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ORIGINALES

Transferring research results to the classroom: Fall incidence records

Transferencia de los resultados de investigación al aula: registros de incidencias de las caídas

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ABSTRACT:

Background: Complete and correct records of fall events help to implement prevention measures. However, there is lack of knowledge among healthcare personnel about the existence of a recording system or the need to record such events. The purpose of this study was that the nursing students make quality records of the fall events, and consequently to develop and implement a system to record patient fall incidents (REOC) for use during the clinical practicums of nursing students.
Method: Participatory action research (critical incident analysis) was carried out at a nursing school in southern Spain and its reference hospital. Among other variables, the implementation of the REOC (intervention), the complexity of records and the students' learning outcomes were assessed.
Results: The recording instrument had a significant impact on patients' health outcomes. The REOC was of medium (42.9%) and low complexity (42.9%), while 71.4% acquired new skills through the implementation. Learning outcomes were of an average level in 71.5% of the cases and positive in 28.6%.
Implications for Practice: The proposed project is an example of an innovation-research-innovation experience carried out in a teaching-learning setting using a cyclical knowledge transfer and feedback process.

Keywords: Records; Accidental falls; Nursing; Adverse effects.

RESUMEN:
Antecedentes: Los registros completos y correctos de los eventos de caídas ayudan a implementar las medidas de prevención. Sin embargo, existe un desconocimiento entre el personal de salud sobre la existencia de un sistema de registro o la necesidad de registrar dichos eventos. El propósito de este estudio fue que los estudiantes de Enfermería realizaran registros de calidad de los eventos de caída y, en consecuencia, desarrollar e implementar un sistema de registro de incidentes de caída de pacientes (REOC) para su uso durante las prácticas clínicas de los estudiantes de enfermería.
Método: La investigación-acción participativa (análisis de incidentes críticos) se llevó a cabo en una Facultad de enfermería del sur de España y su hospital de referencia. Entre otras variables, se evaluó la implementación del REOC (intervención), la complejidad de los registros y los resultados de aprendizaje de los estudiantes.
Resultados: El instrumento de registro tuvo un impacto significativo en los resultados sanitarios de los pacientes. El REOC fue de complejidad media (42,9%) y baja (42,9%), mientras que el 71,4% adquirió nuevas habilidades a través de la implementación. Los resultados de aprendizaje fueron de nivel medio en el 71,5% de los casos y positivos en el 28,6%.
Implicaciones para la práctica: El proyecto propuesto es un ejemplo de una experiencia de innovación-investigación-innovación llevada a cabo en un entorno de enseñanza-aprendizaje utilizando un proceso cíclico de transferencia de conocimientos y retroalimentación.

Palabras clave: Registros; Caídas accidentales; Enfermería; Efectos adversos

INTRODUCTION

Patient safety is a fundamental principle in health care, as the care-giving process involves a certain degree of inherent unsafety[1]. The WHO defines patient safety as the "reduction of risk of unnecessary harm associated with health care to an acceptable minimum," where acceptable minimum refers to "harm arising from or associated with plans or actions taken during the provision of healthcare, rather than an underlying illness or injury." A patient safety incident is an event or circumstance that causes or could have caused unnecessary harm to a patient. These incidents are classified as i) near misses when they do not reach the patient; ii) no harm incidents that reach the patient but do not cause any appreciable harm; and iii) harmful incidents or adverse events that result in harm to a patient[2]. Adverse events are directly associated with clinical practice, products, procedures, or the system. Therefore, improving patient safety requires a complex effort by the entire system involving a wide range of actions aimed at performance improvement, environmental safety and risk management, including infection control, the safe use of medicines, equipment safety, safe clinical practice and a safe environment in which health care is provided[1].

The Spanish study on adverse effects linked to hospitalization directed by Dr. Aranaz[3] concluded that the incidence of adverse events in Spanish hospitals was 9.3%, of which 26% was due to the disease process and 74% related to the health care provided. As regards the severity of the events, 45% were considered mild, 39% moderate, and 16% severe. According to the ENEAS-2005 report[3], 31.4% of patients increased their length-of-stay and 24.4% of hospital admissions as the result of adverse events. Adverse events have a significant impact on patients not only in terms of health, but also economically, since they entail longer hospital stays, readmissions, and additional procedures and treatments, among others [3].

To improve patient safety and analyse the situations, problems, and incidents that resulted in or could have resulted in harm to patients, all adverse events must be recorded in reporting systems [4]. The Heinrich safety pyramid illustrates the importance of incident reporting and its impact on patient safety[5]. As it shows, for

every adverse event, there will be at least 30 minor injuries and 300 will produce no injury to the patient. In Heinrich's model, the tip of the pyramid represents serious incidents, while no-injury incidents are less visible but at the base of the problem. All patient safety events have common root causes, and can provide useful information for preventing the most serious adverse events[5]. However, there is still no widespread awareness of the importance of reporting and there is a tendency to under-report such incidents. According to a report published by the Quality Agency of the Spanish National Health System in 2019[6] an estimated 95% of all AEs go unreported.

The main obstacles to reporting are lack of awareness that an error has occurred; what should be recorded and why; the perception that the patient has not been harmed; fear of disciplinary actions or complaints; lack of familiarity with reporting mechanisms; loss of self-esteem; feeling too overworked to report; increased workload; and the perception that there is no clear benefit to reporting such incidents, among others [5,6].

Organizations committed to improving patient safety focus their efforts on four key aspects of safety [6]: promoting a culture of safety at all levels, assessing and fostering a good safety climate, improving patient safety training, and developing safety measures in clinical units.

Falls are among the different adverse events affecting older patients. In an aging society, it is of vital importance to develop public health policies that preserve people's autonomy and independence. In this regard, falls are among the first causes of loss of autonomy and constitute a serious public health problem due to the clinical, social and economic consequences they have both on the person and on their family [8].

In recent decades, the scientific community has made considerable effort to identify the risk factors associated with falls, but little attention has been paid to the assessment and reporting of fall risk [9,10] and the circumstances surrounding falls [11,12]. Although, it is considered that the precision in the data recording is essential for taking measures that favour the patient's safety [13-15].

Several studies conducted by the research and innovation group supporting this project [11,12,16] coincide with other authors regarding the reasons for under-reporting [17,18], as mentioned above: work overload, feelings of guilt, the feeling that the collected data is not accurate, or lack of knowledge among healthcare personnel about the existence of a recording system or the need to record such events [5,6].

These authors recommend modifying the culture of "blame" for another of freedom of registration, implementing friendly information systems available to all professionals, as well as providing ongoing training on the use and benefits of registration systems.

It is important that these issues be addressed in nursing education and that nursing trainees learn the appropriate strategies to deal with them with a view to their future professional practice. To this end, the main objective of this study was to implement an effective technique for recording patient falls in the students' clinical practicums using the Fall-Incidence Recording Document (REOC) (work carried out in the context of teaching activity). The experience was methodologically grounded in Ausubel's theory[19] of meaningful learning. Theory that is based on building new knowledge through the interaction between the information received by the individual and that

already possessed (old experiences, relationships, learning...), in a continuous feedback modulated by emotions, feelings, relationships, principles, values, etc. The approach of the present project is perfectly framed in Ausubel's theory [19] by allowing feedback between previous knowledge (in the classroom) and acquired (in the place of clinical practices) and intellectual reworking in the classroom, for again return to the clinic in a constant interaction.

Therefore, the purpose of this study was for nursing students to make quality records of fall events, and consequently to develop and implement a system to record patient fall incidents (REOC) for use during the clinical practicums of nursing students.

METHOD

Study design, Setting, Subjects and Study period

The method used for this intervention study was participatory action research (critical incident analysis). The scope of action was undergraduate nursing students at a medical and nursing school of a university in southern Spain. The students implemented the proposed activity at one public hospital and two private hospitals. The research was conducted from May 2017 to December 2018 with i) approximately 300 second-year, third-year and fourth-year students in the Nursing Degree during the 2017–2018 academic year and ii) patients who had experienced a fall and cared for by the nursing students.

Variables

The variables analysed for each patient fall incident were as follows (see Figure 1 for fall record form): i) sociodemographic data (gender, age, marital status and educational level); ii) date and time of fall (hour and minute, calendar day, and nursing shift); iii) patient's position at time of fall (from bed with side-rails up, from bed with side-rails down, while sitting, while standing, and others); iv) fall visualization (self-reported, other patient, family member, healthcare professional); v) cause of fall [instability (general instability or loss of balance); dizziness (collapse or fainting); adverse effects of medication (diuretics, antihypertensives, and other pharmacotherapy); accident (event without an identifiable cause); environment-related (lost objects, obstacles to ambulation, wet surfaces); frailty (extreme frailty, weakness, and others); pathologic fracture (no apparent trauma) and others]; vi) fall location (patient's room, patient's bathroom, corridor, public area, home, and others); vii) injuries and severity of fall [(none/no injury; mild (abrasions, minor contusions); disabling (lacerations requiring sutures, fractures, head injury) and others (injuries that are not disabling but require more than one non-trivial medical intervention)]; viii) patient's footwear at time of fall (closed or open); ix) number and type of comorbid clinical conditions of the elderly person; and x) patient medication and time of administration.

The variables collected for the nursing students who participated in the study were academic year, age, sex, subject (practicum) and learning outcomes.

The aim of the interventions were two: to train nursing students in the use of an effective fall recording technique (REOC) and the implementation of the REOC tool in

daily clinical practice. Falls were measured according to the occurred/recorded event and the accuracy of the fall data.

Concretely, for assessment of the activity and learning outcomes, rubrics with likert-type scale from 1 to 5 (less to greater difficulty/important or positive) and categorical options (yes, perhaps, no) were used. Questions were: *How would you assess the complexity of the fall record?*; *Do you think this registry has an impact on health outcomes?*; *Do you think you have acquired new skills with the development of this activity?*; and *How would you assess learning skills?*

Figure 1. Record form: circumstances of falls (Cordoba, Spain, 2017–2018)

Gender: [ ] Male [ ] Female	**Age:**
Date of fall:	**Time of fall:**
Hospital setting:	**Clinical unit:**
Community setting:	**Nursing shift:**
Marital status: [ ] Single [ ] Married [ ] Legally separated [ ] Divorced [ ] Widowed [ ] Other: _____	**Nurse assessment (yes/no; specify recorded incident)** _____
Educational level: [ ] Cannot read or write [ ] Did not complete primary education [ ] Primary education [ ] Compulsory secondary education with or without diploma [ ] Non-compulsory secondary education [ ] Intermediate vocational training [ ] Higher vocational training [ ] Higher education [ ] Other _____	_____ _ _____ _ **Injuries recorded (specify):** [ ] None/no apparent injury [ ] Minor (skin abrasions, minor contusions) [ ] Disabling (lacerations requiring sutures, fractures, head injury) [ ] Other non-disabling injuries requiring more than one non-trivial clinical intervention. Specify:
Visualization: [ ] Self-reported [ ] Other patient [ ] Family member (specify) [ ] Health professional (specify) [ ] Other _____	_____ _ _____ _ _____ _
Position when falling: [ ] Standing [ ] Seated [ ] From bed, side-rails up [ ] From bed, side-rails down [ ] From chair/sofa [ ] Other:_____	**Current illness/disease (specify number)** _____ _ _____ _
Cause: [ ] Instability [ ] Dizziness [ ] adverse effect of medication [ ] Tripped (specify if furniture/equipment involved) [ ] Slipped on dry surface [ ] Slipped on wet surface [ ] Unknown [ ] Pathologic fracture (no apparent trauma) [ ] Other _____	
Fall location: [ ] Bathroom [ ] Patient's room [ ] Hospital corridor [ ] Public area in the hospital (reception, cafeteria) [ ] Hospital stairs [ ] Street [ ] Patient's home (specify room) [ ] Community setting (specify place)	**Drugs administered to patient (specify drugs)**

Instruments

The teaching strategies and other instruments employed (see Table 2) were: i) an active, participatory methodology (critical incident analysis); ii) introductory seminars (Epidemiology of falls and effective fall-incidence reporting); iii) significant learning (Practicum I students had some general knowledge of safety measures and falls, acquired in the classroom and/or in their family and daily life. The students in practicums II, III, IV, V, VI and VII had knowledge about safety and falls, acquired from prior experience in other practicums); iv) assessment of the activity and learning outcomes (accuracy of records); v) development of the Fall-Incidence Recording Document (REOC); vi) rubrics to assess the activity and learning outcomes; vii) bibliography; and viii) online data collection system.

Table 2. Instruments used in the intervention process

1.- Teaching strategies	**1.1**. Active, participatory methodology	**1.1.1.-** Critical incident analysis
	1.2. Introductory seminars	**1.2.1.** Epidemiology of falls and effective fall-incidence reporting
	1.3. Significant learning (Feedback: prior knowledge - acquired knowledge)	**1.3.1.** *Practicum I* students had some general knowledge of safety measures and falls, acquired in the classroom and/or in their family and daily life. The students in *practicums II, III, IV, V, VI and VII* had knowledge about safety and falls, acquired from prior experience in other practicums. **1.3.2.** Development of the Fall-Incidence Recording Document (REOC)
2.- Assessment procedures	**2.1.** Assessment of the activity	**2.1.1.** Rubrics and Likert-type scale from 1 to 5 (less to greater difficulty) and categorical option (yes, perhaps, no)
	2.2. Learning outcomes	**2.2.1.** Review and analysis Accuracy of records (REOC) https://goo.gl/forms/uCDmJZhXYXW6WZfI3
3. Another Instruments or tools	**3.1.-** Bibliography	**3.1.1.** Virtual Library of University of Córdoba
	3.2.- On line data collection system	**3.2.1.** Moodle virtual platform **3.2.2.** Google Forms application

Procedure

As regards the procedure and intervention, the project was first presented at the three hospitals where the students carried out their practicums and to the professors of the subjects involved. Prior to the practicums, seminars were held for the students on the epidemiology of falls, fall reporting, and the use of online instruments (REOC), rubrics, the information sheet and informed consents (for both students and patients). The records kept by the students during their clinical practicums were obtained and the activity was evaluated once the practicum had finalized

Data analysis

For the data analysis, a descriptive cross-sectional study was carried out. The measures of frequency (%), central tendency (mean, mode, and median) and dispersion (standard deviation and interquartile ranges) were used according to the normality of the variables. To determine normality, the Kolmogorov–Smirnov test was used. To compare the proportions of the categorical variables, chi-square contingency tables were used and if the expected frequency was ≤5, Fisher's exact test was performed.

Ethical considerations

The study complied with the ethical principles established in the Declaration of Helsinki and was approved by the Provincial Research Ethics Committee (Act No. 273, ref. 3738). All participants gave their verbal or written informed consent and authorized the use of the information collected in the fall incidence records. Likewise, all the data of the participants were treated in strict confidentiality and not authorized for use by third parties as established under current legislation: Organic Law 15/1999 of 13 December on the Protection of Personal Data, Royal Decree 994/99 of 11 June approving the regulations on security measures for automated files that contain personal data, and Organic Law 3/2018 of 5 December on the Protection of Personal Data and Guarantee of Digital Rights.

RESULTS

It should be noted that the following results correspond to the data collected by the students who recorded the falls (1.94% of the total number of practicum students in the hospitals where the study was carried out). It should be emphasized that the records of falls made by the students were made in the REOC tool; and nurses in usual registration documents on the hospital ward. There was no comparison of records; in any case consensus of the fall information. It should not be forgotten that the study aimed to raise awareness about the good record of the circumstances of the fall, not to criticize the official care record document of the hospitalization ward. Of the patients who experienced a fall, 71.4% (n=5) were women with a median age of 60 years (range: 27–81), 71.4% (n=5) were married, one patient was single and one patient was widowed. The educational level of the fall patients was recorded in 4 of the 7 cases. Of these recorded cases, 42.9% (n=3) of the patients had a low educational level (cannot read or write/did not complete primary education). As regards the person present when the fall occurred, 57.1% (n=4) of the falls were witnessed by family members. A total of 85.8% (n=6) of the patients presented other concomitant clinical

conditions (33.3% with as many as 5 clinical conditions) and took a median of four drugs.

Regarding the time and location of the falls, all occurred between Wednesday and Friday, with Wednesday (57.1%; n=4) being the day with the most fall incidents. Additionally, 85.8% (n=6) of the falls occurred in two specific time periods: 10:00 a.m.–12:00 p.m. (42.9%; n=3) and 5:00 p.m.–7:00 p.m. (42.9%; n=3). The patient's room (42.9%; n=3) and bathroom (42.9%; n=3) were the locations where the highest number of falls was recorded.

Moreover, 57.1% (n=4) of the records indicate that the patient was standing and 71.4% (n=5) that the patient was not wearing footwear at the time of the fall. The causes of the falls were varied, with loss of balance (28.6%; n=2) and slipping due to wet surfaces (28.6%; n=2) being the most frequent.

In 57.1% (n=4) of the records, the patient was reported to have suffered slight injuries, such as abrasions or minor contusions (42.9%; n=3) or injuries that were not incapacitating but required medical intervention (14.2%; n=1).

Regarding the students, 85.8% of them were female and the median age was 20 years old (range: 19–22). Only second-year (42.9%; n=3) and third-year (57.1%; n=4) nursing students recorded fall events. The fourth-year students did not record any fall events. A total of 85.8% of the students stated that the record sheet was of low (42.9%; n=3) or medium (42.9%; n=3) complexity. In addition, all the students considered that the recording instrument had a medium (57.1%; n=4) or significant (42.9%; n=3) impact on health outcomes. In turn, 71.4% of the students reported that they acquired new skills to some extent through the intervention (implementation of the REOC), while 28.6% (n=2) considered they had acquired new skills. Learning outcomes were of an average level in 71.5% of the cases and positive in 28.6% (n=2). Although the difference was not significant ($p = 0.143$), second-year students found the learning to be more positive than third-year students.

DISCUSSION

This study was presented as a teaching innovation project at a medical and nursing school in southern Spain. One of the long-term objectives of the project is to improve patients' health outcomes by transferring theoretical knowledge to practice in an on-going feedback process where the knowledge produced circles back and is modified.

The objective of the study was to train students enrolled in the Bachelor in Nursing in the use of the REOC during their clinical practicums. REOC is an effective fall incidence reporting technique that allows measuring falls in terms of the occurred/recorded event and the accuracy of the recorded data. The REOC is a new technology that can be used in both the classroom and the clinical units of the hospitals where students are trained in real-life situations. In both cases, the students were supervised by the professors in charge of the project in collaboration with the professors of the practicums and the care managers of the public and private centers where it was carried out.

A recent study shows that greater training in nursing professionals is associated with a greater reduction in total patient falls per 1000 patient-days[20]. Health sciences students receive their clinical training in an academically-directed learning environment, and it is important to remember that they are not practicing professionals but learners. In the case at hand, they used a new technology for recording falls proposed by the teachers involved in the project, as shown in Figure 1 above. Several studies conducted by the research and innovation group in which this project was implemented [11,12,16] have addressed the problem of clinical under-reporting and the reasons for it [17,18]. The results obtained (or the lack of them) confirm the conclusions of previous studies: very few falls were recorded and therefore very few reports were made.

The innovation experience presented here was framed in Ausubel's theory [19] of meaningful learning. Although not a new theory, sometimes it is necessary to renovate in order to innovate. Nonetheless, the paradox in clinical environmental may be that what was is learned in a meaningful way was precisely not to record.

Likewise, the effectiveness of the innovation has been evaluated, although for administrative reasons not attributable to those in charge of the project, the activity did not begin until the second semester of the 2017/2018 academic year, that is, from mid-February to early June. Due to this setback, we were unable to measure changes in the accuracy of the REOC records in consecutive practicums throughout the course (September 2017-June 2018); an aspect that could have been assessed in the third-year and fourth-year students.

It is also important to note that it is not so much a question of the number of records obtained that determines the effectiveness of the recording system, but rather that a sufficient number are registered to construct an idea of safety[21,23]. Our studies are in line with Vincent [23] in that events resulting in serious injuries are reported, but there is no awareness that the system has a low reporting rate, so it follows that many incidents with minor or inconsequential injuries are not included. In this sense, we consider that, in order to support the long-term sustainability and efficiency of health systems, it is necessary to develop awareness and sensitization measures in multidisciplinary health care teams regarding the documentation and recording of patient falls and fall circumstances. In this regard, an initiative of the Spanish Ministry of Health, Consumption and Social Welfare, called the Notification and Learning System for patient safety (SiNASP) [4], a system for the notification and registration of incidents and events, should be noted; The objective of which is to improve patient safety based on the analysis of situations, problems and incidents that produced, or could have produced, harm to patients. As indicated on its website[4] "The main emphasis of the system is on learning for improvement". Strategy that is not only circumscribed to falls. In this sense, it is of interest to consult the newsletter SiNASP-June 2020 [24].

CONCLUSION

Nursing students have completed the REOC fall record document, have participated in the feedback process between the classroom and the clinic, favoring the development of the REOC tool, providing evidence that facilitates the implementation in the clinic.

Finally, an academically-directed, innovative and practical teaching methodology incorporating information and communication technologies (Moodle, electronic questionnaires) has been carried out. The methodology allowed the students involved to acquire real professional skills (clinical record keeping). The proposed project is an example of knowledge transfer and continuous feedback in the teaching-learning environment, that is, innovation-research-innovation.

International implications for practice

In a proposal for the improvement of both clinical approaches to falls and education about fall events, the results of the experience will be presented to clinical managers and the teachers in charge of the subjects in this area of nursing with a view to implementing and disseminating knowledge about the REOC recording system.

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