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VALIDITY AND RELIABILITY OF INSTRUMENT TO MEASURE CLINICAL INDICATOR OF NURSING DIAGNOSIS: FATIGUE ON PATIENT UNDERTAKING HAEMODIALYSIS

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Abstract
Background: Fatigue as nursing diagnosis is a common phenomenon in patient undertaking haemodialysis. There is, however, no clear instrument to measure the clinical indicators of this nursing diagnosis.
Objectives: To measure the validity and reliability an instrument to measure clinical indicator in nursing diagnosis fatigue.
Methods: Content Validity Index for Scale (S-CVI) and Point-Biserial Correlation were used to measure the validity of instrument. Cronbach Alpha Reliability was used for reliability of 72 patients undertaking haemodialysis.
Results: S-CVI score was 1 on relevance, accuracy and clarity, 0.98 on simplicity and ambiguity. The Cronbach's Alpha of the instrument was 0.675 which was considered reliable.
Conclusion: The instrument to measure clinical indicators of nursing diagnoses fatigue has acceptable validity and reliability score in Indonesian, and it is recommended to be used in clinical setting.

Keywords: validity; reliability; fatigue; haemodialysis

INTRODUCTION

Nursing diagnosis is part of nursing process which has to be established in nursing care (Doengoes & Moorhouse, 2013). This diagnosis establishment is considered an important element that can determine the next step for the treatment and evaluation of nursing care for patients (Carpenito, 2006). Diagnostic process is not a simple process. Nursing process can be effectively implemented if nurses have an ability to apply basic skill in nursing process (Doengoes & Moorhouse, 2013). Nurses need to collect accurate and relevant data for hypothetically established nursing diagnosis (Herdman & Kamitsuru, 2014). In this case, it is important for nurses to recognize data or clinical indicators. In order to recognize data, nurses must have sufficient knowledge regarding specific nursing diagnosis, and they must recognize the symptoms of specific diagnosis (Herdman & Kamitsuru, 2014). There are several methods to collect important data to establish nursing diagnosis. Specific instrument is required for accurate nursing

diagnosis, for example: the use of Beck Depression Inventory (Beck, Guth, & Steer, 1997) to establish a diagnosis in those patients who suffer from depression. Instruments used to detect anxiety experienced by the patients are State-Trait Anxiety Inventory, Beck Anxiety Inventory, Hospital Anxiety, and Depression Scale-Anxiety (Julian, 2011). The instrument used to detect patients who experience sleep disturbance is the Pittsburgh Sleep Quality Index (Carpenter & Andrykoswki, 1998). Those instruments are however, not used in establishing nursing diagnosis. Thus, the question arises whether there is any instrument that facilitates the establishment of nursing diagnosis. Currently, nursing diagnosis is based on NANDA-I Taxonomy that has been developed only by stating what clinical indicators may be identified in "problem focused diagnosis" and what risk factors may be identified in "risk nursing diagnosis" (Herdman & Kamitsuru, 2014).

Despite clinical indicators or risk factors in each specific nursing diagnosis, there is no clear information on how to weigh those clinical indicators and risk factors, which one is more important than other data. Moreover, there is no research which explores how to design an instrument for establishing nursing diagnoses based on their own clinical indicators or risk factors. The present study aims to develop an instrument based on clinical indicators for the nursing diagnosis of fatigue. In this development process, an instrument was developed and the validity and reliability of this instrument were assessed.

METHODS

Study design
The research used quantitative with cross sectional design.

Setting
Research was carried out at the haemodialysis unit, at one central hospital in Yogyakarta, Indonesia.

Sample
The study population comprised 72 patients undergoing haemodialysis (n = 72), and 3 experts were selected for analysing the validity of the instrument.

Instrument
Instrument for measuring the NANDA-I nursing diagnosis: fatigue (00093) is developed from 16 clinical indicators (item) of this diagnosis. In the process of development of this instrument, one item is divided into three questions. Thus, the total items in this instrument are 18 questions. Measurement by the instrument is based on the Guttman scale. Patient can answer yes (score 1) or no (score 0). This instrument was used to collect data for content validity from three experts and point-biserial correlation measured on 72 patients. The reliability was measured on 72 patients who were undergoing haemodialysis. Respondents were interviewed using Piper Fatigue Scale to find out the fatigue scale of each respondent. From a total of 97 respondents who experienced fatigue then researcher selected 72 respondents using simple random sampling technique. Those respondents were interviewed using instrument derived from clinical indicators from nursing diagnosis fatigue based on NANDA-I Taxonomy (Herdman & Kamitsuru, 2014).

Ethical consideration
The study was approved by the Ethics Committee of the Faculty of Medicine, Gadjah Mada University with approval number: KE/FK/1328/EC/2016.

Data analysis
I-CVI was used to analyse the instrument which measured content validity of clinical indicators of nursing diagnoses fatigue, while point-biserial correlation was used to measure validity of each items, whereas reliability was measured using Cronbach's alpha. Cronbach's alpha was used to measure internal consistency or reliability of this instrument with multiple items, while using this scale (Dukes, 2005).

Table 1 Instrument development

Number of items	Clinical indicators	Modification of item	Question
1	Listlessness	Changes into 'Apathy' And developed into three items	Three questions 1a. Do you feel less energetic since undergoing haemodialysis? 1b. Do you find it difficult to devise a plan of action? 1.c Do you find it difficult to implement plans?
2	Alteration in concentration	No modification	Do you experience alteration in concentration or paying attention?
3	Alteration in libido	No modification	Do you experience sexual dysfunction since undertaking haemodialysis?
4	Introspection	No modification	Do you self-evaluate regarding haemodialysis you undertake?
5	Tiredness	No modification	Do you feel easily tired or less energetic since undertaking haemodialysis?
6	Insufficient energy	No modification	Do feel less energetic while performing an activity or at work?
7	Disinterest in surroundings	No modification	Do you feel lack of interest toward surroundings?
8	Lethargy	No modification	Do you feel tired or no enthusiasm while undergoing haemodialysis?
9	Drowsiness	No modification	Do you feel sleepy while undergoing haemodialysis?
10	Guilt about difficulty maintaining responsibility	No modification	Do you feel guilty about difficulty in maintaining responsibility?
11	Increase in rest requirement	No modification	Do you feel you need more time for taking a rest since you undergoing haemodialysis?
12	Increase in physical symptoms	No modification	Do you feel you complain more about your physical condition since undergoing haemodialysis
13	Ineffective role performance	No modification	Do you feel a decrease in your performance since undergoing haemodialysis?
14	Non-restorative sleep pattern (i.e., due caregiver responsibilities, parenting practices, sleep partner)	No modification	Do you feel sleep deprived and repeatedly awaken since undergoing haemodialysis?
15	Impaired ability to maintain usual physical activity	No modification	Do you feel unable to maintain your usual physical activity?
16	Impaired ability to maintain usual routines	No modification	Do you feel unable to maintain your usual daily routine activity?

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RESULTS

Result shows that the mean of respondents' age was 51.53 years old (SD ± 12.56). A majority of respondent were aged 46–59 years. The youngest was 25 years old and the oldest was 94 years old (Table 2). All the respondents were routinely undergoing haemodialysis twice a week. And the result of content validity shows that, in the relevance component, all items has 1 value which means that this instrument was valid (Table 3). Based on Polit & Beck (2007), I-CVI value more than 0.78 measured by 3 experts or more is considered as having good content validity.

Table 2 The characteristic of respondent (n = 72)

Characteristic	Mean ± SD	Frequency (f)	Percentage (%)
Age	51.53 ± 12.56		
25–31		3	4.17
32–38		8	11.11
39–45		10	13.89
46–52		18	25.00
53–59		18	25.00
60–66		7	9.72
67–73		4	5.56
74–80		2	2.78
81–87		1	1.39
88–94		1	1.39
Gender			
Female		38	52.78
Male		34	47.22
Duration of haemodialysis treatment (month)	51.82 ± 44.93		

Table 3 I-CVI and S-CVI of relevance, accuracy, clarity, simplicity, and ambiguity

No	Item	Relevance I-CVI	Accuracy I-CVI	Clarity I-CVI	Simplicity I-CVI	Ambiguity I-CVI
1	Apathy: Do you feel reduces in spirit since undertaking haemodialysis?	1	1	1	1	1
2	Apathy: Do you feel difficulty to make a plan for an action	1	1	1	1	1
3	Apathy Do you feel difficulty to take an action?	1	1	1	1	1
4	Alteration in concentration	1	1	1	1	1
5	Alteration in libido	1	1	1	0.67	0.67
6	Introspection	1	1	1	1	1
7	Tiredness	1	1	1	1	1
8	Insufficient energy	1	1	1	1	1
9	Disinterest in surroundings	1	1	1	1	1
10	Lethargy	1	1	1	1	1
11	Drowsiness	1	1	1	1	1
12	Guilt about difficulty maintaining responsibility	1	1	1	1	1
13	Increase in rest requirement	1	1	1	1	1
14	Increase in physical symptoms	1	1	1	1	1
15	Ineffective role performance	1	1	1	1	1
16	Nonrestorative sleep pattern (i.e., due caregiver responsibilities, parenting practices, sleep partner)	1	1	1	1	1
17	Impaired ability to maintain usual physical activity	1	1	1	1	1
18	Impaired ability to maintain usual routines	1	1	1	1	1
	S-CVI	1	1	1	0.98	0.98
	Total Agreement	18	18	18	17	17

S-CVI value of this instrument was 1, which is considered as valid and acceptable. Polit & Beck (2007) stated that S-CVI value is accepted and valid if the S-CVI value is 0.8 or more. Relevance, accuracy and clarity have a value of 1 both in I-CVI and S-CVI. The score of items on the simplicity and ambiguity, could not reach 1, because the item libido has a score of 0.67 in I-CVI. The result of point-biserial correlation to measure validity of each items on 72 patients shows that 3 out of 18 items were not valid (Table 4).

Table 4 Point-biserial correlation

Question	rPBIS	Valid/Not Valid
Q1a	0.3487	Valid
Q1b	0.4415	Valid
Q1c	0.4691	Valid
Q2	0.6549	Valid
Q3	0.3616	Valid
Q4	0.2310	Not Valid
Q5	0.5217	Valid
Q6	0.5217	Valid
Q7	0.4451	Valid
Q8	0.5303	Valid
Q9	0.1737	Not Valid
Q10	0.3562	Valid
Q11	0.2684	Valid
Q12	0.4366	Valid
Q13	0.1813	Not Valid
Q14	0.460	Valid
Q15	0.235	Valid
Q16	0.269	Valid

The result of analysis shows that Cronbach's alpha was 0.675, meaning this instrument was reliable (Table 5)

Table 5 Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.675	.680	18

Researcher analysed the data and found that if items that were not valid based on point-biserial correlation (4, 9, and 13) were deleted, then the reliability increased from 0.675 to 0.688.

DISCUSSION

Content validity is related to the power of the instrument's items to measure a concept. Content validity process is started from concept analysis and instrument development. There are several methods for measuring content validity for example literature review, personal reflection and analytical critique (Higgins & Straub, 2006). Content validity is an important factor in identifying the concept of measuring (Yaghmaie, 2003). By documenting the content validity of the instrument that has been used, the reader can understand the process of measuring content validity and then by measuring content validity, the interpretations of results are precise (Yaghmaie, 2003).

The result of this study shows that content validity is considered as acceptable, even though there is one item which scored less than 1 in I-CVI, which was 'libido', and in item content validity 'simplicity' and 'ambiguity', the S-CVI score was 0.98. Lyn states that if, 5 or less than five ratters conduct measurement then I-CVI has to reach a score 1 and if the number of ratters is 6 or more than I-CVI should not be less than 0.78 (Dukes, 2005). Based on Lyn's statement, the instrument is considered as less acceptable, however, Polit et al. (Polit et al., 2007) suggests that items with an I-CVI of .78 or higher for three or more experts could be considered evidence of good content validity (Polit et al., 2007). Items with an I-CVI lower than .78 would be considered for revision, and those with very low values would be candidates for deletion. For scale to be judged as having excellent content validity, it should be composed of items that had I-CVIs of .78 or higher and a S-CVI/ I-CVI of .90 or higher (Polit et al., 2007).

In this study, item 'libido' has got less score in 'simplicity' and 'ambiguity'. This may be because sexual topic is considered as taboo in developing country. It also may be affected by Javanese culture in which sexual topic is rarely discussed openly. It is known that something that is taboo, is not as simple as it looks. Collecting data regarding sexual topic is not always easy. It may also be understood differently among people. These may the reasons of this item having a lower score for I-CVI in both item 'simplicity' and 'ambiguity'.

Point-biserial correlation is a type of correlation between a dichotomous variable (the multiple choice item score which is right or wrong, 0 or 1) and a continuous variable (the total score on the test ranging from 0 to the maximum number of multiple choice items on the test) (Varma, 2006). In this study, point-biserial correlation find that item 4, 9, and 13 were not valid. Items that have low

point-biserial values need further examination even if that item have good score in I-CVI values. Something in the wording, presentation, or content of such items may explain the low point-biserial correlation (Varma, 2006). Factors that may affected validity of the instrument is the reliability coefficients, that can affect validity coefficients, for examples the more heterogeneous the groups are, the higher the correlations between two measures will ultimately be (Thanasegaran, 2009). If the data range is limited, the scores become more homogenous and the resulting correlation coefficients derived are artificially inflated (Thanasegaran, 2009).

Some factors may result in low validity values, because the items may not have a clear correct response and may represent a different content area than that measured by the rest of the test (also known as multidimensionality) (Varma, 2006). Result shows that this instrument has a good reliability. The range of reliability measures is rated as follows: less than 0.50, the reliability is low, between 0.50 and 0.80 the reliability is moderate and greater than 0.80, the reliability is high (Tan, 2009).

In this study, as the patients were undertaking haemodialysis, researcher considered patient's state of mind and wellbeing while collecting data. Interview to collect data was conducted in short time as instrument has also only 16 items (18 questions). This strategy was applied as test performance can be influenced by patient's psychological and physical state (Polit et al., 2007).

CONCLUSION

The instrument to measure clinical indicators of nursing diagnoses fatigue has acceptable validity and reliability score in Indonesian language. This instrument can be used for measuring nursing diagnosis fatigue, in Indonesian setting.

Declaration of Conflicting Interest
None declared.

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Author Contribution
All authors contributed equally in this study.

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