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Original Article

Evaluation of the implementation of a training course related to pressure ulcer prevention

Avaliação da implementação de uma capacitação relacionada à prevenção de lesão por pressão

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ABSTRACT: *Objective:* to evaluate the implementation of a training program for pressure ulcer prevention measures using validated instruments. *Methodology:* a quasi-experimental study developed in four steps: content validation of an audit tool to assess the implementation of pressure ulcer prevention measures; audit to assess the implementation of the measures; educational intervention with face validation of a questionnaire to assess learning; repetition of the audit two months after the educational intervention. *Results:* the validation reached a percentage of agreement among the experts higher than 0.9. In the first audit, the compliance in the implementation of the measures was 65.1%. The learning assessment score before the intervention was 7.99 and after it was 8.45 ($p<0.0001$). In the second audit, the compliance in the implementation of the measures was 56.2%. *Conclusion:* the implementation of a training program for pressure ulcer prevention measures contributed to increase the participants' level of theoretical knowledge; however, there was no translation of the acquired knowledge into clinical practice. Instrument validation was satisfactory.

Keywords: Pressure ulcer; Inservice training; Simulation training; Patient safety; Nursing.

RESUMO: *Objetivo:* avaliar a implementação de um programa de capacitação para medidas de prevenção de lesão por pressão por meio de instrumentos validados. *Metodologia:* estudo quase-experimental desenvolvido em quatro etapas: validação de conteúdo de um instrumento de auditoria para a avaliação da implementação de medidas de prevenção de lesão por pressão; auditoria para a avaliação da implementação das medidas; intervenção educativa com validação de face de um questionário para avaliar a aprendizagem; repetição da auditoria dois meses após a intervenção educativa. *Resultados:* a validação alcançou porcentagem de concordância entre os especialistas superior a 0,9. Na primeira auditoria, a conformidade na implementação das medidas foi de 65,1%. A nota da avaliação de aprendizagem antes da intervenção foi 7,99 e, após, 8,45 ($p<0,0001$). Na segunda auditoria, a conformidade na implementação das medidas foi de 56,2%. *Conclusão:* a implementação de um programa de capacitação para medidas de prevenção de lesão por pressão contribuiu para aumentar o nível de conhecimento teórico dos participantes, entretanto, não houve a translação do conhecimento adquirido para a prática clínica. A validação dos instrumentos foi satisfatória.

Palavras-chave: Lesão por pressão; Capacitação em serviço; Treinamento por simulação; Segurança do paciente; Enfermagem.

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INTRODUCTION

Ensuring patient safety during care in healthcare institutions is about reducing the risk of unnecessary harm to an acceptable minimum. Incidents that occur during health care delivery and result in harm to the patient are defined as Adverse Events (AE) and their occurrence reflects the quality of service[1].

As the search for safer health care has been on the rise in recent years, Brazil, in order to guide institutions and professionals in the implementation of measures to minimize or prevent the occurrence of AEs, in congruence with the World Health Organization, provides six basic protocols for patient safety: patient identification; safe surgery; hand washing practice; safety in the prescription, use and administration of medications; prevention of falls and Pressure Ulcers (PU)[2].

PU, defined by the presence of localized damage to the skin and/or adjacent soft tissues as a result of pressure or the combination of pressure and shear[3], was one of the most notified AEs at the National Health Surveillance Agency (ANVISA) in the period from June 2019 to May 2020, corresponding to 19.4% of the total events notified in Brazil[4].

PUs usually affects regions with bony prominences, but it can also be related to the use of medical devices and can present itself either intact or as an open ulcer, usually associated with the presence of pain. It results from intense and prolonged pressure, and skin conditions, perfusion, comorbidities, age, and bed rest are factors that increase the risk of its development[3].

Considered one of the most common consequences regarding skin alteration, PU can be classified according to tissue involvement, and initially evidenced by intact skin with an erythema that does not pale upon digit pressure (category I), followed by partial thickness skin loss with dermis exposure (category II), full thickness skin loss (category III) with subcutaneous tissue exposure, and finally full thickness skin loss with subcutaneous tissue with muscle fascia, muscle and/or bone involvement (category IV)[3]. Category III and IV injuries are considered never events by ANVISA, i.e., events that should never occur in health services[4].

It is worth noting that a lesion covered by sphacel or eschar, where tissue damage cannot be assessed, is called an unclassifiable lesion, and finally, lesions with intact skin and a localized area with brown, dark red or purple coloration, which does not pale, are classified as PU in deep tissues. It is important to note that PU on mucous membranes should not be classified due to differences in mucosal structure[3].

PU has been a major concern for healthcare services, since its prevalence and incidence are high worldwide and have an impact on patients, families and the healthcare system itself (increased hospitalization time, risk of infection, costs and mortality)[5,6].

In most cases, PUs can be prevented by implementing prevention strategies for all patients, especially those identified as at risk[3,7], Therefore, risk assessment and the implementation of prevention measures are fundamental to guarantee quality care and minimize the physical, psychological, social and financial impacts related to the occurrence of this event.

Given this concern, health services should have material resources and protocols that support the implementation of preventive measures for PU. In addition, nursing professionals should be trained for this care through education about PU and its prevention[5,6].

However, the literature points to unsatisfactory knowledge of nursing professionals regarding prevention measures, which can be detrimental to patient safety and, therefore, the implementation of training strategies that contribute to changing this reality is of fundamental importance[6,8].

Among these strategies, clinical simulation stands out, providing the individual with the experience of a situation similar to practice. Simulated activities stimulate the use of clinical reasoning, decision making, and team management. The main objectives of a simulation are to allow the participant to acquire knowledge, skills, critical thinking, self-confidence, and satisfaction[9].

Considering that PU has been an AE of great concern for services in Brazil and worldwide and that the implementation of teaching strategies can ensure the effectiveness of the development of professional skills for safer care, this study aimed to evaluate the implementation of a training program for PU prevention measures using validated instruments.

METHODOLOGY

Quasi-experimental study conducted in five wards of a teaching hospital in the countryside of the State of São Paulo, whose PU prevalence indicators were more expressive. The mission of this institution is to provide tertiary care through the Unified Health System and to promote teaching and research.

The study was developed in four stages: 1) review and content validation of an instrument for auditing PU prevention measures, developed and already previously used by nurses of the Stomal Therapy Center of the institution; 2) audit to assess whether the PU prevention measures, described in the institutional protocol, were being implemented by the Nursing team; 3) training of the nursing team through clinical simulation and assessment of pre- and post-training knowledge regarding the implementation of PU prevention measures; and 4) audit to assess whether the PU prevention measures, described in the institutional protocol, were being implemented by the nursing team after

the educational intervention.

In the first stage, the instrument, previously developed by nurses of the institution, was reviewed by the researchers based on the consensus of the National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP) and Pan Pacific Pressure Injury Alliance (PPPIA)[10].

After review, the instrument was submitted to evaluation of the relevance and representativeness of the content of each item, in the period between November 2018 and January 2019, by a group of six experts, selected by convenience, five of whom had specialization in Stomal Therapy, one had a master's degree, and three had doctoral degrees with publications in the study area (most experts had more than one level of post-graduation). Agreement between participants was measured by the Content Validity Index (CVI) and values above 0.9 were considered satisfactory[11].

The second step, an audit to assess whether the PU prevention measures described in the institutional protocol were being implemented by the Nursing team, was performed between February and March 2019. The inclusion criteria for the audit were: patients aged 18 years or older; length of stay in the unit longer than 24 hours; and high risk of developing PU, that is, having values equal to or lower than 12 according to the Braden Scale score[12].

For the sample calculation, the methodology for a paired Student's t-test was considered, with a significance level of 5%, test power of 80%, and effect size equal to 0.50, considered an effect of medium degree. The calculation resulted in a minimum sample size of 34 subjects. For the sample calculation, we used the software G*Power 3.1.9.2.

In the five wards listed for study, patients who met the inclusion criteria were selected by convenience, invited to participate in the study and, when unable to establish communication, their guardians were approached and those who accepted signed the Free and Informed Consent Term (FICT). The data collected were entered into the Excel for Windows® program. To calculate the compliance, the average of the sum of the number of items that met the institutional protocol was calculated, divided by the total number of items of the instrument, and the scores were represented by percentages.

For the third stage, training of the team of Nursing professionals, which occurred in April 2019, all 182 professionals assigned to the described wards were invited to participate in the study. For this stage, a scenario was built for the simulation and an instrument for learning assessment.

The scenario, repeated 18 times to include professionals from all shifts, was prepared according to the National League for Nursing/Jeffries Simulation Theory proposal[9]. Before starting the scenario, the participants were informed about the simulation objective, which was to train them to implement PU prevention measures according to the institutional protocol. A medium-fidelity mannequin (Resusci Anne®, Laerdal Medical) was used, representing an 80-year-old patient with pneumonia and classified as high risk for PU by the Braden Scale[12]. To solve the problem, information about the patient's clinical conditions was provided and all material resources needed for PU prevention measures were available in the simulation environment.

Still in this stage, for the evaluation of learning, an instrument was designed to assess the knowledge of the participating professionals. This instrument was submitted to face validation with two specialist nurses in Stomal Therapy and a professor of the School of Nursing [13]. The items present were the identification of the work unit, the professional category and nine objective questions based on the NPUAP, EPUAP, PPPIA consensus, containing aspects related to PU prevention, such as: risk and skin assessment; skin care; patient positioning; nutrition, friction and twisting; use of medical devices and support surfaces[10]. This instrument was applied before (pre-test) and immediately after (post-test) the training of professionals, which lasted approximately one hour. Participants who agreed to participate signed the FICT afterwards.

The data collected was entered into the Excel for Windows® program and analyzed using absolute and relative frequencies. Data distribution was evaluated using the Shapiro-Wilk test. The comparisons between the professional categories, in the pre- and post-test, were evaluated by the mean score obtained, which ranged from zero (worst performance) to ten (best performance), using the Mann-Whitney test. In these analyses, the Bonferroni correction was applied to the significance level according to the number of tests performed. The level of significance adopted in these cases was 5.0%.

The fourth stage, an audit to assess whether the PU prevention measures were being implemented by the Nursing team after the educational intervention, was performed in July 2019, that is, two months after the simulation, and the same criteria of the second stage for sample calculation, data collection procedure, and analysis were adopted. The comparison of the means of the conformities found in the second and fourth stages of the study was evaluated using the unpaired Student's t-test.

For all analyses, the statistical software Statistical Analysis System® (SAS), version 9.4, and Statistical Package for the Social Sciences® (SPSS), version 22.

The study was approved by the Research Ethics Committee of the University with the Certificate of Ethical Review Submission number 00845118.7.0000.5404 and with approval Opinion number 3.045.941.

RESULTS

In the first stage of the study, after reviewing the audit instrument to assess the implementation of PU

prevention measures, it was composed of 35 items divided into four domains: 1) Risk assessment; 2) Nutritional assessment; 3) Relief and reduction of local pressure and 4) Skin assessment and care.

This version of the instrument was submitted to content evaluation in which two rounds were necessary for all items to reach CVI higher than 0.9. In the first round, suggestions were made that substantially altered five items of the instrument (Table 1).

Table 1 - Items of the audit instrument for PU prevention with a Content Validity Index lower than 0.9 in the first round of evaluation and suggestions made by the experts

Item	CVI*	Suggestions implemented
Is there Braden's 24-hour record?	0.6	Is there a record of the risk assessment by validated scale (Braden, Braden Q, Norton, among others)?
Is there identification of nutritional risk by means of the MUST (Malnutrition Universal Screening Tool)?	0.6	Is the identification of nutritional risk up-to-date and assessed by means of a validated scale (MUST, Strong Kids, among others)?
Observation (related to nutritional assessment): associate whether the assessment is compatible with the patient's clinical condition	0.8	Item Exclusion.
Observation (related to assessment and skin care): check Nursing note	0.8	Note: check nursing note or if the item is checked in the nursing prescription
Is the TOT or TQT fixture without a pressure point?	0.5	Is the attachment of the orotracheal tube or tracheostomy tube free of pressure points?

CVI*= Content Validity Index

In the second round of this stage, conducted with the same experts, the exclusion of the item referring to the observation of the nutritional assessment and the other four items reached 100% agreement. The final version of the instrument was composed of 34 items.

The second stage of the study, an audit to verify whether the PU prevention measures were being implemented by the Nursing team, was performed with 28 patients. The average overall compliance of the implementation of the PU prevention measures was 65.1%.

In the third stage, training of the nursing team, 124 professionals from the three shifts participated, corresponding to 68.1% of the total team. In this stage, the averages achieved by the professionals who took the pre- and post-test are presented in Table 2.

Table 2 - Knowledge performance achieved by the participants before and after the educational intervention

Professionals	Pre-test			Post-test			p-value
	n	M	SD	n	M	SD	
Nursing Technicians	90	7.89	1.33	87	8.40	1.18	0.0007
Nurses	34	8.26	0.67	34	8.56	0.75	0.0299
Total	124	7.99	1.19	121	8.45	1.07	< 0.0001

n=Number; M=Mean; SD=Standard Deviation; p-value=P value obtained using Mann-Whitney test.

The fourth stage, an audit to verify the implementation of strategies for PU prevention after educational intervention, included another 28 patients. The mean compliance obtained was 56.2%. The comparison between the averages found in the two audits (before and after the educational intervention) is presented in Table 3.

Table 3 - Comparison of the conformity of the implementation of PU prevention measures by the Nursing team found in the first and second audits

Audits	n	M	SD	p-value
Audits 1	28	65.1%	11.43	0.0266
Audits 2	28	56.2%	13.70	

n=Number; M=Mean; SD=Standard Deviation; p-value=P value obtained from unpaired Student's t-test.

DISCUSSION

PU prevention is included in the Basic Patient Safety Protocol[2], therefore, preventing this AE is a duty of the health team through quality care, achieved by developing continuing education activities, especially for the nursing team[8].

To verify the adherence of the Nursing team to the PU prevention measures described in the institutional protocol, an audit instrument, previously designed for this purpose, was reviewed and validated. The validation of this instrument was necessary due to the absence of instruments in the literature for this purpose. In addition, we also performed a face validation of the questionnaire to assess the professionals' knowledge regarding the implementation of PU prevention measures.

It is important to choose validated instruments that accurately measure the construct under study and, thus, contribute to more assertive results that can support decision making[11]. The instruments validated in this study were evaluated by a group of specialists with clinical and scientific experience in the area of stomal therapy and PU. Thus, the evaluation of the items was made in a judicious manner, considering the expertise of each one. The suggestions made by the group that evaluated the audit instrument significantly changed five items, allowing the instrument to become more relevant and representative, ensuring a better assessment of the construct that would be studied[11].

The literature highlights that, in addition to the audit, other strategies can be used to verify the adherence of professionals to PU prevention measures, such as self-administered questionnaires[7,14]. However, in this study, we chose to use internal auditing, since it can be a strategy to identify problems related to patient safety and guide managers in prioritizing improvement actions in the search for safer care[15].

In the second stage of the survey, an audit to assess whether the PU prevention measures were being implemented, an unsatisfactory result was found in that less than 70% of the actions were being performed by the professionals. Findings such as these can be used to support adjustments in the policy and culture of the institution in order to stimulate the commitment of the whole team and institution towards quality assurance in care [15]. It is noteworthy that even though the audit was performed with patients, the purpose of using it in the study was to verify whether the professionals were implementing the necessary care for the prevention of PU.

Regarding the educational stage, the team's knowledge improved significantly after the training. Since the institution did not allow the identification of the participants in the pre- and post-test, the comparison of means was not performed, considering a paired sample. However, the results allowed us to conclude, in the sample as a whole, that the method used for professional training proved to be efficient to add knowledge to the nursing team.

Clinical simulation, the teaching strategy adopted, is capable of developing skills and clinical reasoning, as it constitutes a differential tool for the qualification of health professionals and that, increasingly, has been used for the training of work teams, to test new equipment, develop knowledge, skills and decision-making skills[16].

The findings of the fourth stage were contradictory to what was expected, and therefore surprising, because even though more knowledge was gained, there was no change in behavior in practice. Researchers from Belgium emphasized that knowledge alone is not enough to change nurses' attitudes[14].

It is reported that the main factors contributing to this maintenance of the behavior are related to job dissatisfaction, lack of human resources and an effective institutional PU prevention policy[17].

A study conducted with the nursing team with the objective of verifying compliance related to the prevention of PU used other strategies such as: campaign with dissemination of information, scientific meetings, display of illustrated banner containing preventive measures in corridors and elevators, however, these strategies also proved to be insufficient with regard to changing the behavior of professionals[18].

It can be seen that the change in behavior is beyond the implementation of traditional or even contemporary teaching strategies, as is the case of simulation, which shows an increase in the knowledge of professionals, but little change in attitude [19]. When it comes to quality of care and patient safety, the acquisition of theoretical knowledge, without practical application, does little to improve outcomes.

As much as staff education is a daily and essential component in clinical practice, the literature points out that the education of professionals for the prevention of PU is still questioned, since studies conducted on the subject provided little evidence that educational actions brought better results regarding the incidence of PU[20].

As a limitation of this study, one can highlight that the sample size of the second and fourth phases was lower than the initial calculation, because one of the inclusion criteria of the patients was to have a high risk assessment on the Braden scale and, therefore, many patients were in critical condition, which made it impossible for them to sign the FICT and, as the institution has extended visiting hours, finding the people responsible for obtaining authorization was a challenging and often unsuccessful task.

In addition, the constant search by those responsible for the patients meant that the researchers had to return numerous times to the wards, a fact that contributed to their presence, in the role of auditors, being noticed and several questionings and changes in the professionals' behaviors began to be present, such as, for example, placing the

decubitus change clock as soon as the researchers entered the units. At this moment, it was decided to interrupt the collection so that the results would not be biased.

This research makes two valid instruments available to the scientific community, both built based on international consensus recommendations. It is noteworthy that this study also contributes for the continuing and continuing education sectors of institutions to adopt clinical simulation as a teaching strategy, using scenarios based on clinical cases that reproduce reality and allow participants to identify the risk of developing a case of PU, evaluate the material resources available, and implement measures to prevent this event, considering that it has proven to be effective for the acquisition of knowledge.

As future research, it would be interesting to conduct studies with mixed methods to investigate why the knowledge acquired was not, in fact, transferred to clinical practice. These data can help managers improve the quality of care offered to patients.

By considering that the evaluation of the implementation of a training program should be done on four levels: learning (increase in knowledge after the educational intervention); reaction (thought and feeling of the student/professional about the training); behavior (implementation of knowledge in practice) and results (outcomes resulting from the performance of the student/professional in the environment)[21], new evaluation research, especially addressing the last level, can also be developed.

CONCLUSION

The implementation of a training program for PU prevention measures contributes to increase the participants' level of theoretical knowledge; however, there was no translation of the acquired knowledge into clinical practice.

The instruments developed to evaluate the implementation of the training program showed evidence of content validity and can be used by professionals and researchers who aim to improve the quality of care.

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