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Original Research Article

Psychometric Evaluation of IWPS-R: Pilot Study

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Abstract: This pilot study aimed to determine the clarity, relevance, understanding and reliability of the Revised Individual Workload Perception Scale with a sample of Omani nurses. The study also explored use of incident reports to determine if underreporting of errors exists in Omani hospitals. The IWPS-R has been shown to be a valid and reliable tool to measure nurses' perceptions in relation to their workload and work environment in the USA, Europe and Asian countries. IWPS-R has not been used in any Arab country including Oman. Therefore, the validity and reliability of the scale needed to be tested with an Omani sample. This pilot study also assessed the use of incident reports to identify the number, types and causes of errors in Omani hospitals in anticipation of a subsequent study. This pilot study used a descriptive statistical design and the data were collected using IWPS-R and, incident reports submitted by one hospital unit. The sample included 28 nurses. Data were analyzed using SPSS version 24 was used for data analysis .Cronbach's alpha coefficient for the IWPS-R was .708. All but two IWPS-R subscales had coefficients above .50. Most of the nurses reported understanding the items of the IWPS-R. Only six incident reports were submitted by the unit over a 3-month period, suggesting underreporting of medical errors.IWPS-R was found to be a valid and moderately reliable instrument when used with a sample of Omani nurses on four of its six subscales. The results supported the use of the IWPS-R in Oman. The small number of incidents reported suggested underreporting of errors, which necessitated major changes in the design of the subsequent larger study.

Keywords: IWPS-R, underreporting, medical errors, Omani nurses.

INTRODUCTION

Patient safety is a universal concern that has captured the attention of many countries including Oman (WHO, 2002). The importance of patient safety became a global priority in 1999 with publication of the Institute of Medicine's (IOM) report, To Err Is Human: Building a Safer Health System (IOM, 1999). The IOM identified patient safety as a priority research topic and stated that 98,000 Americans die annually as a result of errors in care. In 2010, the U.S. Centers for Disease Control and Prevention (CDC) reported that human errors contributed to the deaths of 180,000 Medicare patients alone (CDC, 2013). In 2013, Johan James updated the number of Americans dying because of medical errors, and reported that more than 40,000 patients die annually in the USA due to preventable harm. A recent study that was published by Martin Makary and Michael Daniel in 2016 indicated that 250,000 Americans die annually as results of medical errors.

Medical error is considered the third cause of death after cancer and heart diseases (Makary & Daniel, 2016). Existence of medical errors in any healthcare system indicates that there is a weakness in that healthcare system and the IOM sounded an alarm about the urgency of finding solutions and plans to solve the problem of medical errors (Makary & Daniel, 2016). Events considered errors include medication errors, falls, and nosocomial infections as well as the development of pressure ulcers (Aiken *et al*., 2001, Aiken *et al*., 2003; Fasolino & Snyder, 2012; Kendall-Gallagher & Blegen, 2009; Pronovost *et al*., 2006; Teixeira & Cassiani, 2014). The IOM (2004) defined an error as "failure of a planned action to be completed as intended or the use of the wrong plan to achieve an aim" (p. 25).

Errors can result from system failure or human-related factors. Human-related factors, e.g., nurses' fatigue, educational background, and training,

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are significantly correlated with the number of adverse events (Graf *et al*., 2003; Pronovost *et al*. 2006; Tella *et al*., 2014). Nursing characteristics, such as level of education and years of work experience**,** were strongly correlated with patient safety and the quality of patient care (O'Brien-Pallas *et al*., 2004; Chaneliere *et al*., 2018; Tella *et al*., 2014). Staffing issues such as staff shortage, skill mix, high patient-to-nurse ratios, and increased workload are associated with poor patient outcomes leading to complications**,** longer lengths of hospital stay, and death (Duffield *et al*., 2011; Unruh & Fottler, 2006).

The work environment plays an integral role in patient safety and quality of care. It was identified that the healthcare environment accounts for 22% of errors in hospital environments (Chaneliere *et al*., 2018). A work environment should have a good management system, good collaborative working relationships with different team members that will lead to positive outcomes and patients will receive good quality care (Chaneliere *et al*., 2018). Nurses who have autonomy, managerial support, collaborative relationships with others, practice control and continuity/specialization in their work environment and the ability to work to the full extent of their expertise and knowledge had a positive impact on patient care outcomes (Boyle, 2004; Unruh & Fottler, 2006). Positive work environments reduced nurses' burnout**,** increased nurses' job satisfaction and affected nurses' intent to stay in their job (Aiken *et al*., 2008; Cho *et al*., 2015; Purdy *et al*., 2010).

Medical errors are documented using different systems. Incident reports are a commonly used method to report errors; submission of these reports depends on nurses' willingness to report errors (Cohen & Shastay, 2009). Lack of willingness of nurses to report errors may be due to fear of punishment, lack of confidence, or lack of support from managers (Mayo & Duncan, 2004; Teixeira & Cassiani, 2014). It is estimated that only 5% of errors are actually reported (Cohen & Shastay, 2009) because of underreporting.

Different medical errors occur daily in healthcare settings. Medication errors are considered the most common medical errors occurring in hospital settings (Björkstén *et al*., 2016). Pressure ulcer is another common medical error that leads to increased morbidity and mortality especially among the older patient population (Jaul *et al*., 2018). In Italy it was found that 6.5% of the sample included acquired pressure ulcers (Palese *et al*., 2017).

In the Oman Ministry of Health (MOH)**,** patient safety is a priority objective. Nurses play a significant role in ensuring patient safety in Oman where Omani nurses make up eighty percent of nursing workforce in hospitals (MOH, 2014). Despite growing concern of the MOH about patient safety and nurses' vital role in maintaining patient safety, no research has been conducted in Oman to examine the relationship of nurses' characteristics, workload and work environment to patient safety and error reporting. Further, no valid and reliable instruments have been used in Oman to address the issue of errors and patient outcomes and their relationship to nurse characteristics. Therefore, this pilot study was conducted to determine the clarity, relevance, understanding and reliability of the Revised Individual Workload Perception Scale with a sample of Omani nurses. This pilot study also examined if underreporting exists in Oman hospitals using incident reports.

EXPERIMENTAL SECTION

This pilot study utilized a descriptive design to examine the relevance, clarity, understanding and reliability of the IWPS-R with a sample of nurses working in Omani hospital. The IWPS-R has been found to be a valid and reliable measure scale with good validity in several studies conducted in the USA (Cox, Anderson, Teasley, Sexton, & Carroll, 2005; Cox *et al*., 2007; Lacey, Teasley, & Cox, 2009; Sexton *et al*., 2008; Teasley *et al*., 2007). The English language version of the IWPS-R is appropriate for use in Oman because English is understood and used by all nurses working in Omani hospitals and it is the most commonly used language in Omani hospitals.

The IWPS was developed by Cox in 2001 to measure nurses' perceptions of their working environment after finding that nurses were stressed by their work environment (Cox, 2002). Cox and her colleagues modified the IWPS in 2006 to enhance and improve its reliability. Both the original IWPS and revised versions (IWPS-R) have 5 subscales, although the total number of items was decreased in the revised instrument from 46 to 29 items. The IWPS and IWPS-R require participants to rate the items using a 5-point Likert-type scale with 1= strongly disagree and 5= strongly agree. The five subscales of IWPS-R, the revised version of the scale, are: manager support (8 items), peer support (6 items), unit support (6 items), workload (6 items) and intent to stay (5 items) (Cox *et al*., 2006). Cox *et al*. (2006) reported Cronbach's alphas for the total scale IWPS-R (.92) and for the subscales: .87 for manager support, .84 for peer support, .68 for unit support, .81 for workload and .88 for intent to stay. Content validity was determined by three nurse executives and two experts in the field of psychometric analysis (Cox *et al*., 2006).

In addition to the IWPS-R, the survey used in the pilot study included questions about nurses' demographic data and general questions about their most recent day/shift at work. This enabled the researcher to ensure that the sample included nurses who worked different shifts. The additional open-ended question asked nurses about the clarity of the items.

Data related to errors and the instrument were collected at the same time for this pilot study.

Omani and non-Omani nurses who worked on a female-medical ward in one regional hospital in Oman were included in this pilot study. The convenience sample was comprised of female nurses with more than one year of work experience; male nurses and nurses with less than one year of working experience were excluded. Male nurses were not included because male nurses are not allowed to work in female wards in Oman. The nurses were approached personally by the researcher and received a verbal explanation of the study, its purpose, and the significance of the study to encourage participation. The study was approved by Villanova University's Institutional Review Board and the Oman Ministry of Health Research Committee. Consent was obtained from each nurse who agreed to participate in the pilot study. Participation was voluntary and subjects were given the option to withdraw from the study at any point. The completed consent forms and surveys were collected separately and kept in separate envelopes, which prevented the researcher from linking survey responses to specific participants. Descriptive statistics were used to analyze the data using SPSS version 24.

Incident reports were collected from the hospital's Quality Assurance unit to obtain data on medication errors and the incidence of pressure ulcers for a period of three months from the first of April to the end of June, 2017. Quality Assurance personnel removed all patients', nurses' and witnesses' names and hospital numbers from the incident reports.

RESULTS AND DISCUSSION

The sample included 28 of the 30 female nurses who worked on the female-medical unit for a response rate of 93.3%. According to Hertzog (2008), a sample of 28 is sufficient to test an instrument's clarity and ensure confidence level of 68%. Hertzog (2008) found that a sample of 20 participants was adequate to ensure confidence level above 50% and to assess test clarity, understanding and validity of instruments in a pilot study.

In this pilot study the Cronbach's alpha for the total IWPS-R was .708. Four of the six subscales had reliability coefficients above .50; the two subscales with low reliability coefficients were unit support (.372) and intent to stay (.079). The mean score value of the total IWPS-R was 3.69 on a scale of 1 (strongly disagree) to 5 (strongly agree) and was positively skewed. The highest mean score reported was on the subscale of peer support (M=4.27), while the lowest mean score reported by nurses was on the subscale of intent to stay (M = 3.08). Reliability coefficients for each subscale are shown in Table 1.

Clarity, relevancy and understanding of items in the IWPS-R were determined using nurses' comments**.** More than 90% of nurses indicated that the items in the instrument were relevant, clear and simple to understand. One participant stated that one item was not clear; because no other participants reported this, the decision was made not to change the item for the subsequent larger study. The nurses' responses to these questions indicated that they understood the items of the IWPS-R, and that the instrument was suitable. Nurses found that the items were relevant to work environment and workload.

Table-1: Reliability of IWPS-R with Omani Sample (N=28)

	IWPS Total	Manager Support	Peer Support	Unit Support	Workload	Intent to Stay
Cronbach's Alpha	.708	.586	.720	.372	.723	.079

Yaghmaie (2003) indicated that clarity and relevance of an instrument can be determined using 10 participants. Therefore, a sample of 28 is adequate to examine the clarity, relevance and understanding of nurses of the items of the scale. Further, the comments from nurses in this pilot study about clarity, relevance and simplicity of the items support the usefulness of the instrument and the relevance of items to nurses in Omani hospitals, suggesting the validity of the content of items in the IWPS-R.

No usable data could be obtained from the hospital incident reports because only six incident reports had been submitted for the female-medical ward during the three-month period. Of the six incidents addressed in the incident reports, one was a medication error and one was the development of pressure ulcer. The number of errors identified through incident reports suggested possible underreporting of errors in Omani that needs to be examined in a subsequent larger study.

A total of 30 surveys were distributed to nurses on the female-medical ward in a hospital in Oman and 28 nurses (93%) completed and returned the survey. The reliability of the instrument completed by nurses working in Omani hospital was lower than expected and lower than that reported by Cox *et al*. in 2006. Although the Cronbach's alpha of the total IWPS-R in this pilot study was .70, the reliabilities of several subscales were lower than expected or desired. In this pilot study, the peer support subscale had the highest reliability and the intent to stay subscale had the lowest reliability. In

contrast, peer support subscale reliability of the IWPS-R reported by Cox *et al*. (2006) had the lowest reliability coefficient score. This difference might be because of social relationships within the work environment in Omani hospitals and European countries. Nurses in Oman work together and support each other because it is part of the Omani culture. However, all subscales in this pilot study had lower reliabilities than those reported by Cox, which may be a result of cultural differences, the nature of the work environment**,** and the small sample size in this pilot study. Nonetheless, IWPS-R was considered clear, relevant and easy to understand when tested with sample of nurses working in Omani hospitals. Based on the overall Cronbach's alpha, the IWPS-R was deemed acceptable for use in a larger sample of Omani nurses to measure nurses' characteristics, work environment, and workload. Further, use of the IWPS-R is appropriate for use in the larger study because the survey items were reported to be clearly understood by nurses working in Omani hospitals and because of the literature support for its use.

The IWPS-R is a relatively new instrument used to measure nurses' perceptions about their work environment and it has been used in a limited number of studies. Cox *et al*. (2005) used the IWPS-R to assess nurses' perceptions of their work environment in different states in the U.S. In this pilot study the peer support subscale had the highest mean score while unit support had the lowest mean score. Similar results were found when Cox *et al*. (2007) used the IWPS-R to measure differences in perceptions of work environment of nurses working in pediatric units versus non-pediatric units. Cox *et al*. reported that the peer support subscale had the highest mean score while manager support had the lowest mean score. The pilot study results were similar to those of previous studies with the peer support subscale having the highest mean score.

A translation of the IWPS-R was used in Taiwan to evaluate its psychometric properties when completed by Taiwan nurses (Lin *et al*., 2011). The Taiwanese version was translated to traditional Chinese and it included only 24 items. The reliability of the total Taiwanese version of the IWPS-R was .88 and reliability of the subscales of manager support, peer support, and intent to stay ranged from .78 to .85. Reliabilities for the unit support and workload subscales of the Taiwanese version of the IWPS-R were .61 and .65, respectively. The IWPS-R collects data about nurses' perceptions and those perceptions are affected by culture, religious views, and nurses' knowledge of the country, which might explain variation in reliability when used in other countries and with other languages.

When the results of this pilot study related to incident reports were compared to those of Teixeira and Cassiani's (2014) study, the difference in the number of reported incidents is clear. Teixeria and Cassiani conducted their study in one general private hospital in Brazil and included different general patient units. The maternity unit in their study had a total of ten reported incidents for a period of three months compared to the same number of months in this pilot study conducted on a female-medical patient unit in Oman, which had a total of six incident reports. Two of the six incidents reported were errors; one was a medication error and the other the development of a pressure ulcer. The other four incident reports were for maintenance issues rather than errors. The difference in number of incidents or errors in this study (n = 2) compared to the number reported by Teixeria and Cassiani (n = 10) strongly suggests that underreporting of errors and adverse events in the female-medical unit that was the site of this pilot study. The results of Teixeira and Cassiani's study and this pilot study were compared because both studies included general units within hospitals that were similar in bed capacity.

CONCLUSION

The results of this pilot study demonstrated the feasibility of using the IWPS-R to assess the work environment in Oman and nurses' perceptions about workload, although reliabilities were lower than expected or desired. The IWPS-R items were understandable by all nurses who participated in the pilot study. Few incident reports were collected from a female-medical unit in Oman, which indicates possible underreporting of errors, which indiates the need in Omani hospitals to examine underreporting in a larger study.

This pilot study had several limitations in addition to the lack of incident report data. The sample used in this study was a convenience sample, which could result in selection bias. Finally, the small sample size and homogeneity of the sample might skew the study results. Therefore, further research is needed to examine the causes of underreporting and common errors in Omani hospitals using a larger sample with the goal of improving patient safety in Omani hospitals.

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