ORIGINAL ARTICLE

USABILITY OF WOUND CLASSIFICATION SYSTEM BY COLOR – RYB WOUND CLASSIFICATION SYSTEM

Isabel Cristina Ramos Vieira Santos*
Jair Luiz dos Santos Júnior**
Larissa Lima Ribeiro***
Raquel de Figueiredo Xavier****
Renata Barros de Almeida*****
Jéssica Emanuela Mendes Morato*******

ABSTRACT

This study aimed to evaluate the usability of the RYB wound classification system. This is an evaluative study with descriptive design performed with 30 stomatherapist and clinical nurses. Data were collected between November 2015 and May 2016, through an adapted and validated questionnaire, the System Usability Scale. The data were analyzed according to the recommended score of the questionnaire, by considering values above 70 as representative of good usability.The results showed usability values per item greater than 90 and in the general evaluation, the method presented a result superior to 80, indicating excellent usability. In the quality assessment the results obtained agreed with those of the usability evaluation, that is, superior to 80. The evaluation using the *System Usability Scale* showed that the RYB wound classification system meets the requirements of usability of teaching and assistance nurses, showing itself adequate to the needs of the users.

Keywords: Wound healing. Wound sand injuries. Nursing assessment.

INTRODUCTION

The nurse plays a very important role in assisting people who are affected or who are at risk of developing a wound. The initial evaluation, lesion evolution, orientation of the technical professional, as well as the execution of the dressing, in order to obtain good tissue reconstruction are under the scope of its attributions[1].

A detailed evaluation of the wound is an essential skill that contributes to the improvement in the quality of care provided to the patient, since it provides a baseline and accurately determines the improvement or deterioration of the wound over the treatment time, directs clinical decisions based and optimizes the cost-benefit of treatment. In addition, it helps the communication between the professionals of the nursing and interdisciplinary team, as well as of these with the patient[2-4].

Therefore, the evaluation should be done in a systematic way, from the first care until the complete resolution of the wound. It is recommended that it be performed at least once a week, using standardized instruments that allow the healing process to evolve reliably. However, there is still no consensus on the best way to evaluate the wound and its healing process[3,5].

Among the evaluation methods used internationally are: the acronym "TIME" (which considers tissue, infection, moisture and edge); "MEASURE" (acronym meaning: measurement, exudate, appearance, suffering, undermining and reassessment); "PUSH" (Scale for wound healing by pressure); "BWAT" (Bates-Jensen wound assessment tool method); and "RYB" (red, yellow and black wound classification system)[5,6].

The "RYB wound classification system" - is particularly useful because of the simplicity of use, since it classifies the types of tissues in the wound bed by color, identifies the stage in which the wound is in the continuous healing process, leads to the appropriate choice of necessary interventions and facilitates communication with the professional at the technical level[6].

The "red" color indicates granulation tissue, which only requires protection and usually shows adequate healing. The "yellow" shows sphincter or exudate, requiring autolytic cleansing and debridement, while

*Nurse.PhD in PublicHealth,Universityof Pernambuco. Recife, PE, Brazil. E-mail: tutornad@yahoo.com.br
**Nurse.ClinicalHospital of Pernambuco. Recife, PE, Brazil. E-mail: jairluizsj@gmail.com
***Nurse.Aggeu Magalhães Research Center. Recife, PE, Brazil. E-mail: lari_lima11@hotmail.com
****Nurse.Instituteof Integral Medicine Professor Fernando Figueira. Recife, PE, Brazil. E-mail: quel_406@hotmail.com
*****Nurse. RestauraçãoHospital. Recife, PE, Brazil. E-mail: renata_balmeida@hotmail.com
*****Nurse.Camaragibe City Hall. Recife, PE, Brazil. E-mail: jessicamorato.enf@gmail.com

"black" color means necrosis[7], for which surgical debridement is necessary[6,8].

Wound evaluation is a practical area, often performed sporadically or insufficiently. The literature has questioned the reliability of some assessment methods[5]. To be useful in the clinical routine, the method needs to be time and cost efficient, accurate, sensitive, and comfortable for the patient and easy to use[2].

The usability tests have had their application pronounced in the last two decades, originating from cognitive science, in the areas of psychology and ergonomics[9]. Although commonly used in the field of information technology, usability can also be incorporated by nursing, since it aims to study the way a user performs their tasks and interacts with a particular product, considering their different needs[10].

Although validated and widely used in Europe and the United States, the system of classification of wounds by color does not have the proper use in Brazil. It is necessary to verify its usability by the care nurses. Thus, this study aimed to evaluate the usability of the Wound classification system (RYB).

METHODOLOGY

This is an evaluative research, with descriptive design and focus on the usability evaluation of the Wound classification system (RYB). Usability testing involves the direct participation of users, and through them it is possible to verify the performance of the user when performing tasks, and the quality of usability of a product (understood here as the system). Its application is made when it is desired to know the opinion of the users regarding the interaction with this product[10].

The literature recommends that the selection of the participating users should be made in order to meet the profile of those who will actually use the product and, when it is intended for users with varied profiles, the tests should be performed with those who attend to each profile[10].

Thus, the study was performed in a convenience sample of 30 stomatotherapist and clinical nurses recruited during the III International and North/Northeast Symposium of stomatherapy, conducted in the Northeast region of the country.

For data collection, these nurses received a sample characterization form, a guideline on the use of the wound classification system by color, a simulated system application exercise and the Usability Scale - SUS)[11].

The characterization form of the sample consisted of the following items: age, gender, occupation and previous knowledge about the method. The guideline on the color wound classification system consists of three items. The first item explains the correlation of the colors with the type of tissue found in the wound bed, that is: red for granulation tissue, yellow for scrapings and black for necrosis; the second item guides on the registration of the identified tissue; and the third item refers to the possibility of various colors/tissues in the wound bed.

The application exercise of the system, in a simulation of care for patients with wounds, comprised the evaluation of three photos that presented each type of tissue, respectively, and a fourth, presenting the three types of tissue in the same wound. The participant was asked to identify, in the first three photos, the color and the fabric related to each color; but for the photo that presented the three tissues, was identified that predominated.

The photographs used belong to the personal archive of one of the researchers, and they present the following characteristics: *Joint Photographic Experts Group* (JPEG), 1597 X 1197 ppi image resolution, and 300dpi prints, obtained through semi-professional 50X optical *zoom* camera. After the simulated exercise, the participant was invited to evaluate the usability of the wound classification system by color, using the System Usability Scale - SUS questionnaire[11].

The SUS is a questionnaire that is validated in Brazil, composed of ten items, which shows a global view of the user in relation to the system, and it is possible, through the analysis of their questions, to recognize the quality components indicated in the literature, namely: ease (questions 5, 6 and 8), ease of memorization (question 2), minimization of errors (question 6) and satisfaction (questions 1, 4, 9). The ten questions are accompanied by a choice of response using a Likert scale, with values ranging from 1 (strongly disagree) to 5 (I fully agree). The research participant should indicate only one value for each question that best describes his perception of the color classification system used in the exercise[12].

The final score of each question can vary from 0 to 4, as follows: for the odd questions (1, 3, 5, 7 and 9), the value considered was the response given by the respondent minus 1, and for the pairs (2, 4, 6, 8 and 10), the value to be counted was 5, less the value of the answer attributed by the respondent. Subsequently, multiply the sum of the scores by 2.5 to obtain the general value. The SUS questionnaire score ranges

from 0 to 100, considering for this study values above 70 as representative of good usability, as recommended by the literature[13].

In order to assess the quality of the wound classification system by color, the discriminated analysis of the components - ease of learning, efficiency, ease of memorization, minimization of errors and satisfaction - was performed by the arithmetic mean of the scores derived from the questions that evaluated the components.

The tests were carried out in a controlled environment in order to avoid the interference of external factors, as in other studies[10,12]. The collected data were digitized and analyzed through the *Statistical Package for Social Science* (SPSS), version 19.0.

In the descriptive analysis, the following variables were used: relative distribution of the characteristics of the sample, measures of central tendency as mean ($\bar{x}$) and median ($\tilde{x}$) and dispersion (standard deviation - SD), besides SUS score, by item and general, and components of quality. The results are shown in Charts and Table.

The research project was approved by the Research Ethics Committee with Human Beings, the Oswaldo Cruz Hospital Complex and the Pernambuco Cardiac First Aid Center (CAAE: 45622114.2.0000.5192; Opinion Number: 1,273,519).

RESULTS AND DISCUSSION

Thirty nurses participated in the evaluation of the usability classification system of wounds by color; their profile is shown in Figure 1. There is greater proportion of participants older than 40 years-old (= 36.6 years-old; = 32 years-old, SD = 10.2), and the majority is female (96.7%).

With regard to occupation, the largest proportion of the sample consisted of nursing assistants and more than half of them had prior knowledge of the color wound classification system.

The efficient evaluation of instruments and methods is essential both for clinical practice and for research, particularly when evaluating treatments. Thus, the distribution of the sample in terms of age and occupation - composed by both teaching and health care nurses - complies with the precept that new users should be able to use the system as well as experienced users[10].
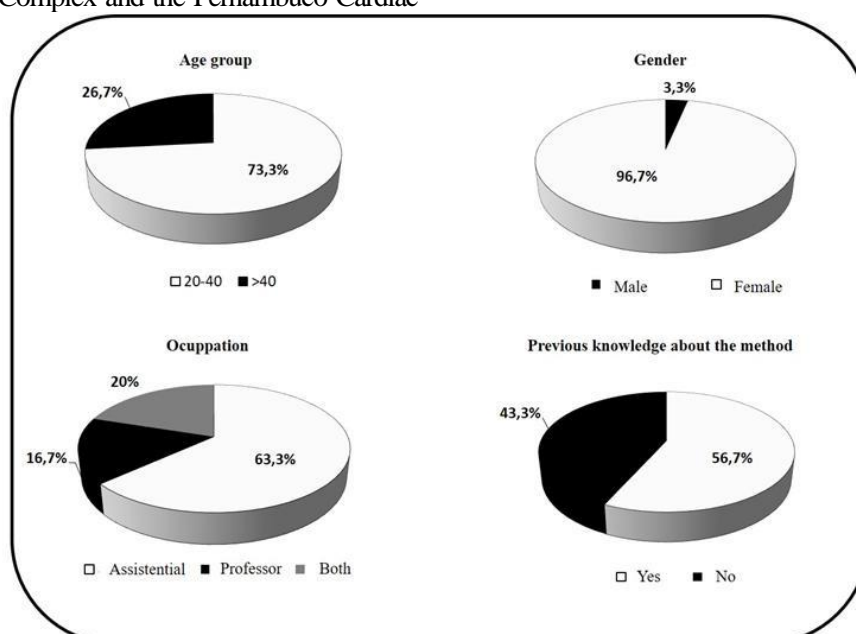

Figure 1. Characterization of the nurses who participated in the usability evaluation of the wound classification system by color. Recife-PE, 2016

Epidemiology regarding the occurrence of wounds has shown a multivariate picture, often related to human development and to the consequences of the way of life adopted by the populations, causing this aggravation to gain interest among health professionals and the scientific community. Linked to this concern, knowledge about the healing process and related interventions has advanced dramatically in recent years.

To this end, it has been a consensus throughout the world that the starting point for the efficient treatment

of the wound, of any etiology, is a thorough and objective evaluation. In addition, it also allows the injury to be monitored throughout the healing process, providing health professionals with the necessary elements to make appropriate decisions[3,4].

Although the evaluation of wounds appears in the mandatory literature of most Brazilian nursing courses, the system of classification of wounds by color has not been commonly used in care practice, possibly due to lack of knowledge[14].

The wound classification system by color or RYB wound classification system was developed by the Danish dermatologist Hellgren in 1983 and later introduced in the United States by Cuzzell in 1988[8,15]. It is a simple and practical method to evaluate wounds, bringing as main advantages the direction to the necessary actions and the easy communication

between the nurse and the nursing technician in the whole lesion follow-up process.

Figure 2 presents the results of the usability evaluation obtained by item and the total SUS score. As can be observed, all items evaluated were higher than 70. Items that evaluated the system positively obtained higher scores (all with a score greater than 90) when compared to those with negative evaluation; and although the latter have obtained values of 70 more, the literature warns that the scores for individual items are not significant, in isolation[13].

The SUS produces a single number (the total SUS score) representing a composite measure of the overall usability of the system studied[11]. With respect to this, it can be noted that the result of the total SUS score for the wound classification system by color was 85 indicating excellent usability.
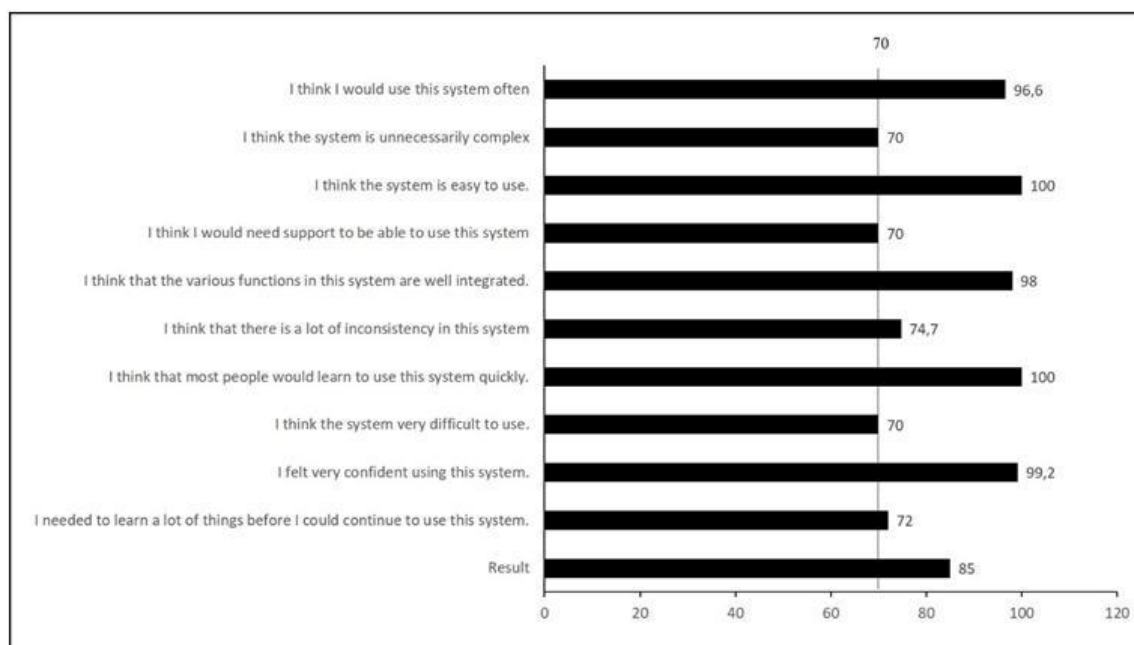

Figure 2. Results of the usability evaluation of the wound classification system by color. Recife-PE, 2016.

Several wound assessment instruments are currently available, covering various measures such as area and depth. One study compared three wound techniques - ruler measurement, graduated acetate paper tracing and digital planimetry - and found strong agreement between the techniques when evaluating small and more regular wounds, while moderate agreement was reached to measure larger and irregularly shaped wounds[4].

Another instrument, which evaluates size, depth, edges, detachment, type and amount of necrotic tissue, type and amount of exudate, edema and hardening of the peripheral tissue, skin color around the wound,

granulation tissue and epithelization, has recently been translated and adapted for Brazil, but it is not validated yet[5].

It should be noted that not all wound evaluation tools and techniques have proven usability to the users, that is, health professionals, collaborating for the possible realization of different, divergent or conflicting practices in wound care by the nursing team[1,4,16].

Thus, the concept of usability assessment, coming from psychology and widely used in the field of information technology, can be incorporated into health science due to the similarity of its objectives,

either in the development of a product with quality and real utility for the community and in the understanding of factors and criteria that affect health professionals in the choice of sources of information, here understood as the instrument for evaluating wounds[10,17].

The SUS questionnaire enabled the evaluation of the quality of the wound classification system by color, by discriminated analysis of the components: ease of learning, efficiency, ease of memorization, minimization of errors and satisfaction (Table 1).

It is observed that, among the evaluated components, the ease of learning, efficiency and satisfaction obtained higher scores, with values higher than 80, demonstrating that the nurses considered the method of excellent quality. And although the scores attributed to the components ease of memorization and error minimization have been lower, they still correspond to the value determined as representative of good quality. The results obtained in the quality evaluation were, therefore, concordant with those of the usability evaluation, that is, superior to 70.

Table1. Quality evaluation of the wound classification system by color.Recife-PE, 2016

COMPONENTS	Q (SUS)*	Q (SUS)	Q (SUS)	Q (SUS)	TOTAL
Learning facility	3 (100)	4 (70,0)	7 (100,0)	10 (72,0)	85,5
Efficiency	5 (98,0)	6 (74,7)	8 (70,0)	--	80,9
Easy formemorization	2 (70,0)	--	--	--	70,0
Minimization of errors	6 (74,7)	--	--	--	74,7
Satisfaction	1 (96,6)	4 (70,0)	9 (99,2)	--	88,6

* Issue that evaluated the referred component and SUS assigned value.

It is understood that the validation of wound evaluation methods is relevant for nursing, since it instrumentalizes it to make decisions consolidated in scientific parameters. However, validation studies should also be accompanied by usability studies, since a product or method may present excellent results during validation tests, but remain distant from those intended[18], either because of the lack of knowledge of the professionals with regard to technological advances in the field, contributing to the gap between research and assistance, either because of the complexity of use and/or cost of the method, which makes it inaccessible or uncomfortable during work.

Therefore, end-user perspective assessment is a crucial step in the refinement of any health-driven product, and contributes to improved work productivity[19]. The system of classification of wounds by color is a simple and economical method, since it depends only on systematized inspection, and can be used by nurses of any level of attention.

However, it is necessary to consider the main limitation of this study, related to the performance of the evaluation in a controlled environment, and it is still necessary to verify external factors, such as: quantity of patients to be evaluated and changes in the state of the lesion accompanied, as well as the effectiveness between the evaluation made through this instrument.

FINAL CONSIDERATIONS

The use of the SUS questionnaire allowed, through a metric, to state that the RYB wound classification system meets the quality criteria, and the total SUS score demonstrated that the method meets the usability requirements of teaching and care nurses, proving to be adequate to the needs of the users. Thus, it can contribute to the teaching of nursing care, providing teachers with a simple and satisfactory means of assessing wounds.

However, more research is needed to test usability in clinical care settings and to evaluate their contributions to the intended audience in real-life situations.

USABILIDADE DO SISTEMA DE CLASSIFICAÇÃO DE FERIDAS POR COR – RYB WOUND CLASSIFICATION SYSTEM

RESUMO

Este estudo teve como objetivo avaliar a usabilidade do sistema de classificação de feridas por cor. Trata-se de estudo avaliativo, com delineamento descritivo, realizado com 30 enfermeiros estomaterapeutas e clínicos. Os dados foram coletados entre novembro de 2015 a maio de 2016, através de um questionário adaptado e validado, o System Usability Scale. Os dados foram analisados segundo score preconizado no referido questionário, considerando-se os valores acima de 70 como representativos de boa usabilidade.Os resultados demonstraram valores de usabilidade por item superior a 90 e na avaliação geral, o método apresentou resultado superior a 80, indicando excelente usabilidade. Na avaliação de qualidade os

resultados obtidos foram concordantes com aqueles da avaliação da usabilidade, ou seja, superiores a 80. A avaliação demonstrou que o sistema de classificação de feridas por cor (RYB woundclassification system) atende as exigências de usabilidade de enfermeiros docentes e assistenciais, mostrando-se adequado às necessidades dos usuários.

Palavras-chave:Cicatrização. Ferimentos e lesões. Avaliação em enfermagem.

USABILIDAD DEL SISTEMA DE CLASIFICACIÓN DE HERIDAS POR COLOR – RYB WOUND CLASSIFICATION SYSTEM

RESUMEN

Este estudio tuvo como objetivo evaluar la usabilidad del sistema de clasificación de heridas por color. Se trata de estudio evaluativo, con delineamiento descriptivo, realizado con 30 enfermeros estomaterapeutas y clínicos. Los datos fueron recolectados entre noviembre de 2015 a mayo de 2016, a través de un cuestionario adaptado y validado, el System Usability Scale. Los datos fueron analizados según puntuación preconizada en el referido cuestionario, considerándose los valores arriba de 70 como representativos de buena usabilidad. Los resultados demostraron valores de usabilidad por ítem superior a 90 y en la evaluación general, el método presentó resultado superior a 80, indicando excelente usabilidad. En la evaluación de calidad los resultados obtenidos fueron concordantes con aquellos de la evaluación de la usabilidad, o sea, superiores a 80. La evaluación demostró que el sistema de clasificación de heridas por color (RYB *wound classification system*) cumple con las exigencias de usabilidad de enfermeros docentes y asistenciales, mostrándose adecuado a las necesidades de los usuarios.

Palabras clave: Cicatrización. Heridas y lesiones. Evaluación en enfermería.

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Corresponding author: Isabel Cristina Ramos Vieira Santos. Rua Teles Junior, 475, apto. 201. Graças. Recife - PE. Brasil. CEP: 52050085. Telefone: (81)31833601.