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EVALUATING THE IMPACT OF FILMING ON THE NUMBER OF ERRORS COMMITTED BY NURSING STUDENTS TO DETERMINE THE EFFICACY OF SIMULATED CLINICAL SITUATIONS

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Abstract

Clinical simulation as a training and knowledge technique allows people to experience a likely scenario with the aim of acquiring knowledge, abilities, and increased aptitude.

The filming of the staging represents a useful tool to review the decisions and actions taken, with the purpose of highlighting the strengths, weaknesses, and areas for improvement.

To evaluate performance, nursing students are placed in clinical simulations and filmed while facing life-like situations. Some students have claimed that the camera might have caused them to commit more errors thereby hindering their overall performance. To test this, a study was designed in which half of the group would be evaluated using the method of filming while the rest would be evaluated without a camera present.

This article details the study above carried out with second year nursing students and tries to evaluate the impact of filming on overall performance during clinical simulations.

Keywords – Film, Error, Simulation, Education, Nursing.

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1 INTRODUCTION AND JUSTIFICATION

1.1 Current situation

Spanish Universities, along with all European Universities, are modifying their educational systems with the goal of meeting the standards set out in the European Higher Education Space (EHES) (Gutiérrez de la Horra, 2010).

Given the complexity of modern health care and nursing responsibilities, the range of environments where nursing training occurs, and the proliferation of technology, it is essential that educational strategies are innovative and research based if universities are to turn out high-quality, professional graduates (Halstead, 2006). For this reason nursing students need knowledge and skills in information technology and patient care to possess the necessary tools which enable them to be effective (Griffin-Sobel, 2009).

Patient simulation experiences are beneficial to students because they allow them to practice the skills (McConville & Lane, 2006) that must be used in real situations, as they require them to act as though they are in real situations with real patients (Wilford & Doyle, 2009). It Is also a tool that allows the teacher to work with the simulator and provide readings to students in preparation (Wilford & Doyle, 2009; Faro, Isern, Sansalvador & Casas, 2008).

1.2 Simulation and investigation

This study demonstrates that such simulation experiences, repetitive and under controlled conditions, confirm the effectiveness of the education in clinical care, which improves clinical thinking, stimulates confidence, and increases knowledge (Griffin-Sobel, 2009; Alinier, Hunt, Gordon & Harwood, 2006; Baker, Pulling, McGraw, Dagnone & Hopkins, 2008). The goal of this type of education is to transfer the knowledge from the classroom to real life situations (Griffin-Sobel, 2009; Prion, 2008, Alfes, 2008).

This type of simulation has the potential to make significant changes to the curriculum in nursing programs by redefining clinical educational strategies and providing alternate tools of evaluation (McConville & Lane, 2006).

There are not enough valid and reliable tools to evaluate the results, which limits the nursing simulation education approach (Kardong-Edgen, Adamson & Fitzgerald, 2010).

In order to improve the quality of nursing programs, investigation related to the human patient simulator (HPS) is needed to develop valid and reliable tools to measure performance. Knowledge, values, and skills are essential in nursing because they require effective cognitive, and psychometric practices (Jeffries & Norton, 2005; Oermann & Gaberson, 2006).

1.3 Filming and simulation

Filmed videos can be useful pedagogical tools and have been used in different programs for many years. For example, videos can display recorded classes in order to facilitate discussion or recordings can be used to model good practice (McConville & Lane, 2006).

Much of the published research on this topic focuses on student self-assessment data in relation to confidence and satisfaction. Recordings allow students to review their performances multiple times thus enabling them to carry out a deeper analysis and identify solutions to errors (Henneman et al., 2010).

What is not reflected when students are being filmed is whether or not the filming has any impact on their overall performance. Students might make more mistakes while being filmed due to anxiety related to the camera.

As part of the evaluation of the impact of filming on students, we hypothesize that students being filmed while simulating clinical cases make more mistakes. To test this we created two groups, Experimental (students being filmed), and Control (second year students in other circumstances). Students were observed preparing antibiotic prophylaxis, the pipeline of a peripheral venous catheter, and the pre and post-surgery patient care according to the NIC (Nursing Interventions Classification) Taxonomy. We then compared the mistakes made between the two groups.

2 METHODOLOGY AND EMPIRICAL APPLICATION

A community “pilot” study was designed (randomization of groups, not of individuals). This study was conducted in the second semester of the 2009-2010 academic year, in clinical simulation laboratories, with the second year students in the Surgical Nursing. Adult I class, during a simulation case evaluation.

The study population was made up of second year students registered in the nursing course listed above, who were being evaluated through clinical simulation. Each student had to give written consent to participate in the study and attend a training session explaining the study. Students who did not sign the consent form were excluded from the study.

A clinical scenario was set up and students were asked to prepare for a case dealing with a patient who was about to undergo knee prosthesis surgery.

The intervention was organized in three phases:

- PHASE 1: Analysis and planning of the case. Students organized the dates based on a care model. In this phase they had to identify possible problems while working independently and as part of a team, and prepare objectives and action plans. They also studied the therapeutic use of prescription drugs in medical treatment and evaluated the hourly dose of medication.
- PHASE 2: Scientific knowledge and professional practice. This phase consisted of applying the scientific evidence and integrating the research into the practice. By reading and analyzing relevant literature, they could answer questions applying the best scientific evidence. This had to be reflected in the third phase of the simulation.

- PHASE 3: Dummy simulation. It consisted of applying the pre and post-surgical nursing care they had already planned in the first phase, and the best scientific evidence studied in the second phase.

We carried out our study during the third phase.

Students were asked to divide themselves into groups of 28. After this we divided the groups into two different groups at random: the Control Group, who did the simulation without being filmed, and the Experimental Group, who were being filmed during the simulation.

The nursing interventions directly related to the clinical situation observed were examined using the Nursing Interventions Classification (NIC) (McCloskey, Bulechek & Butcher, 2009). It consists of 514 coded interventions. The ones chosen to be evaluated were:

- Intervention 2314: preparation and administration of intravenous medication
- Intervention 4190: intravenous puncture
- Intervention 2930: surgical preparation
- Intervention 2870: post-anesthesia care

To document our findings, we created a sheet of paper per intervention and per student, which included demographic information such as the student's age, sex, country of residence, and place of origin. We also noted if they worked in healthcare (if so, we specified the shift), and if they were part of the Control or Experimental Group.

The nursing interventions were evaluated using the Likert Scale, assigning a score 1-5 to each of them. Interventions with a score between 1 and 3 were considered incorrectly performed, while interventions with a score between 4 and 5 were considered correctly performed.

First we prepared two identical simulation laboratories. Both had a nurses' station and a hospital room. The difference between the laboratories was the recording camera, which was only present in the Experimental Group lab.

Students were called prior to the simulation, but were not told which group they were in until they arrived at the laboratory.

The study variables were:

- Dependent variables:
    - the number of mistakes that each student made during the simulation in each NIC intervention
- Independent variables:
    - Member of the Experimental or Control Group
    - Demographic details: age, sex, country of residence, place of origin
    - Professional status: if they worked in health care (shift specified)
    - Academic experience: if they had participated in simulations or in an internship previously
    - Psychological state: Spielberger's State-Trait Anxiety Inventory (STAI)

Each student arrived at the laboratory at the specified date and time and was then informed as to which group they belonged (Spielberg, Gorsuch & Lusherne, 1982). After that they completed the State-Trait Anxiety Inventory. The State part of the inventory evaluates the student's current anxiety levels while the Trait part evaluates basal anxiety.

Following the questionnaires, the students started the evaluation for which they had a maximum of 30 minutes to complete. During the 30 minutes two teachers were observing them while filling in the assessment grid.

3 RESULTS

The results of comparing the characteristics of the members of the Control Group and the Experimental Group, indicate that there are no statistically significant differences in any of the variables, so the two groups can be considered comparable (Table 1).

	Control Group	*Experimental Group*	*p*
Age	*23.6 (22.2-25.0)*	*23.9 (22.5-25.4)*	*ns*
Men	*15.8%*	*13.5%*	*ns*
Working in health care	*29.8%*	*40.4%*	*ns*
Daytime working shift	*47.1%*	*61.9%*	*ns*
Previous clinical experience	*98.2%*	*100%*	*ns*
Simulation familiarity	*8.8%*	*7.7%*	*ns*
From the Osona county	*14.3%*	*17.6%*	*ns*

Table 1. Results of comparing the Control and the Experimental Groups

If we contrast the scores of the State inventory (the Test of Kolmorogov Smirnov suggests normal distribution [p>=0.05]) with a T Student, we do not identify significant statistical differences between the filmed group and the not filmed group (Table 2).

Recording group	*N*	*Mean*	*Standard error of the mean*	*Standard deviation*	*Minimum*	*Maximum*
Not filmed	*57*	*27.5965*	*1.29072*	*9.74470*	*8.00*	*50.00*
Filmed	*52*	*30.9615*	*1.58232*	*11.41028*	*9.00*	*55.00*
Total	*109*	*29.2018*	*1.02075*	*10.65692*	*8.00*	*55.00*

Table 2. Results of the State inventory

If we contrast the scores of the Trait inventory (the Test of Kolmorogov Smirnov suggests normal distribution [p>=0.05]) with a T Student, we do not identify significant statistical differences between the filmed group and the not filmed group (Table 3).

Recording group	*N*	*Mean*	*Standard error of the mean*	*Standard deviation*	*Minimum*	*Maximum*
Not filmed	*57*	*21.5789*	*1.12361*	*8.48307*	*6.00*	*41.00*
Filmed	*52*	*21.6923*	*1.31144*	*9.45690*	*1.00*	*47.00*
Total	*109*	*21.6330*	*0.85429*	*8.91904*	*1.00*	*47.00*

Table 3. Results of the Trait inventory

In terms of the anxiety assessed with STAI, we have noticed that there was no difference in scores between the groups.

Regarding the interventions performed during the simulation, the statistical analysis highlights the following results (Table 4):

- Intervention 2314: administration of intravenous medication. In subsection 2314.1, correct preparation of the medication administration equipment, the test xi2 shows p=0.034, the Experimental Group having performed better than the Control Group.
- Intervention 4190: intravenous puncture. Only in subsection 4190.2, clean the area with the appropriate product, there is a significance difference of p=0.013, the Control Group having performed better than the Experimental Group.

- Intervention 2930: surgical preparation. In subsection 2930.2, perform surgical shaving, there is a difference of p=0.013, the Control Group having performed better.

There were not any differences with regard to intervention 2870 nor in the other sections of the above interventions.

Taula resum proves estadístiques realitzades (Valors p de probabilitat de cada prova)									
		Normalitat		Significància diferències en el grup d'intervenció					
Nivell	Variable	Kolmogorov-Smirnov	S/N	Xi-quadrada	S/N	t-Student	S/N	U Mann-Whitney	S/N
Total proves	PUNTS	0,021	No					0,102	No
Tècniques	Punts de la tècnica V2314	0,321	Si	0,248	No	0,355	No		No
	Punts de la tècnica V4190	0,464	Sí			0,182	No		No
	Punts de la tècnica V2930	0,012	No				No	0,374	No
	Punts de la tècnica V2870	0,004	No				No	0,092	No
Tècniques per apartats	V2314.1	0,001	No	0,034	Sí		No	0,626	No
	V2314.2	0,000	No	0,083	No		Sí	0,029	Sí
	V2314.3	0,003	No	0,384	No		No	0,750	No
	V2314.4	0,000	No	0,308	No		No	0,504	No
	V4190.1	0,020	No	0,714	No		No	0,957	No
	V4190.2	0,000	No	0,025	Sí		Sí	0,027	Sí
	V4190.3	0,000	No	0,214	No		No	0,091	No
	V4190.4	0,075	Sí	0,917	No	0,683	No		No
	V2930.1	0,001	No	0,185	Ni		No	0,529	No
	V2930.2	0,000	No	0,013	Sí		No	0,109	No
	V2870.1	0,004	No	0,600	No		No	0,092	No
Proves STAI	STAI ESTAT	0,418	Sí			0,100	No		No
	STAI RASGO	0,170	Si			0,948	No		No

Table 4. Summary table of statistical tests performed (probability values for each test)

4 CONCLUSIONS

The results of the study confirm that the number of errors that students committed while being filmed is not a result of being filmed. Filming does not cause errors.

These results provide evidence that filming should continue to be used during simulation, knowing that it does not negatively impact the assessment of the student. Filming is intended to improve the use of clinical simulation as a learning, training and evaluation method in a controlled environment, which increases the student's knowledge, skills, and abilities while also enabling them to reflect on errors and to learn from mistakes and experience.

It was not possible to compare our experience with other equivalent experiences, as the literature reviewed highlights the importance of filming to learn different aspects and subsequently analyze and criticize the performance, but does not reflect whether it causes students to make more mistakes.

The points highlighted above, along with the training that we have done on the clinical simulation method, allowed us to improve the process in the following ways:

- Define beforehand all the competences students should meet during the simulation
- Prepare the clinical case scenario to simulate as realistic an environment as possible
- Give relevance to debriefing (time to reflect on what was done and why) and to feedback
- Use the recording only when there are points of confusion during debriefing, because a video can help solve differences in recollection

In the 2012-2013 academic year we changed objectives by competences and we incorporated the debriefing immediately after every simulation.

In the 2013-2014 academic year we have spent more time debriefing and giving feedback (double the amount of time the students used for the intervention in the simulation), making sure to emphasize strengths while also noting areas needing improvement. We have currently started another study to evaluate the student's perceptions of the use of debriefing and feedback, the results of which will be forthcoming.

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