






## Research Article

# Improving practice through collaboration: Early experiences from the multi-site Spinal Cord Injury Implementation and Evaluation Quality Care Consortium

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**Context:** Dedicated implementation efforts are critical to bridging the gaps between current practices and best practices. A quality improvement collaborative (QIC), the Spinal Cord Injury Implementation and Evaluation Quality Care Consortium (SCI IEQCC), was established to meet this need, bringing together a network of clinicians and administrators to systematically improve the quality and equity of tertiary spinal cord injury or disease (SCI/D) rehabilitation care in Ontario, Canada.

**Methods:** Clinicians and leaders from five tertiary SCI/D rehabilitation centers and two not-for-profit SCI/D advocacy groups comprised a network dedicated to supporting implementation of the SCI-High quality indicators in prioritized domains of SCI rehabilitation and related best practices by: (1) building capacity through implementation science education of frontline clinicians; (2) providing resources and support to empower frontline clinicians to lead quality improvement efforts within their institutions; (3) promoting wider learning through a network for sharing ideas, efforts, and experiences; and (4) collecting indicator data to facilitate provincial evaluation of goal attainment.

**Results:** Network members and sites collaborated to implement best practices within six priority domains; in 18 months, significant progress has been made in emotional wellbeing, sexual health, walking, and wheeled mobility despite disruptions due to the COVID-19 pandemic. These efforts encompass heterogeneous challenges and strategies, ranging from developing clinical skills programs, to streamlining processes, to manipulating physical space.

**Conclusion:** A QIC targeting SCI/D rehabilitation demonstrates promise for advancing the implementation of best practices, building implementation science capacity across multiple sites, and for promoting collaboration amongst SCI/D rehabilitation centers and organizational partners.

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**Keywords:** Spinal cord injuries, Implementation science, Rehabilitation, Quality of health care, Networks

## Introduction

The translation of research evidence into clinical practice is slow and incomplete, hampered by the inertia of existing practices and limited time, finances, expertise, and other resources.<sup>1-3</sup> To ensure timely adoption and integration of evidence-based best practices therefore requires an active approach, known as implementation science, to bridge the gap between current practices and best practices.

Spinal cord injury and disease (SCI/D) is a multi-system disorder that requires highly specialized interdisciplinary rehabilitation care. Prior studies show that in SCI/D, passive translation of best practices into routine care is slow and often incomplete.<sup>4-6</sup> Collaborative approaches to best practice implementation that involve networks of health care organizations may enhance service delivery and improve outcomes.<sup>7,8</sup> Although there is considerable variability in the way quality improvement collaboratives (QICs) operate, they are typically characterized by organized cooperation of multiple healthcare sites working within a given healthcare condition; they focus on a shared approach to structured activities that promote collaboration and idea sharing, most often with a specific implementation or quality improvement framework with consistent data captured across organizations related to service performance and clinical outcomes.<sup>7,9</sup> Despite substantial interest in these QICs and sustained establishment of QICs, there is limited, albeit encouraging, evidence to support using this approach to achieve quality improvement and best practice implementation.<sup>7,10</sup>

Prior experience from the Spinal Cord Injury Knowledge Mobilization Network (SCI KMN), which was active from 2011 to 2017 and consisted of 7 participating SCI/D rehabilitation sites across Canada, demonstrated that while a QIC can address quality gaps and build implementation science capacity in SCI/D rehabilitation, it did little to improve the speed of change, did not evaluate the sustainability of best practice implementation, and was vulnerable to funding discontinuation.<sup>11-13</sup> Consequently, an Ontario-specific QIC, the Spinal Cord Injury Implementation and Evaluation Quality Care Consortium (SCI IEQCC – <https://SCIconsortium.ca>) was established in January 2019 to expand on the SCI KMN's efforts to build networks and implementation science capacity and further implementation of best practices within SCI/D rehabilitation.

The SCI IEQCC focuses on key priority domains, best practices, and recommended indicators from the

pan-Canadian Spinal Cord Injury Rehabilitation Care High Performance Indicators (SCI-High) project which employed a modified Hanlon method for prioritization as outlined by Craven *et al.* and Alavanja *et al.*<sup>14,15</sup> The key priority domains for implementation, identified by key stakeholders including persons with lived experience and SCI/D clinicians, based on clinical importance and feasibility were: emotional wellbeing, sexual health, urinary tract infection, tissue integrity, walking, and wheeled mobility.<sup>16-22</sup> Table 1 summarizes the key structural, outcome, and process indicators within each of these domains. This manuscript describes the experiences of the first 18 months of the SCI IEQCC, including development of the network structure, methods of capacity building for implementation science, key learnings from ongoing initiatives, the impact of the COVID-19 pandemic, the perceived challenges and benefits of this QIC, and planned next steps for the SCI IEQCC.

## Methods

### Network structure

The SCI IEQCC is an Ontario-based QIC with a vision that, regardless of where a person with SCI/D lives within Ontario, they will have access to optimal and equitable healthcare services to ensure functional recovery, health and wellbeing. This QIC is aimed at implementing best practices and building capacity in implementation science while collecting structure, process, and outcome indicators to facilitate provincial audit and feedback in order to optimize rehabilitation care within a learning health system. The SCI IEQCC's core values are: learn from each other's experiences; measure and evaluate our performance; plan for success; ensure sustainability; community engagement (policy, service providers, researchers, and individuals with lived experience); it is co-led by leaders of the SCI KMN and SCI-High project teams (BCC and DLW).

The SCI IEQCC consists of five tertiary SCI/D rehabilitation care organizations (located in London, Hamilton, Toronto, Kingston, Ottawa) in partnership with two non-government organizations specializing in SCI/D [Spinal Cord Injury Ontario and the Ontario Neurotrauma Foundation] and in collaboration with two community rehabilitation organizations (located in Windsor and Thunder Bay) who also provide care to people with SCI/D. Ontario Neurotrauma Foundation, the primary funder of the SCI IEQCC, is a non-governmental organization funded by the Ontario government that works as a

**Table 1 Structure, process and outcome indicators for each of the domains addressed by the SCI IEQCC.**

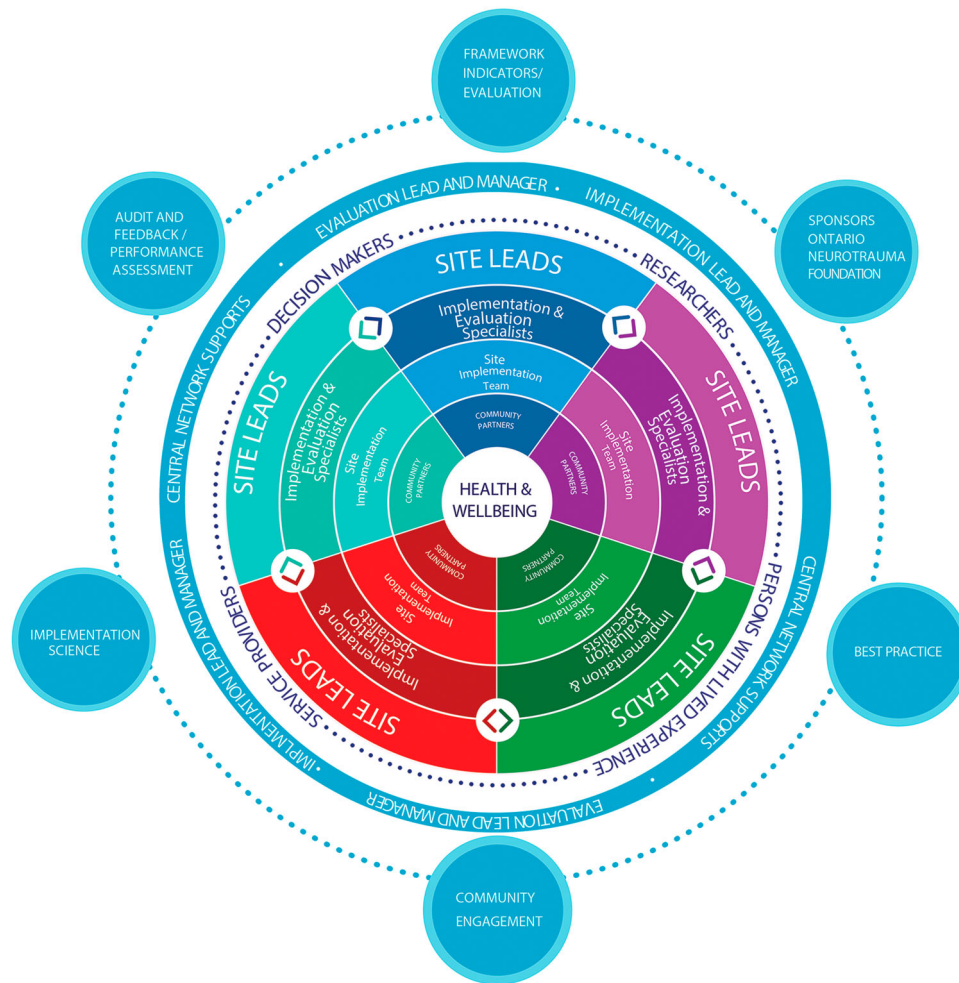
Domain	Walking Mobility (Musselman et al. <sup>21</sup> )	Wheeled Mobility (Bayley et al. <sup>22</sup> )	Tissue Integrity (Flett et al. <sup>20</sup> )	Urinary Tract Infection (UTI) (Craven et al. <sup>19</sup> )	Sexual Health (Elliott et al. <sup>18</sup> )	Emotional Wellbeing (Hitzig et al. <sup>17</sup> )
Structural Indicators	Number of therapists who demonstrate regular use of evidence-based walking interventions	Proportion of regulated healthcare professionals in the program who have specialized training in wheelchair mobility and wheelchair skills development	Proportion of patients with access to education/resources related to tissue integrity and pressure injury Proportion of individuals with SCI/D with access to hand-held or portable mirror for skin check	Proportion of patients with SCI/D with a health care professional (family MD, PMR/urology) Proportion of patients with SCI/D with a health care professional able to follow-up regarding urine culture and sensitivity within 48–72 h of collection	Proportion of SCI/D rehabilitation program staff (regulated health care professionals) who have completed the sexual health video module and SCI-High self-assessment tool	Proportion of staff with appropriate education and training in EWB and access to experts and resources.
Process Indicators	Total hours of received interventional therapies contributing to walking	Total number of hours of wheelchair service provision (WHO guideline, steps 1–8) provided per patient	Proportion of individuals with SCI/D who completed daily head to toe skin checks	Proportion of SCI/D rehabilitation inpatients with UTI as defined by the UTI diagnostic checklist/definitions	Proportion of SCI/D inpatients having a documented introduction to available local sexual health resources	Proportion of SCI/D patients who were screened for depression and anxiety symptoms at rehabilitation admission and rehabilitation discharge.
Outcome Indicators	Proportion of ambulatory individuals with SCI/D that completed a mTUG or 10MWT  SCIM III mobility subscale	Proportion of wheelchair users at discharge who reached the 80% on the WST-Q Mean LSA score Mean Wheelchair Use Confidence Scale (WheelCon-manual/power wheelchair short form) Score	Proportion of individuals with SCI/D diagnosed with a pressure injury  Proportion of individuals with SCI/D diagnosed with intact skin	Proportion of SCI/D rehabilitation inpatients with inappropriate antibiotic prescription	Proportion of individuals with SCI/D who complete the SCI-High Sexual Health Questionnaire	Proportion of SCI/D patients at risk for depression or anxiety at rehabilitation discharge based on screening symptom scores.  Proportion of individuals at risk for depression or anxiety based on screening symptom scores.  Proportion of individuals who received referral for EWB services or intervention.

Abbreviations: mTUG, modified timed up and go test; 10MWT, 10 meter walk test; SCIM III, Spinal Cord Independence Measure III; WHO, World Health Organization; WST-Q, Wheelchair Skills Test Questionnaire; LSA, Life Space Assessment; UTI, urinary tract infection; EWB, emotional wellbeing.

champion of change to prevent neurotrauma, and to ensure Ontarians with neurotrauma lead full, productive lives. Spinal Cord Injury Ontario, a non-governmental organization that delivers and champions excellence in service, support, and advocacy, works with rehabilitation centers across the province to support people with SCI/D and their families through the journey from the point of injury/disease back to

full community participation; Spinal Cord Injury Ontario also works with municipal and provincial governments to forward systemic policy changes. Figure 1 illustrates the organizational structure for the SCI IEQCC and some of its key functional components.

Representatives from each of these care and partner organizations, as well as leaders and managers for implementation and evaluation, formed the SCI



**Figure 1** Organizational structure and key functional components of the SCI IEQCC. Five participating sites are represented by each “pie slice” with key personnel involved at each site indicated by the circles radiating outward from the center of this diagram. The most outward circle represents central network supports of the consortium and the circles connected by the dotted line around the very outside reflects the key components and activities of the SCI IEQCC.

IEQCC steering team. The larger leadership team also consisted of persons with lived experience, directors, medical leaders, and managers from each of the participating organizations. Champions of implementation efforts within each of the 5 participating tertiary rehabilitation care organizations, known as Implementation and Evaluation Specialists (IESs) led the initiatives within their site. Funding for protected time for IESs to carry out their improvement work was provided by the Ontario Neurotrauma Foundation and distributed by the SCI IEQCC to each site for discretionary use to support implementation activities and collection of indicator data and amounted to approximately 0.5 full-time equivalents.

### Capacity building

A crucial aspect of the SCI IEQCC’s efforts is building local quality improvement and implementation science

capacity using a multipronged approach. First, the SCI IEQCC developed an implementation science curriculum and training materials adapted from the National Implementation Research Network’s Active Implementation Frameworks and from teaching materials initially developed by the SCI KMN.<sup>23,24</sup> Sites with existing quality improvement or implementation science programs could amend the methods to those already in place within their context (*e.g.* Lean Six Sigma or Model for Improvement). Second, all site leads and IESs participated in intensive training related to implementation science methodology at a joint meeting in October 2019, as part of capacity building and collaborative network development. Critical components of this training included change leadership and management, drivers and root cause analysis, quality improvement and implementation tools, orientation to the SCI-High indicators, and data

management training. This in-person training also fostered extramural relationships to build the strength of the SCI IEQCC QIC, which would be critical for sharing materials, challenges, learnings, and experience between sites. Third, IESs led the translation of this knowledge to their local teams to propagate implementation science ability to team members who did not attend the intensive in-person training and thereby build upon established local improvement culture. Fourth, frequent virtual IES meetings, which were supported by mentors with experience from the SCI KMN and SCI-High, facilitated sharing of progress, challenges, and successes between sites. Fifth, the steering committee and site leaders met monthly to support implementation plans and share site data with the central data repository.

### *Evaluation and implementation methods*

For each of the six key domains, structural, process, and outcome indicators were revisited according to implementation considerations from the work of the SCI-High network, which aimed to establish consensus for quality indicators for the highest priority elements of SCI/D rehabilitation care amongst persons with lived experience, healthcare professionals, researchers, and health system leaders.<sup>14</sup> Each site underwent appropriate ethics review to obtain approval to proceed with SCI IEQCC quality improvement work. Data sharing agreements, processes for data collection, and plans for future benchmarking were established. [Figure 2](#) outlines the high-level steps that individual local teams took for implementation work within each domain, guided by National Implementation Research Network's Active Implementation Frameworks.<sup>23,24</sup>

### *Local teams*

Sites established local implementation teams to address each of the six key domains. Guided by the SCI IEQCC steering committee and deliverables, sites prioritized the timing of domain implementation based on local needs, goals, capacity, and resources. Within each site, domain-specific implementation teams were self-organizing and led by one or more local IES. Local teams are diverse and include: persons with lived experience, clinicians from multiple medical and allied health disciplines with expertise in SCI/D, leaders with expertise in institutional processes, and researchers; teams also consist of individuals with variable quality improvement/implementation science experience, sex, cultural, and religious backgrounds, and ages. To aid in local capacity building, all teams received education on implementation science principles at the outset as

appropriate, led by their IES and supported by resources developed by SCI IEQCC. In addition, leaders and managers for implementation and evaluation from the SCI IEQCC steering team performed site visits at the outset of the initiative to introduce the QIC, engage directly with local leaders, frontline clinicians, and IESs, and advise on key evaluation and implementation processes.

### *Individualized approach to quality improvement*

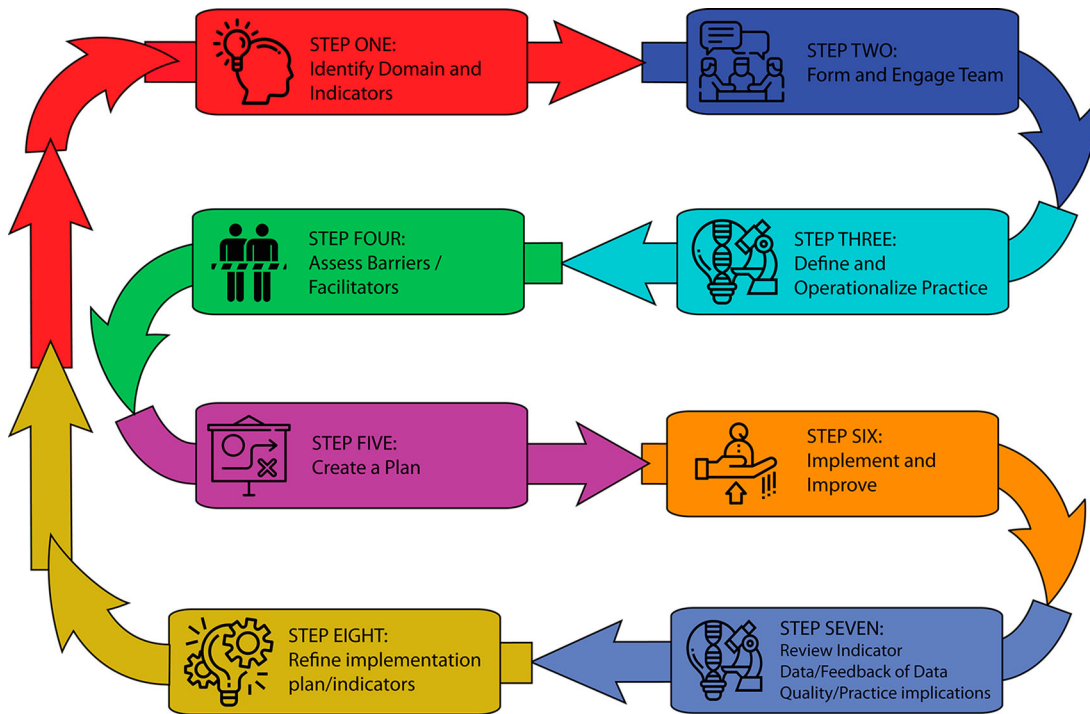
The indicators provided guidance on the standards for each domain and a rationale for applying this standard across all tertiary SCI/D rehabilitation sites within the province. However, in order to operationalize the indicators, teams ensured alignment between the indicators and their institutional practices or amended the indicators if needed. For instance, within the urinary tract infection domain, the process indicator is the use of a diagnostic checklist for urinary tract infection (UTI) which specified a tympanic (ear) temperature cutoff for fever, reflecting the practice of one participating site.<sup>19</sup> Sites within the SCI IEQCC that use oral temperatures, therefore, have adjusted the checklist accordingly to include oral temperature thresholds.

In addition to ensuring applicability of the indicators, IESs and teams were tasked with customizing their approach to implementation change within their setting. Although the SCI IEQCC and the quality indicators established priority domains and metrics for data collection, sites individualized the aims and change strategies as appropriate for their local improvement projects. The SCI IEQCC training program for IESs provided theoretical knowledge for understanding drivers and root causes, developing change ideas, and important concepts about the psychology of change. IESs and local teams ascertained their current or baseline performance, established an appropriate aim, developed strategies for data collection and monitoring, applied theories of change to existing problems using Plan-Do-Study-Act cycles, and assessed the results (as outlined in [Fig. 2](#)).

## **Results**

### *Participants*

Five tertiary care SCI/D rehabilitation sites obtained funding to begin implementation activities and received operational support from Spinal Cord Injury Ontario. These five sites cumulatively provide comprehensive rehabilitative care for approximately 650 inpatients with SCI/D annually. Implementation teams were comprised of clinicians and persons with lived experience led by 12 IESs across the five sites. The two



**Figure 2** Schematic representation of the evaluation and implementation process for each domain. Following domain prioritization (step one), steps two to six reflect the key implementation activities conducted for each domain within each site. Of note, specific tools linking to the Active Implementation Frameworks reflect practice profiling (step three), implementation driver analyses (step four), and Plan-Do-Study-Act improvement cycles (step six). Review, feedback, and refinement of indicators and/or implementation methods (i.e. steps seven and eight) will be conducted at a cross-network level.

participating community sites have allocated time to learning about the processes but are awaiting funding support for full participation. Sites that received funding had discretion for its use: some divided the funding amongst multiple IESs to champion initiatives within each domain while others opted to fund one IES for all initiatives. Context-specific factors such as personnel availability, distribution or centralization of SCI/D rehabilitation units, number of domains receiving institutional commitment, and the COVID-19 pandemic contributed to local decision-making.

*Implementation experiences*

Since the SCI IEQCC launched 18 months ago, all five tertiary rehabilitation sites have established teams for implementing best practices within the six priority domains. To date, sites have made the most significant progress in emotional wellbeing, sexual health, walking, and wheeled mobility; the two patient safety domains, tissue integrity and UTI, have variable degrees of implementation across the network. Table 2 highlights examples of selected change ideas, Plan-Do-Study-Act cycles, and processes that sites have used for each domain, and critical lessons derived from these experiences. Although capturing the entire

breadth and depth of the implementation science efforts of the SCI IEQCC to date is beyond the scope of this manuscript, these selected examples illustrate the heterogeneity of the problems and contexts addressed within the domains and at each of the sites—navigating transformations from paper-based to electronic medical records, manipulating physical space to better meet best practices, developing systems of data collection, introducing new and augmenting existing clinical skills, achieving diagnostic consensus amongst diverse groups of clinicians, streamlining practices to reduce variability, and introducing peer mentorship and education programs.

Sites’ baseline performance varied widely: for some domains, improvements were limited to enhanced documentation to demonstrate that high standards are being achieved; for other domains, improvements required substantial changes to current practices including program development or modification and/or investment of resources. This variability across domains and sites necessitated fostering an individualized approach to quality improvement, allowing teams to begin or enhance their existing work within each domain in a context-congruent manner. This variability was also a key facilitator of expediting change: IESs could share

**Table 2 Selected example change ideas, Plan-Do-Study-Act cycles, and lessons learned from each domain of SCI IEQCC implementation initiatives.**

Domain	Emotional Well Being (EWB)	Sexual Health	Urinary Tract Infection (UTI)	Tissue Integrity	Walking	Wheeled Mobility
Relevant Indicator(s)	Proportion of individuals who received referral for EWB services or intervention. <sup>17</sup>	Proportion of SCI/D inpatients having a documented introduction to available local sexual health resources, and who complete the SCI-High Sexual Health Questionnaire. <sup>18</sup>	Proportion of SCI/D rehabilitation inpatients with inappropriate antibiotic prescription. <sup>19</sup>	Proportion of individuals with SCI/D who completed a daily head to toe skin check. Proportion of individuals with SCI/D diagnosed with a pressure injury. <sup>20</sup>	Proportion of ambulatory individuals with SCI/D that completed the mTUG or 10MWT. <sup>21</sup>	Proportion of regulated healthcare professionals in the program who have specialized training in wheelchair mobility and wheelchair skills development. <sup>22</sup>
Site Change Idea	Kingston Improve identification of individuals that may be appropriate for referral for EWB services or intervention.	Hamilton Improve consistency of delivery of sexual health information and education for inpatients with SCI/D.	London Improve documentation for patients with urine culture investigations with or without treatment.	Toronto Work across all 3 inpatient units to improve patient education for skin checks and nursing documentation of skin check completion and pressure injury incidence.	Ottawa Implement Standing and Walking Assessment Tool (SWAT, which includes mTUG and 10MWT) for PT assessment of walking ability.	Ottawa Provide training for the WST-Q and Wheelchair Skills Training Program for PTs and OTs.
PDSA Cycles	<ol style="list-style-type: none"> <li>Spiritual care or behavioral therapist to complete anxiety and depression screening on admission.</li> <li>Add anxiety and depression screening results to discussion at weekly IPCs.</li> <li>Identify individuals at risk and review their goals and strategies at weekly IPCs.</li> <li>Repeat screening within the week before discharge.</li> <li>Communicate pre-discharge results to outpatient team to aid in transition to outpatient care for EWB.</li> </ol>	<ol style="list-style-type: none"> <li>Improve staff and clinician knowledge and comfort using SCI IEQCC virtual health training sessions.</li> <li>Adapt patient education pamphlet developed by another SCI IEQCC site to include local resources.</li> <li>Distribute new patient education pamphlet to all SCI/D inpatients on admission.</li> <li>Add sexual health to patients' rehabilitation goals for IPCs.</li> </ol>	<ol style="list-style-type: none"> <li>Interviews with key stakeholders (nursing, physician, patient, pharmacy, infectious diseases) about current practices.</li> <li>Chart audit of current practices.</li> <li>Develop consensus for UTI diagnosis and indications for antibiotic treatment.</li> <li>Add rationale for urine culture testing to electronic ordering.</li> <li>Document rationale for treatment of UTI using consensus-based checklist in patient chart.</li> </ol>	<ol style="list-style-type: none"> <li>Chart audit for documentation of pressure injury and skin checks.</li> <li>Survey of inpatients' current understanding and use of skin checks.</li> <li>Interviews with nurses about current practices for patient education and nursing documentation of skin checks and pressure injuries.</li> <li>Develop consensus on definitions of terms within existing documentation forms.</li> </ol>	<ol style="list-style-type: none"> <li>Webinars to educate PTs on SWAT process.</li> <li>Posters with SWAT instructions put up in PT/OT department</li> <li>Modification of physical environment in PT treatment area to improve ease of SWAT performance.</li> <li>Bi-weekly peer mentorship meetings to enhance education and competence.</li> <li>SWAT results incorporated into interdisciplinary meetings.</li> <li>Transition to electronic medical record for documentation included SWAT forms.</li> <li>Trained all new and casual PTs in SWAT.</li> </ol>	<ol style="list-style-type: none"> <li>Amended planned in-person wheelchair skills training to virtual format.</li> <li>Webinars led by remote skills expert on the wheelchairs skills training program and WST-Q to educate PTs and OTs.</li> <li>Assess inventory of current equipment and available indoor and outdoor environment for training.</li> <li>Acquire wheelchair spotter straps.</li> <li>Half day practical training session for OTs and PTs to consolidate virtual wheelchair skills training program learning.</li> <li>Create electronic medical record form for documentation of WST-Q.</li> <li>Rehab engineering and site implementation team created local in-house solution to address equipment needs</li> </ol>

Continued

**Table 2 Continued.**

Domain	Emotional Well Being (EWB)	Sexual Health	Urinary Tract Infection (UTI)	Tissue Integrity	Walking	Wheeled Mobility
Lessons Learned	Attention to EWB in IPCs increased team's awareness and responsiveness to patient needs even if initial screening was negative. Implementation initiative created an opportunity for collaboration between local SCI/D team and adult mental health team.	The SCI IEQCC indicators, tools, and resources supported the local team to bolster existing quality improvement efforts. Using materials developed at other sites expedited changes. <sup>25</sup>	Comprehensive team composition (persons with SCI/D, nursing, physicians, pharmacy) provided multiple perspectives to contribute to consensus building, understanding root causes, and maximizing engagement on an issue with diverse baseline practices.	Documentation differed across SCI/D units and did not always reflect the comprehensive care being provided. Transition to electronic medical record from paper-based that daily skin checks are undervalued as a pressure injury prevention strategy, which is the target of next steps.	Important to explain that change does not diminish current practice to improve morale and buy-in. Opportunity for introducing best practices and improving consistency.	COVID-19 significantly affected the ability to complete practical wheelchair skills education. Availability of equipment and appropriateness of physical environment for wheelchair skills training varied by site; ability to adapt depended on funding and therefore building capacity in this domain is a longer-term process.

Abbreviations: PDSA, plan-do-study-act; EWB, emotional well being; SCI-High, Spinal Cord Injury Rehabilitation Care High Performance Indicators; IPCs, interprofessional patient conferences; SCI/D, spinal cord injury/disease; UTI, urinary tract infection; SWAT, standing and walking assessment tool; mTUG, modified timed-up-and-go; 10 MWWT, 10 meter walk test; PT, physiotherapist; OT, occupational therapist; WST-Q, wheelchair skills test questionnaire.

their resources, such as patient-level educational materials, which other sites could adapt and implement to further their change efforts; IESs could also relay their experiences, such as change ideas that were successful or not worthwhile, to steer other sites away from futile approaches.

*Key lessons*

Although teams' experiences, change ideas, Plan-Do-Study-Act cycles, and progress vary, many common lessons emerged from their participation in the SCI IEQCC. First, most sites selected IESs and local team members who contributed to these change initiatives while concurrently fulfilling their clinical role within SCI/D rehabilitation at their site. All sites described benefits of this approach: having experienced frontline clinicians serve as IES while embedded in clinical practice allowed them to better understand current practices and policies, communicate the rationale for practice improvements, carry out Plan-Do-Study-Act cycles, gather critical and timely feedback, and improve engagement amongst key stakeholders. Second, the key domains address problems that affect persons with SCI/D and multiple healthcare providers, so having diverse representation on each implementation team was critical to building consensus for what aims should be set, what best practices should look like, and how to move forward in a way acceptable to all key stakeholders. Third, IESs and their teams endorse intangible benefits to this collaborative work in improvement: for some, working together with colleagues at different institutions united for a common goal to improve the care we deliver has been very meaningful; for others, having implementation teams consisting of persons from multiple disciplines has augmented the collegiality of already collaborative clinical teams. That implementation science work can have these unquantifiable benefits locally and between sites, particularly in the context of the unprecedented stress and change the coronavirus disease 2019 (COVID-19) pandemic, is notable. Fourth, keeping pace with the data needs of the QIC required substantial work from the evaluation team.

*Impact of the COVID-19 pandemic*

The onset of the COVID-19 pandemic and its related provincial shutdown beginning in March 2020 had an unprecedented impact on everyday life and healthcare delivery. The SCI IEQCC implementation efforts that were underway were no exception. This adversity brought significant challenges, important lessons, and unexpected opportunities. Challenges stemming from



the COVID-19 pandemic include shifting institutional priorities; having to suspend team activities for variable and unpredictable lengths of time due to hospital shut-downs, interruptions in inpatient and outpatient service delivery, and redeployment of IESs and team members to other duties; ensuring ongoing engagement with community partners and persons with lived experience with variable access to virtual meetings; transforming existing resources to virtual and/or asynchronous format to limit in-person synchronous group activities; and, mitigating the psychological and physical toll of the pandemic on healthcare providers and patients. Notably, the domain of emotional well being was selected as an initial priority domain across all sites of the SCI EQCC from the outset as an exemplar for learning about implementation processes. The pandemic elevated the importance of this domain as sites adapted existing local programs and/or developed new methods to support the emotional well-being of patients during the pandemic and beyond.

Some challenges, such as needing to limit in-person gatherings, were seemingly easily overcome by transitioning to virtual meeting platforms. IESs found the transition from in-person to virtual augmented the sharing of knowledge between and within participating sites; for instance, collaboration for the sexual health domain between sites significantly improved and expedited implementation of practice changes by having content experts from one site synchronously teach not only their own personnel but those at other sites. In contrast, the loss of in-person training was detrimental to other domains; for instance, adapting wheelchair skills training to virtual format ensured it could still take place, but was not as effective as in-person training for such a hands-on skill would be. Moreover, not all team members, particularly some persons with SCI/D living in the community, had access to sufficient equipment and/or technology literacy to participate virtually in a meaningful way. Like virtual care, virtual engagement in quality improvement efforts may remove barriers for some patients and exaggerate them for others.<sup>26–28</sup> Teams' approach to this problem varied, and regrettably, some teams found restoring the previous level of meaningful engagement was untenable. However, this highlighted the potential negative consequences of virtual care in expanding inequities for some patients, and galvanized teams and sites to consider this impact on service delivery.

Another critical lesson from this disruption was the vulnerability of the sustainability of these initiatives. As with most QICs, resources—particularly personnel, time, and funding—have been critical to translating

implementation efforts into usual practice. The vulnerability of quality improvement efforts' sustainability is not unique to the pandemic: the importance of designing ways to sustain efforts despite changes in personnel availability is well-established.<sup>29–32</sup> As IESs, whose leadership and implementation science expertise drive their teams forward, had to suspend their individual improvement efforts, this underscored the importance of building implementation science capacity within these teams and institutions so that projects could proceed or changes could be sustained even if an IES was unable to return to their improvement work.

Despite all the challenges, an unexpected benefit of the QIC arose from a change to service delivery that provided an opportunity for advocacy: through the SCI IEQCC, leaders from multiple sites rapidly identified a province-wide disruption to crucial services for persons with SCI/D that arose shortly after the provincial lockdown. After declaring a state of emergency in Ontario due to the COVID-19 pandemic, inpatients admitted for SCI/D rehabilitation were struggling to obtain usual funding from the provincial government for assistive devices, which precluded timely discharges. Because the SCI IEQCC included leadership representatives from all the inpatient SCI/D rehabilitation centers and Spinal Cord Injury Ontario, we were able to leverage the voice of local leaders, the clinical expertise of the rehabilitation sites, and Spinal Cord Injury Ontario's strong government relations department to effectively advocate for the Ontario government to implement an emergency alternate process for automatic approval for inpatient assistive devices. The network was able to justify with lived experience and evidence why the government's assistive devices program needed to modify its services swiftly to ensure timely funding and access to essential mobility devices during the COVID-19 pandemic. Although this service disruption was outside the scope of the SCI IEQCC activities, the collaborative nature of the network leaders, the frontline work of its contributors, and the partnership with Spinal Cord Injury Ontario led to the rapid identification and resolution of this health system-level problem.

## Discussion

This QIC, and implementation science initiatives like it, serve the critical purpose of accelerating the translation of evidence-based best practices into everyday practices. However, the optimal methods for ensuring implementation remain unclear, and implementation initiatives are therefore critical learning experiences. Learning from efforts that came before it, such as the SCI

KMN, the SCI IEQCC has grown from key formative lessons: IESs were trained and supported by improvement experts because implementation science initiatives need mentorship; local teams are self-governing, diverse, and include persons with lived experience and frontline clinicians because representation of relevant perspectives drives engagement; and, change leaders need to be flexible and innovative because implementation challenges will vary across problems, institutions, time, and under external threat, as COVID-19 has shown. Despite the impact of a global pandemic, sites have made considerable strides towards their implementation targets across all domains. As implementation efforts within individual sites and domains progress, reporting on their outcomes will be critical to disseminating evidence of benefit of the QIC and its approach and/or for understanding the limitations of these efforts to better guide future endeavors and others who may lead them.

As with many improvement initiatives, the future of the SCI IEQCC depends on ongoing availability of funding to support ground-level, frontline implementation science leadership and the related data collection and evaluation. Given that healthcare is increasingly resource constrained, care organizations may not be able to prioritize such initiatives without external funding.<sup>10,33</sup> Existing evidence, albeit limited, suggests that QICs may be cost effective and produce cost savings.<sup>10</sup> As networks provide a platform for idea and resource sharing, QICs may augment the cost-effectiveness of implementation initiatives by reducing individual sites' development burden; for instance, SCI IEQCC sites with robust resources on sexual health shared their expertise as well as staff training and patient-level resources with other sites.<sup>25</sup> Nonetheless, most of the initial six key domains addressed by this QIC are unlikely to yield cost savings adequate to support self-sufficiency at this early stage of implementation. Robust implementation of best practices in additional domains, including patient safety domains and those prioritized for later implementation efforts, may offer opportunities for cost-savings that lead towards self-sufficiency, even though this was not a criterion for their selection. Although the delivery of best practices may offer other meaningful benefits to persons with SCI/D and the rehabilitation centers that serve them, future work of this QIC may require cost analysis evaluations to assess if QIC participation offers a relative financial advantage over intramural or extramural funding of individual sites.

Importantly, the early successes and promise of this QIC as described in the present manuscript have

attracted attention across Canada such that Praxis Spinal Cord Institute is supporting a national network expansion. Four additional sites outside Ontario will be joining the SCI IEQCC thereby providing enhanced access to optimal and equitable care for persons with SCI/D and increasing the opportunity for continued sharing of learnings from even more perspectives.

## Conclusion

In its first 18 months, the SCI IEQCC demonstrated promise for advancing the implementation of best practices in key domains, building implementation science capacity across multiple SCI/D rehabilitation sites, and for promoting collaboration amongst SCI/D clinician experts, rehabilitation centers, and organizational partners. All five tertiary rehabilitation sites have made significant progress in emotional wellbeing, sexual health, walking, and wheeled mobility; immediate further efforts will focus on implementation of the two patient safety domains, tissue integrity and UTI. Key learnings from the first 18 months of the SCI IEQCC include: the importance of diverse team composition, including persons with lived experience and frontline clinician stakeholders, in advancing best practices as well as improving collegiality and meaning in the work; the utility of sharing experience and materials across sites to quickly and effectively drive implementation efforts; and, that there is a need for robust data collection infrastructure to capture implementation challenges and successes. Although data analysis has yet to occur in many of the priority domains to quantify demonstrable benefits, this QIC has demonstrated resilience and adapted to the unforeseen challenges of the COVID-19 pandemic, successfully advocated for access to necessary funds for persons with SCI/D, and continues to work together to progress towards best practice implementation. The lessons and experiences from the earliest implementation efforts will be critical for long-term efforts on all domains.

Looking forward, other critical issues facing the SCI IEQCC include establishment of processes to ensure timely data collection, permit effective audit and feedback, establishment of practice benchmarks, sustainability of improved practices, and creating implementation science capacity for additional domains while ensuring the current practices are resilient to external stressors. As the SCI IEQCC's vision is that people with SCI/D will, regardless of where a person lives within Ontario, have access to optimal and equitable healthcare services to ensure functional

recovery, health and wellbeing, other important challenges for this QIC will be building implementation science capacity within its participating tertiary and community SCI/D rehabilitation sites to realize this aim.

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