

The Public Health Emergency Preparedness and Quality Improvement (PHEP-QI) Intervention: Co-Creation and Pilot-Implementation of the PHEP-QI Intervention in Canada

Yasmin Khan

dryasmin.khan@utoronto.ca

University of Toronto

Tracey O'Sullivan

University of Ottawa

Samantha Oostlander

Public Health Ontario

Brian Schwartz

University of Toronto

Adalsteinn Brown

University of Toronto

Madelyn P. Law

Brock University

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Abstract

Background

This paper describes the development of a public health emergency preparedness and quality improvement (PHEP-QI) intervention using a co-creation process with knowledge users, and its pilot-implementation with five local/regional public health agencies in Canada. This work to facilitate the implementation of strategies for enhancing public health emergency preparedness (PHEP) builds on our previous research in which we developed the Resilience Framework and corresponding indicators to define and measure PHEP.

Methods

To co-create the PHEP-QI intervention, Community-Based Participatory Research and Integrated Knowledge Translation methods were used to support a participatory and knowledge user-focused approach to intervention development. The co-created and piloted intervention consisted of three overlapping components and one cross-cutting component: 1) Priority-setting consultation; 2) Educational workshops; 3) Implementation support; and 4) Collaboration (cross-cutting). Adult learning principles were embedded in intervention development to ensure that education and support met the needs of pilot participants. The five pilot sites included local, regional and provincial public health agencies located in jurisdictions from east to west across Canada, and all engaged throughout the co-creation process and implementation.

Results

Initial co-creation and pilot-implementation of the PHEP-QI intervention across Canada resulted in PHEP priorities developed at pilot sites using the Structured Interview Matrix consultation method, based on the Resilience Framework. Next, a series of interactive educational workshops were co-created including a curriculum of webinars on both PHEP and quality improvement topics of interest to knowledge users, with a Community of Practice included in most workshops. Notably, pilot sites indicated interest, as part of co-creation, in a list of PHEP webinars through the workshops to support their practice. Implementation support using quality improvement was provided as information, coaching and facilitated discussions. Intra-organizational and inter-organizational collaboration cut across all components in support of teams enhancing PHEP practice at public health agencies.

Conclusion

The co-creation of the PHEP-QI intervention is an important contribution to advancing the use of QI in public health systems, given the gap in adoption of QI in public health practice. Furthermore, the PHEP-QI

intervention demonstrates how QI can enhance PHEP practice by supporting system resilience and response to emergencies.

1. Background

During the past decade, public health systems around the world faced extraordinary challenges, and were required to adapt rapidly to the complexity of changing contexts. Adaptations ‘on the fly’ to meet increased demands are necessary but take a toll on health professionals who prepare for and respond to emergent public health incidents or large-scale disasters.^{1–3} Over a three-year period, beginning in 2023 through 2025, our team collaborated with five public health jurisdictions in Canada to co-create, implement and evaluate an intervention to improve quality in public health emergency preparedness policy and practice and build system resilience. Creating and implementing a quality improvement (QI) intervention for preparedness practice, to be followed by an evaluation, was an important step in determining how the Resilience Framework for Public Health Emergency Preparedness (PHEP) and corresponding indicators could be used to support public health system resilience.^{4,5} The Resilience Framework for PHEP centers around eleven essential elements that define PHEP at the local/regional level of public health and was developed with health professionals from different regions across Canada using Community-Based Participatory Research (CBPR).^{4,6} Through a Modified Delphi approach, we also developed a comprehensive set of 67 evidence-informed indicators to accompany the framework.⁵ The indicators further support measurement to track identified priorities and monitor progress, which can enhance QI for the public health system.

Rapid learning and practice – grounded in evidence – is imperative for responsive health systems.⁷ The evidence base for QI has expanded since 2000 and includes tools to support organizational learning. QI has been defined as “the use of deliberate and defined methods in continuous efforts to achieve measurable improvements in the efficiency, effectiveness, performance, accountability, outcomes, and other indicators of quality in services or processes”.⁸ While uptake of QI methods and tools in clinical care settings is well-documented, evidence-informed approaches for QI within public health practice environments, especially as it relates to emergency preparedness, are still emerging.⁹

We conducted a scoping review to explore the literature on applications of QI in a public health pandemic context.¹⁰ The findings of the review indicated QI was used during the pandemic in collaborative problem-solving and analysis with stakeholders; learning and capacity-building; integrating lessons learned from past emergencies; and evaluation of performance indicators. Given the importance of QI in public health, there is an opportunity to expand knowledge about how QI can be used to enhance preparedness when health systems are not actively responding to an emergency. By defining essential elements of PHEP, the framework and indicators can be used as a tool to support public health organizations in QI as they identify priority areas of emergency preparedness, lending to an understanding of assets and areas for improvement to enhance adaptive capacity and preparedness for emergencies.¹¹

This paper provides a description of a Public Health Emergency Preparedness and Quality Improvement intervention (hereafter referred to as 'PHEP-QI intervention') and its co-creation process with public health professionals to support organizational learning related to emergencies and the use of evidence to inform PHEP practice, using a QI lens. It further describes how the co-created intervention was piloted with five local/regional public health agencies in Canada to facilitate the implementation of strategies for enhancing PHEP. Evaluation of the PHEP-QI intervention pilot will be presented in a separate paper.

2. Methods

This study is part of a larger program of research focused on enhancing PHEP in public health organizations across Canada. The study and broader research program are grounded in principles of CBPR which situates participants as co-producers of knowledge and Integrated Knowledge Translation (iKT) to ensure relevance and usefulness to end-users.^{6,12,13} iKT has been incorporated in our research program focused on PHEP system resilience since 2015, to facilitate the uptake of knowledge by end-users. Using this approach, knowledge users are engaged throughout the research process to enhance the relevance and utility of the research findings.¹³ In this study, knowledge users were engaged as participants at the five public health organization sites across Canada, as well as through our Knowledge User Steering Committee. The Knowledge User Steering Committee included public health practitioners with relevant PHEP and/or emergency management experience from other local, regional, and national public health contexts, distinct from sites. The Committee provided input on the intervention design and were consulted during the pilot but were not participants in the pilot. Thus, both groups of knowledge users participated in the co-creation process, while only sites directly participated in pilot-implementation.

The collaboration of the research team, sites and KUSC is depicted in Fig. 1. Ethics approvals were obtained from Public Health Ontario Ethics Review Board (primary) and other relevant ethics review boards for this study in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. All participants provided informed consent to participate in any individual-level data collection activities.

2.1 Pilot Sites

Five public health organizations from local, regional and provincial levels across Canada participated as sites in the three-phase research project. One organization was from the Atlantic region of Canada, two from the province of Ontario, one from the Prairies, and one from British Columbia. The public health organizations represented five health region peer groups, which are health regions classified based on similar socioeconomic and sociodemographic characteristics, as defined by Statistics Canada.¹⁴ Two organizations were situated at a local level, one at a regional level, and two at a provincial level.

2.2 PHEP-QI Intervention Components

The multi-component PHEP-QI intervention, implemented with the five pilot sites, included three overlapping and one cross-cutting component: 1) Priority-setting consultation using the Structured Interview Matrix (SIM) facilitation method; 2) Educational workshops held monthly with PHEP and QI webinars and a Community of Practice (CoP) to facilitate collaborative learning; 3) Implementation support with site-specific QI coaching along with online resources and information; and 4) Intra- and inter-organizational collaboration opportunities. A visual representation of the multi-component intervention built with the Resilience Framework for PHEP as a foundation and using a QI lens is depicted in Fig. 2.

1. Priority-setting Consultation

To begin the PHEP-QI intervention, each of the five pilot sites participated in a 3–4 hour group consultation to guide site-specific priority-setting and planning. The consultation was facilitated using the SIM method and was designed to bring team members from each site together to share their experiences; understand the context for recent emergencies including the COVID-19 pandemic; and discuss influences on institutional preparedness and recovery for a large-scale emergency.¹⁵ Additional details on this part of the project will be reported in our evaluation paper.¹⁶

The SIM facilitation method is an interactive, inclusive approach to group consultations which can accommodate $n = 8–40$ participants in-person or $n = 8–20$ participants virtually.¹⁷ Participants are assigned a “seat” at one of four tables or a breakout room in a virtual setting. Each table is assigned a question to focus on for the session. There are three progressive steps in a SIM session: 1) Rotating individual interviews, 2) Small group deliberation, and 3) Large group discussion. For more details of the SIM method for facilitation, and specific adaptations for virtual consultations, please see O’Sullivan et al. (2022).¹⁷ Depending on the topics to be discussed, SIM sessions can span half or full-day time periods. In our experience, half-day (3–4 hour) SIM sessions are most practical for public health professionals, given the challenges of bringing people together at the same time from an essential service organization. For this study, we organized the half-day SIM sessions around 4 main questions developed for this study which focused on: 1) which assets within the public health units support PHEP; 2) which elements from the PHEP framework need improvement; 3) which PHEP elements from the framework would be most feasible to address in their organization; and 4) what strategies could enhance PHEP in public health organizations. SIM questions are provided in Additional file 1. Each site reviewed and reflected on the PHEP framework and how it could be used to support enhancing PHEP activities and efforts.¹⁸

A report of the summary discussion points from each site’s SIM consultation were shared back by the research team with sites within two months of their SIM. At this stage, each site identified an individual to liaise with the research team in supporting priority-setting. The research team provided the report and encouraged the liaison to use the report to support broader engagement at their site to set priorities reflecting key organizational interest holders and decision-makers in the public health organization.

As the priority-setting consultation component transitioned towards educational workshops, the site liaison was asked to identify a group of 3–6 practitioners (influenced by site size/context) who could create change related to their PHEP priorities. These individuals became participants in the intervention co-creation and feedback process. Given the CBPR approach of the larger research project, organization contacts were encouraged to include individuals who had participated in their site's SIM consultation to create opportunities for continued collaboration and engagement; however, additional attendees were added as relevant to the site.

While priority-setting consultations were initiated first to support planning and selection of framework elements and indicators, priority-setting was conceptualized as iterative across the PHEP-QI components. Sites could refine and adapt their priorities as projects and activities progressed over the course of the pilot's timeframe.

2. Educational Workshops

Educational workshops held virtually included webinar presentations and a CoP, aimed to provide participating sites with opportunities for interactive learning and collaboration to support work on their preparedness priorities, project and activities using QI. As part of the co-creation process anchored in CBPR, and aligned with adult learning principles,^{19,20} the development of a webinar curriculum on PHEP and QI topics offered within the workshop format involved engagement with intervention participants. Adult learning is multi-dimensional and encourages self-direction, connection to the learner's life experiences, critical reflection and dialogue, and incorporates creative modes of inquiry to enhance the learning process.^{19,20} To explore intervention participants' educational goals and interests to inform PHEP-QI curriculum development, feedback was collected at the beginning of the workshop series. Initial suggestions were shared that included topics on QI methods and tools, PHEP, change management, leading change, recovery from emergencies, and other (open-ended). Their input was used to co-create and refine the webinar curriculum.

The synchronous workshops started with a webinar presentation and were followed by a facilitated CoP discussion designed to strengthen networks and inter-organizational collaboration through sharing information and exchanging ideas. CoPs are a useful approach in QI to support collaborative learning and offer a mechanism to incorporate adult principles.²¹ CoPs have three characteristics: 1) a domain or shared interest; 2) a community of people who have discussions and share resources and ideas; and 3) a practice, the development of a shared repertoire of resources through sustained interaction of people over time.²² For this study, knowledge within a system was considered an asset; thus, the CoP aimed to bring people together across organizational and geographic boundaries to support co-learning and performance.^{22,23} Site project leaders and/or other representatives involved in the project attended the monthly online sessions, creating the format for inter-organizational collaboration. Sites were invited to suggest topics of interest for CoP discussions.

The PHEP-QI workshop sessions were scheduled monthly and synchronously, with a planned summer break. They were designed with dedicated intervals between workshops so sites could work on their preparedness priorities, project and activities between sessions using QI methods, while receiving site-specific QI coaching support in the interim (see Implementation Support component). Within the workshops, there were opportunities for sites to present their current state of implementation; discuss challenges; problem-solve; and co-learn to assist in their site's project and activities. The sites were engaged in scheduling decisions to maximize participation. Integrated with the Implementation Support component further described below, pre-reading materials were sent to attendees via email one week prior to each workshop to allow sufficient time for review. Zoom videoconferencing computer software was used to host the workshop series for large group discussion and small group discussion using virtual breakout rooms.²⁴

3. Implementation Support

Implementation Support aimed to reinforce the QI lens of the intervention and to facilitate and enable project/activity progress at sites. Support included online information and resources, tailored CoP discussion, and site-specific coaching. Online information and resources were primarily disseminated as pre-reading material for each online workshop, including learning objectives, a lesson plan, and suggested resources identified by both the webinar speaker and QI expert. Within each workshop, interactive CoP discussions aimed to support advancing site projects with principles of QI in mind. These QI-informed CoP discussions were led as a large group discussion by an Implementation Science and QI expert (M.L.) and in select workshops were further supported by facilitators in small group settings. After each workshop, attendees from each site received additional resources related to the topics discussed and recommended exercises to complete prior to the next workshop. Feedback and site-specific coaching with the QI expert (M.L.) was offered for each site to tailor support for QI and site progress.

Support to inform priority-setting and the use of evidence in site project/activities included the SIM report described above, meetings with the Principal Investigator (Y.K.) and study research coordinator (S.O.) to discuss potential framework element and indicator selections and support related to the framework and indicators,¹⁸ and consultations upon request to support refinement or iterative changes to selections and priorities over the course of the pilot.

4. Collaboration

Collaboration as a component of the intervention was embedded in the other components and cut across the intervention. Resilience-building and collaborative outcomes are important in moving knowledge to action and from a training perspective, closely align with adult learning principles.²³ The collaborative structure of the SIM consultations created a foundation for intra-organizational collaboration for the intervention.¹⁵ Small and large group collaboration was incorporated through

workshops and the CoP towards collaborative learning across organizations and at the public health system level. Collaboration approaches aimed to support the development of project teams focused on creating change within sites on PHEP priorities (intra-organizational collaboration), while also creating a forum for peer support and exchange of ideas across organizations related to PHEP (inter-organizational collaboration).

3. Results

In this section, we describe the outputs of co-creation and pilot-implementation of the multi-component PHEP-QI intervention with five public health agencies over 19 months in 2023–2024. A conceptual timeline figure to visualize the implemented PHEP-QI multi-component intervention was developed using Microsoft Copilot (version dated July 2026) and is displayed in Fig. 3.

3.1 Priority-setting Consultation

Five SIM consultations were completed (two in-person, three virtual) over five months. The qualitative data from the SIMs with each site were transcribed and checked for accuracy. Using the analytic process for thematic analysis outlined by Braun and Clarke (2022),²⁵ we explored how experiences across the sites varied, and/or were similar for the COVID-19 pandemic, as well as the context and priorities for QI which informed the broader evaluation. Through the SIM process and upon review of the SIM report and discussions at sites with interest holders and decision-makers, each site chose one of the eleven Resilience Framework elements and up to three corresponding indicators as a priority to focus on for the next phase of the intervention. Further details on the selected element and indicator(s) and SIM data analysis will be reported in the evaluation paper.¹⁶

3.2 Educational Workshops and Implementation Support: Co-Creating a Curriculum

The output of the co-creation process for the workshop series is described below. This resulted in a co-developed curriculum of workshops each with accompanying online resources and information as supports (e.g. QI resources, post-workshop exercises), reflecting two overlapping components of the PHEP-QI intervention.

Feedback was collected from intervention participants at the beginning of the workshop series to clarify goals for curriculum PHEP-QI development. Initial feedback on webinar topics demonstrated that most workshop series participants (77%) indicated an interest in topics related to PHEP, not solely QI methods and supports. PHEP content interests were further explored during Workshop 2, where attendees were asked to indicate an interest in specific PHEP topics including public health ethics, community engagement, an Indigenous lens on preparedness, elements of the framework related to resilience, sustaining change, leadership for preparedness, and after-action reviews. All topics were selected by at least one attendee with the greatest interest in leadership for preparedness and after-action reviews. The

research team used this information to refine the webinar curriculum topics and corresponding speakers for the workshop series. The research team also asked the participants via email about additional resources or tools that they would like to review to support their learning and project implementation.

As part of the iKT approach, the Knowledge User Steering Committee was engaged as part of final refinement of the workshop curriculum to provide input. With this lens and after review of the planned curriculum, the Committee noted equity-informed preparedness approaches had not been explicitly covered, discordant with their experiences from the COVID-19 pandemic. Accordingly, the Committee suggested augmenting the curriculum with a workshop on equity-informed approaches to preparedness and/or response to address this gap. This workshop topic suggestion was further refined with Committee members to focus on community partnership. Specifically, the Resilience Framework for PHEP element Community Engagement was used to inform workshop planning to support sites' reflections on community partnerships with Indigenous communities aligning with Community Engagement indicator #4, *The public health agency and/or its network partners engage with Indigenous communities regarding emergencies and related risks. Engagement may include community-specific risk assessments, plans and/or protocols and inclusion of Indigenous knowledge where possible and appropriate.*⁵

All topics of interest to the participants were covered or planned as a workshop except for After-Action Reviews which was addressed by sharing educational resources. The Principal Investigator's (Y.K.) expertise in After-Action Reviews was leveraged to collate resources pertaining to After-Action Reviews and distribute to sites via email.

3.3 Educational Workshops and Implementation Support: Overview of Implementation

The workshops began approximately five months after the last SIM consultation and spanned nine months (see Fig. 3). The series consisted of eight synchronous online sessions, 90 minutes in length. In this section, we provide an overview of the implemented workshops. Following each workshop description is a table containing a high-level overview of the webinar and CoP topics from PHEP-QI pilot-implementation. Additional details of workshop implementation specifically attendance by site and workshop topic are available in Additional File 2. A detailed description of each workshop with corresponding resources is in Additional File 3.

Workshop 1: Quality Improvement and Key Concepts Relevant to PHEP (Part 1)

For the first PHEP-QI workshop, the research team covered topics related to PHEP and QI to lay the foundation for facilitated implementation of PHEP strategies using QI. The level of QI knowledge and experience was explored for each site prior to introducing QI activities, to support tailoring of subsequent workshops and resources to the needs of the group. We enquired about topics of interest for the group and presented basic principles and practices related to QI. This approach of co-creating and

improving on the workshop over the course of the intervention allowed the team to identify and integrate important topics for participants to support the meaningfulness of the training.

During Workshop 1, the QI expert (M.L.) provided an overview of the QI process and evidence about QI in a public health setting. During the CoP portion, site groups were introduced to the QI Project Charter, a guiding document to help develop and structure their projects, as well as guidance related to measuring QI.^{26,27} In virtual breakout rooms, smaller project groups worked together to identify components of the project charter using the suggested resources, and they continued to do so as a post-workshop exercise. Importantly, if groups indicated their organization had its own approach/templates to support project charter development, they were encouraged to use the approach that aligned best with their work environment.

Table 1

Table 1
Overview of PHEP-QI Workshop 1

Workshop 1: Quality Improvement and Key Concepts Relevant to Public Health Emergency Preparedness (Part 1)	
Webinar	• Presentation by a QI expert on foundational QI concepts relevant to PHEP • Attendee feedback was solicited to help with the development of the workshop series curriculum
Community of Practice	• The QI expert reviewed resources on how to develop a project charter • Attendees were placed in breakout rooms with their site groups to begin discussing their project charter
QI Resources	• Institute for Healthcare Improvement. (2018). <i>Quality improvement project charter</i>.²⁷ • Health Quality Ontario. (2013, April). <i>Quality improvement primers: Measurement for quality improvement</i>.²⁶

Workshop 2: Quality Improvement and Key Concepts Relevant to PHEP (Part 2)

The second workshop webinar presentation, given by a QI expert (M.L.), focused on the Model for Improvement and Plan-Do-Study-Act (PDSA) cycles. Following the presentation, attendees moved to virtual breakout rooms with group members from other organizations and exchanged updates on their project development. This presented an opportunity for attendees to ask questions and learn from each other to support project development. Attendees were provided with PDSA templates to begin developing their first PDSA cycle.^{28,29} Groups were asked to begin developing their plans for a PDSA cycle as a post-workshop exercise.

Table 2

Table 2
Overview of PHEP-QI Workshop 2

Workshop 2: Quality Improvement and Key Concepts Relevant to Public Health Emergency Preparedness (Part 2)	
Webinar	• Presentation by a QI expert on the Model for Improvement and Plan-Do-Study-Act (PDSA) cycles • Attendee feedback solicited to clarify interest for future workshop topics related to PHEP, and on their experiences in developing the project charter
Community of Practice	• Attendees were placed in mixed site breakout rooms to share their project charter progress • Attendees were placed in breakout rooms with their site to begin discussing PDSA cycles for their projects
QI Resources	• Health Quality Ontario. (n.d.). <i>PDSA: Plan-Do-Study-Act instruction</i>.²⁸ • Institute for Healthcare Improvement. (2017). <i>QI essentials toolkit: PDSA worksheet</i>.²⁹

Workshop 3: Bringing Indicators to Life

In Workshop 3, an expert in performance measurement (A.B.) delivered a presentation on the use of indicators for PHEP readiness in public health. During the CoP portion of the workshop, the QI expert (M.L.) continued to provide education and resources for QI project implementation. Attendees participated in a mix of large group activities and small group discussions and engaged in opportunities to share their progress.

Table 3

Table 3
Overview of PHEP-QI Workshop 3

Workshop 3: Bringing Indicators to Life	
Webinar	• An expert in performance measurement delivered a presentation on the use of indicators for readiness in public health
Community of Practice	• In a large group format, one group member from each site was asked to share an update on project charter and/or PDSA cycle progress • A QI expert demonstrated the utility of additional QI tools and exercises which could be used to support their projects, including a Waterfall activity, Triz, and Impact Matrix
QI Resources	• American Society for Quality. (n.d.). <i>Quality tools</i>.³⁰ • American Society for Quality. (n.d.). <i>What is an affinity diagram</i>.³¹ • American Society for Quality. (n.d.). <i>Impact effort matrix</i>.³²

Workshop 4: Using Data to Inform Change

For the fourth workshop, the webinar was presented by public health practitioners who have expertise and experience in data literacy and QI. Presenters for workshop 4 were part of the Knowledge User Steering Committee, leveraging broader expertise and experience with the framework and indicators from the field. The presentation focused on using data to evaluate a public health agency’s response to the COVID-19 pandemic,¹¹ how the Resilience Framework for PHEP and indicators can be used for evaluation, and how to action learnings.

Table 4

Table 4
Overview of PHEP-QI Workshop 4

Workshop 4: Using Data to Inform Change	
Webinar	• An expert in data literacy and QI and a public health practitioner delivered a presentation about using data to evaluate a public health unit’s response to the COVID-19 pandemic, and how to implement learnings
Community of Practice	• In a large group format, one group member from each site was asked to share any facilitators and barriers encountered to-date • Attendees were placed in breakout rooms with their site to begin brainstorming project plans for the next four months, including: - o What are the PDSA cycles that you would like to engage in by the end of the workshop series? - o What is possible to achieve by the end of the workshop series?
QI Resources	• Law, M. P., Muhl, C., McElhone, S., Smith, R. W., Patte, K. A., Khowaja, A., Hannell, S., James, L., Rowe, R. K., Orlando, E., Morrish, J., Mechelse, K., James, N., Mateus, L., & Magier, M. (2022). Data literacy. In <i>Driving change in the health sector: An integrated approach</i> (pp. 5–68).³³

Workshop 5: Leadership and Sustaining Change in Emergency Management

Exceptionally for the fifth month of the intervention, we hosted two workshops. The first workshop was presented by a former senior leader and scientific advisor with expertise in PHEP (B.S.). A presentation about leadership in public health and sustaining investment in emergency preparedness was delivered. This was followed by the QI presentation and CoP discussion related to the sustainability of QI.

Table 5

Table 5
Overview of PHEP-QI Workshop 5

Workshop 5: Leadership and Sustaining Change in Emergency Management	
Webinar	• A former senior leader and scientific advisor in public health emergency preparedness delivered a presentation about leadership in public health and sustaining investment in emergency preparedness
Community of Practice	• A QI expert delivered a brief presentation about sustainability • Attendees were placed in breakout rooms with their site to reflect on project sustainability
QI Resources	• Health Quality Ontario. (n.d.). <i>Sustainability planner instruction sheet and tool</i>.³⁴

Workshop 6: Recovery and System Resilience

Workshop 6 signified the last workshop prior to a three-month break (coinciding with the summer months) where attendees were asked to continue to progress project implementation at their sites. The webinar was presented by an expert in applying asset-based approaches to support community resilience in disaster contexts (T.O.), who delivered a presentation about resilience-thinking and the use of an asset lens to support recovery. During the CoP, attendees presented on their project aim statement, intervention measures, summer goals, and goals for the end of fall 2024 (coinciding with the end of the workshop series). This element of the workshop was designed to support accountability for project progress. During the pause in workshops that followed workshop 6, the research team continued to offer consultation to the participating sites upon request, to facilitate project implementation.

Table 6

Table 6
Overview of PHEP-QI Workshop 6

Workshop 6: Recovery and System Resilience	
Webinar	• An expert in applying asset-based approaches to support community resilience in disaster contexts delivered a presentation about resilience thinking and the use of an asset lens to support recovery
Community of Practice	• In a large group format, one group member from each site was asked to present an update on the status of their project, including: - o The aim statement of this project is... - o Our intervention includes... - o By the end of summer, we hope to achieve... • By the end of fall 2024 we hope to achieve...
QI Resources	• No additional resources were provided for this workshop.

Workshop 7: Sharing Community Partnership Experiences for Readiness and Response to Public Health Emergencies: Spotlight on Evacuations

The webinar for the seventh workshop focused on opportunities for strengthening and sustaining community partnerships through evacuation response experiences. The webinar included two presenters from the Knowledge User Steering Committee: a leader of an Indigenous-led organization dedicated to strengthening health and social outcomes, and a leader from a local public health agency with expertise in local public health emergency management and experience partnering on evacuation responses. This webinar highlighted the importance of partnerships with community and external organizations, such as those with Indigenous communities, and approaching emergency preparedness work with cultural safety.^{35,36} The CoP discussion focused on having sites reflect on relevant partners in relation to their projects and more broadly on approaching QI work with an equity lens. In a large group format, the CoP discussion was facilitated by a QI expert (M.L.) and the sites shared reflections with the group.

Table 7

Table 7
Overview of PHEP-QI Workshop 7

Workshop 7: Sharing Community Partnership Experiences for Readiness and Response to Public Health Emergencies: Spotlight on Evacuations	
Webinar	• An Indigenous organization leader dedicated to strengthening health and social outcomes and a leader in local public health emergency management provided perspectives on evacuation experiences and opportunities for strengthening and sustaining community partnerships
Community of Practice	• A QI expert delivered education related to equity and performance improvement • In a large group format, attendees were asked to reflect on health equity in relation to emergency preparedness work generally, and more specifically in relation to their projects
QI Resources	• Ganz-Lord, F. A., Beechner, P., Wnorowski, M., Asante, D., Johnson, K., Bianco, J., Gazivoda, S., & Forest, S. K. (2024). Equity and performance improvement: A novel toolkit that makes using an equity lens the default. <i>The Joint Commission Journal on Quality and Patient Safety</i> , 50(1), 75-82. ³⁷

Workshop 8: Community of Practice Knowledge and Experience-Sharing

Workshop 8 was the final session in the nine-month workshop series. Each site was allocated 10–15 minutes to present a final update to the large group and ask/answer any questions. The final presentation from each group consisted of sharing the project aim statement, progress to-date (update on whether they achieved their summer and fall goals), successes and challenges, and future plans including ideas for supporting the sustainability of their projects moving forward. The QI expert (M.L.) provided final suggestions and strategies to support continued project progress and sustainability beyond the scope of this study.

Table 8

Table 8
Overview of PHEP-QI Workshop 8

Workshop 8: Community of Practice Knowledge and Experience Sharing	
Webinar	• No webinar presentation for this workshop
Community of Practice	• Each site delivered a 10 minute presentation on their project and answered questions from attendees • The QI expert and study lead moderated the session and completed a final reflection on the workshop series
QI Resources	• No additional resources were provided for this workshop.

4. Discussion

This paper provides a high-level overview of the PHEP-QI intervention that was co-created and implemented to facilitate the advancement of priorities for PHEP in public health organizations. The co-creation process was anchored in CBPR and iKT and included knowledge users across Canada at participating pilot sites and a Knowledge User Steering Committee providing their input at key study milestones.

Unique to this work is the focus on grounding the intervention in an evidence-informed framework, the Resilience Framework for PHEP, and corresponding indicators to support thinking about “where to start”. Using the Resilience Framework for PHEP and indicators allows organizations to consider their own assets, challenges and gaps in their preparedness. The previous development of the framework and indicators enabled grounding of the intervention in evidence.^{4,5} With the backdrop of COVID-19 pandemic recovery and through reflection on the framework and their public health preparedness and response efforts, the teams at each organization used recent experience and understanding to determine gaps and opportunities. Harnessing this experience, together with the clear need to make improvements in emergency preparedness to build resilience for future responses, was instrumental in the development of the educational workshops, enhanced by the relevance and willingness of teams to engage in improvement work.

Another strength of the co-creation approach with knowledge users was the adult learning principles underpinning the training which supported reflection on current state and requirements for learning. Engaging the project teams in thinking about their training needs and having an interdisciplinary research team and experienced knowledge users that could respond to training needs, enabled flexible adaptation as the workshop progressed and ensured that the training was relevant and timely for participants. The co-creation approach is important in adult education approaches to engage learners and support their use of skills and knowledge.^{19,20} Public health agency staff often operate with limited time and resources for advancing their learning. Integrating adult learning principles to ensure that

training and capacity-building investments are effective and efficient, and relevant to their role (E.g. integrating PHEP and QI topics) is crucial given the competing priorities faced by staff in front-line public health agency roles. In addition, the team structured the intervention in a way that included multiple learning methods which support enhanced learning. The team provided pre- and post-workshop readings, videos, templates, didactic presentations, guest speakers supporting practice implementation of core concepts, collaborative-sharing environments as well as just-in-time coaching. This approach allowed for self-directed and problem-focused learning, while accommodating individual learning preferences (i.e., readings, peer interaction) and drawing on real-world experiences of participants.^{19,20,38} For organizations looking to implement a similar intervention, the workshop series presented here can be used as a guide and template that can be adapted to the learning needs of different participants.

Moving forward, it would be beneficial to further expand on this intervention across public health organizations to help increase our understanding of how best to improve PHEP through QI methodologies. In Canada, strong support for the adoption of QI in public health is reflected in the Public Health Agency of Canada's revised Core Competencies for Public Health of which use of "quality improvement approaches to plan, implement, evaluate, modify and improve programs, services and actions" is one of the core areas.³⁹ Capitalizing on important competencies for the field, together with the collective understanding of the importance of emergency preparedness in the years after the COVID-19 pandemic, creates an opportune time to further develop and move forward with this type of QI training in public health organizations towards enhancing PHEP at the organizational level.

5. Conclusion

The co-creation of the PHEP-QI intervention is an important contribution to advancing the use of QI in public health systems, given the gap in adoption of QI in public health practice compared with clinical settings. Further, both co-creation and implementation of the PHEP-QI intervention demonstrate how QI can be integrated in practice to support system resilience to emergencies and enhance PHEP practice. Use of QI and commitment to improvement can support public health organizations' credibility, trust and leadership, in the post-COVID-19 pandemic landscape. As health systems aim to ensure learning is incorporated into continuous organizational processes,⁷ the developed and piloted intervention represents an important contribution to approaches to learning health systems inclusive of public health. An evaluation of the pilot with five public health organizations in Canada will add insights on implementation.

Abbreviations

CBPR

Community-Based Participatory Research

CoP

Community of Practice

COVID-19

Coronavirus Disease 2019

PHEP-QI

Public health emergency preparedness and quality improvement

iKT

Integrated knowledge translation

KUs

Knowledge Users

PDSA

Plan-Do-Study-Act

PHEP

Public Health Emergency Preparedness

SIM

Structured Interview Matrix

Declarations

Ethics approval and consent to participate.

Ethics approvals were obtained from Public Health Ontario Ethics Review Board (primary) and other relevant ethics review boards for this study in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research involving Humans. All participants provided informed consent to participate in individual-level data collection activities.

Consent for publication.

Not applicable.

Competing interests.

The authors declare that they have no competing interests.

Clinical Trial Number:

Not applicable.

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Author Contribution

Y.K., T.O., B.S., A.B. and M.L. conceptualized the study. Y.K., T.O., S.O. and M.L. developed the methodology. Y.K., T.O., S.O. and M.L. conducted formal analysis. T.O., S.O., B.S. and A.B. provided validation of findings. Y.K., T.O., S.O. and M.L. wrote the original draft. Y.K., T.O., S.O., B.S., A.B. and M.L. provided review and editing of drafts. All authors reviewed and approved the final version of the manuscript.

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Data Availability

All data generated or analysed during this study are included in this published article. Additional data insights used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Figures

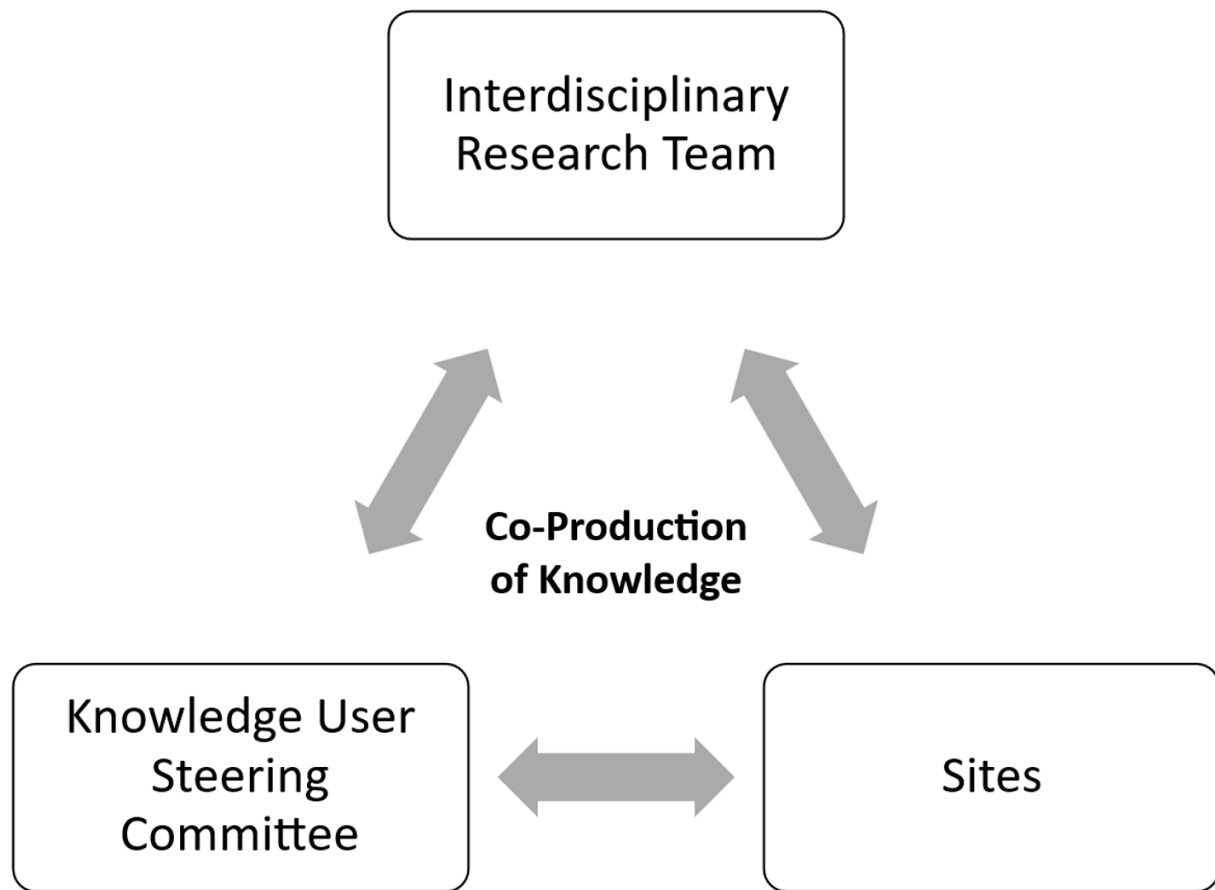


Figure 1

Illustration of Integrated Knowledge Translation Approach for Study

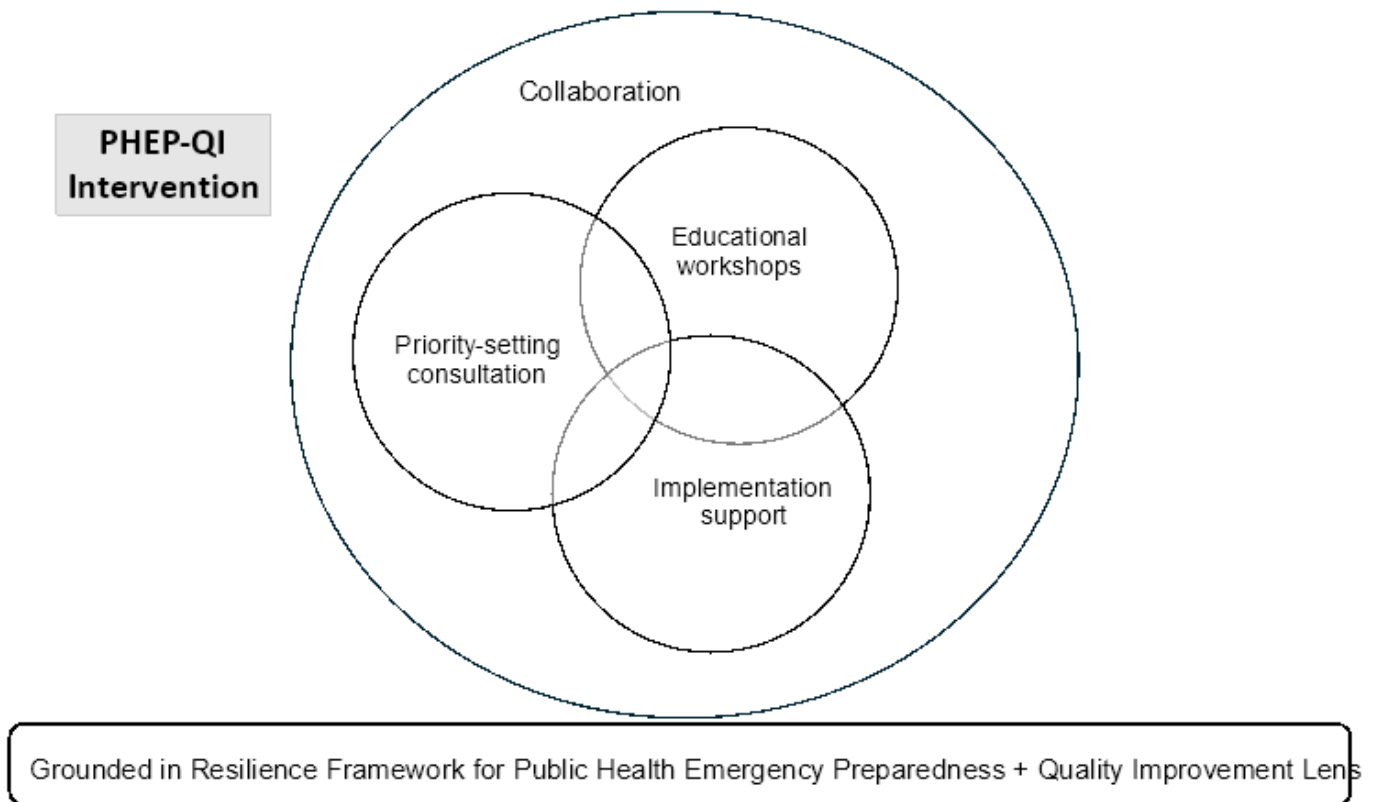


Figure 2

Visual Representation of Public Health Emergency Preparedness and Quality Improvement (PHEP-QI) Intervention

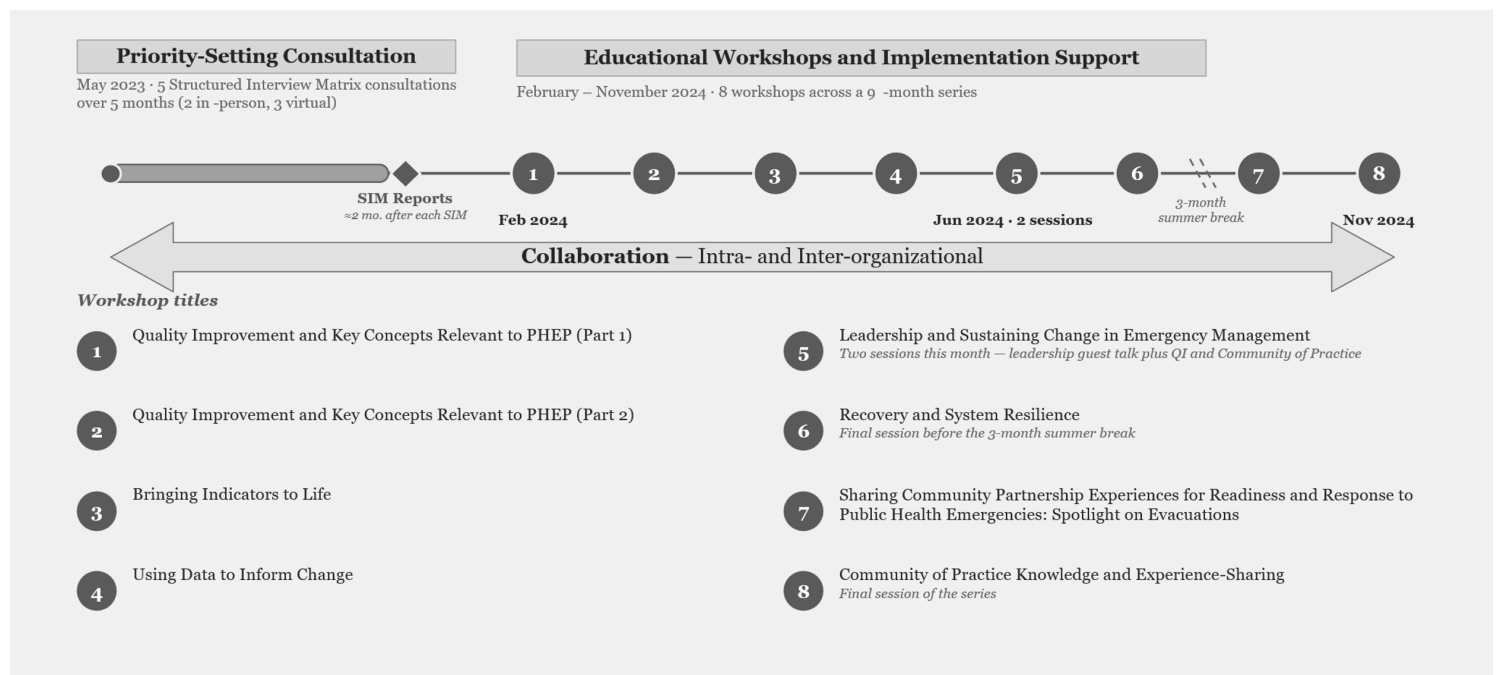


Figure 3

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