A Multi-Method Investigation of Educational Activities for Hospital-Based Healthcare Providers During the Covid-19 Pandemic

by

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Abstract

The Covid-19 pandemic was a period of intense stress for hospital-based healthcare providers (HCPs). Education was frequently proposed as a solution to support HCPs with pandemic-related distress, but little is known about what pandemic training and/or education looked like for hospital-based HCPs. In particular, there is no comprehensive description of pandemic education that covers: (1) what education was delivered, (2) how it was delivered, and (3) stakeholders' experiences with education during this time. My thesis research aimed to fill these gaps using a multi-method approach, including a scoping review and semi-structured interviews with frontline HCPs and educators. I found that educational content primarily focussed on the topics of (1) clinical care of Covid-19 patients, and (2) infection prevention (including personal protective equipment use). Regarding instructional methods, I found that simulation and educational meetings were the most common. In terms of delivery, most activities were in-person; however, blended and virtual training was also prevalent. Stakeholders' experiences highlighted both shared and unique challenges for HCP and educator groups. The interview results also suggested that HCPs hold differing opinions about content needs, instructional methods, and delivery. Overall, the findings provide an opportunity for providers, educators, and other healthcare leaders to reflect on training and education for the pandemic, and consider how to best develop supportive education both now and during future crises.

Preface

This thesis is an original work by Ashley Clelland. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “A Multi-Method Approach to Assess Health Providers’ Training Needs During the Covid-19 Pandemic”, No. Pro00109137.

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Chapter 1: Introduction

The Covid-19 pandemic was a historic event that impacted daily life for people across the globe. At its outset, the pandemic triggered widespread school and workplace closures, resulting in employment changes for workers in several countries (Khamis et al., 2021). There was a forceful contraction of the global economy (Tandon et al., 2020). Streets emptied, and people stayed home for weeks. Since then, school and workplace closures have intermittently continued as waves of infection have ebbed and flowed. The pandemic has become a polarizing political issue (Pennycook et al., 2022). Pandemic-related stress has weighed on families (Calvano et al., 2022); for others, especially seniors, the pandemic has intensified social isolation (MacLeod et al., 2021). As of September 2022, there have been over 600 million confirmed cases of Covid-19 worldwide (World Health Organization, 2022); and tragically, over the same period, 6.5 million people have died.

Hospitals, especially the people who work there, have been at the forefront of this crisis. At times, the sheer volume of Covid patients was staggering. In Canada, hospital workers provided care to over 158,000 Covid-19 emergency patients, and 65,000 inpatients during the first year alone (Canadian Institute of Health Information, 2022). In the United States, total hospitalizations are estimated at roughly 3.5 million (Couture et al., 2022). Beyond patient volumes, hospital workers endured shortages in personal protective equipment and life-saving ventilators. Capacity was stretched, exacerbated by staffing shortages related to illness and quarantine requirements. Uncertain about the disease and its effects, some workers elected to live separately from their families. As the pandemic has pushed on, they have weathered repeated waves, each a combination of familiar and new challenges. They have grown increasingly tired. In a recent *Atlantic* article, an ICU nurse described a sense that their hospital has been constantly

flooded: “We’re still speaking of surges, but for me it’s been a constant riptide, pulling us under” (Yong, 2022).

Healthcare Worker Distress

Although there was some early uncertainty regarding the psychological impact of the pandemic on healthcare workers (Muller et al., 2020; Sheraton et al., 2020), a large body of evidence now supports that the pandemic has taken a toll. A survey among hospital staff in New York City found that 48% reported depressive symptoms, 38% reported anxiety symptoms, and 58% reported “acute distress” (Shechter et al., 2020, p. 1). Surveys among workers in Italy (Guisti et al., 2020), Turkey (Elbay et al., 2020), Singapore and India (Chew et al., 2020) have reported similar findings. In Canada, Binnie et al. (2020) found that nearly two thirds of intensive care workers had “clinically relevant psychosocial distress” (p. 1). Across studies, three reviews have reported depression and anxiety rates among healthcare workers hovering at around 25% (Pappa et al., 2020; Sahebi et al., 2020; Salari et al., 2020).

This distress has been attributed to a wide array of sources. The most frequently reported source is proximity to patients with Covid-19 (Binnie et al., 2021; Carmassi et al., 2020; Di Tella et al., 2020; Lai et al., 2020; Lu et al., 2020; Muller et al., 2020; Vizheh et al., 2020), and the fear of getting infected and passing the infection to loved ones (Adams & Walls, 2020; Binnie et al., 2021; Cai et al., 2020; Caparkapa et al., 2020; Liu et al., 2020; Raudenská et al., 2020; Shanafelt, Ripp, & Trockel, 2020; Shechter et al., 2020; Temsah et al., 2021). Other common sources were limited availability of personal protective equipment (Binnie et al., 2021; Kisely et al., 2020; Shanafelt, Ripp, & Trockel, 2020; Temsah et al., 2021), heavy workloads (Liu et al., 2020; Shoja et al., 2020) and moral injury (Patel et al., 2021). Many HCPs had been redeployed to other areas, which generated the added stress of quickly adapting to a new work

environment (Liu et al., 2020; Shanafelt, Ripp, & Trockel, 2020). HCPs also had concerns regarding staying up-to-date with the most recent pandemic-related information (Raudenska et al., 2020; Shanafelt et al., 2020).

Education as an Intervention

Within the context of the pandemic, training or education has often been proposed as an antidote to healthcare worker distress. Although the recommendation pre-dates the Covid pandemic (Maunder et al., 2006; McAlonan et al., 2007; Waterman et al., 2018), proposals for education have been especially prevalent during this time. For example, to address anxiety among redeployed staff, Shanafelt, Ripp, and Trockel (2020) proposed "rapid training to support a basic, critical knowledge base" (p. 2134). Liu et al. (2020) made a similar recommendation for "education and training" (p. e796) based on a qualitative study of HCPs' experiences during the first wave in China. Other examples include calls for "prompt and extensive training" (Stelnicki, Carleton, & Reichart, 2020, p. 238), "pre-job training" (Liang et al., 2020, p. 1), and "provision of training related to Covid-19" (Labrague & de los Santos, 2020, p. 395). Mo et al. (2020) state strongly that "strengthening specialist training and preparation is the only effective measure to alleviate the psychological pressure of the medical staff" (p. 1006).

Notably, there is some evidence that education *is* supportive. The provision of Covid training has been associated with less fear among nurses (Labrague & de los Santos, 2020). A rapid review that encompassed Covid and other infectious disease outbreaks found that "perceived adequacy of training" (Preti et al., 2020; p. 43) was associated with positive mental health outcomes among healthcare workers. Another review by Kisely et al. (2020) argued that "effective staff training in preparation for outbreaks" (p. 8) was protective against poor mental health. A similar review of outbreak-related studies identified training as a "resilience factor"

(Caramassi et al., 2020, p. 6) in reducing post-traumatic symptoms. Another review by Stuijfzand et al. (2020) reported similar findings.

Research Problem

Despite these many calls for education and evidence of its supportive impact, there is still limited insight regarding what training and education looked like for hospital-based HCPs during the pandemic. In particular, there are gaps in our understanding of: (1) *what* education should be delivered for hospital-based HCPs during a pandemic and (2) *how* it should be delivered. The current literature provides a constellation of individual training studies, but there is no comprehensive overview that describes patterns in training content and instructional methods across studies. This bird's eye view could support a more robust understanding of pandemic-related education among this population. It could highlight patterns in educational content that may represent core educational needs, and reveal overarching trends in educational design and delivery that can inform future educational activities. The development of this overview is also timely. We are now at a pivot point in the pandemic where many countries are moving past the 'acute phase' (Suk et al., 2022). This point presents an opportunity to reflect on the full breadth of educational activities that occurred during this early phase when the pandemic was most severe.

Beyond the questions of what and how, there is also the issue of stakeholders' experiences with education during the pandemic. Again, the current literature provides a constellation of experiences relative to individual activities (Hemann et al., 2021; Lababidi et al., 2020; Reguindin, Capoccitti & Serapion, 2022); however, few studies have examined experiences overall, across activities, from the perspectives of both HCP learners and the educators who delivered them. These perspectives provide a critical complement to the

description of educational activities that occurred during the pandemic. Together, the summary of activities, along with firsthand experiences, provide an overall 'picture' of hospital-based education during the pandemic.

Goals of the Study

The primary goal of my thesis research was to systematically investigate and describe hospital-based education within the context of the Covid-19 pandemic. More specifically, I examined the educational activities implemented among hospital-based HCPs during the Covid-19 pandemic and explored stakeholders' experiences with education during this time. I used a multi-method approach, including (1) a scoping review of published studies that describe training interventions for the Covid-19 pandemic, and (2) semi-structured interviews with stakeholders, including HCPs and nurse educators.

The remainder of this document describes my efforts to achieve this goal. In Chapter 2, I provide a brief summary of the educational literature in the health professions, describe how the pandemic impacted educational programs, and present my research questions. In Chapter 3, I outline my multi-method research methodology. In Chapter 4, I present the study results. Finally, in Chapter 5, I discuss how the study's findings relate to other literature on this topic, and present some potential directions for future research and educational practice.

Chapter 2: Literature Review

The literature review begins with a general discussion that introduces my terminology, and describes the history and importance of educational activities in health settings. Secondly, I discuss education program development, and describe how programs are typically evaluated. Thirdly, I present the literature regarding stakeholders' experiences with education and propose an argument regarding why their perspectives matter. Fourthly, I describe the impact of the Covid pandemic on educational activities, and discuss three previous reviews of educational activities within this context. Finally, I identify some gaps in our current understanding of pandemic-related education, and present the research questions that were the focus of my research.

Education in Healthcare Settings

Terminology

Educational activities in health settings are described using a variety of overlapping terms. *Continuing education* (CE) is the most common, and refers to structured, ongoing learning that happens once an individual has left formal schooling (Jarvis, 2010). Similar terms are used to describe discipline-specific CE. Physicians use *continuing medical education* (CME), which typically refers to activities that are self-directed, but can also include prescribed or organized learning as well (Fox & Bennett, 1998). Nurses use the term *continued professional development* (CPD) to describe similar activities (Gopee, 2005). Allied health professionals, such as occupational therapists, physical therapists, pharmacists, and dieticians, use both continuing education (Dennett et al., 2021; Tassone & Heck, 1997) and continued professional development (French & Dowds, 2008) to refer to CE activities. A key characteristic of these terms is their

reference to ‘continuing’, which implies a sort of gradual, developmental learning process throughout one’s professional life (Vázquez-Calatayud, Errasti-Ibarrondo & Choperena, 2021).

Aside from these terms, many educational studies simply refer to their programs as ‘education’ or ‘training’. Use of these more general terms suggests another type of post-graduate education that, in contrast to CE, targets a specific, short-term goal. These *job training* activities may have some developmental impact on HCPs, but their primary aim is to provide information or elicit practice change in a very specific context. Compared to CE, which is sometimes prescriptive, job training content is usually predetermined by hospital or organizational leaders, and completion of the training is often required. Critically, there is little theoretical or background research aimed towards this type of education in health settings, and insights into its origin and any unique best practices remain scarce.

For this study, my definition of education encompassed both types. Understandably, most education during the pandemic was job-training–it focused on specific, short-term targets related to pandemic information and care practices. For this reason, I use the term ‘education’ throughout this document to refer to these activities. At the same time, my research also considered CE activities with more developmental goals, although to a lesser extent. Given the paucity of historical and theoretical literature on job training in health settings, I also referred to the CE literature to inform the development of my research.

History of Education in Health Settings

The history of post-graduate education in the health professions extends back many years. Among physicians, there is evidence that journal clubs were established in Germany and England during the mid-1800s, with an official club initiated by Sir William Osler at McGill University in 1875 (Linzer, 1987). Among nurses, Stein (1998) traced an emphasis on continued

learning as far back as Florence Nightingale, the 19th-century figure considered to be the founder of modern nursing. Throughout the 1900s, educational efforts became increasingly formalized (Manning & Petit, 1987; Stein, 1998). By the 1960s and 70s, there was pressure across many health professions to require mandatory CE to ensure that health professionals remained up-to-date on available treatments and best practices (Vlasses, 2006). For pharmacists, these requirements began to appear in the mid-1960s (Vlasses, 2006). Similar requirements for physiotherapists began to appear around the same time (French & Dowds, 2008). By the 1980s, an accreditation system for Continuing Medical Education (CME) was established, and CME providers began to issue completion documentation to physicians (Manning & Petit, 1987). Medicare investments, clinical specialization, and the liberalization of feminist politics around nursing resulted in a dramatic increase in CE opportunities for nurses over the same period (Stein, 1998).

Today, there are a plethora of educational opportunities for HCPs that occur at different levels or 'contexts'. The first context relates to learning activities that occur at an *individual level*. Learning in this context maps closely onto the idea of continued learning and development described earlier. It is also tied to self-regulation policies in the health professions, which require that providers take individual responsibility to regularly update their knowledge and engage in critical reflection regarding their own educational needs (Bauchner, Fontanarosa, & Thompson, 2015; Brydges & Butler, 2012; Kennedy et al., 2021). Activities at this level often include attendance at conferences, or taking courses offered by professional organizations. Overall, learning in this context supports HCPs' development and continued competence in their health professional role.

The second context occurs at a more aggregate, *organizational level*. Activities in this context are typically developed by education teams in a system to address specific local concerns. In contrast to the first (individual) context, needs in this second context are often determined by hospital managers or healthcare leaders. Learning in this organizational context supports the widespread use of best practices and the provision of safe, quality care. A final context relates to legislative requirements that govern the delivery of healthcare services in a given *sociopolitical jurisdiction*. These activities are typically mandated to ensure that some minimum standard of safety and care is met. In this sociopolitical context, educational needs are identified by health leaders and policymakers.

Together, these educational efforts are important for several reasons. For one, health evidence and best practices evolve over time, and education provides a mechanism to inform HCPs about these changes so that they can update their practice accordingly (Mlambo, Silén & McGrath, 2021). Education can also build health system capacity, especially in areas where there is a shortage of skilled workers (World Health Organization, 2013). It enhances staff satisfaction and can help to retain them (Levett-Jones, 2005). Perhaps most importantly, well-designed educational programs have the potential to change providers' practice in positive ways (Waddell et al., 1991; Davis et al., 1999), and through these improvements, education can benefit patients (Fletcher, 2007).

Program Development

The development of educational programs involves two key dimensions: *content* and *instructional methods*. Content refers to the curriculum, or the 'what' of training. In health settings, content can be clinical (e.g., clinical treatment, procedures) or non-clinical (e.g., leadership skills, communication), and it can vary widely depending on the care area or local

context. The recommended methods for content selection include needs assessment (Grant, 2002; Moore et al., 2018) and training needs analysis (Gould et al., 2004). Both processes involve systematically examining gaps between the current and ideal states, placing them in order of priority, and developing educational programs to address the most pressing needs (Kaufman & English, 1979; Moore & Dutton, 1978). They are conducted using a variety of methods, including surveys (Holloway, Arcus, & Orsborn, 2018; Le Guen & Costa-Pinto, 2021), or consensus (or Delphi) methods (Nayahangan et al., 2018), literature review (Le Guen & Costa-Pinto, 2021), chart review or recall activities (Ratnapalan & Hilliard, 2002), and more.

Aside from needs assessment, little else has been written about educational content selection for HCPs. However, what is clear is that *who* selects the training content matters. For instance, patients emphasize interpersonal skills training for HCPs over clinical skills training (Repper & Breeze, 2007). Recently, Price et al. (2021) argued that including patients' perspectives in developing educational activities makes them more effective in supporting healthy communities. HCPs' own perspectives are also important. Historically, there has been some objection to providers' involvement in identifying training needs because they were seen as unable to objectively judge them (Lockyer, 1998). However, content developed independently of HCPs overlooks that they are adult learners, who bring knowledge and experience to training environments (Jarvis, 2010). Furthermore, content selected without HCP involvement may fail to activate this knowledge or experience, resulting in ineffective learning programs, or the sense that the educational activity does not apply in their work setting(s). This point is underscored by the recent finding that "relevance to practice" (King et al., 2021, p. 1) is a critical factor in determining educational effectiveness.

In addition to content, instructional methods are also a key element of educational programs. Instructional methods are the techniques used to deliver training, or the 'how' of training and education. There are many instructional methods used in health settings, including educational meetings (Forsetlund et al., 2021), printed materials (Mazmanian & Davis, 2002), coaching (Kowalski, 2020), simulation (Rouleau et al., 2022), and more. Evidence regarding the effectiveness of these individual methods varies. Educational meetings appear to have a small impact over no intervention (Forsetlund et al., 2021). Printed materials can change HCP behaviour but may not have any downstream benefit to patients (Giguère et al., 2020). Coaching is supported by several anecdotal reports of its efficacy (Dyess et al., 2017; Kowalski, 2020); however, empirical evidence is limited. Research on simulation's effectiveness is still emerging (Rosen et al., 2012; Jansson, Kääriäinen, & Kyngäs, 2013, Wilbur, Elmubark, & Shabana, 2018). Recent evidence suggests that more interactive instructional methods have a greater impact on HCPs' intention to change (Bird et al., 2020). Importantly, Mazmanian and Davis (2002) argued that a *combination* of methods is most likely to change providers' practice.

Related closely to instructional methods is the mode of delivery, which is typically classified as in-person, online, or blended. In-person delivery has been most common (Mamary & Charles, 2005); however, even prior to the pandemic, Cullen et al. (2019) argued that overreliance on in-person education was in conflict with physicians' busy schedules and limited availability. Online learning is an alternative that affords learners some flexibility in terms of when and where they complete educational activities, and several studies have found that online learning is an effective option in health settings (Du et al., 2013; Khatony et al., 2009; Kang & Seomun, 2018). Its appeal may vary depending on learner age demographics, and be favored among millennial learners (Desy, Reed, & Wolanskyj, 2017). Notably, the suitability of online

delivery may depend on training content: a systematic review of nursing studies found that online learning is often used for training in close-ended clinical tasks related to medication (Rouleau et al., 2019). Finally, blended delivery methods are a hybrid that combines in-person and online elements. Research on blended delivery methods is more scarce; however, there is some recent evidence that using a combination of online and in-person components is also an effective educational strategy in this context (Manzini et al., 2020; Thai et al., 2020). Taken together, these research findings highlight that the mode of delivery is an important dimension of educational programs.

Evaluation

The success of content selection and instructional methods is measured through the process of evaluation. It is considered a critical step in the development and delivery of educational programs (Furze & Pearcey, 1999). It provides educators with an opportunity to assess the degree to which a program has achieved its intended outcomes. It can also highlight how a program could be revised so that it is more effective in its next iteration. Both can yield insight into whether a program ought to continue or be implemented in additional settings. Methods for evaluating educational programs in health settings include learner surveys and interviews (Bryant & Posey, 2019; Pehrson et al., 2016), knowledge and/or skill assessments (Pehrson et al., 2016), and patient chart reviews (Williams et al., 2015; Zurmehly, 2018), and more. Ideally, measurements should include some follow-up to determine the longevity of training effects (Tian et al., 2007).

Evaluations can vary in terms of the level of outcome(s) that they consider. The Kirkpatrick model (Kirkpatrick & Kirkpatrick, 2016) is often used to describe those levels. The original model includes four levels, however a modified version, where two of the levels have

been further subdivided, is commonly used to describe educational programs in health settings (Yardley & Dornan, 2012). In this version, Level 1 focuses on learners' experiences, Level 2a on their attitudes or perceptions, and Level 2b on knowledge or skills. Education studies reach Level 3 when the outcomes show evidence of a change in learners' behavior. Finally, Level 4 focuses on outcomes that extend beyond the learner; Level 4a refers to any change to organizational outcomes, and Level 4b is achieved where there is an impact to service users (i.e., patients). According to Gristci and Jacono (2006), the outcomes of educational programs should ideally be evaluated at the level of patients.

Stakeholders' Experiences with Education

Frontline Providers

Although HCPs' satisfaction is alone insufficient in establishing education program *effectiveness*, their experiences still matter. For one, providers' experiences with education can yield important insight into how programs could be improved (Gould, Drey & Berridge, 2007), or identify blind spots. Their experiences also shape future engagement: positive experiences generate enthusiasm for continued learning (Griscti & Jacono, 2006), while negative ones dissuade them from participating in the future (Ni et al., 2014). Asking HCPs about their own experiences leverages their knowledge and expertise as adult learners. It also generates a detailed, rich description of the training scenario that is not typically achieved using other methods of inquiry.

Fortunately, HCPs report positive experiences with education overall (Ni et al., 2014). They are motivated to pursue it and see it as an opportunity to continually build and update their practice (Gould, Drey, & Berridge, 2007; Vázquez-Calatayud, Errasti-Ibarrondo & Choperena, 2021). However, their experiences with specific instructional methods are more nuanced. For

instance, previous studies indicate that nurses feel positively about online training (Cobb, 2004; Du et al., 2013; Karaman, 2011); but their experiences depend on a variety of factors, including social engagement, course design, and support (Carroll et al., 2009). Physicians are only somewhat interested in having more simulation and online learning opportunities (Cook et al., 2018). Importantly, these studies provide valuable insight into providers' experiences, but they typically use close-ended (i.e., survey) methods to examine a specific range of experiences. To date, few studies have explored HCPs' experiences with education overall using an open-ended approach that allows providers maximal flexibility in describing their experiences.

Educators

In addition to HCPs, educators' experiences with training activities also matter. This is especially true of nurse educators, who play a key role in the success of educational programs (Nuryani et al., 2022). Educators have their own experiences with developing and delivering training, and examining them provides a unique perspective (Cangelosi, Crocker, & Sorrell, 2009). Furthermore, previous studies have focused on the experiences of nurse education faculty at post-secondary institutions (Evans, 2018); few have explored the perspectives of educators who work within health organizations to deliver training to frontline providers. Including the perspectives of these educators would provide additional opportunities to identify (1) how programs could be improved, and (2) how they could be better supported in their education-related role.

Education During the Covid-19 Pandemic

The Covid-19 pandemic impacted educational programs in significant ways. Firstly, it generated several urgent content-related training needs (e.g., Covid-19 disease information, patient care procedures, preventing transmission). Secondly, pandemic circumstances, including

limits on group size and physical distancing, restricted how training could be delivered (Price & Campbell, 2020). In other words, the educational challenge of the pandemic was to quickly construct effective educational programs at a time when fewer approaches were available.

A small number of review studies provide some insight into education during this time. The first was a rapid systematic review of forty-nine medical education studies conducted through May 2020 (Gordon et al., 2020). It included studies at all levels of medical education, including undergraduate, graduate, and continuing medical education. The studies primarily described (1) adjusting the delivery and instructional methods, and (2) rapid development of Covid training for physicians. Sixty-seven percent of the studies did not report on training outcomes that could be categorized according to Kirkpatrick's model.

This review was later updated to include studies until mid-September 2020, resulting in a new total of 127 articles (Daniel et al., 2021). Nearly half of these described content pivoting toward online delivery. Another relatively large cluster (19%) described simulation activities. Importantly, the definition of 'outcomes' in the updated review was expanded to include things like "quality improvement" (p. 264) and "policy change" (p. 264) that are not captured with Kirkpatrick's model. By this new definition, only eight studies had outcome measures that did not meet the study's criteria. In any case, most of the studies reported outcomes at Kirkpatrick Levels 1 and 2.

The last was a systematic review conducted by Nayahangan et al. (2021). This review aimed to identify and summarize effective training initiatives during previous viral outbreaks (i.e., SARS, H1N1, MERS, EBOLA), as well as during the first months of the Covid-19 pandemic. They found that educational content typically focused on clinical topics related to the pandemic, which could be organized into (1) knowledge about the outbreak, or (2) related

procedural skills. In addition, several non-clinical topics were also presented (e.g., "teamwork", "interpersonal skills", and "resilience"). Regarding instructional methods, they found that three main types of training were used during previous outbreaks, (1) lectures , e-Learning, and simulation. As with the previous reviews, most studies described educational outcomes at Kirkpatrick Levels 1 and 2.

These reviews make an important contribution to our understanding of pandemic-related education, however, there was still an opportunity to explore education that was both *interdisciplinary*, and targeted toward *post-graduate*, *hospital-based providers* (Table 1). Regarding interdisciplinarity, the Gordon et al. and Daniel et al. reviews focused exclusively on physicians, and as such, neglected other HCPs who experienced similar pandemic circumstances. In addition, all three previous reviews included studies across both university-based and professional contexts; however, the educational needs of undergraduate trainees and frontline providers were presumably quite different. In regards to care setting, the needs and experiences of hospital-based HCPs were likely unique given their proximity to the crisis, and role in providing frontline care to patients with Covid-19. As such, I chose to focus this research on educational activities among this population specifically.

Table 1
Comparison of the Current Study with Previous Reviews of Pandemic Education

	Discipline(s)	Education Audience	Care setting
The Current Study	**Interdisciplinary**	**Practicing professionals**	**Hospital-based**
Gordon et al. (2020)	Physicians only	Students + practicing professionals	All care settings
Daniel et al. (2020)	Physicians only	Students + practicing professionals	All care settings
Nayahangan et al. (2021)	Interdisciplinary	Students + practicing professionals	All care settings

Beyond these issues, we've also seen that stakeholders' first-hand experiences provide a critical complement to our understanding of education. None of the reviews consider providers' experiences, and few studies to date have explored stakeholders' experiences with pandemic-related education in general, across multiple activities. As such, in addition to a description of *what* education was delivered and *how*, this study included a component that explored stakeholders' overall experiences with education during the pandemic.

To recap, we have seen that educational activities have a long history in health settings, and that they can have a positive impact on HCP practice and patient care outcomes. Educational activities can be described in terms of their content, instructional methods, and outcomes. In addition, our understanding can be supplemented by examining stakeholders' experiences with education. All of these features help us to generate a 'picture' of education. In terms of the Covid pandemic, we have seen that there were several educational challenges during this time. Based on a small number of earlier reviews, we have some sense of what the educational picture looked like in health settings; however, none have focussed on post-graduate, hospital-based HCPs, and no previous review has integrated stakeholders' firsthand experiences.

The Current Study

My thesis research aimed to provide a comprehensive description of educational activities that were conducted among hospital-based HCPs during the pandemic. I used multiple methods, including a scoping review and semi-structured interviews as sources to inform the description of activities. The study was oriented towards the following research questions:

1. What did education and/or training opportunities look like for hospital-based HCPs during the Covid-19 pandemic?

a. What activities were conducted among hospital-based HCPs for the Covid-19 pandemic?
    - What was the training content?
    - What instructional methods were used?
    - How were training needs identified?
    - What were the outcomes of the activities?
b. What were stakeholders' experiences with educational activities during this time?

Chapter 3: Methods

Research Question 1a: What educational activities were conducted among hospital-based healthcare providers for the Covid-19 pandemic?

Scoping Review

I used a scoping review methodology to answer research question 1a. Scoping reviews can rapidly and systematically summarize the research evidence on a particular topic (Arskey & O'Malley, 2005). The method allowed me to leverage a large number of single-study findings, to support a more comprehensive understanding of activities during this time. To conduct the review, I used the procedure described by Arskey and O'Malley (2005), which involves: (1) determining a research question, (2) searching for relevant studies, (3) selecting studies, (4) extracting information from the selected studies, and (5) reporting the results. Importantly, I performed all of the activities as a single reviewer.

Search Procedure

I used a systematic search procedure to gather relevant articles. I conducted the searches myself; however, the search procedure was developed in consultation with a health sciences librarian at the University of Alberta. I searched four literature databases: (1) OvidMedline (via Ovid), (2) CINAHL (via EBSCOhost), (3) PsycInfo (via Ovid), and (4) Scopus. The initial search was created in Medline, using a combination of identified keywords (e.g., "nurses", "continuing education") and MeSH subject terms (e.g., "Personnel, Hospital", "Education, Medical, Continuing"). To identify articles specific to the pandemic, I used a Covid-19 filter developed by the University of Alberta Health Sciences Library (Campbell, 2022a). After confirming that the Medline search returned relevant articles, I translated it for the CINAHL, PsycInfo, and Scopus databases, using the predeveloped Covid-19 filters as before (Campbell

2022b, Campbell, 2022c, Campbell, 2022d). In addition to database searching, I completed title screening for one key journal from 2020 (i.e., *Continuing Education in the Health Professions*). I also searched "training AND education" in the MedRxiv pre-print database, and screened the first 200 results for any relevant articles. Finally, I searched Google Scholar using the syntax "hospital AND training AND Covid", and screened the first 100 results for relevant articles. All searches were conducted between June and October 2022 and the results were imported into Covidence software for screening. The full search syntax is provided in Appendix 1 (p. 84).

Review Procedure

The review procedure was conducted in two rounds. The first round involved title and abstract screening to remove articles that were obviously irrelevant. The second round involved full-text screening of the articles according to the inclusion and exclusion criteria in Table 2 (p. 21). These criteria were developed iteratively, through pilot screening and consultation with my research supervisors. The goal was to identify studies that described educational activities among hospital-based HCPs *for* the pandemic. Studies were excluded if the training activities occurred in non-hospital settings (e.g., primary care, outpatient, long-term care, etc.), or if the clinical setting was too broad (e.g., all healthcare workers in a specific region) or unclear. I also excluded studies that described training that was implemented prior to the onset of the pandemic, or a 'pivot' of existing training. Finally, I excluded studies where the learner populations were all health professional students.

Extraction and Analysis

Data were extracted from the included articles in multiple stages using a data extraction form. This form was updated iteratively throughout the extraction process as I became more familiar with the included studies. In the first iteration, I relied heavily on a combination of

Table 2
Scoping Review Inclusion and Exclusion Criteria

	Include	Exclude
Source type	Peer-reviewed studies Conference proceedings Dissertations	Review studies
Language	English language	Not English language
Availability	Available from the library database	Not available from the library database
Setting	Hospital-based Acute care	Community settings (LTC, Primary Care, Community Pharmacy, Public Health) Outpatient (Sports Medicine, Clinical Psychology, Ambulatory, Nutrition) Other (Dentistry, Optometry, Audiology) **Setting is unclear**
Population	Frontline HCPs (Physicians, Nurses, Pharmacists, Interdisciplinary) New graduates Residents Fellows	Students in university settings (nursing students, medical students, pharmacy students, 'clerkship', 'rotation') Leaders/Managers Non-frontline (e.g., medical library, informatics, IPC professionals, lab staff) Non-clinical (Case managers) **Population is unclear**
Intervention	**Educational activity was implemented.** ● Identified in the title/abstract. ● Described in sufficient detail. **Training intervention is a response to the Covid-19 pandemic.** ● Covid is mentioned in the title/abstract. ● Implemented after December 2019.	**No educational activity is described.** ● Not identified in the title/abstract. ● Not described in sufficient detail. ● Intervention is primarily clinical/psychological (e.g., group therapy). **Distant/unclear link to Covid-19 pandemic:** ● Covid is not mentioned in the title/abstract. ● Training implemented prior to Covid-19 pandemic. ● Link to Covid-19 pandemic is unclear.

close-ended (i.e., Y/N) and open-ended fields; for instance, I could indicate Yes/No to some commonly used instructional methods (e.g., educational meetings, simulation, etc.), however, I could also enter additional information about the specific methods that were not captured into an

open-text field. After the first round of extraction, I reviewed these open-text fields for patterns and added additional Yes/No dimensions accordingly. A final round of data checking ensured that I had extracted all the dimensions consistently across studies.

The extracted dataset included information about: (1) general article details (e.g., publication year, location), (2) training activity details (i.e., implementation dates, profession types), (3) needs assessment, (4) training content, (5) instructional methods, and (6) evaluation. The dataset was imported into Excel to calculate frequencies and percentages across the various categories (i.e., location, study design, scope, profession types, content type, instructional methods, etc.), and to graph the results.

Research Question 1b: What were hospital-based stakeholders' experiences with education during the Covid-19 pandemic?

Stakeholder Interviews

I conducted semi-structured interviews to answer research question 1b. Semi-structured interviews support inductive and open-ended investigations (Creswell & Creswell, 2018), and as such, were considered appropriate because little was known about stakeholders' educational experiences in pandemic circumstances. Interviews were also selected for practical reasons, given that larger groups of hospital-based providers had very limited availability to participate in focus groups or surveys due to ongoing pandemic demands.

Recruitment

Prior to recruitment, the study received ethics approval from the Health Research Ethics Board (HREB) at the University of Alberta (Pro00109137). Frontline HCPs were recruited from two urban hospitals using an electronic flyer that was distributed by the hospital organization over email in November 2021. This distribution only resulted in a small number of interviews, so

the flyer was redistributed in February 2022. There were no responses to this second distribution, so my research supervisors and I also made the decision to expand the interview population by including individuals responsible for developing and delivering training to HCPs (i.e., nurse educators, learning and development professionals). This amendment to the interview population received ethics approval in March 2022. Educators were recruited using purposive sampling. A contact within the hospital organization distributed an information email to educators that they identified as potentially having some interest in the study. Additional educators were recruited using snowball sampling, by asking interviewees if they would be willing to pass along the study information to others who may be interested in the study. In all cases, potential participants contacted me directly by email to express interest and to arrange an interview time.

Pilot Interviews

Prior to the interviews, a draft interview protocol was pilot tested among three individuals who were contacts of the research team with some relevant knowledge or experience (i.e., health educator experience, health provider experience). Importantly, the pilot interviews provided an opportunity to rehearse the protocol and gather feedback on the interview questions. Prior to the pilot interviews, participants provided verbal consent. Pilot interviews were conducted virtually over Zoom; they were not recorded, but I collected some written notes regarding interviewee feedback about the interview questions. Both my research supervisors and I reviewed the written feedback and determined how it should be integrated into the final protocol.

Interview Procedure

Interview participation occurred virtually over Zoom. Prior to each interview, participants provided written consent (see Appendix 2, p. 89). The final protocol included five main questions that asked about (1) interviewees' job role, (2) their pre-pandemic experiences with

training and education, (3) their work challenges during the pandemic, (4) any training or education they received during the pandemic, and (5) their thoughts about what training would support providers in the future. The same questions were asked for both interviewee types (i.e., HCPs, and educators), but the wording was adjusted slightly for the added educator group. For example, the question '*Can you tell me about any training that you had during the pandemic?'* was adapted to *'Can you tell me about any training that you delivered during the pandemic?'*. After each interview, I recorded field notes, which included any reflections regarding my own positionality relative to the interviewee. The full protocol for both groups is provided in Appendix 3 (p. 93).

Thematic Analysis

Interview audio recordings were transcribed verbatim, cleaned of any potentially identifying information (e.g., hospital names, organization names, clinical specialty), and imported into NVIVO for analysis. The transcripts were coded using the thematic analysis procedure described by Braun and Clarke (2006). Based on this procedure, I conducted a round of preliminary (or open) coding to inductively identify common and/or noteworthy ideas. Next, I revised this full list of inductive themes, removing some that referenced training prior to the pandemic, or did not occur in a hospital-based setting. After that, I organized the first-level codes into higher-order themes. Some of these themes developed around specific interview questions that asked about work challenges and ideas for future training; others were based on categorizations inherent in the research questions, such as instructional methods and content. Importantly, some of the higher-order categories reflected *de novo* groupings of interview comments along similar dimensions that highlight more emergent themes.

I also reflected on my positionality relative to the interviewees and CE topic. I have previously worked in health settings, in both research and corporate roles. I did not work with any interviewees directly, but I have worked within the same organization for over three years. Overall, these work experiences have shaped my perspectives regarding the importance of education, as well as common workplace dynamics in health settings (e.g., hierarchies). Importantly, my work experiences also influenced my approach to analysis, which was pragmatically oriented towards summarizing stakeholders' experiences in a way that would be informative to educators and other decision-makers. In terms of the physician interviewees, I have been immersed in healthcare settings that often weigh physician perspectives strongly, and consider them to be objective and trustworthy sources.

Other aspects of my positionality relate to being a non-health professional. I do not have clinical experience, so my understanding of clinical settings and dynamics is based solely on second-hand descriptions from others. Although I have participated in several non-clinical education sessions, I have not had any firsthand *clinical* CE experiences. This lack of experience may have resulted in an over- or under-estimation of the importance of certain aspects of stakeholders' experiences. Finally, my positionality as a novice researcher is also relevant. As a novice, I felt appreciative of the interviewees, and as such, may have been reluctant to highlight contradictions, or ask for more detailed descriptions of sensitive topics. As a graduate student, I have the overall perspective that learning and education are important, beneficial pursuits.

Chapter 4: Results

Research Question 1a: What educational activities were conducted among hospital-based healthcare providers for the Covid-19 pandemic?

Scoping Review

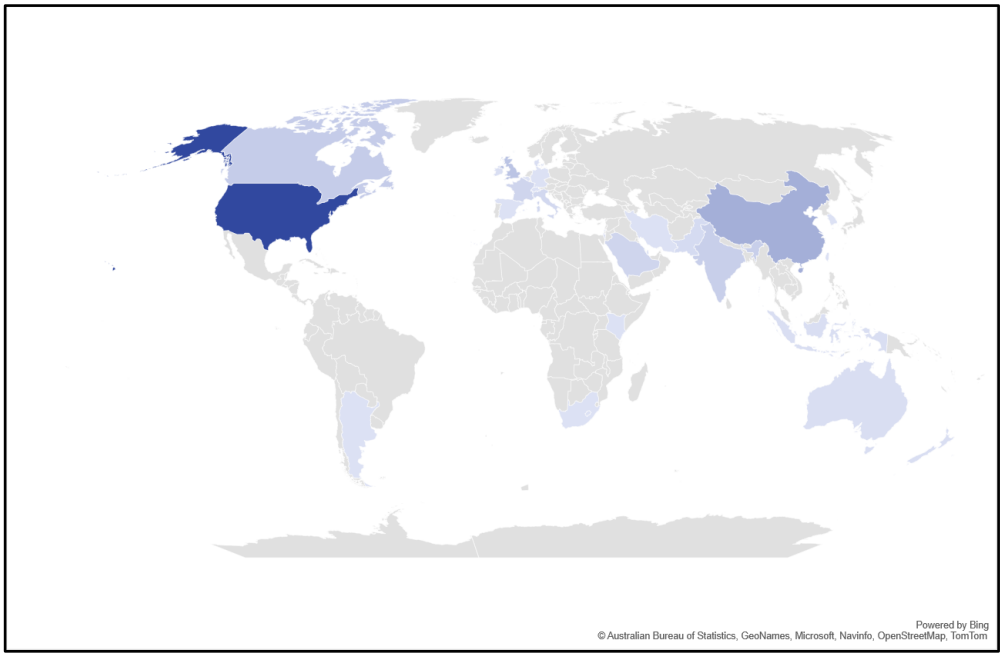
The search procedure yielded 2,628 results; 201 were removed during deduplication. Of the remaining 2,427 articles, 2,014 were removed during title/abstract screening, and an additional 266 during full-text screening. In total, 147 articles were included in the analyses for this review (Figure 1). The included articles were published between 2020 and 2022; 48 (33%) were published in 2020, 73 (50%) in 2021, and 26 (18%) in 2022. The articles describe training activities in many different regions; the greatest representation was from the United States and China (see Figure 2, p. 28).

Figure 1

Scoping Review Article Inclusion and Exclusion Pathway (PRISMA)

Figure 2

Scoping Review Studies by Country (n = 146)



In terms of inclusion and exclusion decisions, one study was included because it described two interventions that were similar to other training studies (i.e., a meeting with a hospital VP talking about Covid-19 crisis; a written letter from the VP); however, it should be noted that this study sits at the outer boundary of what is typically considered training (Lu, Chen, & Li, 2021). Two other studies had substantial overlap (Ahjua et al., 2020; Merchan et al., 2020). Both described pharmacists' activities at the same hospital and emphasized a clinical guidance document as a key educational strategy. However, they described slightly different content (i.e., one mentions that PPE was included in the training document; one talks about training pharmacists for redeployment to ICU) so I decided to include both in the review.

Most of the studies were either descriptive (i.e., training activities are described only) or observational (i.e., training activities that were evaluated). Seven studies (5%) had experimental designs that compared the effects of two different interventions (i.e., training vs. control; training

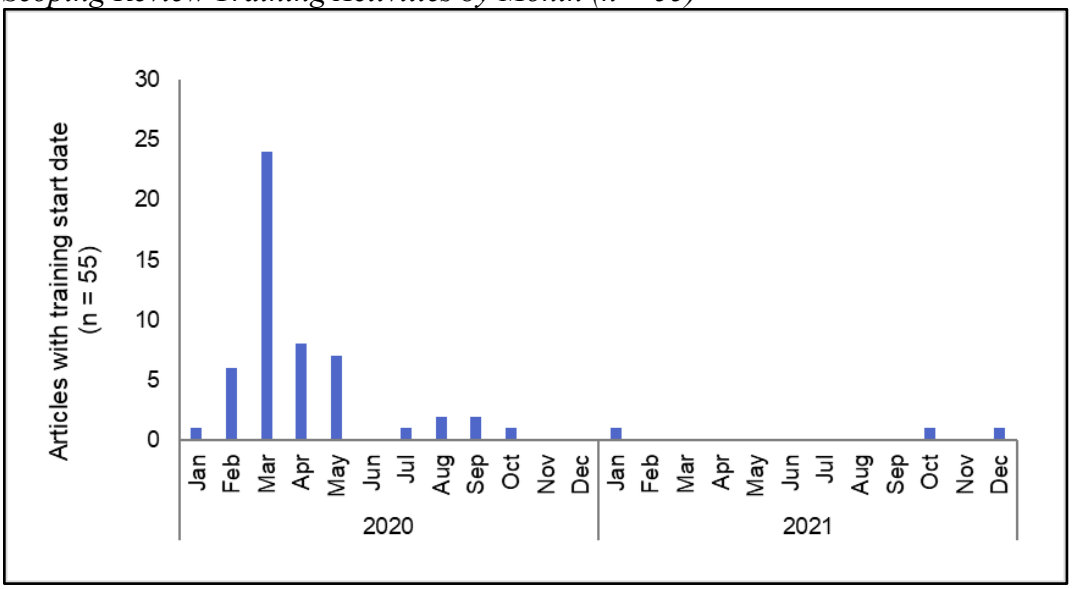
A vs. training B); of these, six (4%) involved random assignment. Six studies (4%) were pilot studies that described the early development and/or testing of a new training activity or strategy.

Training Details.

Information about training reach (e.g., site-level, multiple sites, and country-level) was available from 145 articles. The majority, 113 (78%), described training activities conducted at the site level (i.e., single hospital). Training implemented across multiple sites (17%), or country-wide (4%) was less common. One article described training resources distributed globally (Thomas et al., 2020). Information about the training audience was available from 144 articles. The audience for most of the activities was interdisciplinary (59%). Nurse-specific activities (22%), and physician-specific activities (13%) were somewhat less common. Four articles (3%) described training activities specific to pharmacists. Many of the included articles did not specify the dates that training was implemented. However, among the 55 articles that did specify dates, training was typically initiated between February and May 2020, with a peak in March 2020 (Figure 3).

Figure 3

Scoping Review Training Activities by Month (n = 55)

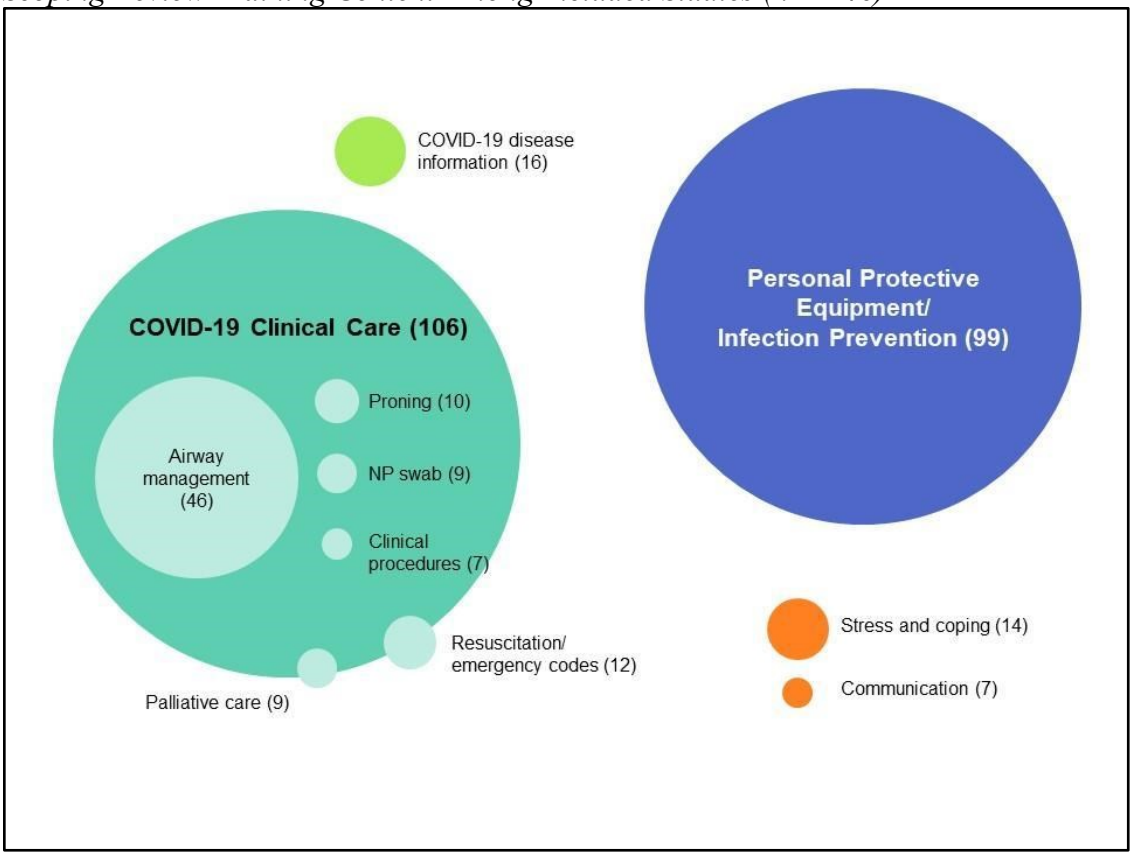


Training Content.

Regarding training content, the topics of (1) clinical care of Covid-19 patients, and (2) infection prevention (including personal protective equipment) were most prominent (see Figure 4). In total, 106 articles (73%) contained some training content related to the clinical care of Covid-19 patients. Within this group, subtopics included airway management (32%), and proning[1] (7%), and nasopharyngeal swabbing (6%). Seven studies described training in a specific clinical procedure, including tracheostomy (Favier et al., 2020; Jafri et al., 2022, LoSavio et al., 2020; Towning, Rennie & Ferguson, 2021), C-section (Kang et al., 2020), endotracheal intubation (So et al., 2020), and transthoracic echocardiography (Williamson & Barron, 2021).

Figure 4

Scoping Review Training Content Among Included Studies (n = 146)



[1] This term refers to placing a patient in respiratory distress on their stomach.

Three studies described training about a specific device, including a device for chest compression (Bhatnagar et al., 2020), mechanical ventilation (Brady et al., 2021), and continuous glucose monitoring (Faulds et al., 2021). Several articles described content that could support Covid-19 patients but would also apply to other patient populations or increase care capacity more broadly. These topics included emergency codes/resuscitation (8%) and palliative care (6%). Fifty-seven articles (39%) indicated that the training content was for the purpose of upskilling staff and/or preparing them for redeployment. Beyond these areas, several studies described content related to general information about Covid-19 (11%) or aimed to support healthcare providers with their stress (10%). A few articles described content aimed at communication (5%); of these, two articles mentioned content related to raising concerns (Hong et al., 2021; Lababidi et al., 2021).

Regarding content selection, twenty-seven articles (18%) described conducting some form of needs assessment prior to training. These articles describe using a variety of assessment methods, the most common being surveys (Bleazard et al., 2021; Chu et al., 2021; Forristal & Kim, 2021; Hessler et al., 2020; Lababidi et al., 2020; Lowry et al., 2021), or discussions with frontline providers, leaders, or other stakeholders (Brickman et al., 2020; Chu et al., 2021; Dundin et al., 2020; Rao et al., 2021; Dutta et al., 2021; Hemingway & Silvestri, 2021; Monteverde et al., 2021; Rao et al., 2021). Other methods included literature reviews (Valderama et al., 2022; Dutta et al., 2021; Jordan et al., 2022; Wundavalli et al., 2020), or gap analysis by nurse educators (Breaux, 2021; Brickman et al., 2020; Tashkandi et al., 2021). In one article, needs were identified using a knowledge assessment (Chiu et al., 2021); in another, the authors generalized the results of a needs assessment conducted elsewhere (Engberg et al., 2021). Jensen et al. (2020) described using HCPs' frequently asked questions as a source of insight into HCPs'

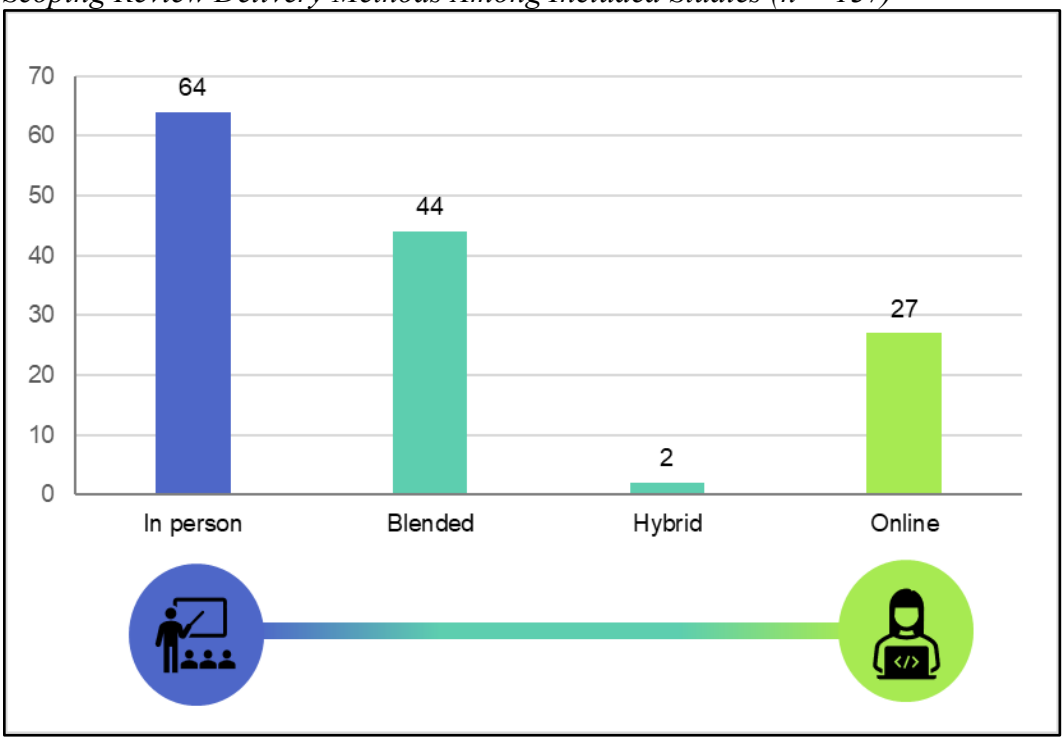
training needs. Importantly, five articles referenced a needs assessment, but did not specify how they conducted it. One article made a recommendation for a needs assessment as a result of their experiences, although they had not conducted one (Jones et al., 2022).

Instructional Methods.

Information about the method of delivery (i.e., in-person, online, blended, etc.) was available from 137 studies. Despite pandemic-related issues such as group size and physical distancing, most studies indicated that training took place in person (Figure 5). Nonetheless, many articles also described blended (i.e., some elements completed in-person, some online) and online delivery. Hybrid training (i.e., some learners complete an in-person version, some online) was rare; it was implemented to provide an option for learners unable to attend in person (Ragazzoni et al., 2021), or where access to computers/devices was limited (Hafeez et al., 2022).

Figure 5

Scoping Review Delivery Methods Among Included Studies (n = 137)

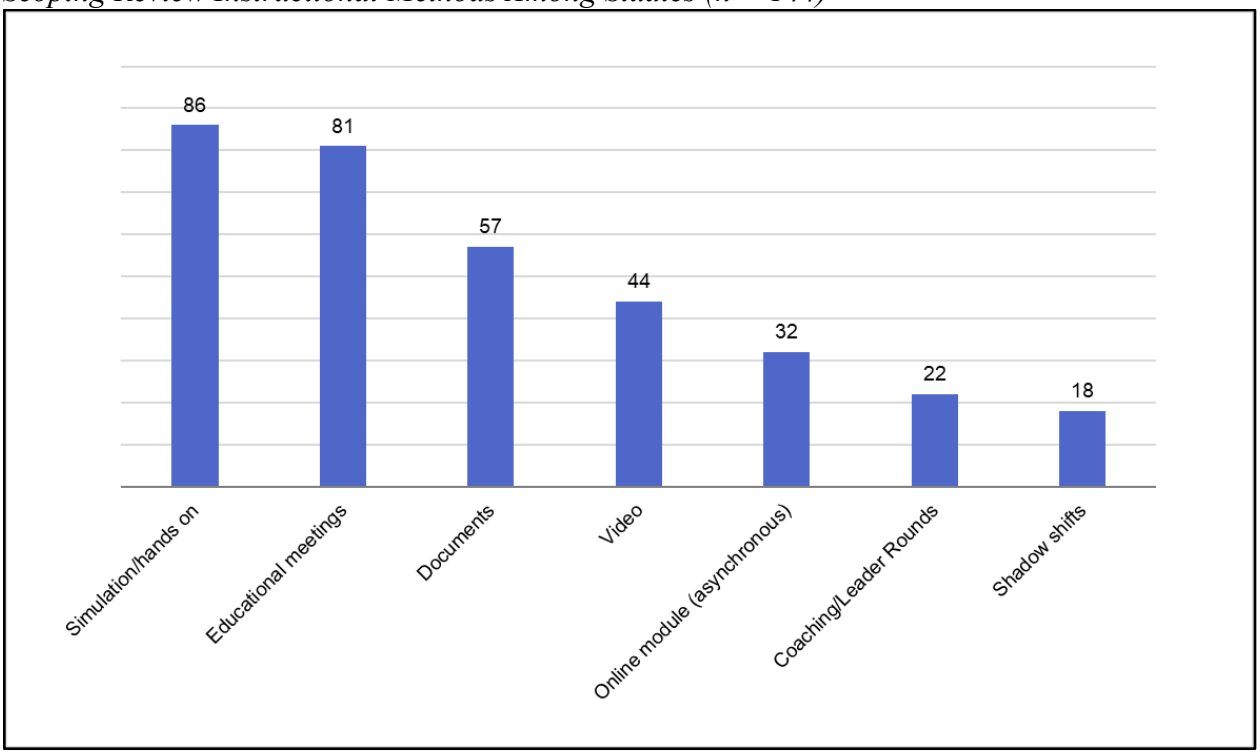


Information about instructional methods was available for 144 studies. Simulation/ hands-on training (60%) and educational meetings (56%) were most common (Figure 6). Methods such as documents (i.e., handouts, posters, clinical guidelines, splash cards, etc.), videos, and online modules also appeared frequently. Social methods such as coaching/leader rounds and shadow shifts were somewhat less common.

Aside from these primary methods, additional strategies included discussion (6%) and huddles (3%). Social media was described in eight studies (6%), primarily for distributing information (Jafree et al., 2022; Li & Qu, 2021; Patel et al., 2022; Peneza et al., 2021; Wang et al., 2021a; Zheng et al., 2020), but also as a forum for communication (Wang et al., 2021b), or asking questions (Joshi et al., 2022). Other articles presented innovative instructional methods. Two studies used virtual reality to (1) orient staff to Covid-19 care units (Zhang et al., 2022), or (2) provide immersive case simulation (Zhang et al., 2021). Another study described the

Figure 6

Scoping Review Instructional Methods Among Studies (n = 144)



development of a mobile app to support physicians with emergency code procedures (Chu et al., 2021). Wang et al. (2022) described implementing a Conceive-Design-Implement-Operate (CDIO) method, wherein clinicians collaboratively developed care protocols through research, discussion, simulation, and revision.

Training Results.

In terms of training outcomes, 67 (46%) of the studies described an evaluation of the training activities. Results of the experimental studies suggest that in situ and lab-based simulation confer similar educational benefits (Cheung et al., 2020) and that the previously mentioned virtual reality simulation (Zhang et al., 2021) and CDIO (Wang et al., 2022) interventions were superior to conventional training. Other experimental results suggest benefits of (1) WhatsApp Covid-19 training (Jafree et al., 2022), (2) time management training (Sun, 2021), and (3) Islamic positive psychology training (Yuliatun & Karyani, 2022). A final experimental study found that a lecture and a written letter from a hospital vice president improved hospital staff's feelings of strength and work meaningfulness during the pandemic (Liu, Chen & Li, 2021).

Of all the studies with evaluations, 15 (12%) had evidence at Kirkpatrick Level 1 (i.e., evidence of learner satisfaction), 28 (42%) had evidence at Level 2a (i.e., evidence of a change in attitude or perception), and 28 (42%) had evidence at Level 2b (i.e., evidence of knowledge of skills). Evidence at higher Kirkpatrick levels was much less common (see Table 3, p. 35). Three articles reported evidence of behavior change, including (1) a reduction in PPE errors following the implementation of 'dofficer' coaches (Picard et al., 2021) and (2) an increase in requests for support from hospital security following workplace violence training (Thompson et al., 2021),

and an increase in advance care planning activities after training (Casey et al., 2022). Regarding the latter, the increase in advanced care planning was not statistically significant.

Table 3
Evaluation Outcomes (Kirkpatrick's levels) of Included Studies (n = 67)

Kirkpatrick's Level	Count (%)
Level 1 (Learner satisfaction)	8 (12%)
Level 2a (Attitude/perception)	28 (42%)
Level 2b (Knowledge or skills)	28 (42%)
Level 3 (Behaviour)	3 (3%)
Level 4a (Organizational change)	0 (0%)
Level 4b (Benefit to patients)	0 (0%)
TOTAL	67 (100%)

Research Question 1b: What were hospital-based stakeholders' experiences with education during the Covid-19 pandemic?

Stakeholder Interviews

Five stakeholders participated in interviews between November 2021 and April 2022. Three of the interviewees were frontline physicians, and two were clinical nurse educators.

Challenges of Pandemic and Training.

Physicians reported several challenges related to their role during the pandemic. Some were related to caring for patients, including (1) concern for patients who had become higher acuity because of delayed medical care, (2) challenges with conducting virtual visits, and (3) suiting up in PPE when seeing each patient. They also identified challenges related to their work role, including (1) HCP attrition, (2) facility outbreaks, (3) having sufficient resources, and (4) uncertainty about support from the hospital.

CNEs reported several challenges as well. There were limitations imposed on training group size due to physical distancing requirements. As one explains:

> *You can only have a finite amount of people in a room now. So if we were to do training, you know, we'd have to split it up into more sessions, or we'd need larger space to do it. Whereas before we could just put a bunch of people in a room and kind of do it, we can't do that now.* (CNE 2)

One CNE reported that they have learned to adapt to these requirements somewhat, by dividing groups into split sessions, but adapting "definitely took time". Another challenge for CNEs was tight timelines. One CNE described rehearsing PPE donning and doffing themselves, and then immediately teaching the procedure to others. Another described having to pivot a multi-day, highly interactive course from in-person to virtual delivery with very little notice.

Some challenges were shared across both groups. One physician and one CNE both noted HCP anxiety as an issue. As the physician described: "You can feel the anxiety building in the department, [ ] and you can feel that you're running out of resources pretty quick, especially in the hospital…". From the CNE's perspective: "There were some people who were very scared to come to work, at least in the first sort of part of it. So you kinda had this hesitancy, um, you know just to engage staff members in general". This anxiety shaped HCPs' engagement with education, but in different ways. For some, education was an "information overload" that caused them to withdraw. For others, including the interviewed CNE, education was seen as something within their "control" that prepared them for difficult scenarios; as a result, they embraced it, learning everything that they could about Covid-19 and caring for patients with the condition.

Another shared challenge was that Covid-19-related information was evolving and "changing quickly". This was a sentiment shared by four of the interviewees. As one CNE described it:

> *So staff would just come—they'd be like 'well this changed today' 'cause everything was changing so rapidly. So not only did--we were not able to do any formal form of education for things that were changing every day.* (CNE 1)

Most participants also had the shared experience of heavy workloads. Both CNEs that I interviewed talked about needing to provide frontline care in addition to their educational responsibilities. Staffing challenges were described by all participants. Physicians experienced staffing challenges in their frontline care settings. CNEs were limited in their capacity to "pull [HCPs] off the floor" for education.

Training Quantity and Quality.

There was a sense among most interviewees that training had been scaled back during the pandemic. CNEs explained that many educational activities deemed "non-essential" were canceled or paused. Physicians' perceptions of training quantity may have also been shaped by poor advertisement and/or efforts to accommodate their schedules. One physician reported that an early pandemic-related training opportunity was presented casually, with little concern for those who could not attend. Another physician reported being unable to attend training that they would have liked to because their clinical duties did not allow them to participate at the scheduled time.

Participants described the quality of training during the pandemic in both positive and negative terms. One physician described an online module that was "well done" and "entertaining", noting that it was not related to the pandemic, and that also contributed to their enjoyment. Another physician reported that a Covid-related session led by an expert was a "helpful and practical summary" and that an "email about Covid drugs was really helpful". On the other hand, a physician commented that training at the beginning of the pandemic seemed "haphazardly" put together, which corresponds with the CNEs' descriptions regarding having

very little time to design and develop training activities. Their experience with a simulation exercise was also negative: “I was like this doesn’t help at all”.

Training Needs Identification.

Interviewees also described their experiences regarding how training needs were identified. All three physician interviewees described self-identifying their own learning needs and pursuing opportunities to address them. This process occurred prior to the pandemic and seemed deeply ingrained in physicians’ professional culture. However, one physician identified a limitation whereby “people pick topics that are either of interest to them, or they’re experts in, not usually—they don’t usually pick topics that they have deficiencies in”. They also described instances where training needs were identified by others. During the pandemic, this process resulted in training that physicians felt was unhelpful, or even unnecessary. One physician expressed:

> *[Organization] would like us to do some, or--but they don’t know what that some is—some what? What do you want us to do? What do you want us to [have] experience in? What would you like us to know about this…* (Physician 1)

Another physician raised the possibility that others had incorrectly judged their knowledge, saying “or it was kind of assumed that I have a better grasp on those [ ] classes of medications than I actually do”.

Both CNEs described needs identification as two processes working simultaneously: (1) bottom up needs identification by providers, communicated through questions or requests for specific training, and (2) top down needs identification, due to a policy change or other mandates. Importantly, one CNE described how pandemic circumstances resulted in an imbalance towards these ‘top down’ needs, saying:

> *'Cause everything has been very one-directional with Covid. Like it's been 'This is the way it is. You have to follow this. We know it sucks. Your input is appreciated, but we can't change it'.* (CNE 1)

Training Content.

For most participants, there was an emphasis on Covid-related training early in the pandemic. Interviewees described training in PPE, ventilator operation, airway management, Covid-19 drugs, and clinical care pathways. Both CNEs mentioned conducting redeployment training for HCPs reassigned to new, and unfamiliar care areas. Since then, CNEs indicated that Covid-19-related training content has decreased, with one saying "we're much more going back to the content that we focussed on pre-pandemic". At the same time, two interviewees emphasized that training during the pandemic was certainly not *all* Covid. This sentiment was echoed in others' descriptions of training content, which included patient confidentiality, patient safety, and quality improvement. A CNE reported that, aside from some additional instruction in PPE donning and doffing, new staff orientation training content was unchanged. They also noted that staff questions were not exclusively about the pandemic: "it's certainly not just Covid".

Instructional Methods.

Most interviewees described experiences with both in-person and online training, with one physician observing a "big shift during Covid to going virtual". Physicians' opinions of online training were mixed. One expressed dislike, explaining that procedural training does not translate well into two-dimensional space. Another expressed "mixed" feelings; they appreciated the convenience of online training but also felt that their engagement was lower than if they had attended in person. The final physician liked online training, which they attributed to their familiarity with it, and comfort with technology; however, at the same time, they also admitted that engagement is challenging in online settings. CNEs, for their part, expressed concerns

regarding their ability to facilitate virtual sessions and challenges in terms of translating interactive elements and gauging understanding.

Simulation and hands-on methods were described by three interviewees. As mentioned previously, one physician reported a negative experience with a simulation early in the pandemic, primarily because the learning objectives were not clear; however, they also felt that well-designed simulations are a useful learning tool. Both CNEs described simulation positively. One discussed some hands-on training they had conducted with redeployed ICU staff to familiarize them with critical care equipment. However, both CNEs reported that it was difficult to develop and implement simulation training because of distancing requirements.

Interviewees also described their experiences with educational documents. Importantly, one physician did not consider documents as training ("I wouldn't say that's *training*"). All three physicians described receiving a large amount of information via email. One physician admitted it was "way too much [to] the point where now I just delete it". Another physician explained:

> *The sheer volume of email that I get feels like—like too much and it's hard sometimes to tell [ ] what's an important email that I need to read, that actually contains, [ ] useful information that will change how I'm practicing. And that's something that's been challenging. It's hard to—I'm just finding it really hard to [ ] even keep up with the volume of email. And like the number of emails is one thing, and [also] the length of the emails. I'm learning to appreciate that more and—a lot of the publications [ ] at least have [ ] a table of contents now. So I can at least identify [ ] if there's something that might be helpful…*
>
> *And insane that I'm also aware that I could have missed that because I just…especially when I'm on service weeks [ ] I literally just can't keep up with the emails and so it could get buried so easily."* (Physician 3)

The two different CNEs' described quite different approaches to email. One described a cautious approach to email, primarily targeting frontline managers with the request that they filter the

information to staff in their area. They were conscious to avoid “information overloading on email” and described it as a “tertiary method of getting information out”. The other CNE talked about using email “quite a bit” because “it’s a good way of sort of reaching [ ] everybody”. They acknowledged that some people may just delete emails but pointed out that others often search their email inboxes for information. Another reason was “because there are some people who work a lot, who are really in the know, and want to be up to date, and will check those regularly”. In terms of documents, both CNEs described using a shared drive as an important resource where HCPs could go search for information related to a specific question.

Additional methods included sharing information in team huddles and staff meetings. CNEs reported using multiple methods in an effort to reach all staff. In terms of *selecting* methods, one physician explained that it depends on what they are learning; some tasks, they suggested, like ultrasound or ventilator operation, are most effectively taught at the bedside with coaching, while others can be learned independently through reading.

Informal Teaching and Learning.

The interviews revealed that informal teaching and learning played an important role during the pandemic. One method involved discussing cases with colleagues, which was described by two physicians. When asked about the conditions that make these discussions possible, one explained that a “lighthearted environment” and colleagues “listen[ing] without judgment” were important factors. Facility-wide culture, including among nursing staff, also contributed: “I think there’s a lot of conversation, [ ] innately at that hospital”. One CNE also acknowledged this method, and recognized that it builds “staff morale” and teamwork; however, they also highlighted a caveat that information being shared needs to be accurate, and staff should be willing to correct misinformation if it occurs.

One physician described self-directed learning, and seeking out, reading, and summarizing clinical content on their own. As I described before, this learning method is closely tied to a culture of continuous learning among physicians. Another physician talked about the knowledge gained through their experiences providing frontline care; however, they describe this "school of hard knocks" as a "really unfortunate reality". In terms of informal learning, CNEs talked about CNE rounds and being available to answer questions. One CNE observed that their informal method of "literally walking around the unit" increased during the pandemic because the information needed to be communicated so quickly.

Future Training.

Interviewees shared a variety of ideas regarding post-pandemic training. In terms of content, they identified specific clinical topics, such as chronic disease care, critical care, and ECG interpretation. Two interviewees talked about reviewing "the basics" and "all the things we haven't seen in the last little while"; another talked about "*gently*" reviewing best practices, especially where clinical practice may have shifted due to pandemic demands. One CNE talked about revisiting the training that had been paused. Physicians differed in their opinions of non-clinical training in the future. One physician reported "they've bombarded us like crazy with that". The others identified non-clinical topics they felt would be useful, such as quality improvement, maintaining mental health during a crisis, and personal development. One physician remarked they would like to learn more about providing culturally-responsive care to Indigenous patients.

There was also variability across participants in terms of recommended instructional methods. One CNE and a physician looked forward to in-person training, with the CNE also mentioning "hands-on". The two other physicians described a preference for mixed methods

with both online and in-person elements. In terms of training quantity, one CNE was emphatic about the need for more training overall. Another emphasized that future training needed to incorporate HCPs' experiences into the learning process:

> *And, I think there's going to be a lot of debriefing that's going to happen in the immediate kind of education sessions that we're providing. I think that um, that's something that we need to also incorporate, because that's part of them learning and moving forward, and that's part of their ability to absorb the content is getting that out.* (CNE 1)

Chapter 5: Discussion

The results of this study provide a window into the training and education provided to hospital-based providers for the Covid-19 pandemic (see Table 4, p. 45). Regarding my overarching research question, which asked what education and training activities looked like, the results convey a nuanced, complex picture. Regarding my second research question, which asked about educational activities, I found that most were targeted toward (1) the care of Covid-19 patients and (2) infection prevention and PPE training. In terms of instructional methods, I found that in-person activities were most common, but that blended and virtual options were also used to address pandemic circumstances. Other findings related to needs assessment and evaluations, which occurred in a minority of cases. Most evaluations were at the level of learner satisfaction or attitudes, and only three studies evaluated educational activities at the level of HCP behavior change.

Regarding my third research question, which asked about stakeholders' experiences with education during the pandemic, I found differing opinions regarding educational content, instructional methods, and delivery. Work challenges, on the other hand, were shared, with most stakeholders reporting staffing shortages, heavy workloads, and information that was changing quickly. In terms of needs identification, it appears that 'top down' directives were common during the pandemic, which resulted in education that some HCPs' regarded as unable to meet their needs at the frontline. Some frontline HCPs described informal learning or information sharing as an important educational strategy during the pandemic. For future education, two suggestions included (1) having an opportunity for HCPs to debrief their pandemic experiences, and (2) reviewing clinical basics and best practices that may have been forgotten.

Table 4
Key Findings

	Scoping Review	*Interviews*
Content	● Content was mostly oriented towards: (1) Clinical care of Covid-19 patients, and (2) Infection Prevention/Personal Protective Equipment	● Some emphasis on Covid-19 content early in the pandemic ● Non-Covid topics were still present
Needs Identification	● Needs assessment was mentioned in less than 20% of included articles ● Surveys and discussion-based methods were the most common	● Nurse educators reported that most training during the pandemic was prescribed (i.e., 'top down') ● Some HCPs reported inconsistency between top-down directives and what was needed at the frontline
Instructional Methods	● Delivery methods varied (in-person, online, etc.) ● Simulation and educational meetings were the most common instructional methods	● Stakeholders' opinions of virtual delivery were mixed; some expressed a preference to return to in-person ● The volume of educational documents received via email was overwhelming for some HCPs
Evaluation	● Evaluation was mentioned in less than 50% of included articles ● Evaluations tended to focus on outcomes at the levels of learner satisfaction, attitudes, and knowledge/skills	
Other findings		● Some pandemic-related challenges were shared among both providers and educators, including: (1) heavy workloads/staffing challenges, (2) pandemic anxiety, and (3) information that was "changing quickly" ● Informal learning and information sharing played an important role during the pandemic ● Future training ideas included: (1) reviewing the basics, and (2) debriefing the pandemic ● There is diversity in HCPs' opinions about training content and instructional methods going forward

As we have seen, most educational activities were targeted toward Covid-19 care and infection prevention. In some ways, these two focus areas seem like an obvious response to pandemic circumstances; however, it is interesting that the two areas were roughly equivalent in terms of their emphasis. Most HCPs likely had some training in infection prevention or PPE *prior* to the pandemic, yet it was presented at a similar rate to clinical care topics related to a novel infectious disease. This may be because infection prevention training was seen as both reducing transmission of the virus for operational purposes, but also as an opportunity to reduce HCP anxieties around becoming ill, and/or transmitting the virus to others. In any case, the two focus areas are consistent with needs assessment studies conducted among hospital-based HCPs during the pandemic (Hou et al., 2020). They also correspond with concerns expressed by hospital-based HCPs, including becoming infected or transmitting the virus (Adams & Walls, 2020; Binnie et al., 2021; Cai et al., 2020; Caparkapa et al., 2020; Liu et al., 2020; Raudenska et al., 2020; Shanafelt, Ripp, & Trockel, 2020; Shechter et al., 2020; Temsah et al., 2021), and concerns regarding their ability to provide effective care for Covid-19 patients (Liu et al., 2020). Importantly, this correspondence of reported HCP concerns and the content areas observed in this study provide some support for the broader notion that education is supportive described in Chapter 1.

Some studies also highlighted additional content areas that were more unexpected, including palliative care training, and stress/coping training. These topics appeared across multiple studies, suggesting that the need for these kinds of training generalizes--at least somewhat--among hospital-based HCPs. In terms of palliative care training, the pandemic may prove to be an impetus for enhancing these skills among hospital-based HCPs. Importantly, the

interview results suggest that not all training during the pandemic was directly Covid-related. This makes logical sense, and adds important context to the results of the review.

Regarding content selection, needs assessment was mentioned in relatively few studies. This finding may simply reflect an overall tendency to overlook needs assessments (or training needs analyses) in health settings (Gould et al., 2004). It is also possible that the pandemic exaggerated this tendency. Staffing challenges and scarce resources may have limited educators' capacity to conduct formal needs assessments. As I described earlier, there was also a sense from educators that there was an imbalance between 'top down' and 'bottom up' needs identification. Furthermore, the perspective of one HCP was that 'top down' training activities did not meet their educational needs at the frontline. Relating back to adult learning theory, one possible explanation is that top down activities did not activate HCPs' previous experiences and knowledge, and as such, the activities were perceived as not relevant to practice.

In any case, this tension between needs identified through 'top down' and 'bottom up' processes is not well described in the education literature to date, and is an issue that is likely to play out during future crises. As such, there is an opportunity for future work to explore how these two processes can be balanced or integrated into health settings.

The study also revealed overall patterns in instructional methods during the pandemic, such that simulation and educational meetings were most common, and social methods, such as coaching or shadow shifts, were less common. Again, these trends may reflect pandemic requirements in terms of physical distancing and limiting close contact. In any case, both simulation and educational meetings appear to be effective instructional strategies (Cook et al., 2011; Forsetlund et al., 2021). In terms of stakeholder experiences, four interviewees spoke about how simulation and hands-on learning can be effective strategies for learning. The scoping

review also revealed that educational documents were a popular strategy; however, some providers expressed that the volume of these documents received by email was too large.

The study also shed some light on delivery methods during the pandemic. In-person delivery was most common, perhaps because much of the training was aimed at clinical care of Covid-19 patients and personal protective equipment. Both of these topics often involve some physical rehearsal, which may explain the tendency towards in-person activities. At the same time, there were also many activities that took place in virtual or blended settings. HCPs appear to have mixed feelings about these methods of delivery, so successful use of these methods in the future should account for the experiences and preferences of target learners. Importantly, review and interview findings suggest that stakeholders have emerged from the pandemic more sensitized to virtual learning, which will likely impact their acceptance of this delivery method moving forward.

Regarding training outcomes, I found that many studies did not include any evaluation of the educational activities described. Where evaluation occurred, it was often limited to learners' satisfaction with the education, or an attitudinal change. As with needs assessment, this may simply reflect a lack of resources during the pandemic. But in any case, it limits our ability to make inferences regarding the effectiveness of training on HCP behavior or patient outcomes. It also highlights a practical gap between the need for educational evaluation, and educators' capacity to evaluate their activities in 'lean' circumstances.

Finally, stakeholders' experiences provided additional insight into the work and educational contexts during the pandemic. I found that some work-related challenges were common across stakeholder groups during the pandemic. These findings hint at larger undercurrents during the pandemic, such that resources were thin, anxiety was high, and

information was constantly in flux. Another finding related to the role of informal learning during the pandemic. Importantly, informal learning was not captured in the scoping review, because of its emphasis on formal educational activities in published studies; it was reflected only through the exploration of stakeholders' experiences. Lastly, there were several instances where stakeholders' experiences were mixed, especially in their descriptions of CE quality, quantity, and instructional methods. These differences highlight an opportunity to assess these needs and preferences more systematically, among larger, more representative HCP samples.

Limitations

The study has several limitations. The scoping review was conducted by a single reviewer, so there is some potential that it is biased in terms of which studies were included. It was also limited to a description of CE activities that were published in peer-reviewed venues. These published activities may represent settings or contexts with a higher level of resources, and as such, not be representative of all the CE activities that occurred during this time. Covid-related literature was also written and published quickly, and key elements of training studies were not included (i.e., number of participants, training date(s), needs assessment methods, etc.), which limited my analyses in these areas.

Regarding the interviews, the stakeholder sample was very small, so the findings may not directly generalize to other HCPs. Furthermore, the provider sample only included physicians, and as such, the study was not able to capture the experiences of other frontline HCP groups. The most notable of these groups is nurses, who played a critical role in hospitals' response to the pandemic. For all non-physician HCPs, their experiences with training could be somewhat different from the physician providers, and unfortunately, this study was not able to incorporate them. In terms of my thematic analysis, the small sample size limited my ability to explore

inductive themes across multiple interviewees. I was also unable to explore the relative frequency of themes (i.e., quantizing) due to sample size. Another key limitation of the interview component was that I did not employ formal strategies to ensure rigor in my qualitative work, such as member checking, interrater reliability, or triangulation (Morse, 2015). Use of these strategies was limited somewhat by pandemic circumstances, including very limited interviewee availability. In any case, the absence of these strategies limits the *trustworthiness* of the interview results.

Finally, the level of analysis for the scoping review and the interviews was also different. The scoping review considered hospital-based educational activities in any country. By contrast, the interviewees were sampled from two hospitals in a single city. As such, the results of this study are best considered exploratory. They provide preliminary insight into the educational activities for hospital-based providers, but should be supplemented by more targeted investigations using multiple methods at more specific levels (i.e., site level, organization level) that can directly integrate the findings across methods.

Future Research and Practice

The results of this study highlight some opportunities for future research and educational practice. The first is based on my observation that needs assessment and evaluation of educational programs were limited during the pandemic, likely because resources were scarce. Future work in this area should explore how to overcome this issue by developing a practical framework for educational needs assessment and evaluation that can be deployed in similar circumstances. Ideally, this framework should be co-developed with educators and providers to ensure that (1) it can be reasonably applied by educators in resource-limited environments, and (2) that it fosters an acceptable level of frontline

involvement in the development of training activities. In terms of the educational contexts described earlier, this framework would support educational activities at the organizational and legislative levels, where prescribed educational activities are most common.

The second relates to the needs identification process. The educators that I interviewed in this study described training needs identification as a bidirectional process, whereby 'top down' needs were balanced by 'bottom up' needs identified by providers. During the pandemic, they noted, the 'top down' needs became dominant, and some providers felt the resultant education missed the mark. One potential strategy would be to develop a systematic procedure for capturing and collating the 'bottom up' needs in real time. For example, clinician questions could be entered into a central system and auto-coded for themes using artificial intelligence. Another possibility could be exploring patterns in views or downloads across information repositories (i.e., clinical care protocols and internal education websites). Viewing the resulting data in aggregate would provide hospital or organizational leaders an opportunity to integrate needs identified on the frontline into decisions about prescribed training without the need for additional surveys, interviews, or other resource-intensive methods of engagement. Again, work to develop this systematic procedure would most directly apply to organizational and legislative contexts.

A final recommendation is that educators and researchers explore HCPs' preferences regarding instructional methods in larger, more representative samples. During the pandemic, the shift to virtual delivery exposed many providers to new instructional methods, and the scoping review revealed that there were some instructional innovations during the pandemic. Conducting a survey to examine HCPs' specific preferences would help to support HCP enthusiasm and uptake of educational activities going forward.

Conclusion

"They will be the heroes of the day, but we will need them for tomorrow"

(Greenburg et al., 2020).

The findings from this study generate a comprehensive picture of education for hospital-based HCPs during the pandemic. The study is primarily reflective–exploring previous educational activities and experiences during unique and stressful circumstances. It is intended as a first step in unpacking how training or education can best support HCPs during future crises. During the interviews, the study also considered what education would support HCPs during the current transition past the acute pandemic phase. Together, these learnings provide insight into how educators and healthcare organizations can enhance the supportive impact of education for HCPs, thereby helping to ensure their wellness and continued service both today and well into the future.

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Appendix 1: Search syntax

Database searches

Source	MEDLINE via OVID
Syntax	**Hospital-based HCPs** S1. Nurses/ or Nurse Practitioners/ or Nurse Specialists/ or Nurse Clinicians/ or Nursing Staff/ or Nursing Staff, Hospital/ or Licensed Practical Nurses/ or Nursing Assistants/ S2. (nurse or nurses).ti,kw,ab. S3. Medical Staff/ or Medical Staff, Hospital/ or Hospitalists/ or Physicians/ or Surgeons S4. Allied Health Personnel/ or Pharmacists/ S5. Personnel, Hospital/ S6. 1 or 2 or 3 or 4 or 5 **Training** S7. Education, Medical, Continuing/ or Education, Nursing, Continuing/ or Education, Pharmacy, Continuing/ or Education, Professional, Retraining/ S8. Inservice Training/ or Staff Development/ S9. (training adj4 (workshop* or class* or course* or opportunit*)).ti,kw,ab. S10. ("continuing education" or "professional development" or "professional training").ti,kw,ab. S11. 7 or 8 or 9 or 10 **Covid-19 pandemic** (((exp Coronavirus/ or exp Coronavirus Infections/ or (coronavirus* or corona virus* or OC43 or NL63 or 229E or HKU1 or HCoV* or ncov* or covid* or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus*).mp.) and (201906* or 201907* or 201908* or 201909* or 20191* or 2020* or 2021* or 2022* 2023* or 2024* or 2025* or 2026* or 2027* or 2028* or 2029* or 2030*).dt,ez,da.) not (SARS or SARS-CoV or MERS or MERS-CoV or Middle East respiratory syndrome or camel* or dromedar* or equine or coronary or coronal or covidence* or covidien or influenza virus or HIV or bovine or calves or TGEV or feline or porcine or BCoV or PED or PEDV or PDCoV or FIPV or FCoV or SADS-CoV or canine or CCov or zoonotic or avian influenza or H1N1 or H5N1 or H5N6 or IBV or murine corona*).mp.) OR ((Covid-19/ or covid or covid19 or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or Deltacron or Omnicron or ((novel or new or nouveau) adj2 (CoV or nCoV or covid or coronavirus* or corona virus or Pandemi*2)) or ((subvariant* or variant*) adj2 (India* or "South Africa*" or UK or English or Brazil* or alpha or beta or delta or gamma or kappa or lambda or mu or "AY.X" or "BA.1" or "BA.2" or "BA.3" or "P.1" or "C.37")) or ("B.1.1.7" or "B.1.351" or "B.1.617.1" or "B.1.617.2" or "B.1.1.529*" or "B.1.61.7*" or "21L/BA.2" or "21K/BA.1").mp.)) S13. 6 and 11 and 12
Limiters	english language and yr=”2020-Current”
Search Date	Jun 29, 2022
# Results	222

Appendix 1: Search syntax (continued)

Source	**CINAHL via EBSCO**
Syntax	S1. (MH "Nurses+") OR (MH "Staff Nurses") OR (MH "Registered Nurses") OR (MH "Nursing Assistants") OR (MH "Clinical Nurse Specialists") OR (MH "Nursing Staff, Hospital") OR (MH "Nurse Practitioners+") OR (MH "Practical Nurses") S2. TI (nurse or nurses) AND SU (nurse or nurses) AND AB (nurse or nurses) S3. (MH "Medical Staff+") OR (MH "Medical Staff, Hospital+") OR (MH "Hospitalists") OR (MH "Physicians+") OR (MH "Surgeons") S4. (MH "Allied Health Personnel+") OR (MH "Pharmacists") S5. (MH "Personnel, Health Facility+") S6. S1 OR S2 OR S3 OR S4 OR S5 S7. (MH "Education, Medical, Continuing") OR (MH "Education, Nursing, Continuing") OR (MH "Education, Continuing+") OR (MH "Education, Continuing (Credit)") S8. (MH "Staff Development+") S9. TI (training N4 (workshop* or class* or course* or opportunit*)) OR AB(training N4 (workshop* or class* or course* or opportunit*)) OR SU(training N4 (workshop* or class* or course* or opportunit*)) S10. TI("continuing education" or "professional development" or "professional training") OR AB("continuing education" or "professional development" or "professional training") OR SU(("continuing education" or "professional development" or "professional training") S11. (S7 OR S8 OR S9 OR S10) S12. (((MH "Coronavirus+") OR (MH "Coronavirus Infections+") or (coronavirus* or corona virus* or OC43 or NL63 or 229E or HKU1 or HCoV* or ncov* or covid* or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus*)) NOT ((SARS or SARS-CoV or MERS or MERS-CoV or Middle East respiratory syndrome or camel* or dromedar* or equine or coronary or coronal or covidence* or covidien or influenza virus or HIV or bovine or calves or TGEV or feline or porcine or BCoV or PED or PEDV or PDCoV or FIPV or FCoV or SADS-CoV or canine or CCov or zoonotic or avian influenza or H1N1 or H5N1 or H5N6 or IBV or murine corona*)) or (MH "COVID-19") OR (MH "COVID-19 Pandemic") OR (MH "SARS-CoV-2") or(covid or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or ((novel or new or nouveau) N2 (CoV or nCoV or coronavirus* or "corona virus" or Pandemi*)) or ((subvariant* or variant*) adj2 (India* or "South Africa*" or UK or English or Brazil* or alpha or beta or delta or gamma or kappa or lambda or mu or AY.X or "BA.1" or "BA.2" or "BA.3" or "P.1" or "C.37")) or ("B.1.1.7" or "B.1.351" or "B.1.617.1" or "B.1.617.2" or "B.1.1.529*" or "B.1.61.7*" or "21L/BA.2" or "21K/BA.1") or Deltacron or Omnicron) and EM 20190601-20301231 S13. S6 AND S11 AND S12
Limiters	English language, 2020-2022, Peer-reviewed scholarly
Search Date	Jun 29, 2022
# Results	320

Appendix 1: Search syntax (continued)

Source	**PsycInfo via OVID**
Syntax	S1. exp nurses/ S2. (nurse or nurses).mp. S3. physicians/ or medical personnel/ or family physicians/ or surgeons/ S4. allied health personnel/ or pharmacists/ S5. exp Health Personnel/ S6. 1 or 2 or 3 or 4 or 5 or 6 S7. continuing education/ or inservice training/ or professional development/ or training/ S8. (training adj4 (workshop* or class* or course* or opportunit*)).ti,id,ab. S9. ("continuing education" or "professional development" or "professional training").ti,id,ab. S10. 8 or 9 or 10 S11. ((exp Coronavirus/ or (coronavirus* or corona virus* or OC43 or NL63 or 229E or HKU1 or HCoV* or ncov* or covid* or sars-cov* or sarscov* or Sars-coronavirus* or Severe Acute Respiratory Syndrome Coronavirus* or D614G).mp.) not (SARS or SARS-CoV or MERS or MERS-CoV or Middle East respiratory syndrome or camel* or dromedar* or equine or coronary or coronal or covidence* or covidien or influenza virus or HIV or bovine or calves or TGEV or feline or porcine or BCoV or PED or PEDV or PDCoV or FIPV or FCoV or SADS-CoV or canine or CCov or zoonotic or avian influenza or H1N1 or H5N1 or H5N6 or IBV or murine corona*).mp.) or Covid-19/ or (((pneumonia or covid* or coronavirus* or corona virus* or ncov* or 2019-ncov or sars*).mp. or exp pneumonia/) and Wuhan.mp.) or ("coronavirus disease 2019" or 2019-ncov or ncov19 or ncov-19 or 2019-novel CoV or severe acute respiratory syndrome coronavirus 2 or sars-cov2 or sars-cov-2 or sarscov2 or sarscov-2 or Sars-coronavirus2 or Sars-coronavirus-2 or SARS-like coronavirus* or coronavirus-19 or covid19 or covid-19 or covid 2019 or "B.1.1.7" or "B.1.351" or "B.1.617.1" or "B.1.617.2" or (variant* adj2 ("South Africa*" or UK or English or Brazil* or alpha or beta or delta or gamma or kappa or lambda or "P.1" or "C.37")) or ("B.1.1.7" or "B.1.351" or "B.1.617.1" or "B.1.617.2" or omnicron) or ((novel or new or nouveau) adj2 (CoV or nCoV or coronavirus* or corona virus))).mp. S12. 7 and 11 and 12
Limiters	English language, 2020-Current
Search Date	Jun 29, 2022
# Results	64

Appendix 1: Search syntax (continued)

Source	**SCOPUS**
Syntax	(((TITLE-ABS-KEY ((coronavirus* OR "corona virus*" OR oc43 OR nl63 OR 229e OR hku1 OR hcov* OR ncov* OR covid* OR "sars-cov*" OR sarscov* OR "sars-coronavirus*" OR "severe acute respiratory syndrome coronavirus*" OR d614g))) AND NOT ((TITLE-ABS-KEY ((sars OR sars-cov OR mers OR mers-cov OR "middle east respiratory syndrome or camel*" OR dromedar* OR equine OR coronary OR coronal OR covidence* OR covidien OR influenza AND virus OR hiv OR bovine OR calves OR tgev OR feline OR porcine OR bcov))) OR (TITLE-ABS-KEY ((ped OR pedv OR pdcov OR fipv OR fcov OR sads-cov OR canine OR ccov OR zoonotic OR "avian influenza" OR h1n1 OR h5n1 OR h5n6 OR ibv OR murine AND corona*))))) OR (TITLE-ABS-KEY ((pneumonia OR covid* OR coronavirus* OR corona AND virus* OR ncov* OR 2019-ncov OR sars*) AND wuhan) OR ((2019-ncov OR ncov19 OR ncov-19 OR 2019-novel AND cov OR sars-cov2 OR sars-cov-2 OR sarscov2 OR sarscov-2 OR sars-coronavirus2 OR sars-coronavirus-2 OR "sars-like coronavirus*" OR coronavirus-19 OR covid19 OR covid-19 OR "covid 2019" OR "b.1.1.7" OR "b.1.351" OR "b.1.617.1" OR "b.1.617.2" OR omnicron OR (variant* W/2 (india* OR "south africa*" OR uk OR english OR brazil* OR alpha OR beta OR delta OR gamma OR kappa OR lambda OR "p.1" OR "c.37")) OR ((covid OR covid19 OR covid-19) AND pandemic*) OR (coronavirus* AND pneumonia)))) OR (TITLE ((novel OR new OR nouveau) AND (cov OR ncov OR covid OR coronavirus* OR corona AND virus OR pandemi*))) OR (ABS ((novel OR new OR nouveau) AND (cov OR ncov OR covid OR coronavirus* OR corona AND virus OR pandemi*))) OR (KEY ((novel OR new OR nouveau) AND (cov OR ncov OR covid OR coronavirus* OR corona AND virus OR pandemi*))) AND ORIG-LOAD-DATE > 20190630) AND (TITLE-ABS-KEY (nurse* OR "nursing staff" OR "medical staff" OR physician* OR "allied health" OR pharmacist* OR "hospital staff" OR "hospital personnel")) AND (TITLE-ABS-KEY ("continuing medical education" OR cme OR "continuing education" OR inservice OR training OR "staff education" OR (training W/4 (workshop* OR class* OR course* OR opportunit*)))) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020)) AND (LIMIT-TO (LANGUAGE , "English"))
Limiters	English, 2020-2022
Search Date	Jun 29, 2022
# Results	2,200
Notes	Only exported the first 2,000 documents

Appendix 1: Search syntax (continued)

Additional searching

Source	**Key Journal: Continuing Education in the Health Professions**
Syntax	N/A
Limiters	2020-2022
Search Date	Oct 15, 2022

Source	**MedRxiv**
Syntax	"training AND education"
Limiters	None
Search Date	Oct 15, 2022

Source	**Google Scholar**
Syntax	"hospital AND training AND Covid"
Limiters	None
Search Date	Oct 15, 2022
Notes	Screened the first 100 results.

# Results Additional Searches	22

Appendix 2: Study consent form

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY
FACULTY OF EDUCATION

6-102 Education North
Edmonton, Alberta
Canada T6G 2G5
Tel: 780.492.5245
Fax: 780.492.1318
www.edpsychology.ualberta.ca

PARTICIPANT CONSENT FORM

Title of Study: A Multi-Method Approach to Assess Healthcare Providers' Training Needs During the COVID-19 Pandemic

Principal Investigator: **Dr. Sharla King**
Associate Professor, Faculty of Education
Program Director, MEd Health Sciences Education program
University of Alberta
Email: sjk1@ualberta.ca

Study Co-investigators: **Dr. Okan Bulut**
Associate Professor & MEDS Program Coordinator, Faculty of Education
University of Alberta
Email: bulut@ualberta.ca
Phone: (780) 492-3668

Ashley Clelland
Masters' Student, MEDS Program, Faculty of Education
University of Alberta
Email: adc@ualberta.ca

Why am I being asked to take part in this research study?
You are being asked to participate in this study because you are either (1) a healthcare provider or (2) have a work role that involves developing and delivering training for healthcare providers. We are doing this study to find out about healthcare providers' training needs during the COVID-19 pandemic.

This Information Sheet tells you more about the study, and what participation in the study would involve. You can use this information to decide whether you would like to participate or not. Before you make a decision, one of the researchers will go over this form with you. You are encouraged to ask questions if you feel anything needs to be made clearer. You will be given a copy of this form for your records.

What is the reason for doing the study?
The purpose of the study is to learn about healthcare providers' training needs during the COVID-19 pandemic. The study will also compare two different methods for identifying training

Appendix 2: Study consent form (continued)

needs. In an earlier phase of the study, we conducted a literature review to identify training needs that appear in published studies. We will compare needs from those studies with what we hear in interviews to see how they are the same or different.

What will I be asked to do?
Participation in this study involves one interview. During the interview, the interviewer will ask you a set of open-ended questions. The questions ask about your work experiences and your thoughts about your training needs. The interview lasts about 1 hour and will occur virtually over Zoom. The interview will be videorecorded. You may shut off your camera during the interview if you choose.

What are the risks and discomforts?
Some interview questions ask about your work challenges during the COVID-19 pandemic. Your experiences during the pandemic may be difficult to recall and talk about, so these questions have some emotional risk. You are free to skip any interview questions you do not want to answer and may stop the interview at any time. After the interview, support for talking about the pandemic is available using the 24-hour Distress Line (780) 482-4357.

You may also experience mental tiredness from participating in the interview. If you feel tired, you are free to stop the interview.

We may use quotes from your interview when we report the results of the study. We will not include any information that directly identifies you, and we will make every effort to remove any information from the quotation(s) that could indirectly identify you. However, it is still possible that someone may be able to identify you from the quotations.

It is not possible to know all of the risks that may happen in a study, but the researchers have taken all reasonable safeguards to minimize any known risks to a study participant.

What are the benefits to me?
You are not expected to get any benefit from being in this research study. The study will help us learn more about healthcare providers' training needs, and what methods can be used to identify them. The study may help Covenant Health to develop future training that is more helpful for healthcare professionals.

Do I have to take part in the study?
Being in this study is your choice. If you decide to be in the study, you can change your mind and stop being in the study at any time, and it will in no way affect the employment that you are entitled to.

You are free to skip interview questions that you are not comfortable with. You can also stop the interview at any time. If you would like to stop the interview, let the interviewer know verbally that you would like to stop. You can also withdraw from the study within 7 days after the interview is completed. To withdraw, contact the Ashley Clelland using the contact information at the top of this information sheet.

Appendix 2: Study consent form (continued)

Will my information be kept private?
During the study we will be collecting data about you. We will do everything we can to make sure that this data is kept private. No data relating to this study that includes your name will be released outside of the researcher's office or published by the researchers. Sometimes, by law, we may have to release your information with your name so we cannot guarantee absolute privacy. However, we will make every legal effort to make sure that your information is kept private.

The information that we collect during interviews will be kept confidential. Only the researchers, including the Principal Investigator, and two Co-investigators will have access to the information. When we report the results of the study, we may use written quotes from your interview, but we will make every effort to ensure that any we use quotes do not identify you. We will store the information that we collect for five years according to the University of Alberta policies for the storage of research information.

What if I have questions?
If you have any questions about the research now or later, please contact Ashley Clelland, Study Co-investigator, at adc@ualberta.ca.

If you have any questions regarding your rights as a research participant, you may contact the University of Alberta Research Ethics Office at 780-492-2615. This office has no affiliation with the study investigators.

Appendix 2: Study consent form (continued)

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY
FACULTY OF EDUCATION

6-102 Education North
Edmonton, Alberta
Canada T6G 2G5
Tel: 780.492.5245
Fax: 780.492.1318
www.edpsychology.ualberta.ca

CONSENT

Title of Study: A Multi-Method Approach to Assess Healthcare Professionals' Training Needs During the COVID-19 Pandemic

Principal Investigator: Dr. Sharla King **Email: sjk1@ualberta.ca**
Study Co-investigators: Dr. Okan Bulut **Email: bulut@ualberta.ca**
Ashley Clelland **Email: adc@ualberta.ca**

	Yes	No
Do you understand that you have been asked to be in a research study?	☐	☐
Have you read and received a copy of the attached Information Sheet?	☐	☐
Do you understand the benefits and risks involved in taking part in this research study?	☐	☐
Have you had an opportunity to ask questions and discuss this study?	☐	☐
Do you understand that you are free to leave the study at any time, without having to give a reason and without affecting your future employment?	☐	☐
Has the issue of confidentiality been explained to you?	☐	☐
Do you understand who will have access to your study records?	☐	☐

Who explained this study to you? _____

I agree to take part in this study:

Signature of Research Participant _____

(Printed Name) _____

Date:_____

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Signature of Investigator or Designee _____ Date _____

THE INFORMATION SHEET MUST BE ATTACHED TO THIS CONSENT FORM AND A COPY GIVEN TO THE RESEARCH PARTICIPANT

Appendix 3: Interview protocols

A Multi-Method Approach to Assess Healthcare Providers' Training Needs During the COVID-19 Pandemic: Interview Protocol

Interview Details
Interview Date:
Interview Start Time/End Time:
Interviewee ID:
Recording Location:
Transcript Location:

Introduction	• **The purpose of this study is to look at frontline healthcare providers' educational needs during the COVID-19 pandemic.**
	• Informed consent
	  ○ Participation will involve an interview. I'll ask six main questions, and the interview will last about an hour.
	  ○ The interview will be videorecorded using Zoom. Once the interview is over, I'll delete the video and only keep the audio recording. You're free to turn off your camera now, or at any point during the interview, if you'd like. The reason that I am keeping the audio recording is that so I can go back and review what we've talked about.
	  ○ Your participation is voluntary. You're free to skip questions or stop responding at any time. If you want to stop, just let me know verbally. I won't be upset. You're also free to withdraw your interview responses for 7 days after the interview. If you'd like to withdraw your responses, you can contact me using the email address on the information sheet.
	  ○ Risks include discussion about work challenges during the pandemic, a topic that might be difficult to recall or talk about.
	  ▪ You are free to skip questions or stop the interview at any time.
	  ○ Interview results will be reported in a way that will not directly identify you, but there is always a small risk that someone might be able to link you to your interview comments.
	→ **Ask if the interviewee agrees to participate; confirm that they have submitted the consent form before proceeding with the interview.**

Opening Question	*Can you tell me a bit about your job at the hospital?*
Preamble	*Before I move to the next question, I just want to take a minute to talk about what we mean when we say 'training'. In this study, we take a broad view of training that includes activities that we typically think about, like workshops, online courses, and simulation, but also extends to things like printed educational materials, hospital rounds, or training/coaching at the point of care.* *In addition, our definition of training includes both clinical training and non-clinical training (e.g., communication skills training, diversity training, etc.).* *As we talk about training during this interview, I'm interested in your thoughts about both the content/topic of training, but also how training is delivered.* *Do you have any questions about how we define training in this study?*

Appendix 3: Interview protocols (continued)

Q1	*Think back, if you can, to before the COVID-19 pandemic, and what you remember about training back then.* *Can you tell me about any training activities that you remember before the pandemic?* • *What training was required by your organization, or to maintain your professional license? What training, if any, was outside of that?* **Prompts →** • What kinds of activities were effective, or ineffective? • Can you tell me a bit about what you learned during [mentioned training activity]? • I heard you describe training topics, like [mentioned topics]. Can you tell me about the *way* training was delivered? • I heard you describe the way training was delivered, like [mentioned methods]. Can you tell me about *training topics*?
Q2	*Now, I'd like you to think about your experiences <u>during</u> the COVID-19 pandemic. Can you tell me about your work challenges during this time?* **Prompts →** • If you wanted people to know one thing about your challenges during the pandemic, what would that be?
Q3	*Can you tell me about any training that you've had <u>during</u> the pandemic?* • *Do you remember, were there online courses? Simulation? Printed educational materials? Coaching at the point of care?* • *Were those activities part of your required continuing education, either by your organization or for your professional licensing requirements, or were they outside of that?* **Prompts →** • Can you provide some more details? • Can you tell me more about…?
Q4	*Now, I'd like you to think ahead to a future time when the burden of the pandemic on hospitals decreases. Thinking about this future time, what kind of training do you think would support you?* **Prompts →** • <u>**I heard you describe training topics, like [mentioned topics]. Can you share your thoughts about *the way* training should be delivered?</u> • I heard you describe the way training is delivered like [mentioned methods]. Can you share your thoughts about *training topics*? • Responding to interviewee suggestions → You mentioned [x], can you tell me a bit about what you think that training should look like? How would it be delivered?
Final Question	*Is there anything that you'd like to mention that we haven't talked about?*
Wrap Up	• Thank you for participating in the interview, for taking the time to talk to me, and for sharing your thoughts and experiences. **→ Ask if the interviewee has any questions.**

Appendix 3: Interview protocols (continued)

	• Our discussion is confidential. I'll take care to ensure that your responses are kept secure and confidential. I'll report the results in a way that you won't be directly identified. • Once all the interviews are completed and I have analyzed all the information, I can send you a summary of the study's results by email. **→ Ask: Would you like to receive a summary of the results?**

Field Notes:

Appendix 3: Interview protocols (continued)

A Multi-Method Approach to Assess Healthcare Providers' Training Needs During the COVID-19 Pandemic: Interview Protocol (Nurse Educators/L&D)

Interview Details
Interview Date:
Interview Start Time/End Time:
Interviewee ID:
Recording Location:
Transcript Location:

Introduction	• **The purpose of this study is to look at frontline healthcare providers' educational needs during the COVID-19 pandemic.**
	• Informed consent
	  ○ Participation will involve an interview. I'll ask six main questions, and the interview will last about an hour.
	  ○ The interview will be videorecorded using Zoom. Once the interview is over, I'll delete the video and only keep the audio recording. You're free to turn off your camera now, or at any point during the interview, if you'd like. The reason that I am keeping the audio recording is that so I can go back and review what we've talked about.
	  ○ Your participation is voluntary. You're free to skip questions or stop responding at any time. If you want to stop, just let me know verbally. I won't be upset. You're also free to withdraw your interview responses for 7 days after the interview. If you'd like to withdraw your responses, you can contact me using the email address on the information sheet.
	  ○ Risks include discussion about work challenges during the pandemic, a topic that might be difficult to recall or talk about.
	  ▪ You are free to skip questions or stop the interview at any time.
	  ○ Interview results will be reported in a way that will not directly identify you, but there is always a small risk that someone might be able to link you to your interview comments.
	→ **Ask if the interviewee agrees to participate; confirm that they have submitted the consent form before proceeding with the interview.**

Opening Question	*Can you tell me a bit about your work role?*
Preamble	*Before I move to the next question, I just want to take a minute to talk about what we mean when we say 'training'. In this study, we take a broad view of training that includes activities that we typically think about, like workshops, online courses, and simulation, but also extends to things like printed educational materials, hospital rounds, or training/coaching at the point of care.* *In addition, our definition of training includes both clinical training and non-clinical training (e.g., communication skills training, diversity training, etc.).* *As we talk about training during this interview, I'm interested in your thoughts about both the content/topic of training, but also how training is delivered.* *Do you have any questions about how we define training in this study?*

Appendix 3: Interview protocols (continued)

Q1	*Think back, if you can, to before the COVID-19 pandemic, and what you remember about training back then.* *Can you tell me about any training activities that you remember before the pandemic?* **Prompts →** • What kinds of activities were effective, or ineffective? • I heard you describe training topics, like [mentioned topics]. Can you tell me about the *way* training was delivered? • I heard you describe the way training was delivered, like [mentioned methods]. Can you tell me about *training topics*?
Q2	*Now, I'd like you to think about your experiences <u>during</u> the COVID-19 pandemic. Can you tell me about any challenges you've had in delivering training during this time?* **Prompts →** • If you wanted people to know one thing about training during the pandemic, what would that be?
Q3	*Can you tell me about any training that you've delivered <u>during</u> the pandemic?* • *Do you remember, were there online courses? Simulation? Printed educational materials? Coaching at the point of care?* **Prompts →** • Can you provide some more details? • Can you tell me more about…?
Q4	*Now, I'd like you to think ahead to a future time when the burden of the pandemic on hospitals decreases. Thinking about this future time, what kind of training do you think would support healthcare providers?* **Prompts →** • <u>**I heard you describe training topics, like [mentioned topics]. Can you share your thoughts about *the way* training should be delivered?</u> • I heard you describe the way training is delivered like [mentioned methods]. Can you share your thoughts about *training topics*? • Responding to interviewee suggestions → You mentioned [x], can you tell me a bit about what you think that training should look like? How would it be delivered?
Final Question	*Is there anything that you'd like to mention that we haven't talked about?*
Wrap Up	• Thank you for participating in the interview, for taking the time to talk to me, and for sharing your thoughts and experiences. **→ Ask if the interviewee has any questions.** • Our discussion is confidential. I'll take care to ensure that your responses are kept secure and confidential. I'll report the results in a way that you won't be directly identified. • Once all the interviews are completed and I have analyzed all the information, I can send you a summary of the study's results by email. **→ Ask: Would you like to receive a summary of the results?**

Appendix 3: Interview protocols (continued)

Field Notes: