

## Low Increment in the Knowledge Concerning Patient Safety in a Nursing Continuing Education Program

Eliana Borges Silva Pereira<sup>1</sup>, Rayany Cristina de Souza<sup>2</sup>,  
Clesnan Mendes-Rodrigues<sup>3</sup>, Renata Lemos de Sousa Neto<sup>4</sup>,  
Elisandro de Souza Batista<sup>5</sup>, Vitor Silva Rodrigues<sup>6</sup>,  
Antônio José de Lima Júnior<sup>7</sup>, Durval Veloso da Silva<sup>8</sup>

<sup>1</sup>Master Degree in Health Science, Nurse in Clinical Hospital of Uberlândia from Federal University Uberlândia, Uberlândia, Brazil.

<sup>2</sup>Nursing student in Medicine Faculty from Federal University Uberlândia, Uberlândia, Brazil.

<sup>3</sup>Doctor in Ecology, Biologist, Statistics student and Nurse in Clinical Hospital of Uberlândia from Federal University Uberlândia, Uberlândia, MG, Brazil; email:clesnan@hotmail.com

<sup>4</sup>Nurse in Clinical Hospital of Uberlândia from Federal University Uberlândia, Uberlândia, Brazil

<sup>5</sup>Biologist in Clinical Hospital of Uberlândia from Federal University Uberlândia, Uberlândia, Brazil

<sup>6</sup>Master Degree student in Environmental and Worker Health from Federal University Uberlândia, Nurse in Clinical Hospital of Uberlândia, Uberlândia, Brazil.

<sup>7</sup>Master Degree in Nursing, Nurse in Clinical Hospital of Uberlândia from Federal University Uberlândia, Uberlândia, Brazil.

<sup>8</sup>Master Degree student in Environmental and Worker Health from Federal University Uberlândia, Nurse in Clinical Hospital of Uberlândia, Uberlândia, Brazil.

**Abstract :** Few studies have assessed the impact of short-term courses on the increase of knowledge, especially regarding patient safety courses. This study has as its objective to report on experience concerning the evaluation of knowledge gained from short-term courses under the theme of Patient Safety in a Continuous Education Program at a Brazilian University Hospital. The study was retrospective, evaluating the acquisition of knowledge in courses through questionnaires applied before and after the course. The courses were part of the routine of the institution and carried a mandatory participation requirement. The percentage of correct answers was calculated along with their association with course and professional category. There occur significant differences with the increase in percentage of correct answers from 70.64% in the pre-test phase (oscillating from 49% to 79% per theme) to 74.23% in the post-test (oscillating from 55% to 86% per theme), showing also a large percentage variation among the questions (-16.15% to 98.24%). The nurses were placed into the category with the highest percentage of correct answers. The mean percentage of increase per question is low (5.78%) when the importance of the theme is taken into account, which reflects upon the lack of knowledge toward the development of a safety culture and strengthens the role of Continuous Education.

**Keywords:** Patient safety; Continuing Education; Nursing; Short-term courses.

### I. Introduction

The concern surrounding patient safety has received special attention in the area of health. For the World Health Organization, patient safety consists of reducing the risk of unnecessary injury associated with health care to an acceptable minimum<sup>(1)</sup>. There exist a number of situations that favour the adverse events and injury to patients in the context of nursing, such as long working hours, fatigue, excessive work load, lack of communication between teams, work places and assistance processes badly planned and lack of knowledge<sup>(2,3)</sup>. The culture of safety is a central element for improving patient safety. Safety culture is understood as being a set of values, attitudes, competencies and behaviour that determine the commitment to the management of health and safety<sup>(4)</sup>. The culture of safety influences the motivation for engaging more fully in safe behaviour and translates into the daily care practices<sup>(5)</sup>. Therefore, guaranteeing patient safety through knowledge should be a fundamental priority in continuing health education programs<sup>(6)</sup>, where the acquisition of knowledge is a key factor in this process. There exist a diverse number of useful instruments for evaluating the organizational atmosphere, prior knowledge of teams and the capacity to increase knowledge after educational activities<sup>(2)</sup>. The evaluation of results from continuing education programs is essential for understanding the processes and the use of pre-tests and post-tests has been widely applied with this proposal<sup>(7-8)</sup>, along with the evaluation of knowledge on the themes of patient safety<sup>(6,9)</sup>. There is a lack of quantitative studies that evaluate the efficiency of strategies or indicators concerning continuing education, and can be seen mainly in short-term courses versus long-term courses or comparatives between arrangements of mandatory versus voluntary participation<sup>(10,11)</sup>.

In this manner, the goal of this study was to evaluate the knowledge acquired by nursing professionals during a Continuing Education Program in courses of short duration, in a mandatory participation regime covering themes related to Patient Safety.

## **II. Method**

### **2.1. Study Location and Population**

The study was conducted at the Clinical Hospital of Uberlândia, a Brazilian university hospital that has 520 beds and provides a low to high complexity service of treatment, in addition to ambulatory services, all of which is exclusively a public service. This research studied nursing professionals from the institution, which has 1,125 nursing professionals divided into the following professional categories Nurse, Nursing Technician and Nursing Assistant. For details from each professional categories see Naves & Maduro<sup>(12)</sup>. The study was carried out in retrospective form, which evaluated one educational institutional modality (short-term courses) through the application of pre-test and post-test. The modality consisted of short-term courses that took place during Hospital Training Cycles, which were and still are part of the Continuing Education Program offered monthly by the Continuing Education Service for Nursing at the hospital, and in this case lasted from March to April of 2015. Each course lasted from one to two hours, offered over three consecutive days in three time periods (morning, afternoon and night), totaling nine classes, all under a mandatory regime of participation. The mandatory participation in the course is a criterion of the institution to guarantee adherence to the activity. These activities are realized routinely by the hospital and there was no interference in these processes. These data were collected on forms or administrative planners. These data are stored in hospital databases and there is no data collected or maintained in the database that permits the identification of the professional that answered the questionnaire.

### **2.2. Legal and ethical aspects**

The training cycles make up part of management, administrative and legal protocols of the hospital, which aim at improving the quality of care assistance, without tending to any research characteristics. The questionnaires pre-test and post-test were applied to evaluate the knowledge acquired by the professionals during the cycles and for decision making by the institution regarding the effectiveness of the undertaken activity. In this sense, this research study was not submitted to the Research Ethics Committee, as the data were proposed under a practical work scheme, which attended to the needs of hospital management and the impossibility of interference in the process. The collected data were liberated by the hospital and no individual from the research can be identified. All the questionnaires were anonymous, the professional had the option of completing or not the questionnaire and the obtained information are public without access restriction and are used for service management.

### **2.3. Knowledge evaluation**

The knowledge evaluation instrument used for evaluating the intervention were questionnaires pre and post-test, semi-structured, self-applicable, composed of multiple choice questions with a single correct answer per question, which cover the theme of the courses. Every answered question was evaluated regarding the result whether correct or not. In the pre-test phase, the questionnaires were applied before each course and at the post-test at the end of the course, all containing the same questions. The institution does not measure the proportion of unreturned or unanswered questionnaires as well as they're not being any pairing of pre and post-tests, as the institution does not use name identification on the questionnaires. The questionnaires were presented with only the focus of each question, as the study aims only at evaluating the increase or no in knowledge and not evaluation of the instrument in itself. The objective was to measure the increase in knowledge and not the evaluation instrument.

The inclusion criterion in the questionnaire analysis was the filling in of at least one knowledge evaluation questionnaire. The questions with more than answer marked were considered incorrect and unanswered questions were discarded. The evaluated courses concerning safety were administered during the 1<sup>st</sup> and 2<sup>nd</sup> Nursing Training Cycles during 2015. In the 1<sup>st</sup> Cycle, the courses centered on the Patient Safety Nucleus, with 248 questionnaires analysed in the pre-test phase and 358 questionnaires in the post-test phase, and the course for the Management of Hospital Residues, with 360 questionnaires analysed in the pre-test phase and 348 questionnaires in the post-test phase. In the 2<sup>nd</sup> Cycle the courses evaluated were Workforce Immunization, Safe Surgery, and Internal Audit, where all had 152 questionnaires analysed in the pre-test phase and 291 questionnaires in the post-test phase. The differences in the sampling of the two phases were due to the voluntary regime for filling in of the tests in both phases. During the 2<sup>nd</sup> Cycle, the participants identified voluntarily their professional category on the tests, something that did not occur in the 1<sup>st</sup> Cycle.

## 2.4. Statistical analysis

The results for the pre and post-test for each of the questions were compared with test Z for proportions, with a significance level of 5%. For every analysis the assumption were acceptable,  $np > 5$  and  $nq > 5$  (n: number of answers per question, p: probability of a correct answers, q: probability of a miss). The delineation was not considered paired, as the sampled individuals in both phases could not be identified by the methodology adopted by the institution. The confidence interval was calculated from the Z distribution, with 95% confidence. The comparison between courses was performed with generalized linear models, using binomial distribution of the data, where the course and phase (pre and post-test) were defined as fixed factors, while the questions were not considered as such (the correct and incorrect answers across all questions were summed together). Where the averages show differences between each other, these were compared with the test of Least Significant Difference. The comparison was also realized among the professional nursing categories during the 2<sup>nd</sup> Cycle, with generalized linear models, a factorial model, with the factors as the theme, the professional category and the phase (pre and post-test) and the interactions of the factors, while the questions were not considered as such (the correct and incorrect answers across all questions were summed together). The statistical analyses were performed on the statistical pack SPSS 20.0.

## III. Results

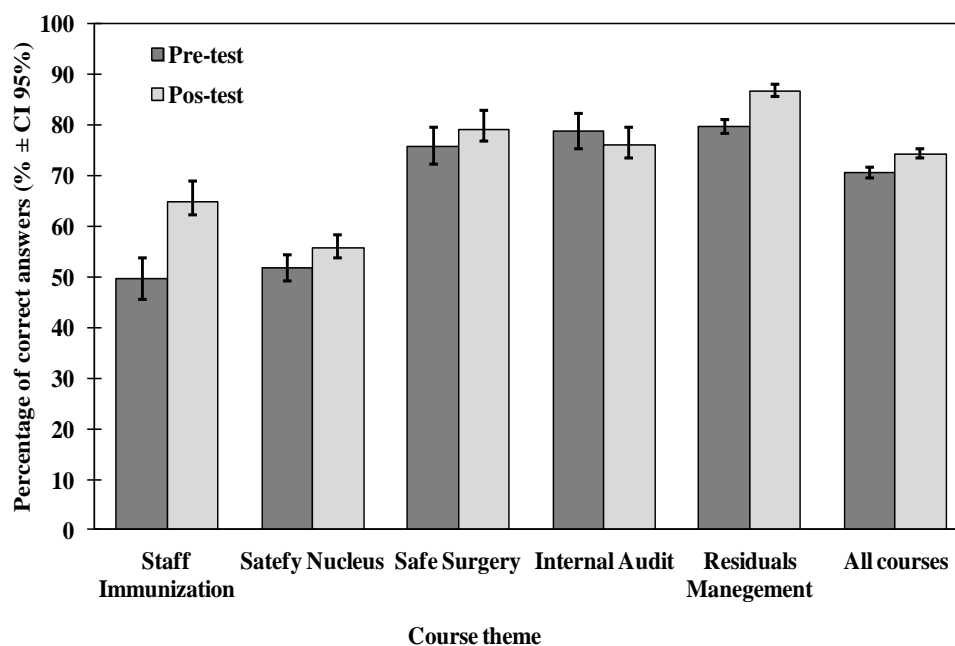
The percentage of correct answers per questions by professionals over the course evaluations oscillated from 16.15% to 96.38% in the pre-test phase and from 31.42% to 98.24% in the post-test phase (Table 1). It was noted that there occurred a significant increase in the percentage of correct answers after the courses in 15 of the 28 questions, although there was a significant decrease in percentage of correct answers in only one of the 28 questions (Question: Role of internal audits). The highest percentage of questions with a significant percentage of correct answers per course was noted under the theme Management of Hospital Residuals (80% of the questions), and the lowest percentage of correct answers of the course were noted under the theme Safe Surgery and Auditory (25% of the questions). Over the whole range of questions, the increase or decrease in their percentage of hits oscillated from -16.55% to 29.55%, where in five of the twenty-eight questions (18%) had a negative showing. Even being only on the question of "Role of internal audit", the negative showing of -16.55% was significant (Table 1). The average percentage of correct answers for the questions on the pre-test was of 68.45% (SE = 4.43; CV = 34.28%; SE: standard error of mean, CV: coefficient of variation) and on the post-test was of 74.22% (SE = 4.04; CV = 28.3%), while the percentage of average increase per question was 5.78% (SE = 1.54; CV = 141.77%).

The general correct answers percentage increased from 70.64% in the pre-test phase to 74.23% in the post-test phase when evaluated independently to the course (Figure 1.  $p < 0.05$ ). Noteworthy is that there occur differences between the courses ( $\chi^2$ : 1150.43;  $d.f.$  = 4;  $p < 0.001$ ), the phase ( $\chi^2$ : 34.96;  $d.f.$  = 1;  $p < 0.001$ ) with course and phase interaction ( $\chi^2$ : 36.4;  $d.f.$  = 4;  $p < 0.001$ ) (Figure 1). The interaction between the course and the phase made the discussion of the main effects difficult (course and phase), but in the binary comparisons between the courses there occurred a lack of any real difference between the hit rate percentage only in the Internal Audit and Safe Surgery courses, where all other combinations show significant differences ( $p < 0.05$ ). In the comparison of the pre and post-test phase, for each course, there only occurred a significant difference for the courses Workforce Immunization ( $p < 0.001$ ), Patient Safety Nucleus ( $p = 0.015$ ) and Management of Hospital Residues ( $p < 0.001$ ). There were no binary comparisons performed between courses within each of the phases. When the relationship of professional category was evaluated, for the course and phase the effect was significant for the Category ( $\chi^2$ : 13.55;  $d.f.$  = 2;  $p < 0.001$ ), for the Course ( $\chi^2$ : 410.51;  $d.f.$  = 1;  $p < 0.001$ ), for the Course\*Phase interaction ( $\chi^2$ : 23.35;  $d.f.$  = 2;  $p < 0.001$ ). While there were no differences between the percentages for the Phase ( $\chi^2$ : 2.56;  $d.f.$  = 1;  $p = 0.109$ ), Course\*Category ( $\chi^2$ : 5.381;  $d.f.$  = 4;  $p = 0.250$ ), Phase\*Category ( $\chi^2$ : 0.142;  $d.f.$  = 2;  $p = 0.931$ ), Course\*Phase\*Category ( $\chi^2$ : 7.65;  $d.f.$  = 4;  $p = 0.105$ ). Even after the exclusion of the sources of variation that were not significant, there was no interaction between the Category and the Phase (data not shown). As the objective of this analysis was only to compare the categories, the binary comparisons were only realized for the categories, which showed that auxiliary and technical nursing staff had the same percentage of correct answers, and the nurses presented better percentage of correct answers than the others (Figure 2).

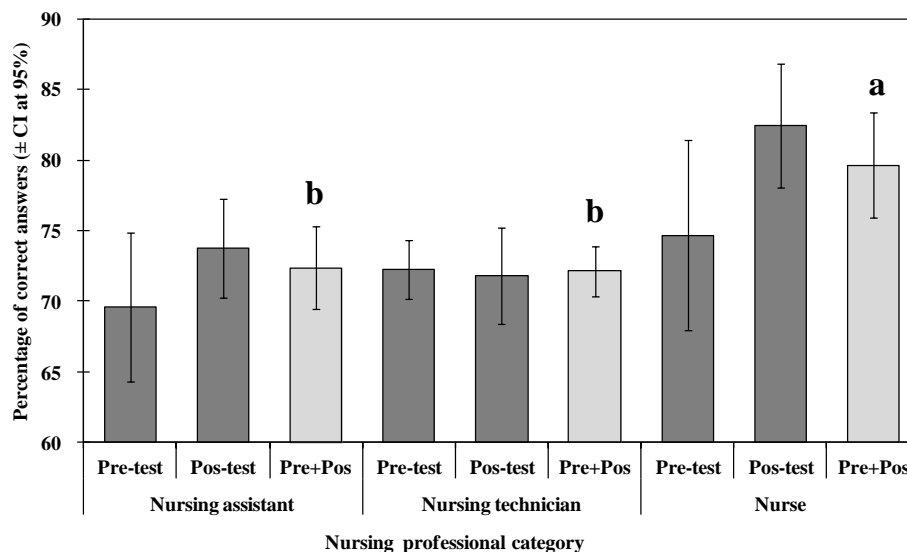
**Table (1)** Percentage of correct answers in knowledge evaluation concerning patient safety acquired by nursing professionals in courses from a continuous education program at a Brazilian university hospital.

Course theme Focus from question	Pre-test		Post-test		p <sup>a</sup>
	% (n)	CI	% (n)	CI	
<b>Management of Hospital Residuals</b>					
Indication of colour for disposal of infectious materials	96.38(359)	1.9	97.11(346)	1.8	0.2925
Law on waste disposal collectors	57.80(346)	5.2	73.29(337)	4.7	<0.0001
Indication of colour for disposal of chemicals	89.30(355)	3.2	95.00(340)	2.3	0.0027
Waste transport stream	82.94(340)	4.0	85.49(324)	3.8	0.1838
Recyclable waste disposal site	90.73(356)	3.0	97.95(342)	1.5	<0.0001
Chemical waste disposal site	82.87(356)	3.9	93.86(342)	2.5	<0.0001
Common waste disposal site	94.97(358)	2.3	98.24(341)	1.4	0.0088
Infectious waste disposal site	94.13(358)	2.4	96.77(341)	1.9	0.0475
Handling site for dirty clothing	89.92(357)	3.1	96.49(342)	2.0	0.0003
Percentage of waste for treatment	16.15(353)	3.8	31.42(331)	5.0	<0.0001
<b>Patient Safety Nucleus</b>					
Definition of Technical Grievance	62.81(242)	6.1	67.88(358)	4.8	0.0996
Definition of Non-Compliance	53.31(242)	6.3	49.86(357)	5.2	0.2039
Definition of Patient Injury	74.27(241)	5.5	78.31(355)	4.3	0.1264
Definition of Adverse Event	21.89(233)	5.3	33.43(356)	4.9	0.0013
Function of Risk Management	24.14(232)	5.5	31.55(355)	4.8	0.0261
Definition of Patient Safety Nucleus	72.37(228)	5.8	73.52(355)	4.6	0.3797
<b>Staff Immunization</b>					
Indication for the postponement of vaccines	60.96(146)	7.9	73.02(278)	5.2	0.0054
Indication for the vaccine booster Hepatitis B	53.15(143)	8.2	65.25(282)	5.6	0.0078
Indication for Td vaccine (Tetanus and Diphtheria)	40.43(141)	8.1	47.69(281)	5.8	0.0787
Indication for the DTaP vaccine (Diphtheria, Tetanus, Acellular Pertussis)	43.97(141)	8.2	73.52(287)	5.1	<0.0001
<b>Safe Surgery</b>					
Objectives behind the campaign "Safe Surgeries Save Lives"	95.21(146)	3.5	95.10(286)	2.5	0.4817
Implementation Difficulties	57.03(128)	8.6	71.00(269)	5.4	0.0029
Focus of campaign "Safe Surgeries Save Lives"	81.02(137)	6.6	79.21(279)	4.8	0.3328
Use of check-list	67.41(135)	7.9	70.65(276)	5.4	0.2509
<b>Internal Audit</b>					
Objective behind internal audits	83.08(130)	6.4	81.59(277)	4.6	0.3576
Who resolves non-conformity?	91.11(135)	4.8	92.47(279)	3.1	0.3157
Examples of non-conformity	79.84(129)	6.9	85.77(274)	4.1	0.0658
Function of internal audit	59.35(123)	8.7	42.80(264)	6.0	0.0012

%: percentage of correct answers; n: number of answers per question; CI: confidence interval with 95% confidence; p<sup>a</sup> Probability of test Z for proportions.



**Figure (1)** Percentage of correct answers ± confidence interval at 95% of nursing professionals in knowledge tests concerning Patient Safety courses in a Continuing Education Program.



**Figure (2)** Percentage of correct answers  $\pm$  confidence interval at 95%, between the different nursing professional categories, in knowledge tests concerning Patient Safety courses in a Continuing Education Program. Percentages in Pre+Post-test comparisons followed by different letters, differ by the Least Significant Differences test ( $p < 0.05$ ).

#### IV. Discussion

The general percentage of correct answers is low (74.23%) when taking into consideration the importance of these courses. The Patient Safety Nucleus and Workforce Immunization present even lower values, which reflects further still the deficiency in knowledge for establishing a safety culture. This finding serves as a warning to managers, since the question of patient safety requires an approach directed toward the human factor<sup>(13)</sup>, as it is necessary that professionals have adequate conditions and knowledge to carry out their work, which in turn minimizes errors and adverse events<sup>(3)</sup>. The fact that a large portion of professionals do not know the correct definition of Adverse Event as well as other terms, as already seen, can lead to reduced quantities of notifications concerning these events or the error in notification, a fact that is detrimental to public health surveillance services<sup>(14)</sup>. An aspect that deserves attention is the need for dissemination of these concepts and the non-punishable aspect of giving notification, as professionals state that they do not notify when events do not affect the patient<sup>(15)</sup>.

In regards to the effective use of the Safe Surgery course, which is contrary to Patient Safety Nucleus, shows that this finding can be a reflexion of various activities for divulging the theme. In 2008, the World Health Organization released the program “Safe Surgery Saves Lives”, along with the implementation of the Safe Surgery Protocol<sup>(16)</sup>. The strategy for improving surgery safety can be seen through the application of a checklist strategy, where reductions have been shown for adverse events<sup>(17)</sup>. Among the challenges for its implementation is full attendance<sup>(18)</sup>, minimized by regulation, awareness and empowerment and consequently the training of the staff<sup>(19)</sup>, which can be treated in Continuing Education Programs. The lack of understanding of the function of Internal Audits is worrying, as the objective is to promote the service assessment as the rules, where its relationship is evidently linked to a safety culture, where the objective is the substitution of the adverse event by the prevention of failures<sup>(20)</sup>. The role of the Internal Audit and of educational services seems to be essential in this context. The high level of knowledge in Management of Hospital Residues is in contrast to other studies<sup>(21-22)</sup>, in which the nurses possess limited or inconsistent knowledge concerning the correct handling of residues, a problem that is easily avoided through team training<sup>(21)</sup>. This theme has been widely divulged at the studied institution and this maybe the reason that it presents such positive results, when compared to other themes. This very knowledgeable scenario is an indicator of an environment ready for the introduction of new concepts and actions on residual management<sup>(23)</sup>.

Although workforce immunization is an indirect aspect of patient safety, as it is related to exposure, its role is essential in this context. The lowest level of knowledge over this course corroborates with other studies<sup>(24-25)</sup>, where the nursing professional presents low knowledge levels concerning workforce immunization. In the comparison of percentage of correct answers, the best performance coming from the nurse category reinforces its educational role in terms of the team. As direct assistance is predominantly executed by the auxiliary and technical nursing teams at the hospital under evaluation, it falls upon the nurse the role of encouraging and providing support towards the culture of safety. This invokes the need for the scientific training of these professionals, aiming at the reduction of undesired outcomes and improving the quality of care

offered<sup>(20)</sup>. In light of this, there exists concern for improving knowledge of auxiliary and technicians of nursing, toward whom courses or activities are being planned. The knowledge differential between the categories has already been observed in other themes<sup>(7-8)</sup>. Evaluations for long-term courses in the same institution also find worse performance indicators for these categories compared to Nurses<sup>(9)</sup>, which reinforces the differential training need for each of the categories. The offering of the course during work hours and as an obligation seems essential for improving the knowledge of professionals, having in mind the obstacles of participating in other regimes<sup>(26)</sup>, being that continual education actions are recognized as the best practices toward patient safety<sup>(27)</sup>. In the institution studied herein, the voluntary participation regime had reached low rates of adherence<sup>(10)</sup>, which also in other situations, has made the implementation of educational actions and behavioral or supportive changes difficult<sup>(28)</sup>. Faced with various associated problems that undermine patient safety<sup>(29)</sup>, among which the understaffing of the nursing sector and low level of team instruction, which are themselves associated with the increase in mortality rates of patients<sup>(30)</sup>, show that continuous education can be a way of circumventing these problems.

New studies should consider that in the comparisons between short-term courses the applied tests possess differentiated levels of difficulty, where the speakers present a variety of capacities and methodologies, which can compromise the comparisons. Noteworthy here is that when the speaker gives the course, they do not always take care to cover in the classes all the items contained in the test. Noted also is that frequently specific speakers give classes concerning the same course to specific groups, where the same questionnaire is used with different approaches, which can lead to differences between the groups. These aspects can be restrictive in the comparison, but they end up reflecting the reality of Continuing Education Programs in large institutions, where there are predominantly large number of classes, at varying times, with groups that have multiple speakers and coming from a variety of professional categories. The construction and validation of instruments of specific knowledge for each course can produce difficulties or make the quick evaluation of the result impracticable, since understaffing of Continued Education Services occurs, and in a majority of cases these activities are managerial and not the objective of research or studies. Short-term courses have been registered as useful for raising awareness and promoting knowledge and staff skills in terms of assistance<sup>(31)</sup>.

## V. Conclusion

Although the results have oscillated due to the course and between specific questions from each course, the positive increment in knowledge having been low, the data indicate that the short-term courses were effective in transmitting the knowledge related to Patient Safety to nursing professionals. However, these results demand greater attention, reinforcing the need of continuity to the Continuous Education Program at the institution, with course reinforcement and knowledge evaluations in order to identify weaknesses in the program.

## Acknowledgements

The authors would like to thank the all professionals that contributed to this study. To Vernon Sipple for the English version. To the reviewers for their contribution.

## References

- [1]. WHO – World Health Organization. *Conceptual Framework for the International Classification for Patient Safety Version 1.1*. (Final Technical Report. Jan, 2009)
- [2]. JF Mello, SFF Barbosa. Cultura de segurança do paciente em terapia intensiva: Recomendações da enfermagem. *Texto Contexto Enfermagem* 22, 2013; 1124- 1133.
- [3]. RM Oliveira, IMTA Leitao, LL Aguiar et al. Evaluating the intervening factors in patient safety: focusing on hospital nursing staff. *Revista Escola Enfermagem USP* 49, 2015, 104-113.
- [4]. Brasil. Agência Nacional de Vigilância Sanitária – ANVISA. *Plano Integrado para a Gestão Sanitária da Segurança do Paciente em Serviços de Saúde: Monitoramento e Investigação de Eventos Adversos e Avaliação de Práticas de Segurança do Paciente*. (Brasília, 2015).
- [5]. SJ Weaver, LH Lubomski, RF Wilson, ER Pfoh, KA Martinez, SM Dy. Promoting a culture of safety as a patient safety strategy. *Annals Internal Medicine* 158, 2013, 369-374.
- [6]. M Mansour, A Skull, M Parker. Evaluation of World Health Organization multi-professional patient safety curriculum topics in nursing education: pre-test, post-test, none-experimental study. *Journal Professional Nursing*, 3, 2015, 432- 439
- [7]. JA Granzotto, S Schneid, A Vecchi et al. Basic life support training in a university hospital. *Revista da AMRIGS*, 52, 2008, 24- 28
- [8]. TMFW Castellões, LD Silva. Resultados da capacitação para a prevenção da extubação acidental associada aos cuidados de Enfermagem. *Revista Mineira de Enfermagem*, 11, 2007, 168-175.
- [9]. JM Yoshikawa, BEC Sousa, DM Kusara, MLG Pedreira, AFM Avelar. Compreensão de alunos de cursos de graduação em enfermagem e medicina sobre segurança do paciente. *Acta Paulista Enfermagem*, 26, 2013; 21-29.
- [10]. GS Mendonça, CM Cunha, EP Dias, TC Resende, C. Mendes-Rodrigues. Attendance indicators for students in long term nursing courses at a university hospital. *Bioscience Journal* 32, 2016, 753-763.
- [11]. RL Sousa Neto, C. Mendes-Rodrigues. Continuing Education Program: a comparative study between voluntary and mandatory regimes applied to a patient safety course. *Journal of Patient Safety and Infection Control (in press)*.
- [12]. Neves E, Maduro M. Nursing in Brazil: trajectory, conquests and challenges. *The Online Journal Issues Nursing*, 6(1), 2000.

- [13]. LT Kohn, JM Corrigan, MS Donaldson. *To err is human: building a safer health system*. (Institute of Medicine, Washington, DC: National Academy Press, 2000)
- [14]. GA Romeu, MRF Távora, AKM Costa, MOB Souza, APS Gondim. Notificação de reações adversas em um hospital sentinela de Fortaleza - Ceará. *Revista Brasileira de Farmácia Hospitalar e Serviços de Saúde*, 2, 2011, 5-9.
- [15]. VS Souza, AM Kawamoto, JLC Oliveira, NS Tonini, LM Fernandes, AL Nicola. Erros e eventos adversos: a interface com a cultura de segurança dos profissionais de saúde. *Cogitare Enfermagem*, 20, 2015, 475-482.
- [16]. Brasil. Ministério da Saúde. *Portaria nº 529, de 1º de abril de 2013. Institui o Programa Nacional de Segurança do Paciente*; (Ministério da Saúde, 2013).
- [17]. AB Haynes, TG Weiser, WR Berry. A surgical safety checklist to reduce morbidity and mortality in a global population. *New England Journal Medicine*, 360, 2009, 491-499.
- [18]. MR Amaya, ECS Maziero, L Grittem, EDA Cruz. Análise do registro e conteúdo de checklists para cirurgia segura. *Escola Anna Nery* 19, 2015, 246-251
- [19]. MR Freitas, AG Antunes, BNA Lopes, FC Fernandes, LC Monte, ZAS Gama. Avaliação da adesão ao checklist de cirurgia segura da OMS em cirurgias urológicas e ginecológicas, em dois hospitais de ensino de Natal, Rio Grande do Norte, Brasil. *Cadernos Saúde Pública*, 30, 2014, 137-148.
- [20]. DF Bogarin, ACB Zanetti, MFP Brito et al. Segurança do paciente: conhecimento de alunos de graduação em enfermagem. *Cogitare Enfermagem*, 19, 2014, 491-497
- [21]. A Moutte, SS Barros, GCB Benedito. Conhecimento do enfermeiro no manejo dos resíduos hospitalares. *Revista Instituto Ciências Saúde* 25, 2007, 345-348.
- [22]. FA Campos, FJG Oliveira, NM Frota, JA Caetano, MOB Oriá, PNC Pinheiro. Avaliação do conhecimento dos profissionais do bloco cirúrgico quanto a gerenciamento dos resíduos sólidos em saúde. *Vigilância Sanitária em Debate*, 2, 2014, 33- 38.
- [23]. RH Naime, AHP Ramalho, IS Naime. Diagnóstico do Sistema de Gestão dos Resíduos Sólidos do Hospital de Clínicas de Porto Alegre. *Estudos Tecnológicos* 3, 2007, 12-36.
- [24]. J Pinheiro, RCG Zeitoune. Hepatite B: conhecimento e medidas de biossegurança e a saúde do trabalhador de enfermagem. *Escola Anna Nery Revista Enfermagem*, 12, 2008, 258-264.
- [25]. FJCP Silva; PSF Santos; FP Reis, SO Lima. Estado vacinal e conhecimento dos profissionais de saúde sobre hepatite B em um hospital público do nordeste brasileiro. *Revista Brasileira Saúde Ocupacional*, 36, 2011, 258-264
- [26]. Z Hamzehgardeshi, Z Shahhosseini. A Cross-Sectional Study of Facilitators and Barriers of Iranian Nurses' Participation in Continuing Education Programs. *Global Journal Health Science*, 6, 2014; 183-188.
- [27]. VT Costa, BHS Meirelles, AL Erdmann. Best practice of nurse managers in risk management. *Revista Latino-Americana Enfermagem*, 21, 2013, 1165-1171.
- [28]. EBS Pereira, MT Jorge, EJ Oliveira, Ribeiro Júnior A, LRL Santos; C Mendes-Rodrigues. Evaluation of the multimodal strategy for improvement of hand hygiene as proposed by the World Health Organization. *Journal Nursing Care Quality* 2016.
- [29]. LA Gonçalves, R Andolhe, EM Oliveira et al. Nursing allocation and adverse events/incidents in intensive care units. *Revista Escola Enfermagem USP*, 46, 2012; 71-77.
- [30]. E Cho, DM Sloane, E Kim et al. Effects of nurse staffing, work environments, and education on patient mortality: An observational study. *International Journal Nursing Studies*, 52, 2015, 535-542.
- [31]. B Dadpour, GH Soltani, A Peivandi, N Zirak, AR Sedaghat, AR Sabzevari, S EftekharzadehMashhadi, N Ariayee, SH Amini. Educational needs of nurses in intensive care unit for poisoned patients. *Patient Safety Quality Improvement Journal*, 2013; 19-22.