

Experiences of Embedded Cardiovascular Surgery Intensive Care Unit Rehabilitation Team: A Pilot Qualitative Study

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Abstract

Background

Rehabilitation in the cardiovascular surgery intensive care unit (CVICU) is becoming a more recognized essential need with a complex patient population. Little research has been conducted on occupational and physical therapy staffing models in the CVICU, how they are experienced by staff, or the possible benefits and challenges of different approaches.

Methods

This pilot qualitative study explored the lived experiences of occupational and physical therapists working in an embedded CVICU rehabilitation team in a large level academic and teaching hospital. Two occupational therapists and three physical therapists with experience in this staffing model participated in semi-structured interviews, exploring the benefits and challenges, especially compared to the more traditional staffing model in their facility.

Results

Participants described a supportive team integrated directly into the CVICU culture, with specialized training and increased staffing consistency compared to the traditional rotating staffing model. Findings coalesced around benefits of the embedded team as well as challenges regarding implementation of embedded occupational and physical therapy services in the CVICU.

Discussion

Embedded occupational and physical therapy rehabilitation in the CVICU is perceived positively by the rehabilitation practitioners who have experienced it. Furthermore, participants reported embedded rehabilitation may help break down barriers to early activity and mobility by improving the timing of therapy consults, helping to create practice experts and improving relationships with the other members of the ICU team. Therapy professionals and future researchers can use this study to spark further exploration into alternative staffing methods and design quantitative research related to outcomes.

Keywords: cardiovascular, intensive care unit, occupational therapy, physical therapy, qualitative

Background

Patient care in the cardiac surgery intensive care unit (CVICU) in the past decade has seen increasingly complex and clinically challenging cases with a patient base that is older, sicker and has more comorbidities (Newman et al., 2022). These challenges have placed new emphasis on the role of the rehabilitation team including occupational (OT) and physical therapy (PT) in this setting, as well as experimentation in different staffing models to meet the needs of the patient population. Exploration of staff experiences in alternative models can yield important information to guide hospitals and health systems in improving CVICU services.

Recent years have seen a paradigm shift away from prolonged periods of bedrest and high levels of sedation that have typically characterized ICU care (Cuthbertson et al., 2020). Therapy involvement with critically ill patients is an important part of this transition toward a more active ICU experience. Up to 65% of critical illness, survivors develop weakness and experience other negatively impacted functional outcomes (Wang et al., 2022). Assessments and interventions provided by OTs and PTs in the ICU such as functional exercises, resistance training and functional mobility training improved outcomes including physical function and were shown to decrease length of stay. Over two million adults undergo open-heart surgery every year and require some degree of a stay in the ICU (National, Heart, Lung and Blood Institute, 2022). Rehabilitation in the CVICU can require therapists to work with patients with high levels of acuity including the advanced life-support known as extracorporeal membrane oxygenation (ECMO) (Cerier et al., 2022). An extension of the heart-lung bypass machine used in the operating room, ECMO uses a mechanical pump to pull out blood and provide oxygenation. Due to the complex nature of and inherent safety risks related

to their care, engaging ECMO patients in rehabilitation requires extensive resources and creation of dedicated multidisciplinary ECMO teams (Dalia et al., 2019). The presence of these teams and appropriately timed utilization of OT and PT has shown to improve survival, reduce the frequency of adverse events and improve functional outcomes (Cerier et al., 2022). Despite growing evidence demonstrating its benefits, implementation data from across the globe indicates that there still is a mismatch between the strength of the evidence for rehabilitation in the ICU and how ubiquitously it has been adopted (Cuthbertson et al., 2020). Many barriers surrounding early mobility and rehabilitation programs include limited staffing, lack of institutional buy-in, inadequate training and safety concerns (Anekwe et al., 2019; Balas, 2019).

Currently, there is limited research on the structure and team designs of ICU rehabilitation programs from the perspective of clinicians who work in these units. There is an existing but limited base of qualitative research related to this topic from the nursing community, mostly centered around early mobilization. The lived experiences of nursing staff in ICU rehab programs related to early mobility was explored in a qualitative observation-based manner, with a central conclusion that it can be difficult for nursing staff to have sufficient time to engage in mobility-based activities (Young et al., 2018). A phenomenological study conducted with ICU nurses in Singapore found barriers to engagement in mobilization related to the logistical challenges and significant lag time involved in contacting the appropriate staff as PTs shared among multiple medical units that required considerable time to travel between units (Liew et al., 2021). Scott and colleagues (2021) described the creation of an “embedded” rehabilitation team in 2016 in one of their major trauma hospitals and this was associated with

improved outcomes. However, the approach described referred to embedding rehabilitation at the hospital level rather than by unit (Scott et al., 2021).

Traditionally, staffing for the acute care practice in the hospital investigated for this study involved occupational and physical therapy practitioners distributed by geographic areas of the hospital but not assigned to any particular unit (Mayo Clinic, 2017). To support improved implementation of evidence-based ICU rehabilitation, the institution in this study created a new care model in 2017. A small group of OTs and PTs with specialized training were embedded into a single ICU to provide seven day a week coverage with increased staffing consistency and continuity. A key and novel element of this new care model involved increasing therapy involvement in the screening process of which patients would benefit from active OT and PT intervention and when it was most appropriate to initiate that intervention. Traditionally, screening of consults has been the sole responsibility of the ICU medical providers, who are not generally trained or directly involved in the provision of rehabilitative care. Metrics taken following the first year of implementation of the new model were quite promising (Bodensteiner et al., 2018). Authors compared a baseline sample of patients in a five-month period prior to implementation of the new model to a sample of 112 patients who received therapy in this new staffing model. There was a 40-minute increase of both OT and PT therapy time per patient in the ICU, as well as a decreased average length of stay from 5.47 days to 4.21. Anecdotally, authors noted an improvement in teamwork and communication with nursing staff was one of their lessons learned, as well as improved continuity of care. A similar embedded rehabilitation approach with only PT

was started in the medical ICU at a hospital in Colorado in 2015, with similar outcomes reported in terms of decreased length of stay (Neff, 2016).

This study addressed a gap in research regarding the lived experience of embedded rehabilitation professionals in an intensive care unit (ICU) and understanding how an embedded rehabilitation team can overcome common service delivery barriers that have been identified in the literature. A pilot qualitative study was implemented to answer the researcher's aim of understanding the the lived experience of occupational and physical therapy practitioners working in an embedded CVICU team within a large level one trauma center hospital. Secondary aims of the study included understanding of the benefits and challenges associated with clinical practice in embedded CVICU teams as well as considerations surroundings training and orientation aspects as well as inter-professional collaboration with health care team members within the CVICU.

Methodology

Study Design

This pilot qualitative study sought to explore the experiences of OTs and PTs in the CVICU through a qualitative descriptive approach well-suited for health science research and thematic analysis (Colorafi & Evans, 2016). Study approval was obtained through local institutional review boards (IRB00000020, 7/11/2023). The study utilized semi-structured interviews using an interview guide. Questions for the interview guide were adapted in part from existing questions used in a study completed by Liew and colleagues (2021) and through several rounds of feedback between mentors in the research process. Prior to conducting interviews, member checks with other members of the embedded CVICU team not involved in the study were completed. The primary researcher reviewed the appropriateness of content and questions with them to assure

alignment with the experience of the participants. Researchers used probing questions during the interview for further clarity or depth surrounding each question.

Description of Hospital Embedded Unit

The CVICU embedded rehabilitation team consists of four OTs and four PTs, all with specialized training to delivery therapy services to critical ill populations with complex medical equipment. During weekdays, two OTs and two PTs provide coverage to all units associated with the CVICU (between two to four floors depending on census). Weekends have only one therapist per discipline. Embedded therapists spend 50% of their time in the CVICU, with the remaining half of their time spent in other areas of the hospital still employing the traditional staffing model. Therapists are typically paired with a member of their opposite discipline for the day. The day begins with therapy participation in the verbal hand-off given by the overnight charge nurse to their oncoming counterpart. Every patient on the unit is reviewed in detail, beginning with a brief summary of their history, review of the events of the previous night and plans for the day. Therapy staff provide occasional input, clarifying activity levels or history if indicated, but primarily use the meeting as an information gathering opportunity. After a brief review of the electronic medical record, therapists report they then complete a rounding process. Therapists briefly meet with each patient and nurse on their assigned unit, further clarifying patient statuses and coordinating plans for the day. This structured routine prior to beginning active patient care is unique to the embedded units and is not standard practice for the rest of the hospital.

Embedded OTs and PTs are tasked with screening the entire unit for therapy needs. Patients are given one of three designations based on their unique needs and

context: 1) Patients unable to engage in activity and mobility due to their hemodynamic instability or bedrest requirements; 2) Patients recovering as expected following surgery and meeting initial activity milestones who will carry out their activity and mobility with nursing staff only and; 3) Patients requiring active therapy evaluation or intervention. Recommendations for new consults based on therapy screening are communicated to the critical care team, who then place orders. Providers do continue to place orders in the traditional fashion on occasion outside of the therapy screening process.

In comparison, therapists working in the traditional staffing model are divided into a number of geographic areas of the hospital based on patient populations such as orthopedics, general medical or cardiology. Practitioners are assigned a designated number of patients they are responsible to follow for the day, which may be on several different floors and units. Therapists in this traditional model rotate through the different coverage areas with varying consistency ranging from a week to a month at a time. They do receive initial orientation and training but not as comprehensive or detailed as with the embedded group. Therapists in the traditional setting are not involved in any patient screening or rounding to help with decision making for therapy consults.

Participants

Potential participants working at a large Midwest level 1 trauma center were recruited via email as part of a purposive sampling process. Inclusion criteria were: 1) currently employed OT or PT, 2) current or recent history of working in the CVICU at least 50% of their time and, 3) one year clinical experience. Exclusion criteria included supplemental staff as well as occupational or physical therapy students. There were a total of five participants who consented to participate with two being occupational

therapists and three being physical therapists. Table 1 summarizes participant demographic information.

Table 1

Participant Demographics

Participant Identification	Gender	Discipline	Years of Experience
A1	Female	Occupational Therapy	2
A2	Female	Physical Therapy	13
A3	Female	Occupational Therapy	6
A4	Male	Physical Therapy	7
A5	Male	Physical Therapy	7

Data Collection

Interviews were conducted in-person in a private room by the primary researcher and were audio-recorded. Data collection occurred between August and October of 2023. Audio files of the interviews were transcribed verbatim using an audio transcription application called ATLAS.Web (Version 22.0.6.0). Participants were identified by pseudonyms for their given transcripts to ensure participant anonymity. Interviews lasted an average of 50 minutes ranging from 45-55 minutes. The interview guide was given to participants prior to their scheduled interview. Interview questions included description of a typical day in the program, the screening and triaging process utilized, collaboration between therapy partners and other healthcare team members, description of training and orientation process and comparing the embedded approach versus the traditional approach. Appendix A provides the interview guide.

Data Analysis

Interview transcripts were reviewed serially for code development by the primary researcher. Codes were developed to mark and categorize salient ideas and assigned names meant to summarize the quote in a process outlined by Jowsey and colleagues (2021). The same process was repeated for the remaining transcripts, adding new codes and matching similar ideas and concepts to codes that had already been developed. Once new codes were identified, previous transcripts were reviewed again for possible matching to the new codes being developed. This process repeated until all transcripts were reviewed numerous times and code development process had saturated. A total of 57 codes were developed between the five interviews. Codes were separated into three groups; benefits, challenges or neutral. Several codes applied to both benefits and challenges and were included in both groups. Interview transcripts were reviewed by the secondary and tertiary researchers for content aspects. Co-investigators consulted with primary investigator on development of themes and sub-themes in a collaborative process.

To support trustworthiness, researchers engaged in several validation strategies as described by Cresswell and Poth (2018). Careful attention to bracket the experiences of the primary author throughout the research process, but it should be noted the principal investigator had experience in the same embedded CVICU team as the participants. Trustworthiness was accomplished through triangulation of codes from multiple participant answers in thematic analysis, member checks of initial theme development and generation of rich and thick descriptions of participant experiences.

Results

Two Themes that emerged from the qualitative data were: 1) benefits of the embedded staffing model and 2) challenges of the embedded staffing model. Three related subthemes for each main theme were identified. See Table 2 for the two themes and associated sub-themes.

Table 2

Themes and Associated Sub-Themes

Themes	Sub-Themes
Benefits of Embedded Staffing Model	1) Timing and Patient Priorization 2) Confidence and Clinical Skills 3) Relationship Building
Challenges of Embedded Staffing Model	1) Multidisciplinary Collaboration 2) Clear and Effective Communication 3) Resource Coordination

Benefits

Participants described their experiences in primarily positive terms. All five participants expressed they felt that the embedded rehabilitation program was superior to the other staffing models they have experienced. The quality of the care provided to CVICU patients was expressed to be better overall, especially in comparison to the time before the creation of the embedded program, as described by participant A3.

(A3, OT) I think we get patients moving faster, sooner. I worked here before we had any embedded ICUs and we would have a handful of patients intermittently

on these units. And now, I mean, this week, I have more patients than I can handle, and we have almost consults on every single patient on both units.

Many different benefits were noted by participants with three sub-themes emerging including improvements in timing and prioritization, confidence and clinical skills and relationship building.

Timing and Prioritization

Participants repeatedly described how the unique screening process utilized in the embedded model helped to identify the appropriate time for formal OT and PT evaluation. Participant A2 described how screening and rounding with nursing staff helps to plan and prioritize the day, as well as help to select the patients that need therapy intervention the most.

(A2, PT) When we do start rounding with the nursing staff, we ask what's going on for the patient for the morning if there's any tests or procedures they know about and if so, what time are they if they're getting dialysis, what time is dialysis planning on coming because there are times that we need to communicate with dialysis to ask if they can come a little bit later. That way we can have our session with the patient before they get tired out from dialysis for the patients that are intubated, what's the plan for sedation vacations, what's the plan for extubation if that's happening and we do stop at every room whether the patient's on therapy caseload or not. And it's nice because the nurses that do know you know that you're coming about that time and they have an idea of kind of what their plan is for the day.

Consults in other units in the hospital are placed without therapy input and participant A1 noted that this can lead to a delay in initiating therapy and poorer outcomes as a result.

(A1, OT) I think that in especially in the general (non-embedded) ICUs, the team waits way too long and then patients miss out on the opportunity for therapy to reduce their hospital stay, reduce their length of stay in the ICU and just improve their function overall.

The screening process used in the embedded therapy model also allows therapists to focus their time and attention on the patients who are in most need of skilled treatment. Participant A4 worked for several years in the embedded therapy model but now works in a different hospital system. He paints a strong contrast between the way consults are placed at the two facilities.

(A4, PT) I work exclusively on the same type of unit, the cardiovascular ICU at (his new employer). But I don't really have any say over who gets consults and who doesn't. And the result is that almost everybody gets consults and it creates a lot of burden on me for chart review.

He also noted this leads to considerable time spent in documentation and care coordination for patients who did not need therapy intervention. This prevents him from focusing on the patients who need him the most, which he did not feel to be the case in the embedded model.

Confidence and Clinical Skills

All five participants expressed that their time working in the embedded model has made them more confident across many aspects of their role as an OT or PT in this

setting. Participants reported feeling more confident in their knowledge and ability to provide care for low-level functioning patients and patients with complex needs. They also reported feeling increased confidence in managing numerous lines and tubes (including ECMO and mechanical ventilation), as well as how to have difficult conversations with nurses or other members of the care team when they receive push-back about treatment. Several participants noted that this increased confidence has led to improved clinical skills. Participant A5 noted improvement in recognizing the most appropriate interventions to provide to patients in this setting.

(A5, PT) I think it's made me a much better therapist. I know more how to work with some of these complex patients and know the appropriate level to push some of these patients and just made my skills overall better too. I mean, as far as even how to even start with standing some of these patients that are just so critically weak.

Participant A3 describes how working in this embedded model of therapy has improved her clinical judgment, especially around the patient's hemodynamic status and this has a carryover effect to other practice areas as well.

(A3, OT) I think also just working with some of the highest acuity patients, you can notice more of those subtle changes, symptoms, vital signs. You're more attuned and aware to that, and with less lines, it's a lot easier to, to manage that on other patients.

Participants attributed these benefits of improved confidence and clinical skills to be a result of the increased time, consistency and exposure to CVICU patients they have in the embedded therapy model. Therapists in the traditional staffing model may go many

months working in other areas other than the CVICU, making it more difficult to develop comfort and expertise in this patient population.

Relationship Building

The final benefit that emerged was the types of interprofessional relationships that develop in the embedded therapy model. Because they are a small group and have a high level of consistency, participants noted they were able to interact and relate with nurses and ECMO specialists in a different way than was possible in the traditional staffing model. Compared to feeling like a visitor on other units, therapy staff know the names of most of the nurses and ECMO specialists and vice versa. Participant A3 noted that this helps to develop rapport and trust between the parties, especially related to ECMO specialists.

(A3, OT) I feel I know more the ECMO specialists, have a closer working relationship with them than some of the nurses which is a great thing, because they are managing the highest form of life support while you're in the room. So you really want to be able to trust them and they also want to be able to trust you.

Participants expressed these improved relationships were personally satisfying, but also stated that they improved the quality of their professional interactions. Participant A5 describes how the embedded unit can foster increased clarity in these interactions.

(A5, PT) Nursing also, in the embedded unit, knows a lot more of what we're looking for, what kind of questions we ask. A lot of times they have their answers prepared for us before we even get to the room, whereas the traditional model, they have no idea when we're coming, if we're coming at all, whether they should get the patient up yet, whether they should not.

Participants also describe how this increased level of trust and familiarity with nurses allows them to be more aggressive in their treatment strategy. Participants describe a natural tension between therapy and nursing around balancing patient stability and safety. Nursing has the responsibility to assist in ensuring medical stability while therapists feel their job, at times, is to take calculated risks that may test patients from a hemodynamic standpoint to ensure a quicker and more positive recovery. Therapists and nurses with levels of personal familiarity and mutual trust are better able to anticipate possible risks and complications that could arise during the session, reducing that tension. Participant A4 noted how this is not always the case in non-embedded units.

(A4, PT) I felt that the embedded model, working with nurses who know me and know that I respect their time and I respect their assessment of the situation and that I'm going to communicate while I'm working with the patient and I'm going to keep that patient safe, it just allowed me to do so much more with the patient than when I go to a unit where they're not familiar with me or are not familiar with the culture of early mobility.

Challenges

While participants speak highly of their time in the embedded therapy model, there were some negative aspects identified. Participants noted that caseloads in the embedded model can be more difficult to manage at times, as the specialized nature of the unit and staffing makes receiving help from other therapists more difficult. Therapy involvement in screening allows patients to be seen in a timelier fashion, but participants reported the number of therapists allotted to the embedded team may not

always meet this increased demand. Some participants describe that working in the CVICU can be draining from an emotional perspective. Tough cases with poor outcomes can create levels of moral distress for the therapists and in the embedded staffing model, they do not get as much of an emotional reprieve. However, the most salient challenges that emerged from the qualitative data related to how the therapy team interacted with the rest of the eco-system of the ICU. Three specific issues emerged as determining variables in the degree of success with embedded staffing models: multidisciplinary collaboration, clear and effective communication, and resource coordination.

Multidisciplinary Collaboration

For an embedded staffing model in the CVICU to be successful, participants noted that buy-in to the mission of early activity and mobility is required from the all health care providers in the unit, not just the rehabilitation therapists. This is not a unique challenge to embedded rehabilitation. However, the supportive nature of the embedded team and involvement in patient screening adds extra layers of collaboration. Several participants have prior experience in other embedded rehabilitation teams in the same hospital system. While there were many similarities and a similar structure, participants noted that differences in unit culture surrounding rehabilitation and early mobility are key to success. Participant A3 compared her experiences in the medical ICU to the CVICU along these lines, noting the surgical nature of the CVICU adds different incentives and resources to promote early activity and mobility. Nurses in the CVICU were noted by multiple participants to be much more willing, comfortable and diligent with engaging patients in functional mobility or activity out of bed. The

participants emphasized that getting nurse buy-in is critical to their screening process and to allocating resources to the most suitable patients. Therapists can rely on nursing staff to help in identifying patients who may fall short of initial activity milestones and deserve consideration for early involvement of OT and PT. In other embedded units where the staff buy-in is lacking, participants noted the screening procedure is not as effective.

Participants also noted that collaboration with nursing staff during treatment sessions can make a huge impact on the success of the session. This includes being able to respond to hemodynamic changes that might occur during the session and decide whether to stop treatment. Participant A5 highlighted how having a positive or negative collaboration with nursing staff can affect treatment.

(A5, PT) There's been some rooms and units I've worked on where I walk into the room. The nurse kind of says, great, therapy's here, and then they walk out. It leads to a lot more complex environment, because as therapists, we're not able to titrate medications, and so if the patient would become hypotensive as they're sitting up, we have no way of fixing that with meds other than just laying the patient down compared to if the nurse is present, they're able to increase pressers or potentially work on any other barriers that show up that would otherwise require us to stop activity.

Clear and Effective Communication

The second key sub-theme that emerged related to challenges of the embedded therapy model was the importance of communication. There were two key aspects to communication identified. One was the communication between OT and PT.

Participants described a close working relationship based around OT/PT pairs in the embedded model. The dynamic of working in pairs was something viewed in a positive light compared to the traditional staffing model. Participants noted being grouped in a pair streamlines their communication and collaboration with their opposite discipline partner, rather than having to communicate with three to four other therapists in the traditional staffing model. When asked about what makes for a good partnership between OT and PT, all participants answers were related to communication in some form. Sometimes it was communication around the plan for day and how to best schedule their patients to make sure they had optimal coverage, while other times it was related more to patient-related issues and clinical judgment. Participant A3 discussed the dynamic between particular pairs and how to best communicate with each other is learned over time and repetition. Participant A5 describes how this communication between therapists is not always verbal in nature.

(A5) We may not want to physically talk about it out loud to each other, especially if family is in the room. But we may kind of give each other a look, yeah, we're on the same page. We're ready to stand. And so being able to read, almost kind of read what each other is thinking based on non-verbals.

The other aspect of communication that emerged as important was the communication between therapists and the other members of the health care team. Participants viewed clear and respectful communication between therapists, nurses, ECMO specialists and providers as a key facilitator of effective collaboration. This is especially true when it comes to ECMO patients, who were mentioned by all participants as complex and difficult patients to treat due to the possible risks and

adverse events that can occur without appropriate caution and care. These adverse events such as accidental de-cannulation, air entrapment and bleeding are rare but have high stakes, as they can be fatal to the patient. Almost all treatment for ECMO patients requires the OT or PT to work directly with both the nurse and the ECMO specialist in the hospital room. It is important for therapists to communicate and troubleshoot their plans with ECMO specialists both prior to and during the session to ensure patient safety. Participants also reported the critical importance of developing a shared language with other members of the healthcare team. This is built through extensive training and increasing the medical knowledge base of therapists. Team members can then use a shared set of terms to communicate with each other, minimizing misunderstandings and allowing for a better collaboration.

Resource Coordination

The final challenge that emerged for embedded therapy teams was the high burden of resource coordination involved in delivering occupational or physical therapy services. This extensive coordination between different services was described by the participants to be due to the fast-changing nature of the CVICU. Patients may look like they are fairly free during rounds, only to have multiple unplanned procedures or medical complications that arise. Therapists may need to coordinate plans with four to five different team members to carry out their treatment plans for a single patient. Coordinating with ECMO specialists was mentioned by multiple participants to be challenging at times, as they often manage multiple patients at a time and need to be present in the room for most of each session. The afternoon hours, when ECMO

specialists are covering breaks for each other, can be particularly challenging to coordinate therapy times.

Compared to traditional staffing models, participants noted less time spent in chart review on the computer. However, the hand-off and rounding process is very time consuming and this is not billable time. Some participants noted it could look like they weren't as productive when working in the embedded units due to the coordination burden. Participant A4 spoke of a potential efficiency gap that could occur as a result of this burden.

(A4) You could end up spending an hour and only having maybe three patients out of that hour that you're gonna get to work with that day. There's a potential efficiency gap where you're spending a lot of time reviewing patients that you're not actually going to work with that day

Discussion

Embedded rehabilitation in the CVICU is viewed positively by the therapists who have experienced it and can help break down traditional barriers to early mobility and activity programs that have been identified. Embedded rehabilitation clearly addresses the barrier of travel time and responsibilities in other units as described in Liew et al. (2021) by limiting therapists to a particular unit. This is particularly important in large hospital systems that may require long walking distances between units, especially with the degree of collaboration required in the CVICU described in this study. Anekwe and colleagues (2019) found inadequate training and nurse safety concerns are two barriers that may be addressed by an embedded team. Therapists in this model have more consistency and rotate to other areas of the hospital less often, which allows them to

develop real expertise in the CVICU patient population. They also can receive specifically targeted orientation and training. Therapists in this staffing model develop improved confidence in their clinical skills and judgment, which allows them to be more aggressive in their treatment plans but also helps to mitigate safety risks. Hemodynamic changes and minor adverse events during therapy interventions such as desaturation, hypotension or arrhythmias do occur in this patient population but they very infrequently cause serious harm to the patient and have not been associated with poorer clinical outcomes (Sousa et al., 2021). Having a shared language to facilitate effective communication and collaboration with CVICU stakeholders can help foster risk/benefit discussions between teammates and prevent holding therapy interventions unnecessarily.

Themes from this study tie closely with some of the findings of Balas et al., (2019). In a discussion of physical activity, OT/PT, and early mobility in the ICU, the authors identified the importance of a collaborative model, with communication between members of the ICU team as a key component. The authors noted that an ICU mobility protocol and mobility training by PTs and OTs for nursing staff are key to implementation of a successful ICU mobility program. These are both key aspects of the embedded therapy program described by the participants in this study. Participants describe being involved in nursing orientation sessions with education provided on body mechanics and transfer techniques.

Implications for Occupational Therapy

There are several implications to this study for occupational therapy practice in acute care. The findings from this study make clear the importance of institutional buy-in

as a potential barrier to optimal ICU rehabilitation, but there are some complex dynamics at play. There is a degree to which the presence of an embedded rehabilitation team can help create buy-in but it does not have as much of a chance to be successful without buy-in on the front end as well. Creating an embedded rehabilitation team for the CVICU requires a significant deployment of therapy resources and this may be difficult for hospital systems experiencing staffing shortages to commit to without negatively affecting other practice areas. Participants in the study expressed that the embedded approach may be less productive by traditional standards, requiring hospital systems and rehabilitation managers to have an appreciation for potential institutional savings that can occur with increased therapy presence in the CVICU.

The need to have a shared language of medical terminology and cardiopulmonary concepts was identified in this study. This is an area where OT entry-level education and advanced practice infrastructure has an opportunity to be further developed. The PT profession has a specialty certification in cardiopulmonary practice since 1985 (American Physical Therapy Association, n.d.). No analogous board or specialty certification exists for OTs. Accreditation standards for PTs clearly specify the cardiovascular system as required content (Commission on Accreditation in Physical Therapy Education, 2020). Similar standards for OT curriculum include language about biological sciences, but do not specifically mention cardiopulmonary content (Accreditation Council for Occupational Therapy Education, 2018). OTs interested in joining embedded CVICU teams may have a higher learning curve to develop this shared language.

Limitations

Like all phenomenological research, caution should be undertaken when attempting to generalize results outside of the participants of this study. This study represents the lived experiences of a particular group in a specialized context. It should also be noted that this was also a pilot study with a small sample size. Experiences of OTs and PTs in other hospital systems and practice areas may vary significantly than was found for this study, especially in smaller institutions. Furthermore, the interviews were completed at one hospital facility that may not represent the lived experience of all rehabilitation teams at different trauma level centers.

Future Considerations

While participants in this study unequivocally expressed the belief that this staffing model helps to improve patient outcomes, it is important to note that this has yet to be identified from a quantitative standpoint in peer-reviewed publications. Future research can build on the findings of this study and explore causal relationships between some of the anecdotal beliefs expressed by the group that could affect clinical outcomes. Participants made clear that there was a great deal of variability between embedded teams in different ICUs even in the same hospital system. Further qualitative research could build on this pilot study to expand the scope of inquiry to other types of ICUs with similar embedded structures or other CVICUs which employ different staffing models. Qualitative findings regarding the interprofessional benefits of embedded rehabilitation, particularly the improved relationship between therapy and nursing staff could be explored in more depth in future studies.

Conclusion

Embedded rehabilitation in the CVICU is viewed positively by the therapists who have experienced it and can help break down traditional barriers to early mobility and activity. Participants note this to be a result of improved timing of therapy initiation through novel therapy involvement in consult screening, improved relationships and improved clinical skills and confidence. Occupational and physical therapy practitioners are enabled to become practice experts through consistency and directed training and orientation. However, OTs and PTs in the CVICU do not operate in isolation. Successful implementation of such an approach requires a significant amount of multi-disciplinary collaboration, clear and effective communication and resource coordination between the rest of the ICU eco-system. Results from this pilot study can be used as a starting point to explore other ICU rehabilitation staffing models and embedded therapy programs in different types of ICUs.

References

- Accreditation Council for Occupational Therapy Education (2018). 2018 Accreditation council for occupational therapy education (ACOTE®) Standards and interpretive guide (effective July 31, 2020). *American Journal of Occupational Therapy*, 72(Supplement_2), 7212410005p1–7212410005p83.
<https://doi.org/10.5014/ajot.2018.72S217>
- American Occupational Therapy Association. (2017). Vision 2025. *American Journal of Occupational Therapy*, 71, 7103420010.
<https://doi.org/10.5014/ajot.2017.713002>
- American Physical Therapy Association. (n.d.). Become a board-certified cardiovascular and Pulmonary Specialist in physical therapy. APTA Specialist Certification - Governed by ABPTS. <https://specialization.apta.org/become-a-specialist/cardiovascular-pulmonary>
- Anekwe, D. E., Koo, K. K., de Marchie, M., Goldberg, P., Jayaraman, D., & Spahija, J. (2019). Interprofessional survey of perceived barriers and facilitators to early mobilization of critically ill patients in Montreal, Canada. *Journal of Intensive Care Medicine*, 34(3), 218–226. <https://doi.org/10.1177/0885066617696846>
- Balas, M. C. (2019). Common challenges to effective ABCDEF bundle implementation: The ICU liberation campaign experience. *Critical Care Nurse*, 39(1), 46–60.
<https://doi-org.rmuohp.proxy.liblynxgateway.com/10.4037/ccn2019927>
- Bodensteiner, E. A., Chitulangoma, J. A., Cornelius, P. J., Fulton, R. S., Hall, K. R., Polley, C. A., Roloff, D. R., Terman, T. A., & Vopava, J. R. (2018). Embedded early mobility and activity in a mixed medical/surgical intensive care unit. Rochester, MN; Mayo Clinic Quality Conference.

- Cerier, E., Manerikar, A., Kandula, V., Nykiel, T., Lane, S., Gabaldon, R., Toyoda, T., Yagi, Y., Bharat, A., & Kurihara, C. (2022). Early initiation of physical and occupational therapy while on extracorporeal life support improves patients' functional activity. *Artificial organs*, 10.1111/aor.14446. Advance online publication. <https://doi.org/10.1111/aor.14446>
- Colorafi KJ, Evans B. (2016) Qualitative descriptive methods in health science research. *Health Environments Research & Design Journal*, 9(4), 16-25.
doi:10.1177/1937586715614171
- Cuthbertson, B. H., Goddard, S. L., Lorencatto, F., Koo, E., Rose, L., Fan, E., Kho, M. E., Needham, D. M., Rubenfeld, G. D., & Francis, J. J. (2020). Barriers and facilitators to early rehabilitation in the ICU: a theory driven delphi study. *Critical care medicine*, 48(12), e1171–e1178.
<https://doi.org/10.1097/CCM.0000000000004580>
- Dalia, A. A., Ortoleva, J., Fiedler, A., Villavicencio, M., Shelton, K., & Cudemus, G. D. (2019). Extracorporeal membrane oxygenation is a team sport: Institutional survival benefits of a formalized ECMO team. *Journal of cardiothoracic and vascular anesthesia*, 33(4), 902–907. <https://doi.org/10.1053/j.jvca.2018.06.003>
- Liew, S. M., Mordiffi, S. Z., Ong, Y. J. A., & Lopez, V. (2021). Nurses' perceptions of early mobilisation in the adult intensive care unit: a qualitative study. *Intensive & critical care nursing*, 66, 103039. <https://doi.org/10.1016/j.iccn.2021.103039>

- National, Heart, Lung and Blood Institute. (2022). *What Is Heart Surgery?*. Retrieved March 28, 2023, from <https://www.nhlbi.nih.gov/health/heart-surgery#:~:text=Each%20year%2C%20more%20than%202,ages%20can%20have%20heart%20surgery.>
- Neff, T. (2016). PT pilot improves patient care, trims ICU stays. UCHealth Today. <https://www.uchealth.org/today/pt-pilot-improves-patient-care-trims-icu-stays/>
- Newman, A. N. L., Kho, M. E., Harris, J. E., Fox-Robichaud, A., & Solomon, P. (2022). Survey of physiotherapy practice in Ontario cardiac surgery intensive care units. *Physiotherapy Canada. Physiotherapie Canada*, 74(1), 25–32. <https://doi.org/10.3138/ptc-2020-0069>
- Scott, J., Kandala, N. B., Fearon, P., & Robinson, L. (2021). Embedded rehabilitation in major trauma: Retrospective pre-post observational study of service and patient outcomes. *Injury*, 52(2), 160–166. <https://doi.org/10.1016/j.injury.2020.11.009>
- Sousa, M. L. A., Coimbra, V. R. M., Takei, M. T., Melo, C. C. A., Feltrim, M. I. Z., & Nozawa, E. (2021). Physiological abnormalities and adverse events during physical therapy in the intensive care unit after cardiac surgery: A prospective observational study. *Brazilian journal of physical therapy*, 25(5), 623–631. <https://doi.org/10.1016/j.bjpt.2021.04.001>
- Wang, Y. T., Lang, J. K., Haines, K. J., Skinner, E. H., & Haines, T. P. (2022). Physical rehabilitation in the ICU: A systematic review and meta-analysis. *Critical care medicine*, 50(3), 375–388. <https://doi.org/10.1097/CCM.0000000000005285>

Young, D. L., Seltzer, J., Glover, M., Outten, C., Lavezza, A., Manthey, E., Parker, A. M., & Needham, D. M. (2018). Identifying barriers to nurse-facilitated patient mobility in the intensive care unit. *American Journal of Critical Care*, 27(3), 186–193. <https://doi-org.rmuohp.proxy.liblynxgateway.com/10.4037/ajcc2018368>

Appendix A

Interview Guide

1. Describe a typical day
 1. How do you know what floor to go to?
 2. What time do you arrive?
 3. What are the first things you do?
 2. Describe the rounding process
 1. Charge nurse handoff
 1. What kind of information is provided?
 2. Is it mostly listening or do you participate in the discussion?
 3. How long does it usually take?
 4. Is it a useful process for you? Why or why not?
 5. How could it be improved?
 2. Therapy rounding
 1. Describe the process
 2. What questions do you ask? What information are you trying to obtain?
 3. What works well about the process?
 4. What could be improved?
 3. What is the chart review process you use?
 1. How is it different from the traditional model?
 2. What parts are the same?
 3. Describe the screening process used on the unit
 1. How do you decide who gets a consult and who does not?
 2. How do you know when the right time to get involved?
 3. When a new therapy order is called for, how does that get communicated to the team?
 4. How do you arrange/figure out the timing of who to see and when?
 5. How does collaboration with therapy partners work?
 1. Who gets seen together as a co-treatment and who gets split?
 2. What makes for a good partnership? What does it look like?
 3. What challenges can arise between partners?
 6. Describe the collaboration and relationship with nursing staff
 1. How is it different than in the traditional model?
 2. How are things affected with a more experienced nurse versus a newer one?
 7. Relationship with RT and ECMO specialists
 1. What makes for a good collaboration?
 2. What makes things difficult?
 8. What was the training and orientation process like for the embedded unit?
 9. How does scheduling work? How long do you stay in one spot? What input do you have about your schedule?
- Compare/contrast**
10. What are the overall benefits you see to this model compared to the traditional model?
 1. What are the benefits of the traditional model?
 2. What are the biggest challenges of the embedded model?
 3. What are the biggest challenges of the traditional model?
 11. What barriers to optimal therapy practice does the embedded model address?
 12. What barriers are still there? How could they be overcome?
 13. How has being in this staffing model affected your clinical practice? Skills?
 14. How program is viewed by staff that aren't in it?