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Feasibility and inter-rater reliability of the ICU Mobility Scale

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ABSTRACT

Objectives: The objectives of this study were to develop a scale for measuring the highest level of mobility in adult ICU patients and to assess its feasibility and inter-rater reliability.

Background: Growing evidence supports the feasibility, safety and efficacy of early mobilization in the intensive care unit (ICU). However, there are no adequately validated tools to quickly, easily, and reliably describe the mobility milestones of adult patients in ICU. Identifying or developing such a tool is a priority for evaluating mobility and rehabilitation activities for research and clinical care purposes.

Methods: This study was performed at two ICUs in Australia. Thirty ICU nursing, and physiotherapy staff assessed the feasibility of the 'ICU Mobility Scale' (IMS) using a 10-item questionnaire. The inter-rater reliability of the IMS was assessed by 2 junior physical therapists, 2 senior physical therapists, and 16 nursing staff in 100 consecutive medical, surgical or trauma ICU patients.

Results: An 11 point IMS scale was developed based on multidisciplinary input. Participating clinicians reported that the scale was clear, with 95% of respondents reporting that it took <1 min to complete. The junior and senior physical therapists showed the highest inter-rater reliability with a weighted Kappa (95% confidence interval) of 0.83 (0.76–0.90), while the senior physical therapists and nurses and the junior physical therapists and nurses had a weighted Kappa of 0.72 (0.61–0.83) and 0.69 (0.56–0.81) respectively.

Conclusion: The IMS is a feasible tool with strong inter-rater reliability for measuring the maximum level of mobility of adult patients in the ICU.

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Introduction

Early mobilization is a part of the rehabilitation process of patients in the intensive care unit (ICU) and is increasingly advocated for the prevention and management of ICU-acquired weakness (ICUAW) and related impairment of physical function.^{1–4} Early

mobilization is the process of improving a patient's functional mobility, such as rolling, sitting, standing and walking, and has been used to reduce duration of mechanical ventilation, ICU and hospital length of stay and to improve functional recovery in ICU survivors.^{5,6} This emphasis has required a cultural shift from providing deep sedation and bed rest in the ICU, to having a more awake and active patient.^{7–9} However, there is no gold standard in the ICU describing intensive care patients' level of mobility that can be used at the bedside by any member of the ICU multidisciplinary team in a quick, easy and reliable manner.^{10,11}

Early mobilization in the ICU can be provided by nursing staff or physical therapists; however physical therapists are not always employed in intensive care units internationally. Any measure of mobility milestones in the ICU must be feasible, valid and reliable across both nursing and physical therapy disciplines. A previous survey suggested that few physical therapists use any specific instrument to evaluate mobility in ICU.¹² These findings may be because many other existing measures, such as the six minute walk test, were developed and validated outside of the ICU setting and are difficult to perform in the ICU.¹¹ No previous data report the reliability and feasibility of nursing and physical therapy staff to report activities of mobilization in ICU.

Several studies have reported mobility milestones, such as sitting, standing or walking, as an important indication of patient physical function in ICU.^{7,8,13} They have not reported the level of assistance required to achieve the mobility milestone and they have not reported the same milestones. A recent systematic review described measures of physical function used in studies investigating early mobilization in the ICU.¹¹ The ability to perform activities of mobility, or mobility milestones, was the most common end-point reported in these studies. However, there was no consensus on the activities that should be included in measures of mobility in the ICU, or reports of the feasibility or inter-rater reliability of such measures.¹¹ No reliable scale or measure was found in the published or unpublished literature that could assess early mobilization in the ICU. One unpublished scale was identified that was used as part of the Critical Care Physical Medicine and Rehabilitation Program at Johns Hopkins Hospital (Baltimore, USA) but it included other criteria that were not mobility items, such as respiratory care, and it had not been tested for reliability.

The ability to quickly, easily and reliably report the highest level of mobilization in the ICU may be important for both research purposes and safe clinical practice. It is plausible that patients who have a higher level of physical function at ICU discharge may have reduced hospital length of stay and improved functional recovery after critical illness.⁶ The objectives of this study was to develop an ICU Mobility Scale (IMS), using commonly reported mobility milestones from published and unpublished literature, to report the highest level of patient mobility in ICU. The criteria for the scale was that it was feasible for use by the nursing and physical therapy staff at the bedside, and that it had good inter-rater reliability to measure the highest level of mobilization of adult ICU patients.

Methods

Design and setting

This prospective observational study was performed at two quaternary ICUs in Melbourne, Australia in September 2012. Both were closed units, one was a 20 bed mixed medical/surgical unit and the other was a 35 bed mixed medical/surgical/trauma unit. The study was approved by the ethics committees of Austin Health and Alfred Health. Patient consent was waived as the study was observational with no identifying data recorded, while verbal consent was gained from the nurses and physical therapists participating in the

study. The study was divided into three parts: part one was the development of the IMS, part two was the feasibility testing of the IMS and part three was the inter-rater reliability testing.

Participants

Inclusion criteria

The participants who developed the scale were clinicians with more than 10 years' experience in ICU who were involved in research projects about ICU mobilization, including 5 physicians, 8 physical therapists and 2 nurses as part of the Australian and New Zealand Intensive Care Society Clinical Trials Group program of research on ICU mobilization and with two international experts collaborating from Johns Hopkins Hospital, USA.

Participants involved in the feasibility testing included a convenience sample of 30 multi-disciplinary ICU clinicians (15 physical therapists and 15 nurses) from two Australian hospitals who were available to complete a survey on the day of feasibility testing.

Twenty clinicians, who were the nurses and physical therapists involved in direct care of a patient on the day of the inter-rater reliability testing, volunteered to participate. In the ICUs involved in the study, the staff at the bedside involved in mobility activities included the bedside nurse, a junior and a senior physiotherapist. Therefore, for each measurement of inter-rater reliability, three clinicians were included and rated the same patient using the IMS; one senior physical therapist (≥ 2 years ICU experience), one junior physical therapist (≤ 2 years' experience) and one nurse (≥ 2 years' experience). Consecutive patients from the mixed medical-surgical-trauma ICU from two different hospitals in Australia, without any exclusion criteria, were assessed using the IMS to determine the inter-rater reliability.

Developing the ICU Mobility Scale (IMS)

A multi-disciplinary group of critical care clinicians, including 5 physicians, 8 physical therapists and 2 nurses from the Australian and New Zealand Intensive Care Society Clinical Trials Group and Johns Hopkins Hospital, Baltimore with expertise in scale development and already conducting studies in ICU rehabilitation, was recruited to develop a scale for measuring mobility in the ICU. The group agreed that the scale needed to meet a number of objectives¹⁴: (1) to be useable by all members of the multidisciplinary ICU team, (2) to have content validity¹⁵ (i.e., to measure what it is intended to measure), (3) to be feasible¹⁶ (i.e., quick and easy to administer and record), and (4) to have high inter-rater reliability across physical therapists and nurses for a wide-spectrum of adult ICU patients.

The ICU mobility scale (IMS) was developed by the multidisciplinary group using both levels of mobilization published from existing studies of early mobilization in the ICU^{5,7,8,13} and the unpublished scale from Johns Hopkins Hospital (as previously described). There were several differences between the IMS and the other reported scales, including more levels of mobilization and the previous scales did not report the level of assistance required for ambulation. For example, the other scales would simply report ability to ambulate, without clarifying whether the patient required assistance of one person, two people or a gait aid.

The IMS was then presented at the Fifth International Meeting of Physical Medicine & Rehabilitation (PM&R) in the Critically Ill in San Francisco on May 19, 2012. At this meeting, the IMS was discussed and one additional item was added based on external expert input from experienced ICU and rehabilitation clinicians and researchers. This included one additional category of ambulation to best represent the activities of mobilization undertaken in ICU by nursing and physical therapy staff, to obtain a final 11-level IMS (Table 1). For the current study, the final 11-level IMS was internationally circulated,

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