy technicians expected to retire in the next five years was reported to be 265 (7.6%), which is similar to the 8.4% reported in 2005/06. Saskatchewan reported the highest percentage of expected technician retirements (11.4%) and Alberta reported the lowest percentage (2.8%).

Table F-3. Expected Retirement Rates in the Next 5 Years (Weighted), as of March 31, 2008

		Bed Size			Teaching Status		Province							
	All	50-200	201-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/ NL
Hospitals (n=)	(163)	(32)	(90)	(41)	(40)	(123)	(22)	(12)	(7)	(10)	(45)	(51)	(8)	(8)
Pharmacists	9.1%	8.8%	10.6%	7.9%	8.1%	10.3%	10.0%	5.8%	18.5%	5.4%	9.0%	9.6%	8.9%	10.3%
Management (n=151)	15.8%	20.0%	19.3%	12.0%	14.6%	17.0%	12.0%	10.1%	43.8%	50.0%	14.1%	11.2%	24.2%	14.7%
Technicians /Assistants (n=160)	7.6%	5.1%	10.4%	5.9%	6.9%	8.4%	7.4%	2.8%	11.4%	7.2%	8.3%	9.8%	5.5%	4.5%
all three positions (n=163)	8.7%	7.8%	11.0%	7.0%	7.8%	9.7%	8.8%	4.4%	17.0%	8.2%	8.9%	9.7%	7.9%	7.5%

Table F-4. Total Number of Expected Retirements in the Next 5 Years, as of March 31, 2008

		Bed Size			Teaching Status		Province							
	All	50-200	201-500	>500	Teaching	Non-Teaching	BC	AB	SK	MB	ON	QC	NB/PE	NS/NL
Hospitals (n=)	(163)	(32)	(90)	(41)	(40)	(123)	(22)	(12)	(7)	(10)	(45)	(51)	(8)	(8)
Pharmacists	257	15	129	113	122	135	30	18	20	9	83	77	10	12
Management	60	7	31	22	28	32	7	5	7	7	19	8	4	3
Technicians / Assistants	265	11	144	109	123	142	29	12	12	10	105	82	9	7
all 3 positions	581	33	304	244	272	309	66	35	39	25	206	166	23	22

PHARMACY STAFFING

Readers are asked to note that prior to the 2005/06 Report, the Hospital Pharmacy in Canada Reports used the term "*paid* hours per acute patient day" for the ratio used to compare staffing levels. The ratio "paid hours per acute patient day" would be calculated using total *paid* (worked) hours as the numerator, and using annual acute patient days as the denominator. The ratio that was reported in our reports was actually "*budgeted* hours per acute patient day", which is calculated using total BUDGETED annual pharmacy staffing hours as the numerator and annual acute patient days as the denominator. Although "paid hours per acute patient day" and "budgeted hours per acute patient day" are virtually identical when a hospital pharmacy is fully staffed, that would not be true if a pharmacy department had a significant number of unfilled positions, in which case the number of paid hours would be less than the number of budgeted hours. For clarity, in the Human Resources chapter, the term "budgeted hours per patient day" was adopted for the 2005/06 and subsequent reports, in order to accurately describe the ratio that we calculate.

As noted above, the Hospital Pharmacy in Canada Report has traditionally 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 previous reports.

The original editorial decision to calculate the ratio in this way, made many years ago, was apparently based on a number of considerations. To begin with, 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 for the benchmarking section of this survey. (See Benchmarking chapters in this report). The survey'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. These assumptions 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. Overall, for the 166 hospitals that participated in this year's survey, 74% of the reported patient days were acute patient days and 26% were non-acute patient days. For the 2007/08 report, in order to better understand the impact of non-acute beds, a decision was made to conduct additional staffing analyses that 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 surveys.

- Overall, the average of reported budgeted hours per acute care patient day (excluding residents) has changed only slightly, from 0.81 in 2005/06 to 0.85 in 2007/08 (Table F-5).

- At the provincial level, the highest reported level of staffing was in Ontario at 0.99 budgeted hours per acute patient day and the lowest was in BC at 0.71 budgeted hours per acute patient day. (Table F-5).

- Teaching hospitals continue to report higher budgeted hours per acute patient day (average of 1.12) than non-teaching hospitals (average of 0.75), as shown in Table F-5. Hospitals with more than 500 beds also reported higher budgeted hours per acute patient day (average of 0.91) than hospitals with 50 to 200 beds (average of 0.83) and hospitals with 201 to 500 beds (average of 0.82).

In a new, second analysis, a new ratio was calculated using total patient days (acute plus non-acute patient days) 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.

- When total patient days (acute and non-acute) were used in the denominator, the average budgeted hours per total patient day for all hospitals was 0.63, compared to 0.85 when only acute patient days were used in the denominator (Table F-5)

Table F-5. Staffing Ratios – budgeted hours /patient day 2007/08 (By hospital size, teaching status, and percentage of acute beds)

		Bed Size			Teaching Status		Percent of acute beds				
	All	50-200	201-500	>500	Teaching	Non-Teaching	10-39%	40-59%	60-79%	80-99%	100%
Hospitals (n=)	(144)	(26)	(78)	(40)	(36)	(108)	(21)	(19)	(26)	(40)	(38)
Budgeted hours / acute patient day *	.85	.83	.82	.91	1.12	.75	.94	.72	.83	.89	.81
Budgeted hours / total patient day (acute and non-acute) * (n=139)	.63	.70	.60	.63	.94	.52	.30	.36	.58	.80	.81
Teaching Hospitals (n=36)	(36)	(3)	(15)	(18)	(36)	(0)	(1)	(1)	(2)	(16)	(16)
Budgeted hours / acute patient day *	1.12	1.45	1.08	1.11	1.12	.	3.29	1.06	1.13	1.08	1.04
Budgeted hours / total patient day (acute and non-acute) *	.94	1.45	1.00	.81	.94	.	.25	.50	.73	.94	1.04
Non-Teaching Hospitals (n=108)	(108)	(23)	(63)	(22)	(0)	(108)	(20)	(18)	(24)	(24)	(22)
Budgeted hours / acute patient day *	.75	.75	.75	.75	.	.75	.83	.71	.81	.77	.65
Budgeted hours / total patient day (acute and non-acute) * (n=103)	.52	.61	.50	.48	.	.52	.30	.35	.57	.68	.65

*** Note that budgeted hours exclude pharmacy residents**

Table F-6. Staffing ratios- budgeted hours/patient day 2007/08 (By province and teaching status)

		Province							
	All	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Hospitals (n=)	(144)	(21)	(10)	(6)	(8)	(42)	(43)	(8)	(6)
Budgeted hours / acute patient day *	.85	.71	.79	.72	.80	.99	.77	.85	1.12
Budgeted hours /total patient day (acute and non-acute) * (n=139)	.63	.47	.62	.64	.60	.78	.50	.75	.92
Teaching Hospitals (n=36)	(36)	(2)	(5)	(2)	(1)	(12)	(10)	(2)	(2)
Budgeted hours / acute patient day *	1.12	1.44	.72	.89	1.19	1.39	.89	.91	1.82
Budgeted hours / total patient day (acute and non-acute) *	.94	1.04	.72	.70	1.19	1.09	.81	.83	1.41
Non-Teaching Hospitals (n=108)	(108)	(19)	(5)	(4)	(7)	(30)	(33)	(60	(4)
Budgeted hours / acute patient day *	.75	.63	.86	.64	.74	.83	.74	.84	.77
Budgeted hours / total patient day (acute and non-acute) * (n=103)	.52	.41	.52	.61	.51	.66	.40	.72	.67

*** Note that budgeted hours exclude pharmacy residents**

- For the 5 subgroups of hospitals, based on the percentage of acute beds vs. non-acute beds, the staffing ratios, using total patient days as the denominator, increase in each subgroup as the percentage of acute beds increases. For hospitals with 10-39% acute beds the staffing ratio was 0.3 budgeted hours per total patient day, which rose to 0.36 for hospitals with 40-59% acute beds, 0.58 for hospitals with 60-79% acute beds, 0.8 for hospitals with 80-99% acute beds, and 0.81 for hospitals with 100% acute beds. (Table F-5). This analysis, based on the percentage of acute beds vs. non-acute beds, was also performed for the ratio that used only acute beds in the denominator. As can be seen, the highest staffing ratio in this analysis occurs in the hospitals with the lowest percentage of acute beds; 0.94 budgeted hours per acute patient day for the hospitals with 10-39% acute beds vs. 0.81 budgeted hours per acute patient day for hospitals with 100% acute beds. This counter-intuitive result probably arises from the exclusion of non-acute beds from the denominator, while total staffing for both acute and non-acute beds is included in the

numerator. This highlights the problem with the way the staffing ratios have been calculated in previous reports; a problem that the board identified prior to this year's survey.

- There were 38 hospitals in this year's survey that reported having 100% acute beds. Of these 16 were teaching hospitals and 22 were non-teaching hospitals. These 38 hospitals reported a 0.81 budgeted hour per acute patient day ratio; 1.04 budgeted hours per acute patient day for teaching hospitals and 0.65 budgeted hours per patient day for non-teaching hospitals. These ratios are true "budgeted hours per acute patient day", since the staffing in the numerator is only for acute patient days and the patient days in the denominator are all acute patient days.

- When the hospitals were further broken down into teaching and non-teaching hospitals, the staffing ratios were, on average, about 50% higher for teaching hospitals than non-teaching hospitals in each grouping based on their percentage of acute beds. For example teaching hospitals with 40-59% acute beds reported a staffing ratio of 0.50 budgeted hours per total patient day, compared to 0.35 for non-teaching hospitals with 40-59% acute beds. (Table F-5) Although the number of respondents in several of the groupings is quite small, the differences between teaching and non-teaching hospitals were quite consistent.

This analysis indicates, not surprisingly, that the mix of acute to non-acute beds has a significant impact on the staffing ratios, as measured by the ratio of budgeted hours per total patient day. When carrying out a comparison of staffing ratios between your hospital and the Canadian averages contained in the 2007/08 report, it is recommended that readers use not only the data that was calculated using the same methodology used in past surveys (using only acute patient days in the denominator), but also calculate their budgeted hours per total patient day and benchmark themselves against the group in Table F-5 that has the same percentage of acute beds and the same teaching status.

The above staffing data, presented as "budgeted hour per patient day", allows for a department's overall human resource allocation to be compared to other organizations, using a proxy workload denominator (patient days). However, it does not provide information that allows the staff composition of a pharmacy department to be compared to other departments. In order to provide data for this purpose, the Hospital Pharmacy in Canada report has also collected and reported data on the number of different types of staff that each respondent employs (i.e. managers, staff pharmacists, pharmacy technicians, support staff and pharmacy residents). This information is useful for examining issues like pharmacist to technician ratios, and differences in staff composition between different provinces, teaching versus non-teaching respondents, and hospitals of different sizes. This year the numbers have remained very similar to the 2005/06 report.

- The average number of pharmacist positions reported represent 40% of total pharmacy staffing (Table F-7). Pharmacists represent the largest proportion of staff in Manitoba (51%) and the lowest in Alberta (37%).

- Management positions have not changed from the previous report, representing 5.3% of total pharmacy staffing. BC is highest at 7.6% with Quebec and Manitoba lowest at 3.6% and 4.5% respectively.

- Technician/Assistant positions represent 49% of total pharmacy staffing with Alberta highest at 52.0%.

- Support personnel represented 3.8% of total pharmacy staffing in 2007/08, compared to 6% in 2005/06. This change is most likely due to the fact that pharmacy assistants have now been clearly defined in the survey and would in most cases be included in the pharmacy technician category, whereas they were sometimes included as support personnel in past surveys.

Overall staff composition of pharmacy departments has changed very little from the previous three surveys. The proportions of technicians, pharmacists, management staff, support staff and residents were almost identical to 2005/06 (Figure F-1). There is a slight upward trend in the percentage of technicians, which could possibly be attributed to expansion of the role of technicians in supporting pharmacy operations and the clarification of the definition of "technicians" and "support personnel". With the regulation of technicians expected to occur in the near future, it will be interesting to see if the ratio of technicians to pharmacists changes in any significant way.

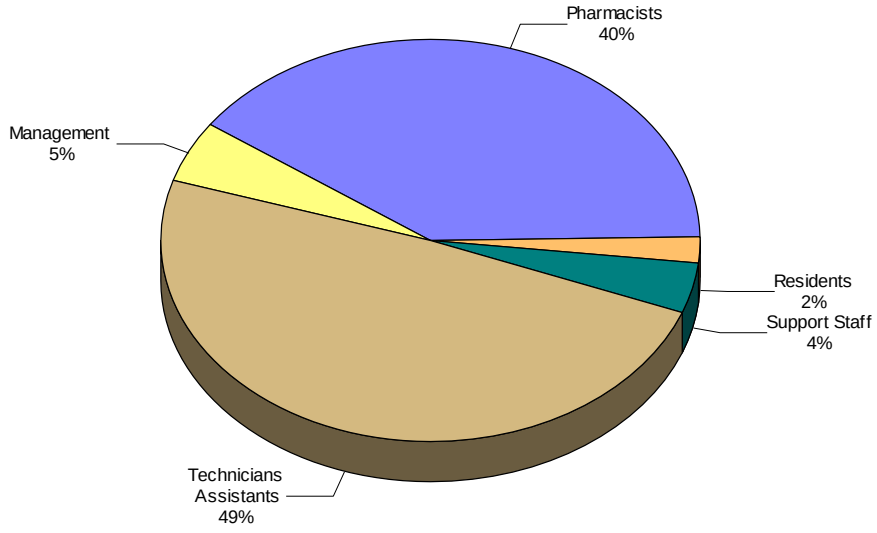
Table F-7. Average Budgeted Pharmacy Staffing (FTEs) and Average Beds 2007/08

	All	Bed Size			Teaching	
		50 - 200	201- 500	>500	Teach	Non-Teaching
Hospitals (n=)	(163)	(32)	(90)	(41)	(40)	(123)
Pharmacists	17.3	5.4	13.5	34.9	37.7	10.7
Management	2.3	1.1	1.8	4.5	4.8	1.5
Pharmacy Technicians / Assistants	21.3	6.8	15.4	45.5	44.4	13.8
Support Staff	1.6	.4	1.4	3.1	3.7	1.0
Residents	.7	.0	.4	1.9	2.5	.1
Total FTE	43.2	13.7	32.4	90.0	93.0	27.0
(n=)	(166)	(35)	(90)	(41)	(40)	(126)
Beds (acute + non-acute)	417	131	344	822	649	343

Table F-8. Average Budgeted Pharmacy Staffing (FTEs) and Average Beds by Province 2007/08

	All	Province							
		BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Hospitals (n=)	(163)	(22)	(12)	(7)	(10)	(45)	(51)	(8)	(8)
Pharmacists	17.3	13.5	25.6	15.4	15.8	20.5	15.7	14.1	14.1
Management	2.3	2.7	4.1	2.3	1.4	3.0	1.3	2.1	2.6
Pharmacy Technicians / Assistants	21.3	17.7	36.3	15.0	13.2	27.9	16.5	19.4	19.3
Support Staff	1.6	.9	2.3	1.2	.8	2.1	1.7	1.6	1.2
Residents	.7	.5	.8	.6	.0	.7	1.1	.3	.3
Total FTE	43.2	35.3	69.2	34.5	31.2	54.2	36.3	37.5	37.5
(n=)	(166)	(22)	(13)	(7)	(11)	(46)	(51)	(8)	(8)
Beds (acute + non-acute)	417	426	521	307	300	417	457	318	321

Figure F-1. Staff Composition of Average Hospital Pharmacy Department 2007/08



Base: All respondents providing relevant data (163)

Overall, the proportion of time that pharmacists spend performing different functions has remained fairly consistent.

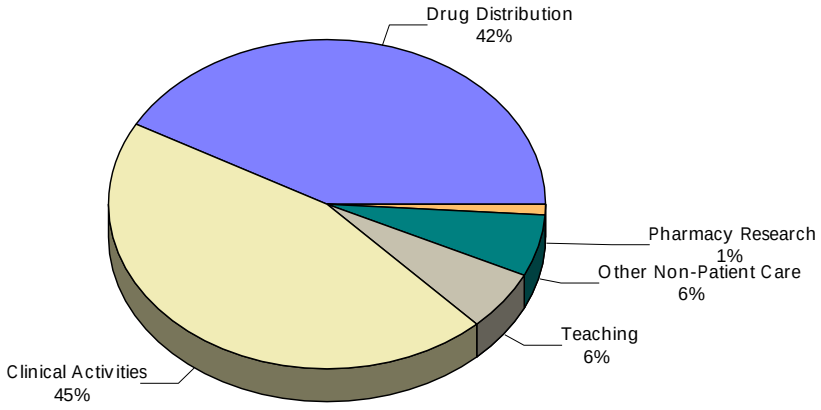
- Respondents reported that pharmacists spent approximately 45% of their time performing clinical activities in 2007/08 (Figure F-2, Table F-9), compared to 41% in 2005/06. This was offset by less time spent in drug distribution, 42% in 2007/08 compared to 43% in 2005/06. There has been a slow but steady increase in time spent on clinical activities, which was only 33% in 1997/98.
- The highest proportion of pharmacist time spent performing drug distribution activities was reported by respondents from New Brunswick/Prince Edward Island (51%) and British Columbia (48%), with the lowest proportion reported by respondents from Alberta (38%) and Ontario (36%). Conversely, the time spent

performing clinical activities was lowest in British Columbia (40%), NS/NL (38%) and New Brunswick/Prince Edward Island (37%). With the increasing scope of practice for pharmacists that is being embedded in the pharmacy legislation in many provinces, it will be interesting to see if the trend toward increased clinical activities continues.

Table F-9. Proportion of Pharmacist Time Spent Performing Different Activities 2007/08

		Bed Size			Teaching Status		Previous Surveys			
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching	2005/06	2003/04	2001/02	1999/00
Hospitals (n=)	(165)	(350	(90)	(40)	(39)	(126)	(142)	(144)	(123)	(115)
Drug distribution (including investigational drugs)	42%	41%	44%	39%	31%	45%	43%	48%	46%	49%
Clinical activities	45%	43%	44%	48%	53%	42%	41%	38%	39%	38%
Teaching	6%	6%	5%	7%	8%	5%	6%	5%	6%	6%
Pharmacy research	1%	1%	1%	2%	2%	1%	2%	1%	2%	1%
Other non-patient care activities	6%	8%	6%	5%	6%	6%	8%	8%	7%	6%

Figure F-2. Proportion of Pharmacist Time Spent Performing Different Activities 2007/08



Base: All respondents providing relevant data (165)

SALARIES:

In the 2007/08 survey questionnaire dealing with pharmacy salaries, two new staff classifications were added – Pharmacy Manager (non-pharmacist) and Pharmacy Assistant. Previous comparisons for these two categories are not available. In addition, more precise definitions of each category of staff were provided to assist respondents in appropriately categorizing their staff. Salaries for technicians are reported separately for those respondents who reported having Level 1 and Level 2 technicians vs. those respondents who reported having only one level of technician salaries. Throughout this section, the salary increases that occurred over the two year period between the 2005/06 and 2007/08 have been annualized. When a percentage increase is referred to in the points below, and is marked with an asterisk (*), the percentage reported applies to each of the years between the 2005/06 and the 2007/08 survey.

- The salaries reported in the 2007/08 report (Table F-10) reflect those that were paid as of March 31, 2008. The average salary per FTE was reported as $62,852 compared to $57,315 in 2005/06, representing a 4.1% * increase since the last report. This is substantially more than the 2.1%* increase reported in the 2005/06 report.
- Average salary increases at the top level for all staff ranged from 4.3% * for Advanced Practice Pharmacists to 7.8%* for Practice Leaders/Coordinators and Pharmacy Supervisors/Coordinators.

*** annualized increase**

- Respondents reported staff pharmacists as having an overall salary increase at the top level of 4.8%*. This indicates an upward trend from the previous survey when an increase of 2.8%* was reported. Many provincial collective agreements, in which hospital pharmacy shortages and higher retail pharmacist wages were recognized, were negotiated since the last report. The largest salary increases for staff pharmacists at the top level were in British Columbia (9.8%*,) Saskatchewan (9.9%*), Nova Scotia/Newfoundland (8.9%*) and New Brunswick/PEI (10.4%*). All other provinces reported changes of less than 3.9%*. There were no noticeable differences in staff pharmacist salaries based on bed size or teaching status.
- Staff technician salaries at the top level rose by 4.4%* compared to 3.8%* in the last report. Senior technician salaries at the top level rose by 4.6%*.
- Technician Manager salaries rose 4.9%* since the last report.
- The mean residency stipend increased by 6.2%*, which varied considerably by province. Some small decreases were reported in Quebec and Ontario. These were offset by increases of 10.9%* in British Columbia, 6.2%* in Saskatchewan and 2.8%* in Alberta. Stipends ranged from a low of $30,000 in Manitoba to a high of $57,886 in British Columbia. The higher rate in British Columbia reflects the fact that the stipend is tied to the staff pharmacist wage (85% of a starting pharmacist salary).

Table F-10. Average Annual Salary by Position by Province 2007/08

		Province							
	All	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Pharmacist Manager / Start Salary (n=122)	87,290	89,368	94,728	90,824	100,035	90,964	79,122	89,005	75,351
Pharmacist Manager / Top Salary (n=130)	100,515	109,850	112,466	100,675	107,561	104,791	90,308	93,022	91,233
Pharmacy Manager (non-Pharmacist) / Start Salary (n=14)	62,006	.	.	.	.	67,396	56,264	81,000	.
Pharmacy Manager (non-Pharmacist) / Top Salary (n=15)	76,533	.	.	.	.	90,144	68,935	62,293	.
Technician Manager / Start Salary (n=26)	51,992	48,174	66,813	.	35,022	58,275	34,353	43,500	52,650
Technician Manager / Top Salary (n=32)	60,986	49,624	85,035	.	42,565	68,613	40,893	49,100	57,542
Practice Leader / Coordinator (Pharmacist) / Start Salary (n=62)	83,600	83,290	81,554	90,191	110,968	85,552	72,147	84,315	77,844
Practice Leader / Coordinator (Pharmacist) / Top Salary (n=64)	98,489	103,249	107,884	93,041	110,968	99,573	84,456	88,078	94,325
Staff Pharmacist (B.Sc.) / Start Salary (n=130)	73,467	69,245	76,061	80,984	86,377	76,579	63,981	80,395	68,958
Staff Pharmacist (B.Sc.) / Top Salary (n=139)	85,807	86,741	92,748	89,125	92,501	90,442	74,655	84,202	80,936
Advanced Practice Pharmacist (Pharm.D. / MSc.) / Start Salary (n=70)	74,502	78,166	.	97,402	102,631	77,597	65,807	85,041	75,657
Advanced Practice Pharmacist (Pharm.D. / MSc.) / Top Salary (n=74)	88,042	97,676	.	100,486	102,704	93,438	78,056	85,041	94,574
Pharmacy Supervisor / Coordinator / Start Salary (n=43)	80,416	81,166	82,174	.	93,631	83,784	72,643	.	62,278
Pharmacy Supervisor / Coordinator / Top Salary (n=45)	96,728	103,889	101,141	.	97,392	101,307	85,846	.	82,749
Pharmacy Assistant / Start Salary (n=38)	33,322	38,630	29,844	31,746	28,436	37,314	31,067	29,937	34,958
Pharmacy Assistant / Top Salary (n=39)	38,145	38,630	34,404	32,838	33,834	43,513	35,707	32,302	40,394
Resident Stipend (n=50)	39,659	57,886	38,618	42,045	30,000	32,166	30,667	34,134	30,205
Salaries from facilities with Level 1 and Level 2 technician salary scales									
Technician - Level 2 / Senior / Start Salary (n=61)	42,132	44,433	52,349	46,749	38,123	47,912	31,371	34,178	36,402
Technician - Level 2 / Senior / Top Salary (n=66)	46,899	44,896	68,909	49,185	42,268	57,224	35,815	36,246	40,448
Technician - Level 1 / Staff / Start Salary (n=62)	38,628	41,372	45,939	38,933	32,160	42,758	31,170	32,803	32,902
Technician - Level 1 / Staff / Top Salary (n=66)	42,705	42,157	57,586	41,592	39,110	51,033	32,962	34,264	36,448
Salaries from facilities with only 1 technician salary scale									
Technician - Single Level / Staff / Start Salary (n=82)	36,985	42,033	46,744	37,998	33,774	43,032	30,269	31,686	35,559
Technician - Single Level . / Staff / Top Salary (n=81)	43,362	42,107	58,098	40,383	39,920	49,849	36,523	33,034	40,897
Average Salary (budget) / Total FTE (excl. residents) (n=154)	62,852	66,382	69,579	66,404	66,071	68,132	56,234	56,504	57,360

*** annualized increase**

- Respondents indicated that 97% of pharmacy directors earned over $80,000 in 2007/08 compared to 89% who earned over that amount in 2005/06 (Table F-11). Sixty-five percent of Directors reported earning over $100,000 in 2007/08, compared to 42% in the previous report. The trend of increasing salaries for Directors of Pharmacy in teaching hospitals and larger facilities continues with this report. Overall, as with the last report, Alberta and Ontario provided the highest directors' salaries.

Table F-11. Distribution of Director Salary Ranges 2007/08

		Bed Size			Province							
	All	50-200	201-500	>500	BC	AB	SK	MB	ON	QC	NB/ PE	NS/ NL
Hospitals (n=)	(162)	(34)	(87)	(41)	(22)	(12)	(7)	(10)	(45)	(50)	(8)	(8)
under $70,000	2%	3%	2%	0%	0%	0%	0%	0%	2%	4%	0%	0%
$70,000- $79,999	1%	0%	1%	0%	0%	0%	0%	0%	0%	2%	0%	0%
$80,000- $89,999	12%	18%	13%	7%	0%	0%	0%	0%	0%	32%	13%	38%
$90,000- $99,999	20%	29%	17%	17%	9%	0%	71%	10%	9%	26%	75%	13%
$100,000-$109,999	29%	24%	31%	29%	41%	17%	0%	50%	38%	22%	13%	25%
$110,000-$119,999	12%	6%	13%	15%	9%	8%	29%	30%	18%	2%	0%	25%
$120,000-$130,000	14%	9%	15%	17%	36%	33%	0%	10%	18%	4%	0%	0%
$130,000+	10%	12%	8%	15%	5%	42%	0%	0%	16%	8%	0%	0%

SUMMARY

This year's report illustrates that human resource shortages still exist in pharmacy. The pharmacist shortage has remained very similar to the last report. With the increasing role of technicians and their pending regulation we may see an increase in the ratio of technicians to pharmacists, helping to alleviate the pharmacist shortage. Expected retirements appear to be similar for pharmacists, and slightly higher for management staff, as compared to the 2005/06 report. Hospital pharmacy continues to struggle to provide appropriate, patient oriented professional practice with limited resources. With anticipated retirements, especially in pharmacy leadership positions, the profession could be faced with a different but equally difficult human resource problem. It will be important to continue to monitor these trends over the next few reports and prepare pharmacists to assume future leadership roles.

* annualized increase

References:

[1] "Health Care Renewal in Canada: Clearing the Road to Quality", Health Council of Canada 2006 Annual Report to Canadians. p. 25, Accessed on Jan 9, 2009 at http://www.healthcouncilcanada.ca/en/index.php?option=com_content&task=view&id=70&Itemid=72

[2] Moving Forward:Pharmacy Human Resources for the Future, Final Report and Recommendations. Accessed Jan9, 2009 at http://www.pharmacyhr.ca

[3] CIHI Data – Canada's Health Care Providers, 1997 to 2006, A Reference Guide. Accessed on January 9, 2009 at http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=hhrdata_personnel_e

G - MEDICATION SAFETY

PATRICIA LEFEBVRE

The Accreditation Canada Qmentum Program now includes standards for the safe use and effective management of medications (Standards for Managing Medications).[1] In addition, organizations seeking accreditation will be required to comply with 31 "Required Organizational Practices" related to patient safety, of which 6 are new requirements of the accreditation survey in 2009.[2,3] The Accreditation Canada document entitled *Evaluation of Implementation and Evidence of Compliance*, details how surveyors assess compliance with the Patient /Client Safety Goals and the Required Organizational Practices.

In 2007, Neil J. Mackinnon published the book "*Safe and Effective – The Eight Essential Elements of an Optimal Medication-Use System".* This book is another key reference for pharmacists and other healthcare providers to use when reviewing and evaluating their medication-use systems.

The results of the 2007/08 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 the 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 and effective systems for managing medications in each of our hospitals.

MEDICATION INCIDENT REPORTING SYSTEM

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.

- All respondents reported use of a medication incident reporting system within their facility (Table G-1). The presence of reporting systems, in all of the hospitals that participated in the 2007/08 survey, will hopefully facilitate future participation in the Canadian Medication Incident Reporting and Prevention System (CMIRPS), a national database of medication incidents which was developed through a collaborative partnership between the Institute for Safe Medication Practices-Canada (ISMP Canada), the Canadian Institute for Health Information, and Health Canada.[4] CMIRPS is part of the pan-Canadian reporting and learning system being developed to support the capture, analysis and dissemination of information about adverse events, with the goal of insuring that known risks are acted upon in a coordinated and timely manner.[5]

- Forty-seven percent (74/159) of respondents indicated that their hospital reported medication incidents to an external reporting program. Of the respondents who reported to external programs, the programs mentioned included a health region reporting program (54%, 38/71), ISMP Canada (40%, 28/71), a

provincial reporting program (34%, 24/71) and other programs (7%, 5/71). (Note: more than one program could be selected)

- The percentage of respondents who reported that medication incident reports can be used during an individual healthcare provider's performance assessment was 11%, compared to 12% in 2005/06, 21% in 2003/04 and 32% in 2001/02. Although progress was made in eliminating this deterrence to the reporting of medication incidents between 2001/02 and 2005/06, there was minimal improvement since the 2005/06 survey and the 2007/08 survey. The use of medication incident reports during individual performance assessments was more commonly reported by non-teaching hospital respondents (13%) than by teaching hospital respondents (5%). None of the respondents with more than 500 beds reported using medication incident reports during an individual healthcare provider's performance assessment.

- Thirty-nine percent of respondents reported that they broadly communicate information regarding the institution's medication incidents to hospital staff and physicians. There was minimal change since 2005/06, when 37% of respondents reported that they broadly communicated this information. This is an area where there is significant opportunity for improvement.

- Fifty-nine percent of respondents reported that they broadly communicate information regarding published medication incidents to their hospital staff and physicians, compared to 47% in 2005/06. The percentage of respondents reporting that they do so was highest in Ontario (89%, 41/46) followed by the Atlantic (73%, 11/15), the Prairies (68%, 19/28), British Columbia (41%, 9/22), and Quebec (31%, 15/49). A number of respondents reported that they post ISMP newsletters on the institution's intranet site.

Table G-1. Reporting System for Medication Incidents 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(161)	(34)	(88)	(39)	(38)	(123)
A medication incident reporting system is in use	100%	100%	100%	100%	100%	100%
Medication incidents are reported to an external reporting program (n=159)	74	13	48	13	20	54
	47%	38%	55%	34%	53%	45%
Medication incident reports can be used during an individual healthcare provider's performance assessment (n=160)	18	7	11	0	2	16
	11%	21%	13%	0%	5%	13%
Information regarding the institution's medication incidents is broadly communicated to hospital staff and physicians (n=158)	61	16	29	16	16	45
	39%	48%	33%	42%	42%	38%
Information regarding published medication incidents is broadly communicated to hospital staff and physicians (n=160)	95	23	47	25	24	71
	59%	68%	54%	64%	63%	58%

MEDICATION INCIDENT REVIEW

- Ninety percent of respondents reported having a designated committee responsible for medication incident review (Table G-2), compared to 80% in 2005/06. All respondents (22/22) from BC reported the presence of a committee, compared to 50% (10/20) in 2005/06, while the situation remained largely unchanged in the other provinces.

- Among the 143 respondents who identified one or more committees in their organization that are responsible for medication incident review, the committees named as being responsible for this function were the Medication Safety/Quality Committee (50%, 71/143), Risk Management Committee (48%, 69/143), Pharmacy and Therapeutics Committee (45%,64/143), Pharmacy & Nursing Committee (31%, 44/143), General Quality Committee (28%, 40/143), Medical Advisory Committee (14%, 20/143) and other committees (10%, 14/143). (Note: more than one committee could be selected) Half of the respondents indicated having designated a Medication Safety/Quality Committee to oversee the review of medication incidents.

- A Medication Safety Self-Assessment tool was reported to have been completed, within the previous two years, by 63% of respondents. Seventy-three percent of teaching hospitals, compared to 61% of non-teaching hospitals, reported completing a self-assessment tool within the previous two years. The completion of a self-assessment tool was highest in the Prairies (89%, 25/28), followed by Ontario (87%, 39/45), British Columbia (59%, 13/22), Atlantic Canada (40%, 6/15) and Quebec (35%, 16/30). Of the respondents who reported completing a self-assessment in the previous two years, 93% used the ISMP Hospital Medication Safety Self- Assessment™ tool (ISMP MSSA). With the implementation of the new Managing Medications Standards, surveyors from Accreditation Canada now frequently ask if you have conducted a Medication Safety Self-Assessment tool and if you wish to share the results at the time of the survey.

ISMP Canada has published a bulletin entitled *"Failure Mode and Effects Analysis (FMEA): Proactively Identifying Risk in Healthcare"* [6] 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-six percent of respondents reported that they had conducted, in the previous year, at least one prospective, medication safety-related, analytical process, such as a failure mode and effects analysis. This percentage is higher in teaching hospitals (61%) than in non-teaching hospitals (41%). The completion of this process was more commonly reported by respondents from Atlantic Canada (67%, 10/15) and Ontario (63%, 29/46), followed by the Prairies (41%, 11/27), Quebec (34%, 16/47) and British Columbia (27%, 6/22). Nearly all of the respondents who had conducted a prospective analysis (94%, 66/70) reported that they had implemented improvements that were recommended as a result of the analysis.

Table G-2. Medication Safety Review and Assessment 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(161)	(34)	(88)	(39)	(38)	(123)
Designated committee responsible for the review of medication incidents	145 90%	29 85%	82 93%	34 87%	35 92%	110 89%
Your facility has conducted at least one prospective, medication safety-related, analytical process in the last year (n= 157)	72 46%	19 58%	34 40%	19 50%	23 61%	49 41%
Your facility has conducted at least one retrospective, medication safety-related, Root Cause Analysis, in the last year (n=142)	90 63%	18 62%	49 66%	23 59%	22 58%	68 65%
A medication safety self-assessment has been completed (n=156)	99 63%	22 65%	52 62%	25 66%	27 73%	72 61%
Type of medication safety self-assessment (n=95)						
ISMP's Medication Safety Self-Assessment	93%	91%	92%	96%	96%	91%
Other	7%	9%	8%	4%	4%	9%

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"* [7] 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 previous year, by 63% of respondents,. Ontario (74%, 32/43) and the Prairies (72%, 18/25) had the highest rate,

followed by Atlantic Canada (62%, 8/13), British Columbia (57%, 8/14) and Quebec (51%, 24/47). As with failure mode and effects analysis, almost all of the respondents (94%, 85/90) 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, either retrospective (root cause analysis) or prospective (failure mode and effects analysis), can assist organizations in the development of strategies to improve patient safety.

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.[8,9]

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 (new 2009)
- Evaluate and limit the availability of narcotic products and remove high-dose, high-potency formats from patient care areas (new 2009).

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

- Thirty-six percent of respondents, compared to 38% in 2005/06, reported that they do not have a policy requiring checking of two patient identifiers before a medication is administered. The percentage without a policy was lower in teaching hospitals (29%) compared to non-teaching hospitals (38%). The use of at least two patient identifiers before administering medications is one of Accreditation Canada's Required Organizational Practices.

- 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, compared to 68% in 2005/06. 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 (66%). Respondents from BC (96%, 21/22) and Ontario (89%, 41/46) reported the highest percentages, followed by respondents from Atlantic Canada (73%,11/15), the Prairies (71%, 20/28) and Quebec (67%, 33/49)

- Fifty-two percent of respondents reported that 90% or more of medication orders remain conditional until reviewed by a pharmacist. This percentage was higher in hospitals with more than 500 beds (62%), compared to hospitals with 201-500 beds (52%) and hospitals with 50-200 beds (38%). Medication order review by a pharmacist prior to the medication being administered, including the evaluation of the appropriateness of the order against the current medication profile for a specific patient, is a key element of safe medication practices.

- Almost all respondents (99%, 153/155) reported a formal process was in place to review and approve pre-printed medication orders, compared to 87% in 2005/06. Eighty-three percent (129/155) of respondents reported having a process in place to review and approve infusion charts and guidelines. This percentage was lowest in hospitals with 50-200 beds (60%). Sixty-three percent (97/155) of respondents reported that a formal process was in place to review and approve physician order sets, compared to 42% in 2005/06.

- Establishment of a designated list of dangerous abbreviations that are not accepted in the institution was reported by 73% of respondents, a notable increase from the 58% reported in 2005/06. Less than half of the respondents from Quebec (42%, 21/50) reported the presence of a list of prohibited abbreviations. The use of nonstandard or ambiguous abbreviations has lead to many medication incidents. ISMP has published a "do not use" list of abbreviations, symbols and dose designations to assist hospitals in establishing their lists.[10]

Table G-3. Medication Safety Strategies - Prescribing, Ordering, Transcribing 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(161)	(34)	(88)	(39)	(38)	(123)
Policy requiring that two patient identifiers (neither to be the patient's room number) are checked before administering medications (n=155)	99 64%	22 69%	56 67%	21 54%	27 71%	72 62%
The patient's allergy status is know prior to a medication order being dispensed (n=160)						
yes, for >= 90% of all orders	126 79%	25 74%	76 86%	25 66%	30 79%	96 79%
yes, but for < 90% of all orders	32 20%	8 24%	11 13%	13 34%	8 21%	24 20%
A medication order remains conditional (i.e., no labels printed or drug dispensed, no update of profile or MARs, or access to automated dispensing units) until reviewed by a pharmacist (n=161)						
yes, for >= 90% of all orders	83 52%	13 38%	46 52%	24 62%	20 53%	63 51%
yes, but for < 90% of all orders	42 26%	11 32%	23 26%	8 21%	13 34%	29 24%
There is a formal process to review and approve (n=155)						
Pre-printed medication orders	153 99%	30 100%	85 99%	38 97%	38 100%	115 98%
Physician order sets	97 63%	18 60%	57 66%	22 56%	23 61%	74 63%
Infusion dosage charts and guidelines	129 83%	18 60%	78 91%	33 85%	34 89%	95 81%
There is a list of dangerous abbreviations that are not accepted in the institution (n=161)	117 73%	26 76%	60 68%	31 79%	33 87%	84 68%

- When asked if a policy was in place that describes the safety procedures for specific high-alert medications used within the organization, the presence of such a policy was reported by 89% (139/156) of respondents for concentrated potassium chloride for injection, 73% (111/152) for potassium phosphate injection, 69% (83/120) for intrathecal vincristine, 63% (97/154) for hypertonic sodium chloride, 58% (90/155) for hydromorphone, 56% (87/155) for intravenous unfractionated heparin, 53% (82/154) for intravenous insulin, 53% (81/154) for morphine, 44% (67/153) for subcutaneous insulin, 38% (58/152) for magnesium sulfate, 35% (54/153) for low molecular weight heparin, 34% (52/155) for neuromuscular blocking agents, and 27% (41/152) for warfarin.

Table G-4. Medication Incident Reduction Strategies - Preparing, Dispensing, Administration 2007/08

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
The hospital has a policy that describes the safety procedures for specific high-alert medications						
Heparin, unfractionated IV (n=155)	87 56%	23 70%	46 54%	18 49%	23 61%	64 55%
Heparin, low molecular weight (n=153)	54 35%	13 41%	32 38%	9 24%	15 39%	39 34%
Hydromorphone (n=155)	90 58%	18 55%	49 58%	23 61%	24 63%	66 56%
Insulin, IV (n=154)	82 53%	20 63%	46 54%	16 43%	20 54%	62 53%
Insulin, subcutaneous (n=153)	67 44%	18 56%	37 44%	12 32%	18 47%	49 43%
Magnesium sulfate, injection (n=152)	58 38%	13 39%	35 43%	10 27%	19 50%	39 34%
Morphine (n=154)	81 53%	16 48%	46 55%	19 51%	23 61%	58 50%
Neuromuscular blocking agents (n+155)	52 34%	13 39%	25 29%	14 38%	15 39%	37 32%
Potassium chloride for injection, concentrate (n=156)	139 89%	29 88%	76 89%	34 89%	34 89%	105 89%
Potassium phosphate injection (n=152)	111 73%	21 68%	61 73%	29 78%	30 79%	81 71%
Sodium chloride, hypertonic (n=154)	97 63%	20 61%	53 63%	24 65%	29 76%	68 59%
Vincristine intrathecal (n=120)	83 69%	13 72%	44 64%	26 79%	26 81%	57 65%
Warfarin (n=152)	41 27%	10 32%	22 26%	9 24%	9 24%	32 28%
The hospital has removed one or more of the following concentrated medications from patient care units in at last 90% of cases						
Potassium Chloride (n=155)	149 96%	29 94%	84 98%	36 95%	38 100%	111 95%
Potassium Phosphate (n=150)	137 91%	26 90%	76 92%	35 92%	37 100%	100 88%
Concentrated Narcotics (n=154)	124 81%	21 70%	70 81%	33 87%	31 82%	93 80%
Sodium Chloride (3%, 23%, etc) (n=152)	139 91%	28 93%	75 89%	36 95%	36 97%	103 90%
The hospital has standardized infusion concentrations for the following high-alert medications, and these standardized concentrations are						
Heparin (n=158)	142 90%	32 97%	75 87%	35 90%	36 95%	106 88%
Insulin (n=157)	90 57%	16 48%	49 58%	25 64%	27 71%	63 53%
Morphine (n=158)	109 69%	20 61%	59 69%	30 77%	28 74%	81 68%
Hydromorphone (n=157)	99 63%	17 52%	55 64%	27 71%	24 63%	75 63%
The hospital uses TALL man lettering (n=159)	92 58%	21 64%	50 57%	21 54%	26 68%	66 55%
TALL man lettering is used: (n=)	(90)	(20)	(49)	(21)	(26)	(64)
In the Pharmacy Information System (PIS) (e.g., drop down drug selection menus)	65 72%	15 75%	34 69%	16 76%	20 77%	45 70%
On Pharmacy-generated labels	67 74%	14 70%	38 78%	15 71%	22 85%	45 70%
On Pharmacy unit dose packaging	66 73%	12 60%	38 78%	16 76%	23 88%	43 67%
On Pharmacy-generated Medication Administration Records (MARs)	45 50%	12 60%	22 45%	11 52%	14 54%	31 48%
In Pharmacy, on shelf labels	44 49%	7 35%	26 53%	11 52%	20 77%	24 38%
In the medication rooms on patient care units (e.g., shelf labels)	17 19%	5 25%	6 12%	6 29%	9 35%	8 13%

The Institute for Safe Medication Practices in the United States conducted a survey on high-alert medications in 2007[11] in which they asked respondents to:

1. identify, from a list of medications, those that they believed were high-alert medications
2. indicate, from that list, if their organization had special precautions in place for those high-alert medications.

It is interesting to note that there are similarities between the results of our survey and the ISMP US survey for potassium chloride (89% vs. 86% ISMP US) potassium phosphate (73% vs. 77% ISMP US) and hypertonic sodium chloride (63% vs. 71% ISMP US).[12] When comparing the results, it is important to take into consideration that differences were noted between nursing and pharmacy in the ISMP US survey. Our survey is completed primarily by pharmacists.

- Ninety percent of respondents reported that they have standardized heparin infusion concentrations, compared to 75% in 2005/06. Standardization of infusion concentrations for morphine was reported by 69% of respondents, compared to 57% in 2005/06. For hydromorphone, 63% of respondents reported standardization of infusion concentrations, compared to 53% in 2005/06. Fifty-seven percent of respondents indicated that they had standardized insulin infusion concentrations, compared to 48% in 2005/06.

- All respondents in BC, the Prairies, Ontario and Atlantic Canada have removed concentrated potassium chloride from 90% or more of patient care units, compared to 87% in Québec (41/47). Ninety-one percent of respondents reported that they have removed potassium phosphate from 90% or more of patient care units. This practice has been implemented in all teaching hospitals for potassium chloride and potassium phosphate. Eighty-one percent of respondents reported that they have removed concentrated narcotics from 90% or more of patient care units. Ninety-one percent of respondents reported that they have removed hypertonic saline from 90% or more of patient care units.

- Fifty-eight percent of respondents reported using TALLman lettering to reduce errors caused by confusion between drug products with look-alike drug names. Only 6% of the Quebec respondents (3/50) reported the use of TALLman lettering, compared to 54% (7/13) in Atlantic Canada, 79% (22/28 in the Prairies, 86% (19/22) in BC, and 89% (41/46) in Ontario. Among the 92 respondents who reported using TALLman lettering, it was most often used on: pharmacy generated labels (74%), pharmacy unit dose packaging (73%), pharmacy information system drop down drug selection menus (72%), pharmacy generated medication administration records (50%), pharmacy shelf labels (49%), and in the medication rooms on patient care units (e.g: shelf labels) (19%). 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 .[13]

MEDICATION RECONCILIATION

Medication reconciliation is a practice designed to prevent medication errors at transition points in care, such as admission to, or discharge from, a hospital. It has been identified as a key component of the seamless care process in the Canadian Society of Hospital Pharmacists/Canadian Pharmacists Association Joint Statement on Seamless Care.[14] Medication Reconciliation is also one of the ten interventions in the *Safer Healthcare Now Campaign* that is currently underway across Canada.[15]

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".*[16]

- Sixty-nine percent of respondents reported the presence of a formal process to obtain a complete medication history of a client's home medications when a patient visits the Emergency Department (Table G-5). This percentage is highest in hospitals with more than 500 beds (79%), followed by hospitals with 201-500 beds (67%) and hospitals with 50-200 beds (61%). On average, a complete medication history is obtained for 62% of patients who visit the ER.

- Of the 109 respondents with a formal process in place to conduct complete medication histories in the ER, 91% reported that nurses conducted medication histories, 67% reported that physicians conducted medication histories, and 50% reported that pharmacists conducted medication histories. (Note: More than one health professional could be identified as being responsible for conducting medication histories) The conducting of a complete medication history in the Emergency Department was highest in Quebec (86%, 43/50) followed by Ontario (63%, 29/46), Atlantic Canada (60%, 9/15), the Prairies (59%, 16/27) and BC (55%, 12/22).

- Among those respondents who reported that a formal process was in place to obtain a complete medication history when a patient visits the Emergency Department, the medication history was created using information provided by the patient/family (98%), information contained on prescription containers (96%), information from a transferring facility (86%), information from a community pharmacy (83%), information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies (57%) and information obtained from the patient's primary care physician (50%). All respondents in BC who obtain a medication history in the ER (12/12), reported using the information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies, followed by Ontario (96%, 27/28), the Prairies (94%, 15/16), Atlantic Canada (22%, 2/9) and Quebec (12%, 5/43).

- Ninety-three percent of the respondents who conducted medication histories in the Emergency Department reported using the complete medication history when writing medication orders at the time of admission. This percentage was consistent across teaching status and bed size. This practice was systematically (100%) implemented in BC, the Prairies and the Atlantic.

- Seventy-two percent of respondents reported having a formal process to obtain a complete medication history of a client's home medications when a patient is admitted to the organization (Table G-6). Ontario led with 89% (41/46), followed by the Prairies (82%, 22/27), Atlantic Canada (73%, 11/15), Quebec (57%,28/49) and BC (55%, 12/22). Of the 114 respondents having a formal process to obtain a complete medication history when a patient is admitted, 95% reported that medication histories were carried out by nurses, 71% by pharmacists, and 68% by physicians. Physicians (86%) and pharmacists (90%) were more likely to conduct medication histories in teaching hospitals than in non-teaching hospitals (physicians 61% and pharmacists 65%). The same situation existed in hospitals with 500 or more beds (physicians 77% and pharmacists 87%).

- Among the 114 respondents who reported that a medication history was conducted upon admission to the hospital, the medication history was created using information provided by the patient/family (99%), information contained on prescription containers (97%), information from a transferring facility (94%), information from a community pharmacy (91%), information obtained from the patient's primary care physician (65%) and information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies (59%).

Table G-5. Medication Incident Reduction Strategies - Comprehensive Medication History 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(159)	(33)	(87)	(39)	(37)	(122)
When a patient visits the Emergency Department						
A formal process is in place to obtain a complete list of the patient's current home medications, including name, dosage, frequency and route	109	20	58	31	26	83
	69%	61%	67%	79%	70%	68%
The list is used when writing medication orders at the time of ER visit (n=109)	100	18	55	27	24	76
	92%	90%	95%	87%	92%	92%
The list is used when writing medications orders at the time of admission (n=108)	100	19	54	27	24	76
	93%	95%	95%	87%	92%	93%
Medication history is carried out by:						
(n=)	(109)	(20)	(58)	(31)	(26)	(83)
Pharmacist	54	7	30	17	12	42
	50%	35%	52%	55%	46%	51%
Nurse	99	18	56	25	21	78
	91%	90%	97%	81%	81%	94%
Physician	73	14	39	20	22	51
	67%	70%	67%	65%	85%	61%
Other	14	2	7	5	5	9
	13%	10%	12%	16%	19%	11%
Medication history is created using: (n=109)						
Information contained on prescription containers brought to the hospital by patient/family	96%	100%	95%	97%	100%	95%
Information provided by the patient/ family	98%	100%	97%	100%	100%	98%
Information obtained from the patient's primary care physician	50%	75%	50%	32%	46%	51%
Information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies	57%	55%	60%	52%	50%	59%
Information from a transferring facility (e.g., a nursing home)	86%	100%	86%	77%	85%	87%
Information from a community pharmacy	83%	95%	81%	77%	73%	86%

- Ninety-four percent of respondents, who conducted medication histories at the time of admission, reported having a formal process to use the list of the patient's current home medications to write medication orders at the time of admission. The use of the medication order form to reconcile medication has led to successful implementation of Medication Reconciliation. With this approach, the prescribing physician has access to the list of medications taken at home while writing the admission order. It also eliminates transcription errors, as well as streamlines the ordering process (i.e. the physician checks the appropriate box: continue, discontinue or modify).

- Forty-seven percent of respondents in 2007/08 compared to 38% in 2005/06, reported reconciling the patient's medications and communicating that information to the next provider of care when the patient is transferred between levels of care within the facility (Table G-7). This practice was more commonly reported by teaching hospital respondents (68%) than by non-teaching hospital respondents (40%). Respondents who conduct medication reconciliation when the patient is transferred reported that the physician was the health professional most frequently responsible (41%), followed by the pharmacist (30%) and the nurse (27%). The results of this survey are encouraging as they suggest that physicians are getting more involved in medication reconciliation (26% in 2005/06). Of the respondents who reported reconciling the patient's medication history when the patient is transferred, 26% had implemented the process throughout the hospital and another 74% had implemented the process for selected patient groups. It is worth noting that 38% of the non-teaching hospital respondents have implemented the practice throughout the hospital.

Table G-6. Medication Incident Reduction Strategies - Comprehensive Medication History 2007/08

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(159)	(33)	(87)	(39)	(38)	(121)
When a patient is admitted to the hospital						
A formal process is in place to obtain a complete list of the patient's current home medications, including name, dosage, frequency and route (i.e., a complete medication history)	114 72%	24 73%	60 69%	30 77%	29 76%	85 70%
The list is used when writing medications orders at the time of admission (n=114)	107 94%	21 88%	57 95%	29 97%	29 100%	78 92%
Medication history is carried out by: (n=114)						
Pharmacist	81 71%	11 46%	44 73%	26 87%	26 90%	55 65%
Nurse	108 95%	24 100%	56 93%	28 93%	27 93%	81 95%
Physician	77 68%	14 58%	40 67%	23 77%	25 86%	52 61%
Other	22 19%	7 29%	10 17%	5 17%	10 34%	12 14%
Medication history is created using: (n=114)						
Information contained on prescription containers brought to the hospital by patient/family	111 97%	24 100%	58 97%	29 97%	29 100%	82 96%
Information provided by the patient/ family	113 99%	24 100%	59 98%	30 100%	29 100%	84 99%
Information obtained from the patient's primary care physician	74 65%	14 58%	43 72%	17 57%	20 69%	54 64%
Information obtained from an electronic database containing records of prescriptions dispensed by retail pharmacies	67 59%	14 58%	36 60%	17 57%	15 52%	52 61%
Information from a transferring facility (e.g., a nursing home)	107 94%	24 100%	55 92%	28 93%	29 100%	78 92%
Information from a community pharmacy	104 91%	22 92%	55 92%	27 90%	27 93%	77 91%

Table G-7. Medication Incident Reduction Strategies - Comprehensive Medication History 2007/08

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(158)	(33)	(86)	(39)	(37)	(121)
When the patient is transferred between levels of care within the facility:						
The facility reconciles the patient's medications and communicates that information to the next provider of care	74 47%	15 45%	42 49%	17 44%	25 68%	49 40%
Health professional most frequently responsible for this medication reconciliation: (n=73)						
Pharmacist	22 30%	4 27%	13 32%	5 29%	8 32%	14 29%
Nurse	20 27%	6 40%	11 27%	3 18%	6 24%	14 29%
Physician	30 41%	5 33%	16 39%	9 53%	11 44%	19 40%
Other	1	0	1	0	0	1
The facility has implemented the process of reconciliation: (n=73)						
Throughout the hospital	19 26%	2 13%	13 32%	4 24%	1 4%	18 38%
For selected patient groups only	54 74%	13 87%	28 68%	13 76%	24 96%	30 63%

- At discharge time, 42% of respondents reported that they provide a printed, reconciled list of the patient's medications to the next provider, while another 1% of respondents were providing an electronic copy of the reconciled medication list (Table G-8). When medication reconciliation occurred at discharge time, the service was most frequently provided by a pharmacist (54%, 37/69), followed by a nurse (23%, 16/69) and by a physician (22%, 15/69). Of the 69 respondents who reported communicating a reconciled medication list at the time of discharge, 84% were providing the service for selected patient groups only.

Table G-8. Medication Incident Reduction Strategies - Comprehensive Medication History 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	160	34	87	39	37	123
When patient is discharged from the facility:						
The facility communicates a reconciled list of the patient's medications to the next provider with:						
A printed copy of the reconciled medication list	67	11	36	20	24	43
	42%	32%	41%	51%	65%	35%
An electronic copy of the reconciled medication list	2	0	1	1	1	1
	1%	0%	1%	3%	3%	1%
Health professional most frequently responsible for this medication reconciliation: (n=69)						
Pharmacist	37	9	22	6	16	21
	54%	82%	59%	29%	64%	48%
Nurse	16	0	8	8	3	13
	23%	0%	22%	38%	12%	30%
Physician	15	2	6	7	6	9
	22%	18%	16%	33%	24%	20%
Other	1	0	1	0	0	1
	1%	0%	3%	0%	0%	2%
The facility implemented the process of medication reconciliation for: (n=69)						
All discharged patients	11	2	5	4	2	9
	16%	18%	14%	19%	8%	20%
Selected patient groups only	58	9	32	17	23	35
	84%	82%	86%	81%	92%	80%
The facility has implemented the process of medication reconciliation in all 4 steps (when patients visit the ER, are admitted, are transferred between levels of care, and are discharged) (n=160)						
yes...	35	5	20	10	16	19
	22%	15%	23%	26%	43%	15%
no...	125	29	67	29	21	104
	78%	85%	77%	74%	57%	85%
...If no, the most significant barriers to provide a reconciled list of the patient's medication in all 4 steps are: (n=117)						
The facility has examined the desirability and feasibility.., but .. additional .. resources would be required	55	10	31	14	9	46
	47%	36%	51%	50%	43%	48%
The facility has examined the desirability and feasibility.., but .. there are not enough other supports to implement it	13	2	8	3	1	12
	11%	7%	13%	11%	5%	13%
The facility has not yet examined the desirability and feasibility of implementing medication reconciliation	17	4	11	2	1	16
	15%	14%	18%	7%	5%	17%
Implementation of medication reconciliation is planned or underway	86	21	41	24	19	67
	74%	75%	67%	86%	90%	70%
The hospital is registered as a participating facility in the 'Safer Healthcare Now!' medication reconciliation initiative (n=158)	112	24	57	31	29	83
	71%	75%	66%	79%	76%	69%

- It is worth noting that medication reconciliation was performed in all four situations (ER visit, admission, and transfers within the facility and at discharge) by only 22% (35/160) of respondents. Medication reconciliation in all four situations was more commonly reported by teaching hospital respondents (43%, 16/37) than by non-teaching hospital respondents (15%, 19/123).

- Respondents who did not carry out medication reconciliation in all four situations were asked to identify the most significant barriers to doing so;
  - Seventy-four percent of respondents in 2007/08, compared to 43% in 2005/06, reported that implementation of medication reconciliation is planned or underway
  - Forty-seven percent of respondents in 2007/08 vs. 34% in 2005/06 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 2007/08 vs. 22% in 2005/06 have not yet examined the desirability and feasibility of implementing medication reconciliation
  - Eleven percent of respondents in 2007/08 vs. 13% in 2005/06 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).
- Seventy-one percent of respondents reported that their facility was participating in the "Safer Healthcare Now!" medication reconciliation initiative. This percentage is consistent across teaching status and bed size. Noticeable differences exist between regions: participation was reported by 100% (15/15) of the respondents in Atlantic Canada, 93% (25/27) of respondents in the Prairies, 89% (41/46) of respondents in Ontario, 55% (12/22) of respondents in BC and 40% (19/48) of respondents in Quebec. The participation in this campaign may partly explain the larger percentages of respondents in 2007/08 who reported that they had implemented medication reconciliation, compared to the 2005/06 survey results 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 [15].

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. The section on safely administering medications to clients lists the criteria related to educating clients about their medications.

- Thirty-five percent of respondents to the 2007/08 survey reported that they provide a copy of a medication record (e.g. a copy of the medication administration record) to selected patient groups, as part of their patient education program (Table G-9). Only 6% of respondents, all non-teaching hospitals, reported providing this service for all patients.
- Viewing of the medication record by the patient/patient's family was reported to be allowed, for selected patient groups, by 15% of respondents and for all patients by 11% of respondents. This practice, for all patients, was more commonly reported by non-teaching hospitals (13%) than by teaching hospitals (5%).
- A pharmacist's consultation at the time of admission, for selected patients groups, was reported to be provided by 62% of respondents. A further 3% of respondents reported that this was provided for all patients.
- A pharmacist's consultation during the hospital stay was reported to be provided for selected patient groups by 76% of respondents. A further 5% of respondents reported providing a pharmacist's consultation for all patients.
- A pharmacist's consultation at the time of discharge was reported to be provided for selected patient groups by 75% of respondents. This practice was more common in teaching hospitals, compared to non-teaching hospitals (95% vs. 68%).

Table G-9. Medication Incident Reduction Strategies - Patient Education Program 2007/08

	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	158	33	86	39	38	120
Implementation of process to facilitate patient teaching with regards to their medication therapy:						
Provide the patient with a copy of the MAR or a similar medication record						
For all patients	9 6%	3 9%	6 7%	0 0%	0 0%	9 8%
For selected patient groups only	56 35%	16 48%	30 35%	10 26%	16 42%	40 33%
Allow viewing of the MAR by the patient / patient's family						
For all patients	17 11%	2 6%	13 15%	2 5%	2 5%	15 13%
For selected patient groups only	23 15%	9 27%	10 12%	4 10%	2 5%	21 18%
Provide a pharmacist's consultation at the time of admission						
For all patients	4 3%	2 6%	2 2%	0 0%	0 0%	4 3%
For selected patient groups only	98 62%	15 45%	53 62%	30 77%	30 79%	68 57%
Provide a pharmacist's consultation during their hospital stay						
For all patients	8 5%	2 6%	3 3%	3 8%	3 8%	5 4%
For selected patient groups only	120 76%	22 67%	66 77%	32 82%	29 76%	91 76%
Provide a pharmacist's consultation at the time of discharge						
For all patients	3 2%	2 6%	1 1%	0 0%	0 0%	3 3%
For selected patient groups only	118 75%	22 67%	63 73%	33 85%	36 95%	82 68%

In summary, improvements in medication safety practices have occurred since the last survey in 2005/06. The biggest changes were reported for medication reconciliation, which many hospitals have implemented more extensively since the last survey. The inclusion of medication reconciliation in the Accreditation Canada standards may have provided the impetus for more facilities to implement this practice.

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H - TECHNOLOGY

PATRICIA MACGREGOR

Medication system technologies supported with clinical decision making, error prevention, and quality improvement capability are now more readily available for use in the hospital setting. These technologies have the potential to significantly improve the quality, efficiency and safety of the medication management system.[1,2]

In the wake of the Institute of Medicine's "To Err is Human" report [3] and The Canadian Adverse Event Study,[4] there has been a welcome increase in the attention being given to initiatives that could improve patient safety. Accreditation Canada recently introduced the Managing Medications Standard, which includes a significant number of medication safety-related standards that healthcare facilities are expected to address. With the increased focus on patient safety in healthcare, it would be reasonable to expect that hospitals and hospital pharmacies are taking full advantage of the opportunities that technology provides to improve medication safety, but are they? The previous Hospital Pharmacy in Canada Report in 2005/06 indicated that the uptake of technology in Canadian hospitals was slow, perhaps due to the cost of the technology and the challenges associated with successfully implementing new technologies. This Chapter provides a summary of the current state of medication technology use in Canadian hospitals.

PHARMACY INFORMATION SYSTEM - CLINICAL DECISION SUPPORT

Clinical decision support is defined as a computer program feature that provides automatic reminders, advice or interpretation, as data is entered for a specific patient and/or a specific medication order. Clinical decision support technology can be as simple as a software feature that warns a clinician when the dosage being prescribed/entered for a patient appears to be too high or low, and provides guidance on what an appropriate dose should be. In more mature clinical decision support systems, the technology guides the clinician through evidence-based, patient-specific algorithms and guidelines for care.

These types of systems have the potential to improve healthcare quality, efficiency and outcomes. Further development of clinical decision support systems (CDSS) is expected to occur, with the goal of insuring that new evidence can be incorporated into these systems as it becomes available.[5] While these evolving technologies hold great promise, they will only achieve their potential if practitioners embrace and use the technology. How well are we doing at optimizing the use of the clinical decision support technologies that are already available to us?

- All respondents, across all sectors and all sizes of hospitals reported that they have a pharmacy information system (PIS). Ninety-one percent of respondents reported that the pharmacy information system includes clinical decision support functionality (Table H-1), compared to 83% (118/142) of respondents in the 2005/06 report and 40% (58/144) of respondents in the 2003/04 report. The increase in 2005/06, compared with 2003/04, may have occurred, in part, because a definition of the term "clinical decision support system" was included in the 2005/06 survey. The 2007/08 increase was reported in all sectors and sizes of hospitals, except for hospitals in the 50 to 200 bed size range and hospitals in the Atlantic Provinces.

The use of specific dosage alerts is an example of clinical decision making support. The survey reviewed the availability of this functionality, the extent of use, and the presence or absence of policies governing how pharmacists respond to alerts. Among the 150 respondents that reported having clinical decision support within their pharmacy information system:

- Almost all respondents (149/150) indicated that their pharmacy information system had drug allergy alerts and 98% reported that the functionality was in use, similar to the 2005 /06 survey. However, only 21% (30/141) reported that they had an override policy to guide staff action in situations where the system user disregards the warning of an apparent drug allergy. Respondents from BC (36%, 8/22) and the Atlantic provinces (31%, 4/13) were more likely to report that they had an override policy than were respondents from other provinces (16-18%).

- All respondents reported that their pharmacy information system had drug interaction alert functionality and 99% of respondents reported that the drug interaction alert functionality was in use. However, only 16% (23/143) reported that they had an override policy for drug interaction alerts.

Appropriate dosing of drugs in patients with renal or hepatic impairment is important for achieving optimal patient outcomes and the avoidance of toxicity. Some studies in the literature indicate that the most common medication error is excessive dosing in patients with reduced hepatic and renal function.[6]

- There was a considerable increase in the percentage of respondents (61%) who reported that their pharmacy information system had clinical decision support functionality with alerts when patients with renal dysfunction are prescribed certain drugs requiring dosage modification as renal function declines. This compares to 46% (54/118) who reported that their systems had this functionality in 2005/06. Of those with this functionality, 67% reported that the functionality was being used, compared to 59% (32/54) in 2005/06. Eight respondents reported that they had an override policy for dosage alerts for renal dysfunction.
- Thirty-eight percent of respondents in 2007/08, compared with 33% (39/118) in 2005/06, reported that their pharmacy information system included clinical decision support functionality with alerts when patients with hepatic dysfunction are prescribed drugs requiring dosage modification in the presence of hepatic dysfunction. Only 21% (11/55) of the respondents with this alert capability reported that they used the functionality, a number that remained unchanged since 2005/06.
- Seventy-three percent of respondents reported that their PIS had the capability to provide maximum dose alerts for adults. Of the respondents reporting this capability, only 28% reported that this functionality was in use. Only 5 respondents reported that they had an override policy in place.
- Sixty percent of respondents reported they have maximum dose alerts for cytotoxic oncology drugs, though only 29% reported that the functionality was in use and, of these respo*n*dents, only 4 reported that they had an override policy for oncology drug alerts. There was little difference in these responses, compared to the 2005/06 survey.
- Sixty-five percent of respondents reported that they had clinical decision support functionality for maximum dose alerts in neonates/pediatrics. Of these, 30% reported that the functionality was in use and only 4 respondents reported that they had an override policy. Respondents from the Prairies (8%, 1/12) were less likely to report use of this functionality than those from other provinces.
- The ability to input patient specific variables (e.g. creatinine clearance) that would be used by the system to calculate patient specific dosing was reported to be available by 51% of respondents, similar to 2005/06 (49%, 58/118). Of these respondents, 84% reported the functionality was in use, representing a slight increase in the percentage of respondents reporting use of this capability since 2005/06 (79%, 46/58).
- Twenty-four percent of respondents reported that their system had the ability to provide drug therapy guidance alerts, based on evidence-based guidelines or clinical pathways. Of these respondents, 49% reported that this functionality was in use.
- Overall, almost a quarter of respondents (23%, 35/150) reported the hospital has an override policy for alerts generated by the pharmacy information system. Teaching hospitals were more likely to report having a policy (36%, 13/36) compared with non-teaching hospitals (19%, 22/114). There were no provincial or bed size differences. Of those with hospital override policies, 29% (8/28) reported that they had specific alerts that were not permitted to be overridden and 54% (15/28) reported they required a documented reason for high-risk overrides. Almost 36% (10/28) reported that they required electronic tracking of overrides. Four respondents indicated that they required audit and follow up of overrides, of which 3 respondents reported this review is conducted by pharmacy personnel and 1 respondent reported the review was conducted by a committee responsible for patient safety.

Reasons given for not using the available functionality of pharmacy information systems include concerns related to the clinical significance of the alert 53% (59/111), insufficient pharmacist time 39% (43/111), out-of-date databases 14% (16/111) and because physicians rarely made any changes when notified of the alert 5% (5/111). Additional reported reasons for variable use of these alerts include:

- use of a computerized prescriber order entry system for this functionality
- lack of a database in the pharmacy information system to drive the functionality
- lack of integration with other modules, such as the lab system, that is necessary to enable dosing alerts such as those based on renal function
- lack of patient demographic information such as patient weight, age, etc.
- technicians perform order entry but have insufficient knowledge to act on 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 H-1. Pharmacy Information System 2007/08

	____	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(164)	(34)	(89)	(41)	(39)	(125)
PIS includes a clinical decision support system	150 91%	30 88%	83 93%	37 90%	36 92%	114 91%
Drug allergy alerts -- available (n=149)	149 100%	30 100%	82 100%	37 100%	36 100%	113 100%
Drug allergy alerts -- in use (n=146)	143 98%	28 100%	80 98%	35 97%	34 94%	109 99%
Drug interaction alerts -- available (n=150)	150 100%	30 100%	83 100%	37 100%	36 100%	114 100%
Drug interaction alerts -- in use (n=147)	145 99%	28 100%	81 98%	36 100%	36 100%	109 98%
Maximum dose alerts for adults -- available (n=145)	106 73%	24 80%	56 70%	26 74%	28 80%	78 71%
Maximum dose alerts for adults -- in use (n=102)	29 28%	5 22%	18 32%	6 26%	7 25%	22 30%
Maximum dose alerts for pediatrics / neonates -- available (n=144)	94 65%	21 72%	48 60%	25 71%	23 66%	71 65%
Maximum dose alerts for pediatrics / neonates -- in use (n=90)	27 30%	3 15%	18 38%	6 27%	5 22%	22 33%
Maximum dose alerts for cytotoxic oncology drugs -- available (n=146)	88 60%	21 70%	46 58%	21 58%	25 69%	63 57%
Maximum dose alerts for cytotoxic oncology drugs -- in use (n=85)	25 29%	4 20%	16 35%	5 26%	8 32%	17 28%
Maximum dose alerts for other selected drugs -- available (n=145)	93 64%	22 73%	50 63%	21 60%	25 69%	68 62%
Maximum dose alerts for other selected drugs -- in use (n=90)	30 33%	6 29%	18 36%	6 32%	11 44%	19 29%
Dosage modification alerts for patients with renal dysfunction -- available (n=147)	90 61%	16 53%	52 64%	22 61%	15 42%	75 68%
Dosage modification alerts for patients with renal dysfunction -- in use (n=87)	58 67%	9 60%	38 73%	11 55%	6 40%	52 72%
Dosage modification alerts for patients with hepatic dysfunction -- available (n=144)	55 38%	12 40%	26 33%	17 47%	10 29%	45 41%
Dosage modification alerts for patients with hepatic dysfunction -- in use (n=52)	11 21%	2 18%	6 23%	3 20%	0 0%	11 26%
Drug therapy guidance based on evidence/clinical pathways -- available (n=148)	36 24%	7 23%	19 23%	10 27%	6 17%	30 27%
Drug therapy guidance based on evidence/clinical pathways -- in use (n=35)	17 49%	2 29%	10 53%	5 56%	4 67%	13 45%
Ability to input patient-specific variables -- available (n=149)	76 51%	15 50%	39 48%	22 59%	13 36%	63 56%
Ability to input patient-specific variables -- in use (n=73)	61 84%	9 64%	34 87%	18 90%	11 85%	50 83%

LAB TEST RESULTS

Pharmacists require easy access to lab data, at the point of care, in order to optimize drug therapy and avoid the risks related to drug use in patients with renal dysfunction, hepatic dysfunction and other patient-specific clinical situations. Essential activities requiring lab interactions include drug choice, dosing, toxicity assessment, and drug-lab test interaction.[7] The benefit is two- way; not only is there a benefit related to the pharmacist's ability to manage drug dosing and track lab test changes over time, lab test interpretation could also be improved if laboratory personnel and clinicians interpreting lab test results were aware of the drugs that patients were taking. For example, one study reported 40% of patients sent for TSH levels were taking drugs that interfere with the lab test[6]. A real time lab-pharmacy interface is the most effective solution for insuring appropriate clinical decision making, by the pharmacist, at the point of order entry. However, as the results of this year's survey indicate, in the majority of hospitals, an integrated pathway is not in place.

- There was no change since 2005/06 in the number of respondents who reported that their pharmacists can access lab test results through interfaced lab- pharmacy systems (35%), or in the number of hospitals that reported that they had view-only, electronic access to laboratory data from computer terminals within the pharmacy, using a separate log-in (61%).

- Eight hospitals reported that they use a paper based system (e.g. the patient's paper-based medical record) to access lab data in 2007/08

Table H-2. Pharmacy Access to Lab Results 2007/08

	____	Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(39)	(126)
Pharmacists are provided with access to laboratory test results through						
Lab system interfaced with medication order entry system	57 35%	10 29%	33 37%	14 34%	10 26%	47 37%
View-only access available from pharmacy terminals	100 61%	21 60%	52 58%	27 66%	29 74%	71 56%
Through paper-based medical record only	8 5%	4 11%	4 4%	0 0%	0 0%	8 6%

COMPUTERIZED PRESCRIBER ORDER ENTRY SYSTEMS (CPOE)

Computerized prescriber order entry systems have been reported in the literature to reduce medication related errors, reduce unnecessary lab tests, and improve the efficiency and quality of care.[8] The Leapfrog group named computerized prescriber order entry systems as one of three changes that would result in the most significant improvements in patient safety in the U.S. (others are the presence of intensivists in the intensive care unit and evidence based practice).[9] Challenges related to implementation of computerized prescriber order entry systems include the high financial cost and human resource investment required to successfully implement these systems. Careful planning and well-executed change management strategies are required to ensure the CPOE system is used effectively and does not inadvertently introduce new ways to make errors in the prescribing process. Risks of error include the high percentage of orders that are entered into the CPOE system by someone other than the prescriber (e.g. support staff), since these systems are designed on the premise that an individual with the appropriate knowledge base and decision making authority will respond to the interactive alerts and prompts that are incorporated into the system.

- Implementation of CPOE continues to proceed very slowly across Canada. There has been little change from the previous two surveys in the number of hospitals reporting that they have implemented a computerized prescriber order entry system (9/165 in 2007/08 and 8/142 in 2005/06.

- The percentage of respondents in 2007/08 who reported they have an approved plan to implement a computerized prescriber order entry system was 22% (37/165) similar to 2005/06 23% (33/142) Although this

suggests that almost 1 in 4 hospitals are moving forward with implementation of a computerized prescriber order entry system, the number who have actually done so did not change over the previous two year period between our surveys. It remains to be seen how quickly hospitals will operationalize their intent to adopt a computerized prescriber order entry system.

- Of those with a computerized prescriber order entry system, 5 of 9 respondents reported that their system is not interfaced with the pharmacy information system. This clearly limits the value of such a system, increasing the chance of transcription errors and causing significant duplication of work. Similar results were reported in the 2005/06 survey, suggesting that an interface between the two systems has not been a priority for hospitals with CPOE over the past few years.

Clinical decision support is also an important feature of CPOE systems, and holds the promise of guiding prescribers towards evidence based practice.[10]

- Seven of the nine respondents with an active computerized prescriber order entry system reported that their system guides the use of formulary drugs, weight based dosing, and dosing of medications in special populations. Six of nine reported that their system alerts practitioners to unsafe orders during order entry, and 5 of 9 reported that their system is interfaced with the lab system. Only one respondent reported that their system is integrated with a clinical decision support system that guides the prescriber through established protocols and clinical pathways (Table H-3). The challenges related to implementation of CPOE are also evident in the U.S. where, in 2007, only 17.8% of hospitals reported using a computerized prescriber order entry system and only 12% of hospitals have a system with built-in clinical decision support functionality.

Table H-3. Computerized Prescriber Order Entry Systems 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(39)	(126)
Computerized Prescriber Order Entry (CPOE) system						
Yes, CPOE operational	9 5%	1 3%	6 7%	2 5%	7 18%	2 2%
No, but approved plan to implement CPOE	37 22%	4 11%	22 25%	11 27%	13 33%	24 19%
No, and no CPOE plan approved	119 72%	30 86%	61 69%	28 68%	19 49%	100 79%
CPOE/PIS Interface (n=)	(9)	(1)	(6)	(2)	(7)	(2)
CPOE is interfaced to PIS (unidirectional)	1 11%	0 0%	1 17%	0 0%	1 14%	0 0%
CPOE is interfaced to PIS (bidirectional)	3 33%	0 0%	3 50%	0 0%	2 29%	1 50%
CPOE is NOT interfaced to PIS	5 56%	1 100%	2 33%	2 100%	4 57%	1 50%
Clinical Decision Support for CPOE						
integrated with a clinical decision support system that guides the user through established protocols and clinical pathways	1 11%	0 0%	0 0%	1 50%	1 14%	0 0%
is interfaced with the lab system to alert practitioners	5 56%	0 0%	4 67%	1 50%	4 57%	1 50%
alerts prescribers to unsafe orders during order entry	6 67%	1 100%	4 67%	1 50%	5 71%	1 50%
guides the use of formulary drugs	7 78%	0 0%	5 83%	2 100%	6 86%	1 50%
guides the use of weight-based or surface area based dosing for selected drugs and/or patient populations	7 78%	1 100%	4 67%	2 100%	5 71%	2 100%
guides the dosing of medications in special populations	7 78%	0 0%	5 83%	2 100%	6 86%	1 50%

WIRELESS NETWORKS

The use of wireless networks to support patient care activities is slowly progressing.

- There was an increase in the number of respondents who reported an operational wireless network within their hospital in this survey compared with 2005/06. Thirty-five percent of the respondents in 2007/08 reported that they had an operational wireless network in place in their organizations, compared to 26% (37/142) of respondents who reported having such a system in 2005/06. There were significant provincial differences in uptake of this technology. In Ontario 72% (33/46) of respondents reported having an operational wireless network, compared with 13-38% in other provinces.
- The wireless network was reported to be used by pharmacy mostly for access to drug information databases (64%), patient profiles (62%), and electronic health records 55%. Forty-three percent also reported using wireless networks for decentralized order entry and 30% reported using this technology for medication reconciliation.

Table H-4. Wireless Network Systems 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(39)	(126)
Wireless system installed and operable	58	9	34	15	18	40
	35%	26%	38%	37%	46%	32%
(n=)	(47)	(7)	(27)	(13)	(13)	(34)
for decentralized order entry on patient care units	20	1	14	5	7	13
	43%	14%	52%	38%	54%	38%
to access patient drug profiles from the pharmacy information system	29	4	19	6	9	20
	62%	57%	70%	46%	69%	59%
to access electronic health records	26	1	18	7	6	20
	55%	14%	67%	54%	46%	59%
to access drug information databases	30	4	18	8	8	22
	64%	57%	67%	62%	62%	65%
medication reconciliation documentation	14	1	10	3	3	11
	30%	14%	37%	23%	23%	32%
other	18	4	9	5	6	12
	38%	57%	33%	38%	46%	35%

SMART IV PUMPS

Smart pumps are designed to prevent potential adverse events/errors related to the administration of parenterally administered medications. 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.[4]

- The numbers of hospitals reporting the use of smart pumps in the 2007/08 survey was surprisingly high for this relatively new technology. Sixty-one percent of respondents (101/165) reported the use of IV smart pumps in their facilities. Non-teaching hospitals (64%) had a higher reported rate of implementation than teaching hospitals (51%). The Atlantic Provinces were less likely to report use of smart pumps than other provinces (25% compared with 50-75%).
- However, many hospitals do not appear to be routinely using the quality control data collected by these pumps to proactively improve the safety of parenteral drug administration process within their facility. Only 36% of respondents with smart pumps reported that they download and review quality control data from pumps at least annually. For those who do review the quality control data collected by their pumps, 71% of respondents reported they had made changes to policies, procedures or pump programming as a result of review of this data. This result supports the value of the quality control data, collected by the pumps, for making improvements in the parenteral drug administration process.

- Forty-three percent of respondents reported that their organization reviews and updates the drug specific pump programming at least annually.
- Only 9% of respondents reported using a wireless network to upload or download information to and from smart pumps.

Table H-5. Smart Pumps 2007/08

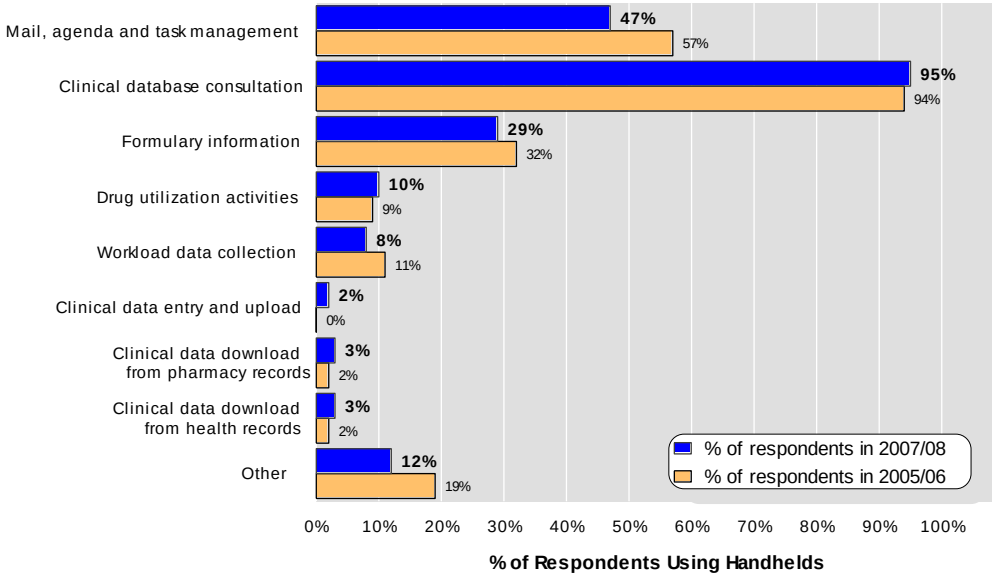
	All	Bed Size			Teaching Status	
		50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(39)	(126)
Hospital uses IV smart pumps (n=165)	101 61%	14 40%	61 69%	26 63%	20 51%	81 64%
Use of wireless network to upload / download data to smart pumps .. (n=99)	9 9%	1 7%	6 10%	2 8%	2 10%	7 9%
Annual review of smart pumps' drug-specific programming .. (n=99)	43 43%	6 43%	28 47%	9 36%	13 65%	30 38%
Annual review of smart pumps' quality review data .. (n=98)	35 36%	4 29%	25 42%	6 24%	7 35%	28 36%
Facility made changes following the review of the pumps' quality control data (n=31)	22 71%	0 0%	18 78%	4 67%	7 100%	15 63%

HAND HELD DEVICES

Hand held devices hold great promise for facilitating efficient access to information that is either stored on the handheld unit or accessed through wireless networks. This section contains data that was collected in the 2007/08 survey related to the use of hand held devices by pharmacy staff.

- Seventy-three percent of respondents reported the use of hand held devices within their pharmacy department. Similar responses were reported regardless of bed size or teaching status.
- Of those who reported the use of hand held devices by their pharmacy staff, 95% reported that hand held devices were used for data base consultation, 47% reported their use for task management, mail and agenda activities, and 29% reported their use for accessing formulary information. These results were similar to those reported in the 2005/06 survey. Additional uses of handheld devices that were reported included pharmacokinetic calculations, inventory management, access to policies, guidelines, stock lists etc required for on call purposes, clinical monitoring, identification of bar coded compounded solutions, and uploading/downloading of smart pump data and libraries.

Figure H-1. Functions for which handheld devices are used 2007/08



Base: Respondents reporting the use of handheld devices (113 in 2005/06, 120 in 2007/08)

Table H-6. Hand Held Devices 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=)	(165)	(35)	(89)	(41)	(39)	(126)
Handheld devices are used in department	121	24	65	32	29	92
	73%	69%	73%	78%	74%	73%
Handheld devices are used for (n=)	(120)	(24)	(65)	(31)	(29)	(91)
Clinical data download from computerized pharmacy records	4	0	3	1	1	3
	3%	0%	5%	3%	3%	3%
Clinical data download from computerized health records	4	0	4	0	1	3
	3%	0%	6%	0%	3%	3%
Clinical data entry and upload to pharmacy or health records	2	0	2	0	1	1
	2%	0%	3%	0%	3%	1%
Clinical database consultation (Micromedex, Lexicomp)	114	24	61	29	27	87
	95%	100%	94%	94%	93%	96%
Drug utilization activities	12	1	8	3	4	8
	10%	4%	12%	10%	14%	9%
Formulary information	35	4	24	7	9	26
	29%	17%	37%	23%	31%	29%
Workload data collection	9	0	6	3	2	7
	8%	0%	9%	10%	7%	8%
Mail, agenda and task management (Outlook, Lotus Notes)	56	15	26	15	14	42
	47%	63%	40%	48%	48%	46%
Other	14	0	10	4	5	9
	12%	0%	15%	13%	17%	10%

BAR CODING

The use of bar codes is rapidly expanding in the pharmaceutical industry. The Veteran Affairs healthcare organization in the U.S has considerable experience in the use of bar codes within hospitals. The VA association has developed a Bar Code Resource Office to support bar code implementation and expansion, and to ensure consistency and integration throughout their network of hospitals. International working groups including the pharmaceutical industry, providers of non-pharmaceutical supplies, hospitals, legislators and the Institute for Safe Medication Practice (ISMP) are actively collaborating to develop global standards for pharmaceutical bar code applications. ISMP Canada and the Canadian Patient Safety Institute (CPSI) are collaborating with Health Canada, professional groups, hospitals, supply chain and pharmaceutical industry, group purchasing organizations and other stakeholders to develop a Canadian bar code standard. Many suppliers now include bar codes on the packaging for medications, and others are considering this application. The availability of readable bar codes on unit of use products will enhance the opportunity to realize the safety potential of bar-code scanning technologies.

- Thirty-seven percent of respondents reported the use of bar codes in the medication use system, similar to the response in the 2005/06 survey. The response was higher in teaching hospitals (56%), than non-teaching hospitals (30%), and in the Atlantic Provinces (56%, 9/16) and BC (46%, 10/22), compared with other provinces.

- Within the 60 hospitals that reported the use of bar coding, the most common uses were for returning doses to inventory (38%), verifying drug selection from pharmacy (31%), verifying stocking of unit dose bins (22%), and verifying stocking of automated dispensing cabinets (24%). These responses are very similar to those in the 2005/06 survey. Very little use of bar code scanning was reported for patient specific activities such as patient identification prior to drug administration (2 respondents), drug identification prior to administration to the patient (1 respondent) and the transfer of patient and/or drug specific information to smart pumps (1 respondent).

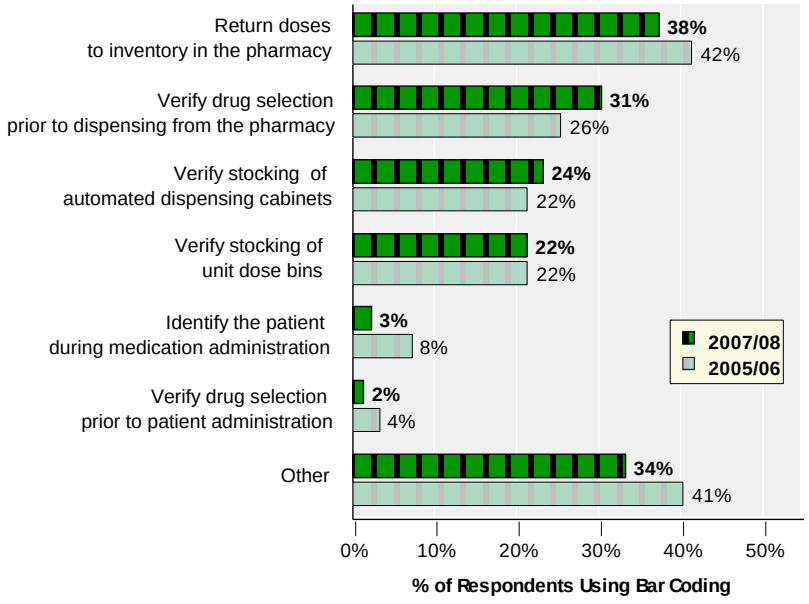
The slow adoption of this technology may be a symptom of the difficulty in both implementing and maintaining these systems. Some of these issues include the financial cost of implementation, the human resources required to maintain the bar code data within the hospital computer system, software incompatibility

with Canadian bar codes, and the requirement for packaging technology that can handle bar-codes as part of the labeling process. 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 bar codes, which represent a considerable burden to organizations.[10]

Table H-7. Bar Coding 2007/08

		Bed Size			Teaching Status	
	All	50 - 200	201- 500	>500	Teaching	Non-Teaching
Hospitals (n=164)	(164)	(35)	(89)	(40)	(39)	(125)
Bar Coding is used in the Medication System	60 37%	9 26%	32 36%	19 48%	22 56%	38 30%
Bar Coding is used in the medication System to (n=)	(58)	(9)	(31)	(18)	(21)	(37)
verify drug selection prior to dispensing from the pharmacy	18 31%	4 44%	9 29%	5 28%	5 24%	13 35%
verify drug selection prior to patient administration	1 2%	0 0%	1 3%	0 0%	0 0%	1 3%
identify the patient during medication administration	2 3%	0 0%	1 3%	1 6%	0 0%	2 5%
return doses to inventory in the pharmacy	22 38%	2 22%	13 42%	7 39%	6 29%	16 43%
verify stocking of unit dose bins	13 22%	1 11%	5 16%	7 39%	4 19%	9 24%
verify stocking of automated dispensing cabinets	14 24%	2 22%	8 26%	4 22%	8 38%	6 16%
transfer patient and/or drug specific information to smart pumps	1 2%	0 0%	1 3%	0 0%	1 5%	0 0%
other	20 34%	4 44%	8 26%	8 44%	8 38%	12 32%

Figure H-2. Uses of Bar Coding 2007/08



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

CONCLUSION

Each of the technologies described above contribute to the improvement of patient safety at the point of care. However, hospitals are only slowly adopting these technological advancements. The greatest gains in the last

couple of years have been made in the availability of wireless networks and smart pumps, perhaps due to the relatively lower implementation costs associated with these technologies. However even these applications are underutilized. Bates reports that many errors, including but not limited to medication errors, could be prevented using electronic systems with prescribing guidance and controls.[2] Other literature supports this recommendation. Accreditation Canada is focusing more extensively on medication safety. Hospitals need to evaluate the efficiency and patient safety benefits of technology, and weigh those against the costs of adopting these technological support systems. It is hoped that this process will result in a higher priority being given to the implementation of these technologies.

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I - EDUCATION

NANCY ROBERTS

TYPES OF STUDENT TRAINING PROVIDED BY PHARMACY DEPARTMENT

Although the total number of respondents was higher in the 2007/08 survey, compared to the 2005/06 survey, the percentage of respondents who reported that they provided student training was similar in the 2005/06 survey (87%, 124/142), and the 2007/08 survey (89%, 147/162). There were also only minor differences in the distribution of respondents by hospital bed-size and region of the country, between the two surveys.

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

- Training was reported to be provided for undergraduate pharmacy students by 93% of respondents in the 2007/08 survey, compared to 90% in the 2005/06 survey (Table I-1).
- Training for pharmacy technician students was reported to be provided by 89% of respondents in 2007/08, which was the same as in the 2005/06 survey.
- Training for pharmacy residents was reported to be provided by 34% of respondents in 2007/08, compared to 29% in the 2005/06 survey and 26% in the 2003/04 survey.
- M. Sc. student training remained fairly similar in the current survey at 10%, compared to 9% reported in the 2005/06 survey. Of the 15 respondents that reported Masters level training placements, 14 were in Quebec, reflecting the unique Masters/Residency program that exists in that province.
- Pharm. D student training was reported by 28% of respondents in 2007/08, compared to 19% in the 2005/06 survey and 17% in the 2003/04 survey. With respect to the training of Pharm. D. students, almost half of the respondents (19/40), who reported that they were involved in the training of Pharm. D. students, were from Ontario. The 19 Ontario respondents that reported their involvement in the training of Pharm. D. students represent 41% (19/46) of all Ontario hospitals that participated in this year's survey. A similar pattern occurred in BC, where 14 respondents, representing 64% (14/22) of all BC hospitals that participated in this year's survey, reported that they had been involved in the training of Pharm. D. students. These results are not surprising, given that Canada's only Doctor of Pharmacy programs are located in these two provinces. Involvement in the training of Pharm. D. students was reported by a much smaller percentage of respondents in other regions of the country (2% in Quebec, 13% in Atlantic Canada, and 14% in the Prairies).

STUDENT DAYS

- The average number of undergraduate pharmacy student training days, provided by the 147 respondents who reported that they participated in this training activity, was 217 days in the 2007/08 survey, compared to an average of 246 days that was reported by the 124 respondents in the 2005/06 survey. This apparent decline in the average number of undergraduate pharmacy student training days provided may be a result, in part, of the change in the qualifying criteria for participation in this year's survey. That change allowed smaller hospitals, with as few as 50 acute care beds, to participate in the 2007/08 survey. Smaller hospitals would generally provide smaller numbers of training days, which may have affected the average number. There was a broad range of reported days of training for undergraduate pharmacy students (1 to 4260 days).
- There were regional differences in the average number of training days provided. Quebec, with an average of 290 undergraduate student training days per respondent, and the Prairies, with an average of

284 days, lead the way. The numbers were smaller in the Atlantic region (182 days), Ontario (162 days), and BC (95 days).

- Twenty-eight percent of respondents reported that they had provided more than 200 undergraduate pharmacy student training days per year. Of the hospitals that reported providing more than 200 days of training, 71% (29/41) were teaching hospitals. Fifty–three percent (20/38) of hospitals with more than 500 beds reported that they had provided more than 200 days of undergraduate pharmacy student training. In Atlantic Canada (47%, 7/15) and Quebec (33%, 15/46), a larger percentage of hospitals reported that they had provided more than 200 training days than did the responding hospitals from the Prairies, (27%, 7/26), Ontario, (25%, 10/40) and B.C, (10%, 2/20).

- Respondents that provide training for M. Sc. students reported that the average number of training days they provided for these students was 665 in the 2007/08 survey, compared to 629 days in 2005/06.

- For those respondents who reported that they provided residency training, the average number of training days provided was 351 days, compared to 515 days in 2005/06. There was a similar pattern for Pharm. D student training days, where the average number of training days reported in 2007/08 was 76, compared to 112 days in 2005/06. The reasons for these changes in the average number of training days for residents and Pharm. D. students are unclear but may, in part, be due to the changes in the qualifying criteria for participation in this year's survey.

- For those participating in pharmacy technician student training, the average number of training days reported was 113, compared to 98 days in 2005/06.

Despite the overall increase in respondents involved in training in the 2007/08 survey, the average teaching workload associated with each type of student appeared to decrease for most types of students, with the exception of M.Sc. students and pharmacy technicians. This finding should, however, be viewed in the context of the changes in the number and characteristics of the respondents who are included in this year's survey. With respect to technician training days, it will be interesting to track any future change in the number of training days being provided. With the changes that are presently occurring in the role and scope-of-practice of pharmacy technicians, it is possible that the training needs of this group, and associated student training days, will increase.

FINANCIAL SUPPORT FOR STUDENT EDUCATION

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

- Fifty-four percent of respondents reported that the pharmacy department received a stipend for training undergraduate pharmacy students and 18% reported that pharmacy staff received a stipend for training this category of student. (Table I-1).

- Pharmacy departments in British Columbia and Ontario were more likely to report that they received stipends for training undergraduate pharmacy students (74% and 68% respectively) than were pharmacy departments in other provinces, where those that reported receiving stipends ranged from 38% to 47% of respondents.

- Of the 18% (24/137) of respondents that reported stipends were received by pharmacy staff for training undergraduate pharmacy students, 19 of the 24 respondents were from Ontario. The other regions to report that pharmacy staff received a stipend were Quebec (4/40) and the Prairies (1/26).

- Stipends were less commonly reported for resident training. Only two respondents providing residency training days, one in the Atlantic region and one in the Prairies, reported that their pharmacy department received a stipend, and no respondent reported that pharmacy staff received a stipend for resident training.

- Of the 14 respondents that reported they provided training for M. Sc. students, one respondent indicated that a stipend was received by the pharmacy department and one respondent reported that pharmacy staff received a stipend.

- Pharm. D. student placements continue to be well supported with stipends. Sixty-four percent (23/36) of respondents involved in the training of Pharm. D. students indicated that the pharmacy department received a stipend, compared to 48% in the 2005/06 survey, and 4 respondents reported that a stipend was received by their pharmacy staff.

- Pharmacy department stipends for pharmacy technician student training were reported by 19% of the respondents who reported that they provided technician student training days, compared to 17% in the 2005/06 survey. Five respondents indicated that pharmacy staff received stipends for training pharmacy technician students.

- Overall, compared with the previous survey in 2005/06, the percentage of respondents reporting that departmental or personal stipends were received for training students remained similar.

Table I-1. Education 2007/08

	-----	Bed Size			Teaching	
	All	50-200	201-500	>500	Teaching	Non-Teaching
Education and Training - involved in training of ..						
Student pharmacists (undergraduate) (n=162)	93%	76%	97%	98%	97%	91%
Pharmacy residents (n=148)	34%	17%	29%	58%	74%	20%
M.Sc. Hospital Pharmacy students (n=145)	10%	3%	9%	19%	33%	3%
Pharm. D. students (n=145)	28%	7%	27%	46%	54%	19%
Student technicians (n=159)	89%	76%	90%	97%	97%	86%
Education and Training - training days						
Student pharmacists (undergraduate) (n=147)	217	104	150	438	531	115
Pharmacy residents (n=45)	351	107	262	493	484	169
M.Sc. Hospital Pharmacy students (n=14)	665	100	562	834	686	587
Pharm. D. students (n=39)	76	70	75	79	79	74
Student technicians (n=135)	113	60	78	221	223	78
Education and Training - stipend received by department						
Student pharmacists (undergraduate) (n=143)	54%	38%	52%	68%	72%	48%
Pharmacy residents (n=44)	5%	0%	0%	11%	8%	0%
M.Sc. Hospital Pharmacy students (n=12)	8%	0%	0%	20%	10%	0%
Pharm. D. students (n=36)	64%	100%	68%	53%	73%	57%
Student technicians (n=123)	19%	0%	20%	26%	34%	14%
Education and Training - stipend received by pharmacy staff						
Student pharmacists (undergraduate) (n=137)	18%	19%	14%	24%	19%	17%
Pharmacy residents (n=43)	0%	0%	0%	0%	0%	0%
M.Sc. Hospital Pharmacy students (n=11)	9%	0%	0%	25%	11%	0%
Pharm. D. students (n=36)	11%	0%	16%	7%	13%	10%
Student technicians (n=120)	4%	11%	3%	3%	0%	6%
Education and Training - university supports positions for student						
University Support (n=162)	10%	3%	9%	18%	32%	3%
Education and Training - average number of university supported FTEs						
Number of FTE's (n=14)	1.4	.	1.1	1.7	1.4	1.4

UNIVERSITY SUPPORTED POSITIONS FOR STUDENT TRAINING

The 2007/08 survey again included questions that provide information on the amount of personnel support that universities provide to facilities to assist in providing experiential training.

- There was an increase since the previous survey in the number of respondents that reported having university funded positions within their department to provide dedicated time for student training. Sixteen respondents, (10%), reported that the university provided support for positions within their department (Table I-1), compared to eleven respondents (8%), in 2005/06.

- Along with the increased number of respondents with university-supported positions in their department in 2007/08, the average number of FTEs supported in each respondent's facility was 1.4 FTEs in 2007/08, compared to 0.6 FTEs in 2005/06.

These results are consistent with the increased emphasis that Faculties of Pharmacy and the Canadian Council for Accreditation of Pharmacy Programs have placed on the experiential component of pharmacy training programs.

J - CSHP 2015

EMILY MUSING

In this year's Hospital Pharmacy in Canada Survey, the special interest topic dealt with the subject of CSHP 2015, a quality initiative of the Canadian Society of Hospital Pharmacists. CSHP 2015 describes a preferred vision for the practice of pharmacy in hospitals and related healthcare settings in the year 2015. CSHP 2015 has 6 goals and under each goal there are a number of specific objectives, with measurable targets, for achieving pharmacy practice excellence. Most of the goals and objectives are directed at optimizing the safe, effective, and evidence-based use of medications, but there is also a goal and associated objectives that address a selected group of public health initiatives.

The survey results presented in this chapter provide a baseline comparison of the current level of performance of Canadian hospital pharmacies against the CSHP 2015 targets. This section will be repeated in future surveys, so that progress in achieving the 2015 targets can be tracked against the baseline data that was established in the 2007/08 survey. In March 2008 the American Society of Health-System Pharmacists (ASHP) posted the 5-year progress results for their Health-System Pharmacy 2015 Initiative, from which the CSHP 2015 project is adapted. That progress report can be viewed on the ASHP website (http://www.ashp.org/2015). It should also be noted that in July 2008, CSHP made some revisions to the CSHP 2015 objectives (available at http://www.cshp.ca/programs/cshp2015/index_e.asp), but those revisions occurred too late to be incorporated in this year's survey.

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

- While many respondents indicated some degree of activity related to medication history taking, only 10% (15/156) reported meeting the 2015 target of 75% that was set for the percentage of inpatients with complex and high-risk medication regimens who receive medication histories from pharmacists upon admission. The highest target attainment was reported in the Atlantic provinces (21%, 3/14). The reported target attainment varied little based on bed size, but a higher number of teaching hospitals reported meeting the target (15%, 6/40), compared to non-teaching hospitals (8%, 9/116). Note that this CSHP 2015 objective has since been revised to reflect the current focus on medication reconciliation during all transitions across the continuum of care.

- Regarding pharmacist monitoring of medication therapy, 47% (74/156) of respondents reported that their pharmacists provided this service to 50% or more of inpatients with complex and high-risk medication regimens, with a higher percentage reported in teaching hospitals (80%, 32/40) than non-teaching hospitals (36%, 42/116). The province of Ontario led the other provinces, with 67% (30/45) of responding hospitals indicating that pharmacists monitored medication therapy in 50% or more of their inpatients.

- The majority of respondents (68%, 107/158) reported that pharmacists had organizational authority for managing medication therapy for selected inpatients, in collaboration with other members of the healthcare team. There was little difference between teaching (70%, 28/40) and non-teaching hospitals (67%, 79/118). The results approach the CSHP 2015 target of 90%.

- Only 3% (4/155) of respondents indicated meeting the target of providing discharge counselling, by a pharmacist, for 75% of inpatients with complex and high-risk medication regimens.

- Although 125 respondents indicated that they conducted client satisfaction surveys, a much smaller number of respondents answered the follow-up question. Of those who did, 89% (47/53) indicated that less than 50% of patients recalled speaking to a pharmacist while in the hospital. Note that most respondents (68%, 75/110) reported that they surveyed less than 25% of patients who had recently been in their hospital.

The above data shows that many hospitals are recognizing the role that pharmacists can play in improving drug therapy and are granting pharmacists the authority to manage medications. Pharmacists seem to be focusing their efforts on medication monitoring rather than acquiring medication histories or providing discharge counselling. Since medication monitoring does not necessarily require direct patient contact, this may explain the low percentage of patients who recalled having an interaction with a pharmacist during their hospitalization. It will be interesting to see if future surveys show an upward trend in the percentage of facilities providing medication histories and discharge counselling, given Accreditation Canada's and CSHP 2015's recent focus on medication reconciliation, not just on admission but at all transition points across the continuum of care.

Table J-1. Results for Goal 1 2007/08

Goal 1: Increase the extent to which pharmacists **help individual hospital inpatients achieve the best use of medications.**										
				2007/08 Hospital pharmacy in Canada responses						
	Subset objectives	**CSHP 2015 target**	**% achievement**	*(n=)*	**yes**	**75- 100%**	**50- 74%**	**25- 49%**	**0- 24%**	**no**
1.1	Pharmacists will be involved in managing the acquisition, upon admission, of medication histories for 75% of hospital inpatients with complex and high-risk medication regimens.	75%	10%	*(156)*		10%	7%	17%	67%	
1.2	The medication therapy of 100% of hospital inpatients with complex and high-risk medication regimens will be monitored by a pharmacist.	100%	≤18%	*(156)*		18%	29%	21%	31%	
1.3	In 90% of hospitals, pharmacists will have organizational authority to manage medication therapy in collaboration with other members of the healthcare team.	90%	68%	*(158)*	68%					32%
1.4	75% of hospital inpatients discharged with complex and high-risk medication regimens will receive medication counselling managed by a pharmacist.	75%	3%	*(155)*		3%	10%	19%	68%	
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%	11%	*(53)*		2%	9%	8%	81%	

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.

- Seventy-eight percent (125/161) of the respondents reported that they had pharmacists involved in delivering care within their outpatient clinics. This was independent of teaching status or bed size, except for hospitals with 50 – 200 beds who reported a lower level of pharmacist involvement in outpatient clinics (44%, 15/35). Of the respondents with pharmacist involvement in clinics, only 36% (42/117) indicated that pharmacists had organizational authority for managing medication therapy for patients with complex or high-risk medication regimens in 50% or more of these clinics. Regarding routine counselling of patients with complex and high-risk medication regimens, 53% (63/118) of respondents reported this was done in at least 50% of clinics. Regionally, the Prairie Provinces (67%, 12/18) and the Atlantic Provinces (71%, 5/7) reported the highest activity for this measure. This level of counselling activity was reported by 68% (23/34) of teaching hospitals compared to 48% (40/84) of non-teaching hospitals.

- Thirty-two percent (52/161) of respondents indicated that their pharmacy department provided home care services. Variation in reported involvement between regions reflects the fact that some provinces see home care as a regional (and therefore hospital-related) responsibility (e.g. 59% in BC, 13/22) while

others do not (e.g. 9% in Ontario, 4/45). Of respondents indicating that their pharmacy department provided home care services, 61% (30/49) indicated that pharmacists were granted organizational authority for managing medication therapy for home care patients in collaboration with other members of the healthcare team. This represents a very good starting point for achieving the CSHP 2015 target of 85%.

In general, the reported level of pharmacist involvement in outpatient clinics is encouraging. However, it must be noted that the wording of the question did not delineate whether pharmacist involvement occurred in one or several outpatient clinics. Given that this is an expanding area of patient care, the role of the pharmacist may not be as well established as in the inpatient setting.

A limited number of respondents indicated that home care services were provided by hospital pharmacies, but where it was occurring the majority of pharmacists had been given organizational authority for medication management.

Table J-2. Results for Goal 2 2007/08

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

				2007/08 Hospital pharmacy in Canada responses						
	Subset objectives	**CSHP 2015 target**	**% achievement**	*(n=)*	**yes**	**75- 100%**	**50- 74%**	**25- 49%**	**0- 24%**	**no**
2.1	In 70% of ambulatory and specialized care clinics providing clinic care, pharmacists will have organizational authority for managing medication therapy for clinic patients with complex and high-risk medication regimens in collaboration with other members of the healthcare team.	70%	≥ 23% but ≤36%	*(117)*		23%	13%	15%	50%	
2.2	In 95% of ambulatory and specialized care clinics, pharmacists will counsel clinic patients with complex and high-risk medication regimens.	95%	≤41%	*(118)*		41%	12%	11%	36%	
2.3	In 85% of home care services, pharmacists will have organizational authority to manage medication therapy in collaboration with other members of the healthcare team.	85%	61%	*(49)*	61%					39%

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

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

- A majority of respondents (81%, 130/161) reported that pharmacists were actively involved in ensuring that patients receive evidence-based medication therapy through routine individual patient monitoring, clinical practice guidelines, and/or drug use evaluation. Teaching hospitals reached the CSHP 2015 target of 100%. Of note 36% (18/50) of respondents in Quebec and 29% (4/14) of respondents in the Atlantic Provinces reported no pharmacist involvement in this activity.

- Most respondents (91%, 145/160) indicated that pharmacists were actively involved in the development and implementation of evidence-based therapeutic protocols involving medication use, which is close to CSHP 2015's target of 100%. Results were similar regardless of teaching status, bed size or region.

- Approximately half of respondents reported that pharmacists were actively involved in ensuring , on discharge, that patients hospitalized for acute myocardial infarction received either an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker (53%, 85/160), a beta-blocker (52%, 83/160),

aspirin (52%, 82/159) and lipid-lowering therapy (51%, 81/159). For patients with congestive heart failure, 50% (80/160) of respondents indicated that pharmacists actively participated in ensuring that patients received either an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker at the time of discharge. Teaching hospitals reported higher participation in these activities (range 69-72%) compared to non-teaching hospitals (range 44-47%). British Columbia consistently reported only 27% (6/22) of respondents participating in these activities. Quebec also reported low levels of activity (range 35-40%).

- The CSHP 2015 target, for pharmacists insuring that clinic patients who receive medications to decrease blood glucose levels also have an HbA1c test performed at least annually, is 90%. However, 77% (82/107) of respondents indicated that this objective was not realized in current practice, independent of teaching status, bed size or region.

While the data indicate that pharmacists actively apply evidence-based methods to the improvement of medication therapy, they do not seem to be as actively involved in the implementation and management of evidence-based drug therapy protocols. It is possible that while the pharmacy department is usually involved in establishing clinical practice guidelines or pre-printed orders to support such protocols, individual pharmacists are less frequently involved in the implementation and management of the protocols, possibly due to inadequate pharmacist resources to do so.

Table J-3. Results for Goal 3 2007/08

Goal 3: Increase the extent to which hospital and related healthcare setting pharmacists **actively apply evidence-based methods to the improvement of medication therapy.**						
				2007/08 Hospital pharmacy in Canada responses		
	Subset objectives	**CSHP 2015 target**	**% achievement**	*(n=)*	**yes**	**no**
3.1	3.1 For 100% of hospital and related healthcare setting patients, pharmacists will be actively involved in ensuring that they receive evidence-based medication therapy.	100%	81%	*(161)*	81%	19%
3.2	3.2 In 100% of hospitals and related healthcare settings, pharmacists will be actively involved in the development and implementation of all evidence-based therapeutic protocols involving medication use.	100%	91%	*(160)*	91%	9%
3.3	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%	53%	*(160)*	53%	47%
3.4	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%	50%	*(160)*	50%	50%
3.5	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%	52%	*(160)*	52%	48%
3.6	3.6 90% of hospital pharmacies will participate in ensuring that patients hospitalized for an acute myocardial infarction will receive aspirin at discharge.	90%	52%	*(159)*	52%	48%
3.7	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%	51%	*(159)*	51%	49%
3.8	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%	23%	*(107)*	23%	77%

CSHP 2015 target achieved *CSHP target not achieved*

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

- The target set for hospitals having an organizational program, with appropriate pharmacy involvement, to achieve significant annual, documented improvement in the safety of all steps in medication use is 90%. The survey results indicate that this target is not yet being met. Thirty-six percent (58/160) of respondents indicated that they do not have such a program. Regionally, British Columbia respondents (86%, 19/22) were most likely to have such a program.
- Only 24% (39/161) of respondents indicated that they conducted an annual assessment, based on established standards and best practices, of the processes used for compounding sterile medications throughout the hospital or related healthcare system. There were no notable differences based on teaching status, bed size or region. The CSHP 2015 target is that 80% of hospital pharmacies will conduct such an assessment. It is surprising that only a small percentage of Canadian hospitals are regularly reviewing their sterile compounding practices. The recently revised US standards for sterile compounding practices, that are contained in "USP General Chapter ‹797› Pharmaceutical Compounding - Sterile Preparations [1, 2,] are having a major impact on hospitals in the US. It will be interesting to see if similar standards are implemented in Canada.
- The CSHP 2015 target is that 75% of hospital pharmacies will utilize a unit-dose system for drug distribution for 90% or more of their total beds. Of all respondents, 62% (99/160) reported that they met this target, with higher rates reported in teaching hospitals (74%, 28/38). The lowest percentages were reported by hospitals with 50-200 beds (44%, 15/34) and the region of British Columbia (36%, 8/22). (Note: With respect to this particular objective, astute readers may have noticed a discrepancy between the data reported in this chapter, compared to data that was reported for a similar question in the chapter that deals with drug distribution systems. In that chapter, it was reported that only forty eight percent (78/162) of respondents indicated that they provide unit dose drug distribution to 90% or more of the beds within their hospital. The structures of the questions were quite different in the two parts of the survey, which may partially explain the different results in the two chapters.)
- CSHP 2015 has a target of 80% of hospitals having at least 95% of routine medication orders reviewed for appropriateness by a pharmacist prior to administration of the first dose. Over 40% (94/159) of respondents indicated that they did not perform at this level. Performance was better in teaching hospitals (74%, 28/38) compared to non-teaching hospitals (55%, 66/121) and in those with higher bed size (>500 beds: 72%, 28/39; 201-500 beds: 63%, 55/87; 50-200 beds: 33%, 11/33). Regionally, a notably lower percentage of respondents from the Atlantic Provinces (21%, 3/14) reported achieving this objective, while a higher percentage of Quebec respondents (78%, 39/50) reported pharmacist involvement in these activities.
- A pharmacist review, within 24 hours, of medication orders written in the emergency department was reported by 68% (107/158) of respondents. However, only 59% (61/103) of those respondents reported that a pharmacist reviewed 75-100% of medication orders written in the emergency department within 24 hours. The CSHP 2015 target is 100% of medication orders. Respondents with 50-200 beds (38%, 13/34), as well as respondents from the Prairies (36%, 10/28) and the Atlantic region (36%, 5/14) were less likely to be carrying out a review of emergency department orders within 24 hours of the order being written. In contrast, 94% (46/49) of Quebec respondents indicated that pharmacists performed this activity.
- Thirty-nine percent (62/159) of respondents indicated that pharmacists participate in ensuring that patients receiving prophylactic antibiotics for surgical infections have their prophylactic antibiotic therapy discontinued within 24 hours after the surgery end time, compared to CSHP 2015's target of 90%. Teaching hospitals reported the highest activity (61%, 23/38) compared to non-teaching hospitals (32%, 39/121).
- A target of 85% was set for the percentage of pharmacy technicians having completed either a provincial certification program or a college training program. Fifty nine percent (94/159) of respondents reported that this was the case for 75% or more of their pharmacy technician workforce. In Quebec 47% (23/49) of respondents indicated that less than 25% of their technicians met these credentials. However, it is

possible that the translation of the term "college training program" from English to French may have affected the interpretation of this question in Quebec.

The results of this section of the survey indicate that there is considerable room for improvement related to this CSHP 2015 goal. The percentage of hospitals without organizational programs to review safe medication use and sterile compounding is a concern. It is also surprising that such a low percentage of hospitals met the targets set for pharmacist review of routine orders prior to administration of the first dose, pharmacist review of orders written in the emergency department, and pharmacist review of post-surgical prophylactic antibiotic therapy. This may be a reflection of lack of resources, limited hours of operations, or institutional decisions regarding where to focus pharmacy resources.

Table J-4. Results for Goal 4 2007/08

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.**										
				2007/08 Hospital pharmacy in Canada responses						
	Subset objectives	**CSHP 2015 target**	**% achievement**	*(n=)*	**yes**	**75- 100%**	**50- 74%**	**25- 49%**	**0- 24%**	**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%	64%	*(160)*	64%					36%
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%	24%	*(161)*	24%					76%
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%	59%	*(159)*	59%					41%
4.4	100 % of medication orders in a hospital's emergency department will be reviewed by hospital pharmacists within 24 hours.	100%	≤59%	*(103)*		59%	27%	10%	4%	
4.5	90% of hospital pharmacies will participate in ensuring that patients receiving antibiotics as prophylaxis for surgical infections will have their prophylactic antibiotic therapy discontinued within 24 hours after the surgery end time.	90%	39%	*(159)*	39%					61%
4.6	85% of pharmacy technicians in hospitals and related healthcare settings will be certified by a clearly identifiable and recognized training program.	85%	≤59%	*(159)*		59%	11%	4%	26%	
4.7	75% of pharmacies in hospitals utilize a unit dose system for drug distribution for 90% or more of their total beds.	75%	62%	*(160)*	62%					38%

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.

- Only 13% (20/158) of respondents reported that they routinely used machine-readable coding in the inpatient pharmacy to verify medications before dispensing, with 22% (8/37) of teaching hospitals

reporting use of the technology compared to 10% (12/121) of non-teaching hospitals. The CSHP 2015 target is 75% of hospitals.

- 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 1 of 158 respondents.

- With regards to the use of computerized prescriber order entry systems that include clinical decision support, only 7% (11/159) of respondents indicated this was in place at their facility, with higher implementation rates reported in teaching hospitals (18%, 7/38).

- The CSHP 2015 target is that 100% of hospital pharmacies will use computerized pharmacy order entry systems that include clinical decision support. Results indicate that 69% of respondents (110/159) have this in place. In BC, 96% (21/22) of respondents indicated that they use such a system.

- Of the 52 respondents who reported having an electronic medical record, 81% (38/47) indicated that pharmacists used the medication-relevant portions of the record to manage patients' medication therapy.

- Regarding electronic access to pertinent patient information and communication across care settings to ensure continuity of pharmaceutical care for patients with complex and high-risk medication regimens, 39% (63/160) of respondents indicated that their pharmacists had this capability compared to the CSHP 2015 target of 75%.

In general, the reported adoption of technologies that can contribute to the safe and effective use of medications was low. This is especially surprising with regard to clinical decision support for computerized pharmacy order entry systems. In cases where a specific technology has been implemented (e.g. electronic medical records), it appears to be well utilized.

Table J-5. Results for Goal 5 2007/08

Goal 5: Increase the extent to which hospitals and related healthcare settings **apply technology effectively to improve the safety of medication use.**						
				2007/08 Hospital pharmacy in Canada responses		
	Subset objectives	**CSHP 2015 target**	**% achievement**	*(n=)*	**yes**	**no**
5.1	75% of hospitals will use machine-readable coding to verify medications before dispensing.	75%	13%	*(158)*	13%	87%
5.2	75% of hospitals will use machine-readable coding to verify all medications before administration to a patient.	75%	1%	*(158)*	1%	99%
5.3	For routine medication prescribing for inpatients, 75% of hospitals will use computerized prescriber order entry systems that include clinical decision support.	75%	7%	*(159)*	7%	93%
5.4	100% of hospital pharmacists will use computerized pharmacy order entry systems that include clinical decision support.	100%	69%	*(159)*	69%	31%
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%	81%	*(47)*	81%	19%
5.6	In 75% of hospitals and related healthcare settings, pharmacists will be able to electronically access pertinent patient information and communicate across settings of care (e.g., hospitals, clinics, home care operations, and chronic care operations) to ensure continuity of pharmaceutical care for patients with complex and high-risk medication regimens.	75%	39%	*(160)*	39%	61%

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.

- Twenty-one percent (33/160) of respondents reported that they had specific ongoing initiatives that target community health. The regions of BC and Atlantic Canada reported higher involvement with 41% (9/22) and 43% (6/14), respectively.
- The CSHP 2015 target related to vaccines is that 85% of hospital pharmacies will participate in ensuring that high-risk patients in hospitals and related healthcare settings receive vaccinations for both influenza and pneumococcus. Twenty-three percent (36/159) of respondents indicated that they had a process in place for insuring that high-risk patients receive both vaccinations. The reported performance for insuring influenza vaccination alone was slightly higher (37%, 59/160), especially in teaching hospitals (53%, 20/38) and within Ontario (50%, 23/46). Twenty-six percent (42/160) of respondents indicated that they had a program for insuring pneumococcal vaccination alone.
- Nineteen percent (30/160) of respondents reported having a process for ensuring that hospitalized patients who smoke receive smoking cessation counselling. This was independent of teaching status, bed size or region. The CSHP 2015 target is 80%.
- Fifty-four percent (86/160) of respondents indicated having a formal and up-to-date emergency preparedness program that was integrated with its institution's and community's emergency preparedness and response programs. BC and Atlantic Canada reported the highest participation with 77% (17/22) and 71% (10/14), respectively. Quebec reported the lowest participation at 20% (10/50).

It is encouraging to see that hospital pharmacies in certain regions (e.g. BC, Atlantic Canada) have made progress in the implementation of initiatives that target community health. Low participation of hospital pharmacists in vaccination and smoking cessation programs suggests a reliance on other healthcare disciplines within the hospital setting, or on community pharmacists, to assume responsibility for these activities. It is surprising that there is such a low number of respondents indicating development of an integrated emergency preparedness program, given the Canadian experience with SARS, avian flu and pandemic flu. While hospitals may have developed their own emergency preparedness programs, it is possible that the reported data reflects a lack of integration between the institutional and community programs.

Table J-6. Results for Goal 6 2007/08

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.**						
				2007/08 Hospital pharmacy in Canada responses		
	Subset objectives	**CSHP 2015 target**	**% achievement**	*(n=)*	**yes**	**no**
6.1	60% of pharmacies in hospitals and related healthcare settings will have specific ongoing initiatives that target community health.	60%	21%	*(160)*	21%	79%
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%	23%	*(159)*	23%	77%
6.3	80% of hospital pharmacies will participate in ensuring that hospitalized patients who smoke receive smoking-cessation counselling.	80%	19%	*(160)*	19%	81%
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%	54%	*(160)*	54%	46%

CSHP 2015 target achieved *CSHP target not achieved*

References:

[1] Pharmaceutical compounding – sterile preparations (general information chapter 797). In: The United States Pharmacopia, 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. 2007.

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

KEVIN HALL

This chapter contains data on the pharmacy staffing and drug costs associated with the delivery of drug distribution and clinical pharmacy services to specific patient care programs (e.g. medicine, surgery, oncology, mental health, etc.). Similar staffing and drug cost data are also provided for certain pharmacy services that often operate as discrete operational units of the pharmacy (e.g. IV admixture services, TPN admixture, investigational drug services, etc.).

The objectives of generating this data are two-fold:

1. 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

2. 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

Even if they weren't able to complete all sections of the benchmark survey, respondents were encouraged to provide any data that they could. For example, many respondents were able to provide a breakdown of drug costs by clinical program, but were not able to supply data on the staffing allocated to specific clinical programs. Similarly, many facilities were able to identify the clinical staff time provided to specific programs, but were not able to provide data on the breakdown of their drug distribution staffing for individual clinical programs.

Readers should note that the criteria for participation in the survey were modified this year, 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, compared to the 2005/06 survey. However, it is interesting to note that the percentages of respondents from small (50-200 beds), medium (201-500 beds) and large hospitals (greater than 500 beds) remained very similar to the 2005/06 survey. Nonetheless any 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 in 2007/08 may not be exactly the same group that provided benchmarking data in past surveys.

STAFFING INDICATORS FOR SPECIFIC INPATIENT CLINICAL PROGRAMS

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

The data can be summarized as follows:

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

- When the staffing figures were looked at for teaching versus non-teaching hospitals, there are some interesting findings. For certain patient care programs (i.e intensive care, pediatrics and mental health) the reported staffing resources (paid hours per patient day) utilized by non-teaching hospitals are as high, or higher, than those reported by teaching hospitals. For other programs (i.e. oncology, medicine, surgery, and rehabilitation), the staffing resources utilized by the teaching hospitals appeared to be slightly higher than those utilized by non-teaching hospitals. Given the small number of respondents in some of the cells this data needs to be interpreted cautiously. However, if on a program by program basis the pharmacy resources used by teaching hospitals are not necessarily higher than those used by non-teaching hospitals, other explanations for the significant differences in overall staffing for teaching versus non-teaching hospitals, as reported in the Human Resources chapter of this survey, need to be considered. It is probable that there is a higher concentration of high-acuity clinical programs in teaching hospitals, which would contribute to the higher level of overall staffing resources (paid hours per patient day) in teaching hospitals. In addition, there may be certain other pharmacy services, such as drug information centres and investigational drug services, that are more likely to be present in teaching hospitals.

Table K-1. Pharmacy Benchmarking Data For Selected Clinical Programs 2007/08

	Intensive Care	Oncology/ Bone Marrow Transplant	Medicine	Surgery	Mental Health	Rehab	Long Term Care	Pediatrics (in a general hospital)
	Mean Indicator Values - All Hospitals							
Total Paid Hours per Patient Day	1.23 (n=27)	0.73 (n=14)	0.38 (n=23)	0.45 (n=20)	0.38 (n=24)	0.41 (n=13)	0.17 (n=15)	0.69 (n=10)
Drug Distribution Paid hours Per Patient Day	0.75 (n=28)	0.53 (n=14)	0.26 (n=26)	0.31 (n=25)	0.26 (n=26)	0.32 (n=15)	0.12 (n=20)	0.53 (n=14)
Clinical Services Paid hours Per Patient Day	0.38 (n=64)	0.28 (n=24)	0.11 (n=52)	0.13 (n=40)	0.10 (n=42)	0.11 (n=26)	0.06 (n=26)	0.23 (n=23)
Drug Costs Per Patient Day	$113 (n=69)	$155 9n=26)	$20 (n=64)	$28 (n=57)	$12 (n=59)	$14 (n=37)	$8 (n=39)	$22 (n=41)
	Mean Indicator Values - Teaching versus Non-Teaching Hospitals							
Total Paid hours Per Patient Day – Teaching	1.13 (n=13)	0.81 (n=9)	0.41 (n=11)	0.49 (n=11)	0.33 (n=11)	0.44 (n=4)	0.17 (n=2)	0.41 (n=3)
Total Paid hours Per Patient Day – Non-Teaching	1.33 (n=14)	0.58 (n=5)	0.36 (n=12)	0.42 (n=9)	0.42 (n=13)	0.40 (n=9)	0.17 (n=13)	0.81 (n=7)
Drug Costs Per Patient Day – Teaching	$143 (n=19)	$154 (n=13)	$28 (n=16)	$33 (n=17)	$14 (n=15)	$31 (n=8)	$10 (n=7)	$25 (n=6)
Drug Costs Per Patient Day – Non-Teaching	$101 (n=50)	$156 (n=13)	$17 (n=48)	$25 (n=40)	$11 (n=44)	$10 (n=29)	$8 (n=32)	$22 (n=35)

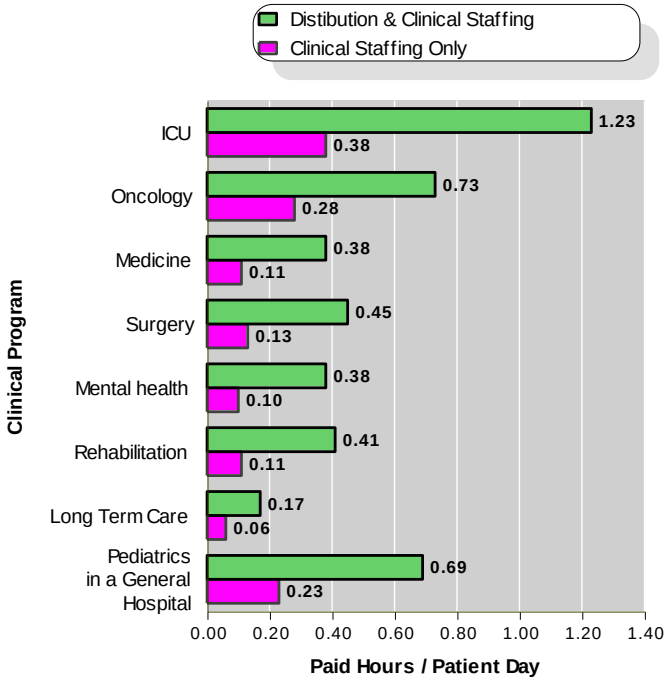
- Comparison of the staffing for distribution and clinical services (Figure K-1) indicates that the paid hours per patient day for clinical services represent between 26% to 38% of the total paid hours per patient day that are required for both distributive and clinical services. The clinical time component appears to be slightly higher in the 2007/08 survey, compared to the 2005/06 survey when the clinical component represented between 22% to 35% of the total paid hours. However, this still suggests that between 60% to 75% of the total paid hours for pharmacists and technicians are utilized to provide drug distribution services.

DRUG COSTS FOR SPECIFIC INPATIENT CLINICAL PROGRAMS

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

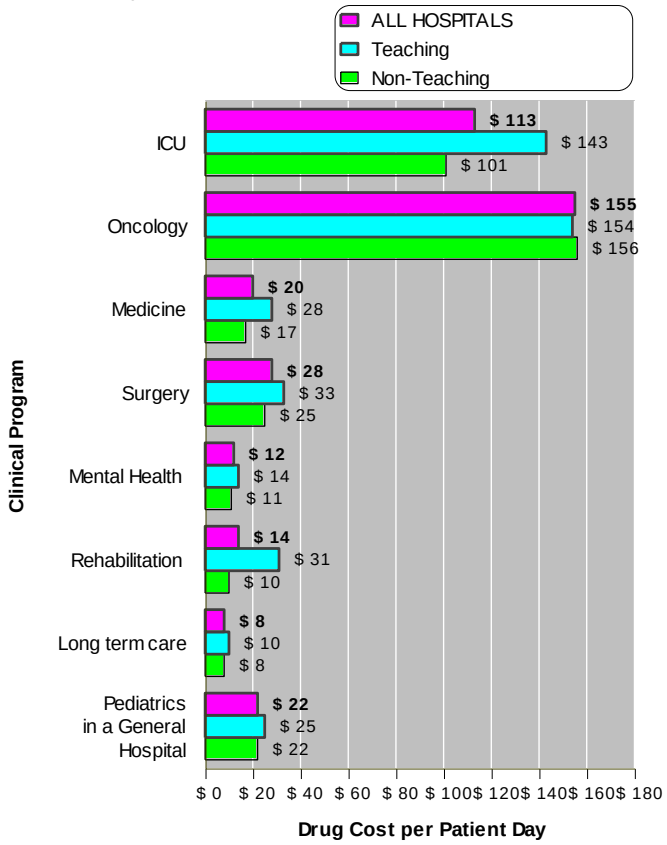
- Like the staffing data provided above, the drug cost data are very consistent with the data provided in the benchmarking chapter of the 2005/06 survey report. There were minimal or no changes in drug costs for the intensive care, medicine, mental health and long term care programs. For the oncology, surgery, rehabilitation and pediatric programs, the drug costs in 2007/08 were 8% to 22% (annualized) higher in 2007/08.

Figure K-1. Mean Pharmacy Staffing 2007/08



- With the exception of oncology/BMT, drug costs for each clinical program are higher in teaching hospitals than in non-teaching hospitals. This may reflect greater use of new, more expensive drugs in the teaching hospital environment. Although the number of reporting hospitals is not large, it does appear that the drug costs in rehabilitation appear to be much higher in teaching hospitals than in non-teaching hospitals in 2007/08, a finding that was not evident in the 2005/06 survey results. It is possible that this reflects the growing use of botulinium toxin to treat muscle spasms in certain types of rehabilitation patients, a relatively new therapy that may be more commonly used in teaching hospitals at this time.

Figure K-2. Mean Drug Costs 2007/08



STAFFING AND DRUG COST INDICATORS FOR OTHER PROGRAMS AND SERVICES

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

Table K-2 Mean Pharmacy Staffing and Drug Cost Indicators for Other Programs and Services 2007/08

Program or Service	All Hospitals	Teaching	Non-Teaching
Oncology Admixture			
Total paid hours per admixture	0.85 (n=41)	0.86 (n=15)	0.84 (n=26)
Clinical paid hours per admixture	0.26 (n=45)	0.31 (n=16)	0.23 (n=29)
Drug costs per admixture	$359 (n=54)	$283 (n=17)	$394 (n=37)
Centralized IV admixture			
Total paid hours per admixture	0.20 (n=12)	0.11 (n=8)	0.40 (n=4)
Drug cost per admixture	$11 (n=12)	$14 (n=8)	$7 (n=4)
Home IV admixture			
Total paid hours per admixture	1.07 (n=7)	0.95 (n=4)	1.23 (n=3)
Clinical paid hours per admixture	0.48 (n=8)	0.52 (n=4)	0.43 (n=4)
Drug distribution paid hours per admixture	0.66 (n=10)	0.43 (n=4)	0.81 (n=6)
Drug cost per admixture	$39 (n=11)	$23 (n=5)	$52 (n=6)
TPN Admixture			
Total paid hours per admixture	0.93 (n=20)	0.43 (n=8)	1.26 (n=12)
Clinical paid hours per admixture	0.18 (n=27)	0.09 (n=10)	0.23 (n=17)
Drug distribution paid hours per admixture	0.66 (n=28)	0.39 (n=10)	0.81 (n=18)
Drug cost per admixture	$40 (n=34)	$28 (n=14)	$48 (n=20)
Investigational Drug Studies			
Total paid hours per concurrent study managed	71 (n=14)	66 (n=11)	92 (n=3)
Renal Dialysis			
Total paid hours per patient year	46 (n=9)	54 (n=4)	39 (n=5)
Clinical paid hours per patient year	32 (n=21)	31 (n=11)	34 (n=10)
Drug cost per patient year (excluding erythropoietic agents)	$3,734 (n=24)	$4,952 (n=8)	$3,126 (n=16)
Drug costs for erythropoietic agents	$15,338 (n=18)	$16,560 (n=8)	$14,360 (n=10)
Emergency Room			
Total paid hours per ER visit	0.09 (n=22)	0.09 (n=9)	0.08 (n=13)
Drug cost per visit	$10 (n=72)	$12 (n=22)	$9 (n=50)
Operating Room			
Total paid hours per case	0.30 (n=6)	0.26 (n=3)	0.34 (n=3)
Drug cost per case	$50 (n=51)	$62 (n=16)	$44 (n=35)

The results in the above table were very similar, in most cases, to those reported in the 2005/06 Hospital Pharmacy in Canada Report. Exceptions are noted in the points below.

- The mean drug cost per oncology admixture was substantially higher in 2007/08 ($359) than in 2005/06 ($220). Similar to the finding in the 2005/06 report, drug costs per admixture in non-teaching hospitals ($394, n=37) were substantially higher than in teaching hospitals ($283, n=17). The mean drug costs per admixture were based on data from a reasonable number of respondents and should therefore be reasonably reliable, but the reasons for this difference are unclear.

- In 2007/08 respondents reported 0.20 total paid hours per admixture in centralized IV admixture programs, compared to 0.13 hours per admixture in the 2005/06 report. Drug costs per admixture were also reported to be substantially higher in 2007/08 ($11 per admixture) than in 2005/06 ($4.42 per admixture). The number of respondents that provided data in both years was quite small, 12 in 2007/08 and 7 in 2005/06, which makes the mean values more susceptible to the influence of outliers.

- In 2007/08, respondents reported a mean of 1.07 total hours per home IV admixture, compared to 1.64 hours in 2005/06. In 2005/06 there had been quite a striking difference between teaching hospitals (0.67 hours per admixture) and non-teaching hospitals (2.06 hours per admixture.) Those differences are much less in the 2007/08 results (0.95 total hours per home IV admixture in teaching hospitals, versus 1.23 hours in non-teaching hospitals. These results must be interpreted in light of the relatively small number of respondents in each sub-group, but the results in 2007/08 show less variability and are likely more reliable estimates of the total hours required for both the clinical services and the preparation of home IV admixtures.

- For those facilities that reported data on their investigational drug study service, the total hours per concurrent study being managed increased from 56 in 2005/06 to 71 hours in 2007/08. This may reflect the increasing complexity and workload associated with many drug studies.

- The data reported for pharmacy services for renal dialysis patients suggests that this service involves a substantial commitment of pharmacy manpower. The total pharmacy hours per year for each of the average number of renal dialysis patients being managed during that year were reported to be 46 hours in 2007/08, compared to 26 hours in the 2005/06 report. The clinical hours per patient showed the biggest increase, from 19 to 32 hours per year per dialysis patient.

- In the 2007/08 survey we included a new question dealing with erythropoietic drug costs for renal dialysis patients. The reported average cost per patient per year was $15,338. Costs were reasonably similar for teaching ($16,560) and non-teaching hospitals ($14,360).

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.

L - PHARMACY STAFFING AND DRUG COSTS FOR SPECIFIC CLINICAL PROGRAMS AND PHARMACY SERVICES - PEDIATRIC HOSPITALS 2007/08

KEVIN HALL AND JEAN-FRANCOIS BUSSIERES

In this section of the survey, respondents from pediatric facilities were asked to provide the following information for the 2007/08 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.

For this pediatric benchmarking part of the survey, we were interested in collecting data 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, 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. Staffing and drug cost ratios were only calculated when sufficient data were available.

Readers are reminded that the number of respondents in each cell may be different from those in other cells. As a result, there are some minor anomalies in the data. For example, for any given clinical program in the table, the paid hours per patient day for clinical services and the paid hours per patient day for drug distribution services may not add up to the same number as the total paid hours per patient day that is in the table for that program. That is a result of the fact that the number of respondents who provided data for each of those three indicators may be different.

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 is more likely to be affected by "outlier" data. Although we believe that the pediatric benchmarking data is very useful, the benchmarking data from any given Hospital Pharmacy in Canada Report should be compared to similar data from earlier reports, to insure that the data has been reasonably consistent from survey to survey. Other sources of benchmarking data should also be used, whenever such data exists.

In Table L-1, data on staffing and drug costs for 4 pediatric inpatient clinical programs are presented. In almost all cases, calculated means were higher than median values, suggesting that the data is not evenly distributed. For each pediatric clinical program area, there were a few hospitals that reported very large pharmacy staffing resource inputs, resulting in an upward skewing of the average.

It should be noted that total paid hours per patient day and drug distribution paid hours per patient day include both pharmacist and technician hours, whereas clinical paid hours per patient day are pharmacist hours only, and only include pharmacist hours spent in providing clinical services.

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

- Paid hours per patient day for clinical are between 27% and 36% of the total paid hours per patient day required for both distributive and clinical services, suggesting that 64% to 73% of the total paid hours for pharmacists and technicians are utilized to provide drug distribution services. These results are very

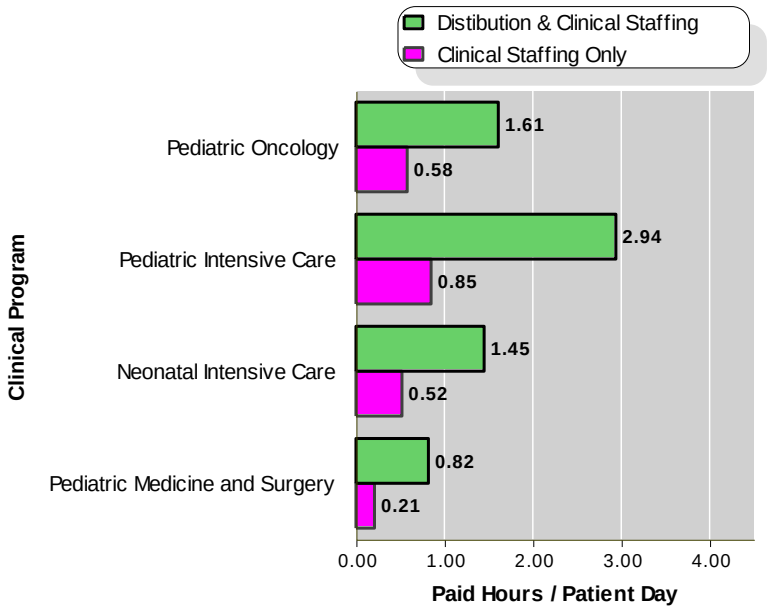
similar to those reported in the 2005/06 Hospital Pharmacy in Canada Report. The percentage breakdown for clinical and distributive services is also similar to the results reported for 2007/08 in the adult benchmarking chapter.

- 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 paid hour per patient day basis, than did similar adult clinical programs. For instance, total paid hours per patient day for pediatric oncology patients were more than twice that reported for adult oncology patients, 1.61 and 0.73, respectively. Pediatric intensive care utilized 2.94 total paid pharmacy hours per patient day, compared to 1.23 for adult patients.

Table L-1. Mean Pharmacy Benchmarking Data for Selected Pediatric Clinical Programs 2007/08

Pediatric hospitals				
	Pediatric Oncology (7)	Pediatric Intensive Care (11)	Neonatal Intensive Care (10)	Pediatric Medicine Surgery (9)
Geographic distribution of respondents considered for calculations	BC (1) Prairies (1) Ontario (2) Quebec (2) Atlantic (1)	BC (1) Prairies (4) Ontario (3) Quebec (2) Atlantic (1)	BC (1) Prairies (4) Ontario (2) Quebec (2) Atlantic (1)	BC (0) Prairies (4) Ontario (3) Quebec (1) Atlantic (1)
Total Paid Hours per Patient Day	1.61 (n=4)	2.94 (n=8)	1.45 (n=9)	0.82 (n=6)
Drug Distribution Paid Hours Per Patient Day	1.01 (n=4)	2.03 (n=8)	0.91 (n=9)	0.60 (n=6)
Clinical Services Paid Hours Per Patient Day	0.58 (n=6)	0.85 (n=11)	0.52 (n=10)	0.21 (n=9)
Drug Costs Per Patient Day	$178 (n=7)	$125 (n=10	$45 (n=9)	$50 (n=8)

Figure L-1. Mean Pharmacy Staffing (paid hours per patient day) by Clinical Program 2007/08



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 (Childrens 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.

- There appears to be a significant drop in the total paid hours per patient day for pediatric oncology in 2007/08 (1.61 total paid hours per patient day), compared to the 2005/06 report (3.77 total hours per patient day). However, in this year's data an extreme outlier was identified and eliminated from the analysis because of a data inconsistency that could not be resolved. Had that outlier been included in this year's average, the 2005/06 and 2007/08 numbers would have been similar. The 2007/08 number is probably a more accurate reflection of the average pharmacy staffing resources that are being utilized for pediatric oncology.

- Staffing ratios were higher in the 2007/08 report for pediatric intensive care (2.94 total pharmacy hours per patient day, versus 2.39 in 2005/06) and for neonatal intensive care (1.45 total pharmacy hours per patient day in 2007/08, versus 1.06 in 2005/06). The staffing ratios for pediatric medicine/surgery were similar in both years (0.82 total hours per patient day in 2007/08, compared to 0.81 hours in 2005/06

- Drug cost comparisons between pediatric and adult programs suggest that drug costs per patient day are higher in pediatric oncology programs ($178) than in adult oncology programs ($155). However, drug costs per patient day were similar for pediatric and adult intensive care programs ($125 and $113, respectively).

- Reported drug costs per patient day for the neonatal intensive care (NICU) program and the pediatric medicine/surgery programs more than doubled between the 2005/06 survey and the 2007/08 surveys. Reported NICU drug costs were $19 per patient day in 2005/06, compared to $45 in 2007/08. Pediatric medicine/surgery drug costs per patient day were $22 in 2005/06 versus $50. in 2007/08. Drug costs per patient day for pediatric ICU patients were also higher in 2007/08 ($125) than in 2005/06 ($102). Oncology drug costs per patient day were much lower in 2007/08 ($178) compared to 2005/06 ($311).

RECOGNITION LIST

Respondents from hospitals in the following list participated, or attempted to participate, in the 2007/08 survey. They all completed the survey on or before August 1st, 2008, 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 2007/08 Hospital Pharmacy in Canada Survey.

Hospitals 50 - 200 Beds

Cambridge Memorial Hospital, Cambridge, ON
Campbell River Hospital, Campbell River, BC
Children's Hospital of Eastern Ontario, Ottawa, ON*
Colchester East Hants Health Authority, Truro, NS
Concordia Hospital, Winnipeg, MB
CSSS de Papineau, Gatineau, QC
CSSS Dorval-Lachine-LaSalle, LaSalle, QC
CSSS Eskers de l'Abitibi, Amos, QC
Cumberland Regional Health Care Centre, Amherst, NS
Cypress Regional Hospital, Swift Current, SK
Dartmouth General Hospital, Dartmouth, NS
Dauphin Regional Health Centre, Dauphin, MB
Hôpital de Montréal pour enfants, Montréal, QC*
Hôpital Fleury, Montréal, QC
Institut de cardiologie de Montréal, Montreal, QC*
Kootenay Boundary Regional Hospital, Trail, BC
Lake of the Woods District Hospital, Kenora, ON
Lloydminster Hospital, Lloydminster, SK
Moose Jaw Union Hospital, Moose Jaw, SK
Northern Lights Regional Health Centre, Fort McMurray, AB
Pembroke Regional Hospital, Pembroke, ON
Pictou County Health Authority, New Glasgow, NS
Prince County Hospital, Summerside, PE
Princess Margaret Hospital, Toronto, ON*
Restigouche Health Services Corporation, Campbelton, NB
Rouge Valley Ajax and Pickering, Ajax, ON
St. Mary's General Hospital, Kitchener, ON
St. Mary's Hospital, Camrose, AB
Strathroy Middlesex Health Alliance, Strathroy, ON
Sturgeon Community Hospital, Edmonton, AB
Thompson General Hospital, Thompson, MB
Victoria Hospital, Prince Albert, SK
Wetaskiwin Hospital & Care Center, Wetaskiwin, AB
Woodstock General Hospital, Woodstock, ON
Yorkton Regional Health Center, Yorkton, SK

Hospitals 201 - 500 Beds

Atlantic Health Sciences Corporation - RHA 2, Saint-John, NB*
Beausejour Regional Health Authority, Moncton, NB
BlueWater Health, Sarnia
Boundary Trails Health Center, Winkler, MB
Brandon Regional Health Authority, Brandon, MB
Centre hospitalier affilié universitaire (CHAU) de St. Mary's, Montréal, QC
Centre hospitalier régional de Trois-Rivières, Trois-Rivières, QC
Chatham Kent Health Alliance, Chatham, ON
Children's & Women's Health Centre, Vancouver, BC*
Chilliwack & Fraser Canyon Hospital, Chilliwack, BC
CHU Sainte-Justine, Montréal, QC*
Cowichan District Hospital, Duncan, BC
CSSS Beauce, Beaucefille, QC
CSSS de Charlevoix, La Malbaie, QC
CSSS de la Baie-des-Chaleurs, Maria, QC
CSSS de la Haute-Yamaska, Granby, QC
CSSS de la région de Thetford, Thetford Mines, QC
CSSS Domaine-du-Roy, Roberval, QC
CSSS du Coeur de l'Ile, Montreal, QC
CSSS Jardins-Roussillon, Châteauquay, QC
CSSS l'Énergie, Shawinigan, QC
CSSS l'Ouest-de-l'Île, Pointe Claire, QC
CSSS Lac-Des-Deux-Montagnes, Saint-Eustache, QC
CSSS Lac-Saint-Jean-Est, Alma, QC
CSSS Manicouagan, Baie-Comeau, QC
CSSS Montmagny-L'Islet, Montmagny, QC
CSSS Pommeraie, Cowansville, QC
CSSS Rimouski-Neigette, Rimouski, QC
CSSS Rivière-du-Loup, Rivière-du-Loup, QC
CSSS Sept-Iles, Sept-Iles, QC
CSSS Sommets, Sainte-Agathe-des-Monts, QC
CSSS Sorel-Tracy, Sorel-Tracy, QC
CSSS Suroît, Salaberry-de-Valleyfield, QC
Eagle Ridge / Ridge Meadows Hospitals, Maple Ridge, BC
Edmundston Regional Hospital, Edmundston, NB
Grace Hospital, Winnipeg, MB
Grey Bruce Health Services, Owen Sound, ON
Grey Nuns Community Hospital, Edmonton, AB*
Hôpital Charles-LeMoyne, Greenfield Park, QC
Hôpital général de Montréal, Montréal, QC*

continued

Hospitals 201 - 500 Beds *continued*

Hôpital Laval, Sainte-Foy, QC*
Hôpital Pierre-Boucher, Longueuil, QC
Hôpital Royal-Victoria, Montréal, QC*
Hôpital Santa Cabrini, Montréal, QC
Hospital for Sick Children, Toronto, ON*
Hôtel-Dieu de Lévis, Lévis, QC
Hôtel-Dieu Grace Hospital, Windsor, ON
IWK Health Centre, Halifax, NS*
Joseph Brant Memorial Hospital, Burlington, ON
Kingston General Hospital, Kingston, ON*
Labrador-Grenfell RHA, Goose Bay, NL
Langley Memorial Hospital, Langley, BC
Lethbridge Regional Hospital, Lethbridge, AB
Markham-Stouffville Hospital Corporation, Markham, ON
Medicine Hat Regional Hospital, Medicine Hat, AB
Misericordia Community Hospital, Edmonton, AB*
Mount Sinai Hospital, Toronto, ON*
Nanaimo Regional General Hospital, Nanaimo, BC
Oakville Trafalgar Memorial Hospital, Oakville, ON
Peace Arch Hospital, White Rock, BC
Peace Country Health Region, Grande Prairie, AB
Penticton Regional Hospital, Penticton, BC
Portage District General Hospital, Portage la Prairie, MB
Queen Elizabeth Hospital / Hillsborough Hospital, Charlottetown, PE
Quinte Healthcare Corporation, Belleville, ON
Rouge Valley Health System, Centenary/Ajax/Pickering Sites, Toronto, ON
Royal Columbian Hospital, New Westminster, BC
Royal Inland Hospital, Kamloops, BC
Royal Jubilee Hospital, Victoria, BC
Sault Area Hospital, Sault Ste Marie, ON
Seven Oaks General Hospital, Winnipeg, MB
South-East Regional Health Authority, Moncton, NB*
SouthLake Regional Health Centre, Newmarket, ON
St. Boniface General Hospital, Winnipeg, MB*
St. Joseph's Health Care, Hamilton, ON*
St. Joseph's Health Centre, Toronto, ON
St. Joseph's Hospital, Victoria, BC
The Brantford General Hospital, Brantford, ON
The Credit Valley Hospital, Mississauga, ON
The Royal Victoria Hospital of Barrie, Barrie, ON
The Scarborough Hospital - General Campus, Scarborough, ON
The Scarborough Hospital - Grace Campus, Scarborough, ON
Thunder Bay Regional Health Sciences Centre, Thunder Bay, ON
Toronto General Hospital, Toronto, ON*
Toronto Western Hospital, Toronto, ON*
Vernon Jubilee Hospital, Vernon, BC
Victoria General Hospital, Victoria, BC
Victoria General Hospital, Winnipeg, MB
York Central Hospital, Richmond Hill, ON

Hospitals >500

Burnaby / Queens Park Hospital, Burnaby, BC
C.H. de l'Université de Montréal, Montréal, QC*
Calgary Health Region, Calgary, AB*
Cape Breton Healthcare Complex, Sydney, NS
Capital District Health Authority, Halifax, NS*
CH universitaire de Sherbrooke, Sherbrooke, QC*
CHUQ - C.H. de l'Université Laval, Québec, QC*
CSSS Chicoutimi, Chicoutimi, QC
CSSS D'Arthabaska-Érable, Victoriaville, QC
CSSS de Saint-Jérôme, Saint-Jérôme, QC
CSSS Drummond, Drummondville, QC
CSSS Haut Richelieu/Rouville, St Jean sur Richelieu, QC
CSSS Laval, Laval, QC
CSSS Richelieu-Yamaska, Saint-Hyacinthe, QC
CSSS Sud De Lanaudiére, Terrebonne, QC
Hamilton Health Sciences Corporation, Hamilton, ON*
Health Sciences Centre, Winnipeg, MB*
Hôpital du Sacré-Cœur de Montréal, Montréal, QC*
Hôpital général juif Sir Mortimer B. Davis, Montréal, QC*
Hôpital Maisonneuve-Rosemont, Montréal, QC*
Hôpital regional de Sudbury Regional Hospital Corp, Sudbury, ON
Humber River Regional Hospital, Toronto, ON
Kelowna General Hospital, Kelowna, BC
Lakeridge Health Corporation, Oshawa, ON
Lions Gate Hospital, N Vancouver, BC
London Health Sciences Centre, London, ON*
MSA Hospital / Mission Memorial Hospital, Abbotsford, BC
North York General Hospital, Toronto, ON
Providence Health Care, Vancouver, BC*
Red Deer Regional Hospital, Red Deer, AB
Regina Qu'Appelle Health Region, Regina, SK*
River Valley Health, Fredericton, NB
Royal Alexandra Hospital, Edmonton, AB*
Saskatoon Health Region, Saskatoon, SK*
St. Joseph's Health Care, London, ON*
Sunnybrook Health Sciences Centre, Toronto, ON*
Surrey Memorial Hospital, Surrey, BC
The Ottawa Hospital, Ottawa, ON*
Trillium Health Centre, Mississauga, ON
University of Alberta Hospital, Edmonton, AB*
William Osler Health Centre, Brampton, ON
Windsor Regional Hospital, Windsor, ON

*** Teaching Hospitals (ACAHO)**

WORKSHEET 2007/08

	Your Facility	All Hospitals	Bed Size			Teaching Status	
			50- 200	201- 500	>500	Teaching	Non-Teaching
1. Acute Inpatient Drug Costs / Acute Admissions (n=129)		$279	$254	$270	$313	$432	$224
2. Acute Inpatient Drug Costs / Acute Patient Day (n=127)		$37	$34	$36	$41	$56	$30
3. Nonacute Inpatient Drug Costs / Nonacute Admission (n=76)		$1,937	$1,753	$2,118	$1,757	$952	$2,140
4. Nonacute Inpatient Drug Costs / Nonacute Patient Day (n=83)		$10.16	$9.54	$8.81	$12.54	$11.97	$9.72
5. Inventory Turnover Rate (n=149)		10.6	8.5	10.5	12.2	13.1	9.7
6. IV Production / Acute Patient Day (for Respondents Providing IV Admixture to >= 90% of Patients) (n=79)		.82	.87	.84	.77	1.19	.57
7. Budgeted Hours (excluding residents) / Acute Patient Day (n=144)		0.85	0.83	0.82	0.91	1.12	0.75
8. Budgeted Hours (excluding residents) / Total (acute + non-acute) Patient Day (n=139)		0.63	0.70	0.60	0.63	0.94	0.52

1. Acute Inpatient Drug Costs / Admissions (Acute Care)
2. Acute Inpatient Drug Costs / Acute Patient Day
3. Nonacute Inpatient Drug Costs / Admissions (Nonacute Care)
4. Nonacute Inpatient Drug Costs / Nonacute Patient Day
5. Inventory Turnover Rate
6. Total IV Admixture Product / Acute Care Patient Days for >= 90%
7. Total Number of Budgeted FTE (Excluding Residents) x Hours per FTE / Acute Care Patient Days
8. Total Number of Budgeted FTE (Excluding Residents) x Hours per FTE / Acute and non-Acute Care Patient Days