*Method and Protocol*

International Journal of Qualitative Methods
Volume 24: 1–6

DOI: 10.1177/16094069251362624
journals.sagepub.com/home/ijq
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# Adherence to Physical Rehabilitation in Patients With Delirium Post Neurosurgery: A Study Protocol

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## Abstract

Delirium is an acute neurocognitive disorder characterized by confusion, disorientation, and fluctuating levels of arousal. It is commonly observed in patients following neurosurgery. This condition can lead to various adverse outcomes, including cognitive and functional decline, prolonged hospital stays, and increased mortality rates. Physical rehabilitation is crucial for these patients' recovery, as it promotes functional improvement, reducing long-term disability risks, and enhancing overall quality of life. While evidence supports rehabilitation's value in delirium management, there is limited understanding of specific strategies to improve adherence to rehabilitation among post-neurosurgery patients experiencing delirium. This study explores the rehabilitation workforce's perspectives on strategies to enhance adherence to physical rehabilitation in neurosurgery patients with delirium. This study will use a qualitative, descriptive exploratory design to investigate strategies that support adherence to rehabilitation. We will use purposive sampling to recruit a diverse group of rehabilitation professionals, including nurses, physiatrists, physiotherapists, speech and language therapists, and occupational therapists, from Lisbon, Portugal. Data will be collected through semi-structured interviews guided by an interview script and analyzed using thematic analysis. Demographic data will be processed with SPSS software, while QDA Miner Lite will assist with coding and qualitative analysis. Identifying effective strategies to promote adherence to rehabilitation in neurosurgery patients affected by delirium could improve patient recovery, reduce healthcare burdens, and inform evidence-based guidelines. The findings of this study may provide practical insights for healthcare providers, administrators, and policymakers, ultimately supporting higher-quality care for this patient population.

## Keywords

delirium, neurosurgery, rehabilitation adherence, qualitative research, interdisciplinary perspectives

## Introduction

Delirium is a neurocognitive disorder characterized by an acute state of confusion and disorientation with changes in arousal, with fluctuating severity during the day (Wilson et al., 2020). Delirium incidence rates can vary depending on the settings. A systematic review that analyzed 42 studies found that the prevalence of delirium in the community ranges from 4% to 12%, while the prevalence among hospitalized patients ranges from 9% to 57% (Watt et al., 2019). Additionally, other studies have reported a pooled prevalence of 31.8% in

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intensive care unit patients (Krewulak et al., 2018), reaching 50 to 70% when mechanically ventilated (Almeida et al., 2014). A previous study to establish the incidence of delirium in the acute care surgery population identified 22.7% of patients as having experienced delirium, with 15.2% experiencing longer episodes (Saravana-Bawan et al., 2019). Postoperative delirium is also a common surgical complication, observed to be as high as 46% of patients (Whitlock et al., 2011).

Studies have shown an association between delirium and various adverse outcomes, including functional and cognitive decline, prolonged hospital stays, increased rates in institutionalization, and higher mortality rates (Efraim et al., 2020; Wilson et al., 2020). Delirium also has a substantial impact on the overall costs of healthcare systems. A study indicated that delirium in hospitalized patients aged 70 years and older results in a cost of approximately 150 billion dollars a year in the United States, comparable to falls and diabetes mellitus (Leslie et al., 2008). Preoperative programs have been developed to address frailty-related factors and minimize postoperative complications. Some of these programs are explicitly designed to prevent delirium, as this disorder is highly prevalent and linked to significant negative patient outcomes (Janssen et al., 2019).

The Guidelines for the Provision of Intensive Care Services are essential for planning, commissioning, delivering, and improving the quality of care treatments for patients hospitalized in critical care services. These guidelines advise the regular screening of delirium and specify that health professionals must develop care plans that include non-pharmacological and pharmacological interventions. The guidelines also specify that patients should have access to daily physiotherapy to enable early mobilization and thus minimize the risk of hospital-acquired deconditioning (Society, 2022).

Physical rehabilitation is a vital part of the recovery process for neurosurgery patients. It can promote functional recovery, reduce the risk of long-term disability, and improve quality of life (Kos et al., 2016; Kushner & Amidei, 2015). There is also evidence that physical and occupational therapy can significantly reduce mechanical ventilation and decrease the duration of delirium in critically ill patients. These findings suggest that early mobilization interventions positively impact patient outcomes while reducing the incidence of delirium (Schweickert et al., 2009; Wilson et al., 2020).

Evidence shows the value of rehabilitation in patients with postoperative delirium. However, the increasing pressure on acute hospitals leaves little time to cultivate and encourage a rehabilitation-focused ethos (Rains & Chee, 2017). Therefore, it is crucial to prioritize rehabilitation as soon as it is clinically appropriate (Society, 2022; Wilson et al., 2020). To make this approach feasible, the rehabilitation workforce must develop individualized care plans addressing patients' needs and challenges. This may include providing motivation, adapting rehabilitation interventions to the patient's cognitive and physical abilities, and providing education and counseling to both patients and their families (Rains & Chee, 2017; Society, 2022). While adherence to physical rehabilitation in patients post-neurosurgery is vital, little is known about the strategies that can improve adherence in those who experience delirium. Therefore, this research aims to address this evidence gap by exploring the perspectives of the rehabilitation workforce on the strategies to improve adherence to physical rehabilitation for patients with post-neurosurgery delirium.

## Materials and Methods

### Study Design

The phenomena under study are the strategies to improve adherence to physical rehabilitation in patients with delirium after neurosurgery.

To address the gap in the existing literature, we will conduct a qualitative descriptive exploratory study. This design can help summarize and understand an area of interest that has yet to be thoroughly investigated within a particular context (Doyle et al., 2020; Hunter et al., 2019).

### Time Period

The Gantt chart (Figure 1) illustrates the study's development over one year.

### Population and Recruitment

We will use purposive sampling to recruit the rehabilitation workforce, including rehabilitation nurses, physical medicine and rehabilitation doctors, physiotherapists, speech and language therapists, and occupational therapists from Lisbon.

Purposeful sampling is a commonly used method in qualitative research to identify and explore data relevant to the research objective. This approach allows researchers to gather data from the most suitable participants, ensuring that the findings are significant and applicable to the study context (Palinkas et al., 2015).

We will promote the study by *posting* multiple updates *on Facebook,* WhatsApp, and Instagram. In addition, to facilitate purposive sampling, the registration survey will include questions to gather the candidates' profession and years of experience working with patients who have experienced delirium after neurosurgery. This will help in selecting participants with a diverse range of lived experiences in patient care.

### Inclusion Criteria

- Be a healthcare professional (i.e., rehabilitation nurse, physical medicine and rehabilitation doctors, physiotherapists, speech and language therapists, and occupational therapists);

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Planning | X | x | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethical approval | --- | --- | x | x | --- | --- | --- | --- | --- | --- | --- | --- |
| Participants recruitment | --- | --- | --- | --- | x | x | --- | --- | --- | --- | --- | --- |
| Data collection | --- | --- | --- | --- | x | x | x | --- | --- | --- | --- | --- |
| Data analysis | --- | --- | --- | --- | --- | x | x | x | x | x | --- | --- |
| Reporting | --- | --- | --- | --- | --- | --- | --- | --- | --- | x | x | x |

**Figure 1.** Project Schedule

- Previous experience working with patients who have experienced delirium after undergoing brain tumor surgery;
- Willingness to participate in the study.

## *Data Collection Procedures*

To ensure that candidates understand the research project's aims and the importance of their participation, a research team member will contact all eligible participants by telephone.

The study will collect data from participants through semi-structured interviews. The leading researcher will conduct the interviews. Suitable participants will not have a prior relationship with the interviewer.

All interviews will be performed individually in a private cabinet at Egas Moniz School of Health and Science. Researchers will ensure that no one else besides the interviewer and participants will be present.

The interviewer will start by reexplaining the research project and its aims. The interview will only take place after participants sign the written informed consent. Interviews will be digitally audio-recorded.

The research team plans to create an interview guide aimed at maintaining the focus on the study's objectives.

This guide will consist of a series of quick-answer questions designed to gather participants' demographic information (sex, age, professional experience, time of experience in working with patients with delirium after neurosurgery). Additionally, it wil include open-ended questions with prompts to explore the strategies used to improve the adherence to physical rehabilitation in patients with delirium.

For example, "What interventions do you use in our daily practice to promote patients with delirium after neurosurgery adherence to physical rehabilitation? Probes: Can you tell me more about that? Please describe the impact of that intervention".

"Are there any interventions that can promote adherence to physical rehabilitation in patients with delirium that are not available to implement? Probe: Can you tell me more about that?".

We will conduct a pilot test with qualitative research experts and participants to ensure the interview script is comprehensive and understandable. This process will allow us to gather feedback on the clarity and usefulness of the script and identify any areas of ambiguity or equivocation in the questions. In addition, we aim to ensure that the script is objective and explicit in retrieving the required information. The estimated duration of the interview will be between 30 to 45 min.

## *Data Analysis*

After conducting the audio-recorded interviews, we will transcribe the recordings verbatim using Microsoft Word®. Each participant will be given a distinctive code using letters and numbers to ensure anonymity. Researchers will return the transcripts to participants to review and provide further clarification that may enhance data accuracy.

We will utilize IBM SPSS Statistics for Windows, Version 28.0, to measure count, mean, median, minimum, maximum, and standard deviation that allow sample characterization.

Concurrent with data collection, two researchers will independently conduct an inductive thematic analysis process on the open-ended questions, following the method outlined by Braun et al. (2019) using the QDA Miner Lite database.

The researchers will initiate the analysis process by thoroughly reviewing and analyzing the audio transcripts to identify key concepts and recurring themes. This methodology aims to enable the emergence of themes directly from the data rather than being influenced by preconceived notions or theories (Thomas, 2016). It will facilitate the recognition of similarities and disparities among the transcripts, leading to identifying patterns conducive to theme development. Subsequently, the researchers will segment the transcriptions into meaningful units, such as individual words, phrases, and passages, that reflect common themes. These units will be systematically coded based on the participant's language, revealing their perspectives on the study's subject matter and highlighting commonalities and distinctions among them.

Researchers will examine the initial coding and discuss themes and subthemes. If a consensus cannot be reached, an additional researcher will be consulted to resolve any disagreement. Subsequently, the other team members will review the data analysis to validate the results. Finally, the themes and organizing framework will be ratified by two external fellow researchers, experts in qualitative research.

### Data Saturation

In this study, we will emphasize the richness of the selected cases rather than the sample size, following the recommendations of Vasileiou et al. (2018) and Gupta et al. (2018). To achieve this, we will not determine a fixed sample size but instead rely on saturation, as proposed by Glaser and Strauss (2017). We will continue conducting interviews until data consistency is appropriate to meet the study's objectives. We will stop data collection when additional interviews do not reveal any new properties or insights regarding the study's subject matter.

### Trustworthiness

To ensure research rigor, researchers will adopt different procedures. First, researchers chose a purposive sampling method to maximize the value of a small population of interest to achieve meaningful research outcomes (Berndt, 2020; Moser & Korstjens, 2018; Palinkas et al., 2015). Second, researchers will follow the procedures Nowell et al. (2017) suggested to ensure data trustworthiness. Therefore, to guarantee credibility, the research teams will establish a good relationship with participants and clarify the significance of the research. The interviews will be scheduled at times appropriate for participants, and each participant will be able to describe their experiences fully. All data analysis procedures will be detailed, and data will be returned to participants to validate the researcher's interpretations. To ensure transferability, researchers will provide a detailed description of the participants' characteristics and study setting. Participants' quotations will provide comprehensive descriptions of their experiences, enabling readers to determine the feasibility of transferring the findings to other contexts. To guarantee the study's dependability, every step of the decision-making process will be documented to allow the research process to be traceable. Finally, fellow external researchers will compare their perceptions to the researchers to find inconsistencies.

### Ethics and Procedures

Researchers will conduct the study in agreement with the Declaration of Helsinki *Declaration of Helsinki*-Ethical principle for medical *research* involving human subjects, as revised in 2013. Researchers have obtained approval from an independent ethics committee (ID:1249). All participants must sign an informed consent form before the interview. They are free to decline to answer any questions, modify or review their answers, or withdraw from the study any time. To ensure confidentiality and anonymity, researchers will assign a unique code number to each participant during data reporting. No individual data will be accessible except for the leading researcher responsible for the identification sheet.

## Discussion

Neurosurgery is a highly complex medical procedure that involves delicate neural tissue manipulation. While it can be lifesaving, it can also significantly damage the patient's neurological function (Travis et al., 2019). This highlights the vital importance of post-neurosurgery rehabilitation .

Post-neurosurgery rehabilitation involves a range of therapies and interventions aimed at minimizing the surgery's impact on the patient's overall health and helping them regain lost functions as much as possible (Barisa et al., 2019; Sveen et al., 2022). By starting rehabilitation early, patients can take advantage of neuroplasticity and regain lost functions more quickly (Kos et al., 2016).

The acute confusion and disorientation accompanying delirium can make it difficult for patients to focus on rehabilitation exercises, engage with healthcare providers, and follow through with treatment plans. Furthermore, patients with delirium may have a reduced ability to comprehend and remember instructions, further hindering their ability to adhere to rehabilitation programs. These challenges make it difficult for patients to engage in rehabilitation and hinder their recovery. Therefore, rehabilitation of patients with postoperative delirium can be challenging for health professionals (Barisa et al., 2019; Gual et al., 2020).

Guidelines have been established to prevent and manage delirium, emphasizing the importance of early rehabilitation interventions (Barr et al., 2013; Smith et al., 2022; Society, 2022). However, although these guidelines provide a framework for rehabilitation, there are still gaps in the literature regarding interventions that promote adherence to rehabilitation programs among patients with delirium. Therefore, there is important to investigate interventions that can facilitate adherence to rehabilitation programs for these patients.

The importance of this research is underscored by the challenges that patients with delirium face when trying to adhere to rehabilitation. Identifying effective strategies to promote adherence to rehabilitation among these patients is a critical area that could lead to improved patient outcomes and greater effectiveness of post-neurosurgery rehabilitation. In addition, this research may serve as a foundation for developing guidelines that facilitate the delivery of evidence-based care to patients with delirium, ultimately improving the quality of care and patient outcomes. As a result, these findings from this study may offer practical insights for patients, rehabilitation professionals, healthcare administrators, and policymakers.

### Study Limitations

This study is not without limitations. First, while using social media for recruitment allows us to reach a broader audience, it also carries the risk that the target population may not use social media extensively. To overcome this limitation, we will advertise the study via social media using direct posts in the

thematic groups to reach users who match the study criteria. Second, similar to previous research using interviews as a data collection procedure, there is a risk of social desirability bias. This bias can lead to an overstatement of the frequency of certain behaviors, particularly those viewed as positive or socially desirable. We will follow the practices recommended by Bergen and Labonte (2020) to reduce the impact of social desirability bias. The interviews will be conducted in a private cabinet to ensure participants can share their honest opinions without fear of judgment. The interviewer will establish rapport with participants using various techniques such as humor, self-disclosure, and showing respect. If the interviewer perceives that social desirability tendencies may influence a response, additional context will be provided to encourage a more genuine and accurate response, acknowledging the diversity of experiences people may have and asking indirect questions. Additionally, the interviewer will encourage participants to offer a narrative or example to elucidate their response further, which can help uncover deeper insights and reduce the influence of social desirability bias. Third, the usefulness of our findings and recommendations depends on the input from participants. Therefore, the study will use purposive sampling to obtain the most comprehensive range of responses. We will use purposive sampling based on the participants' profession and years of experience to select candidates with diverse lived experiences working with patients with delirium after neurosurgery. Finally, we acknowledge that participants may not always feel comfortable reporting accurate perceptions due to concerns about anonymity or protecting their identity. To address these concerns, we have implemented several measures to ensure the research is conducted ethically and rigorously. This report outlines these procedures to demonstrate our commitment to ethical research practices.

## Conclusion

Guidelines for preventing and managing delirium after neurosurgery emphasize the importance of early rehabilitation interventions. However, the existing literature lacks specific interventions that promote adherence to rehabilitation programs for patients with delirium post-neurosurgery. Therefore, it is vital to identify and explore strategies to promote adherence to physical rehabilitation in this population. This focus could lead to improved patient outcomes and enhance the overall effectiveness of post-neurosurgery rehabilitation.

### Acknowledgments

The authors thank FCT/MCTES for the financial support to CiiEM (UIDB/04585/2020) through national funds.

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### Informed Consent Statement

Written informed consent will be obtained from all participants involved in the study.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

### Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article.

### Institutional Review Board Statement

The studies involving humans were approved by Egas Moniz Higher School of Health and the Institutional Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements.

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