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ORIGINAL ARTICLE

SOFTWARE EVALUATION TO PRESSURE ULCER RISK AND EVOLUTION IN INTENSIVE TERAPHEUTIC CARE
AVALIAÇÃO DO *SOFTWARE* PARA RISCO E EVOLUÇÃO DE ÚLCERA POR PRESSÃO EM UNIDADE DE TERAPIA INTENSIVA
EVALUACIÓN DEL SOFTWARE Y EL RIESGO PARA EL DESARROLLO DE ÚLCERAS POR PRESIÓN EN LA UNIDAD DE CUIDADOS INTENSIVOS

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ABSTRACT

Objective: to evaluate the *software* "Ulcer Indicator Application Pressure (UIAP)". **Method**: field study, transversal and prospective study that evaluated specifically the quality characteristics: usability, reliability and the *software efficiency* developed to verify the risk and observe the evolution of pressure ulcers. The sample was constituted by 15 intensive care unit nurses from the Botucatu/SP Central Hospital who answered to the quality Check tool after training and the software's daily use. **Results**: the quality characteristics (according to ISO/IEC9126) they had positive evaluations about the nurses in more than 58.2% of the questions. **Conclusion:** the software was positively evaluated as for management of the ulcer pressure in intensive care as for assistance objectives by the nurses who used them. The elaboration of this study allow to evaluate the software use developed to make easier the pressure ulcer handling and management in a intensive therapy environment in the nurse clinical practice. **Descriptors:** Nursing; Nursing Informatics; Software; Pressure Ulcer.

RESUMO

Objetivo: avaliar o *software* "Aplicativo do Indicador de Úlcera por Pressão (AIUP)". **Método**: estudo de campo, transversal e prospectivo, de abordagem quantitativa, que avaliou especificamente as características de qualidade: usabilidade, funcionalidade, confiabilidade e eficiência do *software* desenvolvido para verificar o risco e observar evolução de úlceras por pressão. A amostra constituiu-se de 15 enfermeiros da UTI do HC de Botucatu/SP que responderam ao "Instrumento de Verificação de Qualidade", após treinamento e uso diário do aplicativo. **Resultados**: as características de qualidade (segundo ISO/IEC9126) tiveram avaliações positivas dos enfermeiros em mais de 58,2% das questões. **Conclusão**: o *software* foi avaliado positivamente tanto para fins de gerência, quanto para fins de assistência pelos enfermeiros que o utilizaram. A realização deste estudo permitiu avaliar a usabilidade do *software* desenvolvido para facilitar o manejo e gerenciamento da UP em ambiente de terapia intensiva na prática clínica do enfermeiro. **Descritores**: Enfermagem; Informática em Enfermagem; *Software*; Úlcera por Pressão.

RESUMEN

Objetivo: evaluar el software "Aplicación del Indicador de úlceras por presión" **Método**: campo de estudio, prospectivo transversal, enfoque cuantitativo que evaluó específicamente las características de calidad: usabilidad, funcionalidad, fiabilidad y eficiencia del software desarrollado para verificar el riesgo y observar la evolución de las úlceras por presión. La muestra está formada por 15 enfermeras de la unidad de cuidados intensivos del hospital central de Botucatu/SP que respondieron a la "Comprobación de la calidad del instrumento" después de la formación y el uso de la aplicación diaria. **Resultados**: las características de calidad (según la norma ISO/IEC 9126) tuvieron evaluaciones positivas de las enfermeras en más de 58,2% de las preguntas. **Conclusión**: el software se evaluó positivamente tanto con fines de gestión y por razones de cuidado de enfermeras que utilizan. Este estudio permitió evaluar la usabilidad del software desarrollado para facilitar el manejo y la gestión de las úlceras por presión en el entorno de cuidados intensivos en la práctica clínica de enfermería. **Descriptores**: Enfermeira; Informática Aplicada a la Enfermería; Úlcera por Presión.

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INTRODUCTION

The hospitalized patients in the Intensive Care Unit (ICU) have a lot of risk factors to the Pressure Ulcer (PU) because of the psychobiological limitations and environmental as: limitation or total restriction of movements by extended periods, sedative drug addiction and painkilling that decrease the sensorial perception, hemodynamic instability, different nutritionals conditions and lack of devices and team handling to decrease the tissue lesion risk.[1]

The PU are characterized as a limited area by the cellular disease for ischemia developed when the tissue is compressed, most of the time between a bone prominence and a external surface, by a extended time period.[2]

Any compressed bony prominence can cause an injury to the tissue, but the most common areas are the sacrum and the coccyx, the ischial tuberosity, trochanter, calcaneus, knee and malleolus.[3,4]

The prevention of this type of injury is accomplished through measures such as changing positions, distribution of tissue loads by decreasing pressure, decreasing the friction and friction, temperature and humidity control of the skin among other. Several health agencies among them the *National Pressure Ulcer Advisory Panel* (NPUAP) and the *Agency for Health Care Policy and Research* (AHCPR), guide health professionals through the dissemination of guidelines for treatment and prevention of pressure ulcers based on scientific evidence.[4,5]

The PU is a complex lesion and to better treat it or preventing it is fundamental to act on all deleterious factors and effects that excessive pressure causes the skin and structures related to it. These related factors are humidity, friction, and shear and nutritional deficit.[6]

Identifying and understanding these factors coupled with effective preventive measures should be priorities to be practiced by the health team. A good assessment of the PU development risk is important information to plan preventive strategies in the care of patients with lesion development potential.[7,8]

To recognize these patients are rating scales. These instruments have predictive validity indices, different sensitivity and specificity and must then use that most appropriate for each patient profile with the purpose of helping the professional to recognize that risk without relying only on clinical skill.[9]

The Braden Scale is the risk assessment tool more extensively tested and was adopted as a theoretical reference in the software used in this study since its predictive validity has been repeatedly tested for clinical application in ICU patients with good specificity and sensitivity in those admitted to therapy intensive, although it was not designed for critically ill patients, it is easily applied in this environment.[10]

The sensitivity and specificity of the Braden Scale are usually tested and studies have shown that scores 14, 13 and 12 were the most efficient in risk prediction for PU in the ratings with their respective sensitivity values around 95% and specificity ranging 45% to 77%. The cutoff score of the Braden Scale is equal to 13, in comparative studies with other scales, showed the best predictive performance in critical patients.[12,11]

In this context, the present study evaluated a software computerized the Braden scale, is able to store a database with different data to the user, you can follow the evolution of existing ulcers and also, according to the patient's score, it was developed to generating conduct prevention and/or treatment of PUs.[12]

The *software* "Ulcer Indicator Application Pressure" (UIAP) It was created by the authors in order to evaluate the PU development risk within the context of innovation and optimization of assistance and manages the Nursing currently follows.[12,13]

OBJECTIVE

● To evaluate the softwar "Ulcer Indicator Application Pressure" (UIAP)

METHOD

A transversal and prospective field study with quantitative approach, to evaluate the UIAP software quality. The evaluation was conducted through a query "Quality Check tool" applied to the nurses at the intensive care unit in the Botucatu Hospital Medical Faculty.

The sample was composed of 15 nurses from the ICU in the Botucatu Hospital Medical Faculty, after signing the Terms of Consent and answering the questionnaire with 16 multiple-choice questions and the answers were later your application, categorized into positive and negative with respect to software quality.

Data collection was performed after approval of the research project by the Research Ethics Committee under

Presentation Certificate of Appreciation for Ethics (CAAE) 15316813.9.0000.5411.

The evaluated software was developed by a nurse ICU HCFMB, student of the Graduate Program in Nursing, Professional Master - FMB/UNESP in the Concentration Area: Health Care Process Nursing resulting in the presentation of the Master's Thesis entitled "Building a software for assessing the risk of pressure ulcers in Intensive Care Unit" in March 2013.[12]

The questionnaire for the survey was based on the ISO 9126 which is a Brazilian standard belongs to "International Organization for Standardization" (ISO) which specifically evaluates the quality of software product. It falls within the quality model of the family 9000. In Brazil, the organization for standardization of software quality is carried out by Brazilian Association of Technical Standards (BATS).[14]

The ISO/IEC 9126 deals with the quality of software products and provides quality attributes that are divided into six main features: functionality, reliability, usability, efficiency, maintainability and portability.[14]

The first characteristic feature is presented. It is defined as the ability to provide a software attributes that satisfy the user in their explicit and implicit needs, within a specified context of use. Evaluates even if the software is able to interact with other systems and it has the ability to protect user data and provide them to authorized persons only.[14,15]

Reliability verifies that the product maintains the specifications of pre-established conditions between the user and the developer. In this feature, you can verify that the software has the ability to prevent failures due to defects, ability to keep working even when defects persist and there functioning recoverability after a failure.[14,15]

Usability is the ability of the product to be understood, having learned its operation, be operated and be attractive to the user. In this feature the ease with which the user can understand its features and assess whether it can be used to meet their specific needs are also assessed.[14,15]

The efficiency checks whether the execution time and the resources involved are compatible with the level of software performance. The behavior over time, or the response time (or processing) and the use of resources consumed (the system's ability to utilize available resources) are evaluated.[14,15]

The maintainability quality attributes and portability were not evaluated in this study because they are not available to users, only for software developers.[14]

The 16 questions were distributed to contemplate the four quality characteristics and response was categorized in order to assess the positive or negative software. So it was assigned a value of 1 (absolute value) if made a positive evaluation and 0 negative evaluation. At the end of the assigned values were added and presented in tables. Thus, the objective of the evaluation was not simply know what the highest frequency of items marked in each issue, but what was the total of positive evaluations in each quality feature.

After the questionnaire data were collected electronically in a spreadsheet in Microsoft Office Excel 2010 and analysis was performed using SPSS for Windows version 12.0.

RESULTS

The query was structured and divided according to the quality characteristics presented in the item 3. Each question had answers categorized in positive and negative distributed in 4 evaluated quality characteristics.

The first assessed quality feature was the functionality and asked questions to nurses were: "Does the software adequately assess the risk for developing PU? Does the software make a proper monitoring of the evolution of CPUs? Does the software present adequately the unit of risk form? Does the results generated by the software easier, help, hurt or do not change the care management nursing? Did the results generate by the software easier, help, hurt or do not change the administrative management of nursing?"

The results are presented in Table 1 showed that this query has been highly evaluated as nurses 12 (80%) evaluated positively the 5/5 issues and only 3 nurses (20%) rated positively only issues 3/5.

Table 1. Evaluation of the software functionality. Botucatu, SP, Brazil, 2015.

Functionality	n	%
No of Positive Evaluations		
1	0	0
2	0	0
3	3	20
4	0	0
5	12	80
Total	15	100

With this evaluation, it was found that the software is able to provide attributes that satisfy the user in their explicit and implicit needs in the context of use of an ICU.

The second quality characteristic evaluated by the instrument was reliability. The issues carried out for the nurses were: "At the end of the visit of the patient, did the software generate the final score screen along with the behaviors identified? Did the software generate the graph of the daily risk of the unit? Did the software have flaws in monitoring the PU?"

The results presented in Table 2 demonstrate that nurses 8 (53%) rated 2/3 questions positively and 6 nurses (40%) rated 3/3 questions positively.

Table 2. Software reliability evaluation. Botucatu, SP, Brazil, 2015.

Reliability	n	%
No of Positive Evaluations		
1	1	7
2	8	53
3	6	40
Total	15	100

Thus it can be inferred that the evaluated software has the ability to prevent failures due to defects, to keep working even when defects persist and still has recoverability of its operation after a failure.

The third quality assessed feature was usability. It is composed of 6 questions being them: "Did you have trouble learning to use the software? Did you have trouble to login, register the patient, perform the visit, and disable the patient (discharge or death) or any other? How do you think the Braden Scale with its dismembered sub influenced the choice of items to result in the final score? As for the design of screens, what do you think? As for the overall software design, what do you think? In any field of filling error, did the software interact with you pointing out the error? "

Os Results presented in Table 3 demonstrate that 7 nurses (47%) 5/6 rated issues in a positive way and 4 nurses (27%) rated positively 6/6 issues.

Table 3. Software usability evaluation. Botucatu, SP, Brazil, 2015

Usability	n	%
No of positive evaluations		
1	1	7
3	1	7
4	2	13
5	7	47
6	4	27
Total	15	100

From this assessment can verify the software presented in a satisfactory manner to assist the user in understanding its features presented by the program, in addition to those specific needs that you need and that this quality feature evaluates.

Finally, the last character quality was evaluated by the instrument efficiency. This

feature was composed of two issues, as follows: "Is the software agile? Did the software lock on any screen?"

The results presented in Table 5 show that 8 nurses (53%) rated positive 2/2 issues nurses and 6 (40%), point 1/2 and 1 nurse point 0/2 positively.

Table 4. Avaliação da efetividade do *software*. Botucatu, SP, Brazil, 2015.

Effectiveness	n	%
No of positive evaluations		
0	1	7
1	6	40
2	8	53
Total	15	100

There were 6 nurses account of an error that occurred in one screen, but its content was always saved without prejudice to the work already done. This item have a specific question about this type of error in the survey, so those nurses who saw the error did not mark all the items positively. This error has been reported to the software developer.

DISCUSSION

The quality evaluation of a computing device in nursing has as main objectives its acceptance by the professionals, and also auxiliary in the assistance process and management with the patient. However, the evaluation of the final product shall also analyze the positive and negative factors of its use, verifying the chosen software quality to the optimization of the daily nurse's activities.[16]

Thus, the evaluation of the quality of the studied product took into account the above items and obtained a satisfactory evaluation both verified by obtaining the quantitative results that had the item functionality with 80% approval, as the positive comments made by nurses during training and data collection for evaluation of product quality.[16]

The quality characteristic feature is the set of functions that satisfies customer needs for the purpose for which the product is intended. This was the best item evaluated in the study, showing that the adequacy, accuracy, interoperability, access security and compliance are assured. A study conducted at HCFMRP/USP in 2010 carried out an evaluation of a software for automatic preparation of nursing work schedule found suitability value and accuracy by 50% of nurses, ie, half of them agreed that the product met all the items evaluated in the study, demonstrating the difficulty of achieving a satisfactory functionality in the evaluation of a software.[16]

The quality feature efficiency checks whether the execution time and resources involved are compatible with the level of software performance.[17] This feature was used in a simplified way to verify that the software was considered agile by customers and was momentary operation standstill (if the software "caught"). This item has been checked an operational problem in just a screen that had possibly this problem, but without prejudice to save the information collected. This error was recorded in the questionnaire and contributes to an assessment of the fall of this Question. Even with this error, the product has obtained a satisfactory evaluation since 53% evaluated all questions positively. This event also showed that the software was able to continue working even when the error occurred, still recovering from the operation and storage of the information demonstrating that the reliability Question being assured. The study in HCFMRP/USP in 2010, showed 56% efficiency in your product. These efficiency figures already show the difficulty of a software in its first versions achieve higher quality values in this regard.[16]

The characteristic quality reliability has ability to prevent failures due to defects, to keep working even when defects persist and still has recoverability of its operation after a failure.[17] In this feature the product obtained all questions with positive evaluation in 40% of items. This was the worst Question assessed by nurses. The report was missing conduits for dressings types at each stage of the wound that the patient had, but the software is not intended for this purpose since the evaluation should be individual according to the needs of each patient.[16]

The characteristic quality usability is the product's ability to be understood, have seized their operation, be operated and be attractive to the user, while being intuitive. In this feature the ease with which the user can understand its features and assess whether it can be used to meet their specific needs are also assessed.[16,17] In this aspect the product obtained 74% of positive evaluation (by adding the questions 4:05 positive evaluations),

demonstrating that the product meets this feature.

CONCLUSION

The elaboration of this study allowed the evaluation of the software developed to make it easier the process to care and manage the PU coordination in the intensive care environment. This product was evaluated according to the quality characteristics proposed and obtained a positive evaluation, ensuring that the computerization of the used instrument by Nursing can me easier the professional's clinical practice, being this professional administrative or assistant, allowing the quality indicators generation to the management of the unit.

The verification of the quality of this computerized system, was obtained in the item functionality 80% of the questions positively assessed, with this result the best quality application.

With regard to data collection about the PUs, it was found that are still prevalent in the setting of intensive care and result in increases in hospital costs, length of hospital stay and risk of morbidity and mortality for the patient, thus demonstrating the importance of studies like this. The fact that the PU onset time is so short on average between the 2nd and 3rd day of hospitalization, shows that the assessment and care of the patient should be started early, that is, when it is received in the Care Unit intensive to avoid this condition, which can even be configured as an iatrogenic from the health-related care.

Although the sample is composed of all the unit nurses, it is recorded that this number is a study of the limit. Still, it is emphasized that there is a need for further studies to undertake the construction and software evaluation in health and contribute to clinical and managerial practice.

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