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ORIGINAL ARTICLE

Psychometrical evaluation of an instrument to measure the nurses' knowledge about early mobilization among post laparotomy patients[☆]



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Validity and reliability;
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Abstract

Objective: This study aims to assess the validity and reliability of an instrument regarding the nurse's knowledge in performing early mobilization intervention on the post laparotomy patients.

Methods: This cross-sectional study involved 13 nurses in the Intensive Care Unit (ICU) in Makassar General Hosp¹⁹. The data were analyzed using Expert Judgment with Content Validity Index (CVI) ≥ 0.80 and Internal Consistency Reliability with the value of Cronbach's Alpha > 0.6 .

Results: The research finding showed that the CVI of 0.96 with I-CVI total value of 19.5 and the value of Cronbach's Alpha of 0.375 ($n = 13$).

Conclusion: The Instrument on the knowledge of the early mobilization intervention steps on the post laparotomy surgical patients can be used as a standardized instrument. Its implication can be used as a Standard Operational Procedure (SOP) in assessing the quality of nurses in providing nursing care services.

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Introduction

A laparotomy is a surgical procedure to gain access to the peritoneal cavity by making a significant cut in the mid-line along the linea alba.¹ In the United States, there were nearly 10 million patients discharges related to laparotomy between 2009 and 2013.² While in the UK, 30,000–50,000 surgical procedures were performed annually.¹ In Indonesia, there were 1.2 million surgeries per year, and it was estimated that 32% of them are laparotomy. The

morbidity rates from surgical complications range from 3% to 16%; meanwhile, the mortality rates range from 0.4% to 0.8% in a developed country and 5% to 10% in developing countries. For this reason, adequate intervention is needed in order to reduce post-operative complication.³

Complications that may occur after surgery are Post-operative Ileus (POI), Deep Vein Thrombosis (DVT), muscle weakness, pulmonary disease, intra-abdominal infection, wound dehiscence, and urogenital infections.⁴ Those complications should be treated immediately, one of which through early mobilization intervention. According to clinical practice guidelines from the American Society of Colon and Rectal Surgeons (ASCRS) and Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), the management of post-operative intervention on early mobilization can minimize some negative impacts caused by surgeries on organ functions.⁵

However, early mobilization intervention is less commonly performed by nurses. According to the study on the nurses in hospitals in Washington, DC, mobilization became the intervention with the highest percentage of Missed Nursing Care Task of 53% by medical-surgical nurses.⁶ This is in line with the result of a study administered to 344 nurses from Australian Hospitals that early mobilization is the most reported missed nursing care component (43.3%) due to inadequate knowledge and skills as well as inability to evaluate the intervention area given.⁷

The lack of knowledge and skills tends to make nurses do not carry out the intervention to patients; it will undoubtedly affect the quality of nursing care.⁷ Therefore, we need a standardized instrument to assess the nurse's knowledge of performing the early mobilization intervention to post laparotomy surgery. In the meantime, there is no standardized instrument assessing nurse's knowledge of the early mobilization steps, appropriate timing for the intervention, as well as its benefits and resulting impacts. The previous instruments, however, lack some components that make it necessary to develop an instrument in accordance with the evidence-based practice in order to be used as a measurement tool in research. Thus, the development of an instrument assessing nurse's knowledge in providing nursing care services to post-laparotomy surgical patients is essential. This study aims at assessing the validity and reliability of an instrument measuring nurse's knowledge in performing early mobilization intervention to post-laparotomy surgical patients.

Methods

Design and samples

This study is a cross-sectional pilot study with a non-probability sampling technique using total sampling by selecting all those that fulfill the inclusion and exclusion criteria. The instrument developed in this study involved all 13 Intensive Care Unit (ICU) nurses of Makassar General Hospital. The inclusion criteria are having minimum education requirement of Diploma III (three) of Health Education and one year plus of experience in ICU while the exclusion criteria are the nurses in the period of leave or got illness during the study.

Procedures and data analysis

The instrument assessing nurse's knowledge regarding early mobilization intervention was in the form of a questionnaire consisting of 20 multiple-choice questions. The questions were compiled based on evidence-based literature. Then, the questionnaire went through the expert judgment consisting of three expert panels to evaluate each item in terms of its relevance, clarity, simplicity, and ambiguity using a four-point rating: 1 = 'not relevant', 2 = 'somewhat relevant', 3 = 'quite relevant', and 4 = 'highly relevant'.⁸ Instrument test results from the three expert panels were calculated using the Content Validity Index (CVI). CVI is used to check the content validity of an instrument and is categorized as very good if the content validity ≥ 0.80 . Meanwhile, a reliability test was carried out using Internal Consistency Reliability to determine if the items measure the right concepts of Cronbach's Alpha. It was analyzed using IBM SPSS Statistics for Windows, version 22.0.

Ethical consideration

Ethics approval for this study was obtained from the Health Research Ethics Commission of Health Polytechnic Makassar no. No: 1135/KEPK-PTKMKS/X/2019 then forwarded to the Hospital Education and Training Center to get permission to conduct the research. The respondents signed the informed consent after receiving the information regarding the objectives and requirements of the study, just in case the respondents quit this study without notice. The items of the questionnaire are presented in Table 1.

Results

The mean age of the participants was 30 years old, ranging from 27 to 36 years. Most of the participants were female (71.4%). 78.6% of participants are Registered Nurse (RN) with an average of 7 years of work experience ranging from the minimum length of work of 1 year to the maximum length of work of 15 years.

Validity test

In order to assess the instrument that will be used as a measurement tool, the validity test in this study was conducted through the judgment by expert quantitatively using the CVI method. The experts consist of 3 people with a doctoral degree and have a basic knowledge of medical-surgical nursing with more than 15 years work experience in the field of education. The experts were asked to rate the content of each item in the questionnaire with the choices of scores 1 = 'not relevant', 2 = 'somewhat relevant', 3 = 'quite relevant', and 4 = 'highly relevant'. From the total score calculated from the three experts, it was concluded that all items in the questionnaire met the relevant criteria with CVI ≥ 0.80 , showing that the questionnaire had a good content validity. Based on the expert judgment, the CVI value was 0.96, with a total I-CVI = 19.5. This showed that all items in the questionnaire are valid and can be used as a measurement tool.

Table 1 Results of the analysis of knowledge instruments and Cronbach's alpha.

Questions and Answers Options	Cronbach's Alpha
An action performed on a post-operative laparotomy patient by doing passive ROM exercises left and right tilted position, sitting position, until helping to walk the understanding of (active ROM/passive ROM/mobilization/immobilization)	0.712
Early mobilization in post-operative laparotomy patients by training the flexibility and strength of muscles and joints by actively using their muscles is called (active ROM/passive ROM/functional motion/activity intolerance)	0.706
Early mobilization interventions is carried out (before surgery/after 6 h post-surgery/immediately after surgery/after 24 h post-surgery)	0.751
Stages of early mobilization consist of (2 stages/3 stages/4 stages/5 stages)	0.713
The purpose of early mobilization is (reducing bleeding/increase the risk of pressure sores/streamlining blood circulation/increase pulmonary complications)	0.713
Early mobilization activities to help post-operative laparotomy patients in performing passive ROM such as helping patients move their shoulders, elbow movements, wrist movements, hip and knee movements, foot and ankle movements performed on (stage 1/stage 2/stage 3/stage 4)	0.763
Assist post-operative laparotomy patients to change their left and right slanted position, the position of semi fowler to fowler (30° to 90°) is done (stage 1/stage 2/stage 3/stage 4)	0.752
Early mobilization of the first phase is carried out on (8 h before surgery/at 6–24 h post-surgery/shortly after surgery/after 24 h post-surgery)	0.722
Activities carried out at the fourth stage of early mobilization are (helping patient lean in bed/help the patient in a sitting position without leaning/helping patients sit on the edge of the bed initiated/helps patients stand and be active in wheelchairs until they walk)	0.706
Activities carried out at the third stage in early mobilization are (help the patient in a sitting position without leaning/helps patients tilt right-left tilt/helping patients sit on the edge of the bed initiated/helping patients walk 2–3 steps beside the bed to get to the bathroom)	0.740
Activities carried out in the second stage in early mobilization are (help the patient in a sitting position without leaning/helps patients tilt right-left tilt/helping patients sit on the edge of the bed initiated/helping patients walk 2–3 steps beside the bed to get to the bathroom)	0.730
The second phase of early mobilization is carried out on (less than 12 h before surgery/12–24 h post-surgery/less than 12 h after surgery/24–48 h post-surgery)	0.746
Assisting post-operative laparotomy patients to sit in bed as much as (1 time per day for 30 min/2 times per day for 30 min in 1 session/at least two times per day for 5–15 min in 1 session/minimum of 2–3 times per day for 1 h in 1 session)	0.687
Benefits of early mobilization in post-operative laparotomy patients (Increase complications of post-operative surgery/increases the risk of deep venous thrombosis/Speed up the process of intestinal peristalsis/Increases the risk of pulmonary complications)	0.713
Complications caused when no early mobilization is carried out in post-operative laparotomy patients (Reducing fatigue/Extend the length of stay/Reducing surgical complications/Speed up the wound healing process)	0.723
Contraindications to early mobilization in post-operative laparotomy patients (post-operative patients with hypertension/post-operative patients with DM/post-operative patient with a history of pulmonary TB/post-operative patients with a history of vertigo)	0.734
Complications caused by immobilization in post-operative laparotomy patients (risk of fracture/risk of muscle hypertrophy/risk of decubitus/risk of urinary tract infections)	0.692
Things to consider before doing early mobilization in post-operative patients laparotomy (measuring intestinal peristalsis/wound condition/measuring vital signs/measuring brachial ankle index)	0.713
Things that must be considered in patients when conducting early mobilization in post-operative laparotomy patients (old bed rest/medical devices installed in the patient's body, so they are not interested/muscle weakness/reduction in surgical complications)	0.720
Early mobilization not carried out according to the procedure can cause (risk of muscle atrophy/risk of infection in wounds/risk of injury to patients and caregivers/risk of deep venous thrombosis)	0.710

Reliability test

The reliability test for the instrument was carried out using internal consistency reliability in order to see whether the questionnaire items measure the same underlying concepts with the Cronbach's Alpha. This is the most accurate approach to measure internal consistency reliability. At this stage, the information was presented in the form of Cronbach's Alpha (0.734). The following table is the Cronbach's Alpha value for each item in the questionnaire. The items of the questionnaire are presented in Table 1. The four answer options are also displayed in the parentheses. The answer options are separated with a slash.

Discussion

Early mobilization procedure performed to the post laparotomy surgical patients contributes to reduce hospital length of stay,⁹ reduce the risk of complications, as well as to reduce morbidity and mortality.³¹ Thus, early mobilization is strongly recommended by Enhanced Recovery After Surgery Society (ERAS).¹¹ Therefore, the nurse's knowledge in providing nursing care services to post-laparotomy surgical patients is important. An evidence-based instrument is needed in measuring nurse's knowledge in providing nursing care since the evidence-based instrument is considered as having high validity. Moreover, the questionnaire is the most practical instrument to use.¹² Early mobilization instruments can be developed following policy formulation and programmed orientation, and the development of the program has a positive impact on nurses' understanding related to the risks of immobilization and the benefits of mobilization in patients.¹³ Thus, an evidence-based instrument is needed in order to assess the competence of the nurse's knowledge.¹²

In developing an instrument, a test for validity and reliability is necessary since they are the most essential and fundamental features in evaluating every measurement tool.¹⁴ Validity concerns with what an instrument measures and how well it measures. In contrast, reliability concerns one's faith in the instrument in obtaining the data, the degree to which a measuring tool can control the random errors.^{12,14,15} The research findings showed the CVI of 0.96 with an I-CVI total value of 19.5, which indicates an excellent content validity (CVI value ≥ 0.80).⁶ The average content validity index for the questionnaire was 0.93, where all items had a score higher than 0.79 with 18 question items.¹⁶ Another research result²⁶ reviewing 20 question items by 27 experts obtained a scale content validity index of 0.94 then tested among 200 undergraduate nursing students used to evaluate EBP knowledge.¹⁷

Another study by Spurlock and Wonder (2015) showed minimum CVI and maximum CVI of 0.83 and 1, respectively, from 20 item questions.¹⁸ This showed strong psychometric properties for an instrument and was available for use in research and educational contexts. Next, the results of the study by Pezeshki et al. (2017) designing 25 items with seven scales showed CVI of 0.99.¹⁹ The results of another study, a draft questionnaire composed of 35 items related to knowledge about musculoskeletal disorders and its risk factors validated by nine experts, yielded a 0.98 overall CVI.

Hence, it can be concluded that high CVI value from the item questions indicates its availability for use in researches.

The reliability test results of this study using internal consistency reliability indicate the value of Cronbach's Alpha 0.734. This indicated that the instrument developed is reliable to be used. A previous study conducted also showed Cronbach's alpha value of 0.90.²⁰ Other studies by developing and validating psychometric scales to prevent early diarrhea in children obtained Cronbach's alpha (0.84), which shows that the scale is reliable.²¹ Coefficient results for items between 0.63 and 0.95 with $p < 0.05$ indicating high internal reliability with Cronbach's alpha values varying between 0.63 and 0.85 and 0.89 so they can be used as instruments.²²

Conclusion

The instrument on the knowledge of the early mobilization intervention steps on post laparotomy surgical patients can be used as a standardized instrument assessing nurse's knowledge regarding early mobilization intervention. Its implication can be used as a Standard Operational Procedure (SOP) in assessing the quality of nurses in providing nursing care services. In addition, this instrument can be used to assess the quality of nurses in providing nursing care services in terms of early mobilization interventions to the post-laparotomy surgical patients based on evidence-based practice.

Conflict of interest

The authors declare no conflict of interest.

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