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Rapid Review

Public Reporting of Healthcare-Associated Infections in Three Canadian Provinces

Prepared for Healthcare Excellence Canada

Bhatia D., Rodrigues A., Mauer-Vakil D., & Allin S.

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Contact Information

North American Observatory on Health Systems and Policies
155 College Street, Suite 425
Toronto, ON M5T 3M6

www.uoft.me/NAObservatory

naobservatory@utoronto.ca

nao_health

Table of Contents

List of Abbreviations

BSI	Bloodstream infection
CDI	*Clostridioides difficile* infection
CLABSI	Central-line associated bloodstream infection
CNISP	Canadian Nosocomial Infections Surveillance Program
CPE	Carbapenemase-producing enterobactieriaceae
CPO	Carbapenemase-producing organisms
DHW	Department of Health and Wellness
HAI	Healthcare-associated infection
IPAC	Infection prevention and control
IWK	Izaak Walton Killam Health Centre
LTC	Long-term care
MHSC	Manitoba Health and Seniors Care
MRSA	Methicillin-resistant *Staphylococcus aureus*
NSH	Nova Scotia Health
PHAC	Public Health Agency of Canada
PHHWG	Provincial Hand Hygiene Working Group
PHSA	Provincial Health Services Authority
PICNet	Provincial Infection Control Network of British Columbia
RHA	Regional Health Authority
VRE	Vancomycin-resistant enterococci bloodstream infections
WRHA	Winnipeg Regional Health Authority

Executive Summary

Healthcare-associated infections (HAI) are the most frequently reported patient safety incidents globally and in Canada. HAI surveillance, monitoring, and active feedback are the core components of effective infection prevention and control (IPAC) strategies. Public reporting may enable healthcare organizations to learn from each other, increase their accountability and transparency, and secure public trust. Specifically, public reporting may improve patient safety by guiding patients to select better-performing organizations (*selection pathway*), identifying areas for improvement for healthcare organizations (*change pathway*), and/or motivating healthcare organizations to engage in quality improvement to preserve their public image (*reputation pathway*).

Although public reporting of HAI information has been of interest in Canada for over two decades, reporting practices vary significantly across Canadian jurisdictions and few studies have attempted to examine and compare these practices in detail. To address this need, between March and July 2021, we conducted a rapid environmental scan to describe how public reporting of HAI information has been implemented as part of IPAC strategies in acute care and long-term care (LTC) settings in three Canadian provinces: British Columbia, Nova Scotia, and Manitoba. Individuals with IPAC expertise within these provinces were also contacted to validate the accuracy of findings.

Public reporting approaches varied between and within the selected provinces. We identified three main mechanisms for public reporting of HAI information: (i) publication of HAI indicators, including infection rates and hand hygiene compliance; (ii) publication of assessments of adherence to safety standards, including accreditation and LTC inspections; and (iii) publication of serious or critical incidents related to HAI. Legislation was often used to mandate public reporting within the three provinces, including HAI indicator reports in Nova Scotia, accreditation reports in Manitoba, LTC inspection reports in British Columbia, and serious or critical incidents in all three provinces. Few formal empirical evaluations have been conducted in Canada to investigate how public reporting may impact infection rates, patient and healthcare provider experiences, and quality improvement initiatives.

The following considerations have emerged from this rapid review to optimize HAI-related public reporting:

1. **Mandatory public reporting legislation** may help standardize reporting practices, including indicator types and definitions, reporting formats, and participating facilities.
2. The **expected mechanism of action for public reporting** appears to be organizational learning and engagement in quality improvement through greater accountability and transparency for the quality and safety of care provided, rather than patient choice of better performing organizations.
3. Staff and patients may be unaware of public reports of HAI information, which may hinder the ability of public reports to increase organizational learning. **Engaging patients and providers** in indicator development and formalizing public reports within learning and feedback systems may improve the visibility and usefulness of the reported information.
4. **High-quality empirical evaluations of public reporting** should be conducted in Canada. Making inferences directly from public reports is challenging due to the absence of pre-reporting data, lack of control groups, changing case definitions, and missing data. The impact of public reporting should also be considered within a broader suite of multimodal IPAC interventions.

Introduction & Background

Healthcare-associated infections (HAI) are the most frequently reported patient safety incidents globally (1). In Canada, approximately 1-in-9 patients develop an HAI during their hospital stay and the proportion of infections from antimicrobial-resistant organisms has increased in the past two decades (2,3). Facility-level, subnational, and national-level HAI surveillance, monitoring, and active feedback have been identified as core components of effective multimodal infection prevention and control (IPAC) strategies by systematic reviews and international guidelines; however, the quality of the evidence is low, and implementation has varied substantially across health system contexts (4,5).

Performance management is a principle of learning health systems that involves actively using data to improve an organization's or system's processes and outcomes (6). A learning system involves the continuous use of the following components: performance standards (expressing performance goals and targets), performance measures (indicators used to benchmark performance against targets), reporting of progress (documentation and reporting of performance measures and standards to enable learning and feedback), and quality improvement (acting on the reported information to improve performance) (6). Public reporting, defined as "data, publicly available or available to a broad audience… about a healthcare structure, process or outcome at any provider level" (7), is one approach to reporting performance within a learning health system. By reporting performance information, organizations can learn from each other, increase accountability and transparency, and engage the public to secure trust (8–12). In the context of patient safety, public reporting can guide patients to select better-performing organizations, thus incentivizing healthcare organizations to improve their performance (*selection pathway*); identify specific areas for improvement for healthcare organizations (*change pathway*); and/or motivate organizations to engage in quality improvement to preserve their public image (*reputation pathway*) (13).

In Canada, public reporting of HAI information has been of interest since at least the early 2000s, following high-profile HAI outbreaks (1,14). Nonetheless, the process for measuring and reporting HAI-related indicators varies across the country, thereby limiting national comparability and benchmarking (1,15). For instance, not all acute care and long-term care (LTC) facilities participate in the Canadian Nosocomial Infections Surveillance Program (CNISP)—a collaboration established in 1994 between the Public Health Agency of Canada (PHAC) and the National Microbiology Laboratory that focuses on standardizing the measurement and active surveillance of HAIs nationally (1,16). The 2014 National Infection Prevention and Control Summit, co-hosted by the Canadian Patient Safety Institute (presently, Healthcare Excellence Canada) and PHAC, re-emphasized the need for national HAI surveillance in acute care and LTC settings by releasing the *Canadian Infection Prevention and Control Action Plan* (17). In 2015, PHAC released the Federal Action Plan and Framework on Antimicrobial Resistance and Use in Canada, committing to strengthening pan-Canadian collaborations to improve HAI surveillance (18,19). The Pan-Canadian Advisory Committee for the Measurement and Surveillance of Healthcare Associated Infections was subsequently established with a mandate to explore options for improved collection, analysis, and reporting of HAI data.

In this context, this rapid review describes how public reporting of HAI information has been implemented as part of IPAC strategies for acute care and LTC facilities in three Canadian provinces: British Columbia, Manitoba, and Nova Scotia. This work provides foundational knowledge to support efforts to standardize subnational and national public reporting on HAI in Canada.

Methods

To describe the HAI public reporting mechanisms in acute care and LTC facilities in British Columbia, Manitoba, and Nova Scotia, we conducted an environmental scan of publicly available documents and academic literature. We used a multiple case-study approach, which is suitable for detailed exploration of the underlying mechanisms of identified phenomena and addressing "how"-type research questions (20).

Environmental Scan

Between March and April 2021, we performed targeted and iterative searches using bibliographic databases (e.g., Medline), search engines (e.g., Google/Google Scholar), and websites of key healthcare organizations in each jurisdiction (e.g., ministries of health, provincial legislature repositories, regional health authorities, and specialized agencies involved in health service delivery or IPAC). Search terms related to HAI, IPAC, quality, safety, performance, accountability, transparency, accreditation, standards, and benchmarking. In the analytic synthesis, we identified and summarized public reporting mechanisms for HAI-related information. We defined "public reporting mechanisms" as any reports of HAI processes, outcomes, or standards published by provincial health-related organizations (7).

Findings from the synthesis of academic and grey literature were presented on May 31, 2021 to the Pan-Canadian Advisory Committee for the Measurement and Surveillance of Healthcare Associated Infections, which has representation from IPAC professionals and scholars from across the country. Between June and July 2021, experts and IPAC practitioners from organizations involved in public reporting (Winnipeg Regional Health Authority, Provincial Infection Control Network of British Columbia, Nova Scotia Health, and Accreditation Canada) were also contacted by the research team to review and validate the accuracy of sections of this rapid review most relevant to their area of expertise.

Limitations

While public reporting may be linked to HAI surveillance, surveillance is a separate and distinct IPAC intervention. Thus, given the expedited nature of this rapid review, we considered an in-depth examination of HAI surveillance definitions, protocols, and guidelines to be out of scope. Furthermore, as we primarily relied on published sources or sources that could be accessed with academic credentials, we could not confirm whether the health authorities reviewed in this report collected additional HAI information internally (e.g., for surveillance), without publicly reporting it. Publicly available sources may also be incomplete or out-of-date with current practices. Indeed, since this study was conducted during the coronavirus disease (COVID-19) pandemic, IPAC practices have been evolving in healthcare facilities in real time. Although some HAI information may be reported at the national level, we focused on public reporting efforts undertaken within the selected provincial jurisdictions. In addition, as the environmental scan did not involve a systematic literature search, certain sources may have been missed despite our best efforts to comprehensively cover the evidence base. Finally, given the competing priorities of IPAC professionals during the COVID-19 pandemic, we were able to reach only a limited sample of relevant local experts, which may not be representative.

Analytic Overview

In this section, we describe the public reporting mechanisms for HAI-related information identified in the environmental scan; these include (i) HAI indicator reports; (ii) facility-inspection reports related to safety standards; and (iii) reports of critical incidents related to HAI. **Box 1** describes the relevant health authorities within each province. The HAI indicators publicly reported by each health authority in British Columbia, Nova Scotia, and Manitoba are summarized in **Table 1**, while the reporting mechanisms for HAI indicators, facility inspections, and critical incidents are outlined in **Table 2**. The main findings are presented below as a cross-case summary. Detailed case studies for each province are available upon request from the NAO.

Box 1. Overview of provincial context

British Columbia

- Central oversight: Ministry of Health (provincial ministry)
- Six health authorities accountable to the Ministry of Health (one provincial, five regional):
  - **Provincial Health Services Authority (PHSA)**: coordinates the delivery of health services province-wide through collaboration with regional health authorities; has its own IPAC department that performs surveillance among its healthcare facilities (i.e., British Columbia (BC) Children's Hospital, BC Women's Hospital, BC Cancer, and BC Mental Health and Substance Use Services); and oversees the Provincial Infection Control Network of BC, described below.
  - **Regional Health Authorities (Vancouver Coastal, Fraser, Interior, Island, and Northern)**: deliver health services in their respective geographic regions and oversee acute and LTC facilities, including their IPAC efforts.
- Provincial Infection Control Network of BC: a provincial program of the PHSA that works in partnership with IPAC departments of the six health authorities (provincial and regional) to develop and manage surveillance programs.
- First Nations Health Authority[1]: semi-independent agency responsible for delivering health and wellness services to over 200 First Nations communities across BC, in collaboration with the Ministry of Health.

Nova Scotia

- Central oversight: Department of Health and Wellness (provincial ministry)
- Two health authorities accountable to the Department of Health and Wellness:
  - **Nova Scotia Health**: delivers health services across four geographic zones (Western, Eastern, Northern, and Central).
  - **Izaak Walton Killam Health Centre:** delivers specialized and complex care services to women, children, youth, and families across Nova Scotia, as well as Prince Edward Island, New Brunswick, and Newfoundland and Labrador; has its own IPAC program.

Manitoba

- Central oversight: Manitoba Health and Seniors Care (provincial ministry)
- Five regional health authorities accountable to Manitoba Health and Seniors Care:
  - **Regional Health Authorities (Winnipeg, Northern, Interlake-Eastern, Prairie Mountain Health, and Southern Health)**: deliver health services in their respective geographic regions; oversee acute and LTC facilities, including their IPAC efforts.

[1] In 2013, the First Nations Health Authority took over responsibility for the health and wellness services formerly delivered federally, by Health Canada. However, this environmental scan of publicly available information and academic literature was unable to uncover the extent to which the First Nations Health Authority may participate in HAI public reporting in British Columbia.

HAI Indicator Reporting

Mandatory Reporting

In Nova Scotia, public reporting of select acute care-related HAI indicators became mandatory in 2012 through the *Act to Improve Patient Safety and Health Systems Accountability (Patient Safety Act)* and the *Patient Safety Reporting Regulations* (21,22). As recommended by the province's Quality and Patient Safety Advisory Committee – a forum of experts mandated to advise the Minister of Health and Wellness (23) – this legislation was created to implement a Quality and Patient Safety Framework, developed as part of the 2011–2016 Quality and Patient Safety Strategic Plan for a "systems approach to quality improvement" (23,24). After the completion of the Advisory Committee's two-year mandate, a Health System Quality branch was established within the provincial Department of Health and Wellness (DHW) to lead the quality improvement and patient safety agenda (23,24).

Provincial documents from Nova Scotia describe public reporting as a means to demonstrate a system-wide commitment to public accountability and transparency for the quality of care provided and to enable hospitals to learn from each other (23,25). The *Patient Safety Act* requires the Health System Quality branch of the DHW to develop surveillance protocols and indicator definitions, while health authorities (Nova Scotia Health [NSH] and the Izaak Walton Killam [IWK] Health Centre) must comply with these conditions (22). Presently, public reporting of hand hygiene compliance, *Clostridioides difficile infection* (CDI), central line-associated blood infections (CLABSI), and *methicillin-resistant Staphylococcus aureus* (MRSA) rates are required (**Table 1**), and the infection case definitions align with the 2015 CNISP guidelines (21,22,26). NSH and the IWK Health Centre report facility-level data, collected using standard data collection forms, to the DHW on a quarterly basis (25). The DHW then publishes these data, aggregated by zone (Western, Eastern, Northern, Central, and IWK Health Centre), on its website alongside the provincial average and the CNISP benchmarks (25). Standard wording accompanies the published data to clarify that HAI information is expected to help hospitals monitor their performance and is not intended to guide patients' choice of healthcare facility, as HAI rates may fluctuate due to random variation (25).

In British Columbia, in response to an auditor general report that identified inconsistencies in hand hygiene compliance, the British Columbia Provincial Hand Hygiene Working Group (PHHWG) was established by the Ministry of Health in collaboration with the six health authorities (Provincial Health Services Authority [PHSA] and five Regional Health Authorities [RHAs]) in 2010 to standardize practices (27). In addition, the Provincial Infection Control Network (PICNet), a program of the PHSA, has been collaborating with the Ministry of Health and the health authorities since 2009 to develop HAI case definitions and reporting protocols (28). According to local experts, PICNet is the primary HAI public reporting mechanism in British Columbia and, in alignment with Ministry of Health requirements[2], the six health authorities are mandated

[2] The British Columbia *Budget Transparency and Accountability Act* (2000) sets out the general legislative framework for planning, reporting, and demonstrating accountability for each provincial governmental organization (29,30). Under the Act, the Ministry of Health, the PHSA, and the RHAs are required to annually publish their service plans, outlining the strategic priorities, specific objectives, expected results, and performance relative to the forecasted targets documented in the previous fiscal year's service plan (29,30). The content of the annual reports is informed by the strategic direction of the Ministry of Health. However, the Act does not explicitly refer to public reporting of HAI information.

to submit their CDI, carbapenemase-producing organisms (CPO),[3] MRSA, and hand hygiene compliance rates for inclusion in PICNet public reports. The HAI rates published by PICNet are aggregated at the facility- and health authority-level, and CDI and MRSA rates are measured for acute care inpatients, while CPO and hand hygiene compliance rates are measured for both acute care and LTC facilities (as well as cases identified in outpatient and community care settings, which are beyond the scope of this report) (28,32). As case finding strategies, application of the provincial (PICNet) surveillance protocols, target populations, and participating acute care and LTC facilities vary between health authorities, PICNet reports discourage direct comparisons (28). The lack of adjustment for potential confounding factors further complicates direct comparisons in HAI rates between the authorities. PHSA and RHAs also publish facility-level HAI indicators through their own annual service reports, though the choice of indicators and participating facilities vary. According to local experts, all RHAs have agreed to include MRSA in their public reports.

Voluntary Reporting

The five-year *Manitoba Patient Safety Framework* was developed by the Manitoba Health and Seniors Care (MHSC) in 2015 to increase health system transparency and accountability, encourage continuous improvement of clinical services, and develop a "no-blame" safety culture (33). The measurement and reporting of HAI indicators was included among the framework's areas of focus (33). Specifically, public reporting of HAI rates was anticipated to (i) demonstrate accountability and transparency in the RHAs; (ii) stimulate quality-improvement activities; (iii) aid organizations in evaluating the effectiveness of quality-improvement efforts; and (iv) enhance the quality and safety of healthcare processes and outcomes by reducing infection rates (34). As described in the 2020 framework documents, a HAI Indicator Project Working Group was established to develop standardized data collection methodologies and case definitions aligned with CNISP to enable pan-Canadian benchmarking (34). According to a document dated January 2020, a staged pilot project was being considered, including reporting of CDI, carbapenemase-producing enterobactieriaceae (CPE), MRSA, and vancomycin-resistant enterococci bloodstream infections (VRE-BSI) rates to the MHSC and the public (34). However, local experts have noted that public reporting for HAI and hand hygiene information outlined in the Manitoba Patient Safety Framework has not yet been implemented province wide (as of June 2021) and it remains unclear when implementation may occur. As such, the Winnipeg RHA is currently the only RHA in Manitoba to participate in public reporting of HAI indicators (35,36) (**Table 1**).

[3] According to the BC *Public Health Act* (2018) (Reporting Information Affecting Public Health Regulation), CPO is considered to be a "prescribed infectious agent" that must be reported by health officials (i.e., health professionals, hospital administrators, or laboratory directors) to the RHA medical health officer upon suspected or confirmed diagnosis within healthcare facilities or in the community (31); however, this legislation does not appear to include explicit requirements to publicly report CPO cases occurring in healthcare facilities.

Table 1. Summary of HAI indicators reported in British Columbia, Nova Scotia, and Manitoba

Indicator	British Columbia								Nova Scotia	Manitoba					
	VCHA	FHA	InHA	IsHA	NHA	PHSA	PICNet	MOH	DHW	WRHA	SRHA	NRHA	IRHA	PRHA	MHSC
BSI	✓	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CLABSI	x	x	x	x	x	✓	x	x	✓	x	x	x	x	x	x
CDI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	✓‡
CPO/CPE	x	✓	x	✓	x	x	✓	x	x	✓	x	x	x	x	✓‡
GI	x	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x	x
HH	x	✓	✓	✓	✓	✓	✓	x	✓	✓	x	x	x	x	x
HWI	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x
IF	x	x	x	✓	✓	x	x	x	x	x	x	x	x	x	x
MRSA	x	✓	✓	✓	✓	✓	✓	x	✓	✓	x	x	x	x	✓‡
RI	x	✓	✓	✓	x	x	x	x	x	x	x	x	x	x	x
SSI	✓	x	✓	✓	✓	x	x	x	x	x	x	x	x	x	x
SSTI	x	x	✓	x	x	x	x	x	x	x	x	x	x	x	x
TB	✓	x	x	x	x	x	x	x	x	x	x	x	x	x	x
UTI	✓	x	x	✓	x	x	x	x	x	x	x	x	x	x	x
VAP	✓	x	x	✓	x	x	x	x	x	x	x	x	x	x	x
VRE/VRE-BSI	x	x	✓	x	✓	✓	x	x	x	✓§	x	x	x	x	✓‡

§ VRE was monitored between 2012–2016. Since 2016, VRE was no longer an organism that was managed with isolation or screening in Manitoba, and thus, was no longer monitored for. As such, only VRE-BSI surveillance has been ongoing across all RHAs since 2016 (37).

‡ Based on the planned Manitoba Patient Safety Framework (2015–2020) (33). As of June 2021, the Framework has not been implemented province wide and it remains unclear when implementation may occur.

Note: this table only displays the HAI indicators that are publicly reported by each province's health authorities; however, individual health authorities may perform surveillance for a broader set of HAI that are not publicly reported.

Abbreviations: bloodstream infections (BSI); central line-associated blood stream infection rates (CLABSI); carbapenemase-producing organisms (CPO); *Clostridioides difficile* infection (CDI); Department of Health and Wellness (DHW); Fraser Health Authority (FHA); gastrointestinal or enteric illness (GI); hand hygiene (HH); healthcare worker influenza immunization (HWI); influenza and influenza-like illness (IF); Interior Health Authority (InHA); Interlake-Eastern Regional Health Authority (IRHA); Island Health Authority (IsHA); methicillin-resistant *S. aureus* bloodstream infections (MRSA); Ministry of Health (MOH); Manitoba Health and Seniors Care (MHSC); Northern Health Authority (NHA); Northern Regional Health Authority (NRHA); Prairie Mountain Health Authority (PRHA); Provincial Health Services Authority (PHSA); Provincial Infection Control Network of British Columbia (PICNet); respiratory illness (RI); Southern Health Regional Health Authority (SRHA); surgical site infection (SSI); skin and soft-tissue infection (SSTI); tuberculosis (TB); urinary tract infection (UTI); ventilator-acquired pneumonia (VAP); vancomycin-resistant enterococci bloodstream infections (VRE); Vancouver Coastal Health Authority (VCHA); Winnipeg Regional Health Authority (WRHA).

Facility Standards Reporting

Accreditation Reports

Accreditation is grounded in the expectation that "adherence to evidence-based standards will produce higher quality health care services in an increasingly safe environment" (38). The accreditation process involves an assessment of a healthcare organization's performance in accordance with predefined standards through periodic self-assessments, onsite visits by third-party expert surveyors, interviews, and analyses of collected data and documentation (38). In Canada, the majority of healthcare organizations are accredited by Accreditation Canada[4] through the Qmentum program (40). The Qmentum IPAC standards provide a framework that includes planning, implementing, and evaluating the impact of an IPAC program. Woven through the standards is a people-centered approach that includes staff, clients, and families, and addresses themes such as: point-of-care risk assessments, hand hygiene, aseptic techniques, personal protective equipment, outbreak management, educating and training staff, clients, and families, and cleaning and disinfecting the physical environment and equipment. During an onsite visit, surveyors from Accreditation Canada review hand hygiene audits, compliance with infection control practices, and infection rates (as monitored by the healthcare organization of interest) (41–43).

Accreditation is only mandatory in select Canadian provinces (38). All organizations that undergo accreditation receive a public recognition of their accredited status. Further, some scholars have suggested that publishing the full accreditation reports may increase the transparency of accreditation decisions and motivate healthcare organizations to engage in quality improvement (38). Through the *Regional Health Authorities Act* (1996), Manitoba was the only province among those examined to require that all RHA facilities are regularly accredited by Accreditation Canada and that the results of accreditation are published on RHA websites (**Table 2**) (44). As such, executive summaries and full accreditation reports of four-year Qmentum onsite surveys are made publicly available on the websites of all five Manitoban RHAs (45–49). The publication of accreditation reports is viewed by the RHAs as a demonstration of their commitment to continuous improvement, public accountability, and transparency (45–49).

In British Columbia, RHAs may voluntarily participate in accreditation and publish accreditation reports (50). All six health authorities in British Columbia voluntarily participate in Accreditation Canada's Qmentum program and view it as a means to embed continuous quality improvement and patient safety into ongoing strategic planning and operations (42,51). Executive summaries or full accreditation reports are publicly available on the Northern, Interior, and Fraser RHA websites (52–54), but not on the Island RHA, Vancouver Coastal RHA, or PHSA websites (51,55,56). There are also no requirements to participate in accreditation or publish accreditation reports in Nova Scotia; however, both the NSH and the IWK Health Centre voluntarily participate in accreditation and the most recent accreditation reports are publicly available on each authority's website (57,58).

Long-Term Care Inspection Reports

Reports of LTC inspections are published in all three provinces of interest (British Columbia, Nova Scotia, and Manitoba) (59,60). Such inspections include routine onsite visits by designated authorities to assess whether safety standards are being met, to investigate complaints, and to follow-up on issues identified in

[4] Accreditation Canada is an independent non-governmental organization affiliated with the Health Standards Organization, which is focused on developing evidence-based quality and safety standards internationally (39).

previous visits. Complying with safety inspections is a requirement for LTC facilities to maintain a provincial license, as outlined in the British Columbia *Community Care and Assisted Living Act* (2002) (61), the Nova Scotia *Homes for Special Care Regulations* under the *Homes for Special Care Act* (1989) (62,63), and the Manitoba *Personal Care Home Standards Regulations* (2005) and *Licensing Regulations* (2005) under *The Health Services Insurance Amendment Act* (1998) (64–67). Standards are set by each provincial ministry and safety reviews are conducted by RHA inspectors in British Columbia, DHW inspectors in Nova Scotia, and jointly by RHA and ministerial inspectors in Manitoba (61,64,66,68).

In all three provinces, reports of completed and resolved LTC safety inspections are published on the provincial ministry websites (64,68,69). In British Columbia, these reports are viewed as a transparency mechanism (69); however, the inspection reports caution that they should not be used to rate LTC facilities against one another or to judge the overall quality of facilities (69). Requirements for RHAs to publish the findings of inspections and investigations, as well as report any actions taken in response to those findings, are outlined in the *Community Care and Assisted Living Act* (61). In Nova Scotia and Manitoba, public pressure and media reports of high-profile safety incidents precipitated the publication of LTC safety inspections to increase transparency and accountability (59,60), though explicit wording regarding how the published information should be used is not provided. Furthermore, requirements to publish LTC reports do not appear to be included in the relevant legislation in either Nova Scotia or Manitoba.

Key considerations for IPAC standards for the three jurisdictions are summarized in **Table 2**. In British Columbia, the standards outlined in the *Residential Care Regulations* (2009) under the *Community Care and Assisted Living Act* include (i) ensuring that residents are up-to-date with provincial immunization and tuberculosis control programs, including pneumococcal, influenza, and tetanus-diphtheria vaccinations; and (ii) ensuring staff compliance with provincial immunization and tuberculosis control programs (63,70,71). In Nova Scotia, the standards are outlined in the *Homes for Special Care Act, Regulations* and the Long-Term Care Program Requirements, and include the following key IPAC considerations: (i) ensuring that IPAC policies and procedures are available and up-to-date, with a focus on hand hygiene; (ii) ensuring that a formal structure, including a responsible point person, is in place to oversee the IPAC program; (iii) ensuring that staff are trained on the IPAC protocols as part of continuing education initiatives; (iv) ensuring that there is an active process for monitoring infection rates (surveillance) that can be shared internally at DHW request; and (v) facilitating immunizations and vaccinations of staff and residents (e.g., for influenza) and providing this information to DHW as directed (68,72). In Manitoba, the standards outlined in the *Personal Care Home Standards Regulations* include: (i) surveillance of nosocomial infections with review of data at regular intervals; (ii) establishing policies and procedures designed to minimize or eliminate transmission of infectious disease; and (iii) education of staff about infectious diseases, their modes of transmission, and methods of prevention (65). The standards in all three jurisdictions also include requirements to have appropriate LTC outbreak management plans (65,70–72).

Table 2. Summary of public reporting mechanisms in British Columbia, Nova Scotia, and Manitoba

Reporting Mechanism	Features	British Columbia	Nova Scotia	Manitoba
HAI Indicator Reports	**Mandatory publication**	Yes, through PICNet§	Yes, by legislation	No
	Main publishing authority	6/6 HAs (PHSA + 5 RHAs) and PICNet (participating facilities and indicators vary)	DHW	5/5 RHA & MHSC planned*; currently 1/5 RHA (WRHA only)
	Facilities	Acute care & LTC	Acute care	Acute care (currently WRHA only) & LTC planned*
	Use CNISP case definitions/ benchmarks?	Yes, partial	Yes	Yes, partial (planned*)
Accreditation Reports	**Mandatory publication**	No	No	Yes, by legislation
	Main publishing authority	3/6 HAs (not published for VCHA, IHA, & PHSA)	2/2 HAs (NSH & IWK Health Centre)	5/5 RHAs
	Summary of key standards	(i) Investing in IPAC; (ii) Keeping people safe from infections; (iii) Providing safe and suitable environment; (iv) Being prepared for outbreaks		
LTC Inspection Reports	**Mandatory publication**	Yes, by legislation	Unclear	Unclear
	Main publishing authority	5/5 RHAs	DHW	MHSC
	Summary of key standards	• Ensuring that residents and staff are up-to-date with provincial immunization & TB control programs • Having IPAC & outbreak management plans	• Formal IPAC program, policies, & procedures • Staff education • Monitoring infection rates (surveillance) • Staff & resident immunizations • Systems in place to detect & respond to outbreaks	• Surveillance of nosocomial infections • Staff education about infectious diseases • IPAC policies & procedures • Contingency plans for outbreak management
Critical Incidents Reports	**Mandatory publication**	Yes, by legislation	Yes, by legislation	Yes, by legislation
	Main publishing authority	5/5 RHAs (linked to LTC inspections)	DHW	MHSC
	Definition	Infectious disease outbreak in LTC	Surgical, product or device, patient protection, care management, environ-mental, & criminal events (do not appear serious or critical HAI)	HAI resulting in death

* Based on the planned *Manitoba Patient Safety Framework* (2015–2020) (33). As of June 2021, the framework has not been implemented province wide and it remains unclear when implementation may occur.

§ According to local experts, submission of health authority HAI data to PICNet is mandated, in alignment with the Ministry of Health requirements (though this does not appear to be explicitly stated in legislation).

Abbreviations: Canadian Nosocomial Infection Surveillance Program (CNISP); Department of Health and Wellness (DHW); health authorities (HA); healthcare-associated infections (HAI); Interior Health Authority (IHA); infection prevention and control (IPAC); Izaak Walton Killam (IWK); long-term care (LTC); Manitoba Health and Seniors Care (MHSC); Nova Scotia Health (NSH); Provincial Health Services Authority (PHSA); Provincial Infection Control Network of British Columbia (PICNet); regional health authority (RHA); tuberculosis (TB); Vancouver Coastal Health Authority (VCHA); Winnipeg Regional Health Authority (WRHA).

Critical Incident Reporting

Critical incidents (also termed "sentinel" or "serious" events) are adverse events resulting in major or permanent loss of function, disability, or death (73). Internationally, infection-related critical incidents are frequently underreported, despite meeting the definition of a critical event (73). In Canada, whether serious infection-related complications have been consistently managed as critical incidents across provinces and whether they have been publicly reported has not been systematically documented across provinces.

In Manitoba, critical incidents are defined as unintended health service-related events resulting in death, injury, or disability not attributable to underlying health conditions and not proportionate to the inherent risks of receiving medical care (74). Based on this definition, the death of a patient associated with HAI constitutes a reportable critical incident (74,75). Reporting of critical incidents to RHAs (who notify the MHSC), to families of the deceased patient, and to the public is mandatory under the *Regional Health Authorities Amendment* (2005). The purpose of publicly reporting critical incidents is to demonstrate transparency and to promote a culture of openness and learning among healthcare providers (74,76). Upon the initial report to MHSC, critical incidents are reviewed by clinical experts, who make recommendations on system improvements to avoid future harm (76). Following the initial clinical expert review, de-identified records of critical incidents are published each fiscal year on the MHSC website (76).

Public reporting of HAI-related critical incidents appears to be less direct in British Columbia. According to the *Residential Care Regulations* (Section 77) under the *Community Care and Assisted Living Act* (2002), an infectious disease outbreak in LTC constitutes a reportable incident (61,70,71). Reportable incidents are defined as events where persons in care have been seriously injured or adversely affected while receiving care within a licensed LTC facility (77). Under the *Residential Care Regulations*, it is mandatory for LTC facilities to report outbreaks to the families of the affected persons in care, healthcare providers involved in the affected persons' care, and the medical health officer at the relevant RHA (61,70,71). As these notifications trigger LTC investigations by the medical health officer, reportable infectious outbreaks are captured in the publicly reported LTC inspection and investigation reports (discussed above).

The Nova Scotia *Patient Safety Act* (2012) defines serious reportable events as a subset of patient safety incidents that must be reported by NSH and IWK Health Centre to the DHW on a quarterly basis (78). These events are then publicly reported by the DHW. The list of serious reportable events in Nova Scotia was adapted from Saskatchewan's Clinical Incident Reporting Guidelines (2004) and does not appear to include infection-related serious events (78).

Evaluations of Impact of Public Reporting

The recent systematic and scoping reviews on the effect of public reporting on patient safety outcomes (15,79) have identified only one Canadian study related to HAI prevention and control (13). This study used population-based administrative data to evaluate the impact of mandatory reporting of CDI rates in Ontario hospitals and found a 25% reduction in new cases over a two-year period (13). The authors speculated that since public reports of CDI rates are "deeply buried" on the provincial ministry of health website, it is unlikely that these reports informed patient choice of facility; rather, public reports have likely elevated the prominence of CDI control on hospital quality-improvement agendas, thereby motivating greater adherence to CDI preventive practices (13). This observation aligns with the expected outcomes of all public reporting mechanisms in British Columbia, Nova Scotia, and Manitoba, including increased public accountability and transparency for service quality and safety, improved performance monitoring and

cross-organizational learning, and stimulation of quality improvement (23,25,34,45–49,69,75,76). The HAI indicator reports in Nova Scotia and the LTC inspection reports in British Columbia also explicitly state that the published information should not be used to judge and compare the overall quality and safety of facilities (25,69).

A qualitative evaluation of British Columbia's PHHWG early in the implementation process provides some insights on the possible short-term effects of public reporting of hand hygiene compliance (27). While the focus of the PHHWG was to provide a forum to share and standardize practices, public reporting of hand hygiene compliance rates was implemented by some hospital units (27). Key stakeholders noted that this public reporting increased the credibility of hand hygiene as an effective preventive practice and secured further engagement and buy in for the PHHWG, held managers accountable and motivated to champion hand hygiene initiatives, and stimulated "friendly competition" between units to improve performance (27). However, others also worried that public reporting could lead to embarrassment without active change and cautioned that hand hygiene programs should include a sustained budget and infrastructure, rather than written policies alone, to ensure continued effectiveness (27).

Comments from expert surveyors in accreditation reports shed additional light on the impacts of public reporting of HAI information in the provinces of interest (though it should be noted that this information did not emerge from empirical evaluation). For instance, despite robust HAI surveillance practices in some RHAs in British Columbia and Manitoba, expert surveyors recommended improving the visibility and usability of HAI-related information regardless of whether public reporting has been implemented. Indeed, while some HAI indicators are published by the Fraser RHA in British Columbia and the Winnipeg RHA in Manitoba, the surveyors noted that these practices may be inconsistent within the regions and few inpatient staff appeared to be aware of the published information or any lessons emerging from outbreak investigations (80,81). The Southern RHA in Manitoba, which does not publish HAI indicators, was observed to "excel" in HAI surveillance and was recommended to use its collected information to establish a quality-improvement program (82). Engaging patients, caregivers, and staff in setting meaningful HAI indicators and in quality-improvement efforts emerged as another common recommendation for improving the prevention and control of HAI in both British Columbia and Manitoba (37,80–84). In Nova Scotia, the IWK Health Centre has demonstrated some evidence of using HAI surveillance data for learning and feedback by establishing organization-wide targets for post-operative infection rates related to caesarean sections and hysterectomies (85). Accreditation surveyors of the NSH noted that reduction of HAI rates and hand hygiene compliance, as well as reporting of this information, are among the organization's priorities (58). In addition, all NSH sites have been publicly reporting HAI indicators in compliance with the *Patient Safety Act* and, due to the organization's comprehensive and well-designed intranet IPAC web page, all staff appeared to be informed of the most up-to-date IPAC manual, policies, and procedures (58).

Understanding patient and public perceptions of publicly reported HAI information is also essential to ensuring that quality-improvement efforts are relevant, as patients believe that sharing responsibility in IPAC efforts and antimicrobial stewardship is an effective approach to controlling HAI (86). While most patients prefer not to be burdened with statistics and may not use published data to make individual choices on "high-performing" healthcare facilities (particularly in Canada), patient advocates, representatives, and those with lived experiences of HAI value public accountability (1,86) and may use published data to demand change and push for quality improvement. Future work should evaluate how public reporting of HAI information may compliment other IPAC interventions that are of interest to patient advocates (e.g., public campaigns, co-design of organizational policies, and provider, patient, and public education) (1,86).

Conclusions

In this rapid review, we reviewed publicly available grey and academic literature to describe the HAI public reporting mechanisms in acute care and LTC facilities in three Canadian provinces: British Columbia, Manitoba, and Nova Scotia. Despite substantial heterogeneity in HAI reporting practices, we identified three main public reporting mechanisms: (i) publication of HAI indicators, including infection rates and hand hygiene compliance; (ii) publication of assessments of adherence to safety standards, including accreditation and LTC inspections; and (iii) publication of critical incidents related to HAI.

Of the three provinces examined, only Nova Scotia has implemented public reporting of select HAI indicators through legislation. In British Columbia, a provincial program, PICNet, is focused on developing HAI surveillance guidelines and publicly reporting HAI indicators based on RHA data. In Manitoba, only the WRHA currently publishes reports of HAI indicators. Although a provincial patient safety framework that includes a comprehensive HAI surveillance and reporting plan has been proposed in Manitoba, it has not yet been implemented (as of June 2021).

Accreditation in all three provinces involves a third-party assessment of adherence to IPAC safety standards, including HAI monitoring and feedback, and publication of accreditation reports is another mechanism for publicly reporting HAI information. Manitoba was the only province to legally require its healthcare organizations to both be accredited by Accreditation Canada and to publish full accreditation reports, though some healthcare organizations in British Columbia and Nova Scotia also voluntarily participated in these practices. Reports of LTC inspections, conducted by health authorities for the purposes of facility licensing, were published in all three provinces; however, publication of LTC inspections appeared to be embedded in residential care legislation only in British Columbia.

Manitoba was the only province of those examined to legally require HAI resulting in death to be managed and publicly reported as critical incidents. In British Columbia, infectious disease outbreaks in LTC are considered to be reportable incidents; thus, outbreaks would be captured in the published LTC inspection reports after being reported to (and investigated by) health authorities. While rates of serious reportable events are published in Nova Scotia, as requited by legislation, the list of such events does not appear to include serious or critical HAI.

Key considerations that emerged from this review to optimize HAI-related public reporting include:

1. **Mandatory public reporting legislation** may facilitate the standardization of reporting practices, including the types and definitions of reported indicators, reporting formats, and participating facilities.
2. The **expected mechanism of action for public reporting** appears to be organizational learning and engagement in quality improvement through greater accountability and transparency for the quality and safety of care provided, rather than patient choice of “better performing” organizations.
3. Staff and patients may be unaware of public reports of HAI information, which may hinder the effectiveness of public reporting. **Engaging patients and providers in indicator development and formalizing public reports within learning and feedback systems** may be necessary to improve the visibility and usefulness of the reported data.
4. H**igh-quality empirical evaluations of public reporting** are needed in Canada. Making inferences directly from public reports is challenging due to the absence of pre-reporting data, lack of control groups, changing case definitions, and missing data. The impact of public reporting should also be considered within a broader suite of multimodal IPAC interventions.

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www.uoft.me/NAObservatory

naobservatory@utoronto.ca

nao_health