**How Can Clinicians Use Outcome Measures
in Routine Care? Knowledge Translation Strategies**

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Abstract

It is well established that admission to intensive care can result in physical, cognitive and psychological impairments. To assess and treat these impairments competently requires the use of outcome measures in clinical practice. To date there are no evidence based recommendations for specific measures to use at different time points on the trajectory of recovery. However, over 33 measures are currently published in research papers. While evidence is scant, the implementation for use of outcomes in daily practice by physiotherapists appears slow and variable. The key aim of this paper is to discuss methods to facilitate clinicians to use outcome measures at the bedside in the ICU. We describe and discuss the barriers and facilitators for use of outcome measures scaffolded in a behaviour change framework and to suggest practical methods by which clinicians may be enabled to use these measures on a daily basis.

Keywords: *Critical illness; Outcome measures; Rehabilitation; Implementation science; Knowledge translation; Rehabilitation outcome; physical rehabilitation.*

Introduction

It is now well established that admission to intensive care can result in physical, cognitive and psychological impairments (1). The identification, treatment and ongoing management of these sequelae are reported to be a defining challenge in intensive care unit (ICU) for the 21st century (2, 3). There is now a large volume of literature published that describe the effectiveness of rehabilitation or mobility interventions in the ICU including five randomized controlled trials (RCT) (4-7) and many systematic reviews synthesizing outcomes (8) (9) (10). The research findings in rehabilitation in ICU have stimulated much worldwide interest amongst researchers. But has there been uptake of the current research findings in clinical practice? To date based upon published literature (11, 12) the answer is likely **no**. It is well known that uptake of evidence based management is slow with reports of implementation taking an average of 17 years (13). Examining the use of measurement of treatment outcomes in a clinical setting provides a similar scenario.

Standardized instruments for measuring patients' activity limitations and participation restrictions have been advocated for use by rehabilitation professionals for many years. (14). However, in the USA, a survey response from nearly 500 physiotherapists who mainly worked in an outpatient setting reports that only half used standardized outcome measures (OMs) in practice (14). In this survey over 70% of therapist thought that standard OMs could be confusing, difficult, and time consuming for patients. While those who used them felt that they improved communication with patients and helped to direct the plan of care (14). Only one survey to date has investigated physiotherapists' use of outcome measures in the ICU, which showed that only 34% of physiotherapists routinely used outcome measures (none standardized) in ICU (15) and no studies have examined perception of barriers and enablers to their use in the ICU.

There is, however, an increasing body of knowledge dedicated to establishing the clinimetric properties of outcomes and the ultimate aim of that work is to develop core sets of outcomes for use in both ICU clinical practice and research. Indeed, core outcomes and the time points of measurement for specific outcome assessment are warranted across the ICU survivor continuum. Selection of outcome measures that have meaning across the continuum from ICU to ward and sub-acute/rehabilitation settings may need a progression of measures. For example, physical function measures in the ICU may have ceiling effects if used in sub-acute or rehabilitation settings (16). Establishing these will require input and agreement from clinicians across different sectors of the patient journey. There would then be an expectation – just as in stroke (endorsed by stroke guidelines) that measures are collected at specific time points and these outcomes are audited. There is much work still to do to achieve consensus about these choices and time points. Currently though, we can perhaps at least describe the core areas we need to measure, if not yet agree on the actual measures we will use. Yet even if a core set of outcomes is developed how will the critical care and rehabilitation professionals implement their use into their daily routine? In research this may be possible, but clinically there are many factors that will impact wide uptake during delivery of care in the ICU.

The potential benefits for use of OMs in clinical practice may include: 1) Health professionals: OMs provide quantifiable data to help identify patients at risk for poor or adverse outcomes, track progress in patient abilities before and after intervention or during the course of intervention and provide quantifiable data to assist in clinical reasoning and decision-making; 2). Colleagues and referring providers: improve communication, facilitate

improved continuity of care and provide quantifiable data to assist in team clinical reasoning and decision-making; 3). Patients and appointed representatives may be more informed and involved when provided with objective contextualised data; 4). ICU clinical practice: assist in determining the most effective interventions for particular conditions; 5). Governments, hospital entities and insurance providers: determine the most cost effective arrangements for patients to receive rehabilitation services. At the highest level there are drivers for use of OMs in practice. The United States (U.S.) Centers for Medicare and Medicaid Services (CMS) and the federal agency that administers governmental-funded health care programs, sponsored a meeting in 2006 and published a report in 2008 outlining recommendations for developing a uniform rehabilitation outcome assessment instrument for patients being discharged from acute care (17). Indeed recently enacted health policy in the U.S (Affordable Care Act) will require hospitals to document progress of patients in a systematic way in order to receive government insurance payments. Similarly in Australia to secure funding for sub-acute rehabilitation organisations are judged on their Functional Independence Measure (FIM) efficiencies. However, despite these top down drivers, it is the attributes of clinicians, their readiness for accepting change, the environment in which they work, their education and the measurement instruments themselves (18) that will influence their use of OMs in practice.

The key aim of this paper is to discuss how to facilitate clinicians to use OMs in the ICU. We aim to describe and discuss the barriers and facilitators for use of OMs scaffolded in a behaviour change framework and to suggest methods by which clinicians may be enabled to use these measures on a daily basis.

Case scenario: the care trajectory of Mrs R (without use of standardised outcome measures).

Mrs R is a 75-year-old female, on day 5 of her ICU admission for septic shock, which is now resolving. She remains intubated and ventilated, on low levels of sedation although is rousable and beginning to interact with those around her.

The physiotherapist is seeing her for the first time. Based on a discussion with the bedside nurse and review of the clinical notes, the physiotherapist does not think the patient is appropriate for intervention at this point in time due to her confusion and reduced level of alertness.

By day 8, Mrs R is no longer being sedated. She is alert, although the nurse reports the patient is confused at times. The physiotherapist passively transfers the patient to a chair and screens quadriceps strength by asking her to actively extend each leg whilst in the chair. The patient can extend each leg against gravity but not against therapist resistance. The physiotherapist decides to progress the patient to standing with assistance. As it is the first time standing, the physiotherapist thinks this is sufficient activity for the first session and returns the patient to sitting.

The consultant (intensivist or attending physician) asks the physiotherapist how the patient is progressing from a rehabilitation perspective as he is wondering whether the patient is going to be able to return home to her previous independent living status. On this basis and in the context of her overall medical issues, he is wondering if she would be appropriate for readmission to (remain in ICU) the ICU following discharge to the ward (standard floor). The physiotherapist reports the patient is progressing slowly.

By day 10, Mrs R is ready for ward discharge. The ICU physiotherapist hands over to the ward physiotherapist: Mrs R is progressing slowly but is now able to stand with assistance of

1-2 staff and is able to march on the spot (march in place) for a brief period of time but fatigues quickly. Based on this information together with, her age and ongoing medical issues, the ward physiotherapist makes a recommendation at the ward meeting that the patient requires further assessment to determine suitability for in-patient rehabilitation and may not be able to return directly home.

Knowledge translation

Increasingly there is a focus on bridging the gap between clinical research and clinical practice in order to improve clinical care and more specifically patient outcomes. This is often referred to as translating research findings into practice, knowledge translation, knowledge exchange or implementation. These terms are commonly used interchangeably. In the context of this paper implementation is defined as ‘the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings’. *Implementation science ‘is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice’*. It seeks to understand the behaviour of healthcare professionals (in this case physiotherapists) and other stakeholders (critical care clinicians) as key variables in the sustainable uptake, adoption, and implementation of evidence-based interventions (the use of OMs). Implementation of evidence takes time and this is reported to be an average of 17 years. Although some time lag is necessary to ensure the safety and efficacy of new interventions or advances, ideally the aim should be to optimize these time lags (13). Improving the design and implementation of evidence-based practice depends on successful behaviour change interventions (19). ‘Behaviour change interventions’ can be defined as coordinated sets of activities designed to change specified behaviour patterns, in the case of this paper changing the behaviour of clinicians toward including measurement of patient outcomes in the ICU (19).

Implementation frameworks

Behavioural change frameworks can be used to study the implementation process of research findings into clinical practice although this is an emerging field in critical care (20, 21). As such there is little literature describing the process to investigate the perceived clinical barriers and facilitators to using outcome measures as part of routine clinical care in the ICU. Pronovost and colleagues (22) provide a model for large scale knowledge translation in the ICU. The model suggested combines several approaches found in behaviour change literature. Some of the common and more formal behaviour change and implementation science frameworks include the Theoretical Domains Framework (TDF) (23, 24). Theory of Planned Behaviour (TPB) (25), Promoting Action on Research Implementation in Health Services (PARIHS) (26) and the Behaviour Change Wheel (19). Any of these frameworks that assist in identifying and changing behaviours in a systematic and comprehensive way could be used to better understand clinician attitudes and behaviour in relation to the use of outcome measures in the ICU. In this paper, we use the Theoretical Domains Framework (TDF) which consists of 14 domains from psychological and organisation theory said to influence behaviour change (24). It provides a set of conceptual determinants and associated constructs that putatively influence behaviour and stimulate behaviour change (24) and was established to be used by anyone, from any discipline, who needs to accurately identify barriers and levers (27) of behaviour change and design interventions with sufficient theoretical richness to address them (28). The TDF has previously been used to understand determinants of hand hygiene (27) and is reported to be highly relevant to the implementation

of clinical quality interventions (29). Recently refined (21, 23) the key domains and context of specific application to outcome measurement are presented in Table 1.

The TDF can be applied in four steps: The first step is to audit needs to demonstrate that there is a gap between the behaviour of interest and outcome measurement use (30, 31). There are data relating to physiotherapists that report low use of standardised OM (18) and use of OM in transplantation in Australia (32) and stroke (33). However, there is little data on use of OM in critical care – the primary data contributing to our understanding in this area is self-report via survey. Only 34% of Australian physiotherapists report using OM routinely in ICU exercise prescription, none of which were validated standardized functional measures (15). The second step is to establish the barriers and facilitators to use of OM in ICU, using the TDF. To our knowledge, no such investigations have yet been conducted. Once barriers and facilitators are established, the third and fourth steps involve developing targeted behaviour change interventions specific to using OM and then evaluating their efficacy. These steps can be applied across any implementation problem, in any setting or institution (Figure 1).

The key domains, scaffolded within the TDF that can influence clinician behaviour (specifically applied to OM) are as follows:

Knowledge

Clinicians need to understand the macro view of OM and why measurement is important, both in their practice as an individual therapist and the contribution of outcome measurement to broader knowledge and understanding of ICU recovery. At a micro level, clinicians need to have procedural knowledge as to i) how to select the best test (34); ii) how to conduct the test and iii) how to interpret test results and integrate the scores to support clinical decision-making for prescribing intervention or progressing patient management accordingly. The OM itself is not the goal, but the use of the score to support clinical decision-making.

Knowledge can be improved by embedding the necessary concepts into entry to practice training of physiotherapist and by providing on-line educational information to clinicians on the topic such as that provided by the Society of Critical Medicine (www.sccm.org) in relation to the legacy of critical illness and use of journal club presentations to ICU clinical staff. Further strategies are given in Table 1.

Skills

Clinicians must possess the skills to actually conduct the test and be able to integrate the OM within therapy time (i.e. optimise therapy time). An important skill, similar to the ability to implement early rehabilitation, is the ability to negotiate with the multidisciplinary team at the bedside and to be able to report relevant OM results to other members of the MDT (e.g. to facilitate discharge planning, extubation or prognostication).

Potential strategies to facilitate improved skills are the enculturation of continuing education in the form of workshops, use of educational videos for performance of OM, practical training and role play, and, if available at the organization or unit level, completion of competency-based skills training modules (Table 1).

Environmental context and resources

The availability of resources (e.g. hardware and software for the OM, clinical research forms that are concise and easily readable, space, other staff to assist and staff time) is fundamental

to the facilitation of outcome measurement in the clinical setting. Staff workloads and competing demands should also be considered here. The organisational culture is a very important part of this domain and whilst this has received some attention in the context of ICU mobility (35), there is little evidence of specific interventions on culture change in the ICU. Some individuals may also behave differently in the environment of the ICU than in other settings, as the ICU is a very unique environment (36). The potential for salient events or critical incidents is also arguably substantially higher due to the physiological instability of patients inherent in the ICU setting.

Social influences (MDT)

This is another very important domain in the context of outcome measurement in ICU – consideration of group conformity and norms, social norms and pressure, social support, power, group identity and intergroup conflict. These aspects of social influences may have a significant effect on individuals working within this context and influence OM (37).

Beliefs about capabilities (particularly for junior staff)

Professional confidence, self-efficacy and perceived behavioural control are likely to be lower in junior staff. This may have implications for the sustainability of implementation of outcome measurement, particularly over weekends where there may be variable physiotherapy cover and absence of senior staff (38). Conversely senior therapists may be very confident in their own intuition and working methods and more resistant to changing their behaviour. Beliefs about capabilities may also vary between disciplines where for example nurses and physiotherapists may perceive there are discipline specific roles and not be willing to move outside their traditional scope of practice.

Beliefs about consequences

The consequences of use (or no use) of OM in clinical practice may not always be clear. Clinicians may need external validation or consequences from OM use that demonstrate such measures are important and contribute to patient care. The clinical relevance of measuring patient outcomes must be clearly demonstrated. For example, the reality of future health care reimbursement may become outcome-driven, not service- or admission-driven. As an example, in the U.S., the recent Affordable Care Act authorizes Medicare, the federal health insurance program for seniors, to reduce payments to acute care hospitals with excess 30-day readmissions. It is more likely that physiotherapists will need to objectively assess the patient at hospital discharge and keep a record of this as evidence of appropriate discharge. Similarly, if a patient has developed weakness measured using the MRC score, the likelihood that this may impact discharge destination is high (39); this is an important and measureable consequence that most physiotherapists would believe was highly significant.

Social/Professional Role and Identity

There may be overlap in professional roles and responsibilities regarding the implementation of certain OM in ICU and this should be recognised and negotiated by the MDT. Team members may limit themselves by applying traditional professional boundaries and identities to the OM they use or don't use or prioritise for outcome measurement. External validation of the importance of using OM in clinical practice will influence clinician behaviour, for example, if physical function measures were included in large core databases such as that of the Australian and New Zealand Intensive Care Society Core database. Clinicians may then perceive these to be an important part of their professional role.

Memory, attention and decision processes

Cognitive overload may be very common in clinicians, particularly those working in the fast-paced, complex and dynamic environment of the ICU. Clinicians must also weigh up the relative value in clinical decision-making around prioritization of OM in the context of their caseload. Such decisions are rarely made in isolation in the clinical setting, as opposed to the conduct of a research protocol. Busy clinicians may be working in ICU and on acute wards, with competing demands such as patient discharge, rehabilitation, respiratory management and referral-based paperwork, teaching and training.

Reinforcement

Strategies such as rewards, incentives, reinforcement may be considered in facilitation of OM by clinicians.

However it should be noted that the empirical literature in support of the clinical benefit of OM is still developing (40) hence it may not be appropriate to use techniques such as punishment or sanctions to facilitate their use by clinicians.

Intentions

There is a large body of literature related to the different stages of change in behaviour with many of the drivers or enablers that can move a clinician to value the measurement of OM and commence using them in the ICU discussed within the TDF and the body of this paper. One such model (19) that includes many of the attributed of the TDF model uses a behaviour change wheel that is based around clinician motivation, opportunity and capability and the local and policy environmental factors that impact these sources of behaviour (Figure 2). Others are based around readiness for change such as brief motivational interviewing (41); completing a questionnaire about readiness for change, example (Heather and Rollnick <http://ndarc.med.unsw.edu.au/>) and the well known transtheoretical model of change developed in 1979 by Prochaska et al (42) identifies five stages of progress: (1) precontemplation (not intending to take action within the next 6 months), (2) contemplation (intending to take action within the next 6 months), (3) preparation (intending to take action within the next 30 days), (4) action (making overt changes less than 6 months ago), and (5) maintenance (making overt changes more than 6 months ago). Initial evaluation of clinician stage may provide some idea of likelihood of timing of success as well as assist implementation strategies.

Goals

This is less likely to be a domain where substantial change can be influenced, as therapists in particular are very goal-driven in the clinical setting. However, goal setting around OM or prescription according to OM may be useful. It also may be important to consider whether goals are set by other disciplines/MDT around OM, or physical rehabilitation, and if not, whether they should be and how this could be facilitated.

Emotion

The ICU environment by its nature can influence stress, anxiety, fear, affect and burnout of team members. Managing and dealing with family members who may suffer high amounts of stress in their context also adds to the potential emotion of working in this area (43).

Behavioural Regulation

This involves anything aimed at changing actions including self-monitoring and action planning. This may be an important target for physiotherapists since time to undertake measures is limited and planning their time and day can help to fit in the extra outcome measurement for patients.

Potential strategies to facilitate the use of outcome measurement in clinical practice

Table 1 proposes some examples of potential strategies, corresponding to key theoretical domains, that can be used by clinicians to facilitate the use of outcome measurement in clinical practice; although it should be noted these are suggestions only – since we currently have no data on barriers/facilitators to the use of OMs in ICU (nor strong evidence that they are not being used widely), these should be verified in future empirical work to ascertain the requirement for targeted implementation interventions. Barriers and facilitators should also be considered to potentially exist at multiple levels: the level of the patient and provider (individual), the unit/ICU, and the organization (21). In future, implementation it may be necessary to target only some of the above-mentioned behaviours. Choosing these may depend upon likely impact if undertaken and likelihood that the behaviour might be implemented, for example the ease or costs of changing the behaviour. It is reported that attempting to change only two or three specific behaviours may be most effective (44). Clearly more research is needed to enable these strategies.

Discussion

With global changes in health care and increased use of incentive drivers, the use of standardised outcome measurement in patient care is becoming more important. This paper makes practical suggestions for embedding the use of OMs in physiotherapy clinical practice based upon theory for implementing behaviour change. There is currently limited research to help to identify the most significant barriers or enablers to implementation of outcome measurement in the context of critical care. Certainly differences at the environmental level (ICU, hospital and government) vary internationally, as do the specific roles and responsibilities of physiotherapist within ICU. These differences may mean that targeted behaviours to drive change are likely to require tailoring to different settings. For example, one enabler may be the introduction of specific fields for therapists to complete in the electronic medical record (EMR), if these are available. Electronic record prompts built into the system may prevent note entry without completion of a minimal set of OMs. As well as outlined above, the addition of basic tests to large intensive care databases similar to the collection of APACHE II and III data. Taking this one step further, perhaps the physiotherapist or another rehabilitation clinician could undertake clinical informatics training so they would have the capacity to produce data from the EMR related to specific patient OMs with the aim of directing institutional process decisions. Another may be incentivization (from the top down) where hospitals can demonstrate improvements in the patient journey using standardised assessments. Given the potential importance of the environment (18) the physiotherapist may need to advocate for changes at this level. To date, what this minimal set and best timing of specific OMs is not yet defined.

Another much discussed driver or enabler is the identification of “Champions”. The use of change champions to implement new innovations in organizations is not new (45). The value of champions is particularly apparent for healthcare changes as evidenced by the large number of articles that report using champions of change (46). In the ICU, Needham and Korupolu (47) included grassroots support established using champions from each discipline in implementing change to mobilization practice (1). Discipline champions were included as

a result of identification of lack of leadership as a potential barrier. The quality improvement project was successful and sustained. The issue of leadership of change in practice is important. While use of champions may be effective (45) investing in multiple levels of change is also important. Shaw and colleagues suggest that in addition to project champions, organizational level champions are needed to provide leadership, authority, and a vision for the 'big picture' of ongoing organizational change to facilitate sustainability. Indeed to effect optimal behavior change to facilitate outcome measurement by physiotherapists a multi-faceted approach is needed (19). This comprehensive method may sustain change even when the initial champions are no longer within the organization.

Some of perhaps the most important questions for therapists that can drive behaviour change are the "so what" questions. What will I achieve by measuring outcomes? Why shouldn't I spend my time on treating the patient instead? Education about the role of outcome measurement in clinical decision-making and assessing progress over time is important. Previous research reports that physiotherapists perceive planning of patient care and monitoring the effects of treatments as the benefits of using OMs (48). There is a paucity of research identifying the benefits of OMs in guiding clinical decision-making. This seems important in clinical practice and identification, as a potential driver needing to be further evaluated.

Case Scenario - the care trajectory of Mrs R (WITH use of standardised outcome measures).

Mrs R is a 75-year-old female, on day 5 of her ICU admission for septic shock, which is now resolving. She remains intubated and ventilated, on low levels of sedation although is rousable and beginning to interact with those around her.

The physiotherapist is seeing her for the first time. Through participation at recent journal clubs on outcome measurement the physiotherapist has an improved understanding of their importance and intends to prioritise them within her daily ICU workload. The physiotherapist has recently completed competency training in various ICU OMs and feels skilled to perform them. The clinical champion for outcome measurement sees the physiotherapist is about to review Mrs R and provides encouragement regarding completing OMs.

Based on a discussion with the bedside nurse and review of the clinical notes, the physiotherapist does not think the patient is appropriate for intervention at this point in time due to her level of alertness. The physiotherapist knows about the CAM-ICU to assess for delirium but can't remember all the instructions so she watches an online video of how to do the test. After completing the CAM-ICU the physiotherapist finds that although she appears confused she does not have delirium as identified by the CAM-ICU. She cannot interact for any sustained period of time but the physiotherapist wonders if her level of alertness and interaction might be improved in sitting. The physiotherapist is also interested in the patient's global strength to undertake this task and performs a MRC strength test to accurately measure this. The patient has Grade 3 strength for all movements (a sum score of 36/60 on the MRC). The physiotherapist proceeds to sit the patient over the edge of the bed with assistance and with her family present Mrs R appears to become more animated and interactive.

By day 8, Mrs R is no longer being sedated. She is alert although the nurse reports the patient is confused at times. The physiotherapist assesses the patient and despite the report

of confusion finds that she again does not have delirium according to the CAM assessment. The physiotherapist repeats the MRC and finds that in her distal movements Mrs R has regained Grade 4 strength although her proximal movements remain a Grade 3 (a sum score of 42/60). The physiotherapist decides with the nurse that they will stand the patient and with help from a third clinician move the patient actively to a chair. Once the patient is in the chair the physiotherapist uses the Physical Function in ICU test (PFIT-s) to assess the patient's current level of functional ability using flip cards with prompts for how to perform and score the test, she has a stopwatch available. The patient can march on the spot (march in place) for one minute and the physiotherapist uses this baseline score to prescribe further marching exercise (80% of the total time) from for that session. When the physiotherapist records their electronic notes, they are prompted electronically to complete the fields for the CAM, MRC and PFIT.

The consultant (intensivist or attending physician) asks the physiotherapist how the patient is progressing from a rehabilitation perspective as he is wondering whether the patient is going to be able to return home to her previous independent living status. On this basis and in the context of her overall medical issues, he is wondering if she would be appropriate for readmission to (remain in) the ICU following discharge to the ward (floor). The physiotherapist is able to report that according to standardised outcome assessment there is a demonstrated improvement in Mrs R's strength and function and she predicts that the patient should continue to improve on the ward and should be able to return home after 2 weeks of inpatient rehabilitation. The consultant is appreciative of the objective information provided.

By day 10, Mrs R is ready for ward discharge and the ICU physiotherapist hands over to the ward physiotherapist that Mrs R has not had delirium when formally assessed despite documentation that she had been confused. She has improved muscle strength according to the MRC and has been able to progress to walking 20 metres per day but her walking distance is limited by fatigue. The ward physiotherapist is clear about the progress of Mrs R and based upon the objective findings makes a recommendation at the ward meeting that Mrs R should go to inpatient rehabilitation and is likely to return home.

Conclusions

This paper presents options for enabling physiotherapist to measure patient outcomes in their routine daily care scaffolded within a behaviour change framework. Different therapist and institutions may require specific enablers to change behaviour but the number of behavioural interventions tried should be limited to two or three in the first instance to increase the chances of success. Undertaking the TDF to determine the most appropriate strategy to use in your own setting ensures a systematic approach to this problem. Understanding behaviour change requires a scientific approach that is comprehensive, transparent and systematic (44). The ISLAGIATT (it seemed like a good idea at the time) principle is not an effective approach to changing behaviours.

The Enablers and Facilitators we suggest may include development of an outcome measurement manual with clear and concise instructions, clinical assessment forms that are easily readable for the clinician and the patient (if using self-report survey), creation of a minimal OM set that is cognisant of the skills and time necessary, creation of a web-based OM competency course that is completed annually similar to infection control, fire safety training), embedding OM into electronic medical record. Potential barriers include therapist

time and care planning, complicated OM, lack of valid and reliable OM for ICU, lack of specific therapist skills, lack of supportive, easily accessible educational material related to OMs, that the OM is not valued by the ICU team and treatment decision are not altered based upon OMs used, lack of evidence that the patient progression is affected, a preference by the therapists to treat rather than measure.

The last 10 years has brought an increased awareness of the role of the physiotherapist in the ICU as well as an increased interest in measuring patient outcomes from ICU; an increase in the number of OM available to the therapist, currently reported to be over 33 (49) and improved technology for measurement. However, changing clinician behaviour to embrace standardised outcome assessment is a complex task that will take time. Comprehensive and systematic analysis of local therapist behaviour is needed to help to bring about this change...in perhaps another 10 years implementation may be achieved.

Compliance with Ethics Guidelines

Conflict of Interest

Kimberley J. Haines, Elizabeth H. Skinner, Amy Pastva, Sue Berney, Linda Denehy declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

Table 1. The refined Theoretical Domains Framework in the context of outcome measurement (adapted (23)). Note that only relevant domains are included here.

Domain	Meaning	How it applies to outcome measurement	Example strategies to address
Knowledge (An awareness of the existence of something)	Knowledge including knowledge of condition/outcome measure/scientific rationale, procedural knowledge, knowledge of task environment	Need to know the possible outcomes that can be used, the method by which they are reliably applied, how they can help in decision-making or treatment prescription and progression	<ul style="list-style-type: none"> • OMs flip cards that clinician carries • Participate in Journal clubs • Read relevant articles • Change champions • Complete annual institutional competency training requirement
Skills (An ability of proficiency acquired through practice)	Skills, skill development, competence, ability, interpersonal skills, practice, skill assessment	Skills in carrying out specific measures and using scoring criteria where applicable	<ul style="list-style-type: none"> • Complete practical training and role play modules developed for annual competency requirement • Teaching/training videos • Workshops • Mentoring/senior support • Co-treatment
Social / Professional Role and Identity (A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting)	Professional identity/role, social identity, identity, professional boundaries/confidence, group identity, leadership, organisational commitment	Physiotherapist perception of the importance of measuring outcomes; Professional obligation to provide appropriate assessments using best evidence Providing discipline leadership Role of physio in the MDT regarding measuring outcomes, for example the role of the nurse compared with the physio	<ul style="list-style-type: none"> • Complete self-analysis/readiness for change survey • Change champions • Professional development • Professional meetings • OMs as organisational KPIs • Senior staff leadership/communication • Agreed roles and responsibilities for OMs

			<ul style="list-style-type: none"> • MDT co-operation/flexibility
Beliefs about Capabilities and Consequences (Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use)	Self-confidence, perceived competence, self-efficacy, perceived behavioural control, beliefs, self-esteem, empowerment, professional confidence	Appropriate specific training in the OM being performed Competency of staff to perform the outcome Understanding implications of outcome assessment for patient care	<ul style="list-style-type: none"> • Competency frameworks • Feedback • Clear communication • Outline expectations • Supervision/performance development
Reinforcement (Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus)	Rewards (proximal/distal, valued/not valued, probable/improbable), incentives, punishment, consequents, reinforcement, contingencies, sanctions	The influence of systems, funding and environment for reinforcement of completing outcomes	<ul style="list-style-type: none"> • Electronic record prompts preventing note entry without OMs • Change champions • Completion of annual competency • KPI include appropriate documentation of OMs
Goals (Mental representations of outcomes or end states that an individual wants to achieve)	Goals (distal/proximal), goal priority, goal/target setting, goals (autonomous/controlled), action planning, implementation intention	Developing individualised patient care plans	<ul style="list-style-type: none"> • Organizational level: formulation of learning and practice goals – ie. goal of a certain % of documentation will include recommended OMs; 100% of staff go through training and achieve competency on web-based module
Memory, Attention and Decision Process (The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives)	Memory, attention, attention control, decision-making, cognitive overload/tiredness	Perception of the importance of measuring outcomes in their total daily workload, eg. as opposed to performing treatment techniques Fitting outcomes into daily work flow Reduce cognitive fatigue	<ul style="list-style-type: none"> • OMs flip cards that clinician carries • EMR automatic population and alerts • Development of decision-making guidelines or decision tree • Adequate staff workloads
Environmental Context and Resources (Any circumstance of a	Environmental stressors, resources/material resources, organisational	Understanding of the barriers and facilitators associated with measurement of outcomes	<ul style="list-style-type: none"> • Organizational allocated effort to “clinician scientist” or “OM director” or “OM liaison” to lead

<p>person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour)</p>	<p>culture/climate, salient events/critical incidents, person x environment interaction, barriers and facilitators</p>	<p>Awareness of educational materials available to therapists Lead the creation and use of specific data forms and EMR population Understand management culture and leadership</p>	<p>OM education and competency agendas. Recommend that the individual have the skills to assess results longitudinally to help make institution process decisions on OM implementation.</p> <ul style="list-style-type: none"> • Organizational dissemination of an OM manual that includes clear and concise instructions • Organizational creation of recommended core OM set. Rehab OM should “measure once, cut twice” – meaning OM serves as assessment tool and therapeutic exercise (eg. PFIT-s) or for tracking patient progress and institutional performance. • Creation of clinical assessment forms that are easily readable with appropriate font size and appearance for both clinician and patients (in self-report survey, for instance) • Creation of web-based OM competency course to be completed annually (just like infection control competency) • Electronic record prompts preventing note entry without OMs
<p>Social Influences (Those interpersonal processes that can cause individuals to</p>	<p>Social pressure, social norms, group conformity, social comparisons, group norms,</p>	<p>Social pressure from within the physiotherapy discipline to complete OM at a peer or senior</p>	<ul style="list-style-type: none"> • Clinical change champions • ICU clinician (team) positive peer support

change their thoughts, feelings, or behaviours)	social support, power, intergroup conflict, alienation, group identity, modelling	level. Social support from other ICU professionals such as doctors and nurses valuing the contribution outcome measurement makes to patient care may provide another level of social influence	<ul style="list-style-type: none"> • Senior physiotherapist modelling
Behavioural Regulation (Anything aimed at managing or changing objectively observed or measured actions)	Self-monitoring, breaking habit, action planning	Willingness to change behaviour (ready for change) Organisation of workload to allow time for measures Monitor or audit change of practice	Institute change- use more outcomes and audit result of patient outcomes Use of Supervision and performance management by senior staff to facilitate behaviour change

OMs = Outcome measures; KPI = key performance indicators; MDT = multidisciplinary team.

Figure 1. Steps to facilitate implementation of outcome measurement in clinical practice.

Figure 2: The Behaviour Change Wheel (from Michie et al. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implementation Science 2011, 6:42 with permission distributed under the terms of the Creative Commons Attribution License.)

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