Younis WY, Abdalrahim MS, Zeilani RS, Albusoul R, Alosaimi D, Hamdan-Mansour AM. Feasibility and clinical utility of Bates-Jensen wound assessment tool among nurses caring of patients having pressure ulcers (Original research). SEEJPH 2022, posted: 10 January 2022. DOI: 10.11576/seejph-5084

ORIGINAL RESEARCH

Feasibility and clinical utility of Bates-Jensen wound assessment tool among nurses caring of patients having pressure ulcers

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Abstract

Aims: One of the vital roles of nurses is to perform pressure ulcer risk assessment that enables them to appropriately assess and track healing progress of wound and pressure ulcers among patients. Our aim was to assess the feasibility and clinical utility of the Bates-Jensen Wound Assessment Tool (BWAT) among nurses caring of patients with pressure ulcer.
Methods: A descriptive cross-sectional design used to collect data from 177 registered nurses caring of patients who developed or have a risk of developing pressure ulcers working in three hospitals in Jordan.
Results: The mean feasibility score of the BWAT was 28.3 out of 36 (SD=3.4) with a median score of 29. Most of nurses reported that the BWAT was easy to use on a scale of 1-4 (best) (M=3.40/4, SD=0.62) and can successfully assess wound characteristics (M=3.40/4, SD=0.59). The mean utility score of the BWAT was 21.3 out of 28 (SD=2.7) with a median of 21. Nurses had a perception that using the BWAT enhances care of patients with wounds (M=3.36/4, SD=0.61) and makes communication easier between nurses and physicians.
Conclusion: This study provided evidence that support the use of the Bates-Jensen Wound Assessment Tool for patients with pressure ulcer. Nurses perceived BWAT as easy to use, understandable, and relevant for assessing patients with pressure ulcers.

Keywords: *Bates-Jensen Wound Assessment Tool, clinical utility, feasibility, wound assessment.*

Funding statement: This work was supported by supported and funded by The Deanship of Scientific Research at The University of Jordan, Amman, Jordan [number1953/2017/19].

Conflicts of interest: The authors declare no potential conflicts of interest with respect to the research, authorship and publication of this study.

Introduction

Pressure ulcer (PU) is a damage to an area of skin which covers a bony prominence (1). Pressure ulcers may cause several bio-psychosocial complications that include depression, pain, and infection of muscles and bones (2). Such complications of PU might lead to more serious forms of poor quality of life, morbidity, and mortality (3,4). The literature is showing that PU is affecting 6% to 10% of patents in the acute care settings causing wide range of significant problems such as pain, delayed recovery, and poor healthcare outcomes (5). Globally, PU is almost affecting 2.1 million people in acute care facilities and the cost of treatment may exceed $26.8 billion (6,7). The critical influence of PU on the patient's biopsychosocial wellbeing is alarming nurses and other healthcare professionals to be attentive to intervene appropriately through assessing and minimizing its negative consequences. Therefore, nurses caring of patients at risk of PU need to be equipped with knowledge and skills that best enable them to detect and manage PU. A systematic review of the literature showed that PUs are considered predictable, and the prevention of such events is considered as a quality indicator (7). In particular, the increased number of older people and their high vulnerability to PU due to longer periods of hospitalization did make management of PU a priority and indicator of quality of care (8,9). Therefore, nurses, have a primary responsibility in maintaining proper skin integrity and preventing skin injury and ulcer complications (10). One of the vital roles of nurses is to perform PU risk assessment that enables them to appropriately intervene to prevent PU and manage it effectively (10-12). This would suggest that feasibility of using the PU risk assessment has to be addressed as priority. Feasibility is defined as the ease with which the clinicians can apply the tool in the clinical setting, while clinical utility is the ability to use the results of the tool in a useful or informative manner in clinical settings (10,13,14). One proposed tool that can be used and assist nurses working in medical-surgical units is Bates-Jensen Wound Assessment Tool (BWAT) (15). Although the tool is proposed for nurses and other healthcare professionals and strong evidence reported to support the usefulness of the tool, few studies have been conducted, globally, to assess the feasibility and clinical utility of the BWAT (15). The purpose of this study is to assess the feasibility and clinical utility of the Bates-Jensen Wound Assessment Tool (BWAT) in the experience of nurses caring of patients with pressure ulcer.
Ethical Consideration: approval to use The Feasibility and Clinical Utility tool was obtained from the original author. Ethical approval obtained from IRB of XYZ University (approval number 1953/2019/19).

Methods

A descriptive cross-sectional design was used to assess the feasibility and clinical utility of the BWAT among nurses caring of patients. Data are collected using a self-administered questionnaire. A liaison has been assigned to invite nurses to participate in the study. Those who expressed interest in participation were directed to the research team who was available to address purpose and significance of the study and ensure voluntary participation. After having all their questions answered, the package including a cover letter that indicated returning the survey is considered as consenting to participate in the study. The package also included a booklet about the technique of wound assessment using the BWAT. Nurses were directed where to return

the survey in the given sealed envelope to ensure anonymity and confidentiality.

Sample and setting

A convenience sampling technique was used to recruit nurses from three major hospitals in Jordan representing the three healthcare sectors: governmental, educational, and military hospitals. Inclusion criteria: 1) has at least three month of experience to ensure knowledge regarding protocol and guidelines of practice, and 2) caring for patients who developed or are at risk of developing PU in the selected hospitals. No exclusion criteria have been indicated. Using G*Power computer software program version 3.0.10, using exact test a medium effect size of 0.20 was determined, a significance level of $\alpha = 0.05$ was set, and at a power of 0.80. The yielded sample was 177 participants. The tools employed are:

- The Bates-Jensen Wound Assessment Tool (BWAT) has been developed in 1990 and revised in 2001. It aims to monitor the healing process of pressure ulcers (15,16). The BWAT contains 13 items that facilitate nurses' role in evaluating wound characteristics such as the depth, size, edges, undermining, necrotic tissue type and amount, exudates, granulation tissue, epithelialization, peripheral tissue indurations, peripheral tissue edema, and skin color surrounding the wound. Each item in the BWAT is graded on a scale from 1 to 5, where a score of 1 indicates improvement toward healing, and a score of 5 indicates lack of healing or wound deterioration. The total scores range from 13 to 65 (15,16). The BWAT has reasonable reliability and validity, with sensitivity of 61%, a Cronbach's alpha of 0.90, positive predictive value of 65%, and specificity of 52% (15).
- The Feasibility and Clinical Utility (FCU) tool has been developed to test Bates-Jensen Wound Assessment Tool feasibility and clinical utility (Appendix A) (17). This tool consists of 16 questions with two subscales. The first subscale measures the feasibility and comprises nine questions while the second subscale measures the clinical utility and comprises seven questions. Nurses are asked to make their responses on a 4-pointscale ranging from of 1-4 (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=highly relevant). The tools have good reliability and validity with Cronbach's Alpha of 0.88. In addition, the questionnaire included a profile for socio-demographic data regarding including age, gender, and years of experiences (see Table 1).

The association between the sample characteristics and feasibility and utility scores was tested using T-test or one-way ANOVA for variables with three categories or more. A value of $P \leq 0.05$ was considered statistically significant.

Results

Nurses' characteristics

A total of 200 registered nurses expressed their interest, 177 nurses which filled and returned the survey represented the final sample of the study with a response rate of 88.5%. The mean age of nurses was 31.8±6.4 ranging from 21 to 50 years. The majority of the nurses were females (n=111, 62.7%), having a bachelor degree (n=165, 93.2%) and were working as a registered nurses (n=137,

77.4%). The mean years of experience was 9.5±6.0, and the majority of them were from the military hospital (n=117, 66.1%), see Table 1.

Table 1. Characteristics of the Participants (N= 177)

Characteristics	Frequency	Percentage
Gender		
Male	66	37.3 %
Female	111	62.7 %
Educational level		
Bachelor degree	165	93.2 %
Master degree	12	06.8 %
Position in nursing		
Staff nurse	137	77.4 %
In charge nurse	21	11.9 %
Supervisor	19	10.7 %
Hospital sector		
Governmental	22	12.4 %
Military	117	66.1 %
University affiliated	38	21.5 %
Already using BWAT* in the hospital		
No	59	33.3 %
Yes	118	66.7 %
Nurses experience**		
Surgical conditions	70	39.5 %
Acute conditions	48	27.1 %
Medical conditions	116	65.5 %
Critical conditions	84	7.5 %
Oncology patients	78	44.1 %
Palliative conditions	65	36.7 %

* BWAT: Bates-Jensen Wound Assessment Tool;
** More than one option acceptable.

Feasibility of the Bates-Jensen Wound Assessment Tool

The mean feasibility score of the BWAT (see Table 2) was 28.3 ±3.4 out of 36.0 with a median score of 29, and range of 17-35. The interquartile range (IQR) classification system was utilized to categorize the feasibility scores into three categories; low (25th IQR), moderate (50th IQR), and high (75th IQR). Accordingly, the results revealed that 32.2% (n=57) of the nurses fell in the low category, 41.8% (n=74) in the moderate category, and 26.0% (n=46) in the high category.

Table 2. Classification of the Feasibility and Clinical Utility of the BWAT

Category	Classification	Range	Frequency (%)
Feasibility of BWAT*	Low Moderate High	(28 and below) (29-30) (31 and above)	57 (32.2%) 74 (41.8%) 46 (26.0%)
Clinical Utility of BWAT*	Low Moderate High	(20 and below) (21-23) (24 and above)	60 (33.9%) 72 (40.7%) 45 (25.4%)

*BWAT: Bates-Jensen Wound Assessment Tool

Regarding feasibility, most nurses (>70%) reported that the BWAT was easy to use indicated by the 4-point scale (M=3.40±0.62), and can successfully assess wound characteristics (M=3.40±.59). Nurses reported that they received sufficient training on using BWAT (M=3.30±0.65), and can easily understood the tool's directions (M=3.35±0.56). The responses that had low mean scores less than 3.0 were, eventually, reported for the items that have structured negatively and those are: "I use the BWAT just because it is required by the hospital administration" (M=2.37±.80) and "Using the BWAT takes too much time from my work" (M=2.32±.69).

Clinical Utility of the Bate-Jensen Wound Assessment Tool

The mean utility score of the BWAT (see Table 2) was 21.3±2.71 out of 28 with a median of 21, and range of 11-28. The Interquartile classification system was utilized to categorize the utility scores into three categories; low (25th IQR), moderate (50th IQR), and high (75th IQR). The analysis showed that 33.9% (n=60) of nurses fell in the low category, 40.7% (n=72) in the moderate category, and 25.4% (n=45) in the high category. Nurses reported that using the BWAT in their daily practice will enhance the nursing care of patients with wounds (M=3.36±.61). According to the nurses, the BWAT makes communication of a patient's wound healing process easier for both nurses (M=3.26±0.57) and physicians (M=3.31±0.59). Most nurses (>60%) reported that they will recommend using the BWAT for wound assessment (M=3.28±0.63). The lowest mean item score was for the item "the tool is not connected to wound management guidelines in most of the hospitals" (M=2.68±0.98). In addition, a relatively low score was reported also to "the physician asks nurses frequently about the BWAT scores for patients with ulcer before managing wound (M=2.78±.86).

Differences in Feasibility and Clinical Utility of the BWAT related to Sample Characteristics

The results (see Table 3) indicated that there is a significant difference in feasibility and clinical utility mean scores between the military hospital and other hospitals (private and governmental). Nurses from the military hospital had higher mean scores in both feasibility and clinical utility (28.5±2.7, 22±2.7; respectively).

Table 3. Association between Sample Characteristics and the BWAT Feasibility and Clinical Utility

Variable	Feasibility M ± SD	P	Utility M ± SD	P
Gender				
Male (n = 66)	28.4±3.90	.751	21.4 ± 2.81	.621
Female (n = 115)	28.2 ± 3.31		21.2 ± 3.10	
Educational level				
BSC (n = 171)	28.2 ± 3.41	.672	21.4 ± 2.90	.045
MSN (n = 10)	28.7 ± 4.61		19.5 ± 2.90	
Hospital sector				
Governmental (n = 21)	26.6 ± 2.11		20.7 ± 2.01	
Military (n = 117)	28.5 ± 2.70	< .001	22.0 ± 2.01	.022
Teaching (n = 38)	26.4 ± 5.31		20.7 ± 4.10	
Nursing position				
Staff nurse (n = 142)	27.7 ± 3.40	.301	21.0 ± 2.41	.501
In-charge nurse (n = 21)	28.5 ± 3.20		21.8 ± 2.60	
Supervisor (n = 18)	28.5 ± 3.20		28.5 ± 3.20	
Caring for medical conditions				
No (n = 61)	27.6 ± 3.21	.091	21.5± 2.90	.401
Yes (n = 120)	28.6 ± 3.51		21.1 ± 2.90	
Caring for acute conditions				
No (n = 133)	28.1 ± 3.41	.240	21.3 ± 2.90	.991
Yes (n = 48)	28.8 ± 3.61		21.3 ± 3.01	
Caring for critical conditions				
No (n= 97)	27.4 ± 3.20	< .001	21.0 ± 3.10	.181
Yes (n =84)	29.3 ± 3.41		21.6 ± 2.81	
Caring for surgical conditions				
No (n = 111)	28.2 ± 3.20	.921	21.2 ± 2.80	.821
Yes (n= 70)	28.3 ± 3.71		21.3 ± 3.20	
Caring for the condition with cancer				
No (n =103)	27.4 ± 3.20	< .001	21.4 ± 3.00	.521
Yes (n= 78)	29.4 ± 3.41		21.1 ± 2.90	

Caring for palliative patients				
No (n = 116)	27.6 ± 3.30	< .001	21.4 ± 2.90	.520
Yes (n = 65)	29.5 ± 3.41		21.1 ± 3.00	
Previous educational program on wound assessment				
No (n = 106)	28.6 ± 3.30	.160	21 ± 2.90	.220
Yes (n = 75)	27.8 ± 3.61		21.6 ± 2.91	
Previous use of assessment tools				
No (n = 59)	26 ± 4.10	<.001	19.8 ± 3.30	.003
Yes (n = 117)	29.4 ± 2.51		21.9 ± 2.50	

Besides, higher mean scores of feasibility and clinical utility were reported among nurses that used the tool previously (had an experience in using the tool at other settings and with other patients: 29.4±2.5 and 21.9±2.5). The work experience affected participants' perception of utility and feasibility of BWAT; nurses who provided care for palliative or cancer patients, and for critical patients had significantly higher mean feasibility scores than other nurses (29.5±3.4; 29.4±3.4; 29.3±3.4). However, there was no significant difference in clinical utility mean scores among nurses in relation to work experience. Nurses with graduate level of education had higher mean scores on the BWAT clinical utility than nurses with undergraduate level. Nurses' age and their years of experience in nursing were positively correlated with feasibility and clinical utility of BWAT (p-value <0.001).

Discussion

Positive healing progress of pressure ulcer is a core indicator for quality of nursing care. Therefore, nurses who assume the responsibility to assess and manage care for pressure ulcers need to be equipped with knowledge and skills to improve quality. In particular, nurses working in general wards - such as medical and surgical ones - caring for patients occupied to bed are challenged with high load of work and simultaneously struggle to keep high quality of nursing care (21). In our study, we found on the one hand that a considerable number of nurses indicated low levels of perception of feasibility and clinical utility of BWAT although were using the tool competently. Such findings partially disagree with previous reports who reported good feasibility and utility of BWAT among health staff (7,18,19) whereas in our study about one third of nurses are categorized at low level. One explanation could be related to the nurses' belief that using BWAT is only for the purpose of adherence to hospitals' protocol rather than their clinical and scientific judgment and practice. Nurses were using the BWAT just to get satisfactory reports from their supervisors which may influence the core principle of safe and quality nursing practices. Such findings support previous studies that nurses found to perform BWAT to get management appraisals rather than for its clinical and quality importance for patients and care outcomes (20). Moreover,

nurses were not well-oriented about such advanced measure as they described BWAT as easy to understand, while their scores on the items of the scale do not reflect such perception. This is one limitation of this study as we have used a self-reported format of data, while using an observational approach through assessing direct skills and outcomes would have revealed more informative results.

One significant contribution of this study is, however, that nurses considered BWAT as a helpful tool for documentation which enhances the feasibility and utility of BWAT in different health care settings. Nurses reported that using BWAT made the communication of the patient's wound healing progress easier between and among nurses and physicians which sustains what Triantafyllouet al. (7) reported that BWAT helped the nurses to establish meaningful communication and accurate tracking of wound healing process for both nurses and physicians (7). Most nurses advocated using the BWAT for wound assessment; however, they asserted also that BWAT has not been integrated into the hospitals' policies which may also explain the low to moderate scores of feasibility and utility. Another significant contribution is related to the effect of training and years of experience in nursing on the willingness to use BWAT. We have found that nurses with more years of experience and those who received training on wound assessment and management did have higher scores of feasibility and clinical utility of BWAT. This indicates that nursing training is required and the notion that nurses should rely on their self-training and education is not valid. Those with better training are capable to provide higher levels of quality of nursing care.

Conclusions

This study found that BWAT is a sufficiently valid and reliable tool used to assess and monitor progress of PU among patients in different clinical settings. The study shows also that nurses have only a low to moderate perception of feasibility and clinical utility of the BWAT tool in PU assessment and monitoring. Therefore, qualified training is needed to ensure nurses' competency to use the tool. Furthermore, policies need to be revised to ensure integrating BWAT into protocols, and a monitoring system should be created to ensure nurses' adherence to use BWAT. Conducting a longitudinal observational study with larger sample size would reveal more informative results regarding competency and willingness of nurses to use BWAT and its outcome on patients' skin integrity.

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Appendix A: BWAT Feasibility and Clinical Utility Questionnaire

Question	1 Strongly not Agree	2 Not Agree	3 Agree	4 Strongly Agree
Feasibility				
1. I understand the BWAT directions.				
2. I found the BWAT is easy to use.				
3. The BWAT can successfully assess level of pain for mechanically ventilated patients.				
4. I received sufficient training about the use of BWAT.				
5. Using the BWAT takes too much time from my work.				
6. The BWAT rating scores accurately reflect patients' pain level.				
7. The BWAT measurement is quick to use.				
8. The score of BWAT is easy to document.				
9. I use the BWAT just because it is required by the hospital administration.				
Clinical utility				
10 The use of BWAT makes communication of patients' pain easy with other nurses.				
11 The use of BWAT makes communication of patients' pain easy with physicians in the ICU.				
12 I recommend the use of BWAT in assessing MV patients' pain.				
13 Using the BWAT will enhance caring of MV patients.				
14 The BWAT scores are often used to manage MV patients' pain in our ICU.				
15 Physicians ask nurses frequently about the BWAT scores for MV patients before managing pain.				
16 The BWAT is not connected to pain management guidelines and policy of pain management in our hospital.				