Evaluation of the Institute for Safe Medication Practices Canada (ISMP Canada) activities for the Canadian Medication Incident Reporting and Prevention System (CMIRPS)

Final Report
Executive Summary

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EXECUTIVE SUMMARY

Introduction

The Institute for Safe Medication Practices (ISMP) Canada is an independent, national not-for-profit organization committed to the advancement of medication safety in all health care settings. Its mandate includes analyzing medication incidents, generating evidence-based recommendations for preventing harmful incidents, and facilitating quality improvement initiatives. ISMP Canada is presently evaluating activities undertaken as part of its involvement in the Canadian Medication Incident Reporting and Prevention System (CMIRPS), a key program in which it engages to promote medication safety in Canada. The CMIRPS is a national, collaborative effort led by Health Canada, ISMP Canada, the Canadian Institute for Health Information (CIHI), and the Canadian Patient Safety Institute (CPSI), the main objective of which is to reduce the possibility of harm caused by preventable medication incidents by identifying potential problems before they occur and implementing the appropriate preventative strategies.

Program description

As CMIRPS is a collaborative effort, the roles and responsibilities specific to ISMP Canada that are covered in the evaluation are described in the table below.

ISMP Canada activities for CMIRPS	
Activity	**Brief description**
Support for, and collection of, medication incident data	*Individual Practitioner Reporting (IPR) System.* The IPR system allows for the direct and voluntary reporting of medication incidents by any individual practitioner across various health settings. *National System for Incident Reporting (NSIR).* ISMP Canada reviews and analyzes all data related to medication incidents in the the NSIR, CIHI's reporting system for health service organizations. *Consumer reporting.* ISMP Canada developed and is piloting a consumer reporting and learning strategy that involves a consumer website (www.SafeMedicationUse.ca), which includes a tool allowing consumers to report medication incidents. *Community Pharmacy Incident Reporting (CPhIR).* The CPhIR component provides an incident reporting tool better suited to the needs of community pharmacy practitioners (i.e., pharmacists and technicians).
Analysis and development of evidence-based interventions/ solutions	*Prioritization of incidents.* The decision of what analyses to conduct is determined by the CMIRPS analysis framework and prioritization matrix, which considers the actual and potential severity of the event and the likelihood of recurrence. *Incident analyses/ cluster analyses of aggregate data.* ISMP Canada reviews and analyzes all data related to medication incidents, and conducts cluster analyses of aggregate CMIRPS data, which can provide insight into systems failures and facilitate development of recommendations for safe practices in particular areas (e.g., types of medications). *Root Cause Analysis (RCA).* Also known as "in-depth analyses of critical incidents," RCAs

ISMP Canada activities for CMIRPS	
Activity	**Brief description**
	may be conducted to identify the factors leading to an adverse outcome. The focus of such analysis is on how systems and processes, rather than individuals, contribute to the event. *Consultation with experts.* ISMP Canada continually consults with subject matter experts in preparing ISMP Canada Safety Bulletins and developing evidence-based medication safety solutions.
Creating, updating, and maintaining programs and tools promoting safe medication practices	*Medication Safety Self-Assessment (MSSA) program.* As the name implies, the MSSA program is designed to assist health care organizations in evaluating the safety of their medication systems by identifying areas requiring improvement, and developing strategies for systems enhancement. *Root Cause Analysis (RCA) framework.* ISMP Canada supports health care organizations in developing the capacity required to conduct their own RCAs by participating in the development and updating of an RCA framework. *Failure Mode and Effects Analysis (FMEA) framework.* While an RCA is a method to find the cause of past incidents, FMEA is a prospective effort to identify potential system weaknesses and develop appropriate preventative strategies. ISMP Canada has developed an FMEA framework for health care processes. *Look-alike, sound-alike drug name framework.* ISMP Canada is working with national and international experts to develop a framework for the assessment of look-alike, sound-alike drug product names. *Draft framework for safe practices in labelling and packaging.* ISMP Canada is currently engaged in developing a framework to guide safe practices in labelling and packaging of these drug products, which involves forming an EAP, as well as conducting stakeholder outreach.

ISMP Canada activities for CMIRPS	
Activity	**Brief description**
Supporting adoption of safe medication practices through knowledge translation	*Publishing in peer-reviewed journals.* ISMP Canada shares recommendations and lessons learned through publication in peer-reviewed journals. *Safety bulletins, alerts, and newsletters for consumers and health care practitioners.* Safety bulletins and alerts are intended to disseminate the knowledge gained through the analysis of medication incident reports, thereby raising awareness around specific medication incidents and strategies to prevent similar incidents. *Social media/networking.* ISMP Canada has begun to incorporate the use of social media to promote its consumer activities, and has established both a Twitter account and Facebook fan page to promote the consumer website and to announce postings and links to other items relevant to medication safety. *Media communication efforts.* ISMP Canada also communicates with the public through various conventional media, such as newspapers and magazines. *RCA and FMEA workshops, webinars, and presentations.* Medication safety workshops, webinars, and presentations are specifically designed to suit audience needs; typical audiences include representatives from acute and long-term care facilities, as well as community pharmacies. *Train-the-Trainer programs.* In addition to the one-day RCA workshops, ISMP Canada offers a Train-the-Trainer educational program, leading to further dissemination of RCA teachings as participants take their knowledge back to their organizations. *Online educational materials.* A large volume of educational content, including downloadable materials, is available on ISMP Canada's organizational website (www.ismp-canada.org), as well as its consumer site (www.SafeMedicationUse.ca) and the CMIRPS-specific site (www.cmirps-scdpim.ca) administered by the CMIRPS Coordinating Group (CCG). *Responses to email and telephone queries.* ISMP Canada serves as a resource to health care institutions and practitioners (and occasionally to the public) for information about medication safety issues and prevention strategies. Stakeholders can email or phone ISMP Canada and staff will assist them. *Development and dissemination of evidence-based interventions.* This activity aims to facilitate the uptake of safe medication practices by providing information and tools to help organizations or practitioners overcome barriers to implementation.
Promoting and supporting consultation and collaboration	*Identification of potential partners; Memoranda of Understanding/partnership agreements; partnerships/action plans; dissemination/ implementation plans.* As the name suggests, this involves collaborating with stakeholders to enhance medication system safety. ISMP Canada currently has MOUs or agreements with a wide range of stakeholders. *CMIRPS Coordinating Group (CCG).* The CCG consists of Health Canada, ISMP Canada, CIHI, and CPSI. The Group supports communication and collaboration between agencies and promotes common goals for reporting and learning activities. ISMP Canada has chaired the CCG since July 1, 2010, coordinating strategic direction and providing some administrative support.

Methodology

KEY POINTS

- This evaluation assesses the relevance, implementation, effectiveness, and performance of CMIRPS activities carried out by ISMP Canada between FY 2010–11 and 2011–12, inclusive, highlighting program achievements and identifying challenges and lessons learned.
- The evaluation drew on several lines of evidence, including document, literature, and administrative data reviews; case studies; key informant interviews; and stakeholder surveys.
- The response to the stakeholder survey was particularly strong, with more than 911 respondents, including 71 hospital administrators.

This evaluation drew on several lines of evidence, including:

- A review of pertinent documents and administrative data provided by ISMP Canada, as well as pertinent literature.
- Case studies of three activity areas in which ISMP Canada is involved, each of which included interviews with three individuals familiar with ISMP Canada's work in those areas (for a total of nine interviews), as well as a review of relevant documents and literature.
- Key informant interviews with a total of 23 individuals, consisting primarily of external stakeholders, and including representatives of national and provincial patient safety organizations (including those with which ISMP Canada has memoranda of understanding), individual health care facilities, the pharmaceutical industry, and Candian and international subject matter experts.
- Stakeholder surveys. A total of 911 stakeholders participated in one of two surveys carried out from July 25 to August 17, 2012, inclusive (n = 662) and from October 1 to October 19, 2012, inclusive (n = 249). All provinces and many practice settings were represented among the respondents, who, as shown below, included many types of health care professionals:

Please indicate which of the following best describes your current position.		
	(n=911)	% - 2012
Nurse/nurse practitioner	309	34%
Pharmacist	240	26%
Hospital executive/administrator	71	8%
Risk manager	40	4%
Patient safety—coordinator/manager/specialist	37	4%
Director/administrator of resident/long-term care	33	4%
Administration/senior manager/executive	31	3%
University/college faculty	28	3%
Pharmacy technician	23	3%
Physician	19	2%
Consultant/analyst/specialist	18	2%
Representative of pharmaceutical industry	13	1%
Senior government official	10	1%
Consumer	9	1%
Representative of professional association	8	1%
Student	6	1%
Anaesthesiologist	3	<1%
Coroner	2	<1%
Registered respiratory care practitioner	2	<1%
Other	9	1%
Source: Survey of stakeholders. **Note:** Percentages may not sum to 100% due to rounding.		

The present evaluation builds on a previous evaluation conducted by PRA on behalf of ISMP Canada in 2010; while the earlier work focused primarily on the impact and value for money of ISMP Canada's CMIRPS activities undertaken up until that time, this evaluation assesses the relevance, implementation, effectiveness, and performance of CMIRPS activities carried out between FY 2010–11 and 2011–12, inclusive, while highlighting program achievements and identifying challenges and lessons learned. Where applicable, the present work drew on the results of the earlier evaluation to examine trends of interest.

The primary challenge encountered while carrying out the evaluation related to measuring ISMP Canada's impact on its long-term and ultimate outcomes (i.e., reduction in and prevention of harmful medication incidents in Canada, improved quality of care and patient outcomes, and reduced costs associated with harmful medication incidents and increased sustainbility of the health care system). The quantity and quality of data required to examine such relationships quantitatively is not available and would be extremely resource-intensive to collect. However, even if such data were available, it would be methodologically challenging to attribute changes in outcomes of interest to CMIRPS-funded activities, due to the many factors influencing medical practice and patient safety in Canada. It is critical to emphasize that such a challenge of linking organizational activities to long-term outcomes is quite common in evaluation.

Relevance

KEY POINTS

- Medication errors are widespread in Canadian health care; harmful errors can significantly affect patient health outcomes, and the cost and quality of health care delivery.
- ISMP Canada contributes to addressing barriers encountered by health care organizations in implementing medication safety improvements by: collecting and analyzing data about medication incidents; developing recommendations and evidence-based solutions to address safety issues; and offering knowledge products and services which share learning and tools with stakeholders.
- Nine in ten survey participants (90%) responded that there is convincing evidence of an ongoing need for ISMP Canada activities; this represents the opinions of stakeholders from across the continuum of health care delivery, from decision makers through to front-line workers responsible for the delivery of care to patients.
- ISMP Canada's CMIRPS activities align well with Health Canada and federal priorities.

It is well-documented that medication errors are widespread in Canadian health care, and that some harmful errors can significantly affect patient health outcomes, as well as the cost and quality of care delivery. However, health care organizations commonly experience barriers to implementing medication safety improvements, such as scarcity of resources, lack of awareness, lack of understanding or engagement, and real or perceived cultures of blame that may result in hesitation to report medication errors. Additionally, current economic conditions may be significantly reducing opportunities for knowledge transfer and diffusion of innovations in patient safety. Most health care organizations would not, by themselves, be able to maintain the expertise and network of contacts necessary to generate such products and services, but even if they did, the result would likely be considerable overlap and duplication.

A large majority of stakeholders believe there is an ongoing need for ISMP Canada and its CMIRPS activities, with many referring to ISMP Canada's unique leadership and expertise in the field of medication safety, and the absence of other organizations providing similar products and services. This is clearly demonstrated by the stakeholder survey, in which nine in ten stakeholders (90%) responded that there is convincing evidence of an ongoing need for ISMP Canada activities. This evidence represents the opinions of stakeholders from across the continuum of health care delivery, from decision makers through to front-line workers responsible for the delivery of care to patients.

ISMP Canada addresses barriers to the implementation of medication safety improvements by focusing on collecting information about medication incidents from a large number and wide variety of stakeholders, analyzing and interpreting the results, collaborating with experts and stakeholders to develop recommendations and evidence-based solutions, and disseminating learnings to health care practitioners and consumers through a variety of channels. ISMP Canada's approach to medication safety is consistent with the patient safety literature, which

encourages addressing medication incidents by focusing less on the failure of individuals than on the shortcomings of the system in which they operate — that is, by focusing on designing systems for medication prescription, dispensing, administration, and use in which errors are less likely to occur.

ISMP Canada's CMIRPS activities align well with Health Canada and federal priorities. The 2010 Speech from the Throne explicitly referred to the health and safety of Canadians as a priority for the federal government — to which reducing medication errors is intended to contribute. In addition, ISMP Canada's CMIRPS activities contribute to the Strategic Outcomes presented by Health Canada in its last three annual Reports on Plans and Priorities (RPPs) (i.e., "[an] accessible and sustainable health system responsible to the needs of Canadians", "access to safe and effective health products and food and information for health choices") by, for example, reducing the frequency of preventable adverse drug events, supporting health system planning, increasing stakeholder awareness and understanding of the impact of medication safety on the quality and sustainability of the health care system, and stimulating adoption of new approaches and best practices in the health care system. The 2002 establishment of the National Steering Committee on Patient Safety (NSCPS) and the 2003 Accord on Health Care Renewal also demonstrated the commitment of both federal and provincial governments to patient safety in general, and to an approach including elements that are also characteristic of CMIRPS, such as the adoption of non-punitive reporting policies.

Implementation

KEY POINTS

- Resources provided by Health Canada in FY 2010–11 and 2011–12 were commensurate to intended CMIRPS activities, which were generally implemented as planned during the evaluation period.
- While it already does this well, a key success factor for ISMP Canada is continuing to develop recommendations and tools that enable stakeholders to overcome the barriers faced by the latter in implementing medication safety improvements in health care settings.
- ISMP Canada has developed a variety of mechanisms that help support efficient and effective CMIRPS delivery; for example, by employing a combination of a full- and part-time staff, as well as consultants and students; involving its senior leadership team in managing projects; and maintaining a favourable work environment, it contains labour and infrastructure costs, maintains organizational flexibility, and ensures retention of knowledge and expertise.

In general, ISMP Canada's CMIRPS activities were implemented as planned during the evaluation period. Where activities are known not to have been carried out as planned, this result was primarily attributable to factors over which ISMP Canada has limited control. For instance, ISMP Canada's inability to respond to the planned number of public and health care practitioner inquiries in FY 2011–12 was entirely attributable to the lower-than-anticipated number of information requests it received in that year; similarly, planned consultative forums with stakeholders related to the development of a framework for the assessment of look-alike and sound-alike (LA/SA) product names could not be carried out before the end of FY 2011–12 due to postponement by Health Canada. The evaluation found that resources provided in FY 2010–11 and 2011–12 were fully allocated to CMIRPS activities, and that ISMP Canada managed all divergences by reallocating funding internally. Combined with the finding that CMIRPS activities were generally implemented as planned during the evaluation period, this suggests that resources provided by Health Canada were commensurate to the planned activities, in the sense that the funding allocated to ISMP Canada was not more than required to generate the desired outputs.

As with any new initiative or program, the uptake of recommendations and guidelines by the health care system stakeholders depends on the extent to which the latter can address such barriers as human and financial resource constraints and organizational resistance to change. It is important to note that much of ISMP Canada's work involves identifying such barriers and evidence-based interventions and solutions that seek to address them. Moreover, the existence of barriers does not necessarily imply a lack of success in implementing patient safety improvements; this is particularly true of large-scale, complicated safety solutions requiring long-range planning and foundational work to make the broad system-wide changes needed to achieve significant improvements in medication safety.

ISMP Canada has developed a variety of mechanisms that help support efficient and effective CMIRPS delivery by formalizing and standardizing the organization's activities; it is also noteworthy that ISMP Canada develops and revises policies and procedures using ISO 9001 templates and frameworks. ISMP Canada has sought to contain labour and infrastructure costs while increasing organizational flexibility by employing a combination of a full- and part-time staff, as well as consultants and students, and by involving the members of ISMP Canada's senior leadership team in leading projects. In addition, maintaining a favourable work environment has helped ensure retention of knowledge and expertise by minimizing staff turnover.

Effectiveness

KEY POINTS

- Use of CMIRPS reporting mechanisms rose significantly over the evaluation period, with the annual volume of reports increasing 112% from FY 2009–10 to 2011–12.
- ISMP Canada's CMIRPS activities have generated many recommendations, safety solutions, and evidence-based interventions, including 109 recommendations for health system improvements, 21 manufacturer commitments to enhance product packaging and labelling, and a framework for the assessment of look-alike and sound-alike product names.
- Several lines of evidence suggest high and increasing awareness of medication safety activities; for example, at least nine in ten stakeholders are aware of a wide range of ISMP Canada's activities, such as consumer newsletters and alerts (94%), incident reporting by practitioners (97%), and ISMP Canada Safety Bulletins and Alerts (99%).
- Three quarters or more of survey respondents believe CMIRPS activities have helped reduce or prevent harmful medication incidents (75%) and have improved quality of care and patient outcomes (77%), while at least half (52%) believe it has reduced costs and promoted the sustainability of the health care system.
- ISMP Canada has successfully established itself as a key partner in medication safety, as evidenced, for example, by the large number of agreements, consultations, and collaborations maintained with other health care organizations, as well as by references to ISMP Canada and CMIRPS by academic or professional journals/publications.
- ISMP Canada has succeeded in expanding the scale of its CMIRPS activities (e.g., larger stakeholder contact lists and higher levels of incident reporting), but more data is needed to assess whether an expansion of scope has also occurred.
- ISMP Canada products and services are widely used by health care system stakeholders, many of whom have also adapted health care policies, practices, or standards based on ISMP Canada recommendations; for instance, nearly three quarters of respondents reported that they (73%) or their organizations (74%) had implemented specific medication safety practice improvements based specifically on ISMP Canada recommendations or tools.
- ISMP Canada has contributed to integration of efforts to promote safe medication practices through extensive collaboration with other health care organizations and direct involvement in most national medication safety initiatives. Its specialization in the area of medication safety means its activities are unlikely to duplicate those of other organizations.
- While the evaluation was not able to precisely estimate program impact, many health care stakeholders believe CMIRPS-funded activities have contributed to ISMP Canada's longer-term and ultimate program outcomes.
- A review of the academic literature suggests that even a small reduction in the frequency of medication incidents would generate savings to the health care system easily exceeding the costs to Health Canada of funding ISMP Canada's CMIRPS activities.

Immediate outcomes

Increased reporting of medication incidents by health care professionals, consumers, and patients is an important outcome because it provides ISMP Canada with data required to understand some of the factors contributing to these incidents and to design evidence-based interventions and solutions to address them. Given that many health care practitioners have access to other reporting systems, their use of CMIRPS for reporting medication incidents is also significant in that it generally reflects their relationship between them and ISMP Canada.

Use of CMIRPS reporting mechanisms rose significantly over the evaluation period, as evidenced by an increase in the annual volume of medication incident reports received by ISMP Canada from 10,670 in FY 2009–10 to 22,689 in 2011–12 (i.e., an increase of 112%). This outcome is primarily due to a significant increase in the volume of reports from the Community Pharmacy Incident Reporting (CPhIR) program, which accounted for less than 1% of all reports received in FY 2009–10 (the year in which the program was introduced) but for more than half of all reports in FY 2011–12. It is also noteworthy that nearly nine in ten stakeholders (88%) reported that their organizations have either formal policies or expectations around reporting or providing information about medication incidents. Increasing adoption of medication incident reporting may be attributable in part to efforts by ISMP Canada to market the CMIRPS reporting mechanisms over the evaluation period.

ISMP Canada's CMIRPS activities have generated a range of recommendations, safety solutions, and evidence-based interventions over the evaluation period, stemming in large part from findings from incident analyses and aggregate analyses, but also from other sources, such as root causes analyses (RCAs). A review of ISMP Safety Bulletins identified 109 recommendations for health system improvements aimed at preventing harmful medication incidents between FY 2010–11 and 2011–12. In addition, ISMP Canada secured 21 manufacturer commitments to enhance health product packaging and labelling, and provided assistance with RCAs on seven occasions. ISMP Canada has sought to facilitate the uptake of medication safety interventions by developing tools such as the Inventory for Medication Safety Interventions for Intensive Care Units (IMSI-ICU), which will enable university and community hospital ICUs to assess how successfully they have integrated evidence-based practices to improve medication safety, and a framework for the assessment of look-alike and sound-alike (LA/SA) product names.

The stakeholder survey found that a large majority of stakeholders are highly aware of many of ISMP Canada's CMIRPS activities; since these activities are intended to share information and knowledge of medication incidents and safe medication practices, this finding suggests that ISMP Canada is contributing to awareness and understanding of medication safety issues and evidence-based safety practices. At least nine in ten stakeholders are aware of ISMP Canada's activities around development and implementation of medication product improvements (90%) and medication safety practice improvements (94%), medication safety workshops and webinars (94%), and consumer newsletters and alerts (94%). Nearly all respondents were at least somewhat aware of incident reporting by practitioners (97%) and ISMP Canada Safety Bulletins and Alerts (99%). Awareness of certain activities (e.g., medication safety workshops

and webinars, medication safety practice and product improvements) appears to have increased moderately since the 2010 evaluation.

Increased awareness of ISMP Canada activities (including its CMIRPS activities), as well as greater awareness and understanding of medication safety issues and evidence-based safety practices is also suggested by:

- marked increases in traffic on ISMP Canada's consumer site over the evaluation period, as well as an increasing volume of Safety Bulletin and other downloads;
- feedback from workshops and webinars, which suggests that many participants find these activities valuable and acquire new knowledge; and
- survey results indicating that ISMP activities have facilitated the identification of medication safety issues and the identification, development, and implementation of potential solutions by more than four in five health care system stakeholders.

Although the evaluation results generally suggest increased stakeholder awareness and understanding of medication safety issues and evidence-based safety practices, several interviewees suggested this may vary between different groups of health care practitioners, different health care settings, and potentially different parts of the country. This observation is supported by some of the results from the stakeholder survey, which found slight differences in awareness and understanding across health care settings and professions. For example, the findings suggest nurses may have relatively lower levels of awareness of ISMP Canada activities than pharmacists or hospital executives/administrators; similarly, awareness may be somewhat higher in teaching hospitals than in long-term care (LTC) facilities and higher still in community hospitals.

The evidence suggests that ISMP Canada has been successful in establishing itself as a key partner in medication safety. This conclusion is supported by the large number of agreements, consultations, and collaborations maintained by ISMP Canada with a wide range of other organizations in the health care sector on medication safety issues and its participation in dozens of collaborative projects over the evaluation period. Other evidence of recognition of ISMP Canada as a key partner in medication safety includes increasing traffic to the consumer website and consumer engagement in social media activities, as well as a multitude of references to ISMP Canada and/or CMIRPS by academic or professional journals or publications. Furthermore, interviewees generally describe ISMP Canada as a key partner in medication safety due to its leadership, expertise, and reputation as a credible, respected, and reliable source of information on medication safety.

Intermediate outcomes

ISMP Canada has succeeded in expanding the scale of its CMIRPS activities, as reflected, for example, in larger stakeholder contact lists, significantly higher levels of incident reporting, increasing trends in downloads (and web traffic on the consumer website), greater awareness

of its activities, increased numbers of webinars provided, and explicit reference to ISMP Canada and/or its products and services in dozens of academic journal articles, conference papers, and presentations, both within Canada and in other countries. As regards expansion of scope, it is not possible to draw conclusions on the basis of the available evidence; although many ISMP Canada products and services are currently being delivered and used outside Ontario and beyond the hospital setting (such as consumer and community pharmacy incident reporting), more data would be required to assess whether this reflects a significant change relative to the time preceding the period considered in this evaluation. For future evaluations, it might be advisable for ISMP Canada to systematically collect data pertaining to efforts to expand the scope of its activities; for example, future performance reports to Health Canada might include a separate section listing pertinent activities and describing their outcomes.

Several lines of evidence indicate widespread use by health care system stakeholders of ISMP Canada products and services, as well as adoption of changes to health care policies, practices, or standards based on ISMP Canada recommendations. For instance, results from the stakeholder survey indicate that:

- Half or more of respondents' organizations use MSSA modules (53%) and the FMEA and RCA frameworks (53% and 57%, respectively), while three quarters have participated in medication safety workshops and webinars (75%). More than nine in ten (91%) receive bulletins and alerts from ISMP Canada. Participation in several of these activities has increased markedly since 2010.

- At least half of respondents attributed changes in their organizations' policies, practices, processes, or standards to conducting MSSAs (52%) and to using the RCA and FMEA frameworks (54% and 57%, respectively), as did nearly six in ten (58%) stakeholders with respect to incident reporting. More than three quarters (77%) of respondents attributed changes to ISMP Canada's Safety Bulletins and alerts.

- Nearly three-quarters of respondents reported that they (73%) or their organizations (74%) had implemented specific medication safety practice improvements based on ISMP Canada recommendations or tools, which is significant in that it illustrates a link between ISMP Canada activities and behavioural changes on the part of health care practitioners, which would be expected to reduce the likelihood of medication incidents.

- Four in five (80%) respondents indicated that their organizations had made changes to health care policies, practices, processes, or standards based on specific ISMP Canada recommendations or considerations related to dangerous abbreviations/symbols/dose designations; similarly, at least half of respondents' organizations had made changes due to ISMP Canada recommendations and considerations related to narcotic/opioid agents (65%), heparin products (60%), concentrated potassium chloride (KCl) (57%), and insulin (51%).

It is important to recognize that these results significantly understate the true impact of ISMP Canada activities, recommendations, and/or considerations, because the former are not

necessarily applicable to all organizations responding to the survey;[1] for instance, focusing solely on the subset of respondents to which recommendations related to concentrated potassium chloride actually apply increases the proportion of respondents reporting changes to organizational policies, practices, processes, or standards from 57% to 76%.

In addition to the above, documentary evidence indicates that ISMP Canada products, tools, and recommendations have significantly affected Accreditation Canada's standards and Required Organizational Practices (ROPs), with which participating health care institutions (288 in 2011) must comply to be accredited. Annual reporting from Accreditation Canada shows compliance by participating institutions with most ROPs to be both strong and increasing with time.

The evaluation found that ISMP Canada has been successful overall in integrating its efforts to promote safe medication practices with other organizations. This is evidenced by the existence of an extensive collaborative network with pan-Canadian organizations, national professional organizations, government departments/agencies, and international organizations, which demonstrates a clear effort to create synergies and avoid duplication. ISMP Canada is directly involved in most, if not all, initiatives carried out at the national level which pertain to medication errors, implying that its activities primarily or even wholly complement rather than duplicate these activities. Its unique expertise with respect to medication errors significantly reduces the likelihood of duplication with the activities of other organizations. Aside from reducing the need for each institution or jurisdiction to individually collect incident reports and disseminate learning, CMIRPS increases national awareness of the occurrence of rare but potentially harmful incidents that would otherwise be limited to a subset of institutions or jurisdictions experiencing them first-hand.

Long-term and ultimate outcomes

Stakeholder survey results suggest three quarters (75%) of respondents believe that participation by their organizations in ISMP Canada activities has contributed to a reduction in the occurrence of harmful medication incidents. One reason for this belief may be the perception by more than eight in ten stakeholders (a marked increase over 2010) that participation in ISMP Canada activities had enabled their organizations to more effectively recognize potential medication safety problems and to identify, develop, and implement preventative strategies.

Some interviewees also stated that although it would be very difficult to estimate the impact of CMIRPS-funded activities on the reduction and prevention of harmful medication incidents, it is entirely reasonable to expect that the activities would have this effect. A few offered anecdotal evidence that higher awareness of particular medication safety issues or implementation of ISMP Canada recommendations had enabled them to prevent some medication errors.

[1] For example, medication safety practices would not be expected to directly affect the policies, practices, processes, and standards of Canadian universities or government departments.

Slightly more than three quarters of survey respondents (77%) believed that participation in ISMP Canada activities had improved quality of care and patient outcomes, while just over half (52%) believed it had contributed to a reduction in costs associated with harmful medication incidents and to the sustainability of the health care system. As with the occurrence of medication incidents, many stakeholders argued that although the relationship would be very difficult to measure, it is entirely reasonable that participation in CMIRPS activities led by ISMP would affect quality of care, patient outcomes, and health care costs.

There is strong evidence to show that successfully reducing the frequency of medication incidents would improve both quality of care and patient outcomes; for example, over the evaluation period alone, ISMP Canada medication incident data records 1,144 cases of patient harm, including 38 deaths. In addition, the case studies provided several examples of how common medication errors can result in patient harm and/or death. A review of the academic literature also clearly demonstrates that even a small reduction in the frequency of medication incidents would generate savings to the health care system easily exceeding the costs to Health Canada of funding ISMP Canada's CMIRPS activities. Accounting for other considerations, such as productivity losses stemming from short- or long-term health impacts associated with medication errors, adds still more weight to this conclusion.

Efficiency and economy

KEY POINTS

- ISMP Canada has implemented several strategies to maximize efficient use of resources; for example, it employs approaches to staffing that minimize labour and infrastructure costs, and applies knowledge and expertise acquired from past work to inform the design and/or implementation of new projects or programs.
- ISMP Canada has succeeded in leveraging additional resources through its CMIRPS-funded activities, such as medication incident analyses, ISMP Canada Safety Bulletins, and the National Medication Reconciliation Strategy.
- The cost of ISMP Canada's CMIRPS activities between FY 2010–11 and 2011–12 ($2.4 million), plus the costs of making changes to the health care system to increase medication safety, are likely much less than the estimated value of averting premature deaths over the same period ($67.2 million).
- CMIRPS activities have brought value to health care stakeholders and to their respective organizations in several ways. There is considerable value for the federal government in maintaining this capacity to respond to or proactively address medication safety issues, an objective to which Health Canada's support for CMIRPS contributes.

ISMP Canada has implemented several strategies to maximize efficient use of resources, including drawing on a combination of full- and part-time staff, as well as consultants and students, and involving members of ISMP Canada's senior leadership team in leading projects. These strategies help to minimize labour and infrastructure costs. In addition, maintaining a favourable work environment has helped ensure retention of knowledge and expertise by minimizing staff turnover. Another example of the consideration of efficiencies is the application of a strategy employed by ISMP Canada whereby knowledge and expertise from one project or program is used to inform the design and/or implementation of other projects or programs, which improves effectiveness and reduces project costs.

There were many examples in which ISMP Canada's CMIRPS activities leverage resources from federal, provincial/territorial, and/or non-governmental sources. Medication incident analyses constitute one important leveraging mechanism, since they often identify medication safety issues and solutions which then become funded by other organizations. In addition, work funded by other bodies is often disseminated to CMIRPS target audiences through ISMP Canada Safety Bulletins and educational activities. Another example of leveraging is the National Medication Reconciliation Strategy, which has drawn support not only from Health Canada but also from a wide range of other stakeholders, including CPSI, the MOHLTC, Canada's Research-Based Pharmaceutical Companies, and Canada Health Infoway.

As in the previous evaluation, the analysis suggests that the cost of ISMP Canada's CMIRPS activities between FY 2010–11 and 2011–12 ($2.4 million), plus the costs of making the changes to the system (e.g., activities involved in diagnosing causes of the error, developing information bulletins, associated outreach, and changing practices), are likely much less than the estimated

value of averting premature deaths over this period ($67.2 million). Furthermore, these costs do not include the value of reducing the other costs of mitigating errors (intensive care and other hospital procedures, lost time at work, and effects on quality of life), and consider only a small number of medication error types.

Supplementing the value for money calculations, stakeholders also described several ways in which CMIRPS activities had brought value to them and to their respective organizations, such as increasing awareness and understanding of medication incidents and safety-based medication practices, and stimulating a culture shift towards increased accountability and prioritization of patient safety. From a regulatory standpoint, there is considerable value for the federal government in maintaining the capacity to respond to or proactively address medication safety issues, an objective to which Health Canada's support for CMIRPS contributes.

List of Acronyms	
Acronym	**Definition**
ACE	Antiotensin converting enzyme
ADE	Adverse drug event
AE	Adverse event
BLPA	Bureau of Licensed Product Assessments
BPMD	Best Possible Medication Discharge
BPMH	Best Possible Medication History
CACCN	Canadian Association of Critical Care Nurses
CAES	Canadian Adverse Events Study
CAPCA	Canadian Association of Provincial Cancer Agencies
CARN	Canadian Adverse Reaction Newsletter
CCG	CMIRPS Coordinating Group
CE	Continuing Education
CEC	Clinical Excellence Commission
CEO	Chief Executive Officer
CHUM	Centre Hospitalier de l'Université Montréal
CIHI	Canadian Institute for Health Information
CMA	Canadian Medical Association
CMIRPS	Canadian Medication Incident Reporting and Prevention System
CMPA	Canadian Medical Protective Association
COO	Chief Operating Officer
CPhIR	Community Pharmacy Incident Reporting
CPSI	Canadian Patient Safety Institute
CSA	Canadian Anesthesiologists Society
CSHP	Canadian Society of Hospital Pharmacists
DVT	Deep Vein Thrombosis
EAP	Expert Advisory Panel
FDA	Food and Drug Administration
FMEA	Failure Mode and Effects Analysis
FY	Fiscal year
GPSA	Global Patient Safety Alerts
HARM	Hospital Admissions Related to Medication
HCPCP	Health Care Policy Contribution Program
HIROC	Healthcare Insurance Reciprocal of Canada
HPFB	Health Product and Food Branch
HQCA	Health Quality Council of Alberta

List of Acronyms	
Acronym	**Definition**
IMSN	International Medication Safety Network
IPG	International Pharmacy Graduate
IPR	Individual Practitioner Reporting system
ISMI-ICU	Inventory of Medication Safety Interventions for the ICU
ISMP Canada	Institute for Safe Medication Practices Canada
ISOPP	International Society of Oncology Pharmacy Practice
LA/SA	Look-alike sound-alike
LTC	Long-term care
MOHLTC	Ministry of Health and Long-term Care (Ontario)
MOU	Memorandum of Understanding
MSSA	Medication Safety Self-Assessment program
MSSS	Medication Safety Support System
NHP	Natural health product
NMBA	Neuromuscular Blocking Agents
NPSF	National Patient Safety Foundation
NSAIDs	Nonsteroidal anti-inflammatory drugs
NSCP	Nova Scotia College of Pharmacists
NSCPS	National Steering Committee on Patient Safety
NSIR	National System for Incident Reporting
OCP	Ontario College of Pharmacists
ORNAC	Operating Room Nurses Association of Canada
PE	Pulmonary Embolism
PHAC	Public Health Agency of Canada
PSEP	Patient Safety Education Program
PSLS	Patient Safety & Learning System
RCA	Root Cause Analysis
ROP	Required Organizational Practice
RPP	Reports on Plans and Priorities
SHN	Safer Healthcare Now!
TBS	Treasury Board Secretariat of Canada
VTE	Venous thromboembolism
WHO	World Health Organization