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REPORTS OF ORIGINAL INVESTIGATIONS

Factors influencing community intensive care unit research participation: a qualitative descriptive study

Facteurs influençant la participation à la recherche dans les unités de soins intensifs communautaires : une étude descriptive qualitative

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Abstract

Purpose *Community hospitals account for 90% of hospitals in Canada, but clinical research is mainly conducted in academic hospitals. Increasing community hospital research participation can improve generalizability of study results, while also accelerating study recruitment and increasing staff engagement. We aimed to identify and describe the factors that influence community intensive care unit (ICU) research participation and the development, implementation, and sustainability of a community ICU research program.*

Methods *We conducted a qualitative descriptive study using semistructured interviews. Between April 2022 and May 2023, we interviewed a purposeful sample of individuals interested or involved in community hospital research in Canadian community ICUs. We analyzed qualitative data using both conventional content analysis and rapid qualitative analysis. Findings were deductively mapped out using the Ecological Model of Health Behavior. Quantitative survey data were analyzed using descriptive statistics.*

Results *Participants included 23 health care workers, ten research staff, and five hospital administrators (n = 38) from 20 community hospitals across six provinces in*

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Canada. The main factors associated with community ICU research participation were 1) infrastructure, 2) personnel characteristics, 3) key relationships and connections, and 4) the COVID-19 pandemic.

Conclusion *In this qualitative descriptive study, participants identified the physical resources, skills, and relationships required to start and sustain a clinical research program in a Canadian community ICU. Our findings suggest that all levels of the Canadian health care system need to invest in strengthening community hospital research capacity to increase research participation.*

Abstract

Objectif *Les hôpitaux communautaires représentent 90 % des hôpitaux au Canada, mais la recherche clinique est principalement menée dans les hôpitaux universitaires. L'augmentation de la participation à la recherche dans les hôpitaux communautaires peut améliorer la généralisabilité des résultats des études, tout en accélérant le recrutement et en mobilisant l'engagement du personnel. Notre objectif était d'identifier et de décrire les facteurs qui influencent la participation à la recherche dans les unités de soins intensifs (USI) communautaires ainsi que l'élaboration, la mise en œuvre et la durabilité d'un programme de recherche communautaire en USI.*

Méthode *Nous avons mené une étude descriptive qualitative à l'aide d'entretiens semi-directifs. Entre avril 2022 et mai 2023, nous avons interrogé un échantillon ciblé de personnes intéressées ou impliquées dans la recherche en milieu hospitalier communautaire dans les unités de soins intensifs communautaires du Canada. Nous avons analysé les données qualitatives en utilisant à la fois l'analyse de contenu conventionnelle et l'analyse qualitative rapide. Les résultats ont été cartographiés de manière déductive à l'aide du modèle écologique de comportement en matière de santé. Les données quantitatives de l'enquête ont été analysées à l'aide de statistiques descriptives.*

Résultats *Les participant·es comprenaient 23 travailleurs et travailleuses de la santé, dix membres du personnel de recherche et cinq membres de l'administration hospitalière (n = 38) provenant de 20 hôpitaux communautaires répartis dans six provinces du Canada. Les principaux facteurs associés à la participation à la recherche en USI dans les collectivités étaient 1) l'infrastructure, 2) les caractéristiques du personnel, 3) les relations et les liens clés, et 4) la pandémie de COVID-19.*

Conclusion *Dans cette étude descriptive qualitative, les participant·es ont identifié les ressources physiques, les compétences et les relations nécessaires pour démarrer et maintenir un programme de recherche clinique dans une unité de soins intensifs communautaire canadienne. Nos constatations suggèrent que tous les niveaux du système de soins de santé canadien doivent investir dans le renforcement de la capacité de recherche des hôpitaux communautaires afin d'accroître la participation à la recherche.*

Keywords community hospital · critical care · research capacity · research culture

Community hospitals account for 544/602 (90%) hospitals in Canada.[1] Nevertheless, most clinical research is conducted in academic hospitals,[2–4] and few community hospitals have significant research engagement.[5] Consequently, patients living near community hospitals have reduced access to health research and are less likely to be enrolled in clinical trials.[6] This situation persisted during the COVID-19 pandemic despite international efforts to broadly recruit patients into large-scale clinical trials.[3,5,7] This is problematic because of differences in sociodemographic and clinical characteristics between patients living near academic and community hospitals. Community hospitals are more likely to be located in suburban and rural communities,[6,8] and to serve populations with higher proportions of recent immigrants,[9] lower socioeconomic status,[10] and reduced access to subspecialized care.[11,12] In addition, patients in community hospitals tend to be older, with more comorbidities and a higher risk of in-hospital mortality.[13] Therefore, increasing community hospital engagement in clinical research is necessary to ensure equitable patient access to research and to enhance the generalizability of research findings, study efficiency, and knowledge translation.[3,13] Furthermore, clinical research participation improves quality of care, drives innovation, enhances clinical staff satisfaction and retention, and may improve patient outcomes.[14–17]

Despite these benefits, barriers to community hospital research participation include a lack of funding, protected time and experienced research staff, limited administrative support, and inadequate research infrastructure.[18–20] Community hospitals also face unique contextual barriers that influence research program initiation, growth, and sustainability,[21,22] including the lack of institutional commitment and mandates,[2,5,7] and varying levels of university affiliation,[23] resulting in a fragmented culture of research.[7] In Canada, these challenges are compounded

by existing funding models that are structured to support hospitals with well-established research centres and infrastructure, and are not adapted to build or sustain research in hospitals that may not have extensive research experience or previous funding.[2,5] Previous research suggests that facilitators of research participation include dedicated external funding, supportive policies and infrastructure, collaborative partnerships, training, mentorship, and institutional commitment.[2,7,24–26]

While existing evidence provides foundational knowledge of the barriers and facilitators to community hospital research participation, little is understood in the context of Canadian community hospitals, specifically within intensive care units (ICUs). To strengthen Canadian community ICU research capacity, richer and contextual descriptions of the barriers and facilitators to research participation in this setting are required. In this qualitative descriptive study, we sought to describe the factors, including the barriers and facilitators, that influence community ICU research participation and the development, implementation, and sustainability of a community ICU research program.

Methods

Study design

This qualitative study drew on the methods of qualitative descriptive study design to describe the factors that influence Canadian community ICU research engagement and program development. We employed qualitative description because it aims to provide an in-depth description of the phenomenon of interest grounded in participants' experiences and perceptions.[27–31]

Sampling and recruitment

Individuals with experience designing and implementing research programs or those interested in supporting research within Canadian community ICUs were identified using purposeful sampling. Recruitment strategies included study poster dissemination via social media and in-person conferences, letters through professional networks, contact with participants of a previous survey,[13] and snowball sampling.[32] Additionally, maximum variation sampling was sought across three variables: 1) discipline or role, 2) geographical location (i.e., province or territory), and 3) self-reported status of the research program (e.g., established, emerging, or nonexistent).[32–34] Our study inclusion criteria were 1) individuals having one of the following roles in a Canadian community ICU: a) health care professional (i.e., physician, nurse, allied health professional), b) research staff (i.e., research assistant/coordinator, research manager), or c) hospital administrator (i.e., manager, director, vice president, educator), 2) individuals with a self-reported interest or involvement in research, 3) individuals with the ability to communicate via video conference or telephone, and 4) individuals with the ability to speak English. Our sample size was one of convenience, informed by our ability to meaningfully answer the research question, feasibility of recruitment and response to recruitment efforts, and the relative frequency of the phenomenon of interest.[27,35,36]

Data collection

We collected data using individual in-depth, semistructured interviews, conducted by either one or a combination of two research team members (P. G., K. R., M. L.) via videoconference or telephone. Given that some members of the research team had relationships with individuals in networks relevant to the phenomenon of interest, we made efforts to mitigate conflicts of interest or power dynamics by ensuring there were no pre-existing relationships between the research team members conducting the interview and the participant. The interview guide was piloted to determine the estimated interview length and the order and clarity of questions. We revised the interview guide to facilitate the flow and added additional prompts to solicit further exploration of study concepts. The final semistructured interview guide was considered flexible enough to allow for emerging concepts to be explored (Electronic Supplementary Material eAppendix). The interviewer(s) maintained field notes to record contextual information and analytic impressions.[37] A professional medical transcriptionist transcribed and anonymized the audio recordings. Participants also completed an electronic questionnaire that included demographics, professional experience, and characteristics of their clinical unit and hospital.

Data analysis

Data were coded concurrently with data collection to identify core concepts to be explored in subsequent interviews and to inform sampling decisions. We analyzed quantitative data from questionnaires using descriptive statistics. We employed two approaches to qualitative data analysis. First, we conducted conventional content analysis to code and categorize the full data set.[38] Conventional content analysis is widely used for developing and extending knowledge by interpreting the meaning of qualitative text data and developing descriptive themes aligning with the purpose of qualitative descriptive

design.[38] The primary analysts (P. G., K. R.) completed line-by-line inductive coding of the first five transcripts independently using Dedoose version 9.0.17 (Dedoose, Los Angeles, CA, USA)[39] while also making analytic memos. The analysts reviewed the initial codes and used them to create a code tree. The analysts then independently coded the remaining 33 transcripts, meeting after every 2–5 transcripts to review codes, discuss themes, and ensure coding congruency. Second, we employed rapid qualitative analysis to increase the dependability and trustworthiness of the findings.[28,40] Rapid qualitative analysis is a team-based, action-oriented approach to qualitative data analysis often used in health services research, whereby the goal is to translate findings into practice.[40] During this analysis, ten research team members with a diverse range of content and methodological expertise summarized and synthesized transcript data by domains (Table 1). During this synthesis, intersecting factors influencing research participation were evident across individual, unit, institutional, and external levels, as depicted in the Ecological Model of Health Behaviour, and were mapped accordingly (Table 2).[41] This model is typically employed to analyze health behaviour or interventions and emphasizes the hierarchies of factors or behaviours that influence health.[42] Levels used to guide this analysis are described in Table 2.

Rigour and trustworthiness

To maintain rigour and trustworthiness, multiple strategies were employed to achieve credibility, dependability, and confirmability (Table 3).[43] Reporting of results was guided by the recommended Standards for Reporting Qualitative Research.[44]

Ethical considerations

The study was approved by the Hamilton Integrated Research Ethics Board (Hamilton, ON, Canada; approval number, 14222). Informed electronic consent was obtained from all participants and confirmed at the beginning of each interview.

Results

Participants

Participants included 38 individuals (23 health care workers, ten research staff, five hospital administrators) from 20 community hospitals across six provinces in Canada (Table 4). Two additional individuals consented to participate but did not complete the interview. One individual completed the interview but was subsequently identified as working in an academic hospital and was excluded from the study. Despite targeted recruitment efforts (e.g., snowball sampling) to achieve equal representation across professions and provinces, we were unable to achieve a balanced sample across maximum variation variables. Interviews (telephone, n = 5; videoconference, n = 33) were conducted between April 2022 and May 2023.

Table 1 Steps of the research team's approach to rapid qualitative analysis

Step	Team member(s)*	Process
Template development	Research co-ordinator, research assistant	A summary template that listed key content domains was developed. This template was informed by content analysis (coding) and the interview guide.
Template pilot	Research co-ordinator, research assistant	The template was piloted with two transcripts from the study. Feedback was solicited from the primary investigator and co-investigators. The template was revised.
Template completion	RQA research team (P. G., K. R., J. T., M. L., S. J., E. O., S. S., J. T., J. W., M. B.)	The remaining 36 transcripts were analyzed by a research team, using the finalized template. During this process, each transcript was first read in its entirety, then the researchers independently summarized key ideas and concepts from the transcript by domain and entered these summaries into the template. "Powerful quotes" were also extracted.
Matrix data entry	Research co-ordinator	A matrix was created in Excel to store data from templates, according to domain and ecological level. Data from completed templates were entered into the matrix.
Domain summary	Research co-ordinator, research assistant	Domain summaries were synthesized from the matrix, and summarized by key factors, then reviewed with the research team to inform the final report.

*Research co-ordinator, P. G.; research assistant, K. R.

RQA = rapid qualitative analysis

Table 2 Definitions of ecological levels used to inform analysis and organization of results

Ecological levels	Factors that are influential within the context of ...
Individual	... personal characteristics (e.g., knowledge, attitudes, behaviour, skills, etc.)
Unit (ICU)	... the space in the hospital dedicated to the conduct of critical care health service delivery
Institutional	... the organization/system that the ICU is a part of
External	... the community, systems, and organizations outside of the boundaries hospital as well as sociopolitical norms and practices

Ecological levels adapted from the Ecological Model of Health Behavior.[27]

ICU = intensive care unit

Table 3 Strategies for achieving trustworthiness and rigour

Strategy	Criteria	Research phase	Action
Investigator triangulation and credibility	Credibility	Protocol development, data collection and analysis	Established a cross-functional research team with a diverse range of skills and relevant contextual experiences, including extensive clinical and research experience in the community ICU setting (J. T., A. B., P. G., E. O., R. M., M. L.)
Peer debriefing	Credibility, dependability	Duration of the study	This process involved the researchers discussing insights with and reflecting on experiences. This occurred: 1) between members of the research team during concurrent data collection and analysis and 2) through frequent meetings with steering committee members.
Data triangulation	Credibility, dependability	Data collection and analysis	To identify points of convergence or divergence, multiple types of data (interview transcripts, demographic questionnaire, field notes) were collected and data were compared
Reflexivity	Credibility, confirmability	Duration of the study	The primary analysts (P. G., K. R.) maintained reflexive journals to document thoughts, responses, and personal biases
Audit trail	Confirmability	Duration of the study	An audit trail was maintained by the research co-ordinator to document study decisions and rationale, and all methodological procedures

ICU = intensive care unit

Factors that influence community hospital research participation

Participants described individual, unit, institutional, and external level factors they perceived as barriers to and facilitators of community ICU research based on five themes: 1) infrastructure, 2) personnel characteristics, 3) key relationships and connections, 4) the impact of the COVID-19 pandemic, and 5) research culture. Participants' reflections on research culture were explored in detailin a separate analysis.[45] Here, we report on the first four themes. Illustrative quotations associated with each of these themes and subthemes are presented in Table 5.

Infrastructure

Participants identified infrastructure as a key factor that influences the ability to initiate and sustain community ICU research programs. This theme included three subthemes: 1) finance management and funding, 2) hard and soft infrastructure, and 3) people operations and protected time.

Finance management and funding

Participants identified the need for funding to hire dedicated research staff, provide educational opportunities, and acquire resources for building research capacity (Table 5, quotes 5–7). Moreover, participants identified a lack of existing government-sponsored funding opportunities specific to community hospital research as a barrier, which may be associated with the perception or "stigma" that community hospitals are not capable of conducting research. To combat these challenges, participants suggested finance management strategies, such as hiring dedicated finance staff to oversee budgets and navigate "red-tape," or participating in industry-sponsored trials to subsidize lower-paying investigator-led studies (i.e., cost-recovery model) (Table 5, quote 3). Notably, some participants reported that their hospitals funnelled overhead or residual funds from industry-

Table 4 Participant and hospital characteristics

Characteristic	*n*/total *N* (%)
Participant sociodemographic variables	
Self-identified as:	
Female	22/38 (58%)
Male	16/38 (42%)
Professional role	
Health care professional	23/38 (61%)
Physician	13/38 (34%)
Nurse practitioner	1/38 (3%)
Registered nurse	6/38 (16%)
Allied health professional	3/38 (8%)
Research staff	10/38 (26%)
Hospital administrator	5/38 (13%)
Years of professional experience in the ICU	
< 1 year	2/38 (5%)
1–5 years	12/38 (32%)
6–10 years	7/38 (18%)
11–20 years	8/38 (21%)
> 20 years	8/38 (21%)
Blank	1/38 (3%)
University faculty appointment	
Yes	12/38 (32%)
No	26/38 (68.4%)
Previous research experience	
Clinical research as a principal investigator	8/38 (21%)
Clinical research as a local site investigator or coinvestigator	11/38 (29%)
Clinical research as a research co-ordinator or research assistant	13/38 (34%)
Caring for patients enrolled in clinical research studies	26/38 (68%)
Graduate level research training (e.g., Master's degree, PhD degree)	12/38 (32%)
Research experience as a trainee (student, resident)	16/38 (42%)
Online research courses (e.g., good clinical practice)	22/38 (58%)
Basic science research experience (i.e., laboratory research)	9/38 (24%)
Physiologic research experience	5/38 (13%)
Other	2/38 (5%)
Hospital and unit characteristics	
Province	
Alberta	5/38 (13%)
British Columbia	8/38 (21%)
Manitoba	2/38 (5%)
Nova Scotia	1/38 (3%)
Ontario	21/38 (55%)
Quebec	1/38 (3%)
Number of ICU beds	
0–15	21/38 (55%)
16–30	14/38 (37%)
31–45	0/38 (0%)
46–60	1/38 (3%)
61–75	1/38 (3%)
Missing data	1/38 (3%)

Table 4 continued

Characteristic	*n*/total *N* (%)
Research program characteristics	
Program status	
Nonexistent	6/38 (16%)
Emerging	18/38 (47%)
Established	10/38 (26%)
Unknown to participant	4/38 (11%)
Years of active program/research participation	
Not applicable, the hospital is not involved in research	3/38 (8%)
< 1 year	3/38 (8%)
1–5 years	14/38 (37%)
> 5 years	13/38 (34%)
Unknown to participant	5/38 (13%)
Hospital research infrastructure	
Pre-existing research program(s) in the hospital (other departments)	18/38 (47%)
Pre-existing ICU research program	19/38 (50%)
Local research ethics board	21/38 (55%)
Remote research ethics board (i.e., at another hospital)	12/38 (32%)
Hospital research administration/office	18/38 (47%)
On-site contract review capability	18/38 (47%)
Research policies and procedures	20/38 (53%)
Pharmacy department with research capability or experience	28/38 (74%)
Clinical laboratory department with research capability or experience	18/38 (47%)
Diagnostic imaging department with research capability or experience	19/38 (50%)
Unknown to participant	11/38 (29%)
Other	16/38 (42%)
Dedicated research staff	
Yes	19/38 (50%)
No	14/38 (37%)
Unknown to participant	4/38 (11%)
Missing data	1/38 (3%)
Number of active research studies	
0	6/38 (16%)
1–3	13/38 (34%)
> 3	13/38 (34%)
Unknown to participant	5/38 (13%)
Missing data	1/38 (3%)
Number of research studies completed to date	
0	3/38 (8%)
1–7	20/38 (53%)
> 7	6/38 (16%)
Unknown to participant	9/38 (24%)
Number of research grants awarded	
0	11/38 (29%)
1–5	9/38 (24%)
> 5	1/38 (3%)
Unknown to participant	17/38 (45%)

Table 4 continued

Characteristic	*n*/total *N* (%)
Professional research association member	
Yes	21/38 (55%)
CCIRNet	8/38 (22%)
No	6/38 (16%)
Unknown to participant	11/38 (29%)
Research is identified on the hospital strategic plan	
Yes	15/38 (40%)
No	12/38 (32%)
Unknown to participant	11/38 (29%)

CCIRNet = Canadian Community ICU Research Network; ICU = intensive care unit

sponsored studies into larger hospital accounts, which did not directly benefit their research programs, thereby disincentivizing research participation (Table 5, quote 4).

Hard and soft infrastructure

Participants identified hard infrastructure[46] (e.g., research office, pharmacy resources, and laboratory equipment) and soft infrastructure[47,48] (e.g., policies, procedures, and program models) as equally important for building research capacity (Table 5, quotes 1 and 2). Reported infrastructural barriers included limited research staff hours (i.e., Monday–Friday, daytime hours), a lack of embedded prompts for research staff and clinicians (e.g., order sets), hospital policies that prevented research staff from accessing patient charts or approaching patients for consent, and inefficient research ethics board and contract processes. To navigate some of these challenges, several participants suggested starting with small studies that require fewer resources and less expertise to help build staff confidence and momentum.

People operations and protected time

To advance research programs and build capacity, participants recommended that institutions hire dedicated (Table 5, quotes 8 and 10) and experienced research staff including research co-ordinators, administrative assistants, research managers, project managers, research pharmacy staff, and physician-scientists (Table 5, quote 11). The "ebb and flow" of research in a community hospital setting can create unpredictable "peaks and troughs" with respect to activity and demand for personnel, making it difficult to balance workflow and budget for staffing. Some participants described creative workarounds to obtain dedicated research staff, such as collaborating with a nearby academic centre to hire a research co-ordinator or hiring bedside clinical staff (i.e., nurses, nurse practitioners, and educators) in their off hours to assist with data collection. Yet, in the absence of financial compensation and protected time, clinician-researchers described how research was a "sideshow" (i.e., conducted on their personal time), limiting research productivity (Table 5, quote 9).

Personnel characteristics

Participants described characteristics of personnel that facilitate research program initiation, growth, and sustainability in a community hospital setting. This theme includes two subthemes: 1) relevant skills, education, and experiences and 2) personal traits.

Relevant skills, education, and experiences

Participants emphasized the value of individual education, training, and research experience (Table 5, quote 12). Several cited the importance of formal degrees (e.g., MSc, PhD) and research training to provide foundational knowledge (e.g., research methodology) and skills (e.g., grant writing). Participants also cited previous research experience in a volunteer, professional, or academic capacity as beneficial (Table 5, quote 12). Additionally, some participants (particularly research staff) valued relevant clinical experience (e.g., nursing) and experience working in the local setting to provide contextual understanding of the impact of research on clinical workflow and to facilitate bedside staff buy-in (Table 5, quote 13). Uniquely, one individual sought clinical training after extensive graduate research education to further their understanding.

Table 5 Factors that influence community intensive care unit research engagement: themes and supporting data

Theme	Subtheme	Ecological level	Illustrative quote
Infrastructure	Hard and soft infrastructure	Unit	1. … it's good because we have physical space to be compliant as far as the storage of our documents and all that sort of stuff. We also support each other, there's nurses and non-nurses, so the nurses can support the non-nurses in certain parts of the clinical work that they can't do themselves, if it's some sort of physical assessment or blood work or something like that. Because we do … there's different therapeutics so we do neurology, infectious diseases, pediatrics, and then adult ICU and then I did all the COVID research during the COVID storm. So my work completely pivoted to that during that timeframe. So the good thing is, we have a structure where we could pivot to take on COVID research and we have more … more core funding. Not tons and not as much as we would like (chuckles) but there's more-more physical structure of space and support … (Research staff, ID030)
		Institutional	2. The biggest one is, we've tried to … to make the research process as un-burdensome as possible to people who don't usually do research but may have good research ideas or questions. In other words, we have an office so, we have a physical space where people can just drop in and discuss their ideas or questions. We, obviously, provide a lot of technical support, writing support, funding support, to, again, alleviate the bottlenecks associated with doing research so they're not tied down or get stopped by the fact that they have to write the grant themselves or that they have to do the research ethics board application themselves or they have to create data collection forms themselves. (Health care professional, ID022)
	Finance management and funding	Unit	3. The renumeration per patient isn't enough to pay your staff. So I sell my soul to the drug companies … when it can pay the bills. (Health care professional, ID032)
		Institutional	4. There's not a lot of advantages, really, even the monetary compensation. Years ago, when I first started [as a health care professional], when we would do industry-sponsored trials … our department would make some money off doing a study and then that money would get funnelled into our department … the pharmacists doing the work would see the direct benefit of that in some sort of monetary compensation. But now any money that's brought in for these studies just gets sucked up into the regional pharmacy program pot, and the pharmacists doing the work don't actually see any of that in any form … so I think that's a bit of a deterrent. (Health care professional, ID038)
		Unit, institutional	5. … you could have interest, you could have buy-in, you could have people that are willing to do this … it does come down to funding a lot of the time. (Health care professional, ID003)
		Institutional	6. … they [academic centres] don't have to make sure that they have studies bringing in funding to support a research co-ordinator, which, I think makes things easier for them, and also allows them to just pursue the studies that … get the studies that they are truly passionate and interested in. (Health care professional, ID016)
		Institutional	7. It's not like we function like another department in the hospital where the hospital gives us a budget of let's say CAD 1,000,000 and you have CAD 1,000,000 to use in terms of supplies and staffing and all that. That's not how research works. Our budget is based off of revenue we have from overhead … or any residual funds you're allowed to keep. (Research staff, ID026)
	People operations and protected time	Unit	8. I think what's helped our program, I guess, is just being able to put more hours towards it. (Research staff, ID028)
		Institutional	9. … when they [clinicians] do research, it's really off the side of their desk in addition to what they're already doing for clinical care. (Research staff, ID026)
		Individual, institutional	10. The challenges are, everybody is stressed, so you try to get radiology or the lab or pharmacy to help and they have human resource limitations and research is always at the bottom of their priority. (Health care professional, ID032)
		Institutional	11. Human resource point of view, that's a huge limiting factor … there's been asks for other studies at our site, we just can't do it. We just don't have the [person-power] to be able to do that. (Health care professional, ID038)

Table 5 continued

Theme	Subtheme	Ecological level	Illustrative quote
Personnel characteristics	Relevant skills, education, experiences	Individual	12. I think to build it from the ground up, you need to have experience and you need to know what you're doing and how to do it, what works and what doesn't work. And that's something that's not gonna work for a brand-new site with a brand-new investigator. (Health care professional, ID001)
		Unit	13. It [being a local staff] just becomes easier for the unit to accept that person as opposed to someone who comes from the outside. In a way, they're known as an 'outsider.' It's not something that you vocalize but you sort of feel that sort of tension … (Research staff, ID034)
		Institutional	14. I think there's lots of people that would like to be involved in research or scholarly work but just don't know how … I think some people feel like it's a protected group of people that get to do research … they just don't know who to ask. (Administrator, ID020)
	Personal traits	Individual	15. I think the focus really is all patient care. And the direct patient need, and there's not a lot of thought down the road … about how can we do things differently; how can we do things better; how do we ask a question … and, to me, research doesn't have to be big, funded projects. (Health care professional, ID002)
		Individual	16. … It's important work and it might change care and this is why we do what we do. (Research staff, ID030)
Relationships and connections	NA	Individual	17. It's really a bit of a black box unless someone can lead you through what is appropriate, what is not appropriate to apply for based on your career stage … based on your experience, based on your past successes, and what is feasible, and how to put these together. (Health care professional, ID001)
		Institutional	18. … our approach has been one of a system-wide plan and not necessarily a department-wide strategy. So, we've decided to not grow research out of one department and then let it spread, shall we say, "naturally" across the organization and have other departments, mimic or reproduce the success of one department or another. We've decided to start system-wide, hospital-wide, and then provide our services to everybody hoping that there'll be one or two people in each department who would be research champions, seek us out, and get their department involved, if you will, with their research ideas or questions. (Health care professional, ID022)
		External	19. That relationship between other hospitals, I think, has been a really critical factor supporting us, and also, at some point, we're supporting them from our side. I just started this conversation on a thread on "how do you guys deal with funding?" And then it just started this conversation where different hospitals are having the same challenges. So we're not operating in silos on what we do in the sites. Somebody else is doing that same trial. They probably know the answer that I am looking for. So, just having those connections really helps support. (Administrator, ID021)
The COVID-19 pandemic	NA	Institutional	20. [Research] started to gain its own momentum and all of the studies and things like that they brought on during COVID … I think that really made them (Administration) realize that, and see what a big part that a community ICU can play in research. They have started to put more resources towards it, with having [Name] now as a research manager. (Administrator, ID019)
		Institutional	21. … there were moments where—especially during COVID and when trials sort of stopped and sometimes when randomizations were low—we really had to keep going … in order to keep [Research co-ordinator] on fulltime. And there was times where he was … he helped out and supported in other studies but there were moments where … (do) we have to have enough work for [Research co-ordinator], to support that he's with us fulltime? (Administrator, ID013)
		External	22. … it was quite clear that COVID related therapeutics were only going to be offered through research projects, and they were only being offered, therefore, in [Hospital]; and we were getting a lot of (COVID) patients, and I thought this is manifestly unjust—denying patients outside of [Hospital] access to COVID therapeutics, I thought was wrong. (Health care professional, ID041)

ICU = intensive care unit; NA = not applicable

Personal traits

Participants interested in research perceived that research improves patient outcomes and advances professional development (Table 5, quotes 15 and 16). They reported that individuals that successfully engage in research are often curious, approachable, capable of building strong relationships with others, and are physically visible in the hospital. They also described that both "hard" and "soft" skills are qualities of equal importance for program growth. Hard skills are those corresponding to specific technical abilities (e.g., budgeting and grant writing). Conversely, soft skills refer to interpersonal abilities and competencies (e.g., leadership and communication). Participants described these experienced individuals as important for research program development because they can identify trial opportunities, negotiate with industry sponsors and senior hospital management, and collaborate with other community hospitals, strongly advocate for research, and are skilled at managing funds (e.g., using industry-sponsored funds to support nonindustry-sponsored studies).

Key relationships and connections

Participants also highlighted the critical role of building connections and relationships across all ecological levels to increase community ICU research participation. Within the organization, participants identified clinical staff (e.g., physicians, allied health professionals) and hospital administration as key individuals and groups to connect with to help build research capacity. They also described developing connections beyond the ICU as important for increasing program awareness, facilitating mentorship and support, and identifying new or increased sources of funding (e.g., Hospital Foundation) (Table 5, quote 18). Externally, participants cited forming connections with academic hospitals, universities, and other community hospitals as important for sharing approaches and resources, and building capacity (Table 5, quote 19). They also described relationships with professional groups, networks, and communities of practice as helpful for building research capacity by facilitating shared knowledge (e.g., strategies for finance management) and resources (e.g., policies, documents). Across all types of connections, participants identified informal and formal mentorship as essential for individuals with and without formal research training to augment experiential learning, fill gaps in previous training, and build confidence (Table 5, quote 17).

The COVID-19 pandemic

Participants discussed factors that influenced community hospital research in both the pandemic and nonpandemic contexts. In some community hospitals, the COVID-19 pandemic catalyzed research participation in response to government or private funding that became available, or in response to investigators seeking enrolment in community hospital settings (Table 5, quote 20). Research programs with little to no research activity were able to obtain funding for staff to initiate research activities. Conversely, for other community hospitals, the withdrawal of temporary pandemic research funding and institutional policies paused research activities and threatened research program collapse (Table 5, quote 21). Other reported challenges during the pandemic included the increased demand for clinical services, widespread staff shortages, re-assignment of research staff to clinical roles, and restrictions on hospital access for research staff.

Discussion

In this qualitative descriptive study, we have documented the factors influencing Canadian community ICU research capacity, as perceived by participating health care professionals, research staff, and hospital administrators. Participants described the barriers and facilitators to initiating and sustaining community ICU research programs, including infrastructure, personnel characteristics, intra- and interinstitutional relationships, and the unique contextual challenges of the COVID-19 pandemic.

Several of the factors identified in our study have previously been cited in the literature as important for strengthening research capacity, outside the community ICU setting. With respect to infrastructure, participants confirmed the importance of adequate funding;[2,22,25,49,50] physical space and equipment;[20,22,24,26,51] protected time;[2,21,22,52] and policies that support research conduct[2,26,49] to build and sustain a functioning research program. Skilled and dedicated personnel were also confirmed as valuable for achieving research efficiency and productivity.[3,26,49] A recent study examining the time to initiate a pandemic clinical trial found that, compared with academic hospitals, almost all study processes took longer in community hospitals because of a lack of infrastructure and experienced staff.[3] Recruiting experienced research staff to community hospitals is challenging when competing with academic centres.[53] Nevertheless, consistent with previous reports, community hospital professionals showed interest in engaging in research.[18,53] Thus, while it is important to recruit skilled individuals, it is equally

important to train existing staff .[21,22,26] Our findings also confirm the benefit of building strong relationships within institutions (i.e., between hospital leaders and administrators),[24,26,49,50] as well as across the health care system (i.e., professional networks, academic hospitals, universities, and other community hospitals) for strengthening research capacity.[49,50]

Notably, participants in our study emphasized that funding is a key facilitator of research capacity building while lack of funding is one of the biggest challenges.[2,21,22,25,49,50] The inefficiencies of existing Canadian research funding models, which are often disconnected from health services funding, have already been highlighted.[3,5,7] In Canadian clinical trials, study sites are typically paid retrospectively based on the number of participants they have recruited (i.e., per patient).[7,55] This motivates recruitment but favours larger hospitals with larger patient populations and pre-existing research infrastructure. Moreover, most government funding agencies do not account for the baseline infrastructure necessary to conduct these trials. In contrast, the National Institute for Health Research (NIHR) in the UK provides infrastructure and financial support to each National Health Service trust, enabling all hospitals in the NIHR to participate in priority studies.[7,55] This model facilitates patient participation from smaller and less-experienced hospitals, leading to significantly higher recruitments.[56]

Our findings advance knowledge about the contextual needs of building and sustaining a research program in a Canadian community ICU setting, while also confirming and expanding upon existing literature that describes the facilitators and barriers to this work.[24,54] Ultimately, to increase health research efficiency and capacity, our findings emphasize the need for more systems-level supports.[7,57] Therefore, future work should consider the current findings, as well as the expertise of systems-level leaders and policy makers to identify strategic policies for strengthening Canadian community hospital research capacity. Research culture[7,51] may also influence community hospital research participation, a factor that should be explored in future analyses.

Strengths and limitations

Methodological strengths of this study include the triangulation of multiple data sources and analytical methods, which enhanced the credibility and dependability of the findings. There were also a number of limitations. First, half of the participants were from Ontario (55%), and their experiences may not reflect those of community hospital professionals in other regions. Notably, only 5% of participants were recruited from Quebec and the Maritime provinces, which limits the transferability of the findings to eastern Canada. Second, our sampling criterion included the ability to communicate in English. This may have limited our description of the phenomenon in the context of French-speaking Canadian institutions, representing most community ICUs in the province of Quebec. Third, nearly half of the participants represented community hospitals with emerging research programs (49%). Additionally, purposeful sampling strategies aimed to recruit participants interested in community hospital research. As a result, almost all participants reported being motivated to participate in research (except for one), and their views may not represent those of all community ICU professionals. Finally, despite recruitment efforts, few community hospital administrators were recruited (5%). Therefore, the findings may not be representative of this key stakeholder group.

In conclusion, in this qualitative descriptive study, participants identified factors influencing community ICU participation in research, including infrastructure, personnel characteristics, key relationships and connections, as well as the impact of the COVID-19 pandemic. To increase community hospital research participation and capacity, the Canadian health care system should invest in core research infrastructure, establish policies and processes that embed research within health service delivery, and facilitate relationships through professional networks and mentorship opportunities.

Author contributions *Jennifer Tsang* and *Alexandra Binnie* acquired funding and supervised the study. *Paige Gehrke*, *Kian Rego*, and *Madelyn Law* collected the data. *Paige Gehrke* and *Kian Rego* drafted the manuscript and led the analysis. All authors contributed to study conception and design and interpretation of the data, and revised the manuscript critically for important intellectual context. All authors agreed to be accountable for all aspects of this work.

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