International Journal of Paramedicine

Published by the National EMS Management Association (USA)

RESEARCH REPORTS

GATHERING EVIDENCE FOR MODIFYING PARAMEDIC PRACTICUM WITH SIMULATION: A PAN-CANADIAN SURVEY

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Recommended Citation: Violato, E., Lea, J., & Rauschning, B. (2025). Gathering evidence for modifying paramedic practicum with simulation: A pan-canadian survey. *International Journal of Paramedicine*. (13). 85-103. https://doi.org/10.56068/KDMU0573. Retrieved from https://internationaljournalofparamedicine.com/index.php/ijop/article/view/3480

Keywords: simulation-based education, high-quality simulation, clinical practicum, health workforce, competency assessment, emergency medical services, EMS, paramedicine

Disclosures: The authors have no disclosures or conflicts of interests to declare.

Funding: External funding was not used to support this work.

Received: August 18, 2025
Accepted: November 16, 2025
Published: January 13, 2026

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ABSTRACT

Clinical practicum placements are a cornerstone of paramedic education, yet Canadian programs consistently face challenges in securing sufficient, high-quality placements due to workforce shortages, increasing student enrolment, and logistical constraints. Simulation-based education (SBE), particularly high-quality simulation (HQS), has demonstrated effectiveness as a partial replacement for clinical time in other health professions, but its role in paramedicine remains underexplored. This study conducted a national needs analysis to assess current perceptions, gaps, and opportunities for integrating HQS into paramedic training as a supplement or replacement for practicum.

A cross-sectional survey was distributed across Canadian paramedic programs and professional networks between March and June 2025. Fifty-seven respondents representing multiple provinces and diverse professional roles completed the survey. Quantitative data were analyzed using descriptive and inferential statistics, and qualitative data were thematically analyzed.

Findings revealed that while practicum remains highly valued, significant gaps exist, including inconsistent preceptor engagement, variable case exposure, and limited opportunities to assess rare, high-acuity, low-occurrence (HALO) events. Respondents reported that simulation is already widely used (88%), though fewer institutions are implementing HQS (63%). Simulation was most valued for teaching technical skills, assessment and diagnostics, and communication. A plurality of respondents agreed that HQS could replace some practicum time, with an ideal curriculum balance approximating 50% SBE and 50% practicum. However, real patient interactions, cultural complexity, and communication under stress were consistently viewed as irreplaceable. Barriers identified included student buy-in, instructor readiness, and resource constraints.

This study provides the first pan-Canadian evidence of educator and stakeholder perspectives on using HQS to modify paramedic practicum. Results suggest that HQS has significant potential to address gaps in practicum by standardizing learning opportunities and enhancing competency development. Future research should examine targeted competencies and best practices for systematically integrating HQS as a partial practicum replacement.

INTRODUCTION

Clinical practicum placements are a cornerstone of paramedic education, providing students with essential real-world experience necessary for developing clinical competence, deci-

sion-making abilities, and professional skills (Brown et al., 2025). Paramedic students rely on these placements to become ready to enter professional practice, while educators rely on practicum to assess student competence (Batt et al., 2025; Brown et al., 2025). However, paramedic programs in Canada and globally consistently face significant challenges in securing sufficient practicum spots for students. These challenges stem from logistical constraints, limited clinical sites, and growing student enrolment, factors that can jeopardize the quality and consistency of paramedic training (Bellefontaine, 2023; National Union of Public and General Employees (NUPGE, 2023).

Simulation-based education (SBE) may be a modality that can address the clinical practicum challenge. SBE involves using diverse modalities, ranging from standardized patient encounters and high-fidelity manikin simulations to virtual and screen-based platforms to provide learning experiences that replicate the clinical environment with appropriate verisimilitude for the level of learner (Bienstock et al., 2022; Oshust et al., 2025). Evidence from multiple healthcare disciplines, particularly nursing and medicine, demonstrates that high-quality simulation (HQS) can effectively replace a substantial proportion of clinical hours without compromising student competency or patient safety (Bogossian et al., 2019). HQS is SBE that is designed and supported by evidence-based best practices and guidelines with clear educational goals, facilitated by trained instructors, to enhance learner outcomes and ensure safety in healthcare training (Hayden et al., 2014). In a landmark study in nursing, it was found that up to 50% of clinical time for nursing students can be replaced with HQS (Hayden et al., 2014). Research in other professions, from medicine to occupational therapy, has similarly found the HQS can be used to replace clinical time (Bogossian et al., 2019). Simulation may provide advantages over traditional clinical time in certain areas, such as inter- and intra-professional communication and collaboration (Bogossian et al., 2019). Based on the accumulating evidence and professional consensus, using HQS to augment, supplement, or replace portions of practicum time appears to be a potentially viable educational method worthy of exploration in paramedicine (Bridge et al., 2022).

Despite findings in other healthcare disciplines, evidence directly addressing the feasibility and effectiveness of simulation as a replacement or supplement to clinical practicum in paramedicine is limited. A recent systematic review examining available literature specifically related to paramedicine found minimal research investigating practicum replacement with simulation (Violato et al., 2025). The three existing studies found suggested receptivity among paramedic educators and students toward partial replacement of practicum time with simulation, particularly in scenarios involving high-acuity, low-frequency events and critical interpersonal or communication skills (Violato et al., 2025). It was also found that simulation is currently being used to replace some portions of practicum experience or to fulfill competencies not met during practicum (Violato et al., 2025). However, the existing research is descriptive and lacks an in-depth examination of replacing clinical hours with simulation, leaving a significant gap in the evidence. The shortage of studies indicates a need for further investigation of HQS to replace practicum time in paramedicine. To guide investigation and design studies to directly investigate the replacement of practicum time systematically, it is necessary to understand current perceptions of the concept, gather insights, and determine what aspects of paramedic practicum are most amenable to replacement.

To address this knowledge gap and assess the potential for HQS replacement, the current study was designed as a national needs analysis to gather expert input from educators and stakeholders within Canadian paramedic training programs. Specifically, the objectives of this study are to:

1. Evaluate receptivity toward engaging in the implementation of simulation-based clinical replacement.
2. Understand perceptions regarding the effectiveness of current clinical practicum experiences, including perceived strengths, weaknesses, and overall adequacy for preparing students for professional practice.
3. Explore views on the effectiveness and utility of simulation-based education for both skill development and competency assessment.
4. Identify competencies considered by educators as either appropriate or inappropriate for replacement or supplementation via SBE, thus establishing clear targets for further research.

METHODS

Study Design

This study employed a cross-sectional survey design, distributed nationally, to conduct a needs analysis, specifically a gap analysis, to assess the current perspectives and educational needs related to practicum and simulation in paramedic education. The survey was used to identify if and how simulation could be used to replace clinical time in paramedicine. The survey was constructed de-novo to address the current state of clinical practicum and SBE in paramedic programs, an ideal state for the use of SBE, and gaps in clinical practicum and SBE for training paramedics. The survey was pilot tested with input from paramedic educators and was estimated to require approximately 20 minutes for completion. The survey included a combination of ranking, closed-ended, and open-ended questions designed to gather quantitative and qualitative data on perceived educational gaps.

Competencies and aspects of practice were derived from the 2011 National Occupational Competency Profile for Paramedics (NOCP), with a 2014 addition on the use of high-fidelity simulation to supplement evaluation of specific competencies in the clinical or preceptorship performance environments (Paramedic Association of Canada, 2011, 2014). There has since been an update to the NOCP competency profile that was not available at the time of development. The prior NOCP, generally, can be mapped to the new NOCP. To provide a common conception of the constructs being addressed, definitions were provided for simulation-based education, high quality simulation, and replacing practicum with simulation (see Supplemental Materials). Ethics approval was provided by the Northern Alberta Institute of Technology Research Ethics Board (REB#: 2024-27).

Sample and Distribution

Direct and snowball sampling targeted educators and administrators in paramedic programs across Canada. A search was conducted to estimate the number of paramedic programs in Canada. Programs listed on Accreditation Canada and CourseCompare.ca were extracted and cross-referenced, producing a list of 35 paramedic programs across Canada (Accreditation Canada, n.d.; Paramedic Programs, n.d.). Respondents from as many schools as possible were targeted, aiming for a response rate of approximately 50%

(16 schools) from at least six provinces. Distribution was extended beyond schools to include Colleges of Paramedicine, professional networks, and associations, as well as direct distribution to individuals. While a minimum of 16 responses was targeted, as many respondents as possible were included; as such no upper bound on responses was set. Due to the use of snowball sampling and distribution through organizational emails, it is not possible to determine the exact distribution rate. It was expected that this sampling frame would adequately cover the range and diversity of paramedic programs in Canada and the different perceptions and experiences with simulation. The survey was administered using Qualtrics (Qualtrics, 2024). An invitation to participate, along with a link to the survey, was sent via email to potential respondents. Upon accessing the survey link, participants were first directed to an informed consent page. All participants provided informed consent. Data was collected from March to June 2025.

Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics to identify patterns and trends related to using simulation to replace/augment clinical practicum. Qualitative responses were analyzed using thematic analysis to identify recurring themes and insights into the educational needs of the target population. Both data forms were synthesized to provide a comprehensive picture of the current educational landscape and potential areas where HQS can be most readily implemented.

RESULTS

Sample

Fifty-seven participants provided adequate data for inclusion in the study. The survey had an average completion rate of 77.7% (SD = 31.4%), ranging from 25% to 100%, with most incomplete items being constructed response items. Participants spent a median of 29 minutes completing the survey, indicating careless responding was not an issue.

Geographically, the majority of respondents were from Alberta (n = 24, 42.1%), followed by Ontario (n = 8, 14.0%), Manitoba and Saskatchewan (n = 6, 10.5% each), British Columbia (n = 5, 8.8%), Nova Scotia (n =4, 7.0%), New Brunswick (n = 3, 5.3%), and Quebec (n = 1, 1.8%).

An educational role related to direct instruction was reported by 82.5% (n = 47) of respondents, while 17.5% (n = 10) indicated another role in paramedic education. Other roles were categorized as regulatory and accreditation, instructional and curriculum development, leadership, and student coordination.

Thirty-nine (69.6%) participants reported currently practicing as a paramedic, while 17 (30.4%) indicated they were not currently practicing. Among current practitioners, most identified as on-road frontline paramedics (n = 20, 51.3%), with others serving in managerial, or administrative capacities (n = 11, 28.2%), supervisory roles (on road with PRU; n = 4, 10.3%), hospital-based emergency paramedics (n = 2, 5.1%), and industrial paramedics (n = 2, 5.1%). Of those not currently practicing, ten indicated previous paramedic practice, all as on-road frontline paramedics, with the last year of previous practice ranging from 2011-2023.

Respondents' primary employers were Public Post Secondary Institutions (n = 25, 43.9%), followed by a Public Health Service (n = 18, 31.6%), Private Paramedic Service (n = 4, 7.0%), Private Post Secondary Institution (n = 4, 7.0%), and other (n = 6, 10%). Other included regulatory colleges, integrated fire services, and graduate education. Fourteen respondents (24.6%) indicated currently working as preceptors. Of the 43 not currently working as preceptors, 36 (83.8%) had previously worked as a preceptor, with the last year of precepting ranging from 2005-2024.

Professions Trained

Respondents most frequently reported working at institutions that trained two (n = 20) or three (n = 15) professions, with others indicating training one (n = 11), four (n = 4), and five (n = 3) professions. Professions trained included Primary Care Paramedics (PCP, n = 49), Advanced Care Paramedics (ACP, n = 42), Emergency Medical Responders (EMR, n = 23), Critical Care Paramedics (CCP, n = 8), and Medical First Responders (MFR, n = 5).

Following a similar pattern, most respondents were involved in training PCP (n = 42), ACP (n = 29), EMR (n = 14), MFR (n = 5), and CCP (n = 3). Respondents frequently reported training multiple professions (n = 32), with twelve indicating only training PCPs.

Simulation Experience

Forty-three participants (76.8%) reported being involved in conducting simulations, with 40 (71.5%) participants involved in preparing simulations. Conducting simulations primarily involved facilitation pre/debriefing with other responses, including evaluation and assessment, and technical support. For those involved in preparing simulations, most respondents indicated being involved in simulation design and writing, followed by coordination and scheduling. Other responses included oversight and leadership, quality assurance, and review.

Current State

Practicum Experience

Participants indicated that the average number of weeks of practicum for students they instruct was 10.7 weeks (SD = 7.13, Median = 10.0, Range = 0 -25). Participants were evenly split (23/23) on whether this was an adequate number of weeks, with a mean ideal number of weeks of practicum being 15.7 weeks (SD = 7.79, Median = 15.0, Range = 2-25).

The value of practicum for teaching aspects of paramedic practice was rank-ordered (Table 1). The value of practicum for teaching various aspects of paramedic practice based on average rank was evenly distributed for most aspects of practice, with a difference of only 0.67 for the top 5. For the rank ordering of teaching and assessing different competencies, average ranks were again closely grouped, with consistent competencies comprising the top and bottom ranks across both areas.

When considering what could only be assessed during practicum and could not be assessed using HQS, Integration was most frequently indicated (n = 21), followed by Professional Responsibilities (n = 16), Transportation, Communication, Health Promotion, and Public Safety (n = 15). Assessment and Diagnostics (n = 6) and Therapeutics (n = 5), which were ranked as the competencies for which practicum was most valuable to teach

and assess, were the lowest ranked for only being able to be assessed in practicum, indicating that relative to the other competencies, these competencies may be more amenable to assessment in simulation.

Simulation Use

All participants agreed with the definitions of SBE and HQS that were provided. While 88.1% of respondents indicated that their institutions use SBE, according to the definition provided, only 62.5% thought that their institutions use HQS. Simulation-based education was estimated on average to comprise 34.2% (SD = 20, Median = 30, Range = 1-91) of the curriculum. The average amount of time spent on SBE during the program was estimated at a mean of 180 hours (SD = 185, Median = 160, Range = 0-800). The majority, 61.3%, indicated that the amount of time for SBE was inadequate, and 38.7% indicated it was adequate. No respondents thought too much time was spent on SBE. Most respondents (86.5%) indicated that if resources were not a constraint, they would increase the amount of simulation time, and 13.5% would keep the same amount of simulation time. No respondents would decrease the amount of simulation time.

The value of simulation for teaching aspects of paramedic practice showed a wider distribution of average rank than practicum, with Practicing the Technical Skills of Paramedicine being the highest ranked (Table 1). Like practicum, simulation was ranked as most effective for teaching and assessing Assessment and Diagnostics, with Transportation and Health Promotion and Public Safety being the lowest ranked (Table 2). Simulation was used for a variety of purposes within programs, with the most common being Experiential Learning and the least common being Competency Assessment, exclusive of Practicum (Table 3).

		Average Rank	Final Rank
Practicum	Practicing the communication skills of paramedicine	3.22	1
	Practicing the technical skills of paramedicine	3.72	2
	Understanding the practical day-to-day work of paramedicine	3.81	3
	Understanding expectations and requirements of paramedicine	3.89	4
	Understanding professionalism in paramedicine	3.89	4
	Practicing the interpersonal (emotional intelligence) skills of paramedicine	4.06	6
	Understanding how paramedicine operates in the healthcare system	5.42	7
Simulation	Practicing the technical skills of paramedicine	1.82	1
	Understanding expectations and requirements of paramedicine	3.24	2
	Practicing the communication skills of paramedicine	3.30	3
	Understanding the practical day-to-day work of paramedicine	4.12	4
	Understanding professionalism in paramedicine	4.79	5
	Practicing the interpersonal (emotional intelligence) skills of paramedicine	5.06	6
	Understanding how paramedicine operates in the healthcare system	5.67	7

Table 1. Value of practicum and simulation for teaching aspects of paramedic practice.

	Practicum			Simulation		
	Competency	Average Rank	Final Rank	Competency	Average Rank	Final Rank
Teaching	Assessment and Diagnostics	2.78	1	Assessment and Diagnostics	2.11	1
	Communication	3.1	2	Therapeutics	3.14	2
	Therapeutics	3.73	3	Communication	3.61	3
	Professional Responsibilities	3.88	4	Professional Responsibilities	4.39	4
	Integration	4.23	5	Health and Safety	4.56	5
	Health and Safety	5.1	6	Integration	4.58	6
	Transportation	6.15	7	Transportation	6.58	7
	Health Promotion and Public Safety	7.05	8	Health Promotion and Public Safety	7.03	8
Assessing	Assessment and Diagnostics	1.9	1	Assessment and Diagnostics	2.17	1
	Therapeutics	2.9	2	Therapeutics	2.74	2
	Communication	3.5	3	Communication	3.57	3
	Integration	4.13	4	Professional Responsibilities	4.49	4
	Professional Responsibilities	4.75	5	Integration	4.54	5
	Health and Safety	5.5	6	Health and Safety	5.03	6
	Transportation	5.75	7	Transportation	6.31	7
	Health Promotion and Public Safety	7.58	8	Health Promotion and Public Safety	7.14	8

Table 2. Effectiveness of practicum and simulation for teaching and assessing competencies.

Use of Simulation	Frequency of Responses
Experiential Learning	26
Preparation for Clinical Practicum	22
Meeting competencies not met during Practicum	21
Formative Evaluation	20
Summative Assessment	18
Competency Assessment exclusive of Practicum	18

Table 3. Uses of simulation in paramedic programs.

Ideal State

Amount of Training

A variety of perspectives emerged on the ideal balance between simulation to clinical experience in paramedicine training. The most frequently cited ratio was 1:2, followed by 1:3 and 1:1. In only three responses, simulation was dominant.

When asked the extent to which simulation could be used to develop the professional competencies required for entry to practice, respondents most frequently indicated Quite a Bit and Somewhat (n = 15, 40.5% and n = 16, 43.2%). Participants rarely used the extreme ends of the scale with Completely (n = 3), Not At All (n = 1), and A Little Bit (n = 2) infrequently used.

Respondents indicated that the ideal percentage of SBE for their program would be approximately half of curriculum time (M = 47.5, SD = 15,6, Median = 50, Range = 20-83) with the mean ideal number of SBE hours being 217 (SD = 181, Median = 235, Range = 3-500), almost 40 hours more than the estimated current mean hours of SBE time.

Replacing Practicum Time

Respondents' opinions on whether some practicum time can be replaced with HQS showed varying levels of agreement to disagreement. Fifty percent Somewhat Agreed or Agreed that simulation can replace some practicum time, while 39.5% Somewhat or Strongly Disagreed, 10.5% Neither Agreed nor Disagreed. For the professions for which HQS could most effectively replace some clinical time, responses were approximately evenly distributed across professions: EMR (16), ACP (14), PCP (13), MFR (13), CCP (10).

Gap

Practicum

A slight majority of respondents (58.6%) indicated that there are specific knowledge, skills, or attitudes (KSA) required for entry to practice that clinical practicum is unable to teach, with a broad range of KSAs indicated. Some of the most frequently noted included communication/interpersonal skills, HALO skills, professionalism, emotional intelligence, and cultural and contextual awareness (see Supplemental Table 1 for a full list of KSAs).

Of the respondents who thought there were KSAs that practicum could not teach, a majority (84.2%) thought that simulation could be used to teach some of those KSAs. Some of the most frequently noted KSAs amenable to simulation were communication and teamwork skills, decision-making, situational awareness, professionalism, and HALO events. Several responses emphasized that simulation is valuable because it removes inconsistency, particularly in exposure to rare events and for standardization of preceptor experience level (see Supplemental Table 2 for a full list of KSAs).

Aspects of practicum identified as challenges for students' learning included variable preceptor engagement, inadequate and inconsistent teaching, and a lack of exposure to different calls and "idle time." Assessment challenges included preceptors untrained or undereducated in assessment, a lack of exposure to assess rare or complex skills, and a "luck of the draw" for exposure to cases (see Supplemental Table 3).

Similar to the KSAs, the most frequent struggle for students on practicum was an inadequate opportunity to see certain cases, including HALO-type calls (e.g., intubation/ventilation, labour and delivery, MCI), followed by a lack of preceptor support/inadequate teaching by the preceptor. Conversely, repetitive and one-dimensional call exposure was also included as an issue. Stress management and face-to-face communication were also noted issues (see Supplemental Table 3).

A plurality of respondents (69.2%) thought that simulation could be a solution to many of the issues identified. The most frequent aspects of practicum that were seen to be irreplaceable with simulation were real patient interactions and rapport, communication with patients, families, or colleagues in real contexts, and exposure to emotional, cultural, and social complexity in real patient encounters (see Supplemental Table 4).

Simulation

Students struggled the most with buying into simulation, believing simulation would transfer to "real-life," and low-fidelity decreasing buy-in. Instructors struggled with cre-

ating adequate fidelity to obtain learner buy-in, troubleshooting IT issues, and familiarity with equipment, and facilitating pre-briefing and debriefing sessions. These findings highlight the challenges of technical execution affecting learner perception, emphasizing the need for alignment between the quality of simulation and student experience (see Supplemental Table 5).

The competencies most frequently selected that could never be replaced with simulation, in order, were Communication, Integration, Health Promotion and Public Safety, Assessment and Diagnosis, Therapeutics, Professional Responsibilities, Health and Safety, and Transportation. Respondents overwhelmingly emphasized that real human interaction, especially communication under pressure, cannot be replicated through simulation. Many stressed that simulated urgency lacks emotional and psychological impact, making certain kinds of judgment, empathy, and regulation impossible to fully teach outside of practicum.

When asked to list the biggest challenges that come to mind with replacing clinical time with HQS, respondents provided multiple responses with similar frequency, with the most frequent being: Lack of Real Human Interaction, Cost and Resource Constraints, Fidelity and Realism Issues, Limited Instructor Capacity, Student Engagement, and Buy-in. Least frequently noted was Inadequate Research and Benchmarking (see Supplemental Table 6).

Respondents most frequently Somewhat or Strongly Agreed (78.3%) that practicum offers learning that can not be replicated in simulation, to a lesser extent, respondents Somewhat Agreed (43.2%) or Neither Agreed nor Disagreed (27.0%) that simulation offered learning that can not be replicated in practicum. Almost half the sample (48.6%) Somewhat Agreed that some of the learning that occurs during practicum could be replaced with simulation, with only 18.9% indicating Disagreement. Correspondingly, 72.9% indicated some level of disagreement that clinical practicum alone is the only method that can adequately prepare paramedics for entry to practice, with 21.6% indicating Agreement.

In a free-response section, respondents overwhelmingly emphasized that HQS is a valuable educational tool, particularly for preparing students for rare, high-acuity scenarios and bridging classroom learning to clinical application. However, respondents opposed the idea of using simulation to replace clinical time, citing the irreplaceable value of real patient interactions, emotional complexity, and dynamic, high-pressure environments. Concerns were also raised about resource limitations, the need for realism, and instructor readiness. Overall, simulation is seen as a supplement, but not a substitute, for authentic clinical experience.

DISCUSSION

Though Alberta was most represented, responses were gathered from multiple provinces, providing a diversity of perspectives from across Canada. The professional and educational roles, as well as the professions trained, and experience in conducting SBE, indicate that the sample was appropriately positioned to respond to the survey questions. Responses to each section of the survey provide adequate information to address the study objectives:

1. There is an openness, though couched in a degree of skepticism, towards the idea that simulation could be used as a method to replace some clinical time, which is already being done, though it should not be a complete replacement.
2. Clinical practicum was perceived to be the most effective method of preparing students for professional practice, and while adequate overall, there were areas of weakness identified.
3. SBE was seen to be an effective instructional modality for skill development and competency assessment. The primary perspective was that the use of HQS should be increased.
4. Multiple aspects of practice, competencies, and KSAs were identified that can be appropriate to explore for replacement or supplementation with SBE.

Current State

Respondents believed that both the amount of time spent in practicum and SBE could be increased to improve training, though more participants thought the amount of time spent on SBE was inadequate compared to practicum. Similar rank orderings in the value of simulation and practicum for teaching and assessing the different aspects of paramedicine and competencies required were observed, though with a narrower average rank for practicum. Less dispersion in opinion for the value of practicum indicates that more value is placed on practicum for teaching and assessing each aspect and competency, while indicating where there may be greater value for simulation to be used to address current shortcomings in training. The areas where simulation was thought to be the best for teaching and assessment were technical skills, with the opportunity for repeated practice in HQS. Assessment and Diagnostics, Therapeutics, and Communication were the top three ranked competencies for both teaching and assessment in simulation and practicum. Based on the overlap, these competencies and related sub-competencies could be amenable to greater coverage through SBE, possibly for competency sign-off.

Based on reports of the uses of simulation in paramedic programs, many programs are using simulation for competency assessment, whether for meeting competencies not met during practicum or for assessment exclusive of practicum. Simulation is also being used for other forms of summative assessment, such as OSCEs, indicating that the systems and processes for high-stakes assessment in simulation exist.

Ideal State

With access to HQS, respondents believed that more simulation time should be offered, that it should make up half of the curriculum time, with nearly 50% agreement that HQS could replace some clinical time for all paramedic professions. Though there is disagreement about whether HQS could be used to replace some practicum time, and that the ideal is to maintain a greater ratio of practicum to simulation time, there is support in general for SBE and for using HQS to replace some practicum time. In an ideal state, some aspects of practicum could be replaced with simulation time.

Gaps

Several KSAs were identified that could be taught in simulation versus in practicum. The main value of simulation would be to address these KSAs in a manner that was more consistent in terms of exposure to cases and the level of proficiency of the precep-

tor overseeing the learner. The struggles students faced were reflective of the KSAs that were not addressed in practicum. Overall, respondents believed that simulation could be a solution to these challenges. Through these findings, a set of situations and skills was identified that could be explored for replacement with simulation.

Challenges existed for the use of HQS for both students and instructors, which is informative for how to improve or bolster the simulation experience if it is to be used for replacing clinical time. The challenges of buy-in for students and technical challenges for instructors reflect each other. If the challenges that instructors face, whether through better equipment or training, can be resolved buy-in for students may be increased. A major drawback of simulation identified for replacing practicum time were the affective components, particularly the stress of a real call and human interaction under pressure. With well-designed simulations in high-fidelity environments focusing on the primary relevant stressors of practice, the level of real-life stress may be approached in simulation. Overall, responses were somewhat ambivalent about what could be offered in simulation compared to practicum, though most did not agree that practicum is the only method that can adequately prepare paramedics for entry to practice. Simulation was acknowledged to offer learning that was not available in a practicum.

Implications

The findings from this study help to directly inform and guide future research as to which areas of practicum training are most amenable to simulation, and specific skills for investigation and the feasibility, efficacy, and best practices of using HQS as a clinical replacement in paramedic education. To continue to explore the use of simulation to supplement, modify, augment, or replace some amount of clinical time in paramedicine, appropriate aspects, competencies, and KSAs identified in this study can be selected for use in research that examines replacing practicum time with simulation. Technical skills, Communication Skills, Assessment and Diagnostics, and Therapeutics were areas of practice and competency identified where simulation was most useful for training and assessment. KSAs that were not effectively addressed during practicum, and that could be effectively addressed in simulation included cultural awareness, HALO events, interpersonal communication, professionalism, and respect.

Simulation could also offer a more standardized experience to ensure that learners are being exposed to a baseline level of cases and the required skills, as well as receive more consistent oversight and assessment from preceptors.

Future Directions

The findings from this study can be used to begin to focus further research on specific areas of paramedic practice and experience that can be investigated for replacement, in some form, in simulation. The identification of various aspects, competencies, and KSAs of paramedic practicum experience and practice allows for the beginning of the development of a curriculum and simulations that can be examined as a replacement for practicum time. Doing this does not imply that all, or even most, practicum time will be replaced with simulation, but rather certain competencies can be assessed through simulation, mitigating the need for the student to have the competency assessed in practicum. By obtaining competencies in simulation, it will allow the student and preceptor during practicum to focus on learning the holistic aspect of paramedic practice.

With the current constraints on available practicum time and experience, the idea of replacement may also be implemented as an augmentation to practicum time. When there are gaps or breaks between education and practicum, or breaks during practicum placements, simulation can be used to not only maintain competency but also assess competency so that students do not require repeated extensions or delays in completing their practicum. The unpredictability and challenges of pre-hospital practice have been previously identified as barriers to clinical experience during placement; the use of simulation may be one method that can help to standardize this experience (Cimino & Braun, 2023).

Limitations

There were two primary limitations to this study. 1) The sampling method leads to potential sampling bias; the convenience sampling meant that it is possible some opinions or perspectives were missed that may provide different insights to practicum and simulation. However, the narrow variance for responses, broad sampling frame, and demographic characteristics indicate a representative sample was likely obtained. 2) Though definitions were provided for the constructs addressed, it is possible that personal interpretation, primarily of replacing clinical time with high-quality simulation, may have skewed responses if respondents were interpreting replacement as a total replacement of practicum with simulation.

CONCLUSION

This needs assessment provides an understanding of the current state of practicum and simulation education for paramedics across Canada. A potential ideal state for the amount of simulation training and replacement of practicum time, and the current gaps in practicum and SBE were identified. Based on responses specific aspects of practicum can be selected for the development of further research that directly examines the replacement of some amount of practicum time with HQS.

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SUPPLEMENTAL TABLE 1

KSAs not effectively addressed during practicum.

Knowledge Area
Scope of practice (especially in hospital settings)
Job roles and professional responsibilities
Cultural awareness
Rare case knowledge (e.g., pediatrics, obstetrics, mass casualty)
Operational realities of paramedic work
How paramedicine fits in the larger healthcare system
Social/environmental determinants of health
Specific conditions in realistic patient contexts
Skill Area
Interpersonal communication (with patients, colleagues, and health teams)
High Acuity, Low Occurrence (HALO) technical skills
Tactical/non-violent crisis communication
Decision-making under stress
Situational awareness
Performing clinical procedures on real patients
Critical thinking
Death notification
Ventilation skills (e.g., using a BVM)
Working in chaotic/high-stimulus environments
Driving and transport navigation skills
Crisis management
Attitude
Emotional intelligence
Professionalism
Empathy
Resilience and adaptability
Respect (for peers, patients, organizations, public)
Emotional maturity
Patient-first mindset
Willingness to learn from real experiences
General positive personality traits

SUPPLEMENTAL TABLE 2

KSAs that could be addressed with simulation.

Knowledge Area
Cultural awareness
Social justice / hidden curriculum / bias awareness
Professional identity and role formation
Skill Area
Communication (general, team-based, and patient interaction)
Team dynamics and collaboration
Decision-making
Situational awareness
HALO (High Acuity, Low Occurrence) procedures
Tactical and respectful communication
Cricothyrotomy and advanced airway management
Integration (applying multiple skills in complex scenarios)
Stress inoculation (performing under pressure)
Attitude
Professionalism and identity development
Respect (for patients, team, system)
Readiness to learn from structured, consistent experience

SUPPLEMENTAL TABLE 3

Ineffective aspects of practicum for teaching and assessment.

Teaching Issue	Assessment Issue
Preceptor engagement varies widely (some disinterested or untrained)	Preceptors are untrained or undereducated in assessment practices
Lack of exposure to diverse or rare calls ("luck of the draw")	Inability to assess rare or complex skills due to limited exposure (e.g., obstetrics)
Wasted or idle time (e.g., offload delays, slow areas)	"Luck of the draw" limits what students are exposed to and can be assessed on
Time constraints / insufficient time in practicum	Subjectivity in assessment (e.g., communication, emotional traits)
Preceptor attitudes (e.g., mistreatment, overworked staff, poor interpersonal skills)	Skills are observed, but not adequately evaluated (checkbox-style assessments)
Lack of preceptor training or standardization	Lack of opportunity to demonstrate skills due to case variety
Low call volume or repetitive patient scenarios	Preceptors unaware or unclear about learning outcomes
Inadequate or inconsistent teaching of health & safety, legal, documentation	Inconsistency in preceptorship across placements
Checklist-driven learning (overemphasis on sign-offs)	Preceptors not hired or formally prepared for their teaching/assessment role
Lack of clarity around the term “clinical practicum” (vs. field practicum)	Wasted or idle time reduces number of observable performance events
Hospital placements (e.g., ICU, diagnostic imaging) not optimal for novice learners	Limited experience makes valid assessment of competence difficult
Driving skills not effectively taught	Personality traits or emotions difficult to measure objectively
Limited integration/teamwork opportunities due to individual performance focus	Inconsistent skill application across different call types
Simulation can deliver more consistent skill coverage than clinical practicum	Preceptor personality conflicts impacting fair assessment
Preceptor influence on learning (students mimic their preceptors)	Assessment inconsistency across sites (e.g., labor shortages, different resources)
Paramedics not adequately prepared to serve as expert clinicians/preceptors	Gender-based barriers in specific contexts (e.g., male students in L&D environments)
	Public health and health promotion not routinely assessed

SUPPLEMENTAL TABLE 4

Aspects of practicum irreplicable in simulation.

Irreplaceable Aspect
Real patient interaction and rapport
Communication with patients, families, or colleagues in real contexts
Exposure to emotional, cultural, and social complexity of real patient encounters
Interprofessional collaboration (e.g., with nurses, EMS, other providers)
Empathy, emotional regulation, and dealing with loss or death
Performing under real pressure or urgency
Working in dynamic, uncontrolled, or chaotic environments
Exposure to diverse settings (e.g., weather, base life, late-night shifts)
Fatigue management and stress regulation
Scene safety and hazard assessment
Hands-on clinical skills on real humans (e.g., IVs, airways)
Real-world integration of assessment, diagnosis, therapeutics
Performing procedures “in vivo” rather than on mannequins
Professional maturity and accountability
Experiencing consequences of real-world errors or decisions
"Job-readiness" and adaptation to the actual work environment
Exposure to mundane but essential aspects of practice (e.g., base life)

SUPPLEMENTAL TABLE 5

Instructor and student challenges with simulation.

Student		Instructor	
Challenge	**Count**	**Challenge**	**Count**
Buying into simulation	29	Creating adequate fidelity to create learner buy-in	27
Not believing that simulation will transfer to 'real-life'	21	Troubleshooting IT issues	22
Low fidelity decreasing buy-in	17	Facilitating debriefing discussions	16
Lack of instructor experience in facilitating simulation	17	Familiarity with equipment/technologies (e.g. manikins, software)	16
Pressure of simulations	13	Facilitating pre-briefing	14
Lack of experience doing simulation	10	Preference for other teaching and learning methods	13
Participating in debriefing discussions	7	Developing applicable scenarios	10
Applicability of scenarios	5	Buying into simulation	9
Team collaboration	4	Facilitating simulations	9
Other (please list)	4	Teaching team collaboration	6
		Believing that simulation will transfer to 'real-life'	6
		Other (please list)	3

SUPPLEMENTAL TABLE 6

Primary challenges to replacing clinical time with simulation.

Challenge	Frequency
Lack of Real Human Interaction	7
Cost and Resource Constraints	6
Fidelity and Realism Issues	6
Limited Instructor Capacity	5
Student Engagement and Buy-in	5
Lack of Industry and Institutional Support	4
Psychological and Situational Gaps	4
Augmentation vs. Replacement	4
Logistics and Implementation Barriers	3
Inadequate Research and Benchmarking	2