

Drug Distribution Systems

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Oral Medication Systems

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

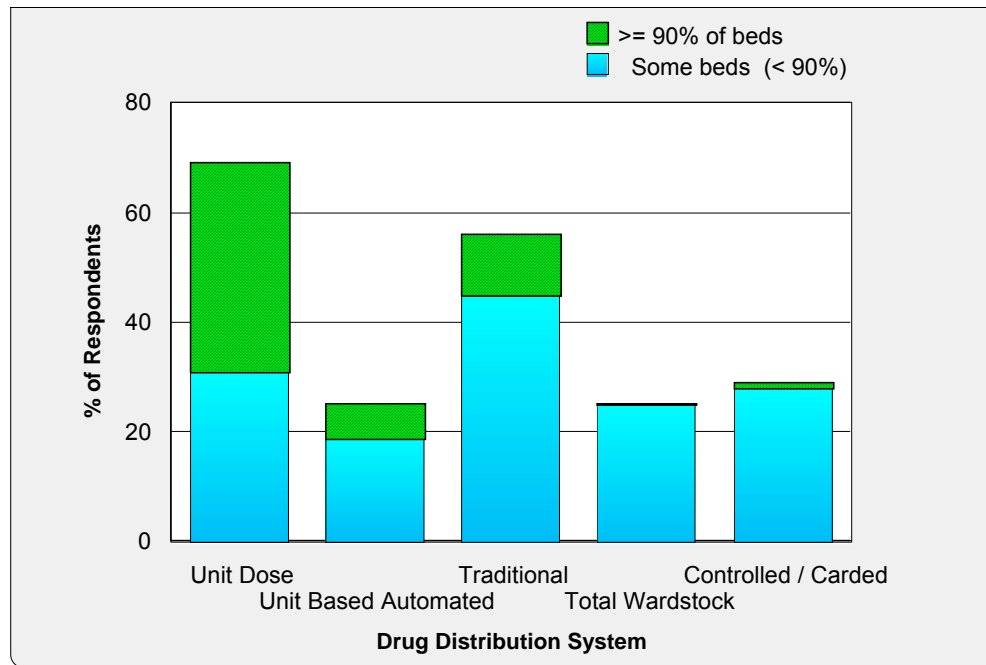
- There was an increase in the total number of respondents reporting use of unit dose systems from 56% (81/144) in 2003/04 to 69% (98/142) in 2005/06. This is a noticeable change from the previous reported increases of two to three percent between surveys dating back to 1997. The reported increase in use of unit dose systems occurred in hospitals of all bed sizes.
- Unit dose systems that provide service to $\geq 90\%$ of beds within their hospital were reported by 38% of respondents, up from 31% in 2003/04 and 24% in 2001/02. These comprehensive unit dose systems are more common in larger hospitals (Table D-1).
- Regional differences in the use of unit dose systems were noted with 45% (9/20) of respondents reporting a unit dose system in BC, 67% (10/15) in Atlantic Canada, 71% (32/45) in Ontario, 75% (15/20) in the Prairies and 76% (32/42) in Quebec.

Table D-1 Drug Distribution Systems 2005/06

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

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

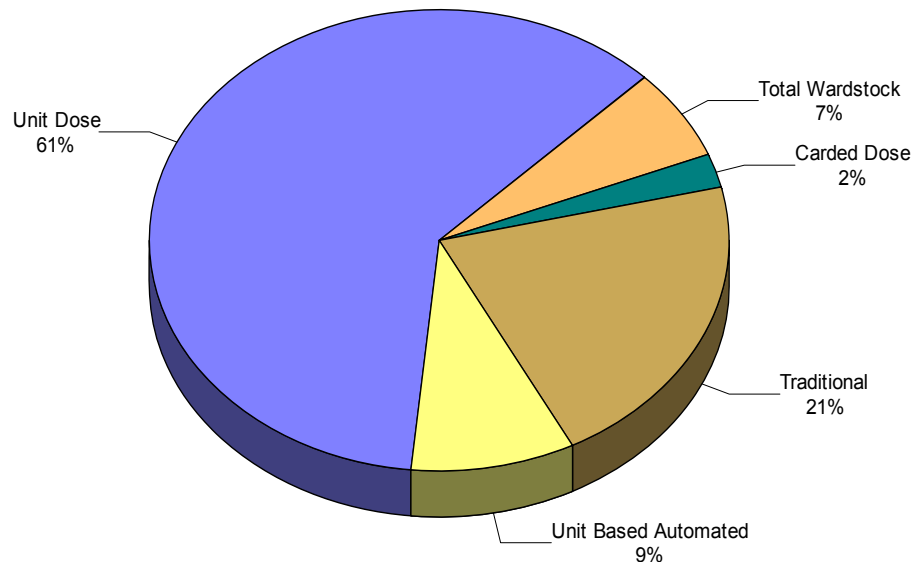
Figure D-1 Drug Distribution Systems 2005/06



Base: All respondents (142)

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

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



Base: All respondents (142)

- Among respondents who reported unit dose drug distribution, 66% (65/98) indicated use of centralized automated dispensing. Regional use of centralized automated dispensing systems were reported by 44% (4/9) of respondents in BC, 53% (8/15) in the Prairies, 63% (20/32) in Ontario, 70% (7/10) in Atlantic Canada, and 81% (26/32) in Quebec.
- Among respondents who reported using centralized automated dispensing systems, 83% (54/65) use a canister type system and 17% (11/65) use a robotic system (five respondents in Quebec, four in Ontario, and one in each of BC and Atlantic Canada).
- The use of unit based automated dispensing systems was reported by 32% (46/142) of respondents, an increase from 20% (29/144) in 2003/04. This includes ten respondents who reported use of unit based automated dispensing systems this survey, but did not provide the percent of beds served by this system. There was little change in the number of respondents reporting use of unit based automated dispensing systems for ≥90% of beds; six in 2003/04 and eight in the current survey year.
- Among the 46 respondents that reported the use of unit based automated dispensing systems, 80% reported they are used in the emergency department, 54% in critical care units, 43% in the operating room, 39% in general inpatient units and 35% in the recovery room. Other locations where unit based automated dispensing systems were reported in use included mental health units, as well as being used for night cabinets and narcotic cabinets.

In comparison, the use of unit based automated dispensing systems in the United States has increased from 49% of hospitals reporting their use in 1999 to 71% of hospitals in 2005. In addition, 88.9% of hospitals with a unit based automated dispensing system reported the cabinets were linked to their pharmacy computer system in 2005 compared to 32.4% in 1999.²

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

Medication Order Entry

- Pharmacists and pharmacy technicians continue to be reported as the categories of personnel who most frequently perform medication order entry (Table D-2). The percent of respondents that reported pharmacy technician medication order entry (78%, 111/142) was unchanged from 2003/04 (78%, 113/144).
- Medication order entry by pharmacy technicians was reported by 95% (40/42) of respondents in Quebec, 90% (18/20) in BC, 80% (12/15) in Atlantic Canada, 71% (32/45) in Ontario and 45% (9/20) in the Prairies. There were no differences between teaching and non-teaching facilities and minimal differences between hospitals of different bed sizes.

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

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

- There has been a decrease in the percent of respondents who reported that orders entered by pharmacy technicians are verified by pharmacists. Among those respondents who reported pharmacy technician medication order entry, 69% (77/111) reported that pharmacy technician order entry is verified by a pharmacist compared to 87% in 2003/04 and 77% in 2001/02. An additional 5% (6/111) reported that pharmacy technician order entry is verified by either a pharmacist or a pharmacy technician. Five respondents reported that orders entered by pharmacy technicians are verified by pharmacy technicians.
- Fifty-six percent (70/126) of respondents who reported pharmacist medication order entry gave no response when asked about verification of order entry by pharmacists or pharmacy technicians. There was no difference between teaching or non-teaching hospitals or between hospitals of different bed sizes.
- Twenty-one percent (23/111) of respondents who reported pharmacy technician medication order entry gave no response when asked about verification of order entry by pharmacists or pharmacy technicians; 31% (9/29) of respondents from teaching hospitals and 17% (14/82) of respondents from non-teaching hospitals.

Table D-2 Medication Order Entry 2005/06

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

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

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

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

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

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

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

Medication Tickets and Medication Profiles

- Eight percent of respondents reported the use of manually prepared medication “tickets” or “cards” in ≥90% of areas and 13% reported partial use. Regional variation was apparent, with use of manual tickets reported by 40% (17/42) of respondents in Quebec, 33% (5/15) in Atlantic Canada, 15% (3/20) in BC, 10% (2/20) in the Prairies, and 9% (4/45) in Ontario.
- Pharmacy medication profiles were reported to include all medications (regularly scheduled, once only, stat and wardstock) prescribed for 90% of patients or more by 88% of respondents (Table D-4). Again, there was regional variation with 100% of respondents in Atlantic Canada, 98% in Quebec, 95% in the Prairies, 82% in Ontario, and 65% in BC reporting complete medication profiles for 90% or more of their patients. This is essentially unchanged from 2003/04.

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

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

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

Technicians Checking Technicians

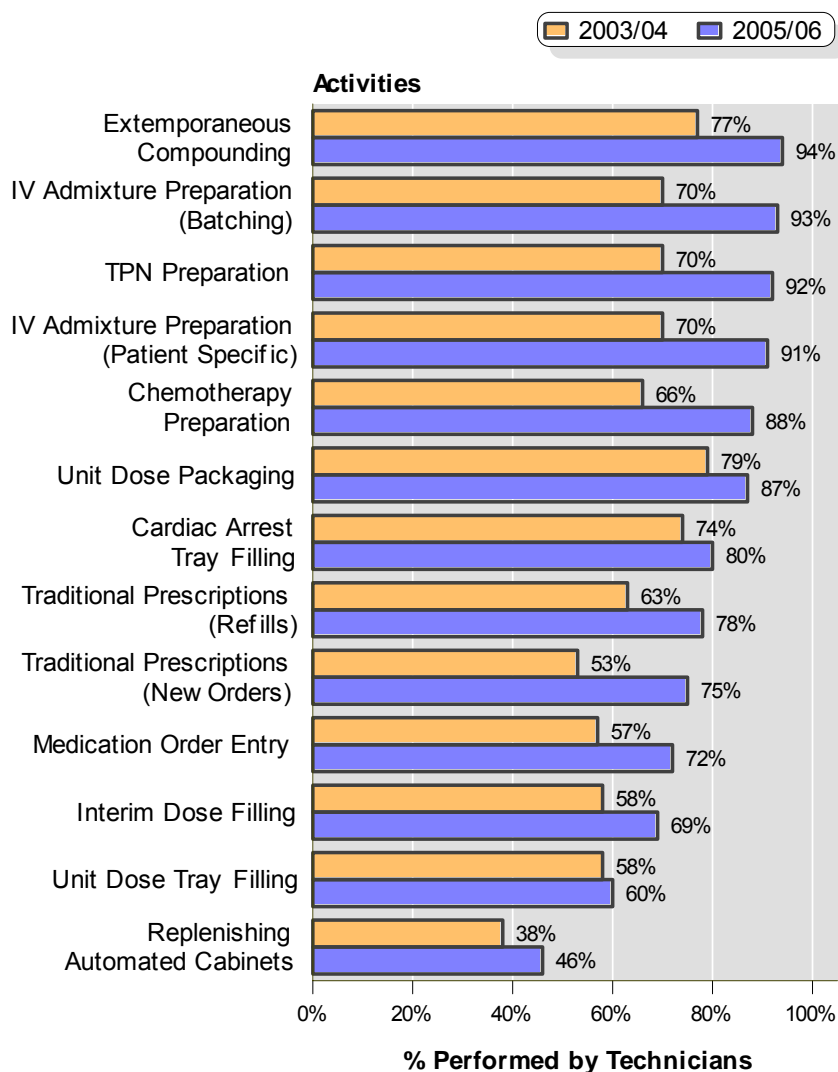
- Ninety-two percent (130/142) of respondents reported pharmacy technicians check the work of other technicians, a slight increase from 87% (125/144) in 2003/04.

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

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

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

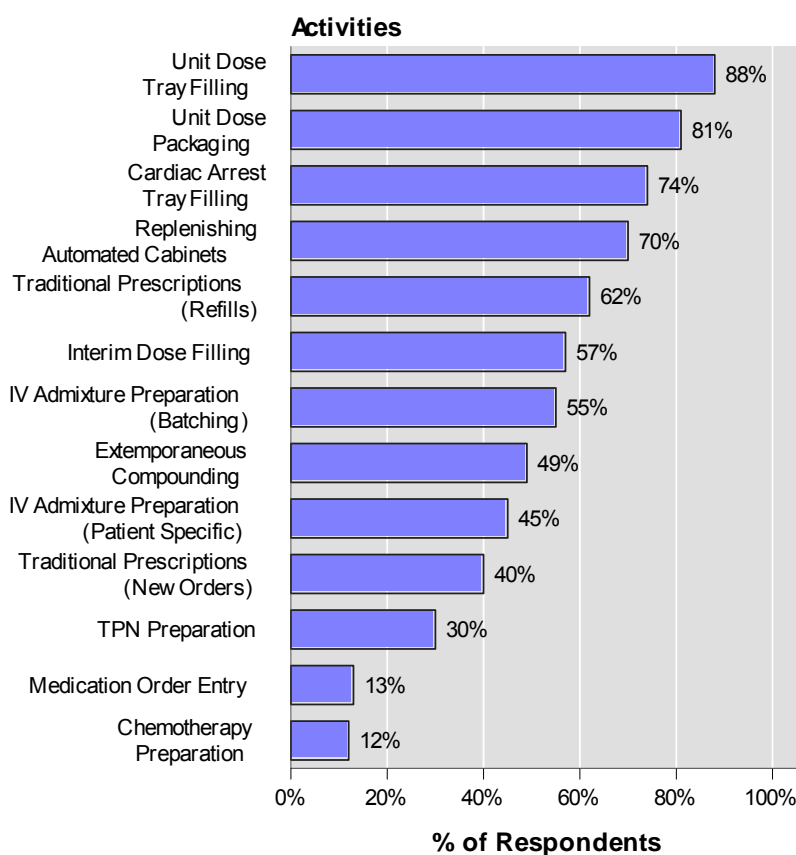
Figure D-3 Functions Performed by Pharmacy Technicians 2005/06



Base: Respondents reporting that technicians check technicians

- All respondents in Ontario (45/45) and Atlantic Canada (15/15), 95% (19/20) of respondents in the Prairies and 90% (18/20) in BC, reported technicians check the work of other technicians compared to 79% (33/42) of Quebec respondents.
- Unit dose tray filling, unit dose packaging and cardiac arrest tray filling were the top three activities for which respondents reported technicians were checking technicians (Figure D-4).

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

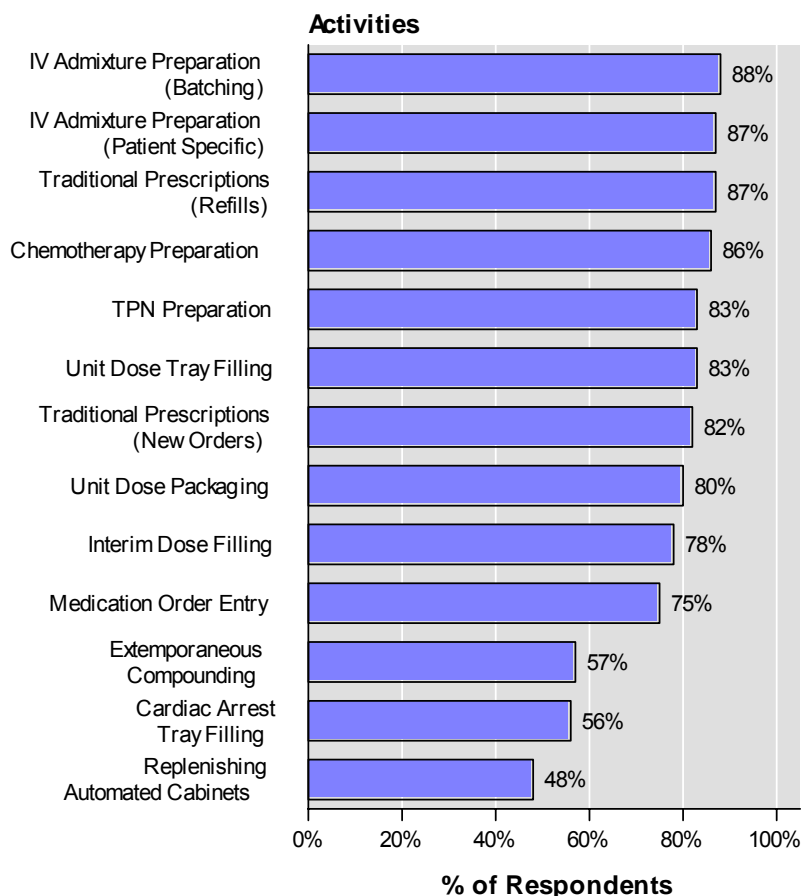


Base: Respondents reporting that function is performed

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

- Technician certification was reported by 85% (121/142) of respondents compared to 71% (102/144) in 2003/04. A consistently applied process for re-certification was reported to be partially in place (<90%) by 31% (37/121) of these respondents and fully implemented (≥90%) by 46% (56/121). In 2003/04, 35% (36/102) of respondents who reported technician certification indicated that a process for re-certification was fully implemented at their facility.
- Among respondents who reported that technicians check technicians, 80% or more required certification for IV admixture preparation (patient specific and batching), chemotherapy and TPN preparation, traditional prescriptions (new and refills), unit dose tray filling and unit dose packaging (Figure D-5).

Figure D-5 Technician Certification Required 2005/06



Base: Respondents using technician check technician

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

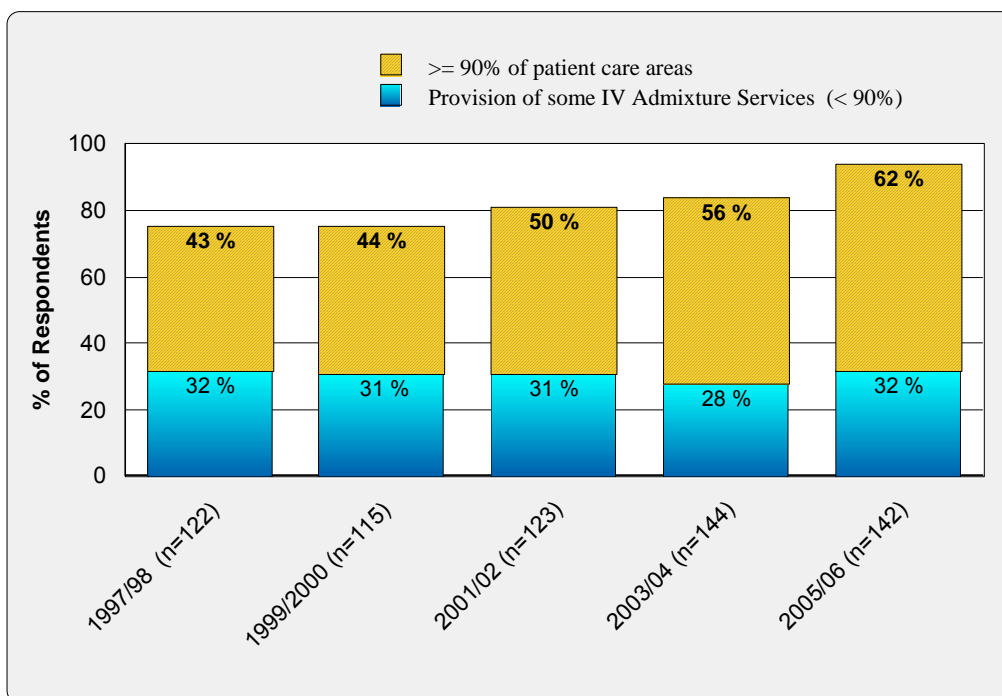
Intravenous Admixture Services

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

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

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

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



Base: All respondents (142)

- Respondents providing IV admixture estimated that 47% of total parenteral (IV, IM, SQ, epidural) doses administered in their respective institutions were either prepared through the IV admixture service or provided as commercially available, ready to use admixtures (Table D-6). This matches the estimate of 47% reported in 2003/04.
- Respondents providing IV admixture estimated that 50% of the total number of parenteral products/line items carried by their pharmacies were either prepared through the IV admixture service or provided as commercially available, ready to use admixtures.
- In hospitals greater than 500 beds, the estimated percent of doses and products/line items prepared through the IV admixture service or provided as commercially available, ready to use admixtures was almost twice that of hospitals of 100-200 beds.
- Among the 134 facilities where respondents reported the provision of IV admixture, patient care areas receiving the service included the OR (49%), ER (63%), other outpatients (75%), critical care (83%) and other inpatients (95%).
- The provision of antibiotics was reported by 93% of respondents with IV admixture programs, large volume parenterals requiring additives by 76%, H2 blockers by 64% and inotropes by 22%. A wide range of other products, including narcotics, chemotherapy, steroids and antiemetics, were identified by 78% of respondents.

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

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

- The reported average production of IV admixtures by respondents providing service to ≥90% of patients was 0.93 admixtures per acute patient day, compared to 1.09 in 1999/2000, 1.19 in 2001/02 and 1.07 in 2003/04.
- The primary method of administering intermittent IV doses has not changed appreciably since the 1997/98 Annual Report; minibag use was reported by 64% (91/142) of respondents, syringe infusors by 27% (38/142), and buretrol/burette by 5% (7/142). Minibag use was highest in BC (90%, 18/20), Ontario (87%, 39/45) and Atlantic Canada (73%, 11/15). Syringe infusors were used more often in Quebec (62%, 26/42) and the Prairies (30%, 6/20).

Chemotherapy

- Ninety-six percent of respondents reported that IV cytotoxic drugs were prepared and administered in their facility. All of these respondents reported the IV cytotoxic doses were prepared in the pharmacy department.
- The average of reported number of chemotherapy doses in hospitals reporting that parenteral chemotherapy doses were prepared by Pharmacy was 9,223 (Table D-7).

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

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

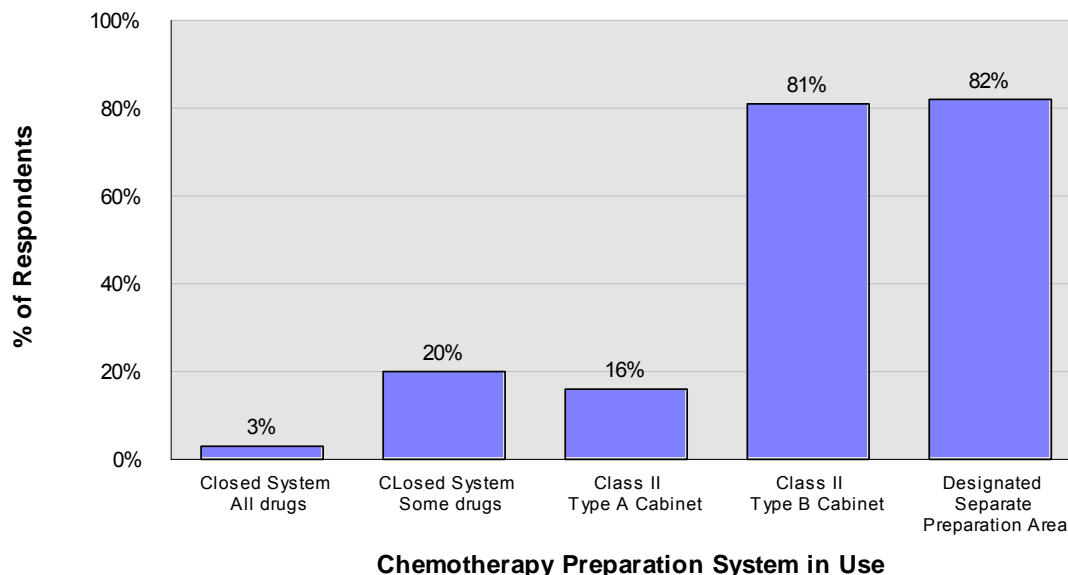
- The provision of home chemotherapy services was reported by eleven respondents, three in the Prairies, seven in Quebec and one in Atlantic Canada.
- Among respondents reporting the preparation of IV chemotherapy, 98% have written policies and procedures to ensure the health and safety of employees preparing, transporting, administering and disposing of cytotoxic drugs (Table D-8).

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

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

- Among respondents reporting the preparation of IV chemotherapy, the use of closed systems for preparation of some drugs increased from 13% in 2003/04 to 20% in 2005/06 and were used by 3% of respondents for preparation of all drugs.
- A designated separate chemotherapy preparation area was reported by 82% of respondents who indicated that Pharmacy prepared parenteral chemotherapy doses (Figure D-7).
- Among facilities reporting that Pharmacy prepared parenteral chemotherapy doses, 81% reported use of a Class II Type B Cabinet and 16% use of a Class II Type A Cabinet.

Figure D-7 Chemotherapy Preparation Systems 2005/06



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

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

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

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

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

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

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