



Implementing System Safeguards to Prevent Error-Induced Injury with Opioids (Narcotics): An ISMP Canada Collaborative

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Abstract

Institute for Safe Medication Practices Canada (ISMP Canada) is involved in collaborative initiatives focusing on opioid safety in two Canadian provinces: Ontario and Alberta. Baseline survey responses from these provinces indicate opportunities for improvements to the opioid system that might be applicable nationally. Information about the Ontario project and preliminary analysis of follow-up survey results from that province are shared here, to increase awareness and create further national impetus for the enhancement of safeguards in the use and management of opioids.

Background

Opioids (narcotics) are “high-alert medications,” defined as medications with a higher risk of causing patient injury when errors occur (Institute for Safe Medication Practices 2005). “Narcotic accidents are among the most frequent of all serious incidents reported” (Cohen 1999: 5.35). Within the ISMP Canada database, opioids are the class of drugs most frequently reported in medication errors causing harm (Institute for Safe Medication Practices Canada 2006). Reports from other countries have also identified opioids as a class of medications frequently involved in preventable adverse events causing patient harm (Hicks et al. 2004; Smith 2004). With an increasing focus on patient safety

in Canada and movement toward outcome measurements (Baker et al. 2004; Forster et al. 2004; Safer Healthcare Now 2005), awareness of medication errors associated with opioids can also provide a collective, national impetus to enhance opioid safety and thus prevent opioid-associated errors.

Opioids are administered by various routes: oral, enteral, rectal, subcutaneous, intramuscular, intravenous, neuraxial (i.e., epidural or spinal) and transdermal. They are available in a variety of dosage forms, including tablets, capsules, liquids, suppositories, injectables, and patches. Suffixes indicating immediate or sustained release are common, but they can be confusing (e.g., IR for immediate release, CR for controlled release, SR for sustained release, XR for extended release). The names of some opioids sound alike, which can result in mix-ups between what is ordered and what is administered (e.g., morphine and hydromorphone; fentanyl and sufentanil; oxycodone and Oxycontin®). Furthermore, opioid products are supplied by a small number of manufacturers in Canada, leading to situations in which multiple strengths of drugs with sound-alike names, in similar packaging, are stored together in patient care areas.

Current medication systems are designed to ensure accurate verification of narcotic counts but not necessarily the safe and appropriate use of these drugs. Known safeguards that have

been implemented for the dispensing of other categories of medications, such as unit-dose packaging, order verification by pharmacy and preparation of specific parenteral doses, are often not in place for opioids. Pharmacy staff are conscientious about ensuring that patient care areas have “enough stock”; current prescribing practices can lead to the stocking of a large variety of opioid medications; and administration practices commonly require a single practitioner to identify, prepare and administer an opioid without redundant checks. All of these factors can result in few barriers (low “fault tolerance”) to prevent errors from reaching the patient.

Ontario Opioid Safety Project

Ontario was the first Canadian province to establish a province-wide support service to assist healthcare organizations to enhance safety in the use of high-alert medications. The Medication Safety Support Service (MSSS) is a joint initiative of the Ontario Ministry of Health and Long-Term Care and ISMP Canada. MSSS projects are led by ISMP Canada with the support of a multidisciplinary provincial advisory committee, composed of representatives from the professional colleges and associations of medicine, nursing and pharmacy. The first MSSS project focused on elimination of concentrated potassium chloride, and resulted

in reduced availability of this high-alert drug in patient care areas by Ontario hospitals (Institute for Safe Medication Practices Canada 2003). The MSSS potassium chloride project enhanced national awareness and action (McKerrow et al. 2004).

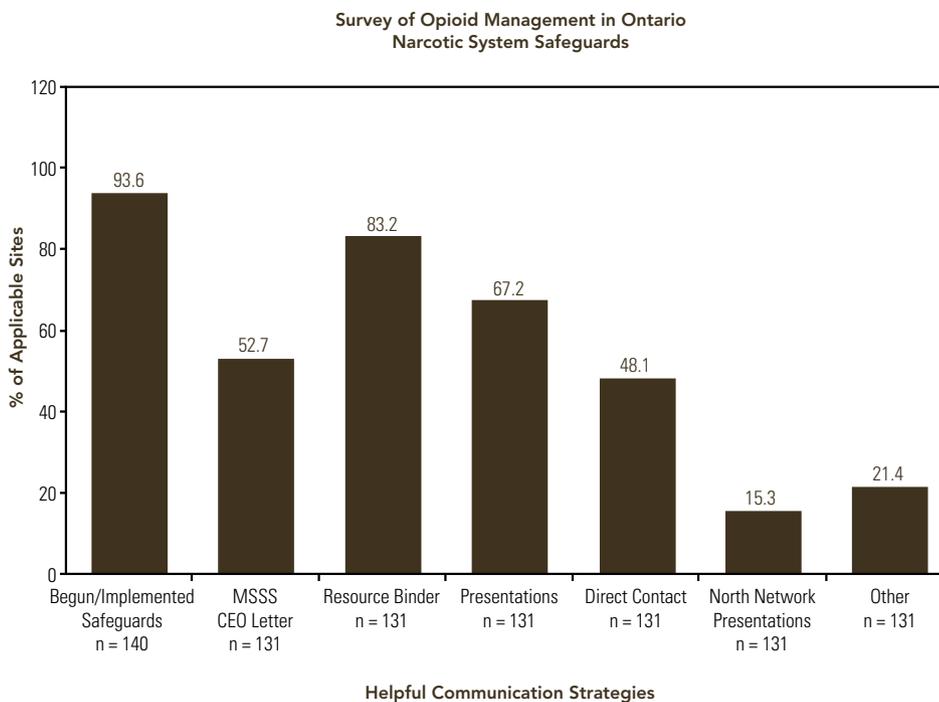
The current MSSS project focuses on opioids, with the goal of reducing the risks associated with the distribution and use of these high-alert medications in Ontario hospitals. It is hoped that sharing the methodology and preliminary analysis of the project results will generate national awareness and action similar to that which occurred with the potassium chloride project.

Project Rationale and Background

In July 2003, ISMP Canada hosted a conference at which Ontario hospital representatives identified opioids as a top concern in medication safety. Central nervous system drugs are the class most frequently involved in medication incidents, with opioids most frequently implicated (Marshman et al. in press). In a review of 32 deaths related to medication errors investigated between 1999 and 2003 by the Office of the Chief Coroner of Ontario, Flynn and Greenall (2004) found that 14 of the deaths (44%) involved opioid medications. A review of numerous articles describing opioid-related errors (Institute for Safe Medication Practices Canada 2005), and two high-profile opioid-related deaths that were investigated by the Office of the Chief Coroner of Ontario (Chief Coroner, Province of Ontario 2000, 2001), provided additional impetus for the project.

A survey based on known best practices for handling of opioids was developed to assess the current management of these medications in Ontario hospitals. The five-page survey was electronically distributed by the Ontario Hospital Association to every Ontario hospital in January and February 2004. Responses were submitted online or via fax to ISMP Canada. Seventy-five percent of Ontario hospitals (165) responded to the baseline survey. Results indicated that there were opportunities to implement system changes to reduce risks associated with opioid use.

Figure 1. Survey of opioid management in Ontario



Note: The n values for bars 2 to 7 represent the number of sites that have begun/implemented narcotic system safeguards.

Source: Used with permission from Institute for Safe Medication Practices Canada.

The survey findings were used to create priority recommendations (see Appendix A). A resource binder was created, compiling information about opioid errors, underlying systems issues and practical strategies and resources, some of which were provided by Ontario hospitals. Recommendations were directed toward short-term and attainable changes that would be relevant to most acute care facilities, rather than longer-term strategies such as automation and computerization. Importantly, the project was intended to contribute to organizational culture change, shifting the focus from individual practitioners as the safety net to systems supporting individuals in safer practice.

The resource binder was distributed directly to representatives of 91 Ontario hospital sites at a workshop in January 2005. Resource binders were mailed to hospitals that were unable to send representatives to the workshop. In addition, multiple communication strategies, such as telemedicine presentations, letters to hospital chief executive officers and direct contact with hospitals by telephone and e-mail, were used to supplement the resource binder and assist hospitals to implement the recommendations. Ontario hospitals were urged to implement the priority recommendations and additional strategies to address potential problems in the management of opioids.

Results

One hundred forty Ontario hospitals (64%) responded to a follow-up survey distributed in November and December 2005. Almost all (94%) of the respondents indicated that they had started to implement recommended safeguards in their narcotic distribution systems. Respondents noted that the variety of communication strategies employed by ISMP Canada had been helpful in implementing system changes (Figure 1).

Of 140 follow-up survey respondents, 131 (94%) have begun or already implemented opioid system safeguards. These respondents also indicated the useful communication strategies employed by ISMP Canada.

Progress is being made in implementation of the priority recommendations. For example, the availability of high-potency opioids as stock items in patient care areas decreased from baseline. Specifically, a 46% reduction in stocking of morphine 50 mg/mL and a 66% reduction in stocking of hydromorphone 50 mg/mL in medical and surgical areas were reported (Figures 2 and 3). Figure 4 illustrates the implementation of several suggested strategies to reduce higher-potency items in patient care areas, such as review of narcotic storage areas, purchase of premixed agents and preparation of parenteral opioids in the pharmacy rather than in patient care areas. There also appeared to be a strong commitment to changes in opioid distribution practices that require additional time and resources, for example, standardization of concentrations of parenteral opioid solutions (Figure 5).

Another priority recommendation for Ontario hospitals is

the implementation of independent double-checks (IDCs) for patient-controlled analgesia (PCA) infusion pumps. The working definition of a non-automated IDC is “a process in which a second practitioner conducts an individual verification” (Institute for Safe Medication Practices Canada 2005). Information and strategies for IDCs are based on human factors engineering principles, and practical examples are included in the resource binder. For example, a report of a usability test for an IDC process and a checklist for a PCA infusion pump are provided. The survey results indicate that Ontario hospitals are implementing IDCs with PCA and other infusion pumps (Figure 6).

The follow-up survey also provided Ontario hospitals with the opportunity to provide further information about changes they had made or were in the process of making. Ninety-four Ontario facilities provided qualitative comments, 80% of these indicating they have made or are in the process of making *multiple* changes. Most frequently identified changes relate directly to the ISMP Canada recommendations and the practical strategies that were highlighted in the opioid resource binder. These include revision of narcotic administration records to incorporate safe design principles; reduction in numbers of opioid stock items in patient care areas; reorganization of patient care area opioid stock; standardization of opioids used for pain management; and enhanced differentiation of long- and short-acting opioid oral products at the point of selection. Many of the respondents’ comments provided insight into the specific changes being made:

Dedicated education time for nursing on pilot units related to narcotic and patient safety; 4 hour education sessions for more than 2000 hospital staff.

Hydromorphone 10 mg/mL only on one nursing cart and clearly labelled “high potency for palliative patients.”

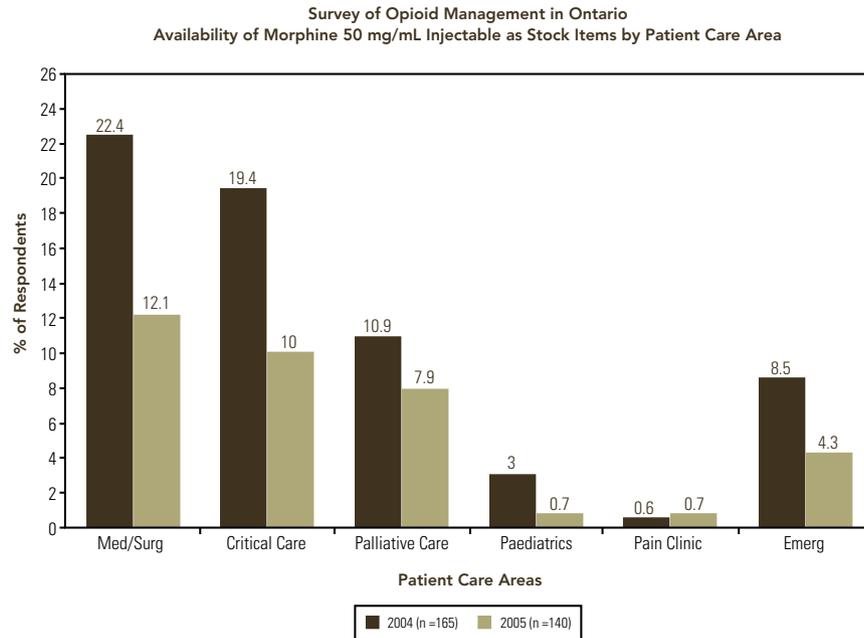
Increased frequency of narcotic delivery to daily to alleviate nursing concern of running out of stock (narcotic requisition trial).

Purchasing narcotics in unit dose where possible, i.e., control packs – it is safer than scanners and less chance of error.

Narcotic safety working group established and currently working on issues around storage, labelling, distribution, education.

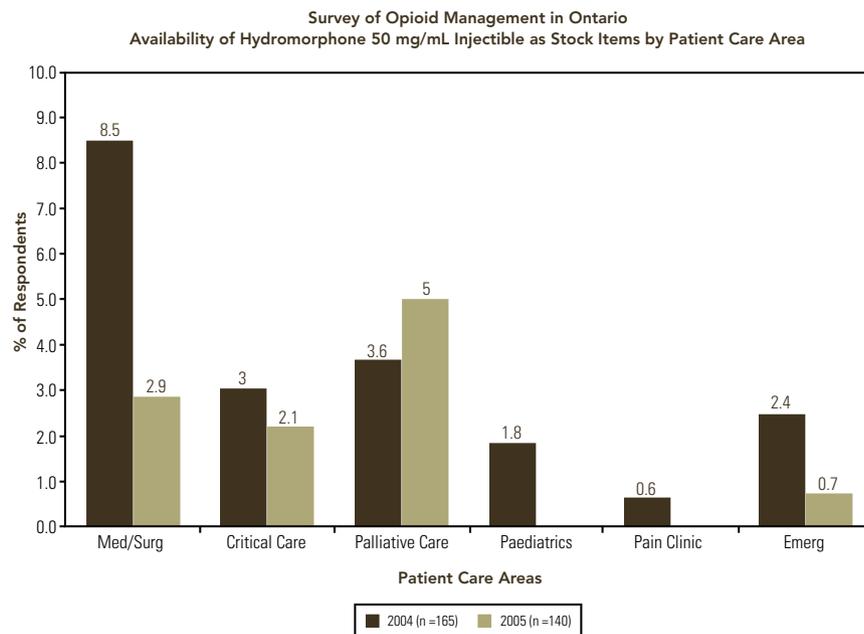
Interpretation of the Ontario results is limited by the nature of the project and the survey methodology: the hospitals responding to the survey were de-identified, making it impossible to know how many hospitals participating in the repeat survey had participated in the initial survey. In addition,

Figure 2. Change in availability of morphine 50 mg/mL (injectable) as stock in patient care areas in Ontario hospitals



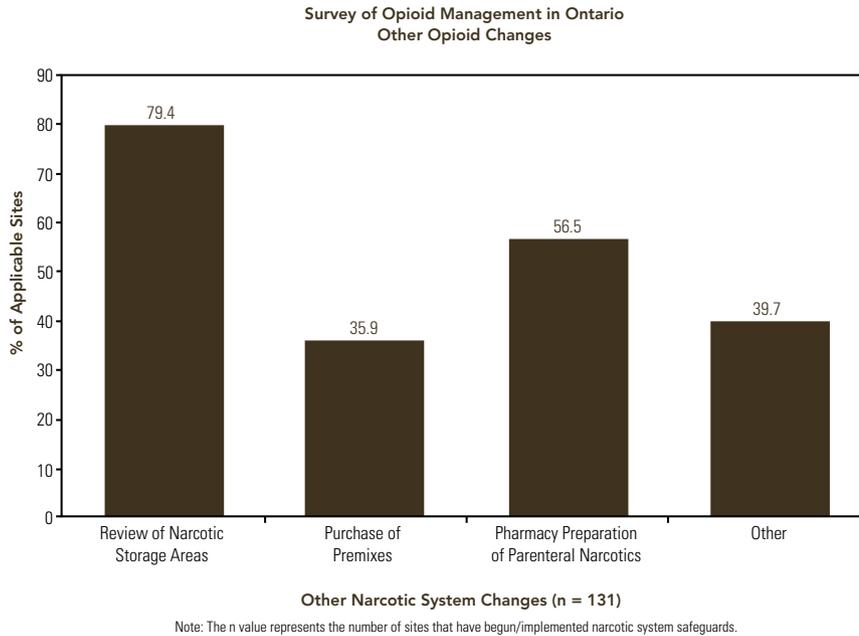
Source: Used with permission from Institute for Safe Medication Practices Canada.

Figure 3. Change in availability of hydromorphone 50 mg/mL (injectable) as stock in patient care areas in Ontario hospitals



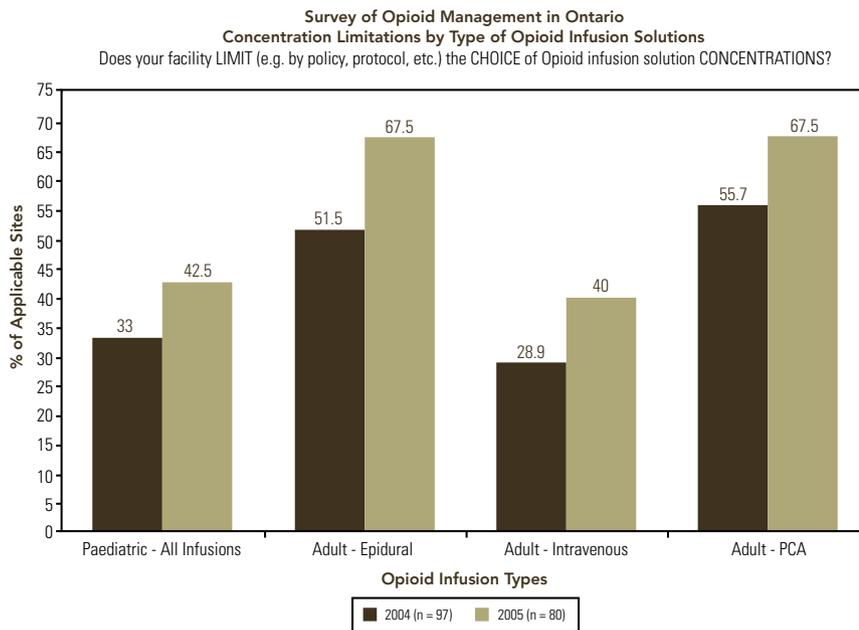
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Figure 4. Strategies in Ontario hospitals to reduce availability of higher-potency opioids in patient care areas

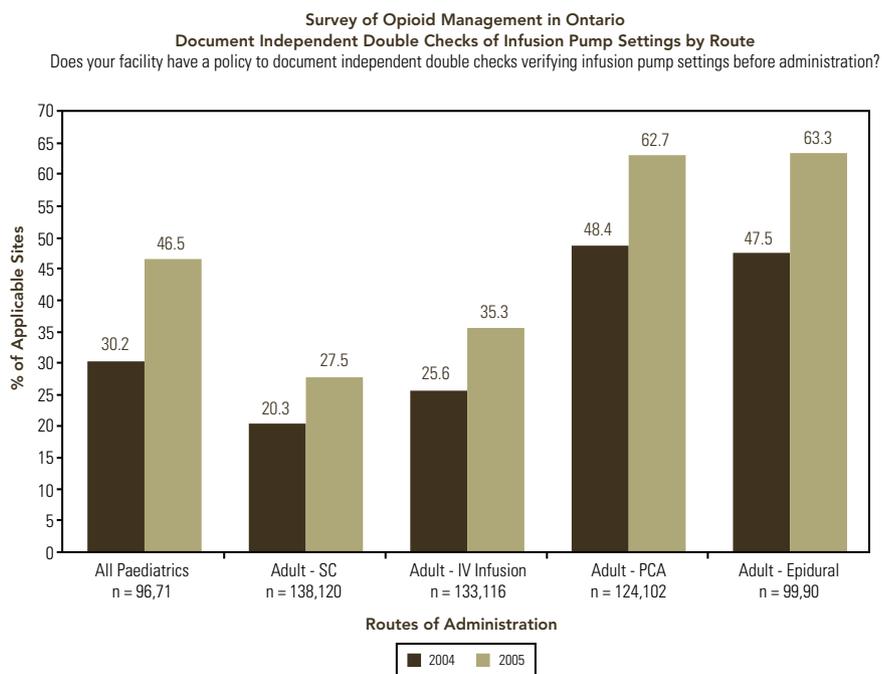


Source: Used with permission from Institute for Safe Medication Practices Canada.

Figure 5. Change in limitation of narcotic solution concentrations by Ontario hospitals (standardization)



Source: Used with permission from Institute for Safe Medication Practices Canada.

Figure 6. Comparison of baseline and follow-up surveys: policy to document independent double-check of infusion pump settings in Ontario hospitals

Note: The n value for each bar represents the number of sites that did not answer 'N/A' for the corresponding route in question 8b.

Source: Used with permission from Institute for Safe Medication Practices Canada.

respondents' interpretation of the questions might have varied, information was provided voluntarily and the accuracy of the information was not verified through other means. However, the comparisons between the baseline and follow-up survey responses and the qualitative responses provide an overview of opioid use in Ontario hospitals indicating positive changes are being made.

Alberta Opioid Safety Project

Building on the Ontario MSSS project, the Health Quality Council of Alberta and the Alberta regional directors of pharmacy, assisted by ISMP Canada, began work on opioid safety as part of the Alberta Medication Safety Collaborative in 2005. A preliminary survey of opioid practices was conducted in July and August 2005. Many of the opportunities identified in the Ontario project were also identified as priority areas in Alberta (e.g., reducing availability of higher-potency opioids and standardization of opioid solutions). At a May 2006 workshop, representatives from all Alberta health regions unanimously chose opioid safety as a top priority from a list of medication safety initiatives. A follow-up survey to measure changes in practice in Alberta is anticipated.

Conclusions

Opioids are potentially lethal, commonly prescribed high-alert medications that are widely available as floor stock in hospitals. Many opioid products have look-alike packaging and labelling, and they may require complex administration procedures. Ontario and Alberta have taken decisive steps to improve system safety related to the management of opioids in facilities. Comparison of Ontario baseline and follow-up survey responses indicate that changes are being made, but more remains to be done. The authors believe that the opioid project successes achieved to date are largely related to:

1. Multidisciplinary and province-wide partnerships and collaboration
2. Practical information, rationale for change and clear recommendations provided in an easy to use reference (binder), and presented at multiple workshops around the province
3. The province-wide Medication Safety Support Service collaborative model
4. Measuring outcomes based on pre- and post-survey responses related to opioid system best practices

Unlike the initiative to improve safety aspects of concentrated potassium chloride, enhancing safety with opioids is a broader and more complex issue. It involves an entire class of medications delivered by a variety of routes and methods, and thus requires greater multidisciplinary collaboration and longer-term efforts by multiple stakeholders, including the pharmaceutical industry. Other provinces are encouraged to focus on system-based safety initiatives for opioid use similar to those undertaken by Ontario and Alberta. There is great potential for healthcare providers across Canada to collaborate and share findings and resources to enhance patient safety through improved management of opioids.

To view Appendix see <http://www.longwoods.com/product.php?productid=18375&cat=452>

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