Australian Clinical Guideline for Physical Rehabilitation and Mobilisation in Adult Intensive Care Units

Main editor

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Sections

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Disclaimer:	This guideline is a general guide to clinical practice, to be followed subject to health care professional's judgement and the person's values, preferences, circumstances and needs. This guideline is designed to provide information to assist decision-making and recommendations included within are based on the best evidence available at the time of development.
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Publication Approval

Australian Government

National Health and Medical Research Council

The guideline recommendations on pages 9-10 of this document were approved by the Chief Executive Officer of the National Health and Medical Research Council (NHMRC) on 8 December 2023 under section 14A of the *National Health and Medical Research Council Act 1992*. In approving the guideline recommendations, NHMRC considers that they meet the NHMRC standard for clinical practice guidelines. This approval is valid for a period of five years.

NHMRC is satisfied that the guideline recommendations are systematically derived, based on the identification and synthesis of the best available scientific evidence, and developed for health professionals practising in an Australian health care setting.

This publication reflects the views of the authors and not necessarily the views of the Australian Government.

How To Use This Guideline

These guidelines seek to present the best available, current scientific evidence for physical rehabilitation and mobilisation of adults in intensive care units (ICUs). The purpose of these guidelines is to provide intensive care clinicians with clear and evidence-based advice on the safe and appropriate use of physical rehabilitation and mobilisation as a treatment to aid patient recovery from critical illness. These guidelines should assist in clinical decision making related to the management of adults with critical illness. These guidelines also form evidence for health professional education including the training of students and specialists, for health administrators and funders to inform local intensive care staffing and models, and for policy makers to inform national policy documents and funding.

The guideline consists of two layers:

1. The Recommendation

Recommendation for (Green)

A strong recommendation is given when there is high-certainty evidence showing that the overall benefits of the intervention are clearly greater than the disadvantages. This means that all, or nearly all, patients will want the recommended intervention.

Recommendation against (Red)

A strong recommendation against the intervention is given when there is high-certainty evidence showing that the overall disadvantages of the intervention are clearly greater than the benefits. A strong recommendation is also used when the examination of the evidence shows that an intervention is not safe.

Conditional Recommendation for (Yellow)

A conditional recommendation is given when it is considered that the benefits of the intervention are greater than the disadvantages, or the available evidence cannot rule out a significant benefit of the intervention while assessing that the adverse effects are few or absent. This recommendation is also used when patient preferences vary.

Conditional Recommendation against (Orange)

A conditional recommendation is given against the intervention when it is judged that the disadvantages of the intervention are greater than the benefits, but where this is not substantiated by strong evidence. This recommendation is also used where there is strong evidence of both beneficial and harmful effects, but where the balance between them is difficult to determine. Likewise, it is also used when patient preferences vary.

Consensus Recommendation (Bluish-Purple)

A consensus recommendation can be given for or against the intervention. This type of recommendation is used when there is not enough evidence to give an evidence-based recommendation, but the panel still regards it as important to give a recommendation.

Good Practice Statement

Good Practice Statements are ungraded statements that represent the GDG's view of optimal practice. Good practice statements are developed when there is high certainty that the desirable effects of an intervention clearly outweigh its undesirable effects, but the body of supportive evidence is indirect and other criteria for their development are fulfilled.

2. Supporting Information

Click on the recommendation to learn more about the basis of the recommendation. Additional information will be added as recommendations are updated in light of new evidence.

Evidence profile: The overall effect estimates and references to the studies.
Summary: Overview and brief review of the underlying evidence.

Certainty of the evidence:

- **High:** We are very sure that the true effect is close to the estimated effect.
- **Moderate:** We are moderately sure of the estimated effect. The true effect is probably close to this one, but there is a possibility that it is significantly different.
- **Low:** We have limited confidence in the estimated effect. The true effect may be significantly different from the estimated effect.
- **Very low:** We have very little confidence in the estimated effect. The true effect is likely to be significantly different from that estimated effect.

Evidence to Decision: Brief description of beneficial and harmful effects, certainty of evidence and considerations of patient preferences.
Rationale: Description of how the above elements were weighted in relation to each other and resulted in the current recommendation direction and strength.
Practical information: Practical information regarding the treatment and information on any special patient considerations.
Decision Aids: Tools to assist shared decision making and patient participation in health care decisions.
References: Reference list for the recommendation.
Feedback: If you have a MAGICapp account, you can log in to comment on specific recommendations. To create a free account, click on the 'Account' button in the top right hand corner of the screen.

The grading of evidence quality and recommendation strength is based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE). For a quick and informative introduction to GRADE, the article 'Understanding GRADE: an introduction by Goldet & Howick' is recommended *[1]*. See also http://www.gradeworkinggroup.org.

Introduction

Plain English Statement

Some patients in intensive care are very sick and receive prolonged, invasive support for their breathing. Severe illness often means patients are confined to bed (i.e. no active exercise out of bed), and may result in severe muscle weakness, longer hospital stay and poor recovery. A strategy that attempts to reduce this muscle weakness is called physical rehabilitation (or mobilisation) and involves techniques to increase movement in these patients. Physical rehabilitation and/or mobilisation **can be delivered within the intensive care environment** by any member of the health professional team, but in Australia it is commonly delivered by physiotherapists and registered nursing staff. This guideline has been developed to assist healthcare providers in the ICU who are deciding whether a patient should receive physical rehabilitation and/or mobilisation.

Introduction

Globally more than one million patients with critical illness will develop ICU-acquired weakness each year *[2]*. This muscle weakness develops within days of admission to the ICU and can lead to prolonged mechanical ventilation, increased mortality, and poor health-related quality of life (HRQoL) *[3]*. Many patients are left with significant long-term impairments (collectively known as Post Intensive Care Syndrome) which persist after hospital discharge and impact their physical functioning, cognition, and mental health *[4]*. Given the high burden on both the patient and society, it is critical that interventions which may mitigate the deleterious impact of critical illness and its associated interventions are elucidated. Therefore, there is great interest in the use of physical rehabilitation and mobilisation to improve muscle strength and physical function within the ICU setting.

Defining physical rehabilitation and mobilisation in the ICU

The World Health Organisation defines rehabilitation as a 'set of interventions designed to optimise functioning and reduce disability in individuals with health conditions in interaction with their environment'*[5]*. Patients admitted to the intensive care can develop profound ICU-acquired weakness within 24 hours and develop impairments in their physical functioning which can result in significant disability long after discharge from the hospital*[6]*. Therefore, there is great interest in interventions which can minimise the deleterious consequences of critical illness.

For these guidelines 'physical rehabilitation and mobilisation' is defined as any exercise where the patient can contribute to the activity with their own muscle strength. This could include functional activities such as bridging, sitting, standing, walking and upper or lower limb exercises, with or without assistance from equipment (e.g. tilt table) or staff. Physical rehabilitation and/or mobilisation interventions which do not involve voluntary, active muscle contraction (e.g., only electrical muscle stimulation or passive cycling) or are not designed as whole-body rehabilitation interventions (e.g., inspiratory muscle training) are beyond the scope of this guideline document.

Physical rehabilitation and/or mobilisation can be delivered by any member of the health professional team but is commonly delivered by physiotherapists and registered nursing staff within the intensive care environment in Australia.

Objectives of the Guideline

The purpose of this guideline is to provide intensive care clinicians with clear and evidence-based advice on the safe and appropriate use of physical rehabilitation and/or mobilisation as a treatment to aid patient recovery from critical illness. This guideline should assist in clinical decision making related to the management of adults with critical illness. This guideline also forms evidence to inform and educate health professionals. This may include: training of students and specialists; information for health administrators and funders about local intensive care staffing and models; information for policy makers to provide policy documents and funding. Overall, the guideline aims to facilitate implementation of the evidence related to physical rehabilitation and/or mobilisation in intensive care into Australian clinical practice to improve the quality of care provided to patients.

This guideline is intended to be used as one component of the clinical decision-making process, rather than as a strict recipe, as other factors including the individual patient situation should be considered when determining the appropriate use of physical rehabilitation

and/or mobilisation as a treatment.

Scope of Guideline

This guideline provides a basis for clinicians to inform their clinical practice and for the development of hospital policies and protocols regarding the use of physical rehabilitation and/or mobilisation in adult ICUs. It is designed to support decisions related to when and how to use physical rehabilitation and/or mobilisation as a safe and effective treatment. This guideline provides an overview of the current evidence base described as a set of three clinical practice recommendations. This guideline is based upon:

- a systematic review of the literature to identify the highest quality and most recent evidence related to the benefit and or harm of physical rehabilitation and/or mobilisation,
- assessment of the quality and certainty of evidence,
- consensus expert opinion in the case of lack of evidence or low certainty evidence,
- consideration of consumers' lived experience and views,
- considerations for implementation including practical information and resources for the adoption of the recommendations into clinical practice, and
- transparent documentation related to the decision making for each recommendation.

Health question covered by this guideline

Should physical rehabilitation and/or mobilisation be used as a therapy in adult patients with critical illness in ICU?

Intended users

This guideline is intended to be used by clinicians (doctors, physiotherapists, registered nurses, and other health care professionals) who treat patients in adult ICUs. Other intended users include educators, hospital managers, administrators, organisations, policymakers, and funders. This guideline can also be a resource for family members of patients in intensive care and as such a plain English statement is included.

Target populations

This guideline addresses the management of adult patients admitted to an acute ICU and receiving invasive mechanical ventilation (IMV) at any point during their ICU stay. Treatment of a patient who does not receive IMV at any point during their ICU stay, is beyond the scope of this clinical practice guideline.

This guideline excludes several specialist populations admitted to intensive care who have unique considerations. As such recommendations may not be generalised to these populations. This guideline do not cover:

- Patients who were never invasively mechanically ventilated in ICU
- Patients with a head injury, stroke, or other neurological condition
- Paediatric patients admitted to an ICU

Vulnerable population groups

This guideline has been developed to be inclusive of people living in rural and remote communities, people from Culturally and Linguistically Diverse (CALD) backgrounds, and Aboriginal and Torres Strait Islander peoples. These groups of people may be vulnerable to increased harms associated with physical rehabilitation and/or mobilisation. However, there is limited research on the appropriate use of physical rehabilitation and/or mobilisation in these population groups. The GDG has considered issues related to physical rehabilitation and/or mobilisation in these population groups as part of the Evidence to Decision (EtD) framework.

Particular risks, treatment and sociocultural considerations to Aboriginal and Torres Strait Islander peoples

The race or ethnic group of patients treated in intensive care with IMV varies among countries. In Australia, patients admitted to intensive care are predominantly white and of European descent. Although, indigenous Australians are over-represented in the intensive care population and are admitted to intensive care at a younger age than non-indigenous Australians. Approximately, 3.4% of patients admitted to ICU between 2017-2019 identified as indigenous *[7]*. Treatment considerations in intensive care should acknowledge the physical, mental, spiritual, and cultural needs of the person admitted to intensive care.

Culturally and Linguistically Diverse (CALD) populations

CALD populations are at risk of social isolation. People with CALD backgrounds may be at higher risk of harm during physical rehabilitation and/or mobilisation due to language barriers increasing the risk of (1) being unable to follow instructions for this complex intervention and (2) being unable to describe symptoms and previous medical history.

It may be necessary to engage with interpreters who can communicate with patients from CALD backgrounds. People from CALD backgrounds should receive culturally appropriate care involving the provision of information about potential benefits and harms of physical rehabilitation and/or mobilisation.

Executive Summary

Clinical Question (PICO)

The GDG engaged in a comprehensive discussion to identify and prioritise critical topics, leading to the formation of the central clinical question and associated outcomes. Subsequent discussions and feedback from the GDG refined the clinical question to align with the guideline's scope. The key clinical question from the guideline - ***should physical rehabilitation and/or mobilisation be used as a therapy in adult critically ill patients in ICU?*** - was integrated with the key outcomes of interest. These outcomes included mortality, health related quality of life, physical function, cognitive function, and adverse events.

Recommendations

Conditional Recommendation for (Yellow)

A conditional recommendation is given when it is considered that the benefits of the intervention are greater than the disadvantages, or the available evidence cannot rule out a significant benefit of the intervention while assessing that the adverse effects are few or absent. This recommendation is also used when patient preferences vary.

Good Practice Statement

Good Practice Statements are ungraded statements that represent the GDG's view of optimal practice. Good practice statements are developed when there is high certainty that the desirable effects of an intervention clearly outweigh its undesirable effects, but the body of supportive evidence is indirect and other criteria for their development are fulfilled.

Weak recommendation

Conditional Recommendation 1

For patients receiving invasive mechanical ventilation in intensive care units, we suggest physical rehabilitation and/or mobilisation over no physical rehabilitation and/or mobilisation.

Conditional Recommendation 2

In intensive care units that routinely provide physical rehabilitation and/or mobilisation during invasive mechanical ventilation, we suggest that you continue to provide physical rehabilitation and/or mobilisation as usual care.

Conditional Recommendation 3

For every patient receiving invasive mechanical ventilation in intensive care units, review the immediate benefits and harms of physical rehabilitation and/or mobilisation on their current clinical state and premorbid level of functioning with the multidisciplinary team prior to implementation.

Good practice statement

Good Practice Statement 1

All patients admitted to the ICU should be assessed and screened daily for suitability to receive physical rehabilitation and/or mobilisation. The initial screening should occur as early as possible after admission to ICU, within 24 hours if feasible.

Good Practice Statement 2

Each hospital should have a dedicated physical rehabilitation / mobilisation program in ICU which includes clinical champions, stakeholders (e.g. management, executive), education, equipment (e.g. tilt tables) and appropriate governance arrangements. Governance arrangements should include ongoing quality evaluation, regular review, budget allocation, risk management and clear reporting frameworks including reporting to hospital executive.

Good Practice Statement 3

Strategies should be implemented to optimise the management of pain, sedation, delirium, communication and sleep, to minimise their effects as barriers to physical rehabilitation and/or mobilisation in patients receiving invasive mechanical ventilation.

Good Practice Statement 4

ICU environments should be designed to facilitate physical rehabilitation / mobilisation including adequate space to safely perform mobilisation and store rehabilitation equipment.

Good Practice Statement 5

For patients receiving invasive mechanical ventilation in the intensive care unit, goal setting for improving physical function with physical rehabilitation and/or mobilisation should be discussed with the multidisciplinary team and the patient or their family, if possible. This should include both short- and long-term goals for physical rehabilitation and/or mobilisation noting that patients report difficulty in engaging in early goal setting due to their limited understanding of the recovery process.

Good Practice Statement 6

Where possible, for patients receiving invasive mechanical ventilation in intensive care, discuss preferences for physical rehabilitation with the patient and/or surrogate decision maker including discussion about potential risks and benefits.

Good Practice Statement 7

Physical rehabilitation and/or mobilisation in patients receiving invasive mechanical ventilation should include multidisciplinary engagement including ICU physiotherapists, registered nursing and medical staff.

Good Practice Statement 8

Discuss criteria for the safe implementation of physical rehabilitation and/or mobilisation for each patient receiving invasive mechanical ventilation with the multidisciplinary team, including respiratory and haemodynamic goals of care identifying that those receiving the most intensive level of physical rehabilitation and/or mobilisation may be at increased risk of adverse events.

Good Practice Statement 9

A medical officer with advanced airway skills should be available on site when an intubated patient is being mobilised away from the bed space.

Good Practice Statement 10

Monitor for safety (adverse) events during physical rehabilitation and/or mobilisation of patients receiving invasive mechanical ventilation in the ICU. Any safety (adverse) events should be documented and the plan for future physical rehabilitation and/or mobilisation should be re-evaluated.

Good Practice Statement 11

Provide education and training to key stakeholders on physical rehabilitation and/or mobilisation of patients receiving invasive mechanical ventilation in the ICU. This includes, but is not limited to, knowledge of precautions and contraindications, safe mobilisation techniques, strength assessment, functional training, use of specific equipment to facilitate safe physical rehabilitation and/or mobilisation and simulation training.

Good Practice Statement 12

The minimum human resources for safely ambulating the patient requiring invasive ventilation away from the bed space should be three staff members, one of whom is experienced and will act as team leader. The actual number of staff will be based on an initial assessment of the patient prior to rehabilitation and/or mobilisation. Management of an artificial airway should be discussed with the medical team in advance of the intervention. The team should pre-brief to determine the intended mobility goal, general precautions & specific precautions related to the individual, and review safety plans.

Good Practice Statement 13

We recommend adherence to the Australian Commission on Safety and Quality in Health Care's standard for infection prevention while implementing physical rehabilitation and/or mobilisation.

Good Practice Statement 14

We recommend that every ICU has a documented policy, procedure or protocol for physical rehabilitation and/or mobilisation for patients receiving invasive mechanical ventilation.

Practical info

- The multidisciplinary team should assess and screen patients individually on a daily basis for physical rehabilitation and/or mobilisation. Criteria for the safe implementation of physical rehabilitation and/or mobilisation should be discussed and agreed considering the patient's goals of care.
- Goal setting for physical rehabilitation and/or mobilisation should be discussed with the patient (and their family) where feasible and the multidisciplinary team and should include short and long-term goals.
- Physical rehabilitation and/or mobilisation should occur in consultation with physiotherapy, registered nursing and medical staff at a minimum, but may also include other multidisciplinary team members (for example occupational therapist, therapy assistants and other allied health professionals)
- Safety events should be monitored and recorded for all episodes of physical rehabilitation and/or mobilisation, including prior, during or immediately post the activity. If a safety event occurs, criteria for the safe implementation of physical rehabilitation and/or mobilisation should be re-evaluated.
- Active physical rehabilitation and/or mobilisation can only occur in an awake patient, therefore strategies for the management of pain, sedation, delirium and sleep are critical for implementation.
- To assist with implementation of physical rehabilitation and/or mobilisation, several strategies should be addressed including education and training to key stakeholders, the use of champions in each ICU and a documented policy, procedure or protocol.
- The human resources required for safely ambulating an IMV patient away from the bedspace is three staff members, however, the actual number of staff will be based on an initial assessment of the patients before physical rehabilitation and/or mobilisation. Management of an artificial airway is particularly important and should be discussed with the medical team in advance.

Evidence to decision

Benefits and harms

Small net benefit, or little difference between alternatives

Compared to standard care, physical rehabilitation and/or mobilisation interventions may offer minimal benefit in terms of HRQoL for ICU patients. At hospital discharge, there is a little or no difference in HRQoL as evidenced by data from 739 participants across 7 studies (SMD 0.10 higher, CI 95% 0.07 lower - 0.27 higher)*[44]*. Similarly, rehabilitation and/or mobilisation has little or no effect on HRQoL compared to standard care at the 6-month mark, based on data from 1497 participants in 13 studies (SMD 0.10 higher, CI 95% 0.03 lower - 0.23 higher).

The effects of rehabilitation and/or mobilisation on physical function at hospital discharge and 6 months, as well as cognitive function at the closest timepoint to 6 months, remain uncertain. This is based on data from 1668 participants in 21 studies (SMD 0.43 higher, CI 95% 0.03 lower - 0.88 higher), 1261 participants in 9 studies (SMD 0.19 higher, CI 95% 0.16 lower - 0.54

higher), and 934 participants in 6 studies (SMD 1.11 higher, CI 95% 0.20 lower - 2.42 higher), respectively.

Rehabilitation and/or mobilisation probably has little or no effect on hospital mortality in ICU patients compared to standard care, with data from 3543 participants in 30 studies showing 7 more mortalities per 1000 (CI 95% 18 fewer - 34 more). Similarly, rehabilitation and/or mobilisation probably has little or no effect on 6-month mortality compared to standard care, as indicated by data from 2813 participants in 14 studies (6 more per 1000, CI 95% 17 fewer - 30 more).

The effect of rehabilitation and/or mobilisation on adverse events remains somewhat uncertain, with data from 2716 participants in 19 studies showing a difference of 5 more per 1000 (CI 95% 8 fewer - 24 more)*[44]*.

Certainty of the Evidence

Very low

The certainty of evidence for rehabilitation and/or mobilisation in intensive care was difficult to interpret due to differences between studies in the type, timing and dose of rehabilitation and/or mobilisation. For example, some studies compared rehabilitation and/or mobilisation compared to no rehabilitation and/or mobilisation. Other studies compared different doses of rehabilitation and/or mobilisation.

Pooling of data between studies for several of the outcome measures was difficult as there were several different measurement tools used (such as physical function, cognitive function and HRQoL).

Adverse events were mainly reported for each episode of rehabilitation and/or mobilisation rather than per patients in randomised clinical trials. In future, for increased transparency of reporting, we recommend that these are reported both per patient randomised and for each episode of rehabilitation and/or mobilisation.

The evidence for rehabilitation and/or mobilisation was considered and reported with all trials included. During the EtD framework, we also considered the evidence from trials with a high risk of bias removed to understand whether there were differences for outcome measures that may have been affected.

The certainty of evidence informing benefits and harms of physical rehabilitation and/or mobilisation in critically ill patients varied. Evaluating the certainty of evidence for critical outcomes posed challenges due to varying levels of certainty caused by issues such as imprecision, inconsistency, and risk of bias.

When considering harms, the certainty of evidence for mortality at hospital discharge and 6-months was rated as moderate due to serious imprecision. The certainty of evidence was rated as very low for adverse events, as it was affected by very serious inconsistency and risk of bias.

When considering benefits, the certainty of evidence for physical function at both hospital discharge and 6-months post ICU were rated as very low, primarily due to serious risk of bias, inconsistency, and imprecision. HRQoL at hospital discharge had a low certainty of evidence, due to serious risk of bias and inconsistency. Meanwhile, the certainty of evidence for HRQoL after 6-months was rated as moderate, due to risk of bias. Finally, the certainty of evidence for cognitive function at the closest time point to 6 months was rated as very low due to serious risk of bias, inconsistency, and imprecision.

Values and preferences

Substantial variability is expected or uncertain

There is limited literature on the preferences and values of people who survived critical illness on physical rehabilitation and/or mobilisation in ICU. The value that patients place on the outcomes of rehabilitation and/or mobilisation is contextual and subject to variation, with research indicating that patients value various outcomes related to their recovery, including survival, HRQoL, mental health, pain, cognition, physical function, muscle/nerve function, and pulmonary function *[8]*.

Other important outcomes relating to patient values were that participation in physical rehabilitation was viewed as providing

hope for returning to 'normal life' in contrast with other ICU treatments which were perceived to be more about survival than recovery *[9]*, and there is agreement among patients that it should begin as soon as possible as soon as possible on admission to the ICU*[9] [10]*. However, research has indicated that exhaustion is a significant challenge to patient participation *[9]*, and some patients find mobilisation overwhelming in their current situation *[11]*.

While patients generally value the outcomes of rehabilitation and/or mobilisation, the inherent variability in patient preferences and values may also be influenced by individual factors such as personal goals or family situations. A consumer representative highlighted that variability might exist due to differences in whether patients perceive a larger purpose for mobilising, such as having children at home to return to.

Resources

Important issues, or potential issues not investigated

The GDG discussed the resource requirements and costs associated with implementing rehabilitation and/or mobilisation interventions. Data from the unpublished TEAM study's economic analysis was presented to the GDG, which showed no significant differences in costs, with significant variability around the costs *[12]*. It is worth noting that the TEAM study's economic results are not yet finalised, and the standard care group received a significant level of standard care mobilisation. Moreover, the ICU patient population is heterogeneous, and the point estimate of cost is higher in the intervention group, both globally and in Australia. In the TEAM trial the incremental cost-effectiveness ratio is negative, suggesting that usual care mobilisation would be better than the intervention. However, there is significant variability in that estimate, making it difficult to draw definitive conclusions about cost-effectiveness.

A GDG member raised the question of whether the intensive, high level of mobilisation in the standard care group in the TEAM study is representative of usual care in Australia, or if a slightly lower level of mobilisation should be considered in the absence of any resource-related data. This was noted as an important consideration to understand the control group in a trial relative to usual practice in the Australian ICU population.

Equity

Important issues, or potential issues not investigated

The GDG discussed the potential impact of recommending rehabilitation and/or mobilisation in the ICU on health equity in Australia. In the absence of data, the GDG considered numerous factors, such as the availability of resources, staffing levels, and socioeconomic factors. Patients in higher socioeconomic areas and major cities were noted to be more likely to receive rehabilitation and have access to senior physiotherapists. Similarly, larger centres with more resources might be more capable of providing rehabilitation and/or mobilisation, while smaller, rural centres may face challenges due to limited staffing and equipment availability. However, recent workforce survey data *[13]* suggested that staffing levels, in terms of physiotherapists per bed, were similar across regional and metropolitan centres.

The GDG noted that widespread implementation of rehabilitation and/or mobilisation in ICU could potentially reduce health inequity for patients who cannot access rehabilitation outside the hospital. On the other hand, it could also introduce inequity if there was no increase in funding by reallocating physiotherapy resources into ICU and away from other patients in the hospital. It was also highlighted that a guideline recommending rehabilitation and/or mobilisation could be used to advocate for increased staffing and resources, potentially improving equity by ensuring all patients can access to rehabilitation and/or mobilisation. Additionally, a guideline might encourage more consistent decision-making across centres, reducing inequity.

Acceptability

Important issues, or potential issues not investigated

The GDG discussed the acceptability of rehabilitation and/or mobilisation intervention recommendations among various stakeholders, including patients, families of patients, clinicians, and policymakers. Research presented to the group indicated

that patients generally agree that physical rehabilitation should begin as soon as possible on admission to the ICU, despite exhaustion being a significant challenge *[9][14]*. Family members of patients found that physical rehabilitation can provide a sense of hope during a distressing time *[9]*. Furthermore, clinicians across disciplines showed near-universal agreement regarding the use of rehabilitation and/or mobilisation for patients receiving mechanical ventilation *[15]*.

The GDG also discussed studies conducted in Australian hospitals (The Alfred and Western Health) in addition to the TEAM study, to highlight the variability in stakeholder acceptability of rehabilitation and/or mobilisation implementation across different centres *[16][17]*. While most units have or are willing to adopt rehabilitation and/or mobilisation, some clinicians and hospitals still face barriers in implementing rehabilitation and/or mobilisation due to concerns about safety, time constraints, or prioritisation. However, the majority of interviewed stakeholders found rehabilitation and/or mobilisation to be acceptable and important.

Feasibility

No important issues with the recommended alternative

The GDG assessed the feasibility of implementing rehabilitation and/or mobilisation interventions, acknowledging that there is currently widespread acceptance of the feasibility of implementing rehabilitation and/or mobilisation by clinicians and researchers. The GDG also recognised that feasibility is influenced by many factors, including hospital policy, multidisciplinary treatment preferences, and patient ability. Research presented to the group identified that barriers to implementation still exist, such as patient factors, clinicians' expectations and knowledge, evidence, safety, environmental influences, culture, and teamwork *[18]*. Staffing and clinician time were frequently identified as cross-disciplinary barriers, with risk of self-injury and excess work stress being common nurse and physiotherapy related barriers *[15]*.

During the discussion, GDG members acknowledged that feasibility studies may not have covered all domains but suggested that the feasibility of rehabilitation and/or mobilisation has likely improved over time as barriers have been addressed. Despite the concerns raised, studies of rehabilitation and/or mobilisation have consistently reported that it is safe and feasible.

Rationale

Physical rehabilitation and/or mobilisation is a complex intervention and its application may be affected by its type, timing or the dose. The panel noted the lack of high quality of evidence for physical rehabilitation and/or mobilisation in patients receiving IMV in ICU, however, several high-quality guidelines have previously recommended physical rehabilitation and/or mobilisation over none *[19][20][21][22][23][24][25][26]*. There is a lack of evidence for a higher dose of physical rehabilitation and/or mobilisation over usual care with one large trial demonstrating increased adverse events. Usual care varies between centres and regions and is often poorly described in clinical trials. Therefore, any decision to use physical rehabilitation and/or mobilisation in patients receiving IMV should take place with a clear shared decision-making framework that acknowledges the relative lack of specific data on risks and benefits, and with a clear understanding of usual care practices to inform the dose of physical rehabilitation and/or mobilisation. The panel acknowledged that there may be heterogeneity of treatment effect that may emerge with further research.

To acknowledge the differences in usual care arms and the type, timing and dose of physical rehabilitation and/or mobilisation in patients receiving IMV, the panel agreed to split the recommendations into three parts. The first recommendation acknowledges the evidence from previous international guidelines. The second recommendation acknowledges and reinforces the need for more research to understand the effect of the timing and dose of physical rehabilitation and/or mobilisation. The third recommendation acknowledges the lack of high-quality evidence for benefits and harms overall, and the potential for individual differences in outcomes.

It is also important to note that previous high-quality research of rehabilitation strategies provided to adults after discharge from intensive care have failed to show a benefit *[27]*.

In Australia, critically ill patients receiving mechanical ventilation are treated on a one to one ratio of patients to registered nursing

staff and physiotherapists are available in most intensive care units. Therefore, physical rehabilitation is usually feasible with adequate staffing. The usual care arm of a recent Randomised Controlled Trial in Australia show a high level of mobilisation. There were 89% of patients in the usual care arm who achieved sitting over the edge of the bed and, 77% of patients able to stand prior to ICU discharge*[12]*.

Implementation

Safety criteria check list *[28]*

Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults

A "PLAN B" *[29]*

Mobilization of intensive care patients: a multidisciplinary practical guide for clinicians

Approach to implementing physical rehabilitation and mobilisation in the ICU *[30]*

Implementing early physical rehabilitation and mobilisation in the ICU: institutional, clinician, and patient considerations

PADIS recommendations for pain, sedation delirium and sleep *[18]*
Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU

Evaluation

Evaluation of physical function in the ICU *[31]*

Evaluating physical functioning in critical care: considerations for clinical practice and research

ICU mobility scale *[32]*

Feasibility and inter-rater reliability of the ICU Mobility Scale

Surgical ICU Optimal Mobilisation Score early *[33]*
Early, goal-directed mobilisation in the surgical intensive care unit: a randomised controlled trial

Physical Function ICU Test *[34]*
A Physical Function Test for Use in the Intensive Care Unit: Validity, Responsiveness, and Predictive Utility of the Physical Function ICU Test (Scored)

Chelsea critical care physical assessment tool *[35]*
The Chelsea critical care physical assessment tool (CPAx): validation of an innovative new tool to measure physical morbidity in the general adult critical care population; an observational proof-of-concept pilot study

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Clinical question/ PICO

Population: Adult intensive care unit patients
Intervention: Physical rehabilitation and/or mobilisation commenced in an ICU where the intervention includes an active component targeting whole body rehabilitation
Comparator: Standard care or no active physical rehabilitation and/or mobilisation

Outcome Timeframe	**Study results and measurements**	**Comparator** Usual care	**Intervention** Rehabilitation and mobilisation	**Certainty of the Evidence** (Quality of evidence)	**Summary**
Mortality Hospital discharge 9 Critical	Relative risk 1.04 (CI 95% 0.89 — 1.21) Based on data from 3,543 participants in 30 studies. (Randomized controlled)	163 per 1000 Difference:	170 per 1000 **7 more per 1000** (CI 95% 18 fewer — 34 more)	Moderate Due to serious imprecision [1]	Physical rehabilitation and/or mobilisation probably has little or no effect on hospital mortality in critically ill patients compared to standard care.
Mortality 6 month 9 Critical	Relative risk 1.03 (CI 95% 0.91 — 1.16) Based on data from 2,813 participants in 14 studies. (Randomized controlled)	187 per 1000 Difference:	193 per 1000 **6 more per 1000** (CI 95% 17 fewer — 30 more)	Moderate Due to serious imprecision [2]	Physical rehabilitation and/or mobilisation probably has little or no effect on 6 month mortality in critically ill patients compared to standard care
Adverse events 9 Critical	Relative risk 1.16 (CI 95% 0.73 — 1.84) Based on data from 2,716 participants in 19 studies. (Randomized controlled)	29 per 1000 Difference:	34 per 1000 **5 more per 1000** (CI 95% 8 fewer — 24 more)	Very low Due to very serious inconsistency, Due to very serious risk of bias. [3]	We are uncertain whether physical rehabilitation and/or mobilisation increases or reduces the number of adverse events in critically ill patients compared to standard care.
Physical function Hospital Discharge 9 Critical	High better Based on data from 1,668 participants in 21 studies. (Randomized controlled)	Difference:	**SMD 0.43 higher** (CI 95% 0.03 lower — 0.88 higher)	Very low Due to serious risk of bias, Due to serious inconsistency. Due to serious imprecision [4]	We are uncertain whether physical rehabilitation and/or mobilisation improves or worsens physical function at hospital discharge compared to standard care.
Physical Function 6 months 9 Critical	High better Based on data from 1,261 participants in 9 studies. (Randomized controlled)	Difference:	**SMD 0.19 higher** (CI 95% 0.16 lower — 0.54 higher)	Very low Due to serious risk of bias, due to very serious inconsistency, due to serious imprecision. [5]	We are uncertain whether physical rehabilitation and/or mobilisation improves or reduces physical function at 6 months compared to standard care.
Health Related Quality of Life Hospital Discharge 9 Critical	High better Based on data from 739 participants in 7 studies. (Randomized controlled)	Difference:	**SMD 0.1 higher** (CI 95% 0.07 lower — 0.27 higher)	Low Due to serious risk of bias, Due to serious inconsistency [6]	Physical rehabilitation and/or mobilisation may have little or no difference on health related quality of life at hospital discharge, compared to standard care.

Outcome Timeframe	**Study results and measurements**	**Comparator** Usual care	**Intervention** Rehabilitation and mobilisation	**Certainty of the Evidence** (Quality of evidence)	**Summary**
Health Related Quality of Life 6 months 9 Critical	High better Based on data from 1,497 participants in 13 studies. (Randomized controlled)	Difference:	**SMD 0.1 higher** (CI 95% 0.03 lower — 0.23 higher)	Moderate Due to serious risk of bias [7]	Physical rehabilitation and/or mobilisation probably has little or no effect on health related quality of life at 6 months compared to standard care.
Cognitive function closest timepoint to 6 months 8 Critical	High better Based on data from 934 participants in 6 studies. (Randomized controlled)	Difference:	**SMD 1.11 higher** (CI 95% 0.2 lower — 2.42 higher)	Very low Due to serious risk of bias, Due to serious inconsistency, Due to serious imprecision [8]	We are uncertain whether physical rehabilitation and/or mobilisation improves or worsens cognitive function compared to standard care.
Economic Outcome					

1. **Inconsistency: no serious. Indirectness: no serious. Imprecision: serious.** 95% confidence interval crosses the threshold for an important difference (2 deaths per 100). **Publication bias: no serious.**
2. **Inconsistency: no serious. Indirectness: no serious. Imprecision: serious.** 95% confidence interval crosses the threshold for an important difference (2 deaths per 100). **Publication bias: no serious.**
3. **Risk of Bias: very serious.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias. **Inconsistency: very serious.** Point estimates vary widely, The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I2 = 91%., The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies.. **Indirectness: no serious. Imprecision: no serious. Publication bias: no serious.**
4. **Risk of Bias: serious.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias. **Inconsistency: serious.** The magnitude of statistical heterogeneity was high, with I2 = 89%.. **Indirectness: no serious. Imprecision: serious.** Confidence intervals cross the threshold for an important difference (SMD 0.4). . **Publication bias: no serious.**
5. **Risk of Bias: serious.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias. **Inconsistency: very serious.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I2 = 86 %.. **Indirectness: no serious. Imprecision: serious.** Confidence intervals cross the threshold for an important difference (SMD 0.4). **Publication bias: no serious.**
6. **Risk of Bias: serious.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias. **Inconsistency: serious.** The direction of the effect is not consistent between the included studies. **Indirectness: no serious. Imprecision: no serious. Publication bias: no serious.**
7. **Risk of Bias: serious.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias. **Inconsistency: no serious. Indirectness: no serious. Imprecision: no serious. Publication bias: no serious.**

8. **Risk of Bias: serious.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias. **Inconsistency: serious.** The magnitude of statistical heterogeneity was high, with I2 = 98 %.. **Indirectness: no serious. Imprecision: serious.** Confidence intervals cross the threshold for an important difference (SMD 0.4). **Publication bias: no serious.**

Evidence Review

How the guidelines were developed

The guideline development process was based on previous similar work and revised to incorporate updates from the NHMRC and the AGREE tool. To facilitate the development of the guideline, a GDG was established, consisting of physiotherapists, medical and nursing experts, clinical researchers, early career researchers, experts in knowledge translation, and consumers with lived experience of ICU admissions. This group undertook the majority of development work for the guideline and collaborated to create a guideline template that outlined the clinical question and specific areas to be addressed within the guideline. To assist in advising the group, two systematic reviews examining existing relevant guidelines *[36]* and randomised controlled trials (RCTs) were undertaken (for more details see below).

The guideline for physical rehabilitation and/or mobilisation of ICU patients were primarily developed through a series of GDG meetings spanning from June 2021 to May 2023. Initial discussions refined the scope, questions, and outcomes of the guideline. As the meetings progressed, the GDG defined the intervention as active physical rehabilitation and/or mobilisation within an ICU context and elected to include a hierarchy of outcomes such as mortality and HRQoL. The group set thresholds for important differences, examined outcome measures, and opted for conditional recommendations. An evidence-to-decision model was deliberated upon and voted for, considering factors like patient values, resources, equity, stakeholder acceptability, and feasibility. Following the meetings, the guideline document was written and circulated among group members. The development of the guideline adhered to NHMRC procedures *[37]*. In instances where research evidence was insufficient, expert opinions from participants were incorporated, and consensus methods were applied.

Selecting the Health question

The GDG engaged in a comprehensive discussion to identify and prioritise critical topics, leading to the formation of the central clinical question and associated outcomes. Subsequent discussions and feedback from the GDG refined the clinical question to align with the guideline's scope. The key clinical question from the guideline - ***should physical rehabilitation and/or mobilisation be used as a therapy in adult critically ill patients in ICU?*** - was integrated with the key outcomes of interest.

Selecting the population

The defined population for the current guideline includes adult patients admitted to an ICU. The intervention of interest is the initiation of mobilisation and/or active physical rehabilitation in the ICU, with the inclusion of an active component targeting comprehensive body rehabilitation. This is compared against the standard care or absence of active mobilisation and physical rehabilitation. A range of outcomes have been considered, including mortality, HRQoL, physical function, cognitive function, complications from physical rehabilitation and/or mobilisation, and economic outcomes.

Selecting the evidence

A systematic review and meta-analysis of RCTs comparing physical rehabilitation and/or mobilisation versus usual care in critically ill adults was conducted. 78 trials indexed in the databases: Medline, Embase, Cochrane Central Register of Controlled Trials, CINAHL Plus, SPORTDiscus, SCOPUS, Web of Science, PEDro were included for review. The reference lists of relevant primary research and review articles, trial registries for unpublished data (World Health Organization International Clinical Trials Registry Platform *[38]* and ClinicalTrials.gov), and published abstracts were also searched. Two reviewers screened all titles and abstracts independently. The Covidence systematic review software facilitated the independent screening by two reviewers of all articles identified during searches. Full copies of articles deemed to meet the inclusion criteria based on their title, abstract, and subject descriptors were obtained for data synthesis. Additional sources, such as articles identified via reference lists and bibliographic searches, were also considered.

Refer to **Technical Report** for further details of the methods used to develop these clinical guidelines.

Formulating recommendations

Guideline development meetings took place from June 2021 to May 2023. During each meeting, the GDG reviewed and discussed the

evidence related to the clinical question and outcomes. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) EtD Framework guided the transparent decision-making process and recommendation formulation, with leadership from experienced methodologist Sue Brennan (Cochrane Australia) and contributions from all GDG members, including consumers. All evidence was digitally presented on the MAGICapp platform. Following review and discussion of the EtD framework, GDG were requested to vote on the direction of the recommendation (i.e., a recommendation for or against the intervention).

In formulating recommendations, the following factors were considered for each clinical outcome:

- Benefits and Harms – evaluating and balancing the desirable and undesirable effects.
- Certainty of evidence – a comprehensive assessment of quality of the evidence contributing to the evidence profile.
- Values – accounting for the priorities of critically ill people receiving mobilisation treatment in ICU (or others affected) concerning the primary outcomes based on a systematic review of qualitative studies.
- Resources – considerations of the direct costs associated with the intervention.
- Acceptability – considering the acceptability for consumers, healthcare professionals and other stakeholders.
- Feasibility – determining the practicality of implementing the recommendation in clinical practice based on a systematic review of qualitative studies.
- Equity – evaluating potential inequities arising from the intervention

Summary of consumer involvement

Three consumers with personal experience of ICU admission, each having undergone rehabilitation and/or mobilisation during their critical illness, actively participated in all stages of guideline development; in particular, decisions regarding the hierarchy of outcomes and EtD process. Shannah Anderson and Pam Taylor were engaged from the inception of the project and are both members of the GDG. After the first GDG meeting, Sherene Magana Cruz was invited to become a member of the GDG and contribute her lived experience and expertise. At each GDG meeting, as least one attendee with lived experience was present. The consumer preferences and values within the EtD framework played a crucial role in incorporating the perspectives of those with lived experience.

Supporting consumers

People with lived experience were consulted and engaged early and consistently throughout the project. Including consumers in the development of the guideline was deemed crucial to foster patient-centred care, enhance guideline relevance and contribute to improved health outcomes and guideline quality. Moreover, supporting consumers in the guideline development process was important to strengthen transparency, accountability, and trust in the guideline, while facilitating effective communication and shared decision-making.

Strengths and limitations of the body of evidence

We addressed a clearly focussed question and the authors searched for the most appropriately designed studies to answer this question. A comprehensive search for all relevant studies was conducted with a rigorous assessment of the quality of the included studies.

The collated data was analysed with methodological and statistical expertise and the precision of the results have been incorporated using GRADE. The results are applicable to the Australian population as most of the studies were conducted in similar settings i.e., high-income countries. It is highly likely that all important, relevant studies were included as a comprehensive search of a number of electronic databases, reference lists and conference abstracts was conducted. The GDG had membership spanning various clinical expertise and geographical location in Australia. This guideline was also externally reviewed and has a procedure in place to update the guideline.

Limitations in the applicability of the findings:

- Large variability in admission diagnoses, usual care rehabilitation and/or mobilisation, intervention (type, timing and dose of

rehabilitation and/or mobilisation)
- Large variability in staff involved in the intervention
- Large variability in outcome measures to assess effectiveness and safety
- Did not include passive exercises

Future Research

There were several important areas of future research that were identified. Future trials need to clearly define the control or comparator group, as it is unclear if differences in the results of trials of physical rehabilitation and/or mobilisation are due to the intervention or because the amount of rehabilitation and/or mobilisation in the comparator groups differ *[39]*.

The timing of the intervention is considered important, where some small trials that have commenced very early report benefit *[40]* compared to other trials where the intervention started later that did not show benefit *[12]*.

The dose of the intervention may have an important effect on outcomes, particularly adverse events, as reported in one large trial that delivered a higher dose of physical rehabilitation and/or mobilisation *[12]*.

The ICU population is heterogenous, and there may be important heterogeneity of treatment effect that has not yet been identified from previous studies.

The duration of the intervention may be important. Most trials have delivered physical rehabilitation and/or mobilisation in the ICU only. One small trial extended the intervention beyond hospitalisation and reported no difference between groups *[41]*, however this needs to be confirmed in larger trials.

Procedure for future update

The guideline will be updated in 5 years (or once every 2 years when new evidence becomes available). Future updates will be managed by the ANZIC-RC. The guidelines have been developed on the MAGICApp which facilitates more updates if required.

Review of current guidelines

The comprehensive systematic review conducted by Lang et al. (2020)*[36]* was undertaken to critically evaluate the methodological quality and thematic completeness of existing clinical practice guidelines concerning physical rehabilitation and/or mobilisation interventions for adults in the ICU. The review provided significant insights into the current state of guidelines and highlighted the strengths and weaknesses. As per the findings, the guidelines varied significantly in terms of quality and thematic inclusivity. The review underscored the need for more comprehensive, evidence-based guidelines on physical rehabilitation and/or mobilisation in ICU settings and highlighted the need for further development in this field to ensure patient-centred, effective mobilisation practices. The review concluded that the current endeavour to update and refine physical rehabilitation and/or mobilisation guidelines is not only warranted but critical to enhance patient care in ICUs (see technical report for more details).

Guideline Development Group

Organisations responsible for publication of this guideline

- Monash University
- ANZIC-RC

Sources of funding

The guideline development was funded by the Australian Government NHMRC Centres of Research Excellence (CRE), a centre for research excellence, whose goal is to transform outcomes of critically ill patients in ICU (CRE-ICU, GNT2006514). All GDG members are independent from funders.

Guideline Development Group members

Selecting members for the GDG entailed a rigorous process, prioritising a multidisciplinary and diverse group of clinical and research professionals. To ensure a balanced mix of expertise and perspective, a targeted approach was employed for the selection of GDG members. Individuals with expertise in specific methods (e.g. GRADE), physiotherapy, ICU, medicine, nursing and knowledge translation were invited to the GDG. The resulting GDG comprised of physiotherapists, medical and nursing experts, clinical researchers, early career researchers, experts in knowledge translation, and consumers with lived experience of ICU admissions. This selection process ensured that the GDG was able to address the broad range of concerns related to physical rehabilitation and/or mobilisation patients with critical illness, and provide robust, evidence-based, and comprehensive guidance to support decision-making processes in patient care.

Please refer to the Administrative Report for more information.

Table 2. GDG Members

Name	Discipline/Expertise	Organisational affiliation	Role
Sally Green	Co-Director Cochrane Australia	Cochrane Australia, Monash University	Independent Chair
Carol Hodgson	Clinician Researcher (Physiotherapy) Head of the Division of Clinical Trials,	The Alfred Hospital, School of Public Health, Monash University	Clinical Chair
Shannah Anderson	Consumer		GDG Member
Sue Brennan	Melbourne GRADE Centre Director	Melbourne GRADE Centre	Methodologist and GDG Member
Tessa Broadley	Early Career Researcher/ Project Manager	Monash University	Evidence Reviewer and GDG Member
Catherine Granger	Clinician Researcher (Fellow of the Australian College of Physiotherapists)	The University of Melbourne, The Royal Melbourne Hospital	GDG Member
Naomi Hammond	Clinician Researcher (Nursing)	The George Institute for Global Health	GDG Member
Lisa Higgins	Health Economist /Researcher	Monash University	GDG Member
Sherene Magana Cruz	Consumer		GDG Member

Jenna Lang	Clinician Researcher (Physiotherapy)	Western Health	GDG Member
Isabel Anne Leditschke	Clinician Researcher (Medical)	Mater Health	GDG Member
Neil Orford	Clinician Researcher (Medical)	Barwon Health	GDG Member
Selina Parry	Clinician Researcher (Physiotherapy)	The University of Melbourne	GDG Member
Michelle Paton	Clinician Researcher (Physiotherapy)	Monash Health	Evidence Reviewer and GDG Member
Bronwyn Price	Physiotherapist/Early Career Researcher	Monash Health	GDG Member
Pam Taylor	Consumer		GDG Member
Andrew Udy	Clinician Researcher (Medical)	The Alfred Hospital	GDG Member

Table 3. Expert Review Panel

Name	**Expertise**	**Organisational affiliation**
Ianthe Boden	Physiotherapist researcher	Launceston Hospital
Wendy Chaseling	Physiotherapist researcher	St George Hospital
Meg Harrold	Senior lecturer, School of Allied Health	Curtin University
Alex Poole	Nurse researcher, guideline methods chair	Royal Adelaide Hospital, University of Adelaide
Shane Patman	Physiotherapist researcher	University of Notre Dame
Benjamin Reddi	Intensivist researcher	Royal Adelaide Hospital
Peter Thomas	Physiotherapist researcher	Queensland Health

Organisations who endorse the guideline

- Australian Physiotherapy Association
- Australian College of Critical Care Nurses
- College of Intensive Care Medicine

Technical Report

A record of the evidence review process can be found in the Technical Report.

To view click HERE

Administrative Report

Non-technical information relating to the guideline development can be found in the Administrative Report.

To view click HERE

Dissemination and Implementation Plan

Background

Development of the guideline has been informed by an integrated knowledge translation approach, incorporating a series of meetings with the GDG, which includes various stakeholders, including patients, clinicians, healthcare professionals and policymakers. The dissemination and implementation plan is informed by the NHMRC recommended approach and our ongoing knowledge translation activities, which involves close consultation with consumers, healthcare professionals and other stakeholders. The objective of the dissemination and implementation plan is to generate broad awareness in key target groups and ensure the successful implementation of the recommendations.

Target Audience

The target audience of the dissemination and implementation plan are clinicians, healthcare professionals, policymakers, adult patients admitted to an ICU and any other individuals involved with their care.

Dissemination

We will disseminate the guideline and supporting resources to create awareness, educate target audiences about best practice, and empower adult ICU patients and those involved with their care. To effectively communicate the recommendations and good practice statements, we will develop key messages that are simple, direct, clear and action-oriented. These key messages will be tailored to meet the specific needs, interests, and abilities of the target audience.

Given the potential for certain recommendations and good practice statements to elicit sensitivities among different stakeholders, we have taken measures to mitigate unforeseen or potential sensitivities. The guideline was developed using a fully integrated knowledge translation approach, incorporating ongoing consultation with stakeholders. In addition, we conducted a systematic review to identify potential barriers and facilitators related to the implementation of physical rehabilitation and mobilisation in the ICU, in order to assess the practicality of this intervention. Furthermore, we sought input through a public consultation process, inviting comments and feedback from relevant government departments, advocacy groups, and relevant professional organisations.

The GDG consisted of a multidisciplinary team, including physiotherapists, clinical researchers, experts in knowledge translation, and individuals with lived experience of ICU admissions.

Key recommendations that are most likely to lead to improvements in health outcomes

The GDG thoroughly assessed barriers and facilitators, including benefits and harms, certainty of evidence, values, resources, acceptability, feasibility, and equity, in relation to the clinical question.

We believe that the conditional recommendations and good practice statements will have important public health benefits and will aid in the integration of evidence-based physical rehabilitation and/or mobilisation in intensive care into Australian clinical practice. This integration will enhance the quality of care provided to patients. By implementing these recommendations and good practice statements, intensive care clinicians will be guided by clear, evidence-based advice on the safe and appropriate use of physical rehabilitation and/or mobilisation as a treatment for aiding patient recovery from critical illness.

Furthermore, we believe that these recommendations and good practice statements will contribute to clinical decision-making processes concerning the management of adults with critical illness and serve as valuable evidence to educate and inform healthcare professionals.

Dissemination to target audiences

To ensure effective dissemination of the guidelines to diverse target audiences, we will develop supplementary resources to support their implementation.

Resources prioritised through integrated knowledge translation activities	
Resources	**Target Audience**
1. **Clinical practice guideline disseminated by MAGICapp**	Clinicians, healthcare professionals, policymakers and other stakeholders.
1. **PDF guideline available for download**	Clinicians, healthcare professionals, policymakers and other stakeholders.
1. **Journal article publication**	Clinicians, healthcare professionals and policymakers.
1. **One-page quick guide summary sheet (with QR code to access full guideline)**	Clinicians, healthcare professionals, policymakers, patients and other stakeholders.

Dissemination activities	
Aim - Create broad awareness of the guideline and educate key target groups **Audience –** Clinicians, healthcare professionals, policymakers, patients and other stakeholders **Outcome -** Improve knowledge and awareness about the new guideline	
Activities	We will use the following channels to disseminate the guideline and supporting resources to a range of target audiences. • Digital dissemination - the guideline will be presented on a digital platform, MAGICapp, which is optimised to maximise guideline useability by clinicians. The guideline will be immediately accessible digitally, nationwide. The final version of the guideline will also be readily available for download from the Monash CRE-ICU website. • Publications – the guideline will be submitted to peer-reviewed national and international scientific and professional journals. • Events - we will disseminate key messages at selected professional conferences throughout 2024-2025 (in-person or remotely). • Professional Networks - our GDG will be invited to share the final guideline with their networks. • E-mailing/mailing list - The guideline and corresponding resources will be distributed via the mailing lists of endorsing institutions.
Timeframe	2024-2025
Who	We will draw on the expertise of the national multidisciplinary GDG to facilitate the interactive workshops in their home city where possible. The GDG members are well qualified to undertake this role. This will serve to minimise the travel and accommodation expenses.
Risks	Key members of the GDG will meet regularly to identify and mitigate against emerging risks, and ensure good stakeholder relations are maintained. The GDG are experienced at producing at scientific and professional publications and have good relationships with journal editors.
Success and measurement indicators	• Number of downloads from MAGICapp • Number of downloads from CRE-ICU website • Number of requests for electronic and hardcopy materials • Number of downloads and citations of journal publications

Implementation

Resources

One crucial element in ensuring the successful implementation of the guideline recommendations is that it is tailored to the availability of local resources, encompassing both human expertise and equipment, in alignment with the specific needs of the patient group and associated medical devices. To facilitate safe physical activity and movement, both human and mechanical resources play a pivotal role. This includes a well-trained multidisciplinary team, which, depending on the patient's condition and activity level, may include various healthcare professionals such as registered nurses, physiotherapists, and other medical personnel.

Education and training

Establishing an ICU culture that wholeheartedly embraces the guideline recommendations is dependent on the implementation of a comprehensive educational program for all healthcare staff involved in patient care. Like any new care model, success is more likely and sustainable when a dedicated staff member, backed by an enthusiastic team, takes the lead in driving the necessary changes.

Local adoption

- Safety checklist
- Mobility champions
- Investment in equipment
- Clear plan staff training
- Investment from leadership team (top down approach)
- Multidisciplinary discussion
- Education and training
- Auditing

To successfully implement the guideline recommendations at a local level, a comprehensive approach is essential. Firstly, the safety checklist provides a framework for safe patient mobilisation, minimising risks. Appointing mobility champions within the staff ensures dedicated leadership and advocacy for these initiatives. Investment in appropriate equipment, coupled with a clear plan for ongoing staff education and training, guarantees that the necessary resources and knowledge are available for effective implementation. Moreover, securing commitment from the leadership team, following a top-down approach, instils a culture of prioritising physical rehabilitation and mobilisation. Furthermore, fostering multidisciplinary discussions, and implementing regular audits allows for ongoing improvements, ensuring consistent adherence to the recommendations. These measures will collectively assist local sites to integrate the guidelines' mobilisation strategies into their ICU protocols.

Barriers and Facilitators to guideline application

A 2016 literature review found that ICUs face many challenges in implementing physical rehabilitation and/or mobilisation, including: patient-related barriers, structural barriers, cultural barriers, and process-related barriers *[42]*. Similarly, a 2017 systematic review identified barriers and enablers of physical activity in the ICU relating to: patient physical and psychological capability; safety concerns for patients, staff and caregivers; cultural barriers; inadequate expertise and training; motivations and beliefs regarding the benefits and risks of mobilisation; and lack of adequate staff, equipment and funding *[43]*. A detailed understanding of these factors that influence physical rehabilitation and/or mobilisation is important for clinicians who desire to incorporate physical rehabilitation and/or mobilisation their clinical practice.

Evaluation strategy

To evaluate the extent to which the guideline is adopted into practice, it is strongly recommended that a comprehensive evaluation strategy be developed and implemented at the hospital level. This strategy should encompass various components aimed at gathering feedback and evaluating the guideline's usability, practicality, and overall success in enhancing patient care. Among these components, sites should document and review data such as the number of patients undergoing mobilisation, the level of mobilisation achieved, the

staff resources allocated per patient, any safety events that occur as a result of mobilisation and the successful delivery of guideline-recommended interventions. Employing this approach will enable a thorough assessment of the guideline's adoption while pinpointing specific areas for improvement, ultimately ensuring its effective implementation within clinical settings.

Glossary of Technical Terms and Abbreviations

AGREE II	The Appraisal of Guidelines for Research & Evaluation Instrument
ANZIC-RC	Australian and New Zealand Intensive Care Research Centre
CALD	Culturally and linguistically diverse
CI	Confidence interval
COI	Conflict of interest
CRE	Centre of Research Excellence
DOI	Declaration of interest
EMS	Electrical muscle stimulation
EtD	Evidence to Decision
GDG	Guideline Development Group
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HDU	High dependency unit
HRQoL	Health-related quality of life
ICU	Intensive care unit
IMT	Inspiratory muscle training
IMV	Invasive mechanical ventilation
IQR	Interquartile range
ITU	Intensive therapy unit
LTAC	Long-term acute care facility
NHMRC	National Health and Medical Research Council
NICE	National Institute for Health and Care Excellence
PICO	Population, intervention, comparison, and outcomes
RCT	Randomised controlled trial
SCCM	Society of Critical Care Medicine
SD	Standard deviation
SMD	Standard mean difference
TEAM	Treatment of invasively ventilated adults with early activity and mobilisation

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