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A Medication Error Prevention Survey: five years of results

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Background. The Alberta Cancer Board is composed of 19 cancer centers in Alberta, Canada. In 1996, the Alberta Cancer Board's Medication Error Prevention Committee developed a medication error prevention survey based on the medication error prevention policies. Since 1996, this survey has been sent annually to the pharmacy departments of the 19 cancer centers. Each year, the results are presented to the Pharmacy and Therapeutics Committee of the Alberta Cancer Board.

Objectives. The purpose of the paper was to present and analyze five years of medication error prevention survey results, thus summarizing adherence to the Alberta Cancer Board's medication error prevention policies.

Methods. Medication error prevention survey results from 2003 to 2007 were collected. For each of the five years, a medication error prevention survey was faxed to the pharmacy department at each of the 19 cancer centers of the Alberta Cancer Board. Results of the survey were tabulated by the pharmacist responsible for quality assurance.

Results. Analysis of the five years of medication error prevention survey results revealed that over 90% of the medication error prevention policies were followed within the 19 Alberta Cancer Board sites. Adherence to the policies was $>90\%$ in the tertiary sites and associate clinics. Adherence was also $>90\%$ in the community cancer centers.

Conclusions. Results from the survey indicated that the medication error prevention policies are practiced within the Alberta Cancer Board. Potential areas of improvement have been identified and will be addressed by the Medication Error Prevention Team.***J Oncol Pharm Practice (2009) 15: 87–93.***

Key words: medication; error; prevention; survey

BACKGROUND

The Alberta Cancer Board (ACB) is responsible for cancer control and research activities for all Alberta cancer patients including the preparation and administration of chemotherapy to Alberta cancer patients. In Alberta, there are 19 cancer centers. There are two large tertiary centers based in Alberta's two largest cities, Calgary and Edmonton. There are five associate clinics, where chemotherapy orders are filled by the pharmacy staff at the clinics. For the 12 community satellite sites, chemotherapy prescriptions are sent to the tertiary centers for the pharmacy departments to review and fill the chemotherapy orders. A copy of the order and the labeled chemotherapy is sent to the pharmacy department at the community cancer center. The orders are reviewed at the community cancer center and entered into the center's computer system before the chemotherapy is administered.

In response to a fatal medication error reported in the literature in 1995,[1] the Alberta Cancer Board Pharmacy Department started a Medication Error Prevention Team. The committee includes pharmacists and pharmacy technicians from across the ACB centers and its goal is to develop proactive medication error prevention strategies.

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In 1996, the Medication Error Prevention Team reviewed the available oncology literature and developed a medication error prevention survey.[2] In 1996, the Alberta Cancer Board had only seven sites and a survey was sent to each site. From this survey, the Alberta Cancer Board medication error prevention policies were developed. These policies were approved by the ACB Pharmacy and Therapeutics (P&T) Committee. These policies cover sections on physician ordering; verification of questionable orders; handling, admixing, distribution, and administration of chemotherapy; and staff and patient education.

Since 1998, the medication error prevention survey has been sent annually to each of the ACB sites. In 2001, the medication error prevention survey was updated (Appendix A) through a literature review and gap analysis.[3] From this updated survey, medication error prevention policies were updated and approved by the ACB P&T Committee in 2003. This paper demonstrates the results of the annual medication error prevention survey since the policies were updated in 2003.

MATERIALS AND METHODS

Medication error prevention surveys were collected for five years, from 2003 to 2007. Each October, the medication error prevention surveys were faxed from the Tom Baker Cancer Pharmacy Department to the pharmacy departments of the ACB tertiary, associate and satellite sites. The surveys were to be completed by the end of November and faxed back to the Tom Baker Cancer Center. Sites that did not send a response were re-faxed with a request to have the surveys returned in the next month.

The results were tabulated by the pharmacist responsible for quality assurance. The Director of Pharmacy presented the results at the following ACB P&T Committee meeting. These results were also published in the ACB Pharmacy Department monthly newsletter.

RESULTS

For the five annual surveys conducted from 2003 to 2007, the medication error prevention survey has revealed that over 90% of the medication error prevention policies were followed within the 19 Alberta Cancer Board sites (Table 1, Figure 1). The results from the tertiary sites and associate clinics indicated that over 90% of the policies were adhered to in these centers. The results from the community cancer centers also indicated that over 90% of the policies were followed at these satellite sites.

The results were further divided by section (Table 2, Figure 2). Each year's results were 90% or

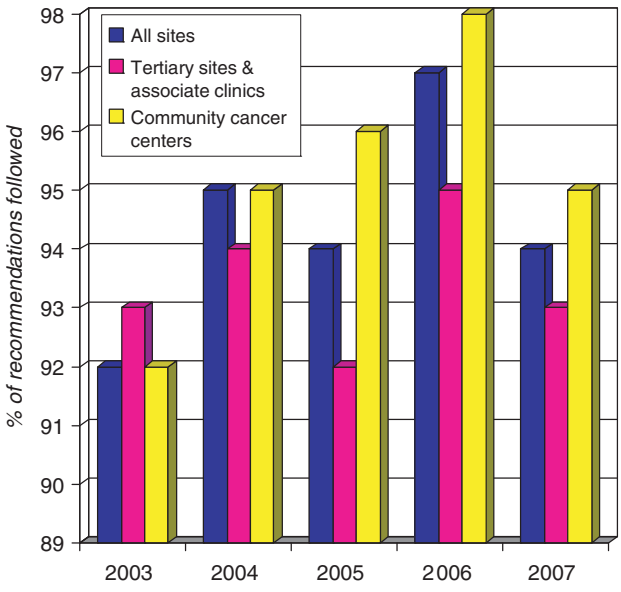

Figure 1. Percent of policy recommendations followed.

Table 1. Percent of policy recommendations followed.

	Tertiary sites, associate clinics, and community cancer centers	Tertiary sites and associate clinics	Community cancer centers
2003	92% (18/19 sites responded)	93% (7/7 sites responded)	92% (11/12 sites responded)
2004	95% (17/19 sites responded)	94% (7/7 sites responded)	95% (10/12 sites responded)
2005	94% (16/19 sites responded)	92% (7/7 sites responded)	96% (9/12 sites responded)
2006	97% (14/19 sites responded)	95% (7/7 sites responded)	98% (7/12 sites responded)
2007	94% (16/19 sites responded)	93% (7/7 sites responded)	95% (9/12 sites responded)

Table 2. Percent of policy recommendations followed according to section of the medication error prevention survey

Section I: Physician order of chemotherapy medications
2003: 90%
2004: 93%
2005: 92%
2006: 96%
2007: 95%
Section II: Verification of questionable chemotherapy medication orders
2003: 88%
2004: 92%
2005: 95%
2006: 95%
2007: 90%
Section III: Handling, admixing, distribution, and administration of chemotherapy medications
2003: 95%
2004: 97%
2005: 97%
2006: 99%
2007: 96%
Section IV: Staff and patient education
2003: 89%
2004: 93%
2005: 93%
2006: 95%
2007: 89%

above except for three values: Section II: Verification of Questionable Chemotherapy Medication Orders, 2003 (88%), Section IV: Staff and Patient Education, 2003 (89%), and Section IV: Staff and Patient Education, 2007 (89%). The best results were obtained in Section III: Handling, Admixing, Distribution and Administration of Chemotherapy Medications, with a five-year average of 95%. The greatest positive change over the five years was in Section I: Physician Order of Chemotherapy Medications (90% in 2003 and 95% in 2007).

Compliance to each policy was examined. The policy with the lowest compliance was from Section II: Verification of Questionable Chemotherapy Medication Orders, policy 4, which reads 'A computerized pharmacy information system shall be employed to assist the pharmacist in detecting drug interactions, daily dose limitations, total dose limitations, and any drugs that a patient is not to receive. The computerized system shall also provide for documentation of these and other interventions.' Over the five years, the surveys indicated that this policy was not yet practiced 27 times (with 19 sites surveyed for five years, or 95 total responses). The policy with the second lowest compliance was from

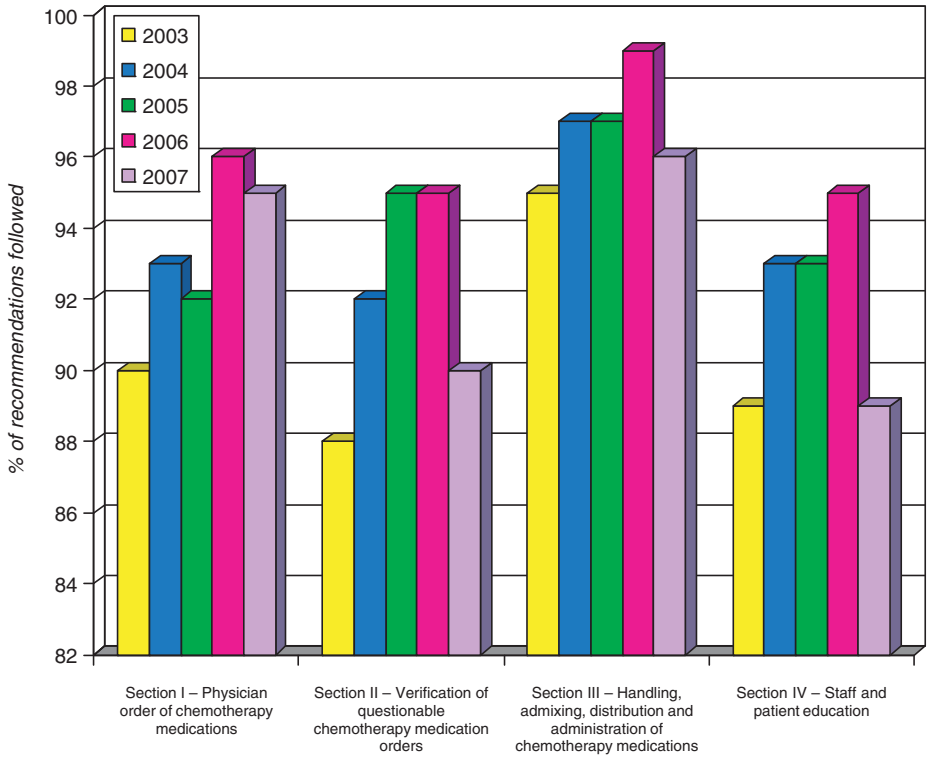

Figure 2. Percent of policy recommendations followed according to section of the medication error prevention survey.

Section I: Physician Order of Chemotherapy Medications, policy 1.g, which reads 'Drugs with maximum lifetime doses shall include the total cumulative dose/m^2 and cumulative dose of other anthracyclines received.' Over the five years, the surveys indicated that this policy was not yet practiced 24 times. The policy with the third lowest compliance was from Section I: Physician Order of Chemotherapy Medications, policy 1.f, which reads 'All orders for chemotherapy should use complete generic names whenever available. The use of drug abbreviations shall be avoided.' Over the five years, the surveys indicated that this policy was not yet practiced 13 times.

DISCUSSION

The biggest limitation in comparing five years of annual surveys is human variation in completing the survey. At a particular site, there is often a different pharmacist completing the survey from year to year. Improved consistency could be attained by specifying that the pharmacy manager respond to the form. For each policy, the pharmacist is given a choice between 'policy practiced' and 'policy not yet practiced'. Unfortunately, the extent to which the policy is practiced is not defined (whether it is practiced 100% of the time, or most of the time, or some of the time). Occasionally, instead of choosing 'policy practiced' and 'policy not yet practiced,' the pharmacist completing the survey writes comments such as 'sometimes not done' or 'most of the time,' requiring the pharmacist responsible for quality assurance to judge which column of the survey should be checked. A change in the wording of 'policy practiced' to 'policy practiced 100% of the time' would improve this discrepancy.

The annual survey serves as a policy reminder to staff, as the results are published each year in the ACB Pharmacy's monthly newsletter, 'Reachout.' The results are also presented to the ACB Pharmacy Medication Error Prevention Team each year. The committee has an ongoing action list, and incorporates areas of the survey identified as potential areas of improvement. In addition, the ACB Pharmacy residents are provided with a potential project list that includes areas of the survey identified as potential areas of improvement.

The ACB remains committed to patient safety. Since the medication error prevention policies were first developed, a number of additional safety initiatives have been implemented throughout the ACB. A Patient Safety Officer position has been created, a Clinical Safety Systems Committee has been formed, and a Provincial Medication Safety Committee has recently been struck. Pharmacy representation on these Committees is present. Review of the medication error prevention survey results will be forwarded to the new Medication Safety Committee for potential improvements on a provincial level.

ACKNOWLEDGMENTS

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APPENDIX A

Oncology Medication Error Prevention Status Survey November 2007

This is the 10th annual Medication Error Prevention Survey. The results will be compared to the survey completed in November 1998 to see if overall compliance has improved. Please FAX the finished product to Frances Cusano at the Tom Baker Cancer Center Pharmacy at (403) 521-3326 by November 30, 2007. Thank you for your attention.

ALBERTA CANCER BOARD

Site/Facility: _____ Date: _____

Completed By: _____

	Policy	Policy Practiced	Not yet Practiced	Comments
Physician Order of Chemotherapy Medications				
1.	All orders for chemotherapy			
	a) shall be written as daily doses. Total course dose shall be written for continuous infusion protocols only.			
	b) shall be dated month/day/year Ex: Feb 08 2003			
	c) shall be expressed in mg or units			
	d) shall have a leading zero (e.g. 0.2) when dose is less than a whole unit.			
	e) shall NOT have a trailing zero (e.g. 2.0)			
	f) shall use complete generic names whenever available. The use of drug abbreviations shall be avoided.			
	g) drugs with maximum lifetime doses shall include the total cumulative dose/m^2 and cumulative dose of other anthracyclines received.			
	h) shall be written on pre-printed forms if available.			
2.	All orders for intravenous or intrathecal chemotherapy shall be written, not verbal.			
3.	All health care professionals involved in the ordering, preparation or administration of chemotherapy medications shall have access to the following information: a) dose/m^2, dose/kg or AUC b) dosing interval c) calculated dose d) height, weight and body surface area e) relevant lab data (e.g. WBC) f) age			
4.	The physician, prior to writing/signing the prescription, shall ensure the correct pre-printed chemotherapy order or electronic regimen has been utilized.			
5.	Modifications a) Physicians writing clarification orders shall also make the change on the original paper prescription or discontinue the orders and generate new orders b) Physicians discontinuing a drug normally included in a protocol (due to toxicity, maximum lifetime dose reached, etc.) shall note this on the Physicians Orders form or in the Progress Notes of the electronic chart. c) Physicians changing a protocol shall note this on the Physicians Orders form or in Progress Notes of the electronic chart.			
6.	A copy of a protocol or article being used as the basis for treatment shall be readily available in the patient's chart for new or innovative protocols to ensure safe, appropriate preparation and administration.			

	Policy	Policy Practiced	Not yet Practiced	Comments
7.	As protocols are approved within the ACB, pre-printed order forms shall be developed and approved by Medicine, Pharmacy, and Nursing (include antidote medication such as leucovorin if required). These forms should include data on cytotoxic agents such as maximum single dose/m^2 to provide a stepwise procedure for dosage verification.			
8.	Dose limits in the form of minimum duration of infusion, appropriate rate, maximum amount for a single dose, maximum amount per 24 hours, maximum amount per course of therapy or per patient lifetime shall be established for cytotoxic drugs where appropriate.			
9.	All staff involved in medication ordering, distribution, or administration shall have access to available published chemotherapy drug and protocol information such as: a) Acronyms in Cancer Chemotherapy, Lilly Oncology Canada (most recent edition) b) ACB Parenteral Drug Manual c) ACB Pre-printed Chemotherapy Order Forms d) Other oncology reference books appropriate for the department/discipline.			
Verification of Questionable Chemotherapy Medication Orders				
1.	Protocols used within the ACB shall go through an approval process via tumor groups. If a medication order seems inappropriate, the pharmacist shall review the protocol and any accompanying references to verify the order.			
2.	If the medication order is from an unapproved protocol, the pharmacist shall: a) obtain the original article on which therapy is based or contact the prescriber directly to obtain a reference;			
	b) discuss the order with the prescriber in order to ensure safe, appropriate, timely preparation and administration of the medications;			
	c) review drug orders for coverage under the Outpatient Cancer Drug Benefit Program and inform the physician if the drug is not covered;			
	d) contact the drug manufacturer of the medication for any additional information;			
	e) contact the Pharmacy Manager or ACB Director of Pharmacy if required.			
3.	All health care providers shall have ready access to patients' laboratory results and body surface area.			
4.	A computerized pharmacy information system shall be employed to assist the pharmacist in detecting drug interactions, daily dose limitations, total dose limitations and any drugs that a patient is not to receive. The computerized system shall also provide for documentation of these and other interventions.			
Handling, Admixing, Distribution and Administration of Chemotherapy Medications				
1.	The ACB Pharmacy shall (with manufacturer's assistance) eliminate look alike vials when possible, limit vial sizes when possible, remove all ambiguous information from educational resources and shall ensure communication is shared within the ACB Pharmacy Department for provincial review.			
2.	An admixing process for injectable chemotherapy drugs shall include the following: a) standardized dilutions of medications; b) a double check by a pharmacist of the medication dose and volume to be added to all infusion bags; c) the entire volume of medication is drawn into separate syringes and verified before admixing; d) a process where at least 2 people are involved with the preparation of the medication and checking of all dose calculations; e) a check of all prepared doses and IV labels against the original order before dispensing; f) appropriate syringe sizes chosen when withdrawing the required dose volume with consideration given to accuracy, safety, and transport. Whenever possible, pharmacy shall follow ASHP guidelines that recommend that syringes containing cytotoxic solutions should never be more than three-fourths full; g) verification that the correct drug, number of vials, and syringe sizes were used in the admixing process, before vials and syringes are disposed of; h) a standard checklist for setting up and preparing chemotherapy medications.			

	Policy	Policy Practiced	Not yet Practiced	Comments
3.	A labeling process shall be instituted with the following: a) a standard checklist for labeling of chemotherapy medications;			
	b) all routes of administration are clearly identified on the label;			
	c) multiple redundant checks of the final label and product against the original physician order;			
	d) distinct patient specific labels as well as coloured auxiliary warning labels used to identify parenteral doses intended for other than IV administration (e.g. intrathecal);			
	e) all medication labels to be detailed so that the persons administering the medication can double check the dose against the original order;			
	f) all vincristine syringes labeled with an auxiliary label ''Not for intrathecal use''			
4.	A distribution system that requires segregation of parenteral doses intended for other than IV administration shall be in place.			
5.	All oral chemotherapy shall be dispensed in monthly allocations for cyclical therapy.			
6.	All doses shall be verified independently by 2 Health Care Professionals (i.e. Pharmacist/ Nurse/Physician) before administration.			
Staff and Patient Education				
1.	The ACB pharmacy shall coordinate an orientation program and certification program for pharmacists, technicians, and LPN's at the ACB pharmacies and community cancer centers.			
2.	An educational process for all new investigational or marketed drugs which covers both professional and technical information shall be in place at all pharmacy sites.			
3.	Pharmacists shall educate patients about their chemotherapy and associated drug therapy using the most appropriate format for the situation.			
4.	A final review with the patient of ACB dispensed drugs that are being taken home shall occur.			
5.	Medication errors shall be reviewed in facility specific multidisciplinary sessions and their recommendations shared within the ACB organization.			