Computerization of risk prediction scale: strategy for safety and quality of care

Informatização de escalas de predição de risco: estratégia à segurança e qualidade assistencial

Informatización escala de predicción de riesgo: estrategia para la seguridad y calidad de la atención

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ABSTRACT

Objective: To describe the development of computerization of risk prediction scales used by nursing in the AGHUse® system.

Method: An experience report of technological production at a university hospital, which followed the phases of conception, detailing, construction and prototyping.

Results: Different scales were computerized, with emphasis on the Braden and Braden Q, which assess the risk of pressure injuries, and the Severo-Almeida-Kuchenbecker, which assesses the risk of falls. The process of computerization and implementation took place through registration of the scales in the software, application of them in care practice, integration and visualization of their scores with the other functionalities of the electronic medical record.

Final considerations: The functionalities developed in the computerization of risk prediction scales favored its operation, reflecting positively on nursing practice and patient safety.

Keywords: Information technology. Nursing informatics. Nursing records. Patient safety. Quality of health care.

RESUMO

Objetivo: Descrever o desenvolvimento da informatização de escalas de predição de risco, utilizadas pela enfermagem no prontuário eletrônico, no sistema AGHUse®.

Método: Relato de experiência de produção tecnológica em um hospital universitário, que seguiu as fases de concepção, detalhamento, construção e prototipagem.

Resultados: Foram informatizadas diferentes escalas, destacando-se as de Braden e de Braden Q, que avaliam risco de lesão por pressão, e a de Severo-Almeida-Kuchenbecker, que avalia risco de quedas. O processo de informatização e implantação ocorreu por meio do cadastro das escalas no software, aplicação delas na prática assistencial, integração e visualização de seus escores em relação às demais funcionalidades do prontuário eletrônico.

Considerações finais: As funcionalidades desenvolvidas na informatização das escalas de predição de risco favoreceram a sua operacionalização, refletindo-se positivamente na prática do enfermeiro e na segurança do paciente.

Palavras-chave: Tecnologia da informação. Informática em enfermagem. Registros de enfermagem. Segurança do paciente. Qualidade da assistência à saúde.

RESUMEN

Objetivo: Describir el desarrollo de la informatización de las escalas de predicción de riesgo utilizadas por la enfermería en la historia clínica electrónica, en el sistema AGHUse®.

Método: Relato de experiencia de producción tecnológica en un hospital universitario, que siguió las fases de concepción, detalle, construcción y prototipado.

Resultados: Se computarizaron diferentes escalas, con énfasis en la Braden y Braden Q, que evalúa el riesgo de lesiones por presión, y la Severo-Almeida-Kuchenbecker, que evalúan el riesgo de caídas. El proceso de informatización e implementación pasó por el registro de las escalas en el software, aplicación de las mismas en la práctica asistencial, integración y visualización de sus puntuaciones con las demás funcionalidades de la historia clínica electrónica.

Consideraciones finales: Las funcionalidades desarrolladas en la informatización de las escalas de predicción de riesgo favorecieron su operacionalización, repercutiendo positivamente en la práctica de enfermería y la seguridad del paciente.

Palabras clave: Tecnología de la información. Informática aplicada a la enfermería. Registros de enfermería. Seguridad del paciente. Calidad de la atención de salud.

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INTRODUCTION

The university hospital, which is the setting of this study, has always sought creative and effective solutions to support health management. Since the 1980s, this hospital has been developing a computerized system called AGHUse®, which, over time, has transformed an in-house solution into a comprehensive, modern platform registered with the general public license[1]. AGHUse® is a free electronic patient record (EPR) software, with an integrated management system, capable of generating results that support the transformation of health care management in the country[1].

Technological innovation research in nursing concerns interdisciplinary partnerships, as well as partnerships with information technology professionals, that promote solutions for the current demands of digital transformation of health[2]. In this regard, in the field of study, as well as in the literature[3], the absence of functionalities that allow the use of risk prediction scales in a computerized way and with interactivity for the information available in the EPR was verified. Risk prediction scales are tools that aim to provide health professionals with an objective assessment of a patient's risk for an adverse outcome. They are used to carry out systematic and accurate assessments, helping the multidisciplinary team in decision-making and health care planning[4,5]. It is known that the final score of the application of risk prediction scales, often performed manually and on paper forms, guides the diagnostic reasoning of nurses, as well as the implementation of preventive and treatment measures for each individual, contributing to higher quality care and safety for patients[4,6]. Thus, risk prediction scales are important elements in the Nursing Process (NP), as they are part of patient data collection which, in turn, is based on the diagnosis and prescription of nursing interventions, in the search for the best possible outcomes.

In the scenario of this study, nursing uses the NP through the computerized standardized language system that is linked to the EPR, according to the institution's care model and Brazilian professional legislation[7]. However, risk prediction scales at the institution were applied in printed forms and are dissociated from the NP and, consequently, from the EPR. This led to weaknesses in the quality of records, impacting patient safety. It is known that registration in the EPR, when performed in real time, is safer, as it reduces the time required for information to reach health professionals, favoring decision-making and minimizing the probability of errors, incidents and adverse events and, therefore, of harm to patients[8]. Thus, this project was guided by the search for the computerization of risk prediction scales applied by nursing, so that a more agile, uniform and clear work process is obtained, which improves the visibility of actions and communication with the multidisciplinary team, with data recorded in the EPR in real time, and adding information to decision-making for patient safety. Therefore, this article aims to describe the development of computerization of risk prediction scales used by nursing in the AGHUse® system.

METHOD

This is an experience report on the development of computerization of risk prediction scales used by nursing in the AGHUse® system, in a public hospital in southern Brazil, linked to the network of university hospitals of the Ministry of Education. This hospital has proposed innovative initiatives, and thus has become a reference for several health institutions in Brazil[9]. The development of computerization took place from November 2018 to June 2019, according to the design, detailing, construction and prototyping phases of the new screens, in an interactive and cyclical way[10].

In the design phase, knowledge of the internal scenarios was enhanced. The work processes were outlined for the computerization of the different risk prediction scales, which were applied on paper forms. Obstacles to the work process and, consequently, to patient care were raised. Subsequently, the objectives, requirements, assumptions and possible risks were established. Professionals from different patient care areas and specialties were involved, which facilitated the identification of real needs and the proposition of ideas about computerization, which should be easy to use, including interactivity in the NP record, visible on different screens of the AGHUse® system.

In the detailing phase, the project was carried out in different cycles, allowing agile and interactive development, with frequent deliveries, enabling evaluations of safety rules, approvals and improvements regarding the proposed requirements, to the satisfaction of users. In the construction and prototyping phase, an analysis of the requirements and development of prototypes for the registration screens and the application of risk prediction scales in the AGHUse® system were carried out. As this is an interactive and incremental process, at each development cycle, new requirements were identified by users, making it necessary to refine the system with the development of improvements and safety rules, until the proposed objectives were reached in a safe way for patients and professionals.

The ethical aspects of this report were observed, and confidentiality of institutional information was ensured.

■ EXPERIENCE REPORT

Different risk prediction scales were computerized, with emphasis on the Braden and Braden Q scales, which assess the risk of pressure injuries in adult and pediatric patients[4], respectively, and the Severo-Almeida-Kuchenbecker (SAK) scale, which assesses the risk of falls in hospitalized patients[11].

Computerization of the risk prediction scales was established as follows: registration, application, integration and visualization of the scales.

Registration of scales in the AGHUse® system

The registration and configuration screens of the computerized scales were developed with the same structure, supporting parameterization, taking into consideration the characteristics of each scale and allowing the inclusion of new scales, whenever necessary. The process starts from a structured registry and there is interactivity of their scores with diagnoses and prescriptions for nursing interventions, that is, stages of the NP that are relevant for decision-making. Once this information is saved, it is possible to register the age group for which the scale will be enabled, as well as the items that compose it and its score. The scores that indicate

the degree of risk to which patients will be exposed are also defined. Through the registration screens, options could also be defined for guidance on the scores obtained in the scales with other modules of the system, accompanied by flagging of patients according to the degrees of risk.

Also, whenever the score of a scale indicates the presence of risk, questions are triggered that guide the nurse in decision-making, which starts with the establishment of a nursing diagnosis (ND) of risk, based on the NANDA Taxonomy International (NANDA-I®)[12]. Next, nursing interventions are prescribed, based on the Nursing Interventions Classification (NIC)[13]. There are also items to be completed in case of occurrence of an adverse event related to the scales (for example, pressure injuries or falls), characterizing the notification of this event.

Application of risk prediction scales used in care practice

When applying the computerized risk prediction scales, the nurse must inform his/her user name and password (Figure 1).

In the list of patients, the nurse selects a patient, then the "*Escala*" (Scale) button, selecting the scale to be applied,
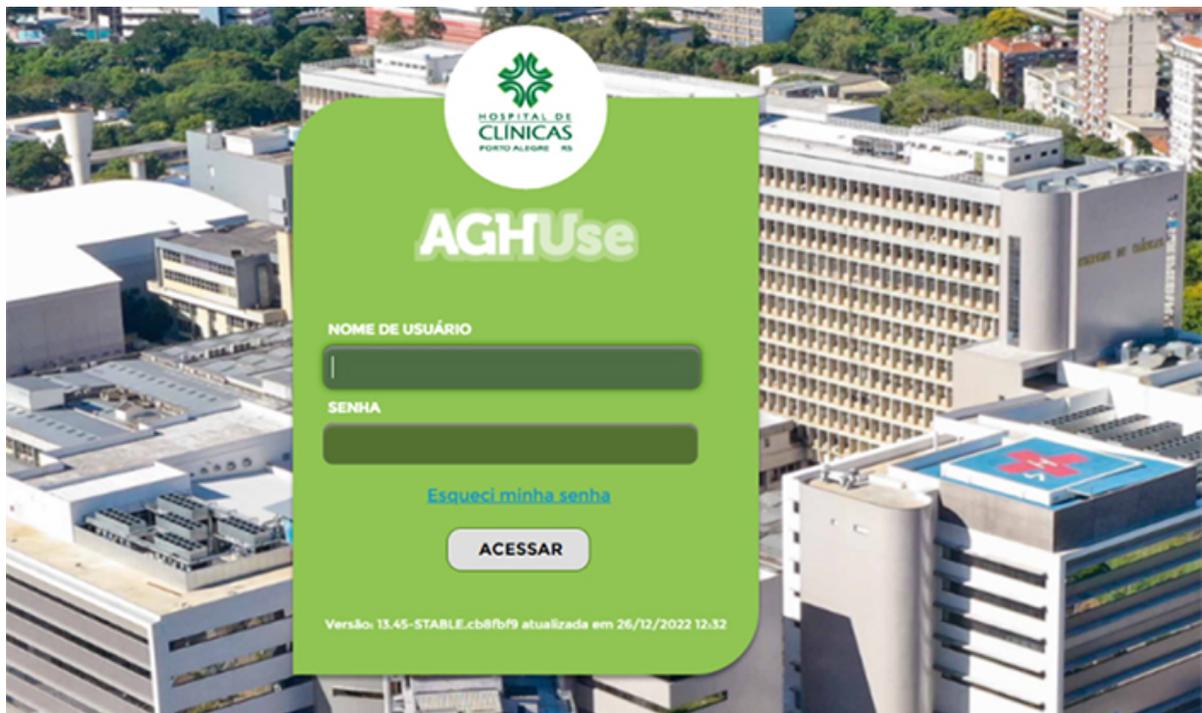
**Figure 1 –** User access login in AGHUse®. Porto Alegre, Rio Grande do Sul, Brazil, 2022
Source: AGHUse® system.

which guides him/her to the "*Novo registro*" (New registration) button. When this button is clicked, the system displays a security question, and the nurse can confirm that the patient and his/her respective electronic patient record number are correct (Figure 2).

When confirmation is made, the system provides the scale to be completed, along with its variables and conceptual definitions, which can be viewed when the mouse is positioned over the question mark (?). While the scale is being completed, the system generates the final score and classifies the patient's risk (Figure 3).

If the final score indicates a patient at risk, the system provides the nurse with the option of starting an accurate ND. In the case of the SAK scale, the system suggests the ND
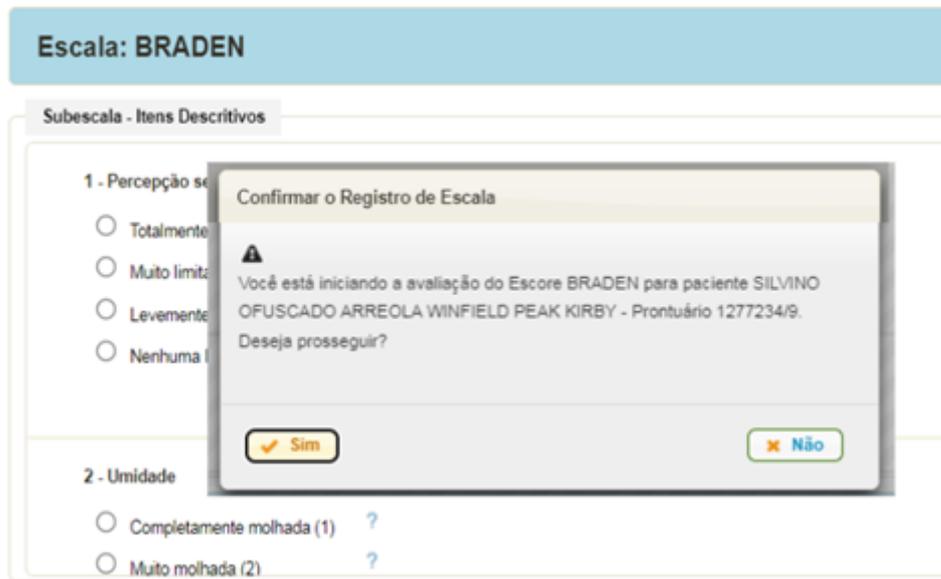
Figure 2 – Security question. Porto Alegre, Rio Grande do Sul, Brazil, 2022
Source: AGHUse® system.

Figure 3 – Registration of the scale with its variables for the clinical evaluation of the patient, with its respective score and final risk classification. Porto Alegre, Rio Grande do Sul, Brazil, 2022
Source: AGHUse® system.

Figure 4 – Suggestion for the nurse to open the accurate ND, according to the patient's final risk score and classification. Porto Alegre, Rio Grande do Sul, Brazil, 2022
Source: AGHUse® system.

Risk for Falls, and in the Braden scale, the ND Risk for Pressure Injury (*Risco de Lesão por Pressão*)[12] (Figure 4).

In the process of computerization of scales, the system allowed nurses to notify an adverse event, asking some questions about it. For example, in the presence of a pressure injury, the questions are: does the patient have a pressure injury? What's the location? Laterality? What is the stage of the injury? What is the origin (community or hospital)? If the answers to these questions are affirmative and indicate pressure injury of stage 2 or more advanced, with hospital origin, the AGHUse® system automatically generates information that feeds the institutional indicator about this adverse event. In the case of the SAK scale, the system provides the question: did the patient experience falls during your work shift? If so, the system automatically generates information that feeds the institutional indicator of falls.

The computerization of risk prediction scales is an innovation that has enabled detailed monitoring of health risks, through automated alerts and nursing care actions, which can prevent or reduce length and cost of hospital stay[14]. In addition, computerization favors the future development of an automated predictive model, as in the example of a study that recently tested a model for assessing the risk of falls and pressure injury, showing agreement between assessments in the conventional system and in the automated system and reduction of the time devoted for this activity[15]. In the final step of application of these scales, the system again displays a security message asking the nurse if the patient and his/her medical record number are correct.

Integration and visualization of risk prediction scales in AGHUse®

When the application of any of the scales is completed, the final score with the risk classification automatically migrates to different modules in AGHUse®, allowing its visualization in the nursing anamnesis, in the daily nursing evolutions, in the vital signs control screens and patient monitoring and in the form containing information about handover. Risk classifications are also visualized in the list of patients, through flags identified by colors. The green flag represents the absence of risk, the yellow one represents risk, and the red one represents an adverse event.

■ FINAL CONSIDERATIONS

The present study described the development of computerization of risk prediction scales used by nursing in the AGHUse® system. This innovative technological product made it possible to relate final scores of risk prediction scales to NP stages, adding greater visibility and quality to nursing records and, consequently, patient safety. The use of the scales, in an interactive way, also promoted the production of evidence, stimulating the team's critical thinking and clinical reasoning, in order to facilitate a more accurate ND, in addition to promoting measures to prevent adverse events and qualify the monitoring of these event.

The computerization of risk prediction scales has shown relevant advances in the systematization of the institution's

records, generating positive impacts on care practice. By organizing clinical reasoning, computerization makes it possible to identify risks and guide preventive actions and specialized interventions, adding security to patients and the professionals involved in their care.

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