



Revista da Escola de Enfermagem da USP

ISSN: 0080-6234

reeusp@usp.br

Universidade de São Paulo

Brasil

Quispe Mendoza, Isabel Yovana; Giani Peniche, Aparecida de Cássia; Alves de Araujo Püschel, Vilanice

Conhecimento sobre hipotermia dos profissionais de Enfermagem do Centro Cirúrgico

Revista da Escola de Enfermagem da USP, vol. 46, núm. 1, outubro, 2012, pp. 123-129

Universidade de São Paulo

São Paulo, Brasil

Available in: <http://www.redalyc.org/articulo.oa?id=361033323018>

- How to cite
- Complete issue
- More information about this article
- Journal's homepage in redalyc.org

redalyc.org

Scientific Information System

Network of Scientific Journals from Latin America, the Caribbean, Spain and Portugal

Non-profit academic project, developed under the open access initiative

Knowledge of hypothermia in nursing professionals of surgical center*

CONHECIMENTO SOBRE HIPOTERMIA DOS PROFISSIONAIS DE ENFERMAGEM DO CENTRO CIRÚRGICO

CONOCIMIENTO SOBRE HIPOTERMIA DE LOS PROFESIONALES DE ENFERMERÍA DE CENTRO QUIRÚRGICO

Isabel Yovana Quispe Mendoza¹, Aparecida de Cássia Giani Peniche², Vilanice Alves de Araujo Püschel³

ABSTRACT

The objective was to identify the difference in knowledge about hypothermia in nursing assistant after an educational intervention. The conceptual basis of education is based on the prospect of meaningful learning allied to the construction of the conceptual map and the case study. Data were collected through the questionnaire validated by experts. The average knowledge after the educational intervention was (-3.49), however, there was no significant difference in knowledge as related to sociodemographic variables studied. We conclude that the educational intervention was satisfactory in that new information was anchored modified and expanded the cognitive structure of study subjects.

DESCRIPTORS

Hypothermia
Nurses' aides
Education, nursing
Perioperative nursing
Learning

RESUMO

Objetivou-se identificar a diferença no conhecimento sobre hipotermia do auxiliar de enfermagem após a intervenção educativa. A base conceitual de educação fundamenta-se na perspectiva da aprendizagem significativa, aliada à construção de mapa conceitual e à realização de estudo de caso. Os dados foram coletados por meio de um questionário validado por especialistas. A média do conhecimento após a intervenção educativa teve aumento de 3,49 pontos. Não se verificou diferença significativa do conhecimento quando foi relacionado às variáveis sociais e de formação estudadas. Conclui-se que a intervenção educativa foi satisfatória na medida em que as informações sobre hipotermia foram ancoradas e modificadas na estrutura cognitiva dos auxiliares de enfermagem.

DESCRIPTORES

Hipotermia
Auxiliares de enfermagem
Educação em enfermagem
Enfermagem perioperatória
Aprendizagem

RESUMEN

Con el objetivo de identificar la diferencia del conocimiento sobre hipotermia en el auxiliar de enfermería después de la intervención educativa. La base conceptual de la educación se fundamenta en el aprendizaje significativo, aliado a la construcción del mapa conceptual y estudio de caso. Los datos fueron colectados a través del cuestionario validado por especialistas. La media del conocimiento después de la intervención educativa fue de (-3,49), no obstante, no se verificó diferencia significativa del conocimiento cuando relacionados a variables sociales y de formación estudiadas. Se concluye la intervención educativa satisfactoria en la medida que las nuevas informaciones fueron ancorados, modificados y ampliados en la estructura cognitiva de los sujetos del estudio.

DESCRIPTORES

Hipotermia
Auxiliares de enfermería
Educación en enfermería
Enfermería perioperatoria
Aprendizaje

*Extracted from the dissertation "Intervenção educativa sobre hipotermia: uma estratégia de ensino para aprendizagem em centro cirúrgico", University of São Paulo School of Nursing, 2011. ¹RN. Adjunct Professor, Federal University of Minas Gerais College of Nursing. Belo Horizonte, MG, Brazil. isabelyovana@ufmg.br ²RN. Free-Lecturer, University of São Paulo School of Nursing. São Paulo, SP, Brazil. ggphe@usp.br ³RN. Free-Lecturer, University of São Paulo School of Nursing. São Paulo, SP, Brazil. vilanice@usp.br

INTRODUCTION

Hypothermia is defined as body temperatures lower than 36° C (96.8 F); this phenomenon takes place when the body is incapable of producing enough heat to carry out its functions⁽¹⁾. In the surgical anesthetic procedure, non-intentional hypothermia may occur due to alterations induced by anesthetic agents in the body's thermo-regulatory physiology, by the decrease of the patient's metabolism and his or her exposure to the cold temperatures in the operating room⁽²⁾.

Literature indicates the existence of a direct correlation between hypothermia and a number of physiologic alterations, such as cardiac arrhythmias, enhancement of mortality rates, incidence of infections in the operating room, and bleeding in the intraoperative period, which consequently increases the numbers of postoperative blood transfusion procedures, prolonged permanence of the patient in the Post-anesthesia Recovery Room (PARR), as well as thermal discomfort and rise of healthcare-related costs in the hospital⁽³⁾.

Therefore, surgical center nursing professionals must have the knowledge and the comprehension of the physiopathogenesis, the complications and the forms of preventing hypothermia, in order to play a competent role and be capable of applying such knowledge toward providing the patient with a high quality care in situations when hypothermia is not intentional.

Education, therefore, opens way to the development of intellectual capacities, such as thinking, rationalizing, searching for information, analysis, questioning and assimilation of meaning to new acquired knowledge⁽⁴⁾.

In this present study, the conceptual basis of education is founded on the perspective of the significant learning⁽⁵⁾ principle, allied both to the construction of a conceptual mapping⁽¹⁾ and the employment of case studies, aiming to present an alternative to the service educational practice and to facilitate the understanding of the contents related to non-intentional hypothermia.

The significant learning⁽⁵⁾ theory proposes a pattern for the process of assimilating new information in the apprentice's current cognitive structure. The cognitive structure concerns the total, organized content of ideas owned by a certain individual, or the organized content of ideas regarding a specific area of knowledge inserted into the individual's brain⁽⁶⁾.

In this way, learning consists of the *expansion* of the cognitive structure by means of the incorporation of new ideas. Depending on the type of relationship established between pre-existing ideas in this structure and new incoming ideas, a learning process may take place, ranging from the mechanical to the significant level⁽⁵⁻⁶⁾.

The significant learning occurs whenever new ideas start relating with pre-existing ideas in a non-arbitrary, substantive basis. A non-arbitrary basis should be understood as a logic and explicit relationship between the new idea and the other(s) pre-existing idea(s) in the individual's cognitive structure. On the other hand, learning must also be substantive; in other words, once an individual grasps a determined content, he will be able to explain it in his own words. Thus, a given concept can be expressed in a similar language and convey the same meaning⁽⁶⁾.

The results of this research are aimed to encourage surgical center nursing professionals to reflect on their praxis by taking into account the principle of comprehensiveness, that is, the possibilities of providing care without fragmenting it into tasks and/or procedures. This process also allows for the construction of a critical awareness. Moreover, it will collaborate toward defining new modalities, mechanisms and instruments of permanent education, in articulation with the hospital's managerial and care-giving bodies.

...surgical center nursing professionals must have the knowledge and the comprehension of the physiopathogenesis, the complications and the forms of preventing hypothermia, in order to play a competent role...

In the light of the above-mentioned considerations, this study aims to: identify the social-demographic characteristics of the nurses' aides that work in surgery centers; compare the knowledge nurses' aides have on hypothermia both prior to and after the educational intervention; and relate the knowledge to the studied social-demographic variables.

METHOD

Characteristics

This quasi-experimental, applied study was aimed to analyze a short-term educational intervention carried out with Surgical Center Nursing Professionals in the headquarters of the studied institution, located in the city of São Paulo. The project was approved by the institution's Research Ethics Committee under number 030/09, title page number 264414. All participants signed the Free and Informed Consent Form prior to the data collection process.

Thirty-five nurses' aides took part in the study. The data collection process was carried out in three stages between August 2009 and April 2010.

In order to assess the knowledge of the nurses' aides on hypothermia in the intraoperative period, a questionnaire was elaborated based on the Recommended Practices of the Brazilian Society of Surgical Center Nurses⁽⁷⁾. The questionnaire was submitted to a group of seven judges (composed of professors and specialists from Surgical Center Nursing areas) aiming at being validated by the Delphi technique.

The questionnaire was carried out by the first researcher, a doctoral graduate nurse from University of São Paulo School of Nursing, who was trained both toward applying the questionnaire and carrying out the intervention.

Data collection

Phase One

To begin with, the nurses' aides were invited to take part in the study. They were clearly informed that their participation was free and that they could withdraw at any time.

Those who accepted to participate were handed the questionnaires and thoroughly instructed on how to fill it in. Due to the dynamics of the work in the Surgical Center (SC), a folder was placed at the Nursing post; participants were asked to deliver the responded questionnaire back in the folder.

The average questionnaire delivery time was two weeks.

The questionnaires were applied in the educational pre-intervention stage and reapplied two months later, following the intervention.

Phase two

Next, the first researcher instructed the chosen institution's nursing professionals on the proposal of the educational intervention concerning the intraoperative hypothermia. In order not to compromise their labor activities, the days, times and number of employees that would take part in the educational intervention were defined along with the SC nurses. Three groups comprised of 10-12 nurses' aides were formed (named Groups A, B and C) and the established days were Monday, Wednesday and Friday, at the end of each shift.

The educational intervention was carried out by the first researcher and the following concepts were approached: definition of hypothermia, physiopathology of hypothermia, temperature control, heat loss mechanisms, active and passive heating mechanisms, consequences of hypothermia, and record of information in the medical report.

The teaching strategy was constituted of the application of the conceptual mapping, aiming to present a diagram that could address conceptual relationships in a bi-dimensional perspective, and seeking to show the hierarchical relationships among content structure-related concepts. The average time spent in the employment of this strategy was 50 minutes.

There was another teaching strategy used in the process. It allowed for the detailed and objective analysis of a concrete situation that needed to be investigated. Data of patients under fictitious names submitted to the surgery were used for the elaboration of the strategy. In this strategy, the researcher divided groups A, B and C into subgroups A1, A2, B1, B2, C1 and C2, and applied two different case studies to the subgroups, which were previously instructed concerning the aspects to be analyzed. Subsequently, major aspects were revisited and the solutions proposed by the participants were examined. The best conclusions were collectively discussed, thus allowing for the knowledge to be improved by the contributions of the colleagues and the researcher.

The average time reserved to the analysis and discussion was 25 minutes for each group.

Phase three

Two months following the beginning of the educational intervention, and in order to assess the learning level of the participants, the assistant nurses who took part in the two first phases (filling in the questionnaire and educational intervention) were invited to respond the same questionnaire applied in the pre-intervention phase once again. The questionnaires were then either delivered to the researcher or placed in the specific folder at the nursing post.

The average time participants took to deliver the document back was two weeks.

Data treatment process

Collected data were fed into the Statistical Package for Social Sciences (SPSS, version 15.0 for Windows) program.

For the statistical analysis, the research made use of the paired t-test, aiming to compare the averages achieved in the pre and post intervention procedures. The adopted significance level was 0.05. Results present absolute and relative frequency, average and standard deviation.

RESULTS

Data in Table 1 show that 91% of the nursing professionals were women; 65.7% graduated from private institutions; 45.7% were between 20 and 30 years old; 48.6% had graduated between 1 and 5 years prior to the intervention; and 91.4% had worked at the Surgical Center between over 1 and less than 5 years.

Table 1 – Distribution of nurses' aides according to social-demographic and academic variables - São Paulo, Brazil, 2010

Variables	N	%	Average (SD*)
Gender			
Male	3	8.6%	
Female	32	91.4%	
Graduation institution			
Public	12	34.3%	
Private	23	65.7%	
Age group			
20 30	16	45.7%	
30 40	13	37.1%	
40 50	4	11.4%	
50 60	2	5.7%	
Time since graduation			
1 5	17	48.6%	6.97(4.61)
5 10	10	28.6%	
10 15	7	20.0%	
15 20	1	2.9%	
Time in the job			
1 5	32	91.4%	2.86(2.09)
5 10	3	8.6%	

* SD = standard deviation

A statistically significant difference was observed between the knowledge ($p=0.00$) presented by the SC nurses' aides about non-intentional intraoperative hypothermia after the educational intervention. After the educational intervention, general maximum and minimum scores, and also the knowledge average scores of the nurses' aides, displayed an increment of 3.49 points in comparison with the stage prior to the intervention (Table 2).

Table 2 – Knowledge assessment scores before and after the educational intervention. São Paulo, Brazil, 2010

Variable	Minimum	Maximum	Average (SD*)	p
Pre knowledge	3,5	10	6.38(1.59)	0.00**
Post knowledge	07	12	9.87(1.18)	0.00**

*SD = standard deviation; ** $p < 0.05$

Following the educational intervention, the most significant average differences were achieved in the following groups: nurses' aides graduated from private institutions (-3.52); 20-30 year old professionals (-3.71) compared to all other age groups; and professionals with graduation length of time of over 15 years (-4.50) - among them, the nurses' aides who had worked in SCs between 1 and 5 years (Table 3). Although the general averages showed significant differences, the results presented after the application of the t-test to the variables showed that the existing difference between achieved averages was statistically not so significant among the variable categories – for instance, public and private institutions.

Table 3 – Average, standard deviation and knowledge average differences according to social and graduation-related variables prior to and after the educational intervention - São Paulo, Brazil, 2010.

Variables	Knowledge			
	Pre Average (SD*)	Post Average (SD*)	Difference	p**
Graduation institution				
Public	7.00(1.62)	10.41(1.29)	-3.41	0.77
Private	6.06(1.51)	9.58(1.18)	-3.52	
Age group				
20 30	5.72(1.45)	0.43(0.93)	-3.71	0.58
30 40	6.73(1.59)	10.11(1.28)	-3.38	
40 50	6.75(0.64)	9.75(0.87)	-3.00	
50 60	8.75(1.76)	12.00(0.00)	-3.25	
Time since graduation				
1 5	5.73(1.40)	9.44(0.90)	-3.71	0.36
5 10	6.95(1.70)	10.10(1.43)	-3.15	
10 15	7.00(1.55)	10.28(1.07)	-3.28	
15 20	7.50(1.0)	12.00(0.00)	-4.50	

* SD = standard deviation; ** $p < 0.05$

Significant differences were observed in all aspects of knowledge after the educational intervention on the non-intentional intraoperative hypothermia ($p < 0.05$). It is worth highlighting that the major average differences related to the following aspects: thermoregulatory center (-0.65); prevention measures (-0.52); and physiologic consequences (-0.48) (Table 4).

Table 4 – Compared averages, standard deviation and knowledge average differences according to the assessment aspects related to prior to and post educational intervention - São Paulo, Brazil, 2010

Variable	Knowledge			
	Pre Average (SD*)	Post Average (SD*)	Difference	p**
Hypothermia concept	0.83(0.38)	1.00(0.00)	-0.17	0.01
Thermoregulatory center	0.29(0.46)	0.94(0.24)	-0.65	0.00
Heat loss mechanisms	0.51(0.51)	0.74(0.56)	-0.23	0.04
Temperature assessment	0.59(0.23)	0.89(0.21)	-0.30	0.00
Signs of hypothermia	0.43(0.27)	0.71(0.25)	-0.28	0.00
Risk factors	0.83(0.45)	1.09(0.37)	-0.26	0.02
Heating methods	1.03(0.38)	1.37(0.49)	-0.34	0.00
Prevention measures	0.91(0.37)	1.43(0.50)	-0.52	0.00
Physiologic consequences	0.26(0.44)	0.74(0.44)	-0.48	0.00
Report records	0.71(0.25)	0.96(0.14)	-0.25	0.00

* SD = standard deviation; ** $p < 0.05$

DISCUSSION

Whenever perioperative hypothermia is not prevented in the operating room (SR) it can unleash a series of complications (respiratory, cardiovascular, tegumentary alterations) in anesthesia recovery (AR) and postoperative (PO) periods. In this way, the role of the nurse in implementing preventive measures against hypothermia in the operating room is extremely important toward improving the nursing quality assistance in the intraoperative period, providing the patient with enhanced safety and reduction of hospital-related costs⁽⁸⁾.

As for the sex variable, nursing has been historically characterized as a typically female occupation, although the universe of male nurses has tripled in the last decade, rising from 86.5% in 1991 to 90% in 2010. Men represent only 7.6% of the total amount of nurses⁽⁹⁾. Studies show variations (from 4.5% up to 30%) in the percentage of male nurses. Even so, the female presence is still predominant in educational program-based studies⁽¹⁰⁻¹¹⁾. Regarding the age aspect, obtained results are corroborated by studies that show that the average age ranged from 27 through 39 years (SD = 3.06-9.89)⁽¹²⁻¹³⁾.

With respect to the graduation institution, the 1990's saw an upsurge in the country's educational system, with a rise in the offers of nursing courses, mainly driven by an expressive participation of the private sector⁽¹⁴⁾. Such development was observed in the educational background of nurses, nurses' aides and nursing technicians.

In Brazil, the policies adopted by the governments are pointed out as one of the major factors that stimulated the growth of the private sector, granting higher education institutions more autonomy toward the curricula flexibilization and the construction of political-pedagogical projects capable of adapting to the dynamic demands of society; moreover, that scenario allowed for the proposition of a minimum hour-based workload and course length of time⁽¹⁵⁾.

The little amount of time working in SCs did not affect the acquisition of knowledge on hypothermia by nurses' aides. Hence, we can infer that this department was the first workplace of these professionals. This can be translated into an unfavorable factor, as this sector is deemed to be a high complexity area and short working periods in this department can eventually lead to greater possibilities of generating adverse events.

The close observation of the data presented in Table 2 shows statistically significant differences after the educational intervention concerning intraoperative hypothermia. Similar results were found in some studies that assessed the effectiveness of educational programs toward both the change of knowledge levels and the improvement of nursing practices⁽¹⁶⁻¹⁷⁾. It is necessary to highlight that the nurses' aides already had information on intraoperative hypothermia; this can be inferred from the fact

that they most certainly had already come across a hypothermic patient during the time they worked in the SC; besides, the vast majority of 20-30 year old professionals were taking the Nursing undergraduate course. Therefore, the application of the questionnaire prior to the educational intervention was aimed to identify the basic notions acquired by their previous knowledge on the matter. This procedure enabled us to rescue elementary concepts about hypothermia in the professionals. The presence of such previous knowledge is essential toward the assimilation of new concepts and their eventual transformation, in such a way the cognitive structure is broadened by the embodiment of new information⁽¹⁸⁾.

Another favorable aspect was the willingness of the nurses' aides to be part of the study group. The willingness of the learner is deemed to be an internal factor in which the individual leaves the condition of passiveness and becomes and inherently active subject. When willingness is not present in individuals, even potentially significant materials can merely be mechanically memorized by the subject⁽⁸⁾.

The acquisition of significances require both the existence of grounding ideas (pre-existing information in the cognitive structure) and the willingness of apprentices to learn in a significant basis; for this purpose, the envisaged material needs to be potentially significant. Bearing that in mind, this study applied the conceptual mapping as a teaching strategy. The strategy demands the involvement of the thought in order to elect key concepts, identify misplaced conceptions and correlate information to previously set concepts, thus allowing the professional to establish a relationship between posed problems and the knowledge already existing in his cognitive structure⁽¹⁹⁾.

Aiming to potentialize the significant aspects of the content, the teaching strategy comprehended the use of the case study. The strategy brought about a problem, which was immediately analyzed and tackled, showing a possible application of complex situations, problem-solving and decision assessment theories into the practice by means of the use of specific skills⁽²⁰⁾.

Although no significant association among social, graduation length of time and knowledge variables were evident, the results on Table 3 show an enhancement in their average after the educational intervention. The most marked average difference was found in the *professionals with graduation length of time of over 15 years* category (-4.50). Such result may possibly stem from the interest, the knowledge and the ability of the two nurses' aides who reached remarkably higher scores comparing to the others in this category. It is believed that this significant difference is a consequence of their individual characteristics and also their professional trajectory, as both were actively working in the SC, following a long period in the Intensive Care Unit, which contributed to a greater assimilation of knowledges and skills.

The apprentice's capacity of transforming potentially significant ideas is an intellectual ability. Such promptness and organization of well-structured ideas in his cognitive framework enhances with experience⁽²⁾.

In the *group age* and *length of time working in the SC* categories, average differences were also quite expressive. The fact that some of the professionals were Nursing undergraduates may have influenced this result, as their steady exposure to the contents related to the issue may constitute an essential variable in learning environments, especially when a longer retention is intended to take place⁽⁹⁾. Therefore, their cognitive structure would be much more elaborated and expanded to welcome new information.

The results on Table 4 allowed us to infer that all assessment aspects of knowledge reached a statistically significant status ($p < 0.005$) after the educational intervention. The most expressive average differences were found in the *thermoregulatory*, *prevention measures* and *physiologic consequences* categories, suggesting the acquisition of new meanings on intraoperative hypothermia in the nurses' aides' cognitive structure following the presented teaching strategies⁽¹⁷⁾. However, the assimilation and the knowledge of the professionals in the above-mentioned categories must be thoroughly understood. The prevalence of intraoperative non-intentional hypothermia is very high, turning it into one of the major causes for the enhancement of complications in the Post-anesthesia Recovery Room; it not only puts the health of the patient in jeopardy, but also contributes toward the increase of healthcare-related costs due to the increment of extra nursing working hours and consequently a rise in the time of permanence of the patient in the recovery room.

REFERENCES

1. Craven RF, Hirten CJ. Fundamentos de enfermagem: saúde e função humanas. 4ª ed. Rio de Janeiro: Guanabara Koogan; 2006.
2. Association of periOperative Registered Nurses (AORN). Recommended practices for the prevention of unplanned perioperative hypothermia. AORN J. 2007;85(5):972-88.
3. Kurz A. Thermal care in the perioperative period. Best Pract Res Clin Anaesthesiol. 2008;22(1):39-62.
4. Haddad J, Mojica MJ, Chang MI. Proceso de educación permanente en salud. Educ Med Salud. 1989;21(1):11-29.
5. Ausubel DP, Novak JD, Hanesian H. Psicología educacional. 2ª ed. Rio de Janeiro: Interamericana; 1980.
6. Moreira MA, Masini EFS. Aprendizagem significativa: a teoria de David Ausubel. 2ª ed. São Paulo: Centauro; 2006.
7. Sociedade Brasileira de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Central de Material e Esterilização (SOBECC). Práticas recomendadas. 5ª ed. São Paulo; 2009.
8. De Mattia AL, Barbosa ME, Rocha AM, Farias IL, Santos CA, Santos DM. Hypothermia in patients during the perioperative period. Rev Esc Enferm USP [Internet]. 2012 [cited 2012 Mar 23];46(1):60-6. Available from: http://www.scielo.br/pdf/reeusp/v46n1/en_v46n1a08.pdf
9. Conselho Regional de Enfermagem de São Paulo (COREN-SP) [Internet]. São Paulo; 2011 [citado 2011 nov. 22]. Disponível em: <http://inter.coren-sp.gov.br/node/1375>
10. Gask L, Dixon C, Morriss R, Appleby L, Green G. Evaluating STORM skills training for managing people at risk of suicide. J Adv Nurs. 2006;54(6):739-50.

CONCLUSION

Hypothermia in the surgical anesthesia procedure is defined as a common thermal perioperative disturbance and results from an alteration in the thermoregulatory process induced by the anesthesia, by the surgery and by the surgical environment. Having that in mind, the educational process in the surgical center stands out as a relevant strategy toward the instrumentalization of nurses' aides, allowing them to provide patients in the intraoperative period with high quality care.

In this study, non-intentional hypothermia-related teaching strategies showed to be quite effective, as they allowed for the integration of the theoretical and practical teaching-learning process. Professionals are expected to play a central role in learning processes. Previous knowledge needs to be modified and expanded within their cognitive structure. Moreover, it must be highlighted that this process was carried out together with other participants, such as the researcher, colleagues and patients; learning processes never happen in isolation, but result from partnerships and connections with other people.

Therefore, the results of this study are expected to aid and drive nurses toward planning educational actions of multiple natures, taking into account the strategies employed here, which have proven to be facilitators of the learning of surgical center nurses' aides regarding non-intentional hypothermia.

11. Liu JE, Mok E, Wong T, Xue L, Xu B. Evaluation of an integrated communication skills training program for nurses in cancer care in Beijing, China. *Nurs Res.* 2007;56(3):202-9.
12. Srikrajang J, Pochamarn C, Chittreecheur J, Apisanthanarak A, Danchaivijitr S. Effectiveness of education and problem solving work group on nursing practices to prevent needlestick and sharp injury. *J Med Assoc Thai.* 2005;88 Suppl 10:S115-9.
13. Dougal J, Gonterman R. A comparison of three teaching methods on learning and retention. *J Nurses Staff Dev.* 1999;15(5):205-9.
14. Teixeira E. A trajetória dos Cursos de Graduação em Enfermagem. In: Haddad AE, organizador. *A trajetória dos Cursos de Graduação na área da Saúde.* Brasília: INEP; 2006. p.140-68
15. Gomes MCSMA. Organização e Gestão do Centro Cirúrgico de um Hospital Universitário de Belo Horizonte [dissertação]. Belo Horizonte: Escola de Enfermagem, Universidade Federal de Minas Gerais; 2009.
16. Carvalho R, Coutinho RMC, Grassia RCF, Barreto AJ. Processo ensino aprendizagem em Centro Cirúrgico. In: Carvalho R, Bianchi ERF. *Enfermagem em Centro Cirúrgico e Recuperação Anestésica.* Barueri: Manole; 2007. p. 387-407.
17. González HL, Palencia AP, Umaña LA, Galindo L, Villafrade LA. Mediated learning experience and concept maps: a pedagogical tool for achieving meaningful physiology students. *Adv Physiol Educ.* 2008;32(4):312-6.
18. Gul RB, Boman JA. Concep mapping: a strategy for teaching and evaluation in nursing education. *Nurse Educ Prac.* 2006;6(4):199-206.
19. Pelizzari A, Kriegl ML, Baron MP, Finck NTL, Dorocinski SI. Teoria da aprendizagem significativa segundo Ausubel. *Rev PEC (Curitiba)* [Internet]. 2002 [citado 2012 abr. 20];1(2):37-41. Disponível: <http://portaldoprofessor.mec.gov.br/storage/materiais/0000012381.pdf>
20. Anastasiou LGC, Alves LP. Estratégias de ensinagem. In: Anastasiou LGC, Alves LP. *Processos de ensinagem na universidade.* Joinville: Univille; 2007. p. 73-107.