



Undertaking rehabilitation research during the COVID-19 pandemic: Emergent strategies from a trainee-faculty workshop

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ABSTRACT

Purpose: The purpose of this article is to report the discussions of an interdisciplinary workshop aimed at understanding the challenges and corresponding strategies for conducting rehabilitation research during the COVID-19 pandemic.

Methods: Twenty-five rehabilitation researchers (17 trainees and 8 faculty) attended a two-hour facilitated online workshop in to discuss challenges and strategies they had experienced and employed to conduct rehabilitation research during the COVID-19 pandemic.

Results: Rehabilitation researchers reported challenges with 1) pandemic protocol adjustments, 2) participant accessibility, and 3) knowledge dissemination, along with corresponding strategies to these challenges. Researchers experienced disruptions in study outcomes and intervention protocols to adhere to public health guidelines and have suggested implementing novel virtual approaches and study toolkits to facilitate offsite assessment. Participant accessibility could be improved by engaging community stakeholders in protocol revisions to ensure equity, safety, and feasibility. Researchers also experienced barriers to virtual conferences and publication, and suggested opportunities

for smaller networking events, and revisiting timeframes for knowledge dissemination activities.

Conclusion: This workshop served as a catalyst for discussion among rehabilitation researchers to identify creative approaches that address the complexities of conducting rehabilitation research during the COVID-19 pandemic and beyond.

Key words: COVID-19, Rehabilitation Research, Methods, Workshop

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INTRODUCTION

Since the outset of the COVID-19 pandemic, many academic institutions have mandated a pause on research involving populations without COVID-19, particularly in outpatient and community settings. The recent development of vaccines for COVID-19¹⁻³ has begun to initiate global recovery from the pandemic, but many precautions are expected to remain in place for the foreseeable future and will likely continue to present significant barriers for conducting and disseminating rehabilitation research. It is therefore imperative that rehabilitation researchers in acute, community and long-term care settings plan for continuing remote rehabilitation research, as we wait to continue in-person activities.

There has been scholarly discourse on the challenges of the pandemic within the broader scientific community. A recent review has discussed the difficulties in research funding, publishing, and conferences,⁴ while other discussions have also outlined strategies for conducting hospital-based, critical care research with COVID-19 restrictions in place.⁵ Of the articles in rehabilitation science, some have described the use of an interdisciplinary collaboration model for rehabilitation research during the pandemic,⁶ while others have written specifically on the perspectives of multiple sclerosis and quality of life researchers, and the challenges they have faced during the pandemic.⁷ However, most discussions have been limited to challenges in specific areas of rehabilitation research, and few have offered discourse on the solutions to such challenges, especially from the perspectives of trainees.

The purpose of this article is to report the discussions of a facilitated online workshop, designed to engage a diverse group of trainees and faculty to discuss the challenges and corresponding solutions for conducting rehabilitation research during the COVID-19 pandemic. The specific objectives of this paper are to 1) highlight the challenges rehabilitation researchers have faced during the global pandemic, and 2) to discuss innovative strategies that can be employed to support ongoing and future rehabilitation research under such challenging circumstances.

METHODS

The workshop was developed and delivered by rehabilitation researchers in the School of Rehabilitation Science at McMaster University in Hamilton, Ontario, Canada. The core group consisted of four PhD students (KN, LN, AM & EW) and the Assistant Dean of the program (JR). The first author (KN) and senior author (JR) identified the broad objectives of the facilitated workshop. Three PhD students (LN, AM, & EW) helped refine the workshop's guiding questions. These students were selected for their diverse research training backgrounds, spanning quantitative and qualitative expertise in childhood disability, psychometric evaluation of measurement tools, stroke rehabilitation, and sex and gender research. The core group developed 5 specific guiding questions for the workshop, which aimed to generate reflection on the challenges for ongoing and future studies in different phases of research (Table 1).

Table 1. Guiding discussion questions for the COVID-19 workshop.

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1. What are some challenges that you have faced in your research since the COVID-19 pandemic began?
 2. When COVID-19 lockdown restrictions first took place in March 2020, what were some considerations that you had to take into account for your research?
 3. What are some strategies that you have used to continue to conduct your research?
 4. For research studies that have data results, what are some challenges that you anticipate you might have with analysis?
 5. As you move forward with your research studies, what are some plans that you might have for the knowledge translation/dissemination of your study findings?
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All research trainees and faculty members in the School of Rehabilitation Science at McMaster University were invited by e-mail to attend the two-hour online workshop held on commercially available video conferencing software (Zoom Video Communications, San Jose, CA, USA). All attendees provided verbal consent for recording the two-hour workshop, and that acknowledged that the findings from the discussion would be used for publication. The recording from the workshop was transcribed verbatim.

RESULTS

One-hundred and eight individuals received an invitation to participate in the facilitated workshop (92 trainees and 16 faculty). Thirty-nine attended the workshop, from which 17 trainees (14 doctoral, 2 Master's, and 1 post-doctoral fellow) and 8 research faculty (5 physiotherapy and 3 occupational therapy) actively participated. Three key research challenges and corresponding strategies emerged, including 1) pandemic protocol adjustments, 2) participant accessibility, and 3) knowledge dissemination. The following sections summarize a narrative synthesis of the workshop discussions, and are summarized in Table 2.

Table 2. Summary of potential solutions to challenges during the COVID-19 pandemic

Pandemic Protocol Adjustments	
How can I keep collecting primary data?	<ul style="list-style-type: none">• Research ‘toolkits’ containing equipment needed for assessments• Consider community spaces to distribute study supplies• Use of wearable sensors for virtual assessment
What should I consider when collecting primary data?	<ul style="list-style-type: none">• Use of focus groups with community members to understand the feasibility of data collection• Use of covariates and subgroup analyses based on participants’ history of COVID-19• Adjust for other pandemic-related contextual factors
Should I shift my in-person intervention to a virtual intervention?	<ul style="list-style-type: none">• Consider the implications for intervention fidelity, safety and feasibility in participants’ homes• Additional supervision in the home by a family member, when possible• Consider disparities in accessibility to virtual interventions• Consider pausing the trial until in-person activities have been permitted
Participant Accessibility	
How can I keep my participants safe and engaged in virtually-delivered research?	<ul style="list-style-type: none">• Consider regular follow-ups with study participants• Consult with community stakeholders about the frequency of follow-ups• Consider providing detailed descriptions of privacy and safety procedures• Consider including family members to monitor safety during performance-based assessments• If safety is compromised in the virtual setting, consider temporarily suspending the trial until in-person activities resume
What if I can’t recruit participants?	<ul style="list-style-type: none">• Consider alternative study designs that are feasible in a remote environment

Knowledge Dissemination

Should I plan to attend virtual conferences?

- Consider the additional time commitment required for virtual conferences
- Conference organizers should consider implementing networking events to facilitate collaboration

What are the implications for my study's findings?

- Consider the impact of the pandemic on your study's population demographics
 - Consider contextualizing study findings to the global pandemic
 - Plan for delays in peer-review times for knowledge translation plans
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PART 1: Pandemic Protocol Adjustments

Challenge #1: How can I keep collecting primary data?

Some researchers shared how they often collected their physical or physiological data through in-person visits to the home or research space prior to the pandemic. Many outcomes involved specialized equipment that may not be feasible to use when adhering to public health and institutional guidelines. For example, the use of electromyography for individuals with stroke is not always possible in the community setting, due to the cost of this equipment, as well as the impracticalities of transporting or leaving them in participants' homes.

Proposed strategies

Several researchers highlighted that performance-based measures, qualitative interviews, and questionnaires may still be safe and feasible in the pandemic setting. When institutional and public health guidelines permitted, some researchers utilized existing community spaces, such as recreation centres and libraries to recruit and distribute study materials and equipment for participants. Then, implementing virtual 'toolkits' as an alternative to in-person assessments has been a viable method for continuing to implement research studies and adhere to physical distancing guidelines. Virtual toolkits contained identical equipment needed for in-person assessments such as pylons, stopwatches, and instructions. A research concierge was then responsible for delivering assessments virtually, through a video conferencing software (e.g., Zoom, Skype, etc.). Participants are guided through the software to set up their home environment to perform performance-based assessments such as a self-selected gait speed assessment.

Participants then performed the task on a video conferencing software, where study staff can monitor set-up and rate assessments.

Challenge #2: What should I consider when collecting primary data?

Although toolkits and virtual assessments were perhaps feasible, there was also several barriers to collecting this data. Researchers noted that adding virtual assessments may be particularly challenging for study participants and investigators. For example, some participants may have limited access to, or experience with, technology in their homes. Adding virtual assessments could restrict participation to select groups, increase the risk of selection bias in remotely delivered studies, and increase attrition, particularly for underrepresented groups with limited accessibility to internet. Researchers emphasized that adding virtually administered outcomes could also place more burden on participants, impact safety and influence the validity of their results.

In the context of clinical research, participants' history of COVID-19 can impact several biological and/or psychosocial outcomes, thus impacting study findings. There are also many contextual and societal impacts of the COVID-19 pandemic on rehabilitation outcomes that are not explained by a history of COVID-19. Closures of public recreation spaces may disproportionately affect the ability of some individuals to participate in community programs and physical activities, resulting in increased sedentary behaviour.

Proposed strategies

To bridge the gaps in primary data collection procedures, small focus groups may be held to incorporate participant and community members' perspectives on best methods to collect data to mitigate these challenges. Focus groups can help researchers understand the strategies necessary to safely and equitably shift from in-person to virtually administered outcomes. Findings from these approaches help to establish an effective plan for a rapid transition in the delivery of research studies since public health guidelines continue to evolve during a global pandemic. Researchers may also consider budgeting for internet access in project grants for virtually-delivered research to mitigate the disparities in data collection.

Researchers in the workshop also discussed the importance of accessing additional health information to help provide context for research continuing during the pandemic. For example, some have amended ethics applications to collect information on participants' history of COVID-19 due to the potential long-term health implications of the condition. In their analyses, they have used history of COVID-19 as a covariate or have planned for conducting subgroup analyses based on previous diagnosis of COVID-19. Even without a diagnosis, some researchers have collected additional demographic variables

such as physical activity levels or mental health assessments that may help to contextualize study findings in the pandemic.

Challenge #3: Should I shift my in-person intervention to a virtual intervention?

Workshop participants identified several methodological considerations before shifting to virtual interventions. Shifting to a virtually-delivered version of an intervention that was originally intended to be in-person could have unintended methodological implications. For instance, some exercise modalities (e.g., cycle ergometry) are not always safe or feasible in a virtual format due to a lack of direct supervision or equipment in participants' homes. In some cases, the participant could be supervised by another person such as a family member while performing the exercise, however, having another person present is not always feasible or ethical, as this places additional study burden on participants and their support network. Participants may also not be able to perform the prescribed interventions due to environmental constraints, such as space limitations in the home setting. These current limitations of home-based or virtual rehabilitation during a global pandemic may contribute to the current low levels of engagement in rehabilitation, especially in higher risk populations.⁸ Thus, shifting to a virtual format, where participants may not have the necessary supervision, equipment, and setting to engage in rehabilitation interventions, may result in substantial variability in exposure to allocated interventions, as conditions are difficult to standardize within the participants' homes.

Proposed strategies

When shifting to a virtually-delivered intervention, researchers carefully considered which core aspects of the intervention are being impacted to ensure treatment fidelity was achieved. If the adapted intervention produces substantial variability in participants' treatment exposure, terminated or paused the study until they are able to continue in-person activities. Researchers also acknowledged the need to adapt interventions and study designs to be easily accessible for study participants of all socioeconomic status. Similarly to data collection procedures, virtually-delivered interventions require fast and reliable internet connections, which may risk introducing treatment inequity and introduce selection bias. When these biases cannot be resolved, researchers acknowledged this as a limitation in the discussion of their study's findings. However, researchers noted that in some cases, shifts from in-person to virtual formats may be appropriate and require much less modification, particularly when simple or minimal equipment is needed for interventions. For example, many qualitative interviews, home-based education, and self-management interventions may transition to a virtual format with relative ease. However,

the congruence between methodologies performed in-person (i.e., pre-pandemic) and virtual (i.e., during- and post-pandemic) protocols need careful consideration.

PART 2: Participant Accessibility

Challenge #1: How can I keep my participants safe and engaged in virtually-delivered research?

Participants in rehabilitation studies are often older adults with chronic conditions who are disproportionately at greater risk for COVID-19 and COVID-19 related mortality.⁹ Therefore, many older adults and immunocompromised individuals are carefully adhering to public health physical distancing measures to reduce their risk of contracting COVID-19, which has led to increased rates of social isolation and mental health challenges.¹⁰ Some researchers in the workshop have been successful in accessing study participants, but highlighted the need for safe strategies to increase engagement with participants, without increasing study burden, in virtually-delivered research.

Proposed strategies

Workshop participants found that socially isolated participants may benefit from being contacted and consenting to virtually delivered research studies, which offer an opportunity to connect and interact with study staff. Once enrolled, there is evidence to suggest that more frequent interactions and follow-ups may improve participant adherence to study interventions.¹¹ Workshop participants suggested that those who work with isolated populations should plan for regular follow-ups in their trials. However, consulting with community stakeholders and engaging directly with participants about the frequency of follow-ups is needed, as too frequent interactions can increase the burden placed on study participants.

To help reduce the potential burden of virtual interventions on participants, intervention procedures planned during a global pandemic may also aim to be safe, simple and affordable. For example, due to the risk of exposure to COVID-19, there may exist challenges to obtaining informed, written consent from study participants, as face-to-face interactions pose an additional risk of COVID-19 exposure to participants. Therefore, video conferencing software can assist in ensuring the safe and ethical provision of informed consent. Researchers in the workshop suggested providing detailed descriptions of safety procedures in ethics applications to mitigate the risks of these forms of delivery, such as the use of virtual private networks and optimized privacy settings during interactions. If investigators plan to use performance-based measures, they also considered the extent to which participants can be at risk of falling in their study. In-depth description of how outcomes assessment will be undertaken are necessary. Therefore, allocating sufficient funding for resources will be necessary to ensure participant safety and adherence. If this

is not possible, researchers may consider placing the study on hold until in-person activities resume.

Challenge #2: What if I can't recruit participants?

Throughout the COVID-19 pandemic, in-person research was strictly prohibited in some settings, especially in rehabilitation studies which frequently involve older adults or individuals with chronic conditions. Workshop participants identified that local hospitals allowed research on-site if a patient was already attending for a medical appointment but did not allow hospital visits solely for research. Researchers were challenged with the implications of the pandemic on their access to study participants. Even when research in hospitals was permitted to continue, hospitals are often operating at near-capacity due to the resurgence of COVID-19 hospitalizations.¹² Many elective treatments have ceased, which has led to reduced access to participants for rehabilitation studies.¹³ As a result, there may be serious implications on study feasibility for prospective and successful grant applications, where extra time is needed to achieve the target sample size. As such, in cases when recruitment of study participants is not an option, some researchers were faced with the inevitable reality of having to terminate or temporarily suspend studies.

Proposed strategies

When recruitment is not possible, pivoting a research program is often necessary. Prior to the COVID-19 pandemic, researchers often collected pilot data to inform larger-scale trials. To accommodate these changes during the pandemic, alternative study methods have been employed such as secondary data analyses, accessing longitudinal datasets, and preparing systematic reviews. Workshop participants recognized that there is no perfect substitute for pilot data, but proposed that alternative research designs may be still developed based on availability of existing data and can aim to inform future studies once in-person research resumes. These projects also allow trainees and early-career researchers to maintain research productivity and provide learning opportunities during the COVID-19 pandemic. Nonetheless, consideration of the long-term implications of altering the direction of learning objectives and research programs will be an important consideration for both trainees and faculty. A flow of potential decisions rehabilitation researchers may consider when shifting to a virtual format is depicted in the Figure.

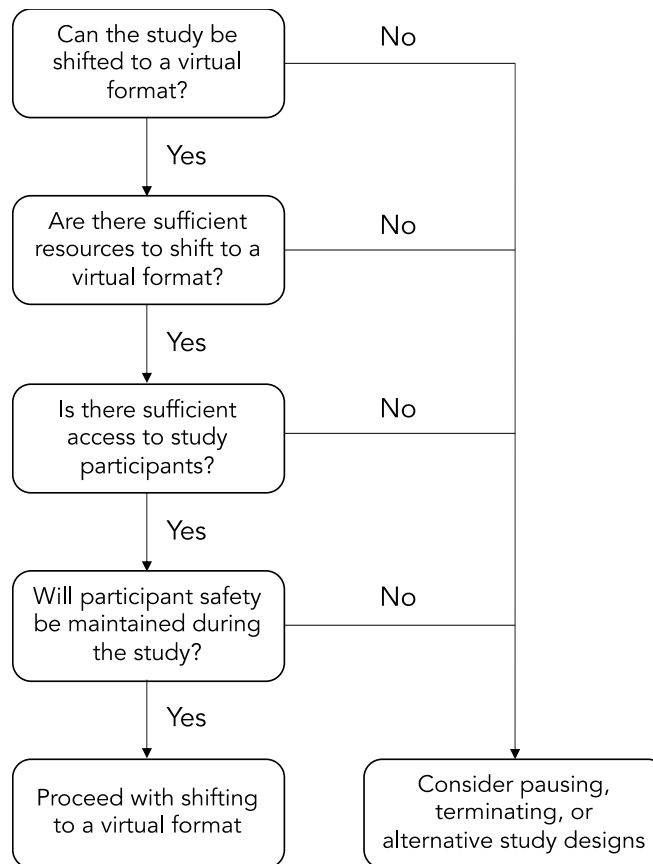


Figure. Potential flow of decisions to shift to a virtually-delivered rehabilitation intervention.

PART 3: Knowledge Dissemination

The COVID-19 pandemic has provided researchers with a unique opportunity to establish and strengthen new and existing partnerships in a virtual environment. Now more than ever, trainees and faculty have the opportunity to interact remotely with other research labs with similar interests, both nationally and internationally. Connecting virtually with different research teams has allowed for increased learning opportunities and collaborations among researchers. We discussed how conferences and knowledge dissemination opportunities have pivoted to a virtual format due to the COVID-19 pandemic, which resulted in mixed opinions of their effectiveness.

Challenge #1: Should I plan to attend virtual conferences?

Virtual conferences have been met with several shortcomings. Some trainees and faculty felt disconnected from the presenters and required additional preparation time and resources for this format. For instance, high-quality video and voice recordings are often needed to transition from in-person conferences to a virtual format since many conferences have increased accessibility by pre-recording sessions. Conference organizers

have also explored several different online platforms for hosting their conferences, requiring constant adaptation for researchers. Such adaptations are often time consuming, which may conflict substantially with the increasing demands of researchers' personal lives during the pandemic.¹⁴ Perhaps the most prominent limitation of virtual conferences is a lack of in-person interactions leading to limited opportunities for spontaneous interactions, networking and sharing research. Despite improved accessibility in the virtual format, researchers agreed that the above limitations are contributing factors to reduced engagement, as they offer a more limited experience.

Proposed strategies

Virtual conferences have become common practice during the pandemic; however, participants suggested that conference organizers to implement creative approaches to facilitate active and engaged knowledge dissemination. For example, networking events can be helpful to encourage collaboration and dissemination with trainees and faculty from different institutions, as the former have missed this opportunity since the pandemic began. Since many researchers have found themselves attending only a small part of virtual conferences, smaller and more intimate networking sessions could also provide a supplementary and informal opportunity for rehabilitation researchers to connect. Due to the lack of in-person interaction with their peers and colleagues, promoting an environment that is supportive of spontaneous discussion about research topics will be vitally important as we move forward.

Challenge #2: What are the implications for my study's findings?

The publication process is an important aspect of knowledge dissemination that has been impacted by the COVID-19 pandemic.¹⁴ Rehabilitation science often involves the study of human behaviour, experiences, characteristics, and traits such as physical activity, socioeconomic status and psychosocial factors. Each of these factors can be substantially altered during times of social isolation.^{15 16} There is an increased importance of contextualizing research findings during a global pandemic. For example, participants included in trials done in a virtual format may not be representative of the population of interest, since accessibility to technology is not uniform across socioeconomic class and ethnicity.¹⁷ Finally, researchers identified notable increases in the duration of peer-review for non-COVID-19 manuscript submissions, which ultimately impacts the timeliness in disseminating research findings to knowledge users and other researchers.

Proposed strategies

To mitigate problems related to study contextualization, researchers suggested including information in the study's results and discussion sections to allow readers to consider the unique influence of the pandemic on a study's outcomes and sample. To

account for delays in peer-review, researchers recommended careful consideration of this aspect in knowledge translation plans for grant applications and project monitoring. For faculty, increased requests for journal reviews may also offer an additional opportunity for trainees seeking experience in participating in co-review with their supervisors.

DISCUSSION

The COVID-19 pandemic has changed rehabilitation research in many ways. We have proposed several challenges and several viable corresponding strategies to conducting research in this era. While some in-patient rehabilitation research has continued,¹⁸ virtually-delivered research have become the preferred and necessary alternative in community settings to ensure that study staff and participants follow public health guidelines and remain physically distant.

Although we have presented several viable strategies to the identified challenges, there exists several gaps in the literature. *Pre-planned* virtually-delivered rehabilitation interventions are both feasible and effective in many patient populations,¹⁹⁻²² but there is limited evidence on the effectiveness of shifting rehabilitation from in-person to virtual formats. Moreover, there is currently limited evidence about the psychometric properties (e.g., validity, reliability, and responsiveness) of remotely administered rehabilitation outcomes, which may have serious methodological implications for trials, such as estimating sample sizes and outcome selection. Thus, there exists an excellent opportunity for rehabilitation researchers to address the gaps in virtually delivered rehabilitation research studies as we move forward in the pandemic.

Limitations

We acknowledge that this paper reflects the challenges and proposed solutions to conducting rehabilitation research within a single institutional context, however since this is a global pandemic, it is likely that they are shared experiences. The challenges and proposed solutions discussed in this paper are based on the perspective of faculty and graduate students from a single university institution. In addition, we posit that rehabilitation researchers outside our specific context may use, some of the strategies we provided. Furthermore, we welcome commentary and dialogue from other institutions on this issue, as other groups are likely to provide meaningful insight. We also acknowledge that the workshop was held in late 2020, and that this paper was written in early 2021, and it is likely that the rehabilitation research landscape has evolved, even within our own institution. Still, we believe that some of the challenges and potential solutions we have presented in this paper are applicable in this current and in future global events as the pandemic and the modifications to work-life continue.

CONCLUSION

This paper addresses many of the current challenges experienced by researchers in rehabilitation science in the COVID-19 pandemic. Rehabilitation researchers may be able to integrate some of the strategies presented in this paper to successfully advance their research programs during a global pandemic. There are many complex issues to consider when pivoting, planning and presenting rehabilitation research within the context of the COVID-19 pandemic. It is important to consider ongoing challenges, and the corresponding strategies that can circumvent such challenges during future global events.

Contributions

Contributed to conception and design: KSN, JR

Contributed to acquisition of data: KSN, LN, AM, EW

Contributed to analysis and interpretation of data: KSN, LN, AM, EW

Drafted and/or revised the article: KSN, LN, AM, EW, SS, KM, JCR, NB, LGD, JVD, CD, AK, ZL, EK, MKB, LGM, BV, SM, LCC, LL, MEK, JR

Approved the submitted version for publication: KSN, LN, AM, EW, SS, KM, JCR, NB, LGD, JVD, CD, AK, ZL, EK, MKB, LGM, BV, SM, LCC, LL, MEK, JR

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