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1997/98 Annual report: Hospital pharmacy in Canada survey report

A supplement to the Canadian Journal of Hospital Pharmacy

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Foreword

Eli Lilly Canada, Inc. is pleased to present the results of the 12th annual Canadian Hospital Pharmacy Survey as a supplement to the Canadian Journal of Hospital Pharmacy and Pharmactuel; the first of many changes to come as we approach the 21st Century.

We at 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 to achieve a 45% response rate. The data presented in the 1997/98 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 1997/98 Editorial Board – Ron McKerrow, Steve Long, Pegi Rappaport, Bonnie Salsman, Alison Pilla, Kevin Hall and Jean-François Bussières for their personal effort and commitment as we produced this year's report.

Management information can be a valuable tool in both decision making and planning in pharmacy and administration. It is our hope that the information in this 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 Hospital Pharmacy in the 21st Century.

Yours truly,

D. Terrence McCool
Vice-President, Federal Government Affairs
Eli Lilly Canada Inc.

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

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1997/98 Annual report
Hospital pharmacy survey in Canada

(Please click on the Table of Contents headings to navigate.)

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Introduction – focus on benchmarking

Ron McKerrow

Over the past few years, Canadian health care has seen the formation of regions, hospital closures and health centre amalgamations. In addition to these externally-driven organizational issues, there is an increasing emphasis on value, productivity and accountability. Pharmacy managers have struggled with a variety of workload measurement systems, productivity analysis tools and clinical outcome measurements. The question that can be asked is: Has this information improved the practice of pharmacy, pointed out areas for productivity improvement and/or advanced pharmacy as a clinical profession?

According to previous hospital reports over the past five years, the health system has downsized while pharmacy staffing continues to increase. It is difficult to know whether this is as a result of the relative value placed on pharmacy by their organizations or whether pharmacy is taking on additional tasks formerly done by other personnel.

The focus of this year's publication is benchmarking. The objectives of this review were:

- To improve the usefulness of the comparative indicators that are generated by the annual survey by extracting and separately analyzing the data for programs that exist in some but not all hospitals, such as certain outpatient programs, certain specialized inpatient programs, and certain other unique programs such as a regional drug information service or contract services provided to other organizations.
- To improve the usefulness of comparative indicators for pediatric hospitals by separately analyzing the data for this particular group of specialty hospitals.

We continually ask our readership how we could improve the Annual Report to make it more relevant and informative to Pharmacy managers. This year, the format of our publication is substantially different:

- Rather than an annual report format, we are publishing a supplement to the Canadian Journal of Hospital Pharmacy.
- Distribution of the supplement is through the Canadian Society of Hospital Pharmacists (CSHP) and l'Association des pharmaciens des établissement de santé (APES).

In addition, the Editorial Board has decided to collect hospital pharmacy data in a survey format every second year Conference. These meetings will bring together leaders in Pharmacy from across the country who will identify emerging trends and assess their effects on hospital pharmacy practice. Proceedings from the conference will be published every second year and distributed to hospital pharmacists across the country. In this way, we hope to continue to bring you a historical perspective of where hospital pharmacy has been as well as a look to the future and where hospital pharmacy is going.

Demographics

Ron McKerrow

The 1997/98 response rate was slightly lower than the previous year at 45% (122/271). Twelve fewer surveys were sent to facilities this year than last year, likely as a result of structural changes and/or hospital closures. The mix of facilities remains unchanged from last year with 58% (71/122) of respondents from non-teaching facilities and 42% (51/122) from teaching facilities.

The response rate by province is illustrated in Figure 1. The response rate from Quebec was similar to last year and formed 39% (48/122) of this year's sample. The 29% response rate for Ontario reduced the province's percentage of the sample to 23% (28/122) compared with 36% in previous surveys.

Hospital demographic information presented in Table 1 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 are consistent in sample size and demographic indicators when compared to previous years.

This year's data is comparable with the information received last year in most areas. However, significantly more facilities were a part of the multi-site organization (49%) when compared to last year (34%). Bed allocation, annual admissions, occupancy rate and patient days changed little from last year. Outpatient visits increased again this year indicating the trend from inpatient to outpatient care. The proportion of hospitals with a program management organizational structure was unchanged from the previous year (Table II).

Figure 1—**Response to the survey by province 1997/98**

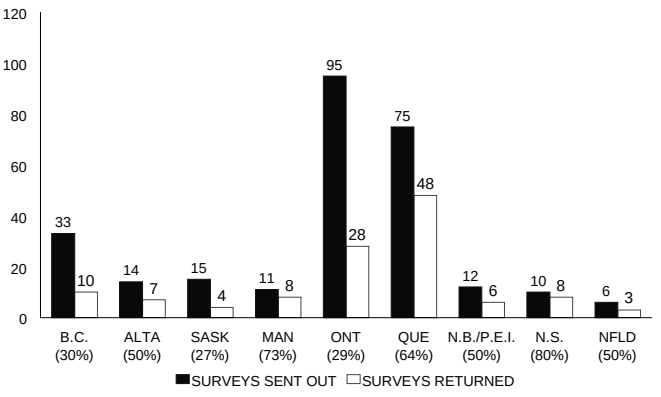


Table I—**Hospital demographic data 1997/98**

Acute care

Hospitals	All (122)	Teaching (51)	Non-teaching (71)
Number of beds	297	430	201
Annual admissions	12,024	16,766	8,627
Occupancy rate	84%	84%	85%
Patient days	91,499	135,112	60,714
Length of stay (days)	7.7	8.2	7.4
Clinic/outpatient visits	99,283	164,279	52,401
Medical day unit visits	15,547	22,510	9,512
Emergency department visits	44,633	49,889	40,811
Operating room case load	6,689	9,206	4,869
Surgical/day unit case load	5,772	7,706	4,445

Non-acute care

Hospitals	All (86)	Teaching (29)	Non-teaching (57)
Number of beds	132	153	122
Annual admissions	504	494	509
Occupancy rate	90%	89%	90%
Patient days	47,536	54,317	44,078
Length of stay (days)	279	254	290

Table II—**Pharmacy department data by bed size and teaching status 1997/98**

Hospitals	All (122)	100–200) (28)	201–500 (66)	> 500 (28)	Teaching (51)	Non-teaching (71)
Pharmacy hours of operation	82	65	84	93	95	72
Satellite dispensaries	55	4	30	21	36	19
	45%	14%	45%	75%	71%	27%
Types:						
Operating room	3	–	1	2	3	–
Critical care	13	1	6	6	13	–
Oncology	38	3	23	12	23	15
Other	24	1	9	14	19	5
Program management						
Yes – total	29	3	17	9	15	14
	24%	11%	26%	32%	29%	20%
Yes – partial	24	6	11	7	9	15
	20%	21%	17%	25%	18%	21%
# of programs implemented (n=53)	7.2	4.8	6.7	9.6	8.6	6.0
# of programs with direct pharmacist involvement (n=53)	5.5	3.4	5.3	7.1	6.2	4.9
Pharmacist salary paid by: (n=51)						
Pharmacy	43	8	24	11	20	23
	84%	89%	89%	73%	83%	85%
Program	5	1	1	3	3	2
	10%	11%	4%	20%	13%	7%
Shared	2	0	1	1	1	1
	4%	0%	4%	7%	4%	4%
Pharmacist's reporting responsibility: (n=51)						
Pharmacy	39	9	20	10	18	21
	76%	100%	74%	67%	75%	78%
Program	1	0	1	0	0	1
	2%	0%	4%	0%	0%	4%
Shared	10	0	5	5	6	4
	20%	0%	19%	33%	25%	15%

Clinical services

Jean-François Bussières

The 1997/98 data continued to show increasing clinical pharmacy services, a trend that has been observed since at least 1991/92. Year after year, there are higher participation rates for pharmacists in most clinical activities described in the survey, although comparisons from one year to another may show only small increases. Although our analysis in 1996/97 suggested some clinical activities were reaching a plateau, our 1997/98 analysis suggests the development of clinical pharmacy services continues, especially when data are examined from a seven year perspective.

As discussed in the Human Resources section, respondents reported that the proportion of time spent in clinical activities was about 33%, a value 14% higher than that observed in 1985/86 to 1987/88 (when it was 29% on average). This proportion varied between regions with 30% reported in BC, 36% in the Prairies, 37% in Ontario, 31% in Quebec and 28% in the Atlantic provinces.

Participation of pharmacists in clinical activities

The participation of pharmacists in clinical activities, described as the percentage of all respondents identifying activities ongoing in their institution, increased by amounts varying from 29 to 90% in the period from 1991/92 to 1997/98. Only central drug order review and adverse drug reaction reporting have remained stable. An increase of 50% from the 1991/92 values was observed in regular rounds with nurses and physicians, clinical drug trial services and pharmacokinetic dosing. An increase of 90% was observed in admission histories and patient group teaching.

Table IIIa presents clinical pharmacy services by bed size and teaching status. In 1997/98 central drug order review (93%), adverse drug reaction reporting (84%), individual patient counseling (84%), and clinical drug trial services (80%) were widely reported and stable in their evolution for the last few years. However, a high participation rate for a given activity does not indicate the quality nor the quantity. Also, our survey did not look at overnight prescriptions filled by nurses in night cabinets without the benefit of drug order review by a pharmacist prior to administration.

In the case of clinical drug trial services, the participation rate increased from 51% in 1991/92 to 80% in 1997/98. Although clinical drug trial services do not necessarily involve a clinical component in pharmacy practice, it is highly suitable that pharmacy departments get involved in clinical drug trial management, especially because federal laws do not mandate the researcher and the pharmaceutical industry to include the pharmacist in their research protocols. It would be interesting to examine pharmacist involvement in hospital research in future surveys.

Other clinical activities are still progressing with increases of 4 to 8% compared to 1996/97 results. In 1997/98, participation rates were 80% for pharmacokinetic dosing, 74% for patient group teaching, 72% for routine consultations with physicians, 69% for discharge interviews and 42% for admission histories.

Other clinical activities reported at comparable rates to 1996/97 were regular rounds with physicians (53%) and regular rounds with nurses (46%). Pharmacists' rounding with physicians and nurses was more popular in BC (70%), the Prairies (79%) and Ontario (64%) than in Quebec (38%) and the Atlantic provinces (41%). Seventy-two percent of all respondents participated in routine consultations with physicians whereas only 54% of Quebec respondents did.

Only two of the 13 activities surveyed showed a slight reduction in 1997/98 compared to 1996/97, i.e. drug utilization reviews (DURs) and therapeutic interchange programs. DURs have shown a significant decrease in participation rate going from 84% in 1991/92 to 65% in 1997/98. This reduction can be explained by different factors: the pharmaceutical care model increases the focus on direct patient care and individualized patient therapy and can reduce the time available to conduct elaborate DURs in institutions. The implementation of critical pathways is a more proactive way of monitoring drug therapy use and pharmacist involvement is increasing in that field. It is interesting that annual savings reported were stable since 1993/94 with an average of $73,000 savings per year per respondent.

Interventions

The number of therapeutic interventions grew significantly again this year, reaching an average of 5290 interventions per respondent (range 50 to 51,490) in 1997/98 (Table IIIa), a 26% increase from 1996/97 and a 92% increase from 1992/93. Teaching institutions reported almost 4 times as many interventions as non teaching institutions (8513 versus 2257). The increased number of interventions can be explained partly by respondents reporting higher values from merged sites but also by further development of clinical activities and increased pharmacist involvement in clinical settings.

The average of reported numbers of pharmacokinetic recommendations was 829 in 1997/98 (range 10 to 12,621), 491 in 1996/97 and 801 in 1995/96. These variations can be partly explained by the fact that some respondents did not collect distinct statistics for pharmacokinetic interventions and respondents can vary from one year to another.

Interventions were documented by 81% of all

Table IIIa—**Clinical pharmacy services by bed size, and teaching status 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Central drug order review	113	27	63	23	41	24
	93%	96%	95%	82%	92%	93%
Regular rounds with physicians	65	7	35	23	41	24
	53%	25%	53%	82%	80%	34%
Regular rounds with nurses	56	9	30	17	29	27
	46%	32%	45%	61%	57%	38%
Routine consultation with physicians	88	19	45	24	46	42
	72%	68%	68%	86%	90%	59%
Documented interventions	99	20	55	24	45	54
	81%	71%	83%	86%	88%	76%
# of therapeutic interventions made/year (n=66)	5,290	2,047	4,479	11,254	8,513	2,257
By % of those who document interventions (n=99)						
• Document in pharmacy	75	15	41	19	39	36
	76%	75%	75%	79%	87%	67%
• Document in health records	76	13	42	21	34	42
	77%	65%	76%	88%	76%	78%
• Reviewed interventions for acceptance	47	11	28	8	24	23
	47%	55%	51%	33%	53%	43%
– acceptance rate (n=41)	88%	89%	89%	87%	90%	86%
• Reviewed interventions for economic outcome	19	4	8	7	8	11
	19%	20%	15%	29%	18%	20%
– annual savings (n=11)	$36,655	$10,667	$51,496	$41,307	$28,500	$38,468
• Reviewed interventions for clinical outcome	14	4	5	5	7	7
	14%	20%	9%	21%	16%	13%
– rate of favourable outcome (n=7)	72%	76%	85%	45%	75%	70%
Pharmacokinetic dosing services	98	22	52	24	47	51
• # of recommendations made/year (n=58)	80%	79%	79%	86%	92%	72%
	829	448	993	860	1,448	392
• Acceptance rate (n=64)	88%	90%	89%	86%	86%	90%
# of interventions per admission (n=67) (therapeutic and pharmacokinetic)	0.44	0.32	0.47	0.51	0.60	0.30
Adverse drug reaction reporting	103	24	54	25	45	58
	84%	86%	82%	89%	88%	82%
Admission histories	51	5	29	17	33	18
	42%	18%	44%	61%	65%	25%
Discharge interviews	84	18	42	24	46	38
	69%	64%	64%	86%	90%	54%
Clinical drug trial services	97	17	54	26	47	50
	80%	61%	82%	93%	92%	70%
Individual patient counselling	102	24	52	26	48	54
	84%	86%	79%	93%	94%	76%
Patient group teaching	90	19	46	25	42	48
	74%	68%	70%	89%	82%	68%
Drug utilisation reviews	79	15	43	21	36	43
	65%	54%	65%	75%	71%	61%
Annual savings ($) (n=29)	$73,613	$30,917	$64,644	$122,453	$120,909	$44,711
Therapeutic interchange program	98	21	53	24	39	59
	80%	75%	80%	86%	76%	83%

respondents, and patient-pharmacist interactions were documented in the same proportion (Table IIIb). Of those, 77% used the medical record for written interventions in 1997/98 compared to 64% in 1996/97. It is now widely accepted that pharmacists should document their interventions in the medical record and not only the pharmacy record.

The number of interventions (therapeutic and pharmacokinetic) per admission increased from 0.15 in 1992/93 to 0.32 in 1996/97 and 0.44 in 1997/98. This is a definite sign of increasing clinical pharmacists' activities in hospitals. The ratio of interventions per admission varied among regions with averages of 0.43 in BC, 0.36 in the Prairies, 0.70 in Ontario, 0.43 in Quebec, 0.15 in the Atlantic provinces and a particularly low rate of 0.03 in Newfoundland.

A new ratio was calculated this year, the number of interventions per pharmacist FTE, which would take into account the staff available to intervene. In 1997/98 an average of 454 interventions per pharmacist FTE (range 20 to 2055) was reported. This was slightly higher in teaching institutions (459) versus non teaching hospitals (425). Respondent hospitals where pharmaceutical care (PC) was implemented showed a higher ratio (498) versus those where PC was not implemented (347). The average of interventions per FTE by region was 556 for BC, 417 for the Prairies, 661 for Ontario, 443 for Quebec and 179 for the Atlantic provinces. The low result in the Atlantic provinces was skewed by Newfoundland respondents who on average had only 34 interventions per FTE.

Outcomes

The measurement of intermediate outcomes provides some information about the success of pharmacist interventions, but obviously less than final patient care outcomes. Forty-seven percent of respondents reviewed the acceptance rate of interventions which has been stable for many years at an average of 88% in all regions (Table IIIa).

Economic outcome documentation has declined from 54% in 1991/92 to 19% in 1997/98. Annual cost savings were reported with an average of $36,655 per respondent, a small reduction from 1996/97 values. The low response rate to this question (19/122) limits its validity and interpretation. The recognition of the impact of clinical pharmacy services by hospital administrators and health care professionals as well as the numerous articles published in the scientific literature may explain the limited data collection for these indicators. There is also the consideration of the busy agenda of clinicians and the costs incurred by data collection.

Clinical outcome documentation was reported by only 14% of respondents that documented interventions in 1997/98 versus 20% in 1996/97. The reduction might be explained by fewer respondents from Ontario this year.

Practice models

Most pharmacy departments have a mix of distribution systems and clinical practice models. Traditional clinical pharmacy services were reported by 89% of all respondents, followed by pharmaceutical care at 66% (Table IIIb).

In terms of beds covered according to practice model, 27% of beds were covered by the pharmaceutical care model whereas 58% of the beds were covered by traditional clinical pharmacy services. Seventy percent of all respondents have groups of patients within their institution that do not receive any patient-oriented clinical pharmacy services. Percentages will not add to 100% since the number of respondents varied according to the question.

Provision of clinical pharmacy services during weekends grew from 59% in 1996/97 to 70% in 1997/98 for sites using the traditional practice model and remained stable at 24% for 1996/97 and 1997/98 for the PC model. Weekend coverage was oriented towards follow-up of patients (83%) to a greater extent than new patients (52%).

As resources were not sufficient to provide adequate pharmaceutical care to all patients, 46% of all respondents have established criteria to target their clinical activities, whatever practice model is promoted. These criteria included the type of drug received (73%), the medical service (64%), disease states (61%), age (48%), number of drugs received (41%) and others (23%).

Drug-related problems identified for patients were communicated to a community pharmacist by 51% of all respondents (with a low of 38% in Quebec to a high of 74% in the Prairies). This interaction between hospital and community settings was provided for an average of 15% of patients (range 3 to 85%).

Evidence-based medicine continues to grow as the number of critical pathways is increasing. Fifty-two percent of all respondents reported the use of critical pathways versus 46% in 1996/97. However, the number of pathways reported per respondent decreased from 10 to 8.5 (range 1 to 40) in 1997/98. A higher percentage of Quebec respondents in the cohort this year might explain that reduction. Pharmacists were involved in their development in 71% of the hospitals.

Effect of region, bed size, teaching status and PC implementation

Our analysis shows generally that Quebec and the Atlantic provinces have lower participation rates and activity indicators in clinical pharmacy services than Ontario, the Prairies and BC.

Without any statistical analysis, bed size seems to match results observed in teaching sites. In both cases, the prevalence of clinical pharmacy services is higher compared to non teaching sites and smaller hospitals.

In looking at the results for respondents where pharmaceutical care was implemented, we observe a higher rate of clinical pharmacy services. Differences in percentages varied between 11% and 55% according to the service offered.

Table IIIb—**Clinical pharmacy services by bed size, and teaching status 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Clinical practice model used:						
• Pharmaceutical care	80	16	43	21	40	40
	66%	57%	65%	75%	78%	56%
– % of beds serviced (n=77)	27%	22%	29%	27%	29%	25%
• Traditional clinical services	108	24	61	23	47	61
	89%	86%	92%	82%	92%	86%
– % of beds serviced (n=103)	58%	67%	57%	52%	50%	64%
• Some patients do not receive any Patient-oriented clinical services	85	23	43	19	39	46
	70%	82%	65%	68%	76%	65%
– % of beds not serviced (n=80)	37%	33%	37%	40%	38%	35%
Weekend/holiday service:						
• Pharmaceutical care:	29	6	16	7	11	18
	24%	21%	24%	25%	22%	25%
– follow-up patients	83%	83%	81%	86%	82%	83%
– new patients	52%	67%	44%	57%	55%	50%
• Traditional clinical service:	86	20	49	17	29	57
	70%	71%	74%	61%	57%	80%
– follow-up patients	88%	95%	88%	82%	86%	89%
– new patients	76%	80%	71%	82%	66%	81%
Established criteria for receiving pharmaceutical care or traditional clinical service:	56	8	32	16	26	30
	46%	29%	48%	57%	51%	42%
Based on: Age	48%	50%	44%	56%	62%	37%
(n=56) Number of drugs received	41%	50%	41%	38%	54%	30%
Type of drug received	73%	88%	66%	81%	69%	77%
Disease state	61%	38%	59%	75%	58%	63%
Service	64%	63%	69%	56%	65%	63%
Other	23%	13%	22%	31%	27%	20%
Pharmacist–patient interactions documented in health record	98	22	54	22	42	56
	80%	79%	82%	79%	82%	79%
• all interactions documented (n=98)	31	8	21	2	12	19
	32%	36%	39%	9%	29%	34%
Drug-related problems communicated to community pharmacy	62	14	29	19	37	25
	51%	50%	44%	68%	73%	35%
• % of patients (n=60)	15%	20%	15%	12%	11%	21%
Critical pathways/care maps utilised:	63	9	36	18	29	34
	52%	32%	55%	64%	57%	48%
• # pathways/care maps (n=52)	8.5	2.7	10.5	7.1	7.8	9.0
• % developed with pharmacist input	71%	83%	79%	49%	67%	75%

Respondents from hospitals where PC was implemented reported on average 6378 interventions whereas those not reporting PC implementation had an average of 2599. The number of interventions per admission was 0.50 where PC was implemented compared to 0.30 were it was not implemented. Clearly, PC seems to contribute to the capacity of the pharmacist to intervene.

The evolution of clinical pharmacy services continues and pharmacists should direct their efforts towards better documentation of outcomes in order to support enhanced services.

Suggested readings

1. Raehl CL, Bond CA, Piterle M. 1995 National clinical pharmacy services study. US Pharmacotherapy 1998; 18 (2): 302–26.
2. Anonymous. Strategic plan for the American College of Clinical Pharmacy 1998–2000. Pharmacotherapy 1998 18 (2): 417–24.
3. CSHP Official Publications. Statement, guidelines and other V5–1995, J2–1994, J6–1996, J7–1996, J8–1997, J9–1997.

Drug information services

Bonnie Salsman

This year's respondents reported very little change in the area of drug information services, with 98% of all respondents (Table IV) indicating that their departments answered drug information questions. Twenty-four percent of these reported that their departments had dedicated staff to provide the service, compared to 25% in 1996/97.

In the 1996/97 report, we observed a consistent six-year decline in the percentage of respondents reporting that dedicated staffing was available for the provision of drug information services. However, since there have been a number of changes to this section of the questionnaire in recent years, it is difficult to speculate on whether the responses reflect a true change. Certainly, with the widespread acceptance of pharmaceutical care as the preferred model for the provision of clinical pharmacy services, one could expect that drug information activities might be increasingly decentralized to pharmacists in patient care areas. However, the percentage of respondents providing drug information services who indicated that one or more FTE pharmacist positions were assigned to drug information has shown very little change over a six year period, with 15% giving a positive response to this question in 1997/98, compared to 14% in 1996/97 and 16% in 1991/92. In hospitals with dedicated staffing, the average number of FTE's assigned to drug information increased from 0.95 in 1996/97 to 1.25 in 1997/98. This seems to suggest that, in most institutions, organized drug information services have fared reasonably well during a period of financial restraint and staffing cutbacks. However, the change may also be partially due to a change in survey demographics, since the larger hospitals and multi-site health organizations now comprise a larger percentage of the survey respondents.

Among respondents who answered drug information questions, 51% reported that they had used a regional drug information service during 1997/98. Thirty-four percent (10/29) of respondents with dedicated drug information staff reported that their service was classified as a regional service. This increase from the 11% reported in 1996/97 may reflect the move toward regionalization of hospital services that is occurring in all areas of the country.

The average of reported annual budgets for books, journals and other reference materials was $7,698, similar to the 1996/97 average of $7,882. As expected, this average was higher in teaching hospitals and hospitals over 500 beds.

The average of reported annual numbers of drug information questions was 3,163, considerably lower than the 1996/97 reported average of 3,976, but still higher than the 1995/96 figure of 2,292. The average was highest in hospitals over 500 beds and teaching hospitals.

Table IV—**Drug information services by bed size, teaching status and regional centres 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)	Regional centre (11)
Answer drug information questions	119 98%	27 96%	64 97%	28 100%	50 98%	69 97%	11 100%
Use a regional service (n=119)	61 51%	18 67%	30 47%	13 46%	20 40%	41 59%	7 64%
Have dedicated staff (n=119)	29 24%	3 11%	10 16%	16 57%	26 52%	3 4%	10 91%
# FTEs dedicated to drug Information (n=29)	1.25	0.1	0.8	1.7	1.4	0.1	2.5
Annual budget (n=107)	$7,698	$3,049	$5,602	$17,685	$14,054	$3,258	$26,507
Annual # drug information questions (all pharmacists) (n=66)	3,163	1,556	2,258	6,123	5,100	1,341	8,638

Drug distribution – outpatients

Pegi Rappaport

Sixty-five percent of all respondents reported that they provided outpatient services. The biggest change was in Quebec where only 50% (24/48) of respondents provided outpatient prescriptions, down from 83% in 1996/97. This is likely due to changes in legislated requirements and continues a trend that began with last year's Report. Also of interest was the fact that only 79% (22/28) of hospitals with >500 beds supplied prescriptions to outpatients compared to 100% last year.

Although 79 respondents had outpatient services, only 29 of these could separate their ambulatory drug costs. For these respondents, the average of reported ambulatory (take home) drug costs was $1,690,835 (Table V), up from $1,297,771 in 1996/97. This 30% increase is consistent with the increase in the average number of prescriptions filled by separate outpatient pharmacies (see below).

Separate outpatient pharmacy

A separate service for outpatients was operated by 18% of all respondents. This is similar to the survey results for the last four years. However, this year 27% (6/22) of respondents stated that the pharmacy was not operated by the hospital compared to only one respondent in 1996/97. All six of these hospitals were in Ontario, 2 in teaching hospitals and 4 in community hospitals. This was half of the Ontario respondents with separate outpatient pharmacies and is indicative of a trend as more hospitals develop retail/mall space that is leased to private businesses.

The average of reported numbers of prescriptions filled annually by separate outpatient pharmacies was 50,880. This prescription volume was 37% higher than the 37,224 reported in 1996/97. This year more pharmacies reported annual prescription volumes over 60,000 per year. However, five Ontario respondents did not give prescription volumes and this may be due to the hospital's limited access to the information because the service was contracted out. The large increase in the average number of prescriptions filled may suggest that retail pharmacies that remain under the ownership of hospitals are the larger, more viable ones. Changes in outpatient dispensing services in Quebec hospitals may also have had an impact on this data.

Sixty-four percent of these pharmacies generated a profit. The average of reported usual dispensing fees was $8.59, up from $8.23 in 1996/97. The highest average of reported fees was in Ontario ($10.07).

Outpatient services through inpatient pharmacy

The central inpatient pharmacy provided prescription services to outpatients in 57% of responding hospitals (Table V). This was similar to the 56% reported in 1996/97. The average of reported numbers of outpatient prescriptions filled annually was 4383. This continues a downward trend seen in the last four years (5130 in 1996/97, 6353 in 1995/96, 7634 in 1994/95 and 8511 in 1993/94). The two provinces with the greatest decreases were Ontario and Quebec.

The usual dispensing fee on average was $3.02 which was lower than the 1996/97 average of $3.48.

Table V—**Ambulatory care pharmacy services by bed size and teaching status 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Separate outpatient pharmacy	22	0	12	10	14	8
	18%	0%	18%	36%	27%	11%
# prescriptions filled/year (n=15)	50,880	–	31,931	67,460	61,952	6,592
Profit generated	14	–	5	9	12	2
(as % of service providers)	64%	–	42%	90%	86%	25%
Usual dispensing fee (n=18)	$8.59	–	$8.22	$8.97	$8.34	$9.48
Outpatient services through inpatient pharmacy	69	15	36	18	30	39
	57%	54%	55%	64%	59%	55%
# prescriptions filled/year (n=50)	4,383	2,405	3,417	8,914	7,828	1,677
Usual dispensing fee (n=66)	$3.02	$3.46	$2.27	$4.15	$4.03	$2.23
Outpatient services not provided	43	13	24	6	14	29
	35%	46%	36%	21%	27%	41%
Ambulatory (take home) drug costs (n=29)	$1,690,835	$30,309	$1,675,769	$3,394,046	$4,735,253	$88,509

Drug distribution – inpatients

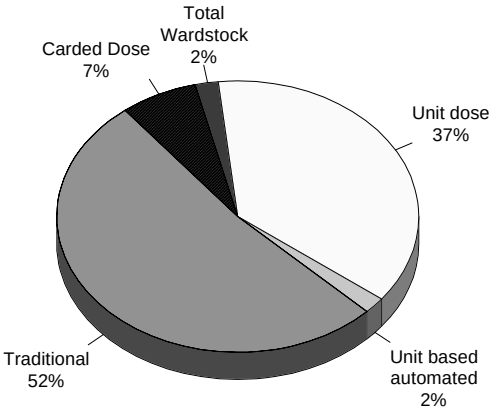
Bonnie Salsman

Hospitals continued to have mixed distribution systems with the proportion of beds serviced by each system for the "average" respondent's hospital as shown in Figure 2.

Progress toward the implementation of unit dose systems in Canadian hospitals has occurred very slowly over the past five years. In 1997/98, 48% of all respondents reported the use of unit dose systems within their institutions (Table VI), compared to 45% in 1996/97. The percentage of respondents reporting the provision of unit dose services to ≥90% of beds increased slightly to 23%, compared to the 20% reported in 1996/97. Although, at first glance, this information seems to reflect some progress, these figures are actually very similar to those reported in 1995/96, when 47% of respondents reported the use of unit dose systems and 22% reported provision of unit dose services to ≥90% of beds.

Unit dose systems were least common in Nova Scotia (13%, 1/8) and New Brunswick/PEI (17%, 1/6). If these provinces are excluded from the calculations, the overall

Figure 2—**Proportion of beds serviced by drug distribution system 1997/98**



Base: All respondents (122)

Table VI—**Drug distribution systems by bed size and teaching status 1997/98**

Hospitals	All (122)	100-200 (28)	201-500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Unit dose, some beds	59	9	32	18	29	30
	48%	32%	48%	64%	57%	42%
Unit dose, ≥90% of beds	28	4	17	7	15	13
	23%	14%	26%	25%	29%	18%
Unit based automated dispensing, some beds	7	2	3	2	4	3
	6%	7%	5%	7%	8%	4%
Unit based automated dispensing, ≥90% of beds	2	2	–	–	1	1
	2%	7%	–	–	2%	1%
Traditional, some beds	93	22	48	23	40	53
	76%	79%	73%	82%	78%	75%
Traditional, ≥90% of beds	53	13	32	8	21	32
	43%	46%	48%	29%	41%	45%
Total wardstock, some beds	19	5	10	4	9	10
	16%	18%	15%	14%	18%	14%
Total wardstock, ≥90% of beds	–	–	–	–	–	–
	–	–	–	–	–	–
Control/carded dose, some beds	29	7	14	8	6	23
	24%	25%	21%	29%	12%	32%
Control/carded dose, ≥90% of beds	1	1	–	–	–	1
	1%	4%	–	–	–	1%
One system for oral medication for ≥90% of beds	84	20	49	15	37	47
	69%	71%	74%	54%	73%	66%
Centralised automated medication dispensing	31	3	17	11	19	12
	25%	11%	26%	39%	37%	17%
Percent of oral unit doses handled	67%	85%	67%	63%	67%	67%

reported unit dose rate for Canada would increase to 53%. The provinces where reporting of unit dose services to ≥90% of beds was most common were Saskatchewan (100%, 4/4) and Ontario (39%,11/28).

In hospitals reporting the use of unit dose systems, the average percentage of patients receiving their medications through this method of drug distribution was 65%, compared to 67% last year. Unit dose services were more commonly reported by hospitals over 500 beds (64%) and teaching hospitals (57%).

Traditional drug distribution systems continued to be the most commonly reported method of drug distribution in 1997/98. The percentage of hospitals reporting some use of traditional drug distribution systems increased to 76%, compared to 71% in 1996/97. In hospitals reporting use of traditional systems, the average percentage of patients receiving their drugs through this method was 75%. Forty-three percent of respondents reported that the traditional system was used for ≥90% of beds, compared to only 31% in 1996/97.

Sixteen percent of all respondents reported use of total wardstock systems, compared to 22% 1996/97. In hospitals using total wardstock systems, the average reported percentage of patients serviced through this system was 11%, down from 22% in 1996/97. This figure has been steadily decreasing. No hospitals reported the provision of a total wardstock system to ≥90% of patients. Use of total wardstock systems was reported most commonly in the Atlantic Region (24%, 4/17), although there were no hospitals in Nova Scotia who reported use of the system.

Use of the controlled/carded dose system of drug distribution was reported by 24% of all respondents. These hospitals provided the system to an average of 33% of patients. One hospital reported use of the carded/controlled system of drug distribution for ≥90% of patients. This data is similar to 1996/97 data.

This year, 6% of all respondents (seven hospitals) reported that unit-based automated medication dispensing systems were used within their institutions, slightly less than the 7% reported in 1996/97. Two hospitals reported that the unit based dispensing system was used for ≥90% of patients. Both of these were in the 100-200 bed hospital category. Two respondents reported use of unit-based medication systems in the Emergency Department and one respondent reported use of the system in the Operating Room. Use of centralized automated dispensing systems increased slightly, with 25% of respondents reporting use of these systems, compared to 21% in 1996/97. In hospitals using centralized automated systems, the average of reported percentages of doses handled by the machine was 67%.

Once again, the percentage of respondents reporting that nurses used medication tickets in the medication administration process increased slightly to 36%, compared to 34% in 1996/97 and 30% in 1995/96 (Table VII). These figures have remained consistent over a five year time period (35% of respondents reported use of medication tickets in 1992/93). Use of medication tickets was most common in Quebec, where 58% (28/48) of respondents reported use of medication tickets compared to 22% (16/74) in the remainder of the country. The use of medication tickets is associated with a high rate of medication errors and, in view of the fact that it is not difficult or expensive to establish alternate systems, it is disappointing that so many hospitals still rely on this outdated tool for medication administration.

The maintenance of patient medication profiles within pharmacy was reported by 98% of all respondents. Of these, 65% reported that the medication profiles included all orders, similar to the 66% reported in 1996/97. Of the hospitals who indicated that partial medication profiles were maintained, 40% (17/42) reported that wardstock items were excluded, 43% (18/42) reported that stat doses were excluded, and 14% (6/42) reported that other items were excluded. As in 1996/97, the category of hospitals reporting the highest percentage of complete medication profiles was hospitals with 100 to 200 beds (79%).

Canadian hospitals clearly lag behind U.S. hospitals in the area of drug distribution. The 1996 ASHP National Survey of Pharmacy Practice in Acute Care Settings (1) did not even include questions on the prevalence of unit dose distri-

Table VII—**Medication tickets and profiles by bed size and teaching status 1997/98**

Hospitals	All (122)	100-200 (28)	201-500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Medication tickets	44 36%	9 32%	27 41%	8 29%	14 27%	30 42%
Profiles kept	120 98%	28 100%	64 97%	28 100%	51 100%	69 97%
Include all orders (n=120)	78 65%	22 79%	40 63%	16 57%	33 65%	45 65%
Orders excluded (n=42):						
• Wardstock (#)	17	1	7	9	12	5
• Stat doses (#)	18	3	12	3	5	13
• Other (#)	6	2	4	–	1	5

bution systems in hospitals, since the percentage of hospitals reporting such systems had remained constant at approximately 90% for the previous six years. This discrepancy between Canadian and U.S. practice may be partly due to drug cost tracking and revenue generation issues in the American health care system. However, the extensive evidence on the positive effects that drug distribution system improvements can have on error rates, drug wastage, inventory control and efficient utilization of hospital personnel should support the provision of a similar level of service in Canadian hospitals.

Clearly, hospital pharmacists have a professional responsibility to provide the safest possible medication system for their patients. Unfortunately, as financial pressures on the health care system mount, there is a valid concern that system improvements are becoming more difficult to achieve.

Pharmacy departments in hospitals currently undergoing mergers, regionalization, reengineering, financial cutbacks or other significant changes may believe that this is not the appropriate time to propose improvements in pharmacy services. Often, however, a climate of change with an accompanying reexamination of current practices can create many opportunities for service improvements. A systematic review of processes can often reveal many areas with potential for improved efficiency. By using this approach, medication system enhancements may prove to be surprisingly affordable!

References

1. Reeder CE, Dickson M, Kozma CM, Santell JP. ASHP National survey of pharmacy practice in acute care settings – 1996. Am J Health-Syst Pharm. 1997; 54:653–69.

Intravenous admixtures

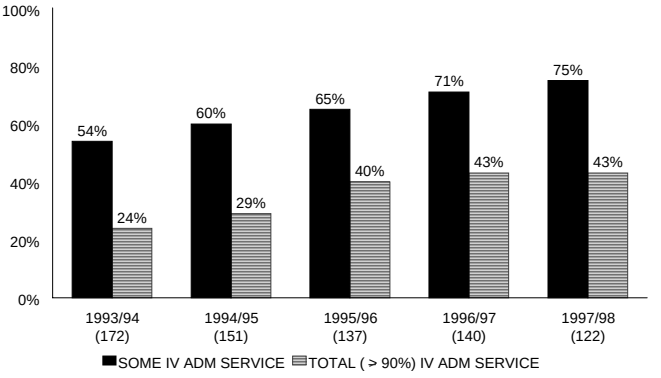
Bonnie Salsman

The 1997/98 responses confirmed a finding observed in previous years: Canadian hospitals are steadily moving toward pharmacy-based intravenous admixture systems as the standard of care (Figure 3). This year, 75% of all respondents reported the provision of intravenous admixture (CIVA) services (Table VIII), compared to 71% in 1996/97. This figure has increased steadily since 1992/93, when only 51% of respondents reported the provision of CIVA services. The percentage of respondents reporting complete CIVA services remained stable, with 43% of all respondents reporting that services were offered to ≥90% of patients or patient care areas. Where partial CIVA programs were reported, the average percentage of patients or patient care areas receiving the service was 32%.

For respondents whose departments provided intravenous admixture services, 63% reported the provision of services to critical care, 27% to the OR, 40% to the ER, 85% to other inpatients and 61% to outpatients. The figures for critical care, OR and ER all represent an increase compared to 1996/97. This is a positive finding in view of the complexity of patients and potential for cost savings in these areas.

For respondents whose departments provided CIVA services, 95% reported that their services included preparation of antibiotics, 57% included H2 blockers, 48% included large volume parenterals, 26% included inotropes and 74% included other drugs.

Figure 3—**Percentage of IV admixture service providers 1993/94–1997/98**



Base: All respondents ( )

Although minibag infusion remained the most commonly reported primary method of preparing intravenous admixtures (52%, 63/122), the use of this system was less common than in 1996/97, when 62% of respondents

Table VIII—**IV admixture service by bed size and teaching status 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Provision of some IV admixture services	92 75%	21 75%	47 71%	24 86%	43 84%	49 69%
≥90% of patient care areas	53 43%	11 39%	26 39%	16 57%	29 57%	24 34%
If partial, % of patient care areas (n=37)	32%	26%	29%	48%	51%	21%
Patient care areas included: (n=85)						
Critical care	63%	71%	64%	54%	63%	63%
Operating room	27%	33%	32%	13%	19%	35%
Emergency	40%	48%	40%	33%	33%	47%
Other inpatients	85%	86%	81%	92%	91%	80%
Outpatients	61%	57%	64%	58%	63%	59%
Products included: (n=92)						
Large volume parenterals	48%	29%	47%	67%	65%	33%
Antibiotics	95%	95%	91%	100%	100%	90%
Inotropes	26%	10%	26%	42%	44%	10%
H_2 blockers	57%	57%	47%	75%	77%	39%
Others	74%	67%	74%	79%	91%	59%
IV production per acute patient day:						
≥90% of patient care areas (n=45)	0.92	0.77	0.93	1.03	1.14	0.63

Table IX—**Averages of reported annual productions of IV admixtures, chemotherapy and TPN by bed size and teaching status 1997/98**

	All respondents				Teaching hospitals			
	All	100–200	201–500	>500	Teaching	100–200	201–500	>500
Annual production of IV admixtures – total	82,182 (81)	21,735 (19)	63,698 (40)	167,992 (22)	135,857 (40)	45,678 (6)	109,371 (18)	199,472 (16)
• inpatients	80,831 (62)	23,421 (13)	48,770 (27)	154,103 (22)	126,216 (32)	44,310 (4)	77,758 (12)	183,037 (16)
• outpatients	8,072 (15)	543 (3)	9,360 (8)	11,142 (4)	10,538 (8)	530 (1)	12,205 (6)	10,545 (1)
• home patients	3,736 (35)	1,584 (8)	3,716 (14)	5,082 (13)	6,432 (17)	2,861 (4)	8,079 (5)	7,188 (8)
Annual production of chemotherapy – total	6,346 (92)	1,369 (21)	5,548 (49)	12,872 (22)	9,759 (42)	1,456 (6)	6,647 (20)	16,762 (16)
• inpatients	1,968 (69)	450 (15)	1,378 (33)	3,980 (21)	3,604 (32)	1,095 (4)	2,281 (13)	5,420 (15)
• outpatients	4,888 (69)	1,226 (15)	4,192 (33)	8,598 (21)	7,007 (32)	1,046 (4)	4,014 (13)	11,191 (15)
• home patients	395 (7)	14 (2)	261 (3)	978 (2)	546 (5)	8 (1)	382 (2)	978 (2)
Annual production of TPN – total	4,058 (100)	872 (19)	3,568 (57)	7,743 (24)	6,889 (42)	1,547 (4)	5,178 (21)	10,261 (17)
• inpatients	3,833 (90)	853 (17)	3,632 (48)	6,246 (25)	5,976 (39)	1,347 (4)	4,877 (17)	8,043 (18)
• home patients	3,818 (13)	798 (1)	3,152 (5)	4,726 (7)	4,921 (10)	798 (1)	5,119 (3)	5,509 (6)

Base: Pharmacy departments providing data ( ).

reported use of minibags. The use of syringe infusers is becoming more common, with 32% (39/122) of all respondents reporting use of this system compared to 28% in 1996/97. Once again, use of syringe infusers was most common in Quebec, where 50% of respondents (24/48) reported use of this system. In the remaining provinces, use of syringe infusers was reported by 20% (15/74) of respondents. These figures appear to reflect a true increase in the overall use of syringe infuser systems throughout the country – in 1995/96, only 9% of all respondents reported use of such systems. The use of buretrols or burettes was reported by 18% (22/122) of all respondents, compared to 16% in 1996/97.

The average of reported annual IV admixture doses prepared (Table IX) was 82,182, slightly higher than the average of 80,588 reported in 1996/97. For respondents providing service to more than 90% of patient care areas, the average reported IV production per patient day was 0.92 overall (up from 0.86 in 1996/97), 1.14 in teaching hospitals, and 0.63 in non-teaching hospitals.

Home care

This year, 52% (64/122) of all respondents reported the provision of I.V. admixtures to home care patients, compared to 53% in 1996/97, 42% in 1995/96 and 29% in 1994/95. This year, home I.V. services were slightly more common in teaching hospitals (57%, 29/51) than in non-teaching hospitals (49%, 35/71). Again this year, regional differences were observed – only 12% (2/17) of hospitals in the Atlantic Provinces and 25% (7/28) of hospitals in Ontario reported the provision of Home IV services, compared to 73% (35/48) in Quebec, 70% (7/10) in BC and 68% (13/19) in the Prairies.

Among respondents reporting home IV services, 64% (41/64) reported that they provided service to more than 50 patients, 22% (14/64) provided service to between 10 and 50 patients, and 9% (6/64) provided service to less than 10 patients. The 1996/97 survey results suggested that many additional hospitals had recently established home IV therapy services. This year, although the number of hospitals reporting the provision of Home IV services remained relatively stable, it appears that utilization of the existing programs is increasing.

Chemotherapy

Ninety-one percent (111/122) of all respondents indicated that chemotherapy was prepared and administered within their institutions. The Pharmacy Department prepared the doses in 96% (107/111) of these institutions. The average of reported annual IV chemotherapy doses prepared was 6,346, an increase compared to the calculated average of 5,014 in 1996/97. The reported average of outpatient chemotherapy doses was 4,888, compared to 1,968 for inpatients. Seven hospitals reported the provision of home chemotherapy services, with an average annual production of 395 doses in these hospitals.

Total parenteral nutrition

Ninety-three percent (114/122) of all respondents reported that TPN was prepared and administered within their institutions. Of these respondents, 97% (111/114) reported that the Pharmacy Department prepared the doses. Use of automated compounding systems was reported by 27% (30/111) of respondents whose departments prepared TPN doses. Of these 83% (25/30) used an automated system to prepare the base solution, and 43% (13/30) used the automated system for TPN additives.

The average of reported annual TPN units prepared was 4,058, an increase compared to the 1996/97 average of 3,066. The calculated average was highest in teaching hospitals and hospitals with more than 500 beds. The average annual inpatient TPN production was 3,833 units. The average Home TPN production for the 13 hospitals providing these services was 3,818.

Purchasing and inventory control

Steve Long

The average of reported total purchases for 1997/98 was $4,023,409 (Table x, *next page*). This was a 15% increase from the average of $3,485,492 reported in 1996/97. Reported total purchases ranged from $312,056 to $30,349,416, total beds from 102 to 1999 and total patient days from 11,507 to 675,965. The data therefore represents responses from hospitals with a broad range of services, programs and specialties. The information and data presented here attempts to bring order to the numbers that are representative of the diversity of respondents' hospitals. They provide valuable insight into trends and averages and allow readers to track changes in their own facilities and make rough comparisons to national averages. They allow readers to determine if their facility is keeping pace and offers some insight as to why the changes are occurring.

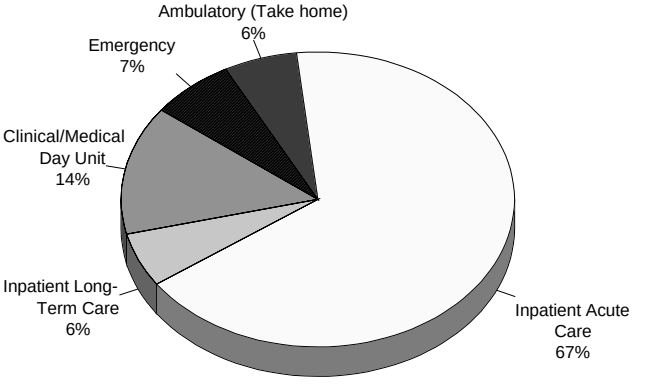
The average of reported changes in drug costs was an increase of 5.7%. This is up from the 2.4% reported in 1996/97. The Patent Medicines Prices Review Board reported that prices of patent medicines were "virtually unchanged from 1996" in their 1997 Annual Report. The report goes on to state, however, that total sales of pharmaceutical products increased by 7% in 1997 while sales of patented medicines increased by over 20%. On the basis of this information, it would seem that increases in expenditures reported were probably driven by volume or technology rather than price.

Increases in total purchases were reported by 66% (80/122) of all respondents. The average reported increase was 9.7% (range 0.3–42%). At least two respondents from each province reported an increase. Increases were cited as being due primarily to inflation by 59% (47/80), to technology by 73% (58/80), to program changes by 56% (45/80) and to bed additions by 36% (29/80) of respondents reporting increases in total purchases.

Decreases in total purchases were reported by 22% (27/122) of all respondents. Seventy percent (19/27) of these respondents were from Quebec. The main changes in Quebec over the past year were program changes that removed the requirement for outpatient dispensing by hospitals and bed closures. The average of the reported decreases in purchases was 6.1% (range 0.01–25%). Decreases were cited as being due to restricted drug policies by 56% (15/27), to program changes or bed closures by 48% (13/27), and to drug use evaluation by 37% (10/27) of respondents reporting decreases in total purchases.

The average value of reported inventories was $425,145, up from the $385,195 reported in 1996/97. The average of reported inventory turnover rates was 8.9 times per year, up from the 8.1 reported last year.

Figure 4—**Proportion of drug expenses by patient care area 1997/98**



Base: All respondents (122)

Finally, the questionnaire requested that respondents supply drug costs for specific areas: acute care inpatients, clinic/medical day units, emergency room, ambulatory patients (take home medications) and long-term care areas. Only 48% (58/122) of all respondents provided this information. The calculated average drug cost per acute patient day and per admission were similar to those reported in 1996/97. The average cost calculated per patient day or per visit for non-acute inpatient areas, clinics and medical day units and emergency rooms all increased. Comparisons within the individual hospital size ranges, though reported, should be made with caution due to the small sample sizes.

This is the third year detailed data has been collected. The breakdown of expenditures by patient area is provided in Figure 4. Expenditures on clinic/medical day unit, emergency and ambulatory medications represented an increasing proportion of total drug costs. The impact of this shift in drug use needs to be considered by pharmacy managers. Clinic space can be expanded more rapidly than inpatient areas. Expansion often occurs without appropriate consideration for the cost of ancillary staff, including pharmacists and technicians, and supplies, like drugs. This data should support pharmacy managers to better plan for these types of services.

Table X—**Drug purchasing, inventory control and inpatient drug costs by bed size and teaching status 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Drug purchases	$4,023,409	$1,227,184	$3,062,415	$9,016,193	$7,304,212	$1,598,468
Inventory value	$425,145	$164,951	$322,011	$928,441	$692,657	$232,989
Inventory turns	8.9	7.4	9.0	10.2	10.7	7.6
Acute care inpatient costs:						
Drug costs/acute patient day	$20.50 (56)	$16.48 (12)	$20.62 (33)	$24.54 (11)	$26.17 (19)	$17.60 (37)
Drug costs/acute admission	$153.86 (56)	$102.10 (12)	$155.84 (33)	$204.36 (11)	$205.99 (20)	$124.90 (36)
Non-acute care inpatient costs:						
drug costs/non-acute patient day	$3.47 (33)	$2.94 (6)	$3.20 (21)	$4.93 (6)	$4.52 (8)	$3.13 (25)
Drug costs/non-acute admission	$1,036 (30)	$1,378 (6)	$913 (19)	$1,095 (5)	$667 (7)	$1,149 (23)
Clinic, medical day unit costs/visit	$7.10 (37)	$4.79 (7)	$8.81 (23)	$3.81 (7)	$6.75 (13)	$7.29 (24)
Emergency room costs/visit	$4.31 (49)	$2.01 (11)	$4.99 (30)	$4.90 (8)	$5.82 (14)	$3.71 (35)

Base: Pharmacy departments providing complete data ( ).

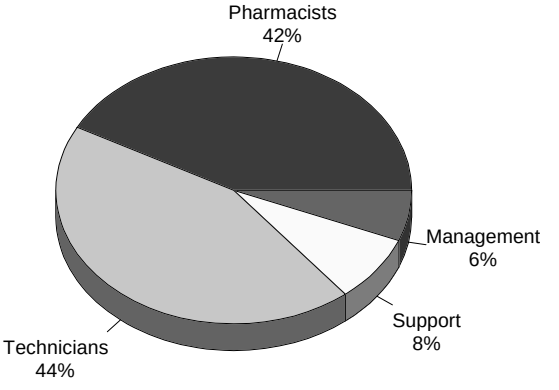
Human resources

Steve Long

In reporting the responses in this year's Annual Report, we have included management as a staff category. Taking this into consideration, the composition of staff appears to be consistent with past Annual Reports (Figure 5). The composition of pharmacy staff by geographic region is reported in Table XI. The average of paid hours per patient day when examined on the basis of geographic region, bed size, teaching status and drug distribution systems was essentially unchanged (Tables XI and XII). The minor changes reported within geographic regions may be the result of the small sample size in each region.

The average staffing by bed size, teaching status and drug distribution system, also did not change (Table XII). Respondents from large hospitals and facilities with unit dose and centralized intravenous admixture (CIVA) services reported higher staffing ratios. The data suggests that conversion from traditional medication delivery systems to a medication system that includes CIVA services would require an increase from 0.51 to 0.62–0.66 paid hours/patient day. This is an increase of 21–29%. Similarly, to change from a traditional medication system, to a unit dose system would require a shift from 0.51 to 0.69 paid hours per patient day, a 35% increase in staffing. To change from a traditional medication delivery system to unit dose with CIVA services would require a shift form 0.51 to 0.75 paid hours per patient day, an increase of 47%. It is recognized that staff increases of this magnitude are a significant barrier to conversion. The change in systems must be viewed as changes that benefit the patient and impact workload not only in pharmacy, but throughout the hospital. Increased efficiency through automation is also recognized to decrease the total pharmacy staff required and may support the business case for conversion.

Figure 5—**Staff composition of average hospital pharmacy department 1997/98**



Base: All respondents (122)

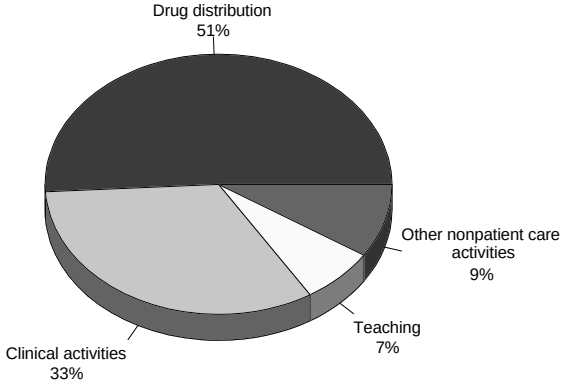
This year, we requested that respondents estimate the proportion of time pharmacists spent in drug distribution (51%), clinical (33%), teaching (7%) and non-patient care activities (9%) (Figure 6). A similar question was asked and reported in the 1985/86, 1986/87, and 1987/88 Lilly Hospital Pharmacy Reports. The average amount of time pharmacists were reported to spend in drug distribution (52%), administration (19%) and providing clinical and drug information services (29%) was identified. Even with all of the changes in

Table XI—**Average pharmacy staffing and net percent change of staffing by geographic region 1997/98**

Hospitals	Canada (122)	B.C. (10)	Alta. (7)	Sask. (4)	Man. (8)	Ont. (28)	Que. (48)	N.B./ P.E.I. (6)	N.S. (8)	Nfld. (3)
Pharmacist	12.1	10.8	20.4	18.4	15.1	15.2	9.0	7.3	11.0	15.8
Management	1.7	3.2	3.4	2.3	2.0	2.0	1.0	1.3	1.8	2.0
Technician	12.5	11.9	19.4	16.9	11.1	17.0	9.7	9.2	9.7	13.7
Support staff	2.4	1.0	6.1	1.9	2.6	2.9	2.1	1.8	1.6	2.7
Residents	0.6	0.8	1.0	1.5	0.4	0.7	0.6	0.2	0.4	0.03
Total FTE	29.3	27.7	50.3	40.9	31.1	37.6	22.2	19.8	24.4	34.2
Total beds	390	447	561	456	378	361	377	329	287	623
Pd hr/acute pt day (excluding residents)	0.57	0.57	0.56	0.68	0.59	0.70	0.51	0.51	0.53	0.53
Net increase	31%	30%	43%	50%	50%	32%	23%	33%	13%	100%
Net decrease	25%	0	0	0	0	39%	33%	0	38%	0
No change in FTE	40%	50%	43%	50%	50%	25%	42%	67%	50%	0

(Total FTE may show effect of rounding)

Figure 6—**Proportion of time spent by pharmacists in each category 1997/98**



Base: All respondents (122)

systems and the introduction of new technology that has occurred in the past decade, the proportion of pharmacists' time spent in distributive functions has remained relatively constant. Creativity in developing new ways to relinquish pharmacists from distributive responsibility is required to ensure patients benefit from our unique expertise.

The responses to this year's Annual Report indicate that the proportion of time pharmacists spent in clinical activities was similar in hospitals of 100–200 beds (32%), 200–500 beds (31%) and non-teaching hospitals (30%). The proportion of time spent by pharmacists in clinical activities was higher in teaching hospitals (38%) and matches that reported by respondents from hospitals of greater than 500 beds.

No net change in pharmacy staff was reported by 40% (49/122) of all respondents, while 31% (38/122) reported a net increase and 25% (30/122) reported a net decrease. Five respondents did not answer this question.

Forty-seven respondents (39%) indicated that they had additions to their staff in 1997/98. These respondents represented 27% (19/71) of respondents from non-teaching hospitals and 55% (28/51) of teaching hospital respondents. Staff was added in 18% (5/28) of hospitals with 100–200 beds, 38% (25/66) of hospitals with 201–500 beds and 61% (17/28) of hospitals with greater than 500 beds. Increases in staff were reported from all provinces. New programs and program changes were indicated as the reason for adding staff by 74% (35/47), workload by 45% (21/47) and revenue generation by 9% (4/47) of respondents who indicated increases.

Deletions of positions were reported by 33% (40/122) of all respondents. These included 57% (16/28) of respondents from Ontario, 44% (21/48) of respondents from Quebec and 38% (3/8) of respondents from Nova Scotia. Deletions were not reported by respondents from any other provinces. Twenty-five percent (18/71) of respondents from non-teaching and 43% (22/51) of respondents from teaching hospitals reported deletions. Deletions were reported by 14% (4/28) of respondents from 100–200 bed hospitals, 36% (24/66) of respondents from 201–500 bed hospitals and 43% of respondents from hospitals of greater than 500 beds. Mandated reductions were indicated as the reason for deletions by 80% (32/40) of these respondents, workload by 8% (3/40), loss of programs or program changes by 8% (3/40) and retirement by one respondent.

Salaries

Average annual salaries are reported by position and geographic region in Table XIII. Overall there was little change in reported values. The average salary per FTE increased from $42,483 in 1996/97 to $43,696 in 1997/98. Average minimum salaries for most position categories increased while average maximums remained essentially unchanged.

Ranges for the salaries for Directors are reported in Table XIV. There continues to be a progression upwards in Director's salaries.

Table XII—**Average pharmacy staffing by bed size, teaching status and type of drug distribution system 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)	≥ 90% Unit Dose (28)	≥ 90% Traditional (53)	≥ 90% CIVA (53)	≥ 90% CIVA +UD (20)	≥ 90% CIVA +Traditional (17)
Pharmacist	12.1	4.1	8.9	27.7	20.7	6.0	15.9	9.2	15.5	18.9	13.9
Management	1.7	0.6	1.3	3.7	2.6	1.1	2.3	1.1	2.3	2.8	2.1
Technician	12.5	4.4	10.2	25.9	20.6	6.7	19.1	9.2	16.6	22.3	14.4
Support Staff	2.4	0.5	1.8	5.6	4.5	0.9	3.4	1.8	3.3	4.3	2.9
Residents	0.6	0.04	0.6	1.3	1.4	0.1	1.1	0.6	1.0	1.4	0.9
Total FTE	29.3	9.5	22.8	64.2	49.8	14.8	41.8	21.8	38.7	49.7	34.2
Total beds	390	156	333	758	517	299	388	282	374	415	312
Pd hr/Acute Pt Day (excl. residents)	0.57	0.51	0.55	0.70	0.70	0.49	0.69	0.51	0.66	0.75	0.62

(Total FTE may show effect of rounding)

Table XIII—**Average annual salary by position and by geographic region 1997/98**

Hospitals	Canada (122)	B.C. (10)	Alta. (7)	Sask. (4)	Man. (8)	Ont. (28)	Que. (48)	N.B./ P.E.I. (6)	N.S. (8)	Nfld. (3)
Assistant Director										
Minimum salary	$54,797	$56,990	$59,880	$46,948	$54,324	$56,853	$55,872	$48,600	$46,855	$42,500
Maximum salary	$62,243	$73,392	$60,984	$59,132	$54,324	$65,823	$63,272	$56,100	$50,914	$49,400
Supervisor/Coordinator										
Minimum salary	$51,102	$59,494	$48,518	$43,947	$42,282	$55,694	$50,937	$50,842	$49,124	$35,354
Maximum salary	$59,835	$71,375	$58,918	$52,472	$50,311	$61,620	$60,973	$55,792	$49,124	$45,084
Pharmacist										
Minimum salary	$43,473	$49,647	$46,170	$39,313	$37,882	$45,559	$43,422	$46,062	$37,116	$32,780
Maximum salary	$54,280	$58,830	$54,037	$47,790	$47,384	$55,102	$57,613	$51,235	$42,785	$41,652
Technician										
Minimum salary	$26,316	$36,104	$30,439	$23,687	$23,530	$28,324	$23,961	$24,279	$23,534	$21,267
Maximum salary	$30,356	$39,034	$36,410	$25,094	$25,796	$32,853	$28,933	$25,811	$26,096	$22,903
Residency stipend										
Average	$17,677	$23,434	$20,760	$23,462	–	$10,421	$15,500	$23,500	$25,000	–
Overall										
Average $/FTE (n=101) (without residents)	$43,696	$55,757	$46,043	$41,051	$39,057	$43,135	$43,197	$38,428	$44,953	$31,928

Table XIV—**Distribution of director salary ranges by geographic region and bed size 1997/98**

Hospitals	Canada (122)	B.C. (10)	Alta. (7)	Sask. (4)	Man. (8)	Ont. (28)	Que. (48)	N.B./ P.E.I. (6)	N.S. (8)	Nfld. (3)	10–200 (28)	201–500 (66)	>500 (28)
Under $55,000	10%	–	–	–	38%	4%	2%	17%	38%	100%	18%	8%	7%
$55,000–$59,999	9%	–	–	–	13%	7%	6%	33%	38%	–	11%	11%	4%
$60,000–$64,999	22%	–	29%	25%	38%	14%	29%	50%	–	–	21%	24%	18%
$65,000–$69,999	24%	–	–	75%	–	25%	40%	–	–	–	14%	35%	7%
$70,000–$74,999	15%	40%	14%	–	13%	18%	13%	–	13%	–	18%	9%	25%
$75,000–$79,999	7%	–	–	–	–	25%	4%	–	–	–	7%	5%	14%
Over $80,000	11%	60%	57%	–	–	4%	6%	–	–	–	7%	8%	25%
No answer/ No director	2%	–	–	–	–	4%	–	–	13%	–	4%	2%	–

Educational services

Bonnie Salsman

The provision of paid time for pharmacists' attendance at continuing education (CE) programs was reported by 93% of all respondents (Table XV), down from 97% in 1996/97. Of these, 59% reported full reimbursement for time and 37% reported partial reimbursement.

The average reported CE expenditure per pharmacist increased to $666, from $400 in 1996/97. However, this may not reflect a true increase, since there has been a change in the wording of this question that may have affected the responses. Twelve percent (15/122) of all respondents reported that their hospitals had no non-salary CE expenditures during 1997/98, compared to 8% in 1996/97. Interestingly, the average reported CE expenditure per pharmacist was highest in smaller hospitals and lowest in hospitals over 500 beds.

Provincially, Newfoundland had the highest average CE budget per pharmacist FTE ($896) and Saskatchewan was lowest ($331). The average of reported total non-salary CE expenditures from hospital funds was $3,823, while the average CE expenditure from external sources was $2,278.

The percentage of hospitals reporting receipt of outside funding for CE programs decreased to 45%, compared to 59% in 1996/97. For hospitals using outside funding, the average of reported percentages of total CE funding provided by outside sources was 58%, compared to 45% in 1996/97. In spite of the reduction in the percentage of hospitals reporting the receipt of outside funding for CE programs, the high percentage of total funding that external sources contributed appears to confirm last years' observation that external funding remains an important source of support for the education of hospital pharmacy staff.

Sixty-one percent (75/122) of all respondents reported that there was no change in their CE budget compared to the previous year; 16% (19/122) reported an increase and 7% (9/122) reported a decrease. The overall average CE expenditures increased by 5.4%, although the overall average for hospitals in the 201–500 bed category decreased by 0.69%.

Similar to 1996/97, 74% of all respondents indicated that their pharmacy departments provided regular internal education sessions for pharmacists in 1997/98. Educational sessions were more commonly reported in teaching hospitals and hospitals over 500 beds. Only 62% of non-teaching hospitals conducted regular internal educational sessions. All respondents in Saskatchewan, Newfoundland and New Brunswick/Prince Edward Island reported that educational sessions were provided. Regular educational sessions were least common in Nova Scotia, where only 25% (2/8) of respondents reported that educational sessions were provided. It is interesting that the reported occurrence of internal education sessions is so much lower than the incidence of paid attendance for external CE programs. Expansion of internal staff development programs provides an excellent mechanism for hospital pharmacies to maintain a learning environment and foster progress, without incurring large costs.

Among hospitals providing educational sessions for pharmacists, the average of reported frequencies was 28 times annually, with 60% of these respondents reporting a frequency in the range of 1–25 times annually. The reported annual frequency of educational sessions was higher in teaching hospitals and hospitals over 500 beds.

In 1997/98, the support for non-pharmacist staff attendance at CE programs increased slightly, with 67% of all respondents indicating that paid time off was provided to staff members in this category, compared to 64% in 1996/97. For hospitals who provided paid CE time for non-pharmacists, 49% provided full reimbursement and 49% provided partial reimbursements. As pharmacists delegate additional duties to pharmacy technicians, it can be anticipated that the percentage of hospitals providing paid continuing education time for non-pharmacist staff will rise.

Table XV—**Education services by bed size and teaching status 1997/98**

Hospitals	All (122)	100-200 (28)	201-500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Regular internal CE sessions held	90	16	48	26	46	44
	74%	57%	73%	93%	90%	62%
# Sessions/year (n=86)	28	14	23	46	37	18
Paid time for CE programmes:						
For pharmacists	114	24	63	27	48	66
	93%	86%	95%	96%	94%	93%
full (#)	67	16	36	15	27	40
partial (#)	42	8	24	10	18	24
For other staff	82	17	45	20	39	43
	67%	61%	68%	71%	76%	61%
full (#)	40	8	22	10	21	19
partial (#)	40	9	21	10	17	23
Non salary reimbursement for CE programmes: (n=113)						
– hospital (internal)	$3,823	$2,719	$3,238	$6,166	$6,225	$2,049
– other funding (external)	$2,278	$1,004	$1,906	$4,300	$3,945	$1,048
CE $/pharmacist FTE (n=112)	$666	$824	$700	$449	$722	$624
Changes in CE budgets (n=104)	+5.4%	+18.9%	(0.7%)	+7.2%	+0.7%	+8.6%
# Sites with outside funding for CE programs	55	9	30	16	31	24
	45%	32%	45%	57%	61%	34%
% Funding from outside source (n=55)	58%	61%	54%	66%	59%	57%

Workload measurement

Pegi Rappaport

Only 58% of all respondents collected any workload statistics (Table XVI), similar to the 59% reported in 1996/97. In Quebec only 25% of respondents collected any workload statistics. For the respondents at sites where workload was reported, 70% (50/71) stated that they used the national Workload Measurement System (WMS). This represented an overall implementation rate for Management Information System (MIS) workload of 41% (50/122). None of the respondents from Quebec and Newfoundland followed the MIS guidelines. This is likely related to the fact that only 9% of respondents felt this system was very useful and 58% found it only somewhat useful.

This report is the fourth to contain workload information based on the national MIS system. However, the completeness and accuracy of the information seems to be declining.

Complete workload information in some categories was available from only 27 respondents, down from 38 respondents with some complete data collection in 1996/97. In Ontario where the system was mandated by the Ministry of Health for 1997/98, there was a decrease in the number of respondents with complete data. Complete information in all categories was only available from 15 respondents in five provinces: BC (1) Alberta (2), Manitoba (1), Ontario (10) and Nova Scotia (1). Because of the decrease in the number of respondents with complete data, the comparison based on drug distribution system was not useful. Even with the information by bed size, the 500 bed size hospitals had only two respondents with complete data.

Accuracy of the information is also in question. The MIS system still does not account for automated drug distribution systems. This may explain why three teaching hospitals had an average unit producing (UP) personnel total worked time accounted for with MIS (patient care and non-patient care) of 105%. These three hospitals had an average personnel patient care worked time accounted for with MIS of 92%. The average values for the rest of the respondents with complete data were 78% and 63% respectively.

Other accuracy concerns are raised because of the method of implementing the MIS guidelines. Forty-six percent of respondents with workload statistics used WMS unit values with modification. This means that the use of the data for comparing between institutions may be limited by the extent of these modifications.

The data presented in Table XVI illustrates productivity indicators that are possible with full implementation of the MIS workload measurement system. All data in the tables is shown with the base used in the calculations to facilitate interpretation since partial information could be used to calculate specific indicators.

It is essential that this information not be used for external bench marking. Because of concerns about completeness and accuracy, MIS data should only be used internally for trending and planning new programs. General information that can be gleaned from this data includes:

- The MIS system cannot account for all worked time.
- The majority of worked time was spent on patient care activities. The majority of these activities were related to the drug distribution system.
- Clinical activities were a more significant part of workload for teaching hospital respondents than for non-teaching hospital respondents.
- The management and operational support to total hours ratio was lower for teaching hospital respondents than for non-teaching hospital respondents. Also, for the last four years, the average of this ratio has declined (9% in 97/98, 11% in 96/97, 13% in 95/96 and 94/95).

Table XVI—**Workload measurement systems used by bed size and teaching status 1997/98**

Hospitals	All (122)	100–200 (28)	201–500 (66)	>500 (28)	Teaching (51)	Non-teaching (71)
Workload statistics available	71 58%	18 64%	34 52%	19 68%	33 65%	38 54%
As a % of workload statistics sites (n=71):						
WMS unit values without modification	17 24%	6 33%	10 29%	1 5%	5 15%	12 32%
WMS unit values with modification	33 46%	8 44%	16 47%	9 47%	19 58%	14 37%
In-house units only	1 1%	– –	1 3%	– –	– –	1 3%
Items for count only	20 28%	4 22%	7 21%	9 47%	9 27%	11 29%
UP personnel total worked time accounted for with MIS	84% (14)	99% (3)	77% (10)	87% (1)	94% (6)	76% (8)
UP personnel patient care worked time accounted for with MIS	69% (15)	81% (3)	65% (11)	77% (1)	78% (7)	61% (8)
UP personnel units per total admission (minutes)						
Drug distribution units/total admission	103 (26)	84 (7)	109 (17)	122 (2)	123 (12)	87 (14)
Clinical units/total admission	22.0 (22)	25.2 (5)	20.3 (16)	33.6 (1)	28.5 (12)	14.3 (10)
Non-patient care units/total admission	22.8 (23)	19.2 (6)	25.3 (15)	14.9 (2)	22.9 (11)	22.7 (12)
Clinical units to total units ratio (%) UP personnel only	15% (20)	19% (5)	13% (14)	20% (1)	19% (10)	11% (10)
MOS hours to total hours ratio (%)	9% (26)	7% (4)	9% (15)	9% (7)	8% (14)	11% (12)

Base: Pharmacy departments providing complete data ( ).

Benchmarking indicators: Can they be refined to provide more useful data for program planning and evaluation?

Kevin W. Hall

Introduction

The term "benchmarking" was probably unfamiliar to most hospital pharmacists prior to the 1990s. In this decade, however, most pharmacy managers have had to face hospital administrators or external consultants who were intent on determining if the efficiency and effectiveness of their department had been maximized. Those administrators or consultants have sometimes come armed with their own comparative efficiency/effectiveness data from other hospitals – benchmark data. In other cases the pharmacy manager has been challenged to produce benchmark data that would provide convincing evidence that their department could not do more with less, or face the prospect of having to accept budget reductions while maintaining adequate levels of pharmacy service. In either case pharmacy managers have had to deal with the shortcomings in the benchmark data that either they, or those they were confronting, were attempting to use to make their case. Too often we have known that the benchmarks being used do not represent appropriate standards to compare our own departments to, but better comparative data have eluded us.

Early benchmark indicators for Canadian hospital pharmacy came from a number of sources. Beginning in the 1960s the federal government and provinces have cooperated in the collection and reporting of hospital data. The early reports generated as a result of this initiative contained a limited number of pharmacy indicators, such as pharmacy paid hours per patient day and drug costs per patient day, that were intended to facilitate resource utilization comparisons between different hospitals. In the mid-1970s a Federal–Provincial Working Group on Hospital Pharmacy Services, which included a number of prominent Canadian pharmacists, recommended several human resource indicators that could be used in the evaluation of hospital pharmacy data (1). That report suggested that approximately 0.1 to 0.2 pharmacy paid hours per patient day were required to operate a traditional drug distribution system and between 0.2 to 0.4 pharmacy paid hours per patient day were required for a unit dose/intravenous admixture system. The report also recognized that additional resources might be required for specialized pharmacy services, such as the preparation of total parenteral nutrition solutions (TPN), that were just becoming recognized as a part of hospital pharmacy practice.

Pharmacy managers were not infrequently asked by their administrators to respond to unfavourable comparisons to the Federal–Provincial Working Group standards, or unfavourable comparisons to other hospitals whose data was included in the federal/provincial reports. As time went by, pharmacy managers became convinced that the standards and comparisons were flawed. The standards had been suggested at a time when hospital pharmacy was just beginning to implement many new drug distribution services such as oncology admixture, specialized satellite pharmacy programs in critical care, operating rooms, bone marrow/organ transplant units, and many others. Pharmacy managers also challenged the comparisons being made with other hospitals because of differences in the types of patient programs and patient acuity. In addition, hospital pharmacists were accepting new clinical roles and responsibilities to varying degrees in different hospitals, and no method existed for adjusting comparisons to reflect the extra human resources needed for these new roles.

In the 1980s a new approach to measuring the efficiency of hospital pharmacy's human resource utilization was proposed. It was suggested that the total workload of a pharmacy department could be reliably estimated by collecting a limited number of workload indicators, such as the number of physician orders received, number of IV admixtures prepared, etc., and multiplying those indicators by the average time required to perform the associated tasks. The total workload calculated for the department could then be divided by the worked time within the department to determine how efficient the department was. This method of workload measurement had been applied with some success in industrial settings where technical tasks were repeated over and over. Hospital laboratories and hospital pharmacies were identified as several health care departments where the work, performing lab tests and dispensing prescriptions, was amenable to such a measurement methodology. A national study to establish time standards for a hospital pharmacy workload measurement system was undertaken with the support of the Canadian Society of Hospital Pharmacists in the mid 1980s (2). In the late 1980s the Canadian Hospital Pharmacy Workload Measurement System (CHPWMS) was formally introduced as part of the federal government's hospital productivity improvement initiative.

Introduction of the CHPWMS was pursued with varying degrees of commitment and enthusiasm by the provinces and by the profession itself. Some provinces mandated pharmacy workload data collection shortly after the system was introduced, others followed later, and some provinces have never required the reporting of this data. Some provinces that had

mandated CHPWMS data collection have recently rescinded that decision. Within hospital pharmacy itself there have been advocates for, and critics of, the system. Advocates were hopeful that the system would provide a useful management tool for demonstrating the efficiency of their departments and provide a planning tool for predicting human resource requirements for new programs or changes to existing programs. Critics were dismayed by the amount of time and effort required to maintain the system, by the lack of time standards for many drug distribution activities (e.g. outpatient dispensing) and new drug distribution systems (e.g. automated drug distribution technologies such as the Pyxis® system), by the system's inability to capture most of the clinical and cognitive functions performed by hospital pharmacists, and by the inconsistency in the way time standards were utilized and/or modified from hospital to hospital. In an attempt to address the concerns of the critics, efforts were made to streamline use of the system by developing software to automate the collection of data and preparation of reports, to develop more time standards for additional drug distribution activities, and to standardize the way the system was used at different hospitals. Despite these efforts, the use of the system remains inconsistent. In the 1996/97 annual survey of Canadian hospital pharmacy it was reported that only 43% of reporting hospitals were using the CHPWMS and over half of those were modifying the time standards and/or adding their own in-house units. (3)

The shortcomings of the existing methods for benchmarking have not deterred the pursuit of useful tools to assist in the planning and evaluation of hospital pharmacy services. For the past 12 years an annual survey of Canadian hospital pharmacies, funded by Eli Lilly Canada and carried out under the direction of an independent Editorial Advisory Board made up of hospital pharmacy practitioners, has been undertaken with the goal of providing useful comparative data. The survey tool has been refined over the years in order to allow certain subsets of the data to be analyzed. For example, data on human resource utilization (paid hours per patient day) is reported for all hospitals but is also broken down into various subgroups – hospitals with unit dose/intravenous admixture (UD/CIVA) systems versus those with more traditional systems, hospitals with less than 500 beds versus those with more than 500 beds, and teaching versus nonteaching hospitals. Drug costs and many other data elements are also collected, categorized and reported in a way that provides useful data for planning and evaluating pharmacy services.

Despite the usefulness of the data that has been collected and reported, many pharmacy managers have felt that there is still room for improvement with respect to the comparative indicators generated by the annual survey. In recent years, CHPWMS data has been collected as part of the survey in an effort to identify useful workload system indicators that could facilitate comparisons between hospitals. However, in the 1996/97 annual survey report it was noted that implementation of the CHPWMS was not widespread, perhaps due to skepticism concerning its usefulness and the workload involved in maintaining the system, nor was its implementation carried out in a consistent way. Therefore the survey's Editorial Advisory Board decided to explore other ways of improving and expanding upon the benchmark indicators that are collected and reported through the survey.

The major premise of benchmarking is that hospital pharmacies dealing with similar types of patients should use similar amounts of resources to achieve a given patient care outcome, assuming that they are all delivering a similar standard of care. Data collected in past Canadian Hospital Pharmacy surveys were limited to some extent by the fact that the report did not separate the pharmacy resources that were committed to certain patient care programs that were present in some, but not all, hospitals. Therefore, the premise that a similar group of patients was being managed by the pharmacy departments in different hospitals was not valid, and hence resource utilization comparisons were flawed. These unique services include specialized, resource-intense inpatient programs (e.g. bone marrow transplant, and tertiary level intensive care), a variety of resource-intensive outpatient programs that are often delivered from the hospital setting (e.g. home IV admixture, home TPN, and supply of expensive drugs to dialysis, transplant and AIDS patients) and contracted services provided to external organizations (e.g. procurement and supply of oncology drugs to other facilities, and regional drug information services). In addition, although it is widely accepted that pediatric services are more labour-intensive, the annual surveys had not separately analyzed and reported the data from pediatric and adult hospitals. Finally it was recognized that some facilities had a large long-term care component, requiring less pharmacy resource than acute care beds, that probably should be extracted from the overall analysis.

In view of these considerations, a new "benchmarking" section was developed by the Editorial Advisory Board for inclusion in the 1997/98 annual survey.

Methods

The new benchmarking section was designed to capture a more detailed breakdown of the human resources committed to the types of pharmacy services described above, as well as to capture more information on the drug costs associated with these services. In Section I respondents were asked to provide data on total pharmacy staffing for their entire pharmacy operations, total inpatient and outpatient drug costs, total hospital beds and total inpatient days. In Section II the respondents were asked to provide similar data for various subgroups of inpatients, such as critical care patients, bone marrow transplant patients and long term care patients. The survey instructions suggested that the pharmacy resources associated with any specialized service to these, or any other unique inpatient groups, should be identified unless they were insignificant in relation to the department's overall

resources. In Section III the respondents were asked to provide resource data for a variety of outpatient programs that some hospitals operate, such as outpatient dispensing, home I.V. admixture and home TPN. In Section IV respondents were asked to identify any other unique programs that they operated, such as contracted services to external organizations, and the resources associated with each of those.

Data on the resources committed to these special programs was viewed as potentially serving two purposes. To begin with, it was hoped that the data for these special programs would be useful in its own right for planning and evaluating the resources committed to these unique patient care activities. In addition it was also anticipated that the extraction of these unique programs from the overall hospital data would reduce the variability in the remaining data for the "generic" acute care inpatient programs.

Section V, the final part of the benchmarking section was intended to represent the remaining "generic" acute care inpatient programs, such as internal medicine and general surgery, and the resources associated with those programs. If Sections I to IV were completed correctly, Section V should have represented the total resources and patient days described in Section I, minus the resources committed to the specialized services described in Sections II to IV and any inpatient days associated with those services.

A final part of the survey asked respondents to rank and list their Top 20 drugs in terms of the 1997/98 total dollar expenditures for each particular drug. They were also asked to indicate what percentage of the hospital's total drug expenditures each drug represented. Where possible respondents were asked to create a separate "Top 20" list for inpatient and outpatient drug expenditures.

The Editorial Advisory Board felt that overall data from large hospitals with a variety of special programs would be the most likely to benefit from this type of detailed program analysis. Also, there was uncertainty surrounding whether or not pharmacy managers could submit enough data to make this new section useful. Therefore, the distribution of the benchmarking section was limited to approximately 55 adult hospitals or regional hospital groupings, listed as having more than 400 acute care beds, and to four major pediatric hospitals. All regions of the country were represented. Recipients responsible for a regional group of hospitals were advised to complete a benchmarking section for each hospital with more than 400 beds, or to complete a single survey for all hospitals in their region if their data was available in that format. Recognizing the complexity of this new section, respondents were provided with the telephone number, fax number and e-mail address of the author for any questions that they had. Telephone or fax follow-up with non-respondents was carried out at approximately six weeks after distribution of the survey, and completed surveys received within 4 months of mailing were included in the analysis.

The returned benchmarking questionnaires were individually reviewed by the author. In some cases where the respondents had misinterpreted the instructions, direct contact was made with them to clarify some of the information that had been provided. In a few cases some assumptions were made in order to make use of the data provided. For example, some respondents could not provide complete inpatient day data for one or more of the unique programs they were operating, but could provide the number of serviced beds. In this case the hospital's overall average occupancy rate was used to estimate the number of inpatient days for that particular program. Any error that this might have introduced was felt to be small in relation to the value of including the data in the analysis.

Although some of the data provided, particularly on drug costs for specialized programs, appeared to be unreasonably high or low in comparison to other facilities, it was nonetheless included in the analysis. In some cases the apparent reason for a major discrepancy could be identified from some of the respondents' comments, such as a comment to the effect that "all oncology drugs are paid for by the provincial cancer agency". It was felt that resolving these reporting discrepancies would have to await future refinements of the survey tool.

All data for each facility was entered into an Excel® spreadsheet that carried out the necessary calculations on the data, and verified that the data in Sections II to V totaled the data provided in Section I. When discrepancies were found the data was reviewed and obvious mathematical errors on the part of the respondent were corrected. When significant discrepancies remained, the respondent was contacted for clarification.

After the data for each hospital had been analyzed and validated to the extent possible, the data from all hospitals was entered into another spreadsheet that enabled the calculation of human resource indicators and drug cost indicators for each of the programs described by respondents (e.g. mean paid hours per patient day, mean drug cost per patient day). This spreadsheet also allowed for analysis of the data according to the usual annual survey subgroups based on hospital size and type of drug distribution system.

Finally the data on the Top 20 drug expenditures for each hospital was entered into another spreadsheet that allowed the data to be separated into groupings from hospitals with more than 500 beds, hospitals with 300 to 500 beds, and pediatric hospitals. Within each grouping, the drugs were then organized based on how frequently they were reported in the Top 20 list of the hospitals within that grouping.

Results and Discussion

Thirty-six individual hospitals or regions, representing a 61% response rate, returned the benchmarking section. Six of these responses were eliminated from the analysis for a variety of reasons. All six of these responses had less than 300 acute care beds in 1997/98, which was substantially below

the cut-off of 400 beds that had originally been targeted for the benchmarking survey. In addition several of these hospitals were specialized facilities that serviced a unique patient population (e.g. a cardiology institute and a psychiatric institute), which made them distinct from the other hospitals in the analysis. Finally, most of these hospitals provided a very limited amount of data that made it difficult to break down their facilities into separate programs for the purpose of benchmarking.

Of the remaining 30 responses, 10 were from hospitals with more than 500 acute care beds, 16 were from hospitals with 300 to 500 beds and 4 were from pediatric hospitals. The completeness of the data submitted varied. Some respondents provided data on human resources for each of the programs they described in their response, but did not have drug cost data for each of these programs. Others listed drug costs for the various programs but did not indicate that any significant human resources were dedicated to these programs. Each usable 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 indicators the number of reporting hospitals was high enough to make the data quite meaningful. Readers are cautioned, however, that the number of reporting facilities on which some indicators are based is small and thus the results must be interpreted accordingly. It is hoped that the number of respondents reporting data in this section will increase in the future, thus improving the reliability of the reported data.

Table XVII shows the results of the analysis of human resource and drug cost data for the 26 adult hospitals before and after the resources for specialized inpatient, outpatient and other programs had been extracted from the overall figures. The "before adjustment" figures represent the overall data submitted in Section I of the benchmarking survey and the "after adjustment" figures represent the data for the "generic" inpatient programs in Section V. The data is presented for all 26 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 substantially less variability than the before adjustment data. For example, if the human resource data for all 26 hospitals is examined it can be seen that the before adjustment paid hours per patient day varies almost fivefold, from 0.20 to 1.17. The variability drops to less than three fold, 0.36 to 1.02, after special program adjustments have been made. The interesting point to note is that the range is reduced at both ends of the spectrum. Hospitals that had reported very low paid hours per patient day usually had a significant long term care component. When that low-resource program was extracted the paid hours per patient day for the remaining hospital beds increased. Hospitals that had reported very high paid hours per patient day usually had a significant number of special-

Table XVII—**Human resource and drug cost data before and after adjustment for outpatient and specialized inpatient programs 1997/98**
(Note: Data excludes pediatric hospitals)

	All hospitals combined			Hospitals with 300 to 500 beds			Hospitals with more than 500 beds		
	All (n = 26)	≥90% UD/CIVA (n = 9)	Traditional/ Mixed (n = 17)	All (n = 16)	≥90% UD/CIVA (n = 6)	Traditional/ Mixed (n = 10)	All (n = 10)	≥90% UD/CIVA (n = 3)	Traditional/ Mixed (n = 7)
Pharmacy paid hours per patient day									
1. Before adjustment									
Mean	0.59	0.84	0.46	0.56	0.78	0.41	0.65	0.95	0.52
Minimum	0.20	0.40	0.20	0.20	0.40	0.20	0.29	0.75	0.29
Maximum	1.17	1.17	0.82	1.17	1.17	0.67	1.05	1.05	0.82
2. After adjustment									
Mean	0.58	0.79	0.48	0.55	0.72	0.48	0.62	0.89	0.48
Minimum	0.36	0.60	0.36	0.36	0.60	0.36	0.37	0.79	0.37
Maximum	1.02	1.02	0.58	1.02	1.02	0.57	0.95	0.95	0.58
Drug costs per patient day									
1. Before adjustment									
Mean	$50.41	$56.76	$46.60	$45.47	$45.84	$45.21	$57.31	$78.60	$48.20
Minimum	$11.63	$21.06	$11.63	$11.63	$21.06	$11.63	$17.16	$48.88	$17.16
Maximum	$209.99	$99.53	$209.99	$209.99	$76.92	$209.99	$99.53	$99.53	$87.62
2. After adjustment									
Mean	$17.21	$17.51	$14.91	$16.85	$15.84	$17.35	$18.09	$19.73	$15.63
Minimum	$8.70	$8.70	$11.27	$8.70	$8.70	$11.27	$11.50	$12.47	$11.50
Maximum	$25.82	$25.25	$25.82	$24.09	$24.09	$25.82	$25.25	$25.25	$19.76

ized high-resource programs. When those high-resource programs were extracted the paid hours per patient day for the remaining hospital beds decreased.

The skeptic might question how useful the data is, even after adjustment for specialized programs, if there is still almost a three fold variability. Where the real value of this reduction in variability can be seen is when one combines this analysis with the analyses that break down the data by hospital size and type of drug distribution system. For example, the before adjustment range of paid hours per patient day for the 7 hospitals with more than 500 beds utilizing a traditional or mixed drug distribution system is 0.29 to 0.82. This range decreases to 0.37 to 0.58 in the after adjustment analysis. The same sort of improvement in the data variability can be seen in each of the subgroups. Using these analyses in combination, it becomes possible to predict, within a reasonably narrow range, the staffing resources required by a particular hospital to service its general medical/surgical beds.

Just one example of how this data might be used is the situation where a pharmacy manager is challenged by their hospital administrator to justify their staffing resources, since the department appears to have higher paid hours per patient day than other supposedly comparable hospitals. The pharmacy manager could extract the human resources and patient days associated with resource-intensive specialized programs and compare the "after adjustment" figure for their hospital to the data in Table XVII. This might well indicate that the adjusted human resource figures were comparable to those of similar size hospitals employing the same type of drug distribution system.

Table XVII also shows the before and after adjustment figures for drug costs per patient day. The before adjustment figures show very large variability around the mean drug cost per patient day, sometimes as much as twenty fold variability between the minimum and maximum reported costs. The after adjustment variability is markedly reduced. The after adjustment figures for mean drug costs per patient day are remarkably similar, regardless of the size of hospital or type of drug distribution system. This is what would be expected, since in each grouping the after adjustment drug costs are for similar types of patients – the "generic" medical/surgical grouping. Although the type of drug distribution system has been shown to have some effect on drug costs, perhaps in the range of a 10%–15% reduction for UD/CIVA systems versus traditional systems, it is not surprising that this relatively small difference is not evident in Table XVII, given the small numbers of hospitals in each grouping and the two-fold range between the minimum and maximum values in each category.

It is also of interest that the adjusted drug cost per patient day ($17.21 for all 26 adult hospitals) is only about one-third of the unadjusted drug cost per patient day ($50.41 for all 26 adult hospitals. This indicates that the high cost drug therapies tend to be associated with specialized inpatient and outpatient programs. Therefore, benchmarking of drug costs must adjust for these programs in order to have any validity.

Table XVIII—**Pediatric hospitals – human resource and drug cost data before and after adjustment for outpatient programs and non-pediatric inpatient programs 1997/98**

	All pediatric hospitals (n = 4)	Hospitals with ≥90% UD/CIVA (n = 2)	Hospitals with traditional/ mixed systems (n = 2)
Pharmacy paid hours per patient day			
1. Before adjustment			
Mean	0.98	1.21	0.74
Minimum	0.65	0.65	0.66
Maximum	1.78	1.78	0.81
2. After adjustment			
Mean	1.11	1.41	0.81
Minimum	0.80	1.35	0.80
Maximum	1.47	1.47	0.81
Drug costs per patient day			
1. Before adjustment			
Mean	$42.45	$48.89	$36.02
Minimum	$32.34	$45.23	$32.34
Maximum	$52.54	$52.54	$39.70
2. After adjustment			
Mean	$40.50	$47.70	$33.30
Minimum	$32.34	$42.85	$32.34
Maximum	$52.54	$52.54	$34.26

In Table XVIII similar data is shown for the 4 pediatric hospitals that responded to the benchmarking section. For the pediatric hospitals there was insufficient data provided on specialized inpatient pediatric programs to permit extraction of these programs, but it was possible to extract outpatient and other unique programs. In addition, one of the pediatric hospitals also services a significant number of adult long term care beds and it was possible to extract the resources for that program from the main pediatric program. The results show a surprising similarity between the after adjustment paid hours per patient day for the two UD/CIVA facilities (1.47 and 1.35 paid hours per patient day). The figures for the two traditional drug distribution facilities were also remarkably similar (0.81 and 0.80 paid hours per patient day). The almost 2 fold difference in human resources for UD/CIVA systems versus traditional drug distribution systems is not unlike the differences between the two systems that are evident in Table XVII for adult hospitals. It is clear from the data in Tables XVII and XVIII, however, that pediatric facilities utilize about 50% more human resources per patient day than adult hospitals with the same type of drug distribution system.

The drug cost per patient day for pediatric facilities shows little change between the before and after adjustment

Table XIX—**Specialized inpatient programs: human resource and drug expenditure data from 26 hospitals with more than 300 beds 1997/98**
(Note: Data excludes pediatric hospitals)

	Human resource data: paid hours per patient day				Drug expenditure data: drug cost per patient day			
Specialized inpatient program	n = Hospitals	Mean	Min	Max	n = Hospitals	Mean	Min	Max
Adult critical care	n = 13	0.81	0.16	2.84	n = 16	$76.71	$32.35	$119.44
Neonatal critical care	n = 3	1.58	0.23	2.91	n = 4	$16.09	$3.35	$26.04
OR/recovery room (per case)	–	–	–	–	n = 10	$42.30	$1.92	$106.24
Long-term care	n = 7	0.08	0.03	0.17	n = 8	$7.45	$1.88	$25.41
Mental health	n = 8	0.34	0.13	0.49	n = 12	$5.35	$0.89	$8.68
General pediatrics	n = 3	0.76	0.45	1.15	n = 10	$20.48	$8.70	$45.85
Solid organ transplant	n = 2	0.71	0.68	0.74	n = 3	$61.72	$46.73	$79.39
Bone marrow transplant	n = 3	4.57	1.16	6.40	n = 2	$252.29	$188.50	$316.07
Oncology	n = 9	0.52	0.16	1.04	n = 11	$96.86	$25.54	$198.93
Remaining general inpatients	n = 22	0.58	0.36	1.02	n = 17	$17.21	$8.70	$25.82

figures. This is primarily because specialized pediatric inpatient programs were not extracted from the after adjustment figures for the pediatric hospitals.

Table XIX provides data on the human resource and drug costs associated with specialized inpatient programs. In some cases the number of hospitals reporting data on specialized programs was small, and there is a large amount of variability in the data reported for some of the programs. However there are clear separations between the mean amount of human resources required for programs like long term care (0.08 paid hours per patient day), oncology (0.52 paid hours per patient day), pediatrics (0.76 paid hours per patient day), and bone marrow transplant (4.57 paid hours per patient day). It should be noted that some of the 26 "adult" hospitals also had some pediatric beds, in which case the resources committed to pediatrics were extracted as a specialized inpatient program. The human resource data, although limited by the small numbers of observations and the large degree of variability, still provides some useful information for program planning and evaluation.

The drug cost data for many of the specialized inpatient programs also demonstrate considerable variability but again there are clear demarcations between the drug costs per patient day for many of these programs. Mean mental health drug costs per patient day were only $5.35 as compared to $252.29 for bone marrow transplant, $96.86 for oncology and $61.72 for solid organ transplant.

In Tables XXa and XXb *(opposite)*, the human resource and drug cost data that was provided for outpatient programs by the 26 adult hospitals are presented. The number of facilities reporting human resource data for some of the programs was again quite small. Nonetheless there are some interesting observations that arise from this data. To begin with there was only a small variability reported in the paid hours per outpatient prescription dispensed. Regular retail prescription services utilized 0.28 paid hours per prescription dispensed, while the no-charge outpatient programs for drugs like cyclosporin and AIDS drugs utilized more time, 0.39 paid hours per prescription. The latter tended to represent a smaller percentage of outpatient prescriptions in those hospitals that operate outpatient services, which explains why the figure for combined retail and no-charge prescriptions was 0.31 paid hours per prescription. These figures should be of interest to those planning or evaluating their outpatient dispensing programs. The human resource commitments to other outpatient programs also provide some basis for assessing the human resource requirements for those programs.

The drug costs associated with these outpatient programs tended to be quite variable, perhaps because of differences in the way these drug costs were determined. Some hospitals appeared to have included the costs of agents like erythropoietin, AIDS drugs and oncology drugs in their outpatient costs, while others made note of the fact that these costs were directly covered by their provincial government. In addition it is possible that for other outpatient programs like home TPN and home I.V. admixture, some hospitals may have included bags and supplies in their costs, while others did not.

Table XXI *(opposite)* provides data on investigational drug services and drug information services, that are not universally present in all hospitals but tend to use significant resources in those facilities where they are present. Investigational drug services were provided by 16 of 26 adult hospitals and utilized a mean of 2414 paid hours per year, with a wide range. There was much less variability in the paid hours per year per active study managed (mean of 36.5 hours, with a range of 19.5 to 74.5 hours). Dedicated drug information staffing was reported by 12 facilities and utilized a mean of 3124 hours per year, also with a wide range.

As noted previously, the data for specialized inpatient pediatric programs was insufficient to permit their extraction. The limited data available for outpatient, investiga-

Table XXa—**Specialized outpatient programs: human resource data from 26 hospitals with more than 300 beds 1997/98**
(Note: Data excludes pediatric hospitals)

Specialized outpatient program	Indicator	n = Hospitals	Mean	Minimum	Maximum
Outpatient retail sales	Paid hours per prescription	n = 5	0.28	0.19	0.39
Outpatient no-charge drug programs	Paid hours per prescription	n = 6	0.39	0.26	0.65
Combined retail and no-charge outpatient programs	Paid hours per prescription	n = 12	0.31	0.18	0.64
Outpatient clinics	Paid hour per clinic visit	-	-	-	-
Home TPN	Paid hour per unit prepared	n = 2	1.31	1.12	1.49
Outpatient oncology admixture	Paid hour per admixture	n = 12	0.54	0.30	1.07
Home IVadmixture	Paid hour per admixture	n = 4	0.48	0.34	0.64
Emergency room	Paid hour per visit	n = 5	0.16	0.005	0.70
Dialysis service	Paid hour per patient year	n = 3	16.70	6.24	33.00

Table XXb—**Specialized outpatient programs: drug expenditure data from 26 hospitals with more than 300 beds 1997/98**
(Note: Data excludes pediatric hospitals)

Specialized outpatient program	Indicator	n = Hospitals	Mean	Minimum	Maximum
Outpatient retail sales	Drug cost per prescription	n = 4	$56.87	$21.80	$95.67
Outpatient no-charge drug programs	Drug cost per prescription	n = 6	$410.06	$102.16	$876.50
Combined retail and no-charge outpatient programs	Drug cost per prescription	n = 10	$216.92	$63.40	$876.50
Outpatient clinics	Drug cost per clinic visit	n = 5	$3.88	$1.28	$8.02
Home TPN	Ingredient cost per unit	n = 4	$41.60	$19.18	$58.91
Outpatient oncology admixture	Drug cost per admixture	n = 14	$81.47	$38.58	$190.79
Home IV admixture	Drug cost per admixture	n = 8	$12.13	$0.37	$29.19
Emergency room	Drug cost per visit	n = 14	$4.52	$1.80	$11.70
Dialysis service	Drug cost per patient year	n = 5	$2,955.00	$407.00	$6,131.00

Table XXI—**Miscellaneous special programs: data from 26 hospitals with more than 300 beds 1997/98**
(Note: Data excludes pediatric hospitals)

Other programs	Data	n = Hospitals	Mean	Minimum	Maximum
Investigational drug services	Total paid hours per year	n = 16	2414	562	5070
	Paid hours per year per active study	n = 12	36.5	19.5	74.5
	Average number of active studies	n = 12	76	20	185
	Percentage recovery of costs from investigators	n = 13	65%	0%	100%
Drug information service	Total paid hours per year	n = 12	3124	975	10,920

tional and drug information programs in pediatric hospitals is presented in Tables XXIIa, XXIIb and XXIII *(overleaf)*. It is of interest that like inpatient programs, it appears that outpatient dispensing for pediatrics requires more human resources (0.40 paid hours per prescription) than is required for adult outpatient dispensing (0.31 paid hours per prescription).

Data on the Top 20 drug expenditures is provided in Tables XXIV to XXVI *(pages 37 and 38)* for adult hospitals greater than 500 beds, adult hospitals with 300 to 500 beds, and for the pediatric hospitals. Although hospitals were asked to supply information on both inpatient and outpatient drug expenditures, the number of hospitals that could separate their drug cost data this way was very small. As a result, the Top 20 drug expenditure data represents combined inpatient and outpatient expenditures. Spreadsheets were set up and then sorted on the basis of the frequency that each particular drug appeared in the top 20 list within each particular group of hospitals. Each frequency grouping was then extracted into a table until at least 20 drugs were included. (e.g. 7 drugs that appear in top 20 list, 9 of 10 times; 6 drugs that appear in top 20 list, 8 of 10 times; 9 drugs that

Table XXIIa—**Specialized outpatient programs: human resource data from 4 pediatric hospitals 1997/98**

Specialized outpatient program	Indicator	n = Hospitals	Mean	Minimum	Maximum
Outpatient retail sales	Paid hours per prescription	n = 1	0.42	–	–
Outpatient no-charge drug programs	Paid hours per prescription	n = 1	0.53	–	–
Combined retail and no-charge outpatient programs	Paid hours per prescription	n = 2	0.40	0.35	0.44
Outpatient oncology admixture	Paid hours per admixture	n = 0	–	–	–
Home IV admixture	Paid hours per admixture	n = 1	0.57	–	–

Table XXIIb—**Specialized outpatient programs: drug expenditure data from 4pediatric hospitals 1997/98**

Specialized outpatient program	Indicator	n = Hospitals	Mean	Minimum	Maximum
Outpatient retail sales	Drug cost per prescription	n = 2	$152.65	$41.42	$263.87
Outpatient no-charge drug programs	Drug cost per prescription	n = 2	$550.76	$544.31	$557.20
Combined retail and no-charge outpatient programs	Drug cost per prescription	n = 2	$201.50	$88.20	$314.79
Outpatient oncology admixture	Drug cost per admixture	n = 2	$41.19	$40.57	$41.81
Home IV admixture	Drug cost per admixture	n = 2	$29.41	$10.69	$48.13

Table XXIII—**Miscellaneous special programs: data from 4 pediatric hospitals 1997/98**

Other programs	Data	n = Hospitals	Mean	Minimum	Maximum
Investigational drug services	Total paid hours per year	n = 3	1349	182	2925
	Paid hours per year per active study	n = 3	36.0	18.2	58.5
	Average number of active studies	n = 3	30	10	50
	Percentage recovery of costs from investigators	n = 1	100%	100%	100%
Drug information service	Total paid hours per year	n = 3	3152	940	4875

appear in top 20 list, 7 of 10 times – for a total of 22 drugs).

Drugs are listed in declining order of the frequency that they were listed in the top 20 expenditures for that group of hospitals. For example, alteplase was listed in the top 20 drugs by 9 of 10 hospitals with more than 500 beds (Table XXIV). In those hospitals the average expenditure for alteplase was $250, 289 which represented an average of 1.8% of all drug expenditures. In the same group of hospitals cyclosporin was reported in the Top 20 list by 8 of 10 hospitals, but represented an average cost of $4,020,790 and a mean of 13.4% of total drug expenditures.

It can be seen from Tables XXIV to XXVI that, not surprisingly, the drug cost drivers are quite different between the three groups of hospitals. As a result, drug use management efforts will likely be focused on different drugs in different types of hospitals. This type of data could also help hospitals identify those drugs which were being used more or less extensively at their facility compared to similar hospitals. For example, if a drug represented an abnormally high expenditure at a particular hospital it might behoove the facility to look into the reasons for this. Perhaps it would be found that the drug was being used for indications where another less expensive drug was being used in other hospitals.

The differences between drug use patterns in the different types of hospitals also have implications for large buying groups where bundled contracts, focusing on a certain mix of products, may serve the needs of one type of hospital but disadvantage another type of hospital.

Conclusion

This first attempt to develop more refined benchmarking indicators has produced data that should prove useful to hospital pharmacy managers. This was achieved despite the fact that respondents sometimes had difficulty in knowing exactly what the benchmarking survey was attempting to accomplish and exactly what data should be reported. If this initial effort proves to be of interest and value to Canadian hospital pharmacists it is anticipated that the survey tool could be significantly improved and that respondents would ultimately provide more accurate and reliable data.

Although the development of more reliable benchmarking indicators is an objective that can and should be

Table XXIV—**Most frequently reported top 20 drug expenditures from 10 hospitals with more than 500 beds 1997/98**

Drug name	# of hospitals reporting drug in top 20 list of expenditures	Average expenditure	Expenditure range	Average % of total drug expenditures	Range of % of total drug expenditures
Alteplase	9	$250,289	$137,340 – $456,300	1.8	0.7 – 3.5
Cyclosporin	8	$4,020,790	$360,609 – $18,553,000	13.4	4.0 – 32.0
Paclitaxel	7	$357,879	$98,254 – $654,259	2.7	1.1 – 6.3
Filgrastrim	7	$390,308	$146,728 – $690,419	2.5	1.2 – 4.0
Propofol	7	$234,025	$130,123 – $338,000	1.4	0.7 – 2.7
Ciprofloxacin	6	$169,956	$66,000 – $383,000	1.1	0.4 – 2.2
Ondansetron	6	$130,133	$102,360 – $423,070	1.5	1.0 – 2.7
Lamivudine	6	$226,181	$111,129 – $270,591	1.3	0.8 – 1.6
Abciximab	6	$120,539	$54,738 – $235,589	0.8	0.5 – 1.1
Erythropoietin	5	$1,969,396	$1,133,104 – $4,133,000	12.1	7.1 – 21.9
Ceftriaxone	5	$216,652	$97,580 – $323,176	1.9	0.4 – 3.8
Docetaxel	5	$242,478	$88,646 – $414,205	1.3	0.9 – 2.4
Pamidronate	5	$186,589	$85,499 – $258,000	1.1	0.9 – 1.5
Amiodarone	5	$182,219	$64,771 – $369,000	1.0	0.7 – 1.2
Doxorubicin	4	$183,794	$111,797 – $272,000	1.5	0.9 – 2.6
Hyaluronate (sodium)	4	$164,854	$90,849 – $242,195	1.3	1.0 – 1.5
Imipenem	4	$139,759	$79,136 – $207,098	1.3	0.3 – 3.0
Rocuronium	4	$150,028	$111,269 – $221,340	1.1	0.4 – 1.8
Tranexamic acid	4	$175,456	$73,152 – $346,000	0.9	0.4 – 1.2
Acyclovir	4	$154,151	$84,605 – $220,000	0.8	0.1 – 1.6
Clozapine	3	$141,419	$123,714 – $156,134	0.8	0.5 – 1.2
Ceftazidime	3	$173,245	$139,232 – $208,000	0.5	0.1 – 1.0
Pancrelipase	2	$323,885	$264,285 – $383,485	1.9	0.8 – 2.9

pursued, the profession and those to whom we report must not lose sight of the fact that resource utilization is only one side of the equation. The other side, patient outcomes, must also be assessed. When we reach the point where we are fairly sure that similar patient groups are being compared with a particular benchmarking indicator, hopefully hospital pharmacy and hospital administrators will examine the differences that still remain between different hospital pharmacies from both an efficiency and an outcome perspective.

References

1. Federal–Provincial Working Party on Standards for Institutional Pharmacy Services. Recommendations on the scope of service, staffing and facilities for Pharmacy Service in Institutions providing types II to V Care. December 1975.
2. National Hospital Productivity Improvement Program. Pharmacy Workload Measurement System. Health and Welfare Canada, October 1985.
3. Rappaport P, Workload Measurement: Skeptics Abound in Hospital Pharmacy in Canada, 1996/97 Annual Report, Eli Lilly Canada Inc. 1997.

Table XXV—**Most frequently reported top 20 drug expenditures from 16 hospitals with 300 to 500 beds 1997/98**

Drug name	# of hospitals reporting drug in top 20 list of expenditures	Average expenditure	Expenditure range	Average % of total drug expenditures	Range of % of total drug expenditures
Alteplase	16	$139,596	$44,307 – $339,600	4.0	1.6 - 10.4
Propofol	15	$77,582	$37,037 – $128,000	2.2	0.9 - 3.5
Cefuroxime	12	$64,921	$49,378 – $96,749	2.1	0.8 - 4.1
Rocuronium	12	$63,506	$39,614 – $130,929	1.9	1.0 - 3.3
Pamidronate	9	$88,071	$34,795 – $156,778	2.7	1.5 - 4.6
Ciprofloxacin	9	$64,743	$18,348 – $136,000	1.8	0.4 - 3.3
Ondansetron	9	$51,078	$17,180 – $91,743	1.5	0.9 - 2.3
Amiodarone	9	$47,284	$35,049 – $73,790	1.3	0.9 - 2.0
Doxorubicin	9	$51,198	$10,748 – $101,060	1.2	0.5 - 2.2
Paclitaxel	8	$110,687	$25,000 – $237,377	3.0	0.6 - 7.4
Docetaxel	8	$70,121	$5,483 – $137,000	2.0	0.2 - 3.3
Epirubicin	8	$66,999	$14,254 – $180,225	2.0	0.4 - 5.3
Erythropoietin	7	$349,206	$11,514 – $872,145	8.7	0.3 - 22.5
Ceftriaxone	7	$77,101	$39,872 – $179,000	2.0	0.9 - 3.2
Filgrastrim	6	$71,358	$9,534 – $206,000	1.6	0.5 - 4.3
Isoflurane	6	$43,203	$23,800 – $62,078	1.5	0.8 - 2.6
Midazolam	6	$43,660	$14,794 – $92,000	1.3	0.4 - 1.7
Omeprazole	6	$33,738	$19,580 – $65,821	0.9	0.7 - 1.1
Lidocaine	5	$44,159	$12,397 – $58,507	1.6	0.3 - 2.4
Etoposide	5	$32,331	$10,935 – $52,454	1.1	0.5 - 1.7
Morphine	5	$36,310	$12,445 – $90,736	1.3	0.3 - 2.9

Table XXVI—**Most frequently reported top 20 drug expenditures from 4 pediatric hospitals 1997/98**

Drug name	# of hospitals reporting drug in top 20 list of expenditures	Average expenditure	Expenditure range	Average % of total drug expenditures	Range of % of total drug expenditures
Filgrastrim	4	$287,395	$90,000 – $477,500	5.6	4.1 – 6.3
Ambisome	4	$262,370	$70,400 – $454,340	5.3	1.5 – 9.2
Mesna	4	$62,053	$22,173 – $98,040	5.1	1.0 – 2.0
Surfactant	4	$146,350	$115,000 – $179,100	3.4	2.0 – 5.2
Ondansetron	4	$138,724	$41,600 – $252,596	2.7	0.9 – 5.1
Ifosfamide	4	$66,266	$14,000 – $107,765	1.3	0.6 – 2.2
Antihuman thymocyte	4	$49,771	$20,000 – $89,082	1.0	0.7 – 1.8
Acyclovir	3	$84,219	$25,000 – $193,007	2.2	1.1 – 3.9
Ceftazidime	3	$35,086	$16,459 – $48,800	0.9	0.3 – 1.8
Cyclosporin	2	$213,114	$65,828 – $360,400	3.1	1.3 – 4.8
Dinoprostone	2	$64,150	$62,000 – $66,300	1.8	0.9 – 2.8
Alprostadil	2	$88,245	$34,300 – $142,190	1.5	0.7 – 2.9
Piperacillin	2	$75,824	$56,920 – $94,728	1.5	1.2 - 1.9
Propofol	2	$49,800	$42,000 – $57,600	1.3	0.8 – 1.9
Isoflurane	2	$37,000	$32,500 – $41,500	1.3	0.7 – 1.9
Leuprolide	2	$70,427	$24,054 – $116,800	1.3	1.1 – 1.5
Amino Acids	2	$58,532	$31,800 – $85,264	1.2	0.7 – 1.7
Ceftriaxone	2	$53,389	$34,839 – $71,938	1.1	0.7 – 1.5
Rocuronium	2	$54,510	$41,700 – $67,320	1.1	0.9 – 1.4
Midazolam	2	$59,577	$33,800 – $85,354	1.2	0.7 – 1.7
Cefotaxime	2	$39,900	$20,000 – $59,800	0.85	0.8 – 0.9
Cefuroxime	2	$28,700	$13,000 – $44,400	0.8	0.6 – 0.9
Methotrexate	2	$35,628	$10,100 – $61,155	0.7	0.2 – 1.2

Respondents

Hospitals <201 Beds

Aberdeen Hospital
Belleville General Hospital
Brockville General Hospital
Campbell River & District Hospital
C.H. Brome Missisquoi-Perkins
C.H. Cloutier
C.H. de Buckingham
C.H. Fleury
C.H. Hôtel Dieu d'Arthabaska*
C.H. Rouyn-Noranda
C.H. Saint-Eustache
Children's Hospital of Eastern Ontario*
Colchester Regional Hospital
Concordia Hospital
Dartmouth General Hospital
Grace General Hospital (St. John's)
Grey Nuns Community Hospital & Health Centre*
Health Services Association of the South Shore
Hopital Sainte-Croix
Institut de Cardiologie de Montréal*
Lake of the Woods District Hospital
Misericordia Community Hospital & Health Center*
Orillia Soldier's Memorial Hospital
Perth Smith Falls District Hospital
St. Paul's Hospital (Saskatoon)*
St. Thomas-Elgin General Hospital
Sudbury Memorial Hospital
Trail Regional Hospital
Valley Regional Hospital
Wetaskiwin General Hospital District*
Yarmouth Regional Hospital*

Hospitals 201-500 Beds

Beausejour Hospital Corporation*
Brandon General Hospital
Burnaby Hospital
Cambridge Memorial Hospital
Centenary Health Centre
C.H. Anna-Laberge
C.H. Charles Lemoyne*
C.H. Cité de la Santé de Laval*
C.H. de Gatineau
C.H. de Granby
C.H. de Lachine
C.H. de la Riviere du Nord
C.H. de l'Université de Quebec*
C.H. des Sept-Iles
C.H. Haut-Richelieu
C.H. Hôtel Dieu de Lévis*
C.H. Hôtel Dieu de Québec
C.H. Hôtel Dieu de Roberval
C.H. Hôtel Dieu de Sorel
C.H. Hôtel Dieu de St-Jérôme
C.H. Laurentien
C.H. Le Gardeur Inc.
C.H. Pierre Boucher
C.H. Régional de Rimouski
C.H. Régional de Trois-Rivières
C.H. Saint-François d'Assise*
Complexe Hospitalier de La Sagamie*
Credit Valley Hospital
Greater Niagara General Hospital
Hamilton Health Sciences Corporation – Henderson Division
Hôpital Douglas*
Hôpital du Saint-Sacrement*
Hôpital Général de Montréal*
Hospital for Sick Children (Toronto)*
Hotel Dieu Grace Hospital (Windsor)
Hotel Dieu Hospital (Kingston)
Institut universitaire de gériatrie de Montreal*
Institut universitaire de gériatrie de Sherbrooke*
Isaak Walton Killam Hospital*
Joseph Brant Memorial Hospital
Kingston General Hospital*
Les Centres Hospitalieres et d'Hebergement de Riviere-du-Loup
Medicine Hat Regional Hospital
Misericordia General Hospital (Winnipeg)
Mount Sinai Hospital*
Oakville-Trafalgar Memorial Hospital
Oshawa General Hospital
Ottawa General Hospital*
Penticton Regional Hospital
Peterborough Civic Hospital
Portage District General Hospital
Queen Elizabeth Hospital (Charlottetown)*
Queensway Carleton Hospital
Region 4 Hospital Corporation
Regional Hospital Center (Bathurst)
Réseau Santé Richelieu-Yamaska
Restigouche Health Services Corporation
Royal University Hospital*
Salvation Army Grace Hospital (Winnipeg)
Saskatoon City Hospital*
Scarborough General Hospital
Seven Oaks General Hospital
St. Catharines General Hospital
St. Mary's Health Center
St. Paul's Hospital (Vancouver)*
St. Vincent's Hospital
Sudbury General Hospital
The Lakeshore General Hospital
The Mississauga Hospital
The Moncton Hospital*
The Montreal Children's Hospital*
Toronto East General Hospital*
Victoria General Hospital (Winnipeg)
York Central Hospital
York County Hospital

Hospitals >500 Beds

Camp Hill Medical Centre*
Capital Health Region
C.H. Angrignon
C.H. de l'Enfant-Jésus*
C.H. du Sacré-Coeur Montréal*
C.H. Louis-H. LaFontaine*
C.H. Notre-Dame (Montréal)*
C.H. Région de l'Amiante Inc.
C.H. Sainte-Justine*
C.H. Saint-Luc*
C.H. St-Joseph de Trois-Rivières*
Foothills Provincial General Hospital*
General Hospital – Health Sciences Centre (NF)
Hamilton Health Sciences Corporation – Chedoke-McMaster Division*
Health Sciences Centre (Winnipeg)*
Jewish General Hospital*
Kelowna General Hospital
Lion's Gate Hospital
London Health Science Centre*
M.S.A. General Hospital
Ottawa Civic Hospital*
Pasqua Hospital*
Queen Elizabeth II Health Science Centre*
Ridge Meadows Hospital & Health Care Centre
Royal Alexandra Hospital*
Royal Columbian Hospital*
Royal Victoria Hospital*
St. Boniface General Hospital*
Sunnybrook Health Science Centre*
Surrey Memorial Hospital
Toronto Hospital*
University of Alberta Hospital*
Victoria General Hospital (Halifax)*
Western Memorial Regional 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.

Table XXVII—**Worksheet 1997/98**

Key indicators	All hospitals (122)	teaching (51)	Non-teaching (71)	100–200 (28)	201–500 (66)	> 500 (28)	Your figures
1. Acute inpatient drug costs/ acute admission	$153.86	$205.99	$124.90	$102.10	$155.84	$204.36	
2. Non-acute inpatient drug costs/ Non-acute admission	$1,036	$667	$1,149	$1,378	$913	$1,095	
3. Inventory turns	8.9	10.7	7.6	7.4	9.0	10.2	
4. IV production/acute patient day for ≥90% patients	0.92	1.14	0.63	0.77	0.93	1.03	
5. # of interventions/admission	0.44	0.60	0.30	0.32	0.47	0.51	
6. Drug distribution units/ total admissions	103	123	87	84	109	122	
7. Clinical units/total admissions	22.0	28.5	14.3	25.2	20.3	33.6	
8a. Paid hours/acute patient day	0.57	0.70	0.49	0.51	0.55	0.70	
	All hospitals (122)	≥ 90% unit dose (28)	≥ 90% traditional (53)	≥ 90% CIVA (53)	≥ 90% CIVA+UD (20)	≥ 90% CIVA+ traditional (17)	
8b. Paid hours/acute patient day	0.57	0.69	0.51	0.66	0.75	0.62	

1. Acute inpatient drug costs ÷ admissions (acute care)	(F4a ÷ A4a)
2. Non-acute inpatient drug costs ÷ admissions (non-acute care)	(F4c ÷ A4b)
3. Inventory turnover rate	F3
4. Total IV admixtureproduct ÷ acute care patient days for ≥90% CIVA	(H4d ÷ A6a) for ≥ 90% CIVA
5. Total # of pharmacokinetic recommendations made and therapeutic interventions made ÷ total admissions	(M1mi + M2b) ÷ (A4a + A4b)
6. Drug distribution units ÷ total admissions	O2ai ÷ (A4a + A4b)
7. Clinical units ÷ total admissions	O2aii ÷ (A4a + A4b)
8a. Total # of approved FTE (excluding residents) × 1950 hours ÷ acute care patient days	(D1a + b + c + d) × 1950 ÷ (A6a + A6b)
8b. Total # of approved FTE (excluding residents) × 1950 hours ÷ acute care patient days	(D1a + b + c + d) × 1950 ÷ (A6a + A6b)