

ORIGINAL STUDIES

Perme Intensive Care Unit Mobility Score and ICU Mobility Scale: translation into Romanian and cross-cultural adaptation for use in Romania

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Abstract

Background. Instruments to measure functional mobility for patients in the ICU are primarily written in English. However, translations of instruments into the Romanian language are also needed.

Aims. This study aims to perform the translation and cross-cultural adaptation of the Perme ICU Mobility Score and ICU Mobility Scale into the Romanian language, evaluate inter-rater agreement, inter-rater reliability, and correlation between the two instruments.

Methods. The steps involved in the translation and cross-cultural adaptation process were: preparation, translation, reconciliation, synthesis, back-translation, revision, approval, and pre-test. Two physical therapists evaluated patients in the ICU using the Romanian language version of both instruments, the Perme Score and IMS. The inter-rater agreement for the Perme ICU Mobility Score and ICU Mobility Scale was confirmed using weighted kappa statistics, and the Cronbach's alpha coefficient used for the inter-rater reliability. The correlation between the instruments was also evaluated.

Results. The study included 110 patients, 56% (n=62) men and 44% (n=48) women. Patients admitted with surgical diagnoses comprised a considerable proportion of the sample at 73% (n = 80). The duration of ICU stay at the time of evaluation was 5.04 days. Both instruments showed excellent inter-rater agreement ($\kappa > 0.90$) and inter-rater reliability ($\alpha > 0.90$). Additionally, there was a significant positive correlation between the instruments ($r = 0.998$; $p < 0.001$).

Conclusions. As a result of this study, we conclude that the Perme ICU Mobility Score and ICU Mobility Scale were accurately translated, cross-culturally validated, and suitable for use in Romania. The Romanian translations demonstrated strong inter-rater agreement, inter-rater reliability, and positive correlation between the two instruments.

Keywords: Physical therapy, intensive care units, translations, validation studies.

Introduction

Patients admitted to the intensive care unit (ICU) are usually on bedrest, which limits their mobility and could harm several physiological systems (Alaparthy et al., 2020). Long recovery times for critical patients in the ICU increase the chance of functional decline (Hodgson et al., 2023). As the value of rehabilitation continues to gain recognition, new mobility strategies are being created specifically for the ICU (Parry et al., 2015a). Early mobilization in the ICU is a strategy to enhance functional recovery during and after prolonged critical illness, and to decrease ICU-acquired muscle weakness (Wilches et al., 2018). Early mobilization techniques in the ICU may prevent and lessen muscle weakness in critically ill patients, enhance the

quality of life, shorten ICU and hospital stays, and reduce hospital mortality (Miranda Rocha et al., 2017). The assessment of mobility in the ICU is necessary to support patient recovery, identify patients who might benefit from rehabilitation, and track the effectiveness of therapeutic interventions. Safety during mobility activities requires a thorough evaluation of the patient's physical health before considering mobilization. However, there is a limited specific guidance (Yang et al., 2021). There are benefits for clinical practice and research when monitoring functional outcomes related to early mobilization in the ICU. There are a few instruments already available that can be used to assess the mobility status of patients in the ICU (Parry et al., 2017). In 2015, a study reported that only six of the

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26 instruments to measure patient function were developed specifically for use in the ICU (Parry et al., 2015a). None of these instruments, however, are regarded as the “gold standard” for helping multidisciplinary teams to objectively determine the patient’s level of mobility (Nawa et al., 2014). Additional extrinsic circumstances that limit the patient’s mobility are the presence of access ports, lines, and chest tubes, which can be viewed as a potential barrier to mobility, and not taken into account by most instruments (Kawaguchi et al., 2016). Along with identifying these potential barriers to mobility, it is essential to develop and put into action plans that minimize the side effects of bedrest (Luna et al., 2021).

The Perme Intensive Care Unit Mobility Score (Perme Score) is an instrument that objectively measures the patient’s level of mobility in the ICU, starting with the ability to follow directions and ending with the distance walked in two minutes. The Perme Score is a comprehensive instrument with 15 items divided into 7 categories, and scores ranging from 0 to 32. A high score on the Perme Score demonstrates a high mobility level and a reduced need for help. On the other hand, a low score on the Perme Score denotes a lower mobility level and a greater need for physical assistance. The Perme Score has good inter-rater reliability (Perme et al., 2014). When utilized in a mixed general ICU patient population, the Perme Score showed a good capacity to detect changes in patient’s mobility status over time (Kenji et al., 2023). The ICU Mobility Scale (IMS) is an instrument also developed to objectively assess the mobility status of ICU patients and the scores range from 0 to 10 (Hodgson et al., 2014). An IMS score range of 0 indicates a patient who has a very low mobility status and a score of 10 indicates considerable increased levels of mobility (Tipping et al., 2016).

When selecting an instrument that will most effectively assess the functional changes of patients during the ICU stay, healthcare professionals and researchers should consider instruments with robust clinometric data (Parry et al., 2015b). An instrument developed in another country’s language and culture must undergo cultural adaptation and validation to ensure that the translated version is accurate and reliable (Parry et al., 2017). The Perme Score and IMS have been translated into several languages, including Portuguese and Spanish (Kawaguchi et al., 2016; Wilches et al., 2018). This study aims to perform the translation and cross-cultural adaptation of the Perme Score and IMS into the Romanian language and evaluate inter-rater agreement, inter-rater reliability, and correlation between the two scales.

Hypothesis

The Romanian translation of the Perme Intensive Care Unit Mobility Score and ICU Mobility Scale will have an inter-rater agreement, inter-rater reliability, and positive correlation between the two scales.

Material and methods

The Ethical Committee of the Prof. Dr. Octavian Fodor Regional Institute of Gastroenterology and Hepatology, Cluj-Napoca, approved the study (Nr. 2371/16.02.2021).

Research protocol

a) Period and place of the research

The study was conducted at “The Prof. Dr. Octavian Fodor Regional Institute of Gastroenterology and Hepatology” in Cluj-Napoca (Romania) between March and October 2023. The study took place in two different ICUs, a medical ICU with 6 beds and a surgical ICU with 14 beds. This study was an observational, prospective single-center research.

b) Subjects and groups

The participants in the study were over 18 years old and admitted to the intensive care units. The procedures were carried out by two physiotherapists with experience in critical patients; in addition, certified translators participated.

c) Used instruments

Current standards for the translation and cross-cultural adaptation of instruments with strict methodology were used to translate, cross-culturally adapt, and validate the Perme Intensive Care Unit Mobility Score and ICU Mobility Scale (Beaton et al., 2000; Wild et al., 2005).

The steps in the process included: 1) *Preparation*: The principal investigator contacted the authors of the original instruments to get permission to use, translate, and cross-culturally authenticate the Perme Score and IMS Scale; 2) *Translation*: The two instruments were independently translated from English into Romanian by two translators who were native Romanian speakers and fluent in English, one with experience in the medical field, the other not; 3) *Reconciliation and synthesis*: Two physical therapists who were familiar with both instruments reviewed the first Romanian-language version of the instruments, item by item, and compared with the original English-language versions. The researchers examined and reviewed any discrepancies, and as a result, a second Romanian-language version for both instruments was created; 4) *Back-translation*: For the back-translation, the second Romanian version of the two instruments was sent to two native English speakers who were also proficient in Romanian. Neither translator had access to the first English versions; 5) *Review and harmonization of the back-translation*: To identify potential discrepancies and make the necessary adjustments, the back-translated versions of every item in both instruments were compared with their original English-language versions by researchers in the review committee. This resulted in the final back-translated versions of both instruments which were further reviewed by a Romanian language teacher; 6) *Approval by the original author of the instrument*: The final version of the back-translation was sent to the original author of both instruments for review and comments. A final version of Romanian translations of both instruments was created after two physical therapists reviewed the comments and suggestions made by the original authors taking into account all of their recommendations; 7) *Pre-test*: Two senior physical therapists with more than five years of experience were trained in the administration and scoring of the final Romanian-language version of the Perme Score and IMS. After receiving training, the raters administered the two instruments to 30 patients as a pilot study using the methodology outlined in the original

articles for both instruments. The raters had an opportunity to discuss any challenges they experienced when utilizing the instruments. One rater assessed the patient, while the other rater observed the entire process without making any physical contact with the patient. Immediately following the assessment, the two raters completed the score sheet for the Perme Score and IMS Scale adhering strictly to their guidelines. The rating sheets were completed independently, and the raters did not communicate with one another to minimize biases (Hodgson et al., 2014). The roles of rater and observer were consistently switched after data collection was completed for two patients.

d) Statistical processing

The clinical features of the population were determined by gathering information on age, gender, reason for ICU admission, use of mechanical ventilation, use of vasoactive drugs, and additional factors. Taking into consideration the possibility that the instruments might be equal (50%) or not (50%), the sample size was determined with a power of 80% and a level of significance of 5%. The Bernoulli probability distribution makes this possible. We also observed that a sample size of 100 people was necessary when we considered a delta of 10%, which means that the chance of equality may range from 40% to 60%. IBM SPSS Statistics, version 27.0.1, was used to conduct the statistical study. The mean and standard deviation were used to describe the patients' clinical features. Weighted kappa statistics and 95% confidence intervals were used to assess the degree of inter-rater agreement in the scoring of each instrument. The Cronbach's alpha coefficient (Tavakol & Dennick, 2011) was used to assess the internal consistency, or inter-rater reliability, in the scoring process. Inter-rater agreement and reliability for each domain (items 1 through 15) of the Perme Score were evaluated

separately. For correlation analysis, we used the values of the two raters.

Table I
The patients' characteristics (N=110).

Characteristics	Results
Age, years	65.65±13.05
Male gender	62 (56)
Female gender	48 (44)
Reason for ICU admission	
Clinical	29 (27)
Respiratory	5 (5)
Gastroenterological	6 (6)
Hepatic	18 (16)
Surgical	80 (73)
Gastroenterological	67(61)
Hepatic	5 (5)
Respiratory	8 (7)
Vasoactive drug use	40 (36)
Mechanical ventilation	21 (19)
Duration of mechanical ventilation, days	1.41
Length of ICU stay at the time of evaluation, days	5.04

Value expressed as mean ± SD, Values expressed as n (%).

Results

The demographics of individuals assessed in this study are displayed in Table I. Our sample consisted of a total of 110 patients, 56% (n=62) men and 44% (n=48) women. Of the patients, 27% (n = 29) were admitted for clinical reasons, including 5% (n=5) with respiratory, 6% (n=6) with gastroenterological, and 16% (n = 18) with hepatic diseases accounting for most cases. Surgical patients comprised a considerable proportion of 73% (n=80) including 61% (n=67) gastroenterological, 5% (n=5) hepatic, and 7%

Table II
ICU Mobility Scale (IMS) and Perme ICU Mobility Score inter-rater reliability and agreement.

Instrument	Rater 1 Median [min-max]	Rater 2 Median [min-max]	Reliability Cronbach's alpha coefficient	Agreement k (95% CI)
IMS	4 [0-8]	4 [0-8]	0.99	0.99 (0.98-1.00)
Perme ICU Mobility Score				
1) Mental status: item 1	2 [0-2]	2 [0-2]	0.98	0.95 (0.90-0.99)
2) Mental status: item 2	1 [0-1]	1 [0-1]	0.98	0.97 (0.91-1.00)
3) Potential barriers: item 3	1 [0-1]	1 [0-1]	0.99	0.98 (0.94-1.00)
4) Potential barriers: item 4	0 [0-1]	1 [0-1]	0.92	0.86 (0.77-0.96)
5) Potential barriers: item 5	0 [0-1]	0 [0-1]	1.00	1.00
6) Potential barriers: item 6	0 [0-0]	0 [0-0]	1.00	1.00
7) Functional strength: item 7 (left leg)	1 [0-1]	1 [0-1]	1.00	1.00
8) Functional strength: item 7 (right leg)	1 [0-1]	1 [0-1]	1.00	1.00
9) Functional strength: item 8 (right arm)	1 [0-1]	1 [0-1]	1.00	1.00
10) Functional strength: item 8 (left arm)	1 [0-1]	1 [0-1]	1.00	1.00
11) Bed mobility: item 9	3 [0-3]	3 [0-3]	1.00	1.00
12) Bed mobility: item 10	3 [0-3]	3 [0-3]	0.99	0.98 (0.96-1.00)
13) Transfers: item 11	1 [0-3]	1 [0-3]	1.00	1.00
14) Transfers: item 12	0.5 [0-3]	0 [0-3]	0.99	0.98 (0.97-1.00)
15) Transfers: item 13	0 [0-3]	0 [0-3]	1.00	1.00
16) Gait item 14	0 [0-3]	0 [0-3]	0.99	0.99 (0.99-1.00)
17) Endurance: item 15	0 [0-3]	0 [0-3]	1.00	1.00
18) Perme ICU Mobility Score (Total)	15 [0-30]	15 [0-30]	1.00	1.00

(n=8) respiratory cases. Mechanical ventilation was used in 19% (n = 21) of the patients, and 36% (n=40) of the cases involved used vasoactive drugs. Patients spent on average 1.41 days on mechanical ventilation. The duration of ICU stay at the time of evaluation was 5.04 days.

Table II presents the reliability (Cronbach's alpha coefficient and internal consistency) and inter-rater agreement (kappa statistics and 95% CI) for the IMS and each item of Perme Score. The inter-rater agreement and reliability of the IMS were very good (Ranganathan et al., 2022).

Furthermore, there was good inter-rater agreement and reliability for every item in the Perme Score, with inter-rater agreement ranging from 77% to 100% and inter-rater reliability (Cronbach's alpha coefficient) ranging from 92% to 100% for each item.

The average completion time for the Perme Score and IMS scoring sheets was two minutes and less than one minute, respectively. Additionally, there was a significant positive correlation ($r = 0.998$; $p < 0.001$) between the two instruments' application in the patient evaluation.

Discussion

In recent years, many studies have discussed the advantages and necessity of physical therapy for critically ill patients (Wang et al., 2023). To improve physical therapy care for patients in the ICU, instruments to assess function and mobility have been developed specifically for this population. These instruments allow for the performance and progression of exercises based on individual mobility characteristics (Parry et al., 2017). A rising number of scales and questionnaires are available in the health domain that aim to assess and validate phenomena identified in many research studies and health domains, therefore, the reliability and validity of these instruments are crucial (Dalla et al., 2017).

The Perme Score and IMS instruments were meticulously translated into Romanian language and culturally adapted for use in Romania. Both the Romanian-language and original versions of the instruments were found to be semantically and technically equivalent. Our findings show that both instruments demonstrated a strong inter-rater agreement and reliability in their translations customized for utilization in Romania, after a brief period of familiarization and training. There was also a significant positive correlation between the Perme Score and the IMS,

Prior to this study, there were no cross-culturally adapted instruments for assessing mobility in ICU patients that could be used in Romania. Healthcare providers across Romania now have access to two instruments that can enhance the standard of care given to critically ill patients in the ICU.

Both the Perme Score and IMS demonstrated strong inter-rater agreement and reliability ($\kappa > 0.9$ and $\alpha > 0.9$ for most areas) in their versions tailored for usage in Romania. Our study showed a higher level of reliability between evaluators, this was also observed in item 4 of the Perme Score where we obtained 0.860 compared to the original item which was 0.800. Although item 4 in the Perme Score obtained the lowest score amongst the evaluators, the same observation was reported by the researchers from Germany

(Nydahl et al., 2017).

The group that created the Perme Score reported moderate to high reliability (Nawa et al., 2014). The fact that there was a larger sample size in our study than in the original study can be considered a strength. Item 4 in the Perme Score, "The patient experiences or does not experience any pain at any time during mobility activities", showed the lowest inter-rater reliability and agreement in our study, perhaps because raters interpreted the responses differently about the pain experienced by the patient, pain measurement is strongly discussed in the literature (Deldar et al., 2018). While the assessment of pain by academics and physicians is dependent on observations, the subjective experience of pain is inherently unobservable (Wideman et al., 2019). Half of the Perme Score items showed excellent inter-rater reliability and inter-rater agreement.

It is interesting to note that despite the IMS's sole domain having an 11-point scale from 0 to 10, inter-rater reliability and agreement were outstanding. The mobility milestones in the IMS are clear and easy for the rater to assess, even though the range is wider than in each area of the Perme Score.

We expected scores on the two instruments to be highly correlated because they both measure the same activities and are easy to apply. It should be noted that half of the maximum score was obtained by both, the IMS and the Perme Score, this is because 71.81% of patients were conscious.

Analyzing inter-rater reliability and agreement involving physical therapists was essential since it is well known that they were directly involved in the process of functional evaluation and early mobilization of critically ill patients. We cannot, however, guarantee that the features described in this study will be accessible to other medical professionals—such as nurses and doctors—who make up multidisciplinary ICU teams and may want to utilize the Perme Score and IMS. Lastly, the assessments happened simultaneously. Therefore, our study did not analyze factors that may vary from one healthcare practitioner to another, such as tone of voice, personal style, and patient guidance. Nevertheless, the fact that each rater oversaw half of the assessments mitigated this effect.

The fact that the Perme Score and the IMS have been translated to other languages and culturally adjusted for other nations makes it easier to compare the results of the research that has been conducted (Kawaguchi et al., 2016; Nydahl et al., 2017; Wilches et al., 2018). This study was carried out in a single institution and did not consider other professionals of the ICU team, which can be considered as a study limitation, but it does not affect the validity of the results.

Conclusions

1. As a result of this study, we conclude that the Perme ICU Mobility Score and ICU Mobility Scale were accurately translated, cross-culturally validated, and suitable for use in Romania.

2. The Romanian translations demonstrated strong inter-rater agreement, inter-rater reliability, and positive correlation between the two instruments.

Conflicts of interests

No conflicts of interest exist.

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