1999/2000 Annual Report:
Hospital Pharmacy in Canada Survey
Pharmacy Staffing and Drug Costs

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HOSPITAL PHARMACY ANNUAL REPORT

EDITORIAL BOARD

Foreword

D. Terrance McCool

Eli Lilly Canada Inc. is pleased to present the results of the 13th Annual Canadian Hospital Pharmacy Survey on our new website, www.lillyhospitalsurvey.ca, another of the many changes to come as we enter the 21st Century.

Lilly, the Editors and the users of the Annual Report would like to thank all of the hospital pharmacists in Canada who responded to this year's survey. The names of their hospitals appear in our Respondent Recognition section. Our special thanks to the Regional Coordinators who assisted us and helped us to achieve a 50% response rate. The data presented in the 1999/2000 Edition of the Canadian Hospital Pharmacy Annual Report is your data, as submitted and compiled by Chapter Three Marketing Research Services Inc. *

We would like to thank our 1999/2000 Editorial Board – Ron McKerrow, Steve Long, Kevin Hall, Pegi Rappaport, Jean François Bussières and Bonnie Salsman for their personal effort and commitment to produce this report.

Management information can be a valuable tool in both decision-making and planing in pharmacy and administration. It is our hope that the information in the report is helpful and contributes to effective decisions in hospitals, professional associations and in governments.

The next edition of the Canadian Hospital Pharmacy Annual Report will be a special edition that will focus on the results of the Second Millcroft Conference on Hospital Pharmacy in the 21st Century.

Yours truly,

D. Terrance McCool
Vice-President, Corporate Affairs
Eli Lilly Canada Inc.

* The Editorial Board 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.

T.O.C. >

Introduction – Focus on Recruitment and Retention

Ron McKerrow

Since the last hospital pharmacy report two years ago, numerous changes have occurred in the Canadian Healthcare System. Demands for health services have increased while funding to support these services has declined. Access issues are evident across the system, illustrated by the emphasis on increasing wait lists and surgical cancellations. Throughout these changes, the Canadian public has been clear that healthcare remains an extremely important issue.

In addition to our aging population putting pressure on our healthcare system, our pharmacy workforce is aging. With the increasing demand for service, and a shrinking supply of qualified professionals, it is anticipated that pharmacy will have to significantly change practice in order to meet the demands of the Canadian public over the next ten years. Recognizing this challenge, the focus for this survey is the recruitment and retention of pharmacists. We have all read of the shortage in medical and nursing staff across the country. This report illustrates that the shortage of pharmacists will be similar to the shortages in other professions. The demands for pharmacists appear to be increasing and 54% of all respondents reported they had to curtail services because of staff shortages. At the time of the survey, there were more than 150 vacant pharmacists' positions, and more than 200 pharmacists will be retiring over the next five years. Professional planning strategies should focus on ensuring that appropriate numbers of pharmacists are trained while the role of the pharmacist is redesigned. Automation of dispensing systems, coupled with an increased role and responsibility of technicians will reduce the need for pharmacists in dispensing tasks.

Retention strategies for pharmacists are unclear. Continuing education is cited as an effective means to retain pharmacists; however, support for continuing education appears to have declined. To be successful, hospital pharmacy must continue to attract highly qualified clinicians and develop strategies to retain them within the public sector.

Over the past seven years, funding for hospitals has declined; however, pharmacy staffing continues to increase. These increases in pharmacy staffing are more commonly associated with pharmacists' participation in more advanced practice rather than workload adjustments. The move to outpatient care from inpatient care continues, as shown in the increasing importance placed on Ambulatory Care pharmacy practice in the hospital setting.

Drug distribution systems have changed only slightly over the past two years. With the Institutes of Medicine reports in the United States drawing attention to the high incidence of medical errors, safer drug distribution systems are required. In this environment, it becomes increasingly critical for institutions to utilize drug distribution systems that are designed to minimize the potential for human error.

In an age of increased accountability, pharmacy managers continue to struggle with a variety of workload measurement tools. For this reason, we have continued the program-based benchmarking study that was first presented in the 1997/98 survey of hospital pharmacy in Canada. The results validate the methodology demonstrating that substantial increases in both staffing and drug costs have occurred over the past two years.

In this new millennium, the Editorial Board has decided to collect and report survey information electronically. A website has been developed (www.lillyhospitalreport.org - to become www.lillyhospitalsurvey.ca after February 2001) in order to improve communications amongst hospital pharmacy managers in Canada. In addition to presenting the 1999/2000 hospital pharmacy report, it is hoped that this website will be used as a communication tool for hospital pharmacy managers in Canada. Calendar events, bulletin board, and indexing of facilities and managers are tools which will assist pharmacists in sharing information.

Our editorial board is currently planning a second conference to bring together leaders in pharmacy from across the country to identify emerging trends, and assess their effects on hospital pharmacy practice. Proceedings from this conference will be published and distributed on our website. By using an electronic medium, and having a combination of surveys and conferences, we hope to provide you with both a historical review and future perspective of hospital pharmacy practice in Canada.

T.O.C. >

Demographics

Ron McKerrow

The 1999/2000 response rate was slightly lower than the last survey at 42% (115/273). Two more surveys were sent to facilities than in 1997/98, however our new electronic format made comparisons to past years difficult. The mix of facilities was similar to past years with 54% (62/115) of all respondents being from non-teaching facilities and 46% (53/115) from teaching facilities. The numbers of facilities responding from multi site health organizations increased over the past several years from 34% in 1996/97 to 57% in 1999/2000, likely as a result of the effects of regionalization in health centres across Canada.

The response rate by province is illustrated in Figure 1. In most provinces the response rate increased however notable reductions in response were seen in Saskatchewan (13%), Ontario (22%), Quebec (53%) and Nova Scotia (42%). The reduction in the response rate for Ontario was most noteworthy – in the past three surveys the province's percentage of the sample fell from 36% to 18% (21/115).

Hospital demographic information presented in Table I is the average of reported data from hospitals with a total of 100 beds or more and at least 50 acute care beds. These data were consistent in sample size and demographic indicators when compared to previous years.

The consistency between this year's data and that of two years ago is remarkable. Bed allocation, annual admissions, occupancy rate and patient days changed very little from the last survey. The length of stay increased slightly in teaching hospitals and decreased in non-teaching facilities. The most significant change was in surgical/day unit caseload where teaching hospitals saw a 50% increase over last year.

Figure 1: RESPONSE TO THE SURVEY BY PROVINCE
1999/2000

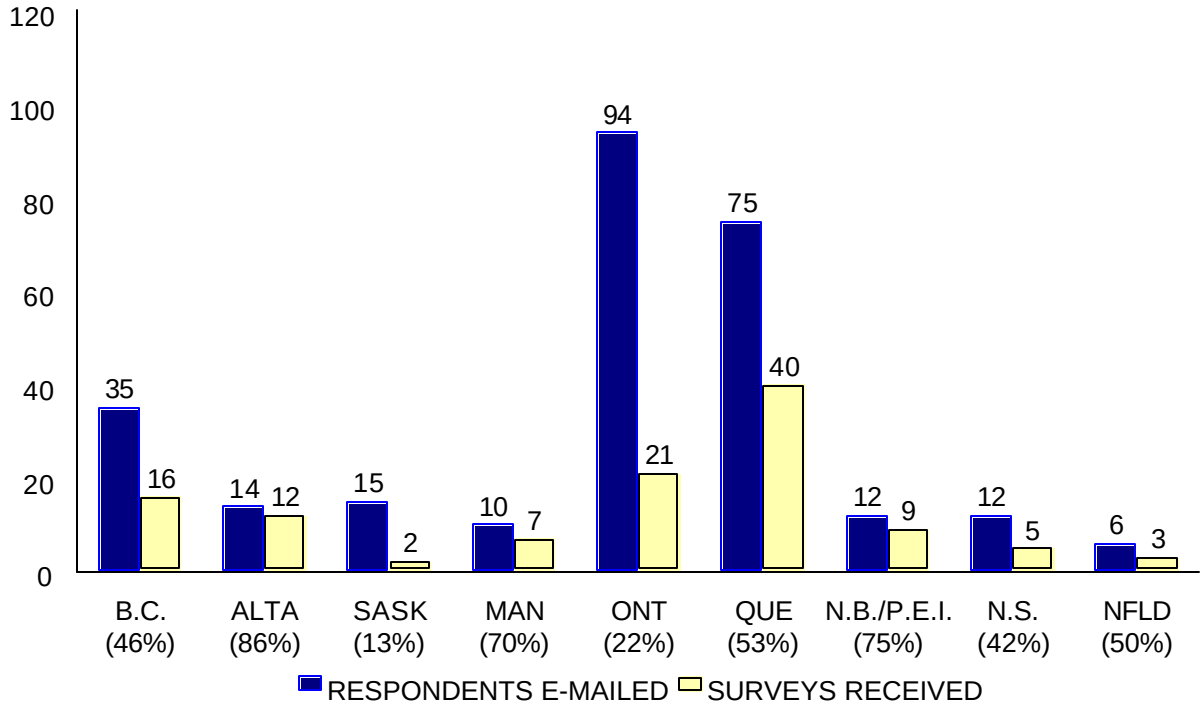

Table I **Hospital Demographic Data 1999/2000** back

Hospitals	Acute Care		
	All (115)	Teaching (53)	Nonteaching (62)
Number of beds	299	420	196
Annual admissions	12,950	17,774	8,988
Occupancy rate	85%	84%	86%
Patient days	94,564	134,844	60,644
Length of stay (days)	7.6	8.7	6.8
Clinic/Medical Day Unit Visits	112,312	200,448	45,330
Emergency Department Visits	48,722	62,011	38,633
Operating Room Case Load	6,904	9,954	4,647
Surgical/Day Unit Case Load	7,631	11,560	4,602

Hospitals	Nonacute Care		
	All (87)	Teaching (37)	Nonteaching (50)
Number of beds	156	168	148
Annual admissions	492	754	309
Occupancy rate	91%	87%	93%
Patient days	47,652	51,210	45,226
Length of stay (days)	230	232	228

T.O.C. >

Clinical Services

Jean-Francois Bussières

During the 1990's there was significant development of clinical pharmacy services in North America. Many evaluative research and economic studies were published showing the positive clinical and economic impact of clinical pharmacists in their milieu. It is clear that pharmacists are key players in health care and that they can make a difference through the implementation of inpatient and outpatient clinical pharmacy services. A literature review of economic studies published between 1988 and 1995 showed an average benefit:cost ratio of 16.7:1 for clinical pharmacy services. [1-2] A study looking at clinical pharmacy services, pharmacy staffing and the total cost of care in United States hospitals suggested that as staffing increased for clinical pharmacists and hospital pharmacy administrators, total cost of care decreased. [3] Another study using data from the 1992 national clinical pharmacy services database identified four clinical pharmacy services associated with lower hospital mortality. [4] The 1999/2000 data from the Canadian Hospital Pharmacy Survey supports the tendency to continued growth of clinical pharmacy services.

Profile of clinical pharmacy services

For the first time this year, questions probed the nature of clinical pharmacy services developed for outpatients and inpatients and the allocation of pharmacist resources dedicated to these activities. The development of clinical pharmacy services relies on many factors, including the mission of the institution, the needs expressed by medical and clinical teams for such services, the evaluation of patient needs, and the expertise of pharmacists on the team.

Outpatient clinical pharmacy services were developed in at least one sector by 78% of all respondents (Table II). Specific services were reported by 3 to 39% of respondents; with the most common being haematology-oncology clinics, diabetes clinics, palliative care/pain clinics, emergency rooms, and DVT/anticoagulant clinics. In general, outpatient services were more prevalent in teaching hospitals. However, some clinical pharmacy services were more prevalent in non-teaching institutions, e.g. pain/palliative care clinics, diabetes clinics, and lipid/cardiovascular clinics.

Inpatient clinical pharmacy services were implemented in at least one area by 92% of all respondents (Table III). Various services were offered by 2 to 59% of respondents; with the most popular being adult general medical units, adult intensive care units, geriatric/long term care units, adult surgical units, adult mental health units, and adult haematology-oncology units.

Pharmacist staffing, distribution systems and clinical pharmacy practice models

The average of reported pharmacist staffing for clinical services was 1.66 FTE for outpatient and 4.46 FTE for inpatient areas. Although staffing levels correlated with bed size for respondents, there was proportionately more staff for these services in teaching hospitals compared to non-teaching hospitals. Respondents from non-teaching institutions had fewer outpatient clinical pharmacists (0.84 FTE) compared to teaching hospitals (2.65 FTE) as well as fewer inpatient clinical pharmacists (1.97 vs. 7.16 FTE). However, it is also important to note that there was considerable variance in reported staffing and standard deviations often equalled the means. For example, the range of pharmacist staffing in outpatient haematology-oncology clinics was 0.1 to 4 FTE and in asthma/allergy clinics it was 0.01 to 4 FTE. The range of reported total clinical pharmacist FTE assigned to inpatient areas was 0.1 to 31.4 FTE.

Looking at the correlation with drug distribution systems, there was a tendency for respondents with unit dose and CIVA to have more staff dedicated to clinical pharmacy services than respondents with traditional drug distribution systems (5.04 vs. 2.73 FTE). In other words, pharmacy departments that have adopted more complex and integrated distribution systems do not have to sacrifice clinical services.

There was also a correlation with respondents' clinical pharmacy practice model. Respondents that had adopted the pharmaceutical care model were more likely to offer clinical services compared to respondents using a traditional clinical pharmacy model (97% vs. 82% for inpatients and 82% vs. 72% for outpatients). The level of staffing was also higher for respondents using the pharmaceutical care model compared to traditional clinical pharmacy (5.18 vs. 2.19 FTE for inpatients and 1.76 vs. 0.49 FTE for outpatients).

Interventions

Pharmacists are being more and more proactive in their clinical duties. There has been a sustained growth in the average of reported numbers of interventions/year going from 2749 in 1992/93, to 5290 in 1997/98 and to 7505 in 1999/2000 (Table IVa). This trend might be related to mergers and larger hospitals; but the average number of acute care beds/respondent increased by only 18% from 253 in 1992/93 to 299 in 1999/2000. A reduced acute care length of stay (from 8.1 days in 1992/93 to 7.6 in 1999/2000) and a tertiarization of the care may have increased the need for clinical pharmacy services.

The increase in reported numbers of interventions is probably related more to increased pharmacist staffing (from 9.1 FTE in 1992/93 to 13.8 FTE in 1997/98 and 15.8 FTE in 1999/2000). The average of reported interventions/admission went from 0.15 in 1992/93 to 0.44 in 1997/98 and to 0.53 in 1999/2000. However, the average of reported interventions/pharmacist FTE remained similar for the last two reports (454 in 1997/98 vs. 418 in 1999/2000).

It is interesting to mention that the rate of interventions/admission (0.51) and the number of interventions/pharmacist FTE (385) as somewhat lower in pharmacy departments that had adopted the pharmaceutical care model (0.58 and 505 respectively for traditional clinical services). This observation has been proposed elsewhere in the literature. [5]

Participation of pharmacists in clinical activities

Table IVa presents data on the participation of pharmacists in specific clinical activities according to bed size, teaching status and clinical practice model. Small increases were observed in routine consultations with physicians (from 72% in 1997/98 to 77% in 1999/2000), admission histories (from 42% to 53%), individual patient counselling (from 84% to 96%) and pharmacokinetic dosing (from 80% to 84%). The average of reported numbers of pharmacokinetic recommendations varies considerably from one report to the next (459/year in 1999/2000, 829 in 1997/98, 491 in 1996/97, and 801 in 1995/96). Adverse drug reaction reporting has been quite stable since 1992/93 at 84% of all respondents. Overall, activities presented in Table IV have grown from 16 to 294% since 1992/93, another sign of sustained growth of clinical activities in hospital pharmacy practice.

There were no significant differences among regions except for regular rounds with nurses (13% in Quebec vs. 45% in Canada) and patient group teaching (29% in Manitoba vs. 76% in Canada). Clinical activities were more prevalent in teaching institutions and for respondents that have adopted the pharmaceutical care model.

Documentation of interventions and outcomes

Pharmacists have traditionally documented much of their practice through evaluative studies and as statistical reports to pharmacy management. Eighty-eight percent of all respondents documented their interventions; and of those, 70% documented them partially and 30% documented $\geq$ 90% of them. Documentation occurred in pharmacy records only (35%), medical records only (16%) and both medical and pharmacy records (45%). Computerized documentation of interventions was variable throughout the country and averaged 43%.

Data from 1999/2000 shows that documentation of intervention outcomes regarding acceptance rate (44%) and economic outcome (10%) were the lowest reported since data has been collected in this survey. The average of reported acceptance rates was stable with a small standard deviation at 89% $\pm$

9%. The average of reported cost savings was $106,440/year. Documentation efforts were mainly directed towards the appropriateness of the interventions (75%). The evaluation of clinical outcomes averaged 18% of all respondents and was more popular in western Canada (> 30%). The average rate of favourable outcome was 78%. Twenty-seven percent of the respondents used the drug-related problem (DRP) categories for their documentation of clinical interventions. Finally, pharmacist-patient interactions were documented in the health (medical) record by 77% of respondents and of those, 30% documented ≥ 90% of these interactions.

Practice models

Most pharmacy departments have a mix of distribution systems and clinical practice models. Pharmaceutical care is defined as the responsible provision of drug therapy for the purpose of achieving definite outcomes. The process of pharmaceutical care includes designing, implementing and monitoring a therapeutic plan that involves the identification of potential or actual drug-related problems, their prevention and resolution. Traditional clinical pharmacy services are defined as a variety of clinical pharmacy services related to a specific drug, a specific pharmaceutical expertise or a targeted approach that will maximize a specific outcome for a patient (e.g. pharmacokinetic services, total parenteral nutrition (TPN) services).

Traditional clinical pharmacy services were provided by 89% of all respondents, and pharmaceutical care was provided by 66% of all respondents (Table IVb). These values were similar to those reported in 1997/98. Pharmaceutical care was reported to a greater extent in Ontario (81%), BC (71%) and Quebec (73%) and to a lesser extent in the Maritimes (33%). Traditional clinical pharmacy services were provided to 52% of respondents' beds while pharmaceutical care services were provided to 26% of respondents' beds. Eighty-three percent of all respondents did not offer any clinical pharmacy services to an average of 38% of their beds.

Provision of clinical pharmacy services on weekends dropped from 70% in 1997/98 to 50% in 1999/2000, a situation that could be explained by a pharmacist shortage throughout the country. Weekend coverage was oriented towards both new and follow-up patients (52%), follow-up only (41%) or solely new patients (5%).

Seamless care

Seamless care is defined as the desirable continuity of care delivered to a patient in the health care system across the spectrum of caregivers and their environments. Pharmacy care is carried out without interruption such that when one pharmacist ceases to be responsible for the patient's care, another pharmacist or health care professional accepts responsibility for the patient's care.

Thirty-two percent of all respondents had established a policy for seamless care that covered an average of 11% (range 5 - 50%) of their patients (Table IVb). Information was provided on a prospective basis in 26% of the cases, and upon request in 35% of the cases. The information provided was directed towards community pharmacists (53%), family physicians (37%), home care providers (30%) or home care centres (23%). The information provided included medications at discharge (51%), medications discontinued during hospital stay (32%), relevant drug monitoring parameters and lab values (30%), care plan information (28%) and diagnosis (17%). Respondents that had adopted the pharmaceutical care model reported the development of a seamless care policy in significantly higher proportions compared to respondents with traditional clinical services (43% vs. 10%).

Evaluation of clinical pharmacy services

Organizations generally invest in planning activities but tend to under-invest in the control of their business either due to a lack of funding or low expected benefits. The control function includes several aspects of evaluation. The American Society of Health System Pharmacists has published a useful handbook on job skills and evaluation. [6] Thirteen percent (15/115) of all respondents evaluated direct patient care services by sampling of clinical activities. The evaluation was performed by peers (other

pharmacists) in 93% of cases, by physicians in 20% of cases and/or by others in 13% of cases. Departmental evaluation of clinical activities was more prevalent in teaching institutions (23%) compared to non-teaching institutions (5%). The methods of evaluation included retrospective chart review (80%), direct observation (33%) and self-evaluation by pharmacists (33%). The aspects that were evaluated included competency assessment (73%), documentation (67%), implementation of objectives and monitoring plan (53%), patient assessment (40%), and patient counselling and understanding of information (33%).

Future perspective

Respondents were asked if additional staff were required in order to provide adequate levels of clinical pharmacy services to inpatients and outpatients. Ninety-three percent of all respondents indicated that additional FTEs were required, with an average of 2.0 (range 0.4 – 8.0) FTE for outpatients and 3.5 (range 0.4 - 14.2) FTE for inpatients. Based on the average of reported total staffing, this addition of staff would represent a 17% increase in overall FTE. The average of reported pharmacist requirements were higher in teaching institutions in terms of absolute numbers (2.6 FTE outpatients, 4.6 FTE inpatients) but lower as a percentage of total staff (13%). The comparable numbers for non-teaching hospitals were 1.4 FTE for outpatients and 2.4 FTE for inpatients which was 24% of total staff. The author's assumption is that this additional staff would cover the 38% of beds that did not receive any clinical pharmacy services.

Respondents also outlined the barriers that existed within hospitals that prevented the provision of adequate clinical pharmacy services to both inpatients and outpatients. They included: lack of funding/support from administration (82%), lack of pharmacists FTEs/recruitment issues (78%), lack of clinical training (33%), and lack of support from the clinical team (12%). Only 3% of all respondents considered there were no barriers.

Research activities in pharmacy practice are now covered in the education and research section. Further comparisons with U.S. hospital pharmacy practice can be undertaken with two recent publications: the 1998 National Clinical Pharmacy Services Study [7] and the National Survey of Pharmacy Practice in Acute Care Settings - 1999. [8] The American College of Clinical Pharmacy has recently published a white paper on the vision of pharmacy's future roles, responsibilities and manpower needs in the U.S. [9]. A recent review of ambulatory care clinical pharmacy services is also a helpful reference. [10]

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Table II Distribution of outpatient clinical services and resources allocated (FTE) 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	NonTeaching (62)
Respondents with Outpatient	90	20	41	29	41	49
Clinical Services	78%	69%	77%	88%	77%	79%
Total FTE ( )	(1.66)	(0.53)	(1.76)	(2.30)	(2.65)	(0.84)
• Haematology-oncology (n=34)	39% (0.80)	25% (0.38)	51% (0.69)	31% (1.35)	41% (1.12)	37% (0.51)
• Diabetes clinic (n=32)	38% (0.27)	45% (0.13)	44% (0.30)	24% (0.38)	32% (0.48)	43% (0.14)
• Pain/palliative care (n=28)	37% (0.23)	45% (0.19)	39% (0.28)	28% (0.17)	27% (0.43)	45% (0.15)
• Emergency room (n=26)	31% (0.46)	15% (0.11)	41% (0.44)	28% (0.64)	29% (0.64)	33% (0.34)
• DVT/anticoagulant clinic (n=26)	31% (0.72)	20% (0.48)	39% (0.96)	28% (0.35)	29% (1.21)	33% (0.42)
• Infectious disease/AIDs (n=21)	24% (0.69)	20% (0.33)	15% (0.76)	41% (0.80)	39% (0.79)	12% (0.47)
• Renal/dialysis (n=19)	23% (0.54)	20% (0.50)	20% (0.59)	38% (0.52)	29% (0.65)	18% (0.41)
• Others (n=18)	21 % (0.65)	10% (0.25)	20% (0.61)	31% (0.72)	29% (0.75)	14% (0.43)
• Asthma/allergy (n=16)	18% (0.47)	5% (0.10)	27% (0.21)	14% (1.30)	22% (0.78)	14% (0.08)
• Geriatric day care (n=11)	14% (0.36)	5% (0.10)	17% (0.31)	17% (0.50)	22% (0.42)	8% (0.25)
• Cardiovascular/lipid clinic (n=12)	14% (0.12)	25% (0.10)	12% (0.16)	10% (0.08)	7% (0.35)	20% (0.08)
• Mental health (n=7)	9% (0.12)	5% (0.20)	10% (0.08)	10% (0.15)	7% (0.15)	10% (0.10)
• Transplantation (n=6)	7% (0.82)	5% (0.20)	0% (0)	17% (0.94)	12% (0.96)	2% (0.10)
• Neurology (n=1)	3% (0.50)	0% (0)	2% (0.50)	7% na	7% (0.50)	0% (0)

% = percentage of respondents offering clinical services in that sector
(0.00) = average number of full-time equivalents dedicated to clinical services in that sector

Table III Distribution of inpatient clinical services and resources allocated (FTE) 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	NonTeaching (62)
Respondents with Inpatient Clinical Services	106 92%	26 90%	48 91%	32 97%	51 96%	55 89%
Total FTE ( ) Total Beds	(4.46) 417	(1.42) 141	(3.50) 350	(8.60) 770	(7.16) 537	(1.97) 315
• Adult general medicine units (n=59)	59% (1.85)	62% (0.55)	46% (1.65)	78% (2.74)	59% (2.78)	60% (0.96)
• Adult intensive care units (n=57)	57% (0.88)	42% (0.34)	54 % (0.55)	72 % (1.48)	59% (1.31)	55% (0.43)
• Adult geriatrics/LTC units (n=57)	55% (0.77)	42% (0.38)	54% (0.60)	66% (1.20)	51% (1.02)	58% (0.57)
• Adult surgical units (n=43)	42% (1.19)	42% (0.45)	33% (0.80)	56% (2.00)	37% (2.10)	47% (0.54)
• Adult mental health units (n=40)	39% (0.73)	23% (0.31)	35% (0.82)	56% (0.79)	45% (1.06)	33% (0.32)
• Adult haematology-oncology units (n=35)	35% (0.94)	15% (0.41)	33% (0.52)	53% (1.46)	41% (1.30)	29% (0.46)
• Paediatric general medical units (n=27)	26% (0.77)	31% (0.52)	23% (0.59)	28% (1.17)	18% (1.88)	35% (0.21)
• Adult rehabilitation units (n=19)	21% (0.46)	19% (0.38)	17% (0.49)	28% (0.46)	16% (0.71)	25% (0.31)
• Obstetrics/gynaecology units (n=19)	21% (0.37)	23% (0.31)	13% (0.13)	31% (0.54)	12% (0.74)	29% (0.24)
• Paediatrics intensive care units (n=18)	18% (0.93)	8% (0.55)	8% (1.10)	41% (0.93)	31% (1.09)	5% (0.10)
• Paediatric haematology-oncology units (n=9)	8% (1.28)	4 % (1.00)	6% (1.40)	16% (1.27)	16% (1.42)	2% (0.20)
• Paediatric surgical units (n=6)	8% (0.76)	4% na	6% (0.87)	13% (0.65)	12% (0.89)	4% (0.10)
• Paediatric mental health units (n=6)	8% (0.31)	0% (0)	8% (0.31)	13% (0.30)	14% (0.36)	2% (0.05)
• Paediatric rehabilitation units (n=2)	2% (0.75)	0% (0)	2% (0.50)	3% (1.0)	4% (0.75)	0% (0.75)

% = percentage of respondents offering clinical services in that sector
(0.00) = average number of full-time equivalents dedicated to clinical services in that sector

Table IVa Clinical Pharmacy Services by Bed Size, Teaching Status and Pharmaceutical Care Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)	PC Providers (76)	Not PC (39)
Clinical Activities:								
• Admission Histories	61 53%	8 28%	30 57%	23 70%	40 75%	21 34%	45 59%	16 41%
• Discharge Interviews	84 73%	17 59%	39 74%	28 85%	48 91%	36 58%	62 82%	22 56%
• Individual Patient Counselling	110 96%	28 97%	51 96%	31 94%	51 96%	59 95%	74 97%	36 92%
• Patient Group Teaching	87 76%	21 72%	41 77%	25 76%	41 77%	46 74%	61 80%	26 67%
• Regular Rounds with Physicians	63 55%	4 14%	32 60%	27 82%	44 83%	19 31%	47 62%	16 41%
• Regular Rounds with Nurses	52 45%	11 38%	19 36%	22 67%	28 53%	24 39%	37 49%	15 38%
• Routine Consultation with Physicians	88 77%	21 72%	37 70%	30 91%	49 92%	39 63%	64 84%	24 62%
• Adverse Drug Reaction Reporting	97 84%	21 72%	45 85%	31 94%	47 89%	50 81%	66 87%	31 79%
Interventions:								
• Pharmacokinetic Dosing Services	97 84%	26 90%	42 79%	29 88%	46 87%	51 82%	69 91%	28 72%
• # of Pharmaconkinetic Recommendations Made/Year (n=97)	459	193	606	537	687	244	540	243
• Documented Interventions	101 88%	23 80%	47 89%	31 94%	50 94%	51 83%	70 92%	31 79%
• # of Therapeutic Interventions Made/Year (n=101)	7,505	1,254	6,709	12,474	10,782	3,409	7,993	6,185
• Reviewed Interventions for Acceptance – acceptance rate (n=36)	44 44% 89%	10 43% 90%	16 34% 91%	18 58% 87%	25 50% 91%	19 37% 87%	31 44% 89%	13 42% 91%
• Reviewed Interventions for Economic Outcome – annual savings (n=5)	10 10% $106,440	2 9% $12,100	3 6% $50,000	5 16% $229,000	3 6% $229,000	7 14% $24,733	6 9% $130,500	4 13% $10,200
• Reviewed interventions for Clinical Outcome – rate of favourable outcome (n=10)	18 18% 78%	4 17% 90%	4 9% 94%	10 32% 65%	8 16% 73%	10 20% 86%	14 20% 78%	4 13% –
• Interventions reviewed regarding appropriateness	76 75%	18 78%	39 83%	19 61%	37 74%	39 76%	52 74%	24 77%
• Interventions reviewed regarding type, using drug related problem (DRP) categories	27 27%	4 17%	12 26%	11 35%	14 28%	13 25%	17 24%	10 32%
Ratios:								
• # of interventions per admission (n=57)	0.53	0.25	0.59	0.64	0.61	0.42	0.51	0.58
• # of interventions per Pharmacist FTE (n=61)	418	298	442	455	417	421	385	505

Table IVb Clinical Pharmacy Services by Bed Size, Teaching Status and Pharmaceutical Care Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)	PC Providers (76)	Not PC (39)
Clinical Practice Models:								
• Pharmaceutical care	76	18	35	23	40	36	76	–
	66%	62%	66%	70%	75%	58%	100%	–
– % of beds serviced (n=76)	26%	20%	24%	35%	31%	21%	26%	–
• Traditional clinical services	102	27	43	32	48	54	68	34
	89%	93%	81%	97%	91%	87%	89%	87%
– % of beds serviced (n=102)	52%	66%	51%	43%	48%	55%	47%	62%
• Some patients do not receive any patient-oriented clinical services	95	26	40	29	43	52	66	29
	83%	90%	75%	88%	81%	84%	87%	74%
•								
– % of beds not serviced (n=95)	38%	32%	43%	37%	39%	38%	36%	44%
• Pharmaceutical care/traditional clinical service provided on weekend/holiday	58	16	27	15	23	35	43	15
	50%	55%	51%	45%	43%	56%	57%	38%
– follow-up only	41%	31%	52%	33%	52%	34%	40%	47%
– new patients only	5%	6%	4%	7%	9%	3%	5%	7%
– both	52%	56%	44%	60%	39%	60%	53%	47%
Seamless Care:								
• Established policy for seamless care	37	7	19	11	20	17	33	4
	32%	24%	36%	33%	38%	27%	43%	10%
- % of patients with information transferred to community (n=37)	11%	12%	11%	13%	12%	11%	10%	22%
• Information provision (n=63):								
- on request	40	12	16	12	21	19	29	11
	35%	41%	30%	36%	40%	31%	38%	28%
- on a prospective basis	30	4	16	10	19	11	26	4
	26%	14%	30%	30%	36%	18%	34%	10%
• Information provided to (n=63):								
- community pharmacists	53%	55%	53%	52%	58%	48%	61%	38%
- family physicians	37%	41%	36%	36%	40%	35%	42%	28%
- home care providers	30%	28%	34%	27%	30%	31%	36%	21%
- care centres	23%	24%	21%	27%	26%	21%	29%	13%
- other	8%	3%	2%	21%	11%	5%	8%	8%

T.O.C. >

Drug Distribution – Outpatients

Pegi Rappaport

Thirty-one percent of all respondents reported that they did not provide any outpatient services, which is similar to the 35% reported in 1997/98 (Table V).

Separate Outpatient Pharmacy

A marketed service for outpatients was operated by 24% of all respondents. This is similar to the survey results for the last four years. Eighty-two percent of these pharmacies were operated by the hospital's pharmacy department. Only two pharmacies were contracted out services.

The average of reported numbers of prescriptions filled annually by these facilities was 67,580. This prescription volume was 33% higher than the 50,880 reported in 1997/98 and 82% higher than in 1996/97. This is the fourth report in a row where volumes have increased suggesting that there is a greater shift to ambulatory care services within hospitals.

Forty-eight percent of these pharmacies generated a profit, a considerable drop from the 60-65% reported in the last seven surveys. The average of reported usual dispensing fees was $8.58, unchanged from 1997/98. The highest average of reported fees was in Alberta ($12.70).

Outpatient Services Through Inpatient Pharmacy

The central inpatient pharmacy provided prescription services to outpatients in 49% of responding hospitals. This was lower than the 57% reported in 1997/98. The average of reported numbers of outpatient prescriptions filled annually was 3628. This continues a downward trend seen in the last five reports (4383 in 1997/98, 5130 in 1996/97, 6353 in 1995/96, 7634 in 1994/95 and 8511 in 1993/94). The three provinces with the greatest decreases were Manitoba, Quebec and Nova Scotia. Quebec's outpatient prescription reimbursement system changed in 1997 such that there is no longer a requirement for hospitals to fill these prescriptions.

The usual dispensing fee on average was $3.07, the same as the 1997/98 average of $3.02.

Table V Ambulatory Care Pharmacy Services by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Separate Outpatient Pharmacy	28 24%	1 3%	12 23%	15 45%	22 42%	6 10%
# Prescriptions filled/year (n=20)	67,580	12,152	85,603	59,511	52,533	203,000
Profit generated (as % of service providers)	12 48%	0 0%	3 30%	9 64%	12 57%	0 0%
Usual dispensing fee (n=21)	$8.58	$14.70	$6.90	$9.19	$9.48	$0
Outpatient Services through Inpatient Pharmacy	56 49%	12 41%	27 51%	17 52%	21 40%	35 56%
# Prescriptions filled/year (n=44)	3,628	2,102	1,563	8,095	9,526	1,662
Usual dispensing fee (n=56)	$3.07	$2.58	$2.79	$3.85	$3.65	$2.71
Outpatient Services not provided	36 31%	16 55%	15 28%	5 15%	14 26%	22 35%

T.O.C. >

Drug Distribution – Inpatients

Bonnie Salsman

Unit Dose Systems

The Institute of Medicine Report, "To Err is Human" has focused attention on the alarmingly high rate of medical misadventures in the health care arena. It has long been recognized that medication errors are a common source of adverse events in the hospital setting, and as the number of therapeutic choices grow, the potential for medication errors, drug interactions and other drug related problems becomes even greater. In this environment, it becomes increasingly critical for institutions to utilize drug distribution systems that are designed to minimize the potential for human error.

Although the "To Err is Human" report has captured the attention of the media, the public and U.S. legislators, the message is not new. The widespread occurrence of medication misadventures and the role of drug distribution systems in protecting patients from untoward events has been clearly established in studies that date back over 30 years. In spite of this, the majority of patients in Canadian hospitals are served by drug distribution systems that rely heavily on human attention to detail.

During the past decade, we have observed a movement toward implementation of unit dose systems that, while painstakingly slow, has been reasonably consistent. This gradual progress continued during the two years since the last survey. In 1999/2000, 51% of all respondents reported the use of unit dose systems within their institutions (Table VI), compared to 48% in 1997/98. The percentage of respondents reporting the provision of unit dose services to ≥90% of beds was 24%, similar to the 23% reported in 1997/98. In hospitals reporting the use of unit dose systems, the average percentage of patients receiving their medications through this method of drug distribution was 67%, compared to 65% at the time of the last survey.

Unit dose systems were only slightly more common in teaching hospitals, where 53% of respondents reported unit dose systems compared to 50% of non-teaching hospitals. Unit dose systems were least common in Nova Scotia (20%, 1/5) New Brunswick/PEI (33%, 3/9) and British Columbia (38%, 6/16). In the remaining provinces, the overall percentage of hospitals reporting some use of unit dose systems was 58% (49/85).

Automated Dispensing

Some small gains were also made in the area of decentralized automated medication dispensing systems. These systems offer many of the safety and medication control advantages of unit dose systems, and may also reduce pharmacy manpower requirements and improve turnaround time by increasing medication accessibility. This year, 10% of respondents (twelve hospitals) reported that unit-based automated medication dispensing systems were used within their institutions, an increase compared to the 6% reported in 1997/98. In these hospitals, the average percentage of patients receiving their doses through this system was 39%. Two hospitals (2%) reported that the unit based dispensing system was used for ≥90% of patients. Two respondents reported use of unit-based medication systems in the Operating Room and one respondent reported use of the system in the Emergency Department.

Use of centralized automated dispensing systems remained stable at 26%. In hospitals using centralized automated systems, the average of reported percentages of doses handled by the machine was 77%, up from 67% in 1997/98.

Controlled/Carded Dose System

The controlled/carded dose system also offers safety advantages compared to traditional and wardstock systems and may be a practical choice in settings with lower acuity of care. Use of the controlled/carded dose system of drug distribution was reported by 29% of respondents, compared to 24% in 1997/98.

These hospitals provided the carded dose system to an average of 41% of patients. Three hospitals reported use of the carded/controlled system of drug distribution for ≥90% of patients.

Traditional and Total Wardstock Systems

Although there was little reported progress toward the expansion of unit dose systems, the percentage of hospitals reporting use of traditional drug distribution systems decreased to 65% compared to 76% in 1997/98. This may be partly due to the fact that the percentage of respondents reporting use of total wardstock systems increased to 20% from 16% in 1997/98. The remaining reduction in the prevalence of traditional systems can be attributed to an increase in use of decentralized automated dispensing systems and controlled/carded dose systems. Unit dose systems, decentralized automated dispensing systems and controlled/carded dose systems all offer safety, cost, control and efficiency advantages compared to traditional and wardstock systems. It is interesting to note that when the figures for these three systems are combined, 72% (83/115) of responding hospitals offer an advanced drug distribution system to at least some beds. Overall, from Figure 2 we see that for the first time, the majority of beds (52%) from the entire respondent data base are serviced with these advanced systems.

In hospitals reporting use of the traditional system, an average of 66% of beds received service through this method of drug distribution, compared to 75% in 1997/98. Only 27% of all respondents reported using a traditional drug distribution system for ≥90% of beds, compared to 43% in the last survey. No hospitals reported use of total wardstock systems for ≥90% of beds, but for hospitals reporting some use of wardstock systems the average proportion of beds being serviced through this system increased to 16% from the 11% reported in 1997/98.

Medication Administration Records

Generation of the patient Medication Administration Record (MAR) from the Pharmacy Information system is an approach that can save nursing time and reduce the potential for medication errors, by reducing or eliminating nurse transcription and improving legibility of the MAR. Utilizing the Pharmacy MAR for electronic charting is a further enhancement of this approach that significantly reduces paper utilization and offers increased accessibility to the MAR for physicians and other healthcare providers. Fifty-five percent of all respondents indicated that data from the Pharmacy Information System was being used to generate MARS (Table VII), but only 10% of these had on-line charting available.

Medication Order Entry

Medication order entry is another process that offers opportunities to improve the safety and efficiency of the drug distribution system. In particular, physician order entry can greatly reduce the risk of prescribing and transcription errors, and reduce the amount of pharmacy time required for order processing. Additionally, many Pharmacy Departments have implemented technician order entry as an approach to increasing the proportion of pharmacists' time spent in direct patient care activities.

Pharmacists were the group most commonly reported to conduct medication order entry at 81%, with technicians close behind at 77%. Nurses and physician order entry was reported by only 6% and 3% of all respondents, respectively, while 3% of respondents indicated that medication order entry was performed by individuals other than those noted above. Pharmacists verified orders entered by technicians in 85% of hospitals who reported the occurrence of technician order entry. Among hospitals utilizing nurse order entry, only 57% reported that pharmacists verified orders entered by nurses. Of the four hospitals reporting physician order entry, 2 reported that the orders were not verified by pharmacists, 1 reported that the orders were verified and one did not respond to this question. Four hospitals reported that orders were entered by persons other than pharmacists, physicians, nurses or technicians- three of these reported that the orders were verified and in one hospital these entries were not verified.

A broad range of order types were entered by technicians, with wardstock order entry commonly reported (79% of all respondents), while chemotherapy (38%) and unit dose (36%) order entry were less common. As illustrated in Table VIII, technician entries of traditional and outpatient prescriptions, unit dose, IV

admixture, TPN and chemotherapy orders were generally verified by pharmacists, but 54% of hospitals where technicians entered wardstock reported that the orders were not verified by pharmacists.

The possible advantages of decentralizing order entry to patient care areas have been discussed in previous annual reports. Providing a system that allows pharmacists to perform medication order entry on nursing units or in other patient care areas can minimize the number of pharmacists required in dispensary areas, place the pharmacists geographically closer to the patient, and perhaps increase the amount of time available for direct patient care activities. These advantages must be balanced against potential disadvantages such as the difficulty of procuring adequate equipment and space for this function in patient care areas, the challenge to the individual pharmacist of performing order entry in a timely manner without jeopardizing the quality of pharmaceutical care, and the possible loss of efficiency compared to a system where a large number of orders can be entered in a centralized location.

Centralized order entry systems remain by far the most common (Table VII). Overall, the average of reported percentages of orders entered within Pharmacy was 86%, and 96% of all respondents indicated that at least some medication orders were entered within pharmacy. However, order entry on nursing units was also common, being reported by 35% of all respondents. Among hospitals where some decentralization of order entry to patient care areas was reported, the overall average percentage of orders entered in these areas was 9%, with a range of 1-95%. Thirty percent of respondents reported satellite pharmacies as a site of medication order entry, although the percentage of orders overall reported as being entered in the satellites was only 5%.

Technician Roles and Responsibilties

Many progressive hospitals that are attempting to maximize their utilization of pharmacist time have implemented systems in which technicians check the work of other technicians. When implemented in concert with appropriate training, certification and quality control programs, “tech-check-tech” programs can maintain or enhance the safety of the drug distribution system, minimize the amount of pharmacist time spent in drug distribution activities, free up additional pharmacist time for direct patient care activities and reduce overall costs. Not surprisingly then, reporting of technician check systems was relatively high (Figure 3), particularly for activities such as unit dose packaging (40%), extemporaneous compounding (35%), arrest tray filling (35%), unit dose tray filling (31%), and IV admixture preparation (26% and 21% respectively for batched and patient-specific IV products). Only 7% of all respondents reported that technicians checked the work of other technicians for chemotherapy, and 3% for medication order entry. It is interesting to note that while 59 hospitals (51%) reported the use of unit dose systems, only 36 (31%) reported that technicians check unit dose trays filled by other technicians. These figures would suggest that a surprising number of hospitals are currently missing a opportunity for a quick win to improve utilization of pharmacist time by transferring unit dose tray checking functions from pharmacists to technicians. This may be due to a variety of real or perceived barriers, as discussed further in the section dealing with Pharmacy Human Resources.

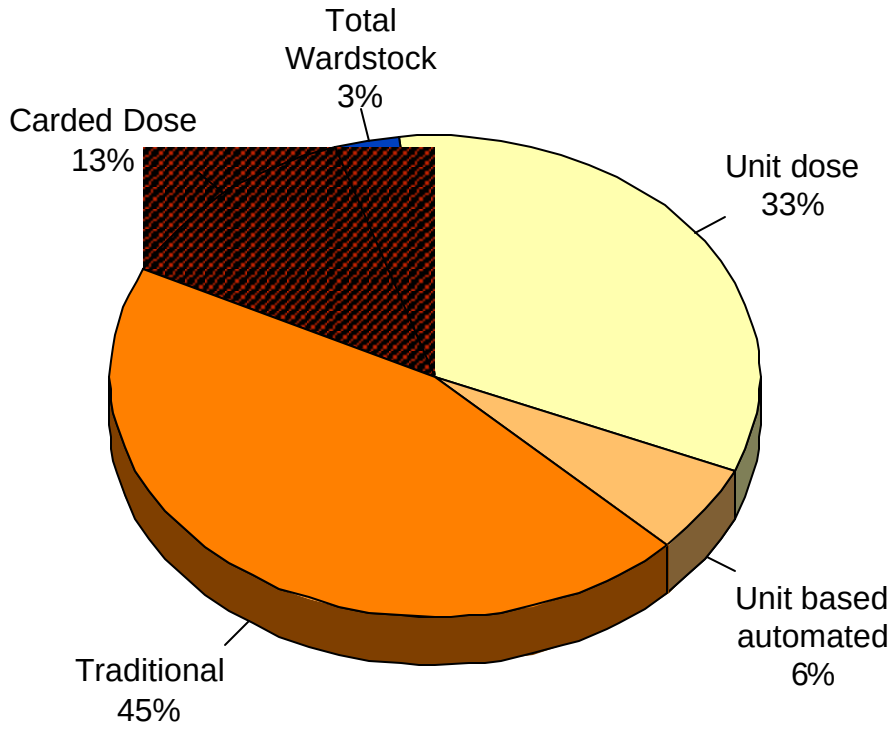
Of the 86 respondents who indicated that technicians check the work of other technicians for at least one activity, only 45 (52%) reported the existence of an in-house certification program. This could be a quality and safety concern unless other programs are in place to ensure the competency of technicians performing these functions.

As public awareness regarding medication safety issues grows, there will be an ever-increasing onus on pharmacy leaders to enhance drug distribution systems and expand the direct patient care role of the pharmacist. The information provided by this year’s survey points to some interesting trends and possibilities for meeting this challenge. Pharmacy managers and pharmacists are encouraged to consider this information in the context of their own institutions, consult with colleagues, and build on the successes already achieved in many institutions across the country.

Table VI Drug Distribution Systems By Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Unit dose, some beds	59 51%	12 41%	32 60%	15 45%	28 53%	31 50%
Unit dose, ≥90% of beds	28 24%	5 17%	18 34%	5 15%	13 25%	15 24%
Unit based automated dispensing, some beds	12 10%	2 7%	5 9%	5 15%	8 15%	4 6%
Unit based automated dispensing, ≥90% of beds	2 2%	1 3%	1 2%	– –	– –	2 3%
Traditional, some beds	75 65%	19 66%	30 57%	26 79%	38 72%	37 60%
Traditional, ≥90% of beds	31 27%	11 38%	15 28%	5 15%	13 25%	18 29%
Total wardstock, some beds	23 20%	4 14%	11 21%	8 24%	14 26%	9 15%
Total wardstock, ≥90% of beds	– –	– –	– –	– –	– –	– –
Control/carded dose, some beds	33 29%	8 28%	12 23%	13 39%	12 23%	21 34%
Control/carded dose, ≥90% of beds	3 3%	1 3%	2 4%	– –	1 2%	2 3%
One system for oral medication for ≥90% of beds	64 56%	18 62%	36 68%	10 30%	27 51%	37 60%
Centralised automated medication dispensing	30 26%	2 7%	15 28%	13 39%	19 36%	11 18%
- Percent of oral unit doses handled	77%	83%	83%	69%	71%	85%

Figure 2: PROPORTION OF BEDS SERVICED BY DRUG DISTRIBUTION SYSTEM1999/2000

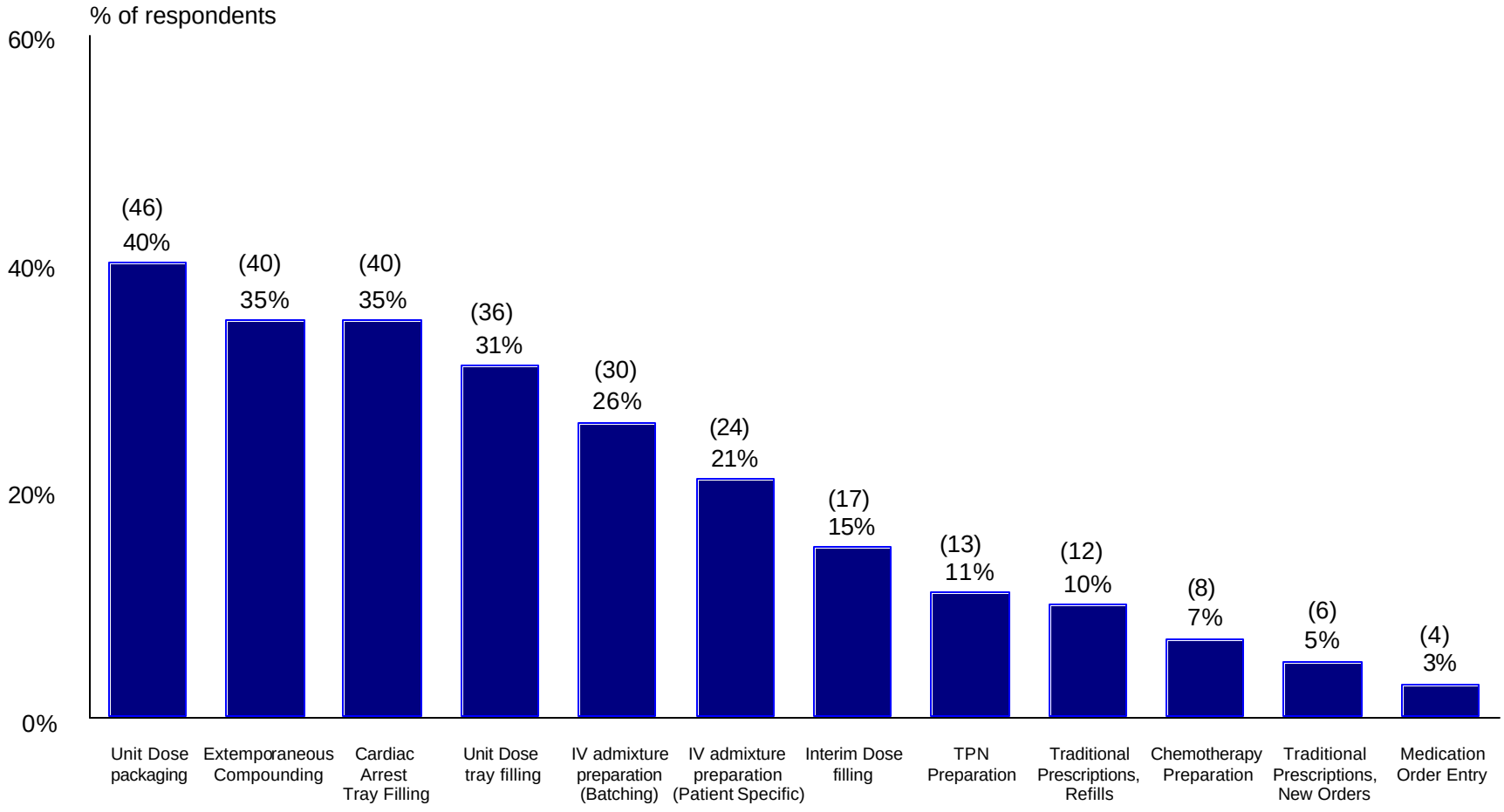


Base: All respondents (115)

Table VII Medication Order Entry By Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Medication Administration Records:						
• Pharmacy system used to generate MARs	63 55%	16 55%	29 55%	18 55%	28 53%	35 56%
• Electronic (online) MARs charting (n = 63)	6 10%	1 6%	3 10%	2 11%	4 14%	2 6%
Location for Order Entry:						
• Central pharmacy	110 96%	29 100%	51 96%	30 91%	50 94%	60 97%
- % of orders entered	86%	91%	90%	75%	78%	92%
• pharmacy satellite	35 30%	5 17%	17 32%	13 39%	26 49%	9 15%
- % of orders entered	5%	2%	4%	8%	8%	2%
• nursing units/ patient care areas	40 35%	8 28%	15 28%	17 52%	23 43%	17 27%
- % of orders entered	9%	6%	6%	18%	13%	6%
Personnel performing order entry:						
• pharmacists	93 81%	25 86%	42 79%	26 79%	44 83%	49 79%
• technicians	88 77%	20 69%	40 75%	28 85%	45 85%	43 69%
- Verified by pharmacists (n = 88)	75 85%	15 75%	38 95%	22 79%	39 87%	36 84%
• nurses	7 6%	1 3%	3 6%	3 9%	4 8%	3 5%
- Verified by pharmacists (n = 7)	4 57%	0 0%	2 67%	2 67%	3 75%	1 33%
• physicians	4 3%	1 3%	1 2%	2 6%	3 6%	1 2%
- Verified by pharmacists (n = 4)	1 25%	0 0%	1 100%	0 0%	1 33%	0 0%
• others	4 3%	1 3%	1 2%	2 6%	3 6%	1 2%
- Verified by pharmacists (n = 4)	3 75%	1 100%	1 100%	1 50%	2 67%	1 100%

Figure 3: TECHNICIAN ACTIVITIES CHECKED BY OTHER TECHNICIANS



Base: All respondents (115)

Table VIII Medication Order Entry By Technicians By Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Wardstock orders	91	24	40	27	44	47
	79%	83%	75%	82%	83%	76%
- Verified by pharmacists	49	7	24	18	29	20
(n = 91)	54%	29%	60%	67%	66%	43%
Traditional prescriptions, new orders	74	19	31	24	35	39
	64%	66%	58%	73%	66%	63%
- Verified by pharmacists	67	14	31	22	33	34
(n = 74)	91%	74%	100%	92%	94%	87%
Traditional prescriptions, refills	78	21	33	24	37	41
	68%	72%	62%	73%	70%	66%
- Verified by pharmacists	61	13	29	19	30	31
(n = 78)	78%	62%	88%	79%	81%	76%
Unit dose orders	41	8	22	11	21	20
	36%	28%	42%	33%	40%	32%
- Verified by pharmacists	35	7	20	8	18	17
(n = 41)	85%	88%	91%	73%	86%	85%
IV admixture orders	64	15	30	19	32	32
	56%	52%	57%	58%	60%	52%
- Verified by pharmacists	59	13	29	17	30	29
(n = 64)	92%	87%	97%	89%	94%	91%
TPN orders	49	11	22	16	26	23
	43%	38%	42%	48%	49%	37%
- Verified by pharmacists	43	9	21	13	23	20
(n = 49)	88%	82%	95%	81%	88%	87%
Chemotherapy orders	44	12	21	11	20	24
	38%	41%	40%	33%	38%	39%
- Verified by pharmacists	41	9	21	11	20	21
(n = 44)	93%	75%	100%	100%	100%	88%
Outpatient prescriptions, new orders	60	12	29	19	32	28
	52%	41%	55%	58%	60%	45%
- Verified by pharmacists	54	8	29	17	30	24
(n = 60)	90%	67%	100%	89%	94%	86%
Outpatient prescriptions, refills	61	12	28	21	34	27
	53%	41%	53%	64%	64%	44%
- Verified by pharmacists	54	10	27	17	30	24
(n = 61)	89%	83%	96%	81%	88%	89%

T.O.C. >

Intravenous Admixtures

Bonnie Salsman

For the first year since 1992/93, there was no growth in the provision of IV admixture programs, with 75% of all respondents reporting the provision of IV admixture services in both 1999/2000 and 1997/98 (Table IX). The six year trend is shown in Figure 4. The percentage of respondents reporting the provision of complete IV admixture programs also remained similar, with 44% of all respondents reporting that services were offered to ≥90% of patients or patient care areas, compared to 43% in 1997/98. Among the hospitals that provided IV admixture services, 59% offered complete programs. For those offering partial programs, the average percentage of patients or patient care areas receiving the service was 28%, a reduction compared to 32% in 1997/98.

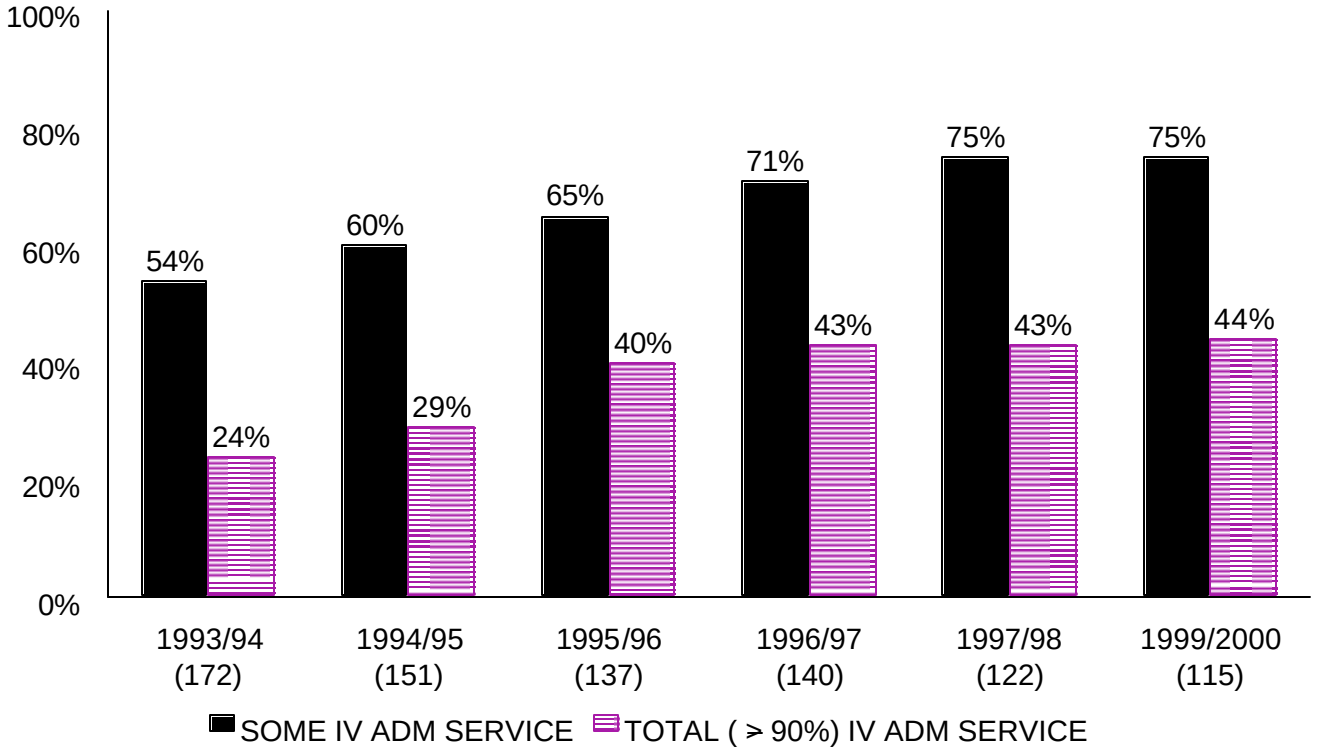
For respondents whose departments provided intravenous admixture services, 73% reported the provision of services to critical care, 28% to the Operating Room, 43% to Emergency, 78% to other inpatients and 65% to outpatients. The figures for all areas other than “other inpatients” represent an increase compared to 1997/98.

Minibag infusion remained the most commonly reported primary method of administering intravenous medications (54%, 62/115). The use of syringe infusers was also common, with 30% (34/115) of all respondents reporting use of this system. Eleven percent (13/115) of all respondents indicated that use of buretrols or burettes was the primary method of administering intravenous drugs in their hospitals.

The average of reported annual IV admixture doses prepared (Table X) was 97,642, much higher than the average of 82,182 reported in 1997/98. For respondents providing service to ≥90% of patient care areas, the average reported IV production per acute patient day was 1.09 overall (up from 0.92 in 1997/98), 1.30 in teaching hospitals, and 0.81 in non-teaching hospitals.

Thirty seven percent (32/86) of respondents with IV admixture services reported use of automated devices to support IV admixture preparation. Pharm Assist was the automated device most commonly reported (23%, 20/86), and use of the Baxa pump was reported by 14% (12/86) of those with IV admixture services. Use of automated TPN compounding systems was reported by 34% (29/86) of hospitals with IV admixture programs, with 30% (26/86) using the Baxter system and only 3% (3/86) reporting use of the Baxa system.

Figure 4: PERCENTAGE OF IV SERVICE PROVIDERS 1993/94 - 1999/2000



Base: All respondents ( )

Table IX IV Admixture Service by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Provision of Some IV Admixture Services	86 75%	18 62%	40 75%	28 85%	43 81%	43 69%
≥90% of patient care areas	51 44%	9 31%	23 43%	19 58%	31 58%	20 32%
If partial, % of patient care areas (n=25)	28%	18%	24%	56%	38%	23%
Patient care areas included: (n=82)						
Critical Care	73%	72%	73%	75%	79%	67%
Operating Room	28%	22%	30%	29%	26%	30%
Emergency	43%	33%	53%	36%	40%	47%
Other inpatients	78%	78%	73%	86%	84%	72%
Outpatients	65%	67%	73%	54%	58%	72%
IV production per acute patient day: ≥90% of patient care areas (n=51)	1.09	1.23	1.04	1.10	1.30	0.81

Table IX IV Admixture Service by Bed Size and Teaching Status 1999/2000
1999/2000

Hospitals	All Respondents				Teaching Hospitals			
	All	**100-200**	**201-500**	**>500**	**Teaching**	**100-200**	**201-500**	**>500**
Annual Production of IV Admixtures – total	97,642 (75)	25,538 (15)	67,877 (36)	187,355 (24)	158,950 (37)	63,824 (3)	104,814 (17)	229,874 (17)
• inpatients	95,603 (41)	24,540 (8)	65,285 (19)	177,357 (14)	143,572 (22)	50,500 (2)	102,016 (10)	203,743 (10)
• outpatients	3,137 (41)	1,005 (8)	2,484 (19)	5,242 (14)	3,588 (22)	0 (2)	1,599 (10)	6,294 (10)
• home patients	2,649 (41)	1,029 (8)	1,453 (19)	5,197 (14)	2,479 (22)	2,551 (2)	1,781 (10)	3,162 (10)

Base: Pharmacy departments providing complete data ( ).

T.O.C. >

Drug Purchasing and Inventory Control

Steve Long

Though hospital size has been fairly constant, expenditures on pharmaceuticals increased by over $1 million to $5,187,498 when compared to the 1997/98 Annual Report. Total drug purchases were reported to have increased in the past fiscal year by 98 of the 115 respondents. Within this group, the reasons for the increase was indicated as due to technology by 70% (69/98), due to inflation by 56% (55/98), due to program changes by 54% (53/98) and due to addition of beds by 26% (25/98). The average of reported increases was 13.7% (range 0.6-45%). Double digit average percentage increases were reported for teaching (13.9%) and non-teaching hospitals (13.5%) and by each size category: 100-200 beds (11.3%), 201-500 beds (14.4%) and greater than 500 beds (14.8%).

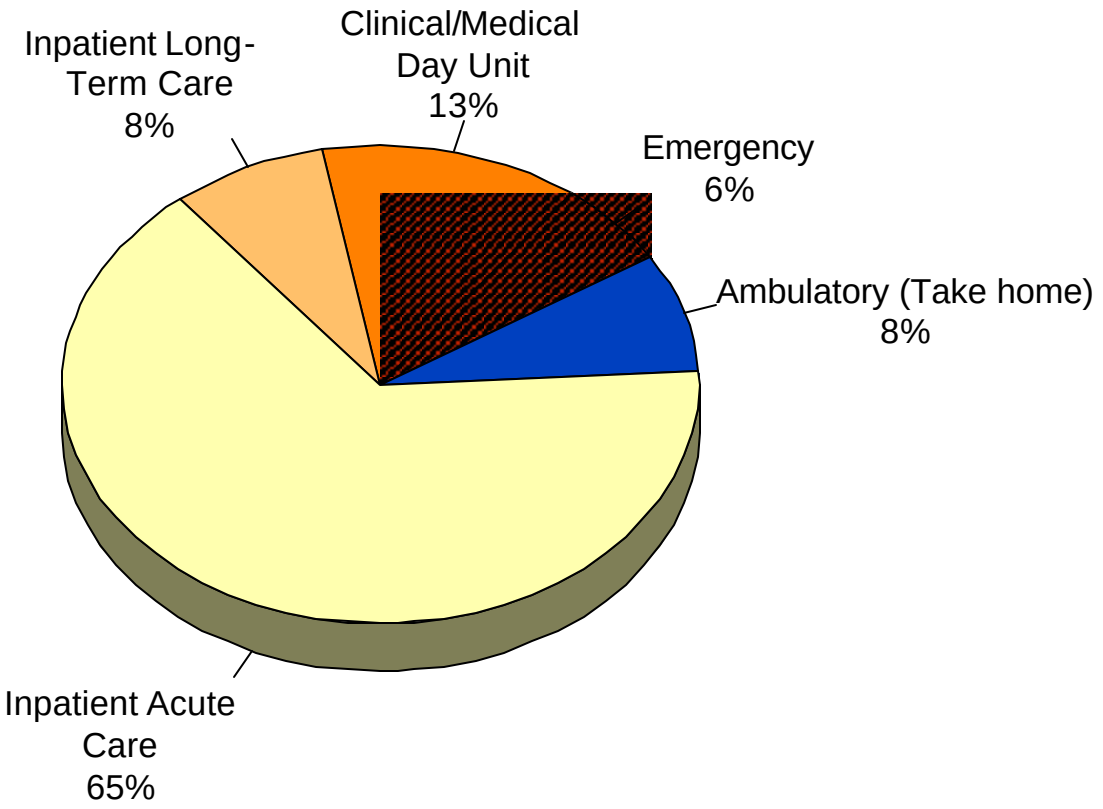
Only seven respondents reported a decrease in the total cost of drugs purchased. The average of reported drug purchase decreases was 3.3% (range 0.1-6%). Decreases were reported to be due to price or contract changes (57%, 4/7), program changes (57%, 4/7), drug use evaluations (43%, 3/7), bed closures (29%, 2/7) and restricted drug policies (29%, 2/7).

The average of reported drug inventories was $469,810, representing an increase of 10% over the value reported in 1997/98 ($425,145). The average of reported inventory turns was 9.3 times, compared with 8.9 times in the 1997/98 Annual Report.

Respondents were again requested to supply drug cost by area: acute inpatients, clinic and medical day units, emergency room, ambulatory (take-home), and long-term care inpatients. Only 30% of all respondents (34/115) were able to provide the requested information for all applicable areas. Figure 5 displays the proportion of costs by area for these respondents. The relative expenditure for each area in comparison to the others has remained unchanged. It is interesting that only 65% of total drug expenditures were for acute care inpatients.

Values for total purchases, drug cost per patient day and drug cost per visit are reported by bed size and for teaching and non-teaching facilities in Table XI. Costs have increased for all categories and by all respondent types. The average drug cost per acute patient day was $27.55 for all respondents, $32.83 for teaching and $22.27 for non-teaching hospital respondents.

Figure 5: PROPORTION OF DRUG EXPENSES BY PATIENT CARE AREA 1999/2000



Base: All respondents (115)

Table XI Drug Purchasing, Inventory Control and Inpatient Drug Costs by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Drug Purchases	$5,187,498	$1,264,203	$3,880,581	$10,586,016	$9,494,673	$1,829,361
Inventory Value	$469,810	$178,877	$374,606	$886,142	$742,068	$255,573
Inventory Turns	9.33	7.37	9.64	10.49	11.10	7.84
Acute Care Inpatient Costs:						
Drug Costs/Acute Patient Day	$27.55 (54)	$24.76 (11)	$25.21 (25)	$32.49 (18)	$32.83 (27)	$22.27 (27)
Drug Costs/Acute Admission	$196.93 (52)	$159.04 (11)	$174.56 (25)	$257.94 (16)	$255.30 (26)	$138.57 (26)
Nonacute Care Inpatient Costs:						
Drug Costs/Nonacute Patient Day	$5.47 (31)	$3.93 (4)	$5.15 (15)	$6.39 (12)	$4.93 (13)	$5.86 (18)
Drug Costs/Nonacute Admission	$1,260 (31)	$2,261 (4)	$1,122 (15)	$1,099 (12)	$722 (14)	$1,704 (17)
Clinic, Medical Day Unit Costs/Visit	$5.49 (50)	$3.74 (12)	$5.98 (24)	$6.06 (14)	$5.90 (23)	$5.11 (27)
Emergency Room Costs/Visit	$4.22 (48)	$2.61 (11)	$4.53 (22)	$4.96 (15)	$5.10 (23)	$3.42 (25)

Base: Pharmacy departments providing complete data ( ).

T.O.C. >

Information Systems

Pegi Rappaport

For this year's report, a number of new questions were developed for the Information Systems section, many of them addressing new trends in this area. Pharmacy information systems have evolved in the last few years with the introduction of products that use client server architecture. There is also a recognition that pharmacy information needs to be shared both with other pharmacies and with the health system as a whole.

Pharmacy systems that were integrated with the hospital's information system were in the majority, but until this information is collected again, trends will not be apparent. Looking at the distribution of computer vendors within our sample of respondents, there were definite regional trends. Meditech led with 23% of installations, but it was based almost solely in B.C., Ontario and the Atlantic provinces. Some systems such as CGSI (14%) and Medisolution/IST (9%) were seen almost exclusively in Quebec. BDM RXTFC (9%) and BDM other (7%) were mainly in B.C. and the Prairies. HBOC (5%) was the second most common system in Ontario. Health Vision (5%), Cerner (6%) and Clinical Pharmacist (3%) had installations spread across various provinces.

Respondents overall were fairly satisfied with their pharmacy computer systems with an average 2.4 rating on a scale of 1 (very satisfied) to 5 (very dissatisfied). Respondents from teaching hospitals (2.1), and those from Alberta (1.6), Nova Scotia (2.0) and Newfoundland (2.0) were the most satisfied and respondents from non-teaching hospitals (2.6), Manitoba (3.1) and Saskatchewan (3.0) were the least satisfied. No trends were clear by vendor or by hospital bed size.

Twenty-three percent of all respondents stated that they had a regional pharmacy information system that gave staff access to patient-specific information from other hospitals. This was most evident in B.C. (44%), Alberta (75%) and the Atlantic provinces (29%). In comparison, Ontario (5%) and Quebec (5%) had the least amount of information sharing. Given that the continuum of care should be a priority for an efficient and effective health care system, this is a trend that needs to continue.

Alberta, Ontario and Quebec led the country with 79% of those respondents (22/28) that have developed and maintained a pharmacy web site. Web sites were also seen more commonly in teaching hospitals (43%, 23/53) compared to non-teaching hospitals (8%, 5/62). These web sites were mainly part of the hospital/institution web site (61%, 17/28). Internet applications were more common (36%, 10/28) than intranet applications (25%, 7/28). The content of web sites varied considerably with no clear trend. There were drug use policies, dosing guidelines/handbooks/protocols, formulary information, drug information databases, departmental policies and operating procedures/manuals and position advertisements and postings.

In 1993 the Lilly Report found that 27% of respondents used the electronic bulletin board of CSHP. This was followed in 1996 with 60% of users having access to e-mail and 24% having access to the internet from their departments. Today, these "general" tools that connect us easily and quickly to others are ubiquitous. It will be interesting to see how Pharmacy applies these technologies to the specifics of pharmacy practice in the 21st century.

T.O.C. >

Human Resources

Steve Long

Staffing

Average staffing, paid hours per patient day and changes in staff are reported in Table XII. Comparisons at the provincial level between this Annual Report and previous Reports should be made with caution. Changes in numbers of respondents and the number of beds suggest that the respondents or the method of reporting (i.e. single sites or part of regional groups) may have changed. The percentage make up of the pharmacy department staff remains consistent with the proportions reported previously (Figure 6).

Paid hours per patient day for pharmacy staff, as reported by respondents, increased in the past 2 years from 0.57 in the 1997/98 Annual Report to 0.68 this year (Table XIII). Paid hours per patient day increased for hospitals of 100-200 beds (from 0.51 to 0.66) and 201-500 beds (from 0.55 to 0.68) but remained unchanged for hospitals of greater than 500 beds (0.7). Increases were reported for teaching and non-teaching hospitals and for all types of medication delivery systems.

Half of the respondents (57/115) reported an increase in staff positions, 43% (49/115) indicated no net change, and 7% (8/115) reported a decrease in positions. Increases were reported by 42% (26/62) of non-teaching hospital and 58% (31/53) of teaching hospital respondents. Seventy-one percent of hospitals larger than 500 beds reported a net increase in pharmacy staffing.

Staffing increases were cited as being due to program changes by 75% (43/57) of respondents with increases, due to increased workload by 67% (38/57) and due to revenue opportunities by 7% (4/57). Staffing decreases were reported to be the result of mandated reductions in 63% (5/8) of institutions reporting decreases and program changes in 50% (4/8) of these institutions.

Pharmacists continued to spend approximately 50% of their time in drug distribution (Figure 7). Gains were made in the amount of time spent performing clinical activities, however this appears to have come at the expense of time spent in teaching and other non-patient care activities.

Salaries

The salaries reported in Table XIV are reflective of those paid prior to March 31, 2000. Numerous contracts were to be settled April 1st. A shortage of available staff for all positions has resulted in volatility in staff salaries. Though the figures are valid for the survey period, great caution should be exercised when using this information to benchmark salaries in today's market. The market for pharmacists and hence compensation is very dynamic at this time.

The average annual expenditure on salaries increased by approximately 8% to $1,415,057. The average expenditure per full time equivalent pharmacy staff position increased to $44,286 from $43,696 reported in the 1997/98 Annual Report.

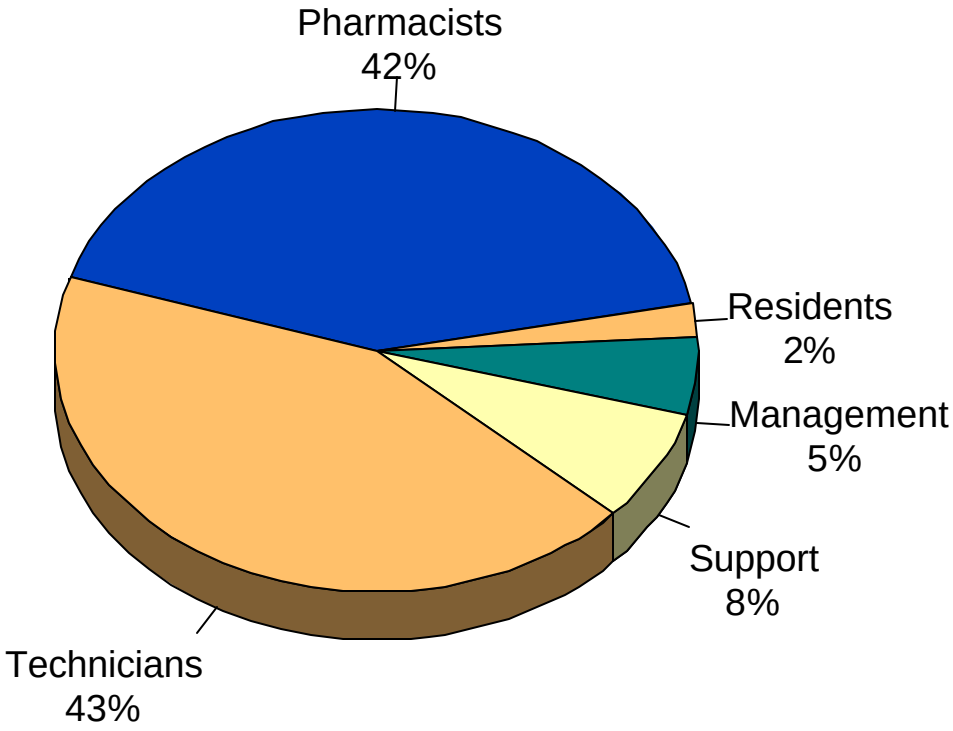
Ranges for the salaries of directors are reported in Table XV. Respondents indicated that 19% of directors earned over $80,000 per year. Directors of larger facilities tended to be compensated at higher levels.

Table XII Average Pharmacy Staffing and Net Percent Change of Staffing by Geographic Region 1999/2000

Hospitals	Canada (115)	B.C. (16)	Alta. (12)	Sask. (2)	Man. (7)	Ont. (21)	Que. (40)	NB/PEI (9)	N.S. (5)	Nfld. (3)
Pharmacist	14.1	14.9	16.5	3.0	18.8	17.8	11.4	9.8	16.0	17.5
Management	1.7	2.4	2.0	1.0	1.4	2.2	1.0	2.0	2.3	2.0
Technician	14.4	14.3	15.6	4.1	15.1	20.3	11.9	11.7	16.1	15.9
Support Staff	2.5	1.2	6.6	0.5	2.6	3.8	1.6	1.3	2.1	2.7
Residents	0.7	0.8	0.6	0.0	0.3	1.0	0.9	0.1	0.6	0.0
Total FTE	33.5	33.6	41.2	8.6	38.1	45.1	26.8	24.9	37.1	38.1
Total beds	417	547	376	192	383	412	394	370	365	710
Pd hr/Acute Pt Day (excluding residents)	0.68	0.65	0.94	0.68	0.61	0.73	0.63	0.57	0.67	0.58
Overall staffing change										
• net increase	50%	56%	58%	0%	100%	48%	40%	56%	20%	67%
• net decrease	7%	0%	0%	0%	0%	10%	10%	0%	40%	0%
• no change in FTE	43%	44%	42%	100%	0%	38%	50%	44%	40%	33%

(Total FTE may show effect of rounding)

Figure 6: STAFF COMPOSITION OF HOSPITAL PHARMACY DEPARTMENT 1999/2000



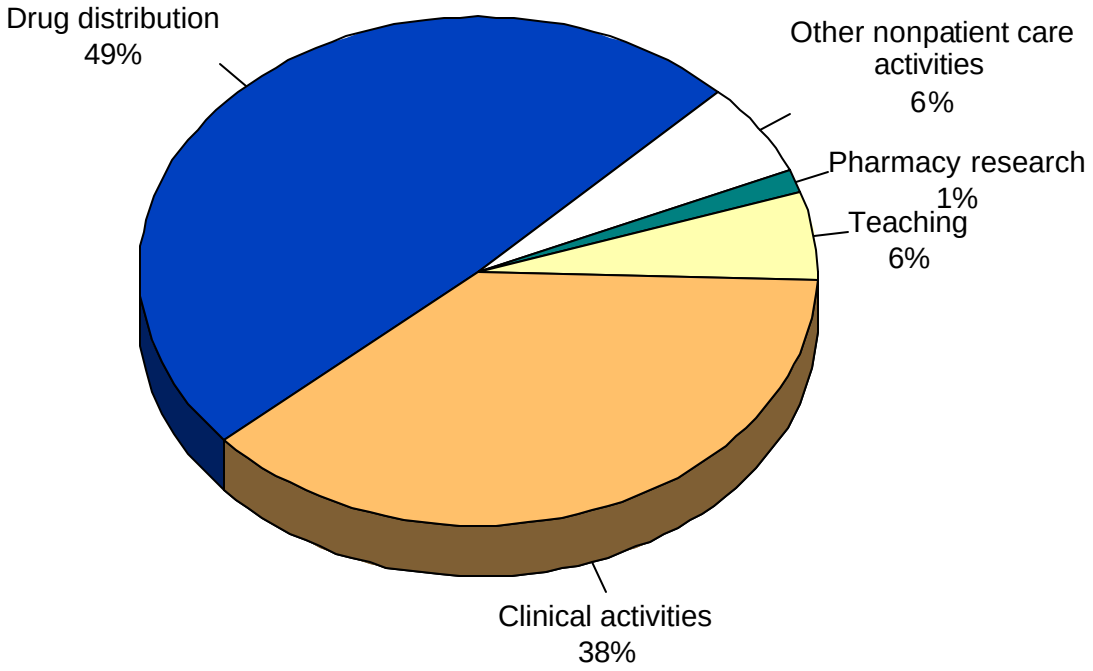
Base: All respondents (115)

Table XIII Average Pharmacy Staffing by Bed Size, Teaching Status and Type of Drug Distribution System 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Non-teaching (62)	≥ 90% Unit Dose (28)	≥ 90% Traditional (31)	≥ 90% Civa (51)	≥ 90% Civa + UD (23)	≥ 90% Civa + Traditional (7)
Pharmacist	14.1	4.2	11.2	27.1	22.7	6.6	15.4	11.0	19.3	17.0	18.4
Management	1.7	0.9	1.3	3.1	2.3	1.2	2.0	1.7	2.2	2.2	2.1
Technician	14.4	4.9	12.7	25.3	22.5	7.3	18.1	11.0	20.2	20.0	17.8
Support Staff	2.5	0.9	2.2	4.4	4.5	0.8	3.7	1.7	3.5	4.2	2.5
Residents	0.7	0.04	0.7	1.4	1.5	0.1	0.9	0.6	1.3	1.0	1.4
Total FTE	33.5	10.9	28.1	61.3	53.5	15.9	40.0	25.9	46.5	44.3	42.2
Total beds	417	141	350	770	537	315	368	377	453	381	394
Pd hr/Acute Pt Day (excluding residents)	0.68	0.66	0.68	0.70	0.84	0.53	0.81	0.60	0.78	0.85	0.74

(Total FTE may show effect of rounding)

Figure 7: PROPORTION OF TIME SPENT BY PHARMACISTS IN EACH CATEGORY 1999/2000



Base: All respondents (115)

Table XIV Average Annual Salary by Position and by Geographic Region 1999/2000

Hospitals	Canada (115)	B.C. (16)	Alta. (12)	Sask. (2)	Man. (7)	Ont. (21)	Que. (40)	N.B./P.E.I. (9)	N.S. (5)	Nfld. (3)
Assistant Director										
Min. Salary	$54,054	$58,753	$58,090	$51,500	$58,000	$59,863	$51,754	$46,100	$47,786	$45,084
Max. Salary	$66,770	$73,320	$69,700	$53,400	$72,434	$67,867	$65,812	$58,700	$59,723	–
Ave. Salary	$60,652	$82,800	$64,976	$52,450	$65,622	$66,687	$56,291	$56,134	$55,335	$51,000
Supervisor/Coordinator										
Min. Salary	$52,431	$59,339	$56,925	–	$53,172	$56,288	$46,117	$48,472	$36,690	$51,151
Max. Salary	$64,543	$74,528	$66,571	–	$57,484	$66,541	$61,721	$56,192	$47,563	$67,240
Ave. Salary	$61,558	$66,269	$63,762	–	$54,088	$62,311	$60,557	$56,342	$53,863	$83,720
Pharmacist (B. Sc.)										
Min. Salary	$45,201	$48,818	$44,243	$41,037	$43,462	$48,822	$43,308	$42,213	$38,937	$44,161
Max. Salary	$57,454	$60,754	$57,257	$49,885	$54,288	$59,669	$57,667	$57,223	$48,528	$54,248
Ave. Salary	$53,447	$58,691	$54,304	$47,672	$50,662	$55,836	$51,175	$50,003	$47,540	$58,788
Pharmacist (PharmD./MSc.)										
Min. Salary	$47,4317	$53,640	$48,916	–	$53,846	$51,971	$44,088	$49,660	$47,739	–
Max. Salary	$61,543	$67,079	$62,855	–	$67,500	$62,076	$60,133	$55,870	$59,674	–
Ave. Salary	$55,221	$60,020	–	–	$60,568	$59,747	$51,326	$55,792	$60,587	–
Technician										
Min. Salary	$28,506	$37,617	$31,710	$26,063	$23,034	$30,807	$24,400	$24,993	$26,270	$28,487
Max. Salary	$32,933	$39,668	$38,561	$27,765	$27,939	$34,998	$29,372	$28,916	$29,842	$33,636
Ave. Salary	$30,722	$38,692	$37,748	$26,909	$26,572	$33,124	$27,131	$25,536	$28,873	$33,598
Residency Stipend										
Average	$18,099	$23,208	$18,313	–	–	$14,074	$17,000	$23,500	$25,010	–
Overall										
Average $/FTE (n=100) (Without Residents)	$44,286	$55,562	$46,128	$46,332	$40,748	$46,591	$41,676	$36,112	$38,548	$39,032

Table XV Distribution of Director Salary Ranges by Geographic Region and Bed Size 1999/2000

Hospitals	Canada (115)	B.C. (16)	Alta. (12)	Sask. (2)	Man. (7)	Ont. (21)	Que. (40)	NB/PEI (9)	N.S. (5)	Nfld. (3)	100-200 (29)	201-500 (53)	>500 (33)
Under $55,000	7%	–	–	100%	–	–	8%	11%	20%	33%	14%	6%	3%
$55,000 — $59,999	6%	–	–	–	–	–	10%	–	20%	67%	3%	6%	9%
$60,000 — $64,999	22%	–	33%	–	43%	14%	23%	44%	40%	–	31%	26%	6%
$65,000 — $69,999	22%	6%	–	–	29%	24%	35%	33%	–	–	14%	26%	21%
$70,000 — $74,999	10%	19%	–	–	–	14%	15%	–	–	–	14%	13%	3%
$75,000 — $79,999	10%	31%	–	–	–	14%	8%	–	20%	–	7%	6%	21%
$80,000 — $84,999	5%	19%	–	–	14%	10%	–	–	–	–	–	6%	9%
$85,000 — $89,999	11%	6%	67%	–	–	14%	–	11%	–	–	10%	6%	21%
Over $90,000	3%	19%	–	–	–	5%	–	–	–	–	3%	2%	6%
No answer/ No Director	3%	–	–	–	14%	5%	3%	–	–	–	3%	4%	–

T.O.C. >

Pharmacy Human Resources – Special Interest Section

Steve Long

The availability of qualified health care providers is rapidly becoming one of the most significant issues facing hospitals. News headlines have alerted the public to nursing, physician, and care provider shortages on a regular basis. The impact of pharmacy staff shortages on institutional pharmacy practice and identification of strategies to deal with shortages are a focus of this year's Annual Report. The number of vacancies, the duration of vacancies, and the difficulty experienced in filling positions indicated that recruitment issues for pharmacy managers were as significant as those reported by other health professions. As competition for pharmacists and other pharmacy staff increases, pharmacy managers were forced to make difficult choices. New strategies must be developed to ensure pharmacists continue to supervise safe, accurate and efficient medication distribution systems while continuing and expanding their direct patient care roles. It is hoped that information provided in this section will assist pharmacy managers in devising effective strategies to deal with staff shortages.

Vacancies

Pharmacist position vacancies in the last fiscal year were reported by 69% of all respondents (Table XVI). Vacancies were reported by respondents from non-teaching (65%) and teaching hospitals (74%). They were reported by 52% of small (100-200 beds), 75% of medium (201-500) and 73% of large (>500 beds) hospital respondents. Vacancies were reported by at least 80% of the respondents from Alberta (92%), Manitoba (86%) and Nova Scotia (80%) (Table XVII).

Respondents reported an average of 3.63 pharmacist vacancies (range 1 to 14). The average number of pharmacist vacancies increased with facility size: 2.31 for 100-200 bed facilities, 2.97 for 201-500 bed hospitals and 5.65 for facilities of greater than 500 beds.

The average of reported durations of vacancies was calculated as 122 days or about 4 months. The shortest duration reported was 3 days and the longest 550 days. The average reported by non-teaching hospitals was 134 days, and by teaching hospitals 110 days. There was no specific trend by size of the institution. An average vacancy duration of 5 months or more was reported for Newfoundland (365 days), New Brunswick/PEI (194 days), Manitoba (175 days) and Nova Scotia (149 days).

Seventy-eight percent (62/79) of respondents reporting pharmacist vacancies indicated they were having difficulty recruiting to fill positions. This included more than 90% of respondents from Saskatchewan, Newfoundland, Nova Scotia and Ontario.

Positions Vacant on March 31, 2000 and Budgeted Hours Left Vacant in 1999/2000

The total number of vacant positions on March 31, 2000 (Table XVIII) was tabulated as an indicator of the personnel gap in respondent hospital pharmacies at a given point in time. The number of hours left vacant during the last fiscal year was also tabulated for pharmacists with Pharm.D./M.Sc. degrees, pharmacists with B.Sc. degrees, managers, technicians, and support personnel. In interpreting data, it should be noted that most pharmacists practicing in Quebec hospitals have completed a two year, post B.Sc., M.Sc. program. Due to the fact that this situation is unique within Canada, vacant hours for pharmacists (M.Sc./Pharm.D. and B.Sc.) for Quebec have been tabulated and reported separately from the other provinces. Also note that the data in Table XVIII is the average of reported budgeted hours left vacant for the 79 respondents that reported pharmacist vacancies in 1999/2000.

Forty-five percent (18/40) of Quebec respondents reported that they had Pharm.D./M.Sc. pharmacist vacancies on March 31, 2000. The number of vacancies indicated by these respondents ranged from 1-12 positions. A total of 45 M.Sc./Pharm.D. positions were vacant in the responding hospitals from Quebec on March 31, 2000. Respondents from Quebec reported, on average, 1918 M.Sc./Pharm.D. vacant hours in the last year. This average was 781 vacant hours for non-teaching hospital respondents and 2973

hours for teaching hospital respondents from Quebec. A single facility reported 21,840 vacant pharmacist hours, the equivalent of 11 positions being vacant for a full year.

Forty-nine percent (37/75) of respondents from the rest of Canada indicated that they had B.Sc. pharmacist vacancies on March 31, 2000. The number of vacancies reported ranged from 1 to 12 positions. There were a total of 87 B.Sc. pharmacist vacancies in the rest of Canada on March 31, 2000. There were, on average, 1552 pharmacist hours left vacant, with 1110 vacant pharmacist hours in non-teaching hospitals and 2030 vacant pharmacist hours in teaching hospitals.

Pharm.D./M.Sc. vacancies on March 31, 2000 were reported by 13% (10/75) of respondents from outside Quebec. There were a total of 14 positions that required filling and 2 of these were in non-teaching facilities. An average of 221 Pharm.D./M.Sc. hours were left vacant in the last fiscal year.

Ten respondents reported vacancies in manager positions in their facility on March 31, 2000. A total of 16 management positions were reported as vacant (3 in non-teaching hospitals and 13 in teaching hospitals). An average of 150 management hours (range 0 - 2015) were reported vacant in 1999/2000.

Twelve respondents reported technician position vacancies on March 31, 2000. A total of 13 technician positions were reported as vacant (5 from non-teaching hospitals and 8 from teaching hospitals). An average of 310 budgeted technician hours were reported as vacant. A single respondent reported 5850 vacant hours, the equivalent of 3 full time positions being vacant for the entire year.

Finally, 3 of the 79 respondents reporting vacancies had support personnel positions vacant on March 31, 2000. A total of 3 positions were reported as vacant. On average 39 support personnel hours were reported vacant in the last fiscal year.

Impact on Service Levels and Orientation Periods

Considering the extensive nature of the reported vacancies, it is not surprising that the ability of Pharmacy departments to maintain previous levels of service was affected. The impact of the staffing shortages is illustrated by the fact that over half of the respondents (54%, 62/115) indicated they had to curtail service due to an inability to recruit or retain staff. Service was reported curtailed by 51% (27/53) of teaching and 56% (35/62) of non-teaching hospital respondents and by 45% (13/29) of respondents from 100-200 bed, 55% (29/53) of respondents from 201-500 bed, and 61% (20/33) of respondents from greater than 500 bed hospitals.

Direct patient care services were withdrawn by 71% (44/62) of respondents that had to curtail services. Implementation of approved services was delayed by 61% (38/62), teaching commitments reduced by 52% (32/62), hours of service reduced by 31% (19/62) and distribution services withdrawn by 8% (5/62) of these respondents.

A number of strategies were put in place to blunt the impact of pharmacist vacancies. The average of reported orientation periods for pharmacists was 7.4 weeks (range 0-52 weeks). This average was consistent between teaching and non-teaching hospitals and the 3 hospital size groupings. The duration of orientation was shortened in 21% (24/115) of respondent institutions. Twenty-nine percent (18/62) of non-teaching hospital respondents indicated shortened orientation periods in their facilities compared with 11% (6/53) of respondents from teaching facilities.

Role of Technicians and Automation

Forty-one percent (47/115) of all respondents indicated that the role of technicians has been changed to cover for pharmacist vacancies. A higher percentage of non-teaching hospital respondents (45%, 28/62), indicated they had changed the role of technicians to cover for pharmacist vacancies than respondents from teaching hospitals (36%, 19/53). Over half of the respondents from NB/PEI (56%, 5/9), Alberta (58%, 7/12), and Nova Scotia (60%, 3/5) indicated changes to technician roles. Of the respondents

indicating changed technician roles, 19% (9/47) converted pharmacist positions into technician positions to cover for pharmacist vacancies.

A slightly larger percentage of respondents (43%, 49/115) indicated that they hesitated to change the role of technicians to cover pharmacist vacancies due to perceived barriers. Barriers perceived by these respondents included the level of technician training (65%, 32/49), current provincial legislation (55%, 27/49) and lack of available technicians (6%, 3/49). The level of technician training was perceived to be a barrier to a similar degree by teaching and non-teaching respondents (62% versus 68%). However, teaching hospital respondents perceived current provincial legislation to be a barrier to the use of technicians to a greater extent than their non-teaching counter parts (67% versus 46%) and lack of available technicians to a lesser extent (0% versus 11%).

Automation has been introduced into 34% (39/115) of all respondent's facilities to decrease staff workload and/or to support a change in pharmacist and technician roles. The use of automation was more likely to have occurred in teaching hospitals and larger facilities. Introduction of automation was indicated by 47% (25/53) of teaching hospital and 23% (14/62) of non-teaching hospital respondents. Automation was reported by 21% (6/29) of respondents from 100-200 bed facilities, 32% (17/53) from 201-500 bed facilities and 48% (16/33) from greater than 500 bed facilities.

Staff Demographics

In an effort to complete the picture, the questionnaire requested information regarding the demographics of pharmacy staff. The current age of staff by each category for the respondents' facilities is provided in Table XIX. Overall 81% of pharmacy staff were female, with 36% of all staff being females between the ages of 20 and 35 and 38% females between the ages of 35 and 50. About 90% of all staff were under the age of 50 years.

These statistics suggest a fairly young staff. Qualification for retirement was indicated as based on a combination of age and years of service by 71% (82/115) of all respondents, on the basis of age only by 12% (14/115) and on the basis of other factors by 10% (11/115) of respondents. The minimum age for retirement was stipulated as 55. Retirement at a combined age and service totaling 70, 80, 85 or 90 years was reported. Service duration of 25, 30, or 35 years could also qualify an employee for retirement. Respondents indicated a total of 208 pharmacists will be eligible for retirement in the next 5 years and 367 will be eligible in the next 10 years (Table XX). These retirements will further deepen the shortages documented in the vacancies described in this report.

Retention

In order to curb the flow of pharmacists out of hospital practice, an understanding of where pharmacists are going when they leave to accept other positions, why they are leaving and job satisfaction is required. Respondents were asked to provide insight into where pharmacists were going when they left respondents' departments. Over half (58%, 46/79) indicated vacancies were the result of extended leaves including maternity leaves. As noted above, over one third of all pharmacists working in respondents' hospitals were women in the 20-35 year-old age category. Forty-seven percent (37/79) indicated pharmacists left to take a position at another hospital, 35% (28/79) were lost to community pharmacy, 18% (14/79) went to work in the pharmaceutical industry and 9% (7/79) left for extended educational leave. The most noted difference between teaching and non-teaching hospitals was loss of pharmacists to industry. Only 8% (3/40) of non-teaching hospital respondents reported pharmacists resigning to accept positions with industry compared to 28% (11/39) of teaching hospital respondents.

Measurement of job satisfaction was reported by 23% (27/115) of all respondents. Job satisfaction was measured in 15% (9/62) of non-teaching facilities and 34% (18/53) of teaching facilities. Job satisfaction was more likely to be measured in larger institutions. It was measured in 10% (3/29) of 100-200 bed, 23% (12/53) of 201-500, and 36% (12/33) of greater than 500 bed institutions. Job satisfaction was measured for all staff by 19 respondents, for pharmacists by 5 respondents, and for technicians and support personnel by 1 respondent. Job satisfaction and the specific factors that satisfy staff are key indicators

that can be used to determine retention strategies. Managers would be well advised to make a concerted effort to address job satisfaction issues in the current highly competitive environment.

The most frequently cited retention strategy was to offer additional educational opportunities to staff (57%, Table XXI). The second most frequent response, "no answer", indicated a lack of retention strategies by 37% of respondents. Retention strategies reported by large hospitals (greater than 500 beds) included additional educational opportunities 79%, formal training 24%, certification programs 30%, advanced practice positions 21%, top of scale bonuses 9%, and career ladders 9%. Smaller institutions were less likely to support retention strategies of any description and had the highest proportion of "no answer" (59%).

Recruitment

To recruit pharmacists, additional educational opportunities were indicated as the most frequent strategy (40%, 46/115). Offering starting salaries above the usual salary for education and experience was reported by 34% (39/115) of respondents. Flexible work hours were offered by 29% (33/115) of all respondents. Shortened work weeks were indicated by 5% (6/115) of respondents, all from Quebec. Signing bonuses were indicated to have been offered by 10% (11/115) and recruitment fees for staff that bring in others by 6% (7/115).

Respondents indicated they have been successful in recruiting new staff. Pharmacists were most often recruited from other hospitals (52%, 60/115), community pharmacy (44%, 51/115) or as new graduates (43%, 49/115). These were fairly consistent for teaching and non-teaching hospitals. Teaching hospitals were more likely to recruit graduating residents (47%, 25/53), pharmacists from out of province (34%, 18/53) or pharmacists from out of country (8%, 4/53) than non-teaching hospitals (residents 11% (7/62), out of province 6% (4/62) and out of country 3% (2/62)).

To ensure pharmacists are available to support medication systems, 24% (28/115) of all respondents indicated that they have altered their position criteria for B.Sc. pharmacists. Altered position criteria were indicated by 32% (20/62) of non-teaching hospital respondents and 15% (8/53) of teaching hospital respondents. Altered criteria were reported by 21% (6/29) of respondents from hospitals of 100-200 beds, 25% (13/53) of respondents from 201-500 bed hospitals and 27% (9/33) of respondents from hospitals of greater than 500 beds. Experience requirements were more frequently altered by teaching hospital respondents (75% (6/8) versus 60% (12/20)) and residency requirements by non-teaching hospital respondents (35% (7/20) versus 13% (1/8)).

Ten percent (11/115) of all respondents indicated they had altered their criteria to recruit Pharm.D or M.Sc. pharmacists. The requirements for experience were altered by 6 and advanced degree designation by 5 of these respondents.

Unions

Pharmacists were part of a union in 67% (77/115) of respondent’s facilities including 100% of facilities in B.C., Saskatchewan, and NB/PEI. Only 24% (5/21) of respondents from Ontario indicated their pharmacists belonged to a union. Of respondents with pharmacists in the union, 39% (30/77) believed the collective agreement hindered recruitment and retention of pharmacists, 25% (19/77) believed the collective agreement supported recruitment and retention and 31% (24/77) believed it had no impact. Respondents from teaching hospitals were more polarized in their view of the impact of the union than their non-teaching counterparts. Forty three percent (15/35) of teaching hospital respondents believed the union environment hindered recruitment, 31% (11/35) believed it supported recruitment, and 20% believed union status had no impact on recruitment. Thirty six percent (15/42) of non-teaching hospital respondents believed the union environment hindered recruitment, 19% (8/42) believed it supported recruitment, and 40% (17/42) believed it had no impact.

Summary

In summary, there is a shortage of pharmacists and the shortage is impacting the provision of pharmacy services. Respondents indicated there were 163 vacant pharmacist positions (combined pharmacist and manager vacancies), 13 vacant technician positions, and 3 vacant support personnel positions in their hospitals on March 31, 2000. Over the next 5 years an additional 208 pharmacists will be eligible to retire in these facilities. Managers will be forced to deal with pharmacist shortages for the foreseeable future.

Strategies to ensure job satisfaction and pharmacist retention must be emphasized. Removal of practice and legislative barriers must be undertaken to reshape practice, to optimally use pharmacists, technicians and support personnel. Training of technicians and support personnel to ensure continued development of safe, efficient and effective medication systems can occur more rapidly than expansion of pharmacist training programs. Departments have been successful in using these strategies in conjunction with increased automation to blunt the effects of pharmacist shortages. Pharmacist involvement in direct patient care activities has been shown to improve patient outcomes. Creative strategies must be adopted to ensure pharmacists continue to maximally participate in these activities.

Table XVI Pharmacist Vacancies Reported by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Respondents reporting pharmacist vacancies	79 69%	15 52%	40 75%	24 73%	39 74%	40 65%
Number of vacancies (n=79)	3.63	2.31	2.97	5.65	4.94	2.16
Duration of vacancy (days) (n=79)	122	143	106	136	110	134
Difficulty in recruiting pharmacists (n=79)	62 78%	12 80%	33 83%	17 71%	30 77%	32 80%

Table XVII Pharmacist Vacancies Reported by Geographic Region 1999/2000

Hospitals	All (115)	B.C. (16)	Alta. (12)	Sask. (2)	Man. (7)	Ont. (21)	Que. (40)	NB/PEI (9)	N.S. (5)	Nfld. (3)
Respondents reporting pharmacist vacancies	79 69%	9 56%	11 92%	1 50%	6 86%	15 71%	27 68%	5 56%	4 80%	1 33%
Number of vacancies (n=79)	3.63	3.67	6.91	3.00	3.17	3.45	2.63	2.4	4.33	1.00
Duration of vacancy (days) (n=79)	122	133	69	4	175	88	128	194	149	365
Difficulty in recruiting pharmacists (n=79)	62 78%	6 67%	6 55%	1 100%	4 67%	14 93%	23 85%	3 60%	4 100%	1 100%

Table XVIII Total Vacant Positions March 31, 2000 and Average Budgeted Hours Left Vacant by Geographic Region 1999/2000

Hospitals	All (79)	B.C. (9)	Alta. (11)	Sask. (1)	Man. (6)	Ont. (15)	Que. (27)	NB/PEI (5)	N.S. (4)	Nfld. (1)
Total Vacant Positions March 31, 2000										
- Management	16	0	8	1	2	2	2	0	1	0
- Pharmacist (PharmD, M.Sc.)	59	2	5	0	3	1	45	1	2	0
- Pharmacist (B.Sc.)	88	9	15	2	14	34	1	7	5	1
- Technician	13	1	6	0	0	3	3	0	0	0
- Support Personnel	3	1	1	0	0	0	1	0	0	0
Average Budgeted Hours Left Vacant 1999/2000										
- Management	150	0	136	675	366	141	110	0	600	0
- Pharmacist (PharmD,M.Sc.)	801	4	0	0	969	301	1918	0	275	0
- Pharmacist (B.Sc.)	1094	553	1474	1440	1738	2102	211	1878	1200	1950
- Technician	310	393	627	0	300	617	104	0	0	200
- Support Personnel	39	0	109	0	283	0	0	0	0	150

Base: Respondents reporting pharmacist vacancies in 1999/2000

Table XIX Pharmacy Staff Demographics 1999/2000

Age Group	20-35 yrs old			35-50 yrs old			50-65 yrs old			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Management	6 3%	9 5%	15 8%	53 27%	91 47%	144 75%	22 11%	12 6%	34 18%	81 42%	112 58%	193 7%
Pharmacist (PharmD, M.Sc.)	38 8%	181 39%	219 48%	60 13%	140 30%	200 43%	23 5%	18 4%	41 9%	121 26%	339 74%	460 16%
Pharmacist (B.Sc.)	91 10%	334 35%	425 45%	94 10%	329 35%	423 45%	39 4%	61 6%	100 11%	224 24%	724 76%	948 33%
Technician	48 4%	524 41%	572 44%	54 4%	544 42%	598 47%	22 2%	94 7%	116 9%	124 10%	1162 90%	1286 45%
Total Staff	183 6%	1048 36%	1231 43%	261 9%	1104 38%	1365 47%	106 4%	185 6%	291 10%	550 19%	2337 81%	**2887**

Table XX Total Number of Pharmacy Staff Eligible for Retirement by Geographic Region 1999/2000

Hospitals	All (115)	B.C. (16)	Alta. (12)	Sask. (2)	Man. (7)	Ont. (21)	Que. (40)	NB/PEI (9)	N.S. (5)	Nfld. (3)
Staff Eligible for Retirement:										
- Within 5 years	208	25	5	3	39	36	83	14	2	1
- Within 10 years	367	55	18	2	28	52	183	20	7	2

Table XXI Staff Retention Strategies by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Additional educational opportunities	66 57%	11 38%	29 55%	26 79%	35 66%	31 50%
Advanced practice positions	18 16%	0 0%	11 21%	7 21%	14 26%	4 6%
Formal training support, i.e. for degrees	18 16%	1 3%	9 17%	8 24%	11 21%	7 11%
Certification programs	16 14%	2 7%	4 8%	10 30%	9 17%	7 11%
Top of scale bonuses	6 5%	1 3%	2 4%	3 9%	3 6%	3 5%
Career ladders	4 3%	0 0%	1 2%	3 9%	3 6%	1 2%
No answer	42 37%	17 59%	20 38%	5 15%	14 26%	28 45%

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Education and Research

Bonnie Salsman

Professional Development

The unique learning environment and availability of professional development opportunities are commonly cited advantages of pharmacy practice in an institutional setting. These aspects of the hospital pharmacy environment play an even more important role in the recruitment and retention of qualified staff in the current environment of global pharmacist shortages.

Additionally, with the rapidly expanding selection of therapeutic modalities available on the market, it is critical for pharmacists to continuously expand their knowledge base regarding drug therapy. This can be achieved through a variety of approaches, including self-directed study and reading, in-house education sessions, or attendance at external continuing education programs.

The close proximity of pharmacist colleagues in most hospitals offers many possibilities for sharing of ideas and knowledge. Many hospitals formalize this sharing by offering internal education sessions for staff. In 1999/2000, 73% of all respondents indicated that regular internal education sessions were offered for staff, and in these hospitals the sessions were offered at an average frequency of 26 times per year (TableXXII). Educational sessions were more commonly reported in teaching hospitals and hospitals over 500 beds (both reported at 94%), but 55% of non-teaching hospitals also conducted regular internal educational sessions.

In this year's special interest section on human resources, 40% of all respondents noted that additional educational opportunities were being offered as an incentive for staff recruitment and retention. In spite of this, 78% (90/115) of respondents indicated that there was no change in the continuing education (CE) budget compared to the previous year, and only 14% (16/115) reported a budget increase. A decrease in the continuing education budget was reported by 6% (7/115) of respondents and 17% (19/115) of respondents indicated that they had no non-salary CE expenditures from internal funds during 1999/2000. However, 62% of all respondents indicated that pharmacists were provided with funding for registration or tuition at external continuing education programs, and 55% of these reported that the registration or tuition was fully covered. Ninety three percent of all respondents provided paid time off for pharmacists' attendance at continuing education programs and of these 63% reported that the time taken was fully covered by the hospital while 32% reported that it was only partially covered.

The provision of paid time for attendance of non-pharmacist staff at CE programmes was also common but was reported at a slightly lower rate than for pharmacists, with 83% of all respondents indicating that this support was provided. Of these, 64% reported that the time was fully funded while 31% reported that the time was only partially funded. Funding of registration or tuition for continuing education programs for non-pharmacists was reported by 55% of respondents, with 56% of these reporting that full funding was provided while 19% reported that only partial funding was provided.

External funding remained an important source of educational support during 1999/2000. The average of reported continuing education expenditures from external funding was $3,515, while the average of reported expenditures from internal funding was $4,223. Overall, 53% of all respondents reported receiving funding from external sources, and of these the average of reported percentages of the total continuing expenditures that were provided by external sources was 56%. In Newfoundland, Manitoba and New Brunswick/Prince Edward Island the percentage of external funding was over 70%. Twelve hospitals reported that external funding was their sole source of support for CE expenditures. Overall, the average continuing education budget per pharmacist and management FTE from external and internal funding sources combined was $690, but the average ranged from $360/FTE in British Columbia to $1264/FTE in Newfoundland.

Student Instruction

This year's survey captured new information regarding the teaching and scholarly activities occurring within hospital pharmacy departments (Table XXIII). It is clear that the majority of hospitals participate in student instruction, and in many departments the teaching involvement is extensive. Eighty two percent of all respondents reported at least some "student days" in the category of undergraduate pharmacy student instruction, and 27% (31/115) reported more than 100 student days during the 1999/2000 year. The average of reported undergraduate student days was 129 (212 in teaching hospitals and 59 in non-teaching hospitals). Participation in student technician training was also common, with 73% of all respondents reporting technician student days. The overall average of student technician training days for all respondents was 48. Thirty percent of all respondents reported the occurrence of student days for residency training, but only 10% reported participation in Pharm D training. Respondents as a whole reported an overall average of 155 student days for pharmacy residents and 21 students days for Pharm D training. For the 35 respondents that trained residents, there was an average of 500 student days reported and at the 11 hospitals where Pharm D residents were trained, there was an average of 214 student days reported.

Although teaching activities were common, only 14% of hospitals responded that a university-supported positions within their departments to provide dedicated time for student training. Among these hospitals, the average number of positions supported was 1.1 FTE, with a range of 0.1 to 5 FTEs. Only two of the hospitals that reported university-supported positions for student training were non-teaching institutions.

Provision of a stipend from the university to compensate for the training of students was more common than the provision of dedicated positions. Forty-eight percent of respondents reporting student days for undergraduate pharmacists indicated that a stipend was provided. However, a relatively low percentage of those who reported the occurrence of technician and resident student days received a stipend to compensate for the training (19% and 14% respectively).

Publications and Research

The average of reported numbers of peer reviewed papers published (or accepted for publication) by staff was 2.4, although in non-teaching hospitals this average was only 0.4 while in teaching hospitals the average was 4.9. Seventy percent (37/53) of teaching hospitals reported the publication of at least one peer reviewed paper by a staff member, but only 13% (8/62) non-teaching hospitals reported the occurrence of such publications.

Not surprisingly, involvement of Pharmacy staff in conducting research was also reported far more commonly by teaching hospitals, with 70% of teaching hospitals providing a positive response to this question as compared to only 21% of non-teaching hospitals. For departments who reported that their staff had conducted research during the past year, the average number of active ongoing projects was 5.9 (7.4 in teaching hospitals and 1.9 in non-teaching hospitals).

Table XXII Education Services by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Regular internal CE sessions held	84	14	39	31	50	34
	73%	48%	74%	94%	94%	55%
# Sessions/year (n=86)	26	20	25	29	32	16
Paid time for CE programmes:						
For pharmacists	107	25	51	31	49	58
	93%	86%	96%	94%	92%	94%
full (#)	67	15	28	24	35	32
partial (#)	34	8	20	6	12	22
For other staff	96	23	46	27	43	53
	83%	79%	87%	82%	81%	85%
full (#)	61	14	26	21	30	31
partial (#)	30	8	17	5	10	20
Funding for registration/tuition for CE programmes:						
For pharmacists	71	15	34	22	35	36
	62%	52%	64%	67%	66%	58%
full (#)	39	6	17	16	21	18
partial (#)	14	6	5	3	8	6
For other staff	63	16	28	19	31	32
	55%	55%	53%	58%	58%	52%
full (#)	35	8	15	12	17	18
partial (#)	12	4	4	4	8	4
Total non salary reimbursement for CE programmes:						
– hospital (internal)	$4,223	$3,024	$3,738	$6,133	$6,635	$2,250
– other funding (external)	$3,515	$1,277	$3,056	$6,252	$5,644	$1,735
CE $/pharmacist FTE (n=88)	$690	$909	$642	$589	$670	$707
Changes in CE budgets (n=113)	+5.0%	+4.6%	+7.7%	+1.1%	+3.3%	+6.4%
# Sites with outside funding for CE programmes	61	10	30	21	34	27
	53%	34%	57%	64%	64%	44%
% Funding from outside source (n=61)	56%	58%	53%	59%	56%	56%

Table XXIII Education and Research Services by Bed Size and Teaching Status 1999/2000

Hospitals	All (115)	100-200 (29)	201-500 (53)	>500 (33)	Teaching (53)	Nonteaching (62)
Average # of 'student days' for:						
– student pharmacists	129	78	102	218	212	59
– pharmacy residents	155	37	84	379	319	21
– Pharm. D. students	21	0	14	50	46	0.3
– student technicians	48	20	47	76	67	32
% of respondents reporting 'student days' for:						
– student pharmacists	82%	86%	77%	85%	81%	82%
– pharmacy residents	30%	17%	23%	55%	57%	8%
– Pharm. D. students	10%	0%	6%	24%	19%	2%
– student technicians	73%	48%	81%	82%	81%	66%
% receiving a stipend from the University for:						
– student pharmacists (n=94)	48%	44%	51%	46%	60%	37%
– pharmacy residents (n=35)	14%	0%	17%	17%	17%	0%
– Pharm. D. students (n=11)	45%	–	33%	50%	50%	0%
– student technicians (n=84)	19%	14%	16%	26%	19%	20%
% with supported positions in the department for student training	16 14%	2 7%	8 15%	6 18%	14 26%	2 3%
- # of FTEs supported (n=16)	1.1	1.5	0.7	1.7	1.1	1.3
# of peer reviewed papers authored by staff	2.4	0.7	1.6	5.4	4.9	0.4
% pharmacy staff conducting research	50 43%	6 21%	27 51%	17 52%	37 70%	13 21%
- # of active projects (n=50)	5.9	2.3	3.7	10.6	7.4	1.9

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A Program-Based Approach to Developing Benchmark Indicators for Pharmacy Staffing and Drug Costs

Kevin W. Hall

Benchmarking Indicators, All Respondents

In this year's survey a number of questions were asked about benchmarking practices in Canadian hospitals. When pharmacy managers were asked if the hospital, or the hospital's funding agency, compared pharmacy staffing and drug cost indicators with those at other facilities, 22% (25/115) responded that this was done on an ongoing basis and another 33% (38/115) indicated that it had been done at least one or more times in the past. When questioned if this type of benchmarking was used in whole or in part to determine the hospital's overall budget, 43% (27/63) of respondents using benchmarking responded that it was. The pharmacy department's budget allocation was reported to be based on benchmarking comparisons by 49% (31/63) of these respondents.

In Table XXIV, the sources of comparative data that the respondents indicated were used in these benchmarking initiatives are presented. The responses indicate that a number of sources of comparative data were used. It is clear that some of these data sources are more valid than others. For example, comparisons that involved hospitals of all types within the same province would be of only limited usefulness, and could be very misleading, if subsets based on the type and size of hospital were not created.

Sixty percent of all respondents (69/115) reported that they collected and reported indicator data on a regular basis, mainly for use within the department/hospital. The Canadian Hospital Pharmacy Workload Measurement System (CHPWMS) is a mandated reporting requirement in a number of provinces and presumably represents the indicator data that many pharmacies are reporting. When questioned on their view of how useful that system is for making comparisons between hospital pharmacies, only 4% (5/115) of all respondents rated it as very useful, 55% (63/115) rated it as somewhat useful and 30% (35/115) rated it as not useful.

Benchmarking Section 1999/2000, Introduction

Many pharmacy managers have experienced the frustration of being challenged about their department's staffing or drug costs when the comparison was based on data from hospitals with a very different mix of patient care and pharmacy programs. In addition the shortcomings of the CHPWMS, that were discussed in the 1997/98 Survey of Hospital Pharmacy in Canada[1], have made many managers uneasy about inter-facility pharmacy comparisons that are based on that data. The annual survey of hospital pharmacy in Canada has been producing data for over 10 years that has helped pharmacy managers to respond more knowledgeably to questions concerning their staffing and drug costs. The usefulness of the data has been improved over the years by creating subsets of the overall data, grouping hospitals on the basis of their number of beds and the type of drug distribution system in use. These subset analyses improved the usefulness of the data for inter-facility comparisons. However data analysis was limited by the fact that all hospitals with at least 100 beds were combined, regardless of their mix of patient services and types of pharmacy services being delivered. This meant that a diverse group of facilities, such as hospitals providing primarily acute care services, hospitals providing significant amounts of long-term care services, pediatric hospitals, and psychiatric hospitals were all included in the same pool of data. Similarly all of the data from within a single hospital was being rolled up despite the fact that many hospitals, particularly the larger ones, operated a number of quite distinct programs to serve different patient groups within their facility.

In the last Hospital Pharmacy in Canada Survey, covering the 1997/98 year, the results of a new approach to developing benchmark indicators for pharmacy departments in Canada were first published.[1]

The benchmarking section was an attempt to identify the staffing and drug costs incurred by pharmacy departments in the delivery of services to specific inpatient and outpatient programs, such as critical care, pediatrics, outpatient prescription services, and home IV admixture. In addition it attempted to capture the resources committed to those indirect patient care programs that are operated by some but not all pharmacy departments, such as a regional drug information centre or an investigational drug service.

An important premise underlying this benchmarking approach is that there should be a reasonable degree of consistency when the pharmacy resources required to service the same type of patient group, or to deliver a similar type of pharmacy service, are compared between facilities. The assumption underlying this premise is that a similar standard of care is being delivered at the facilities being compared; an assumption that is probably not always valid. Nonetheless, the argument has been made by pharmacy managers that only by breaking down a pharmacy department into its sub-component parts, and identifying the resources committed to each, is it possible to create more refined and useful data on which to attempt inter-facility resource utilization comparisons. In the future it would be ideal if this type of program-specific benchmarking analysis could be combined with accepted outcome measures, so that both quality of care and efficiency of service delivery could be assessed.

Although justification of pharmacy resources is an important reason for developing improved pharmacy benchmark indicators, it is not the sole use for program-specific pharmacy data. Planning for any new or expanded patient care program is greatly facilitated when there is some knowledge of the pharmacy staffing and/or drug costs being incurred at other facilities to service the same type of patient group, or to operate the same type of pharmacy program. Likewise, with all of the program consolidations, program transfers and downsizing that are occurring as a result of the regionalization of health care, it is important to have data on which to base the amount of resources that will be removed from one site and transferred to another. Applying the existing overall departmental average for staffing (e.g. paid hours per patient day), or drug costs (e.g. drug cost per patient day), will underestimate the resources associated with pharmacy resource-intensive programs, such as oncology, critical care and pediatrics. On the reverse side, such an approach would overestimate the resources required for programs that are less pharmacy resource-intensive, such as long term care or labour and delivery. Thus the availability of data on the pharmacy resources required to service defined patient groups was felt to be an important planning tool.

The benchmarking analysis in the 1997/98 survey demonstrated that the variability in pharmacy resource utilization was greatly reduced when this program-specific methodology was used. It was therefore decided to repeat this analysis in the 1999/2000 survey in order to validate the 1997/98 results and ensure their reproducibility.

Methods

The benchmarking section of the 1999/2000 survey consisted of 5 sections. In Section I, survey respondents were asked to provide data on total pharmacy staffing for their entire pharmacy operations, total inpatient and outpatient drug costs, total hospital beds, total patient days and the type of drug distribution system in use at their hospital. In Section II respondents were asked to provide similar data for subgroups of inpatients such as critical care patients, bone marrow transplant patients, and long term care patients. The survey instructions for this section requested that the pharmacy resources associated with each distinct inpatient program be reported separately. In Section III, respondents were asked to provide data for any outpatient pharmacy programs, such as outpatient prescription dispensing and home parenteral nutrition, that were operated by their hospital. In Section IV, respondents were asked to provide data on any other unique pharmacy services that they operated, such as a regional drug information service, investigational drug services and contract services to external organizations. Section V was intended to represent the remaining pool of inpatient acute care patient groups such as family medicine, internal medicine, and general surgery. If the survey was completed correctly, the inpatient beds, inpatient days, pharmacy staffing resources and drug costs in Section V would equal those in Section I minus those in Sections II through IV.

The Editorial Advisory Board for the survey recognized that the type of survey being proposed would be time-consuming for respondents to complete, and would be time-consuming and challenging for the

Board to analyze. As a result the Board decided to limit the distribution of the survey to those hospitals that were most likely to derive benefit from this type of program-based analysis. Specifically the facilities selected to receive the benchmarking section of the survey were facilities that were identified in the Board's database of Canadian hospitals as having over 300 acute care beds, or which were identified as a pediatric hospital. Facilities with more than 300 beds were seen as most likely to operate a variety of different programs that could be assessed in terms of their different resource utilization patterns. Pediatric hospitals were selected for inclusion in the survey because of the widespread belief, based on a very limited amount of data, that the delivery of pediatric pharmacy services requires significantly greater amounts of pharmacy staffing than does the delivery of similar adult care programs. It was also anticipated that specialized pediatric hospitals might show a quite different profile of resource utilization than would a small pediatric service within a primarily adult care facility.

In the 1999/2000 survey, the benchmarking section was distributed to 68 "adult" hospitals with more than 300 beds, and to 7 pediatric hospitals. All provinces in the country were represented in the distribution list, with the exception of Prince Edward Island which did not have any hospitals that met the distribution criteria. E-mail follow-up with non-responders was undertaken approximately 6 weeks after the benchmark survey section was distributed.

The returned benchmarking surveys were individually reviewed by the author. Direct contact was made with most respondents to clarify data discrepancies. Based on the data submitted, indicators such as paid hours per patient day and drug costs per patient day were calculated for each program. To the extent possible, efforts were made to ensure that there was consistency in the program data provided by the different facilities. For example, some facilities were able to provide a more detailed breakdown of their programs than were the majority of other facilities. When this was the case, the data for a number of programs reported by that facility were combined to create a program grouping that was similar to that reported by other facilities. An example of this would be the combining of separate data provided for general medicine and general surgery, since most facilities could not provide that breakdown.

The program-specific indicators were then subjected to calculations to determine the mean, median, standard deviation, minimum and maximum values. A spreadsheet was set up to calculate this data for all hospitals, as well as for subgroups of hospitals based on their size and the type of drug distribution system reported to be in used within each facility.

Results and Discussion

Response Rate and Survey Sample

Thirty-one individual hospitals or regions, representing a 41% response rate, returned the benchmarking section of the survey. This was similar to the 42% response rate for the general section of this year's survey. Four of these responses were eliminated from the analysis because inadequate data were submitted for the calculation of indicators (3 facilities), or because the facility fell well below the 300 acute care bed cutoff (1 facility). Of the remaining 27 responses, 11 were from adult hospitals with more than 500 acute care beds, 11 were from hospitals with between 300 and 500 acute care beds, and 5 were from pediatric hospitals. Each province was represented in the results with the exception of Prince Edward Island and Saskatchewan. Approximately 80% of the respondents to the 1999/2000 benchmarking survey also responded to the 1997/98 survey, so any comparisons between the two time periods should reflect valid trends rather than being the result of a different sample group.

The completeness of the submitted data varied between hospitals. Each useable data element was included in the analysis, regardless of whether or not the respondent could provide all of the data requested in the survey. For many of the calculated indicators the number of reporting hospitals was high enough to make the data quite meaningful. For other indicators the number of reporting facilities was quite small and caution is warranted with respect to the interpretation and use of that data.

Adult Hospitals

Table XXV shows the results of the analysis of human resource and drug cost data for the 22 adult hospitals before and after the resources for specialized programs were extracted. The "before

adjustment" figures represent the overall pharmacy data submitted in Section I of the survey, and the "after adjustment" figures represent primarily the general inpatient medical and surgical programs that remained in Section V of the survey. Other pharmacy data that would roll up in this "after adjustment" section would include any staffing committed to core pharmacy department functions such as purchasing, inventory management, wardstock distribution, office functions and departmental management. The "after adjustment" figures are felt to represent a fairly homogeneous group of pharmacy services, based on the assumption that respondents have identified the high and low pharmacy resource programs in Sections II to IV of the survey. This grouping should be quite similar to an acute care community hospital that provides services primarily to general medicine and surgery patients.

The data is presented for all 22 adult hospitals and is also reported separately for hospitals with more than 500 beds and for hospitals with 300 to 500 beds. The after adjustment data shows much less variability than the before adjustment data. The variability diminishes even further when hospital size and type of drug distribution system are used to sub-categorize the data. Hospitals that had reported very low staffing and drug costs in Section I of the survey were usually found to be operating patient care programs, like long term care beds, that consumed lower than average amounts of resources. When those low-resource programs were extracted, the paid hours per patient day and the drug costs per patient day increased for the remaining beds. On the other extreme, hospitals that had reported very high paid hours per patient day or very high drug costs per patient day were usually found to be operating a number of specialized resource-intensive pharmacy programs. When those resource-intensive programs were extracted, the paid hours per patient day and drug costs per patient day decreased for the remaining beds.

The decrease in variability can be demonstrated by examining the paid hours per patient day data. The overall data show that the 22 facilities had an almost five-fold variation in paid hours per patient day, from 0.27 to 1.20. The breakdown of facilities by hospital size and type of drug distribution system, reduces that variability considerably. For example the "before adjustment" range for hospitals with more than 500 beds, using a unit dose/IV admixture system of drug distribution, is 0.75 to 1.18 paid hours per patient day. The benchmarking "after adjustment" further reduces the range to 0.76 to 0.92 paid hours per patient day. Examination of the same scenario for a hospital with more than 500 beds using a traditional/mixed system of drug distribution shows a similar improvement in the data ranges. The range decreases from the initial values of 0.27 to 1.20 paid hours per patient day, to 0.27 to 0.94 with adjustment for bed size and type of drug distribution system, and finally to 0.42 to 0.69 after the benchmarking adjustments have been made.

The pharmacy manager who was asked to justify why their pharmacy department appears to have higher staffing indicators than comparable hospitals could use the benchmarking data reported in Table XXV to determine if that assumption was in fact true. The manager could extract the resources associated with resource-intensive programs and compare the "after adjustment" figure for their hospital with that for the hospital grouping in Table XXV that is most similar to their own in size and type of drug distribution system. This might well demonstrate that their hospital's pharmacy staffing was quite appropriate in relation to other facilities when this programmatic approach to benchmarking was used.

Table XXV also shows before and after adjustment drug costs per patient day. It is clear that there is large variability in drug costs per patient day when overall drug costs are used to create drug cost indicators. Even adjustment for the size of the hospital and the type of drug distribution system leaves a large range. In contrast, the mean after adjustment drug costs per patient day are remarkably similar, regardless of the size of hospital or type of drug distribution system in use. It is also of interest that the after adjustment drug costs per patient day are, on average, only about one-third of the before adjustment figures. This indicates that specialized inpatient and outpatient pharmacy programs tend to be associated with the most costly drug therapies. This is probably not surprising to most managers who have had to deal with the high cost therapies used in areas such as oncology, critical care, and organ transplant programs.

The impact of the program-based benchmarking approach for 1999/2000 is the same as the results in the 1997/98 report. Not surprisingly, however, there has been an upward trend in both pharmacy paid hours

per patient day and in drug costs per patient day. With respect to the pharmacy staffing indicator of paid hours per patient day, there was an increase of approximately 10% in the before adjustment figures compared to 1997/98. This increase was remarkably consistent for each of the sub-categories of hospitals that were created when the hospitals were grouped on the basis of their bed size and type of drug distribution system. In contrast, the after adjustment figures for pharmacy staffing were virtually unchanged from the 1997/98 results. This suggests that any increases in pharmacy staffing over the two-year period occurred almost exclusively because of the continued implementation and expansion of pharmacy services in specialized program areas like oncology, organ transplant, and critical care.

Drug costs per patient day were also higher in the 1999/2000 results than they were in the 1997/98 report. The increases were generally in the 20% to 30% range and were reasonably consistent in both the before adjustment figures and the after adjustment figures, suggesting that drug cost increases are occurring in all program areas.

Pediatric Hospitals

In Table XXVI, similar data is provided for the 5 pediatric hospitals. As was the case for the adult hospitals, the program-based benchmarking analysis reduced the variability between facilities with respect to both their staffing and drug cost indicators. As was demonstrated in the 1997/98 survey results, it is clear that the pharmacy staffing required to provide pharmacy services to pediatric patients is substantially higher than that required for adult pharmacy services. For both unit dose/IV admixture hospitals and traditional/mixed distribution system hospitals, the paid hours per patient day were approximately twice that reported by adult hospitals. As compared to the 1997/98 results, the 1999/2000 results indicate that pharmacy paid hours per patient day increased approximately 20%.

Before adjustment drug costs for the pediatric hospitals were about 30% higher in 1999/2000 than they were in 1997/98. The after adjustment drug costs were actually lower than they were in the 1997/98 results but this is almost certainly the result of being able to extract out the drug costs associated with oncology and critical care in the 1999/2000 survey. The data available in the 1997/98 survey had not been adequate to enable this to be done for the pediatric hospitals.

It should be noted that one of the three unit dose/IV admixture pediatric facilities was operated as a partially separate component of a larger pharmacy department in a multi-site complex. As such it received much of its core services, such as overall management, purchasing and inventory control, from the central department. Although the staffing for these services was apportioned to the pediatric facility for the purposes of this analysis, it is uncertain how this would compare to the same services delivered in a completely stand-alone pediatric hospital. It is unknown if this may have contributed to the lower adjusted paid hours per patient day (1.16) for this unit dose/IV admixture pediatric facility, as compared to the other two facilities in this group (1.95 and 1.99).

Specialized Inpatient Programs, Adult Hospitals

In Table XXVII, information on staffing and drug costs is presented for a number of inpatient programs where enough hospitals provided data to make the program-specific information meaningful. In addition to the mean and median values for the data submitted, the raw data points from all of the reporting hospitals is included to provide a better indication of data clustering. It provides essentially the same information as a standard deviation but may be more informative for some readers.

In some cases, there is a pronounced clustering of the raw data with very few outliers. This pattern suggests that there is considerable consistency between hospitals with respect to these programs, and that the outliers may represent data reporting errors or inconsistencies on the part of a few hospitals. Examples of this relatively “tight” data include the drug costs per patient day for long term care, and mental health, as well as the staffing information for the mental health programs.

For other programs the raw data is scattered over a fairly broad range, without much clustering around the mean. The wide variations in paid hours per patient day for programs like critical care and bone marrow transplant may suggest that there were major differences in the way that these programs were provided by pharmacy at different hospitals. The variability may indicate the need for the profession and

the affected clinical programs to establish standards for pharmacy services delivered to these patient groups. Wide variations in the drug cost per patient day for some of these specialized programs may also indicate differences in the type of drug therapy being used at different facilities, which could again be a standard of care issue. However it is also possible that the wide variations represent an inconsistency in what is being included in the drug costs for any given program. For example some hospitals start thrombolytics in the emergency room and charge those costs to that area. Other facilities charge those same costs to the critical care areas. If this benchmarking survey repeated, it would probably be worthwhile to reach agreement on what costs should be rolled up under each program.

It is of interest to note that the pediatric program staffing and drug costs reported in Table XXVII by adult hospitals with a pediatric program component are similar to those reported by the pediatric hospitals in Table XXVI with a traditional/mixed drug distribution system. The mean paid hours per patient day were 0.93 and 1.03 respectively, and the drug costs were $20.94 and $22.70 respectively. This provides evidence that pediatric patients are labour-intensive for pharmacy departments to service, regardless of the type of facility in which their care occurs.

Outpatient Pharmacy Services, Adult Hospitals

Table XXVIII provides similar program-specific data for outpatient pharmacy services. The close clustering of paid hours per outpatient prescription dispensed suggests that the mean value of 0.27 hours per prescription would be quite valid for benchmarking comparisons, and for use in program planning.

For oncology admixture preparation, the paid hours per admixture cover a fairly broad range, but there is a reasonably close clustering around the mean value of 0.54. This suggests that this figure would be a reasonable benchmark value and that it should be useful for program planning purposes.

The sample size for home TPN, home IV admixture, and dialysis services were small and should be interpreted cautiously. They are included here in the hope that they provide some useful information that might otherwise not be available.

Investigational and Drug Information Services, Adult Hospitals

Although there is a fair degree of variability in the data points for paid hours per concurrent investigational drug study managed, the mean of approximately 40 hours per study suggests that the human resource costs of managing these studies were substantial (Table XXIX). Given that the mean number of concurrent studies was close to 100, the average hospital providing this service would be committing over 2 FTEs to investigational drug study management.

The variability in paid hours per drug information question handled is probably in part a reflection of differences in the types of questions that are documented. Some facilities only documented complex questions while others documented any question received, including quickly answered questions like those dealing with IV compatibility. Likewise some facilities documented only questions received by the drug information centre itself, whereas other facilities documented all questions received by pharmacy staff working anywhere in the hospital. Nonetheless, the mean paid hours per question of 0.93 indicates that significant resources were required to provide drug information to today's major hospitals.

Conclusions

The data provided in the program-based benchmarking survey for 1999/2000 largely validates the methodology that was first used in the 1997/98 Survey of Hospital Pharmacy in Canada. The results demonstrate that substantial increases in both staffing and drug costs have occurred over the two-year period. Staffing increases appeared to be attributable to continued growth in resource-intensive pharmacy programs, rather than as a result of staffing increases in the general medicine/general surgery areas. Drug cost increases in this program-based analysis appear to be occurring in many different program areas. Staffing for pediatric pharmacy services approaches twice the amount required for adult services. A number of program-specific pharmacy indicators for both staffing and drug costs have been derived from the survey results. Some of these appear to be quite reliable benchmark indicators while others must be interpreted more cautiously. The variability in pharmacy staffing for some specialized programs

speaks to the need for the development of standards for the pharmacy services delivered to those programs. If this survey is to be repeated on a regular basis, it would be desirable to better define the data that should be collected and reported for each program area. It is anticipated that this would improve the reliability of the data being collected and thus would result in better benchmark indicators.

References

1. Hall KW. “Benchmarking Indicators: Can they be refined to provide more useful data for program planning and evaluation?” 1997/98 Annual Report: Hospital Pharmacy in Canada Survey, Can J. Hosp. Pharm 52(1s): S29-S37, Feb 1999.

Table XXIV Sources of pharmacy benchmark indicators used for comparisons against the respondent's pharmacy department 1999/2000

Hospitals	All (63)	100-200 (13)	201-500 (30)	>500 (20)	Teaching (33)	Nonteaching (30)
Data reported in the Lilly Hospital Pharmacy in Canada Survey	24 38%	3 23%	11 37%	10 50%	18 55%	6 20%
Peer group of similar hospitals in the same province	44 70%	9 69%	23 77%	12 60%	21 64%	23 77%
Peer group of similar hospitals from across Canada	19 30%	4 31%	4 13%	11 55%	14 42%	5 17%
Hospitals of all types within the same province	12 19%	1 8%	7 23%	4 20%	7 21%	5 17%
Hospital of all types across Canada	1 2%	0 0%	1 3%	0 0%	0 0%	1 3%
Hospitals in the United States	2 3%	0 0%	1 3%	1 5%	2 6%	0 0%

Base: Respondents whose hospitals used pharmacy benchmarking indicators for comparison.

Table XXV Human Resource and Drug Cost Data for 22 Adult Hospitals Before and After Adjustment for Specialized Inpatient, Outpatient and Pharmacy Programs 1999/2000

	All Hospitals			300 - 500 Beds			> 500 Beds		
	All (n=22)	≥ 90% UD/CIVA (n=6)	Traditional/ Mixed (n=16)	All (n=11)	≥ 90% UD/CIVA (n=3)	Traditional/ Mixed (n=8)	All (n=11)	≥ 90% UD/CIVA (n=3)	Traditional/ Mixed (n=8)
Pharmacy Paid Hours per Patient Day									
• Before Adjustment									
Mean	0.66	0.94	0.55	0.58	0.88	0.47	0.73	1.00	0.63
Minimum	0.27	0.62	0.27	0.29	0.62	0.29	0.27	0.75	0.27
Maximum	1.20	1.20	0.94	1.20	1.20	0.61	1.18	1.18	0.94
• After Adjustment									
Mean	0.58	0.80	0.49	0.53	0.77	0.42	0.63	0.82	0.55
Minimum	0.31	0.55	0.31	0.31	0.55	0.31	0.42	0.76	0.42
Maximum	1.10	1.10	0.69	1.10	1.10	0.54	0.92	0.92	0.69
Drug Costs per Patient Day									
• Before Adjustment									
Mean	$57.33	$78.46	$49.41	$36.51	$44.76	$33.41	$78.15	$112.15	$65.41
Minimum	$12.19	$27.25	$12.19	$12.19	$27.25	$12.19	$20.89	$69.48	$20.89
Maximum	$143.06	$143.06	$123.45	$67.51	$67.51	$44.20	$143.06	$143.06	$123.45
• After Adjustment									
Mean	$21.68	$22.30	$21.37	$20.53	$19.58	$20.94	$23.12	$25.02	$21.98
Minimum	$12.00	$15.77	$12.00	$12.00	$15.77	$12.00	$15.82	$24.05	$15.82
Maximum	$27.31	$26.93	$27.31	$27.31	$21.57	$27.31	$26.93	$26.93	$26.68

Table XXVI Human Resource and Drug Cost Data for 5 Pediatric Hospitals Before and After Adjustment for Specialized Inpatient, Outpatient and Pharmacy Programs 1999/2000

	All Pediatric Hospitals (n=5)	≥ 90% UD/CIVA (n=3)	Traditional/ Mixed (n=2)
Pharmacy Paid Hours per Patient Day			
• Before Adjustment			
Mean	1.27	1.53	0.88
Minimum	0.72	0.72	0.78
Maximum	2.18	2.18	0.97
• After Adjustment			
Mean	1.43	1.70	1.03
Minimum	1.00	1.16	1.00
Maximum	1.99	1.99	1.06
Drug Costs per Patient Day			
• Before Adjustment			
Mean	$61.11	$70.46	$47.08
Minimum	$24.88	$24.88	$33.63
Maximum	$121.68	$121.68	$60.52
• After Adjustment			
Mean	$30.26	$35.31	$22.70
Minimum	$18.25	$21.11	$18.25
Maximum	$47.50	$47.50	$27.15

Table XXVII – Specialized Inpatient Programs: Human Resource and Drug Expenditure Data from 22 Hospitals with More Than 300 Beds 1999/2000 (Note: Data excludes pediatric hospitals)

	Adult Critical Care		Long Term Care		Mental Health		Bone Marrow Transplant		General Pediatrics		Operating Room
	Pd Hr/ Pt Day	Drug $/ Pt Day	Pd Hr/ Pt Day	Drug $/ Pt Day	Pd Hr/ Pt Day	Drug $/ Pt Day	Pd Hr/ Pt Day	Drug $/ Pt Day	Pd Hr/ Pt Day	Drug $/ Pt Day	Drug $/ Case
n = hospitals	12	17	6	9	5	13	5	4	5	8	11
Mean Value	0.92	106.27	0.14	5.48	0.30	7.75	1.95	153.39	0.93	20.94	39.65
Median Value	0.75	104.77	0.12	5.46	0.29	7.51	1.06	155.13	0.92	18.69	28.32
Individual Data Points from the Reporting Facilities	0.40 0.40 0.41 0.53 0.62 0.69 0.81 0.85 1.02 1.03 1.48 2.75	52.89 56.58 79.91 82.21 89.49 94.65 96.23 101.25 104.77 109.69 110.83 111.62 116.78 129.56 139.47 155.28 175.32	0.06 0.07 0.08 0.15 0.17 0.32	2.57 3.05 3.95 4.65 5.46 5.46 6.86 7.17 10.15	0.18 0.28 0.29 0.35 0.39	3.88 4.90 5.05 5.37 7.17 7.35 7.51 7.61 7.79 8.03 10.61 11.12 14.41	0.57 0.60 1.06 3.52 4.02	112.82 144.20 166.06 190.48	0.54 0.61 0.92 0.99 1.61	3.36 8.82 12.72 14.01 23.36 30.69 34.89 39.70	10.79 19.30 20.41 23.13 24.07 28.32 39.56 46.77 46.95 85.90 90.99

Table XXVIII Specialized Outpatient Programs: Human Resource and Drug Expenditure Data from 22 Adult Hospitals with More Than 300 Beds 1999/2000
(Note: Data excludes pediatric hospitals)

	Outpatient Prescription Dispensing	Oncology Admixture (Combined Inpatient and Outpatient)		Home TPN		Home IV Admixture		Dialysis Service	
	Pd Hr/ Prescription	Pd Hr/ Admix	Drug $/ Admix	Pd Hr/ TPN Unit	Cost/ 2 L Unit	Pd Hr/ IV Admix	Drug $/ IV Admix	Pd Hr/ Pt Year	Drug $/ Pt Year
n = hospitals	10	15	13	3	3	7	6	6	5
Mean Value	0.27	0.54	122.13	0.81	51.12	0.79	13.32	9.3	4,110
Median Value	0.29	0.51	93.01	0.92	49.98	0.60	10.49	11.0	4,839
Individual Data Points from the Reporting Facilities	0.17 0.19 0.20 0.27 0.27 0.30 0.30 0.31 0.31 0.35	0.24 0.25 0.32 0.32 0.32 0.36 0.48 0.51 0.55 0.55 0.59 0.63 0.64 0.81 1.55	46.69 67.46 86.62 87.00 88.83 91.08 93.01 100.80 105.52 108.50 130.34 177.05 404.76	0.56 0.92 0.96	48.96 49.98 54.43	0.36 0.38 0.47 0.60 0.89 0.92 1.91	6.00 7.50 10.05 10.93 20.14 25.30	0.71 1.93 8.89 13.10 15.44 15.70	593 880 4,839 6,907 7,332

1999/2000 RESPONDENTS

Hospitals <201 Beds
Aberdeen Hospital
Alberta Hospital Edmonton
Battlefords Union Hospital
C.H. de Buckingham
C.H. Fleury
C.H. Hôtel Dieu d'Amos
Children's Hospital of Eastern Ontario*
C.H. Régional Baie-Comeau
C.H. Rouyn-Noranda
C.H. De Val D'Or
Colchester Regional Hospital
Concordia Hospital
Cranbrook Regional Hospital
Delta Hospital
Fort McMurray Hospital
General Hospital of Port Arthur
Grey Nuns Community Hospital & Health Centre*
Guelph General Hospital
Hopital Sainte-Croix
Inst. de Cardiologie de Mtl*
Lake of the Woods District Hospital
Miramichi Regional Hospital
Misericordia Community Hospital & Health Center*
Pembroke Civic Hospital
Perth Smith Falls District Hospital
Prince County Hospital
Trail Regional Hospital
Valley Regional Hospital

Hospitals 201-500 Beds
Beausejour Hospital Corporation*
Brandon General Hospital
Cambridge Memorial Hospital
Centre hospitalier Anna-Laberge
C.H. Charles Lemoyne*
C.H. Cité de la Santé de Laval*
C.H. de Granby
C.H. Haut-Richelieu
C.H. Hôtel Dieu de Levis*
C.H. Hôtel Dieu de St-Jérôme
C.H. Jean-Talon
C.H. Jonquière
C.H. Laval*
C.H. Pierre Boucher
C.H. Régional de l'Outaouais
C.H. Régional de Rimouski
C.H. Régional du Suroît
Complexe Hospitalier de La Sagamie*
Greater Niagara General Hospital
Hopital Douglas*
Hopital du Saint-Sacrement*
Hôpital Général de Montréal*
Hospital for Sick Children (Toronto)*
Hôtel Dieu Grace Hospital (Windsor)
Institut universitaire de gériatrie de Montreal*
Institut universitaire de gériatrie de Sherbrooke*
Isaak Walton Killam Hospital*
Langley Memorial Hospital
Les Centres Hospitalieres et d'Hebergement de Riviere-du-Loup
Medicine Hat Regional Hospital
Misericordia General Hospital (Winnipeg)
Oakville-Trafalgar Memorial Hospital
Peace Arch Hospital
Penticton Regional Hospital
Region 4 Hospital Corporation
Regional Hospital Center (Bathurst)
Restigouche Health Services Corporation
Salvation Army Grace Hospital (Winnipeg)
Seven Oaks General Hospital
St. Catharines General Hospital
St. Joseph's Hospital (Hamilton)*
St. Joseph's General Hospital (Comox)
St. Mary's Hospital (Camrose)
St. Paul's Hospital (Vancouver)*
St. Vincent's Hospital
The Moncton Hospital*
The Montreal Children's Hospital*
The Richmond Hospital
Toronto East Gen/Orth Hospital*
York Central Hospital
York County Hospital
Yorkton Regional Health Center

Hospitals >500 Beds
Atlantic Health Sciences Corp*
Capital Health Region
Centre hospitalier universitaire de l'Estrie
Central Nfld. Regional Health Centre
C.H. de l'Enfant-Jésus*
C.H. du Sacre-Coeur Montréal*
C.H. Louis-H. LaFontaine*
C.H. Maisonneuve-Rosemont*
C.H. Région de l'Amiante Inc.
C.H. Sainte-Justine*
C.H. Saint-Luc*
Foothills Provincial General Hospital*
General Hospital – Health Science Centre (St. John's)*
Health Sciences Centre (Winnipeg)*
Jewish General Hospital*
Kelowna General Hospital
M.S.A. General Hospital
Ottawa Civic Hospital*
Region 3 Hospital Corporation*
Ridge Meadows & Health Care Centre
Royal Alexandra Hospital*
Royal Victoria Hospital*
St. Boniface General Hospital*
St. Joseph's Health Centre (London)*
Surrey Memorial Hospital
Toronto Hospital*
University of Alberta Hospital*
Vancouver Hospital and Health Sciences Centre
Victoria Hospital Corporation (H) (London)
Western Memorial Reg. Hospital*
Women's & Children's Hospital of B.C.*

**Teaching Hospital*

This report contains information on hospitals greater than or equal to 100 beds and at least 50 acute care beds.

WORKSHEET 1999/2000

Key Indicators	All Hospitals (115)	Teaching (53)	Nonteaching (62)	100-200 (29)	201-500 (53)	> 500 (33)	Your Figures
1. Acute Inpatient Drug Costs/ Acute Admission	$196.93	$255.30	$138.57	$159.04	$174.56	$257.94	
2. Nonacute Inpatient Drug Costs/ Nonacute Admission	$1,260	$721	$1,704	$2,261	$1,122	$1,099	
3. Inventory Turns	9.3	11.1	7.8	7.4	9.6	10.5	
4. IV Production/Acute Patient Day for ≥ 90% Patients	1.09	1.30	0.81	1.23	1.04	1.10	
5. # of Interventions/Admission	0.53	0.61	0.42	0.25	0.59	0.64	
6.a. Paid Hours/ Acute Patient Day	0.68	0.84	0.53	0.66	0.68	0.70	
	All Hospitals (115)	**≥ 90% Unit Dose (28)**	**≥ 90% Traditional (31)**	**≥ 90% Civa (51)**	**≥ 90% Civa + UD (23)**	**≥ 90% Civa + Traditional (7)**	
6.b. Paid Hours/ Acute Patient Day	0.68	0.81	0.60	0.78	0.85	0.74	

1.	Acute Inpatient Drug Costs ÷ Admissions (Acute Care)	(F4A ÷ A4A)
2.	Nonacute Inpatient Drug Costs ÷ Admissions (Nonacute Care)	(F4C ÷ A4B)
3.	Inventory Turnover Rate	F3
4.	Total IV Admixture Product ÷ Acute Care Patient Days for ≥ 90% CIVA	(H4D ÷ A6A) for ≥ 90% CIVA
5	(Total # of Pharmacokinetic Recommendations Made and Therapeutic Interventions Made) ÷ Total Admissions	(M2I2 + M3B) ÷ (A4A + A4B)
6.a.	Total # of Approved FTE (Excluding Residents) x 1950 hours ÷ Acute Care Patient Days	(D1A + B + C + D) × 1950 ÷ (A6A + A6B)
6.b.	Total # of Approved FTE (Excluding Residents) x 1950 hours ÷ Acute Care Patient Days	(D1A + B + C + D) × 1950 ÷ (A6A + A6B)