

Analysis of accidents with organic material in health workers

Mariana Vieira¹

Maria Itayra Padilha²

Regina Dal Castel Pinheiro³

This retrospective and descriptive study with a quantitative design aimed to evaluate occupational accidents with exposure to biological material, as well as the profile of workers, based on reporting forms sent to the Regional Reference Center of Occupational Health in Florianópolis/SC. Data collection was carried out through a survey of 118 reporting forms in 2007. Data were analyzed electronically. The occurrence of accidents was predominantly among nursing technicians, women and the mean age was 34.5 years. 73% of accidents involved percutaneous exposure, 78% had blood and fluid with blood, 44.91% resulted from invasive procedures. It was concluded that strategies to prevent the occurrence of accidents with biological material should include joint activities between workers and service management and should be directed at improving work conditions and organization.

Descriptors: Accidents Occupational; Occupational Exposure; Occupational Health; Exposure to Biological Agents.

¹ RN, Doctoral student in Nursing, Universidade Federal de Santa Catarina, Florianópolis, SC, Brazil. E-mail: nanyufsc@ibest.com.br.

² RN, Ph.D. in Nursing, Associate Professor, Departamento de Enfermagem, Universidade Federal de Santa Catarina, Florianópolis, SC, Brazil. E-mail: padilha@nfr.ufsc.br.

³ Physical Educator, M.Sc. in Production and Systems Engineering. Centro de Referência em Saúde do Trabalhador, Florianópolis, SC, Brazil. E-mail: recastel@yahoo.com.br.

Corresponding Author:

Mariana Vieira

Rua João Pio Duarte Silva, 1172, Fundos

Bairro: Córrego Grande

CEP: 88037-416 Florianópolis, SC, Brasil

E-mail: nanyufsc@ibest.com.br

Análise dos acidentes com material biológico em trabalhadores da saúde

Este é um estudo retrospectivo descritivo, com abordagem quantitativa, com o objetivo de conhecer os acidentes de trabalho com exposição a material biológico e o perfil dos trabalhadores, a partir das fichas de notificação do Centro de Referência Regional em Saúde do Trabalhador da Macrorregião de Florianópolis. A coleta de dados foi realizada pelo levantamento das 118 fichas de notificação de 2007. Os dados foram analisados eletronicamente. Os acidentes ocorreram, predominantemente, entre os técnicos de enfermagem do sexo feminino e a idade média era de 34,5 anos. Dos acidentes, 73% envolveram exposição percutânea, 78% tiveram contato com sangue e/ou fluidos com sangue e 44,91% decorreram de procedimentos invasivos. Conclui-se que as estratégias de prevenção à ocorrência dos acidentes de trabalho, com material biológico, devem incluir ações conjuntas, entre trabalhadores e gerência dos serviços, devendo estar voltadas às melhorias das condições e organização do trabalho.

Descritores: Acidentes de Trabalho; Exposição Ocupacional; Saúde do Trabalhador; Exposição a Agentes Biológicos.

Análisis de los accidentes con material biológico en trabajadores de la salud

Estudio retrospectivo descriptivo con abordaje cuantitativo, cuyo objetivo fue conocer los accidentes de trabajo con exposición a material biológico y el perfil de los trabajadores, a partir de las fichas de notificación del Centro de Referencia Regional en Salud del Trabajador de la Macro Región de Florianópolis. La recolección de datos fue realizada por el levantamiento de las 118 fichas de notificación de 2007. Los datos fueron analizados electrónicamente. Los accidentes ocurrieron predominantemente entre los técnicos de enfermería del sexo femenino y edad promedio de 34,5 años; 73% de los accidentes involucraron exposición percutánea; 78% tuvieron contacto con sangre y/o fluidos con sangre; 44,91% provinieron de procedimientos invasores. Se concluye que las estrategias de prevención a la ocurrencia de los accidentes de trabajo con material biológico deben incluir acciones conjuntas, entre trabajadores y gerencia de los servicios, debiendo estar dirigidas a mejorar las condiciones y organización del trabajo.

Descriptorios: Accidentes de Trabajo; Exposición Profesional; Salud Laboral; Exposición a Agentes Biológicos.

Introduction

Interest in the theme "Occupational accidents involving exposure to biological material, based on records in reporting forms sent to the Regional Reference Center of Occupational Health (CEREST) in the Macro-Region of Florianópolis" derives from the growing number of notifications involving such accidents. In this context, various factors influence this occurrence and, no matter which factors, awareness raising and changing attitudes are fundamental, among workers as well as health institution managers and administrators, regarding the adoption of standard precautions, with a view to minimizing the number of accidents involving biological

material⁽¹⁾. Health workers' adoption of protection equipment is considered a challenge, as they accept this theoretically, but the equipment still does not permeate daily practice with the same level of intensity⁽²⁾. This fact results from a range of factors, such as unavailability/inappropriateness of Personal Protective Equipment (PPE), work overload, lack of training on the correct use of existing biosafety measures to be taken, as well as the workers' feeling of invulnerability and some workers' wrong habit of recapping contaminated needles⁽³⁾.

As a result of the arrival of HIV/aids in the 1980's and, later of epidemiological profile changes,

all workers consider themselves vulnerable, including health workers. Considering that, in most cases, they deal with procedures involving biological material, they are more susceptible to these accidents⁽⁴⁾. Given the relevance of the theme, occupational accidents involving biological material cannot be seen as random or casual events, as their understanding and prevention demand a broader approach, which permeates workers, health institutions and social relations⁽⁵⁾. In this perspective, epidemiological research on factors associated with occupational accident occurrence involving biological material, including institutional and individual factors, i.e. related to the workers themselves, can contribute to a greater understanding on the determinant processes for accident occurrence and also offer support for further research and intervention programs in other social contexts⁽⁶⁾. Despite the countless studies on occupational accidents, biological risks and HIV/aids, there is still a lack of research to be used as knowledge and work instruments for professionals and institutions involved in the theme and committed to the formulation of public policies directed at the prevention and health promotion of workers' health⁽⁷⁾.

The results of this study can contribute to knowledge dissemination produced on the theme, as well as to the construction of occupational accident prevention and control strategies involving biological material, through the identification of possible risk factors that may exist during job activities. In view of the entire context and weighing the problem raised – *increasing number of reports involving occupational accidents with biological material*, the accomplishment of this study is justified, which aims to: Get to know occupational accidents including exposure to biological material which occurred in Greater Florianópolis and; get to know the workers' profile, based on the reporting forms forwarded to the CEREST in the Macro-Region of Florianópolis, between January and December 2007.

Method

This is a retrospective and descriptive study with a quantitative design. Data sources were all 118 accident reporting forms involving biological material occurred in Greater Florianópolis in 2007. Health institutions in this area forwarded these forms to the CEREST, where data were collected. Initially, a survey was carried out and the accidents reported in the forms were investigated. Then, the accidents were analyzed according to the accident victims' profile and accident characteristics, according

to the following variables: gender, age, city of residency, work contract, occupation, employer, exposure type, organic material involved, accident circumstance and causal agent, use of Personal Protective Equipment (PPE), as well as information about the victim's vaccination situation and completion of the Occupational Accident Report (CAT). These data were electronically processed and typed in Tabwin, Tabnet and statistics software SPSS 12 for Windows. The research was submitted to the Institutional Review Board of the Florianópolis Health Secretary and, after its approval, data were analyzed⁽⁸⁾.

Results

Profile of workers victims of accidents involving biological material

As for gender, 73% of the accidents involved women, against 27% men. Most of the occupational accidents involving biological material happened among workers in the age range between 20 and 34 years, with 39 cases (56%), against 26 cases (37%) in the age range between 35 and 49 years.

Professional occupation of accident victims involving biological material

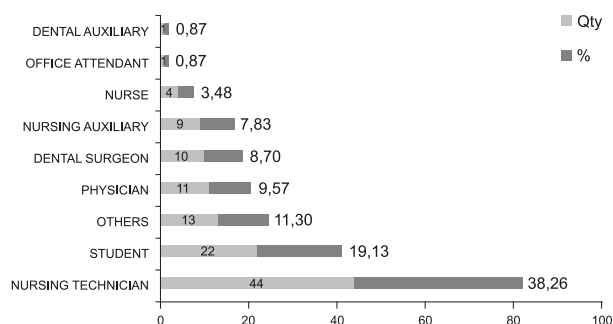


Figure 1 – Accident victims according to professional occupation. SINAN, Florianópolis, Brazil, 2007.

Regarding professional occupation, the category that showed to be the most susceptible to occupational accidents involving biological material was that of nursing technicians, with 44 accidents (38.26%). According to Figure 1, 57 cases (49.57%) affected nursing workers, including nurses, nursing technicians and auxiliaries. Fifty-three (46.09%) of these happened among nursing technicians and auxiliaries, and 3.48% among nurses. The study also reveals an increasing number of accidents among trainees/students, including resident physicians, corresponding to 19.13% of occurrences.

Type of exposure to accidents involving biological material among workers

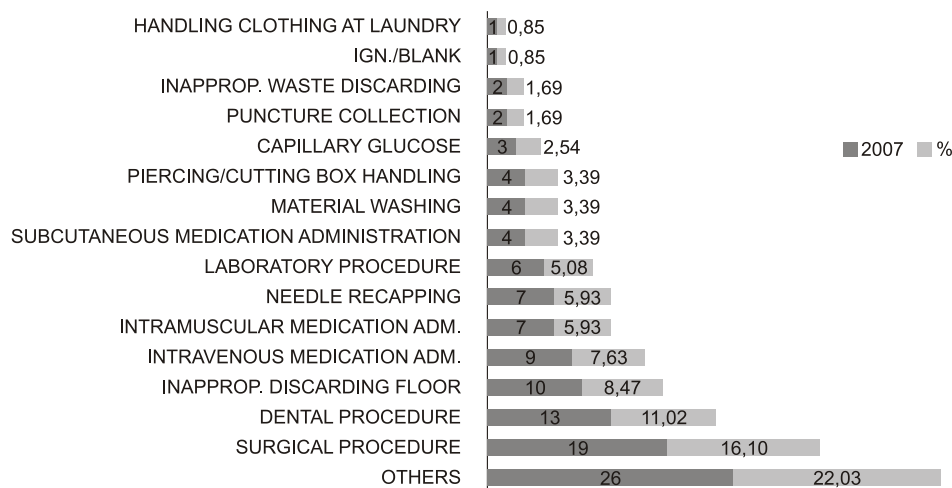
With regard to the types of exposure to accidents involving biological material, percutaneous exposure should be highlighted, with 56 cases, representing 73% of the total number. Next, exposure of mucous tissue is observed (10%), as well as exposure of intact and non-

intact skin, with 10 and 7% of accidents, respectively.

Circumstances of accidents involving biological material among workers

In this context, it is also important to mention that various circumstance predispose to occupational accident occurrence involving biological material.

CIRCUMSTANCES OF ACCIDENTES



Picture 2 – Accident victims according to accident circumstance. SINAN, Florianópolis, Brazil, 2007

In this study, in 32.20% of cases, accidents derived from surgical, dental and laboratory procedures, followed by 16.95% originating in intravenous, intramuscular and subcutaneous medication administration; 10.16% due to inappropriate discarding of contaminated material (floor, garbage) and 5.93% during needle recapping. Besides the above mentioned circumstances, Figure 2 also reveals 22.03% reported as “others”.

Organic material involved in accidents with biological material

Another extremely important variable during post-accident assessment, besides the type of exposure, is the organic material involved, which is characterized by the presence of blood, fluid with blood, liquor, among other secretions and body fluids.

Figure 3 demonstrates that 82 accidents involving biological material (69.49%) contained blood; 9.32% fluid with blood; 14.41% were reported as others, including organic material like liquor, serous fluids, sputum and 6.78% were reported as ignored and/or left blank.

ORGANIC MATERIAL

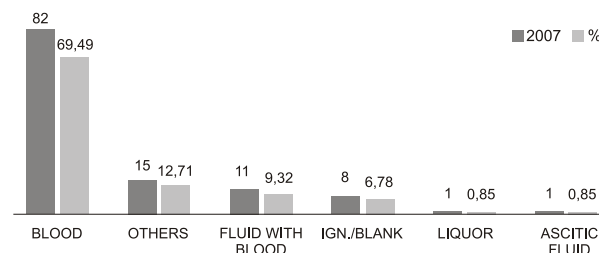


Figure 3 – Accident victims according to organic material. SINAN, Florianópolis, 2007

Workers’ use of Personal Protective Equipment in view of accidents involving biological material

Regarding the health workers’ adoption of PPE in their professional activities, although the present study data revealed that a majority uses these biosafety measures, the workers do not always mention these in practice. It was verified that, in 83 records (71%), the workers affirm that they were using some kind of PPE, such as gloves, gown, mask, glasses, among others, at

the time of the accident. Twenty-six percent of them answered that they were not using the PPE and only 3% left this question blank and/or ignored it.

As for the vaccination situation against Hepatitis B, among the accident victims involving biological material, the study data reveal that, although the large majority informed on the reporting forms that they underwent the recommended vaccination scheme, 37 records were taken into account, that is, 31% of workers had not been vaccinated or their vaccination status was ignored and/or left blank.

With respect to the completion and issuing of the Occupational Accident Report after the accidents involving biological material, out of 118 analyzed reporting forms, only 26 (22%) issued the CAT, while 88 (75%) did not, ignored and/or left this question blank.

Discussion

Based on the presented results, occupational accidents involving biological material predominated among women and nursing professionals, including nurses, nursing technicians and auxiliaries. These results are expected as, according to data by the Federal Nursing Council, today, the nursing profession in Brazil comprises 88.26% women. This fact is also justified as nursing team professionals are not only the biggest group, but are also acknowledged as the largest workforce in health institutions, who have direct contact with the patient, administering medication, doing wound dressings, among other invasive procedures that entail a constant risk of accidents involving biological material⁽⁹⁻¹⁰⁾.

As opposed to other categories of health professionals, nursing workers spend most of the time with the patient, performing "care" from the perspective of "doing" and, consequently, exposing themselves to different risk, as they can acquire occupational illnesses and injuries due to work⁽¹¹⁾. As an aggravating factor for accidents involving this professional category, double work journeys should also be reminded, often leading to mental illness, lack of attention and stress⁽¹²⁾. Also regarding accident susceptibility, students follow nursing professionals. This incidence is due to the large number of technical schools and colleges in the Macro-region of Florianópolis, with many students taking their curricular and/or extra-curricular practicum at different health institutions, sometimes without technical conditions or without direct supervision from the schools or even indirect supervision from the services, as a result of the

high demand for existing health actions⁽¹³⁾.

Regarding types of exposure to accidents involving biological material, this study highlighted piercing-cutting objects, such as scalpel blades and needles, mainly in recurring recapping. Studies confirm the high incidence level of accidents involving perforations, underlining the urgent need for surveillance and continuous training for care when handling these objects⁽¹⁴⁾.

In Brazil, occupational accidents involving piercing-cutting material at hospital institutions started to be mentioned in research in the 1970's, although still incipiently. As from the 1980's, due to the alarm raised in publications and debates about aids, many health professionals got terrified by the possibility of catching the disease through accidents involving material contaminated with secretions and fluids, which are common in piercing and cutting material⁽¹⁵⁾. This increased the interest in investigating this issue more in-depth, particularly in the hospital context, observing that, since then, it has been the target of further speculations, debates, studies and research⁽¹⁶⁾.

Occupational accidents involving piercing-cutting material deserve further research in comparison with other types of accidents (deriving from exposure of mucous tissue, intact and/or non-intact skin), as they result from needle pricks, cuts by blades or shards of glass, objects that may be contaminated by the presence of blood, among other body fluids that frighten workers regarding the possible risk of contamination by HIV and hepatitis viruses⁽¹⁷⁾. In this contact, rigorous assessment of the accident type is needed, that is, the type of exposure needs to be investigated and registered, as well as the body part in contact with the organic material, as the contamination risk degrees vary for certain diseases, consequently entailing different recommended post-accident conducts⁽¹⁸⁾.

In accident assessment, besides knowing the type of exposure, it is fundamental to know what biological material was involved, characterized by the presence of blood, fluid with blood, liquor, among other secretions/body fluids. Investigating the presence of biological material is extremely important, and attention should be even greater when this material is blood and/or fluids with blood, like in the present study. Occupational accidents involving blood and other potentially contaminated fluids should be treated as emergency cases, as interventions for HIV and hepatitis B prophylaxis, when indicated, need to start soon after the accident with a view to greater efficacy. Severity criteria in accident risk assessment consider the blood volume, as well as the virus quantity

present⁽¹⁹⁾. The most severe accidents involve a larger blood volume, marked by: profound injuries caused by piercing-cutting material, visible presence of blood on the invasive device, accidents involving needles previously used in source patients' veins or arteries and accidents involving large caliber needles, as well as accidents that involve enhanced budded virus involving an HIV-positive source patient⁽¹⁸⁾. The most important is to avoid these accidents, through permanent education, making workers familiar with the adoption of standard precautions and raising their awareness about the need for adequate use, as an effective measure to reduce infection risks by blood-borne diseases, as post-exposure prophylactic measures are not totally effective⁽¹³⁾.

Various circumstances predisposing to occupational accidents involving biological material were mentioned in the study. In this context, there are individual conditioning factors, such as non-adherence to personal protective equipment use, contaminated needle recapping, inappropriate discarding of contaminated material, as well as double work journeys, which in turn lead to fatigue, tiredness and lack of attention^(2,7). Also, institutional conditioning factors exist, such as lack of training offered by institutional managers, the agitation of the health service, lack of human resources, inadequacy of recipients for discarding contaminated materials, among others^(2,7). In the circumstances mentioned, the workers handled piercing-cutting objects while performing the activity. Hence, the high number of accidents involving piercing-cutting objects as causal agents is not a coincidence. In the same line of thought, the occurrence of occupational accidents involving biological material is also related to the discarding of contaminated material in inappropriate places, loaded containers, transportation/handling of unprotected needles, medication administration without the use of proper protective equipment, disconnection between needle and syringe, as well as contaminated needle recapping. The containers used for discarding piercing-cutting material are not always adequate for this purpose. Sometimes, adaptations are made, using containers like medication boxes and cleaning product packages^(11,13).

As for contaminated needle recapping, 15 to 35% of occupational accidents appoint this error in the needle care procedure. These data were evidenced in a study carried out at a Brazilian teaching hospital, which analyzed accident occurrence situations and trends involving needles⁽¹⁴⁾. In this line of thought, other studies also ratified the occurrence of these accidents among

workers, through the disconnection of the uncapped needle from the syringe, as well as needle recapping, procedures that are no longer recommended according to the Standard Precautions^(14-15,17,20). Although health institutions are entities aiming for care, treatment and care delivery to patients affected by diseases, the latter can also be responsible for illnesses among professionals who are part of the workforce at those institutions⁽¹²⁾.

Regarding the use of PPE, although figures still reveal that some workers do not adopt this equipment, in this study, based on data completed on the reporting forms, the importance managers and workers attribute to PPE use in their job activities is observed when in contact with blood and/or body fluids. Countless efforts have been made to seek ways to minimize accidents involving biological material and possible infection acquisition, such as HIV and hepatitis viruses^(1,4). Just supplying PPE is not sufficient though. Instead, workers need to be sensitized, trained and their anxiety and doubts about the adoption and correct use of biosafety measures need to be listened to. Moreover, it is highlighted that, to enhance health workers' protection in their daily activities involving patients, using common sense, adequate work conditions, availability of PPE and mainly permanent education are necessary and fundamental, with a view to occupational safety and health promotion⁽¹²⁾.

As for the vaccination situation against hepatitis B among accident victims involving biological material, despite the free recommended doses the Health Secretary offers health professionals, unfortunately, the latter still are not totally immune to the hepatitis B virus, as observed in this study. In this sense, constant vaccination campaigns against hepatitis B and on-the-job orientations are opportune and necessary, as transmission occurs despite very small quantities of blood or fluids coming from chronic patients, when in contact with the eye surface or other exposed mucous tissues⁽²¹⁻²²⁾.

Another important finding revealed in this study refers to underreporting, due to the non-completion and issuing of the CAT after the occupational accident involving biological material. Despite the great importance of this action, in most cases, it is still ignored and/or not completed. There are several reasons for this occurrence, ranging from mere lack of knowledge about the compulsoriness of this procedure to the non-characterization of the episode as an accident and victims' fear of reporting⁽²³⁾. It is highlighted that, no matter the occupational accident category, reporting is compulsory,

including CAT issuing, so as to contribute to the planning of disease and/or health problem prevention actions, as well as occupational health promotion.

Conclusion

This study provided knowledge about the profile of accident victims involving biological material, as well as the peculiar characteristics of these accidents in Greater Florianópolis. Regarding the profile, nursing workers were the most exposed to occupational accidents involving biological material and piercing-cutting objects, with the presence of blood and/or fluid with blood. This is in line with research ratifying the high incidence level of these accidents among nursing workers, as these are not only the main group, but also have direct contact with the patient, handling piercing-cutting objects.

In view of this context, research is needed about accidents involving biological material, so as grant managers, institutions and workers the possibility to (re)plan strategies that go beyond the mere avoidance of accidents and aim to promote workers' health and quality of life in their job activities.

Finally, it is concluded that the data collected in this study indicate that strategies to prevent occupational accidents involving biological material should include joint actions, established between workers and service management, aiming to improve job conditions, especially directed at work organization, supply of materials with safety devices, establishment of educative programs, as well as sensitization with a view to behavioral change among workers and managers, as isolated actions are considered ineffective to minimize these problems.

References

1. Ribeiro LCM, Souza ACS, Neves HCC, Munari DB, Medeiros M, Tipple AFV. Influência da exposição a material biológico na adesão ao uso de equipamentos de proteção individual. *Ciênc Cuidado Saúde*. 2010; (2):325-32.
2. Chiodi MB, Marziale MHP, Robazzi MLCC. Acidentes de trabalho com material biológico entre trabalhadores de unidades de saúde pública. *Rev. Latino-Am. Enfermagem*. [Internet]. 2007 [acesso 09 out 2009];15(4):632-8. Disponível em: http://www.scielo.br/pdf/rlae/v15n4/pt_v15n4a17.pdf
3. Spagnuolo RS, Baldo RCS, Guerrini IA. Análise epidemiológica dos acidentes com material biológico registrado no Centro de Referência em Saúde do Trabalhador - Londrina-PR. *Rev Bras Epidemiol*. [internet]. 2008 [acesso 06 ago 2009];11(2):315-23. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1415-790X2008000200013&lng=en&nrm=iso&tlng=pt
4. Gir E, Takahashi RF, Oliveira MAC, Nichiata LYI, Ciosak SI. Biossegurança em DST/AIDS: condicionantes da adesão do trabalhador de enfermagem às precauções. *Rev Esc Enfermagem USP*. [internet]. 2004 [acesso: 09 nov 2009];38(3):245-53. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342004000300002&lng=pt&nrm=iso&tlng=pt
5. Guilarde AO, Oliveira AM, Tassara M, Oliveira B, Andrade SS. Acidentes com material biológico entre profissionais de hospital universitário em Goiânia. *Rev Patol Tropic*. 2010;39(2):131-6.
6. Oliveira AC, Lopes ACS, Paiva MHR. Occupational accidents due to exposure to biological material in the multidisciplinary team of the emergency service. *Rev Esc Enferm USP*. [internet]. 2009 [acesso: 09 out 2010];43(3):677-83. Disponível em: http://www.scielo.br/scielo.php?pid=S0080-62342009000300025&script=sci_arttext&tlng=en
7. Galon T, Robazzi MLCC, Marziale MHP. Acidentes de trabalho com material biológico em hospital universitário de São Paulo. *Rev Eletr Enferm*. [Internet]. 2008 [acesso: 11 out 2010];10(3):673-85. Disponível em: <http://www.fen.ufg.br/revista/v10/n3/v10n3a13.htm>
8. Ministério da Saúde (BR). Resolução Nº 196/96. Diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Conselho Nacional em Saúde. Comissão Nacional de Ética em Pesquisa com Seres Humanos. Brasília (DF): MS; 2003.
9. Cardoso ACM, Figueiredo RM. Situações de risco biológico presentes na assistência de enfermagem nas unidades de saúde da família (USF). *Rev. Latino-Am. Enfermagem*. [Internet]. 2010 [acesso: 11 out 2010];18(3):73-8. Disponível em: http://www.scielo.br/pdf/rlae/v18n3/pt_11.pdf
10. Caetano JA, Soares E, Braquehais AR, Rolim KAC. Acidentes de trabalho com material biológico no cotidiano da enfermagem em unidade de alta complexidade. *Enferm Global* [internet]. 2006 [acesso 27 fev 2010];9:1-10. Disponível em: http://www.erevistas.csic.es/ficha_articulo.php?url=oai:revistas.um.es/index/oai:article/371&oai_iden=oai_revista53
11. Sêcco IAO, Robazzi MLCC. Accidentes de trabajo en el equipo de enfermería de un hospital de enseñanza de Paraná - Brasil. *Cienc Enferm*. 2007;(13):65-78.
12. Monteiro CM, Benatti MCC, Rodrigues RCM. Acidente do trabalho e qualidade de vida relacionada à saúde: um estudo em três hospitais. *Rev. Latino-*

- Am. Enfermagem. [internet]. 2009 [acesso 04 março 2010];17(1):101-7. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692009000100016&lng=pt&nrm=iso&tlng=pt
13. Toledo ACC Junior, Ribeiro FA, Ferreira FGF, Ferraz RM, Greco DB. Conhecimento, atitudes e comportamentos frente ao risco ocupacional de exposição ao HIV entre estudantes de Medicina da Faculdade de Medicina da Universidade Federal de Minas Gerais. *Rev Soc Bras Med Trop.* 2007;32(5):509-15.
14. Brevidelli MM, Cianciarullo TI. Análise dos acidentes com agulhas em um hospital universitário: situações de ocorrência e tendências. *Rev. Latino-Am. Enfermagem.* [internet]. 2002 [acesso 03 jul 2009];10(6):780-6. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692002000600005&lng=pt&nrm=iso&tlng=pt
- 15 Vieira M, Padilha MICS. O HIV e o trabalhador de enfermagem frente ao acidente com material perfurocortante. *Rev Esc Enferm USP.* [internet]. 2008 [acesso 04 janeiro 2009];42(4):804-10. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342008000400026&lng=pt&nrm=iso&tlng=pt
- 16 Costa R, Padilha MI, Vieira M, Maliska IA, Bastiani J. La contribución de la Enfermería brasileña para la producción de conocimiento sobre el SIDA. *Index Enferm.* [internet]. 2009 [acesso 03 jul 2009];18(1). Disponível em: <http://www.index-f.com/index-enfermeria/v18n1/sumario.php>
17. Canini SRMS, Moraes SA, Gir E, Freitas ICM. Percutaneous injuries correlates in the nursing team of a Brazilian tertiary-care university hospital. *Rev. Latino-Am. Enfermagem* 2008;16(5):818-23.
18. Ministério da Saúde (BR). Recomendações para atendimento e acompanhamento de exposição ocupacional a material Biológico: HIV e hepatites B e C. Brasília: MS; 2004.
19. Fonseca MMR. Profilaxia pós-exposição a material biológico para profissionais da saúde. In: Mello HRL. *Conduta em doenças infecciosas.* Rio de Janeiro (RJ): MEDSI; 2004. p.758-65.
20. Marziale MHP, Rodrigues CM. A produção científica sobre acidentes de trabalho com material perfurocortante entre trabalhadores de enfermagem. *Rev. Latino-Am. Enfermagem.* 2002 julho;10(4):571-7.
21. Ferreira CT, Silveira TR. Prevenção das hepatites virais através de imunização. *J Pediatr.* 2006;82(3):55-66.
22. Gir E, Caffer J Netto, Malagutti SE, Canini SRMS, Hayashida M, Machado AA. Acidente com material biológico e vacinação contra hepatite B entre graduandos da área da saúde. *Rev. Latino-Am. Enfermagem.* [internet]. 2008 [acesso 18 out 2009];16(3):401-6. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692008000300011&lng=pt&nrm=iso&tlng=pt
23. Napoleão AA, Robazzi MLCC, Marziale MHP, Hayashida M. Causas de subnotificação de acidentes do trabalho entre trabalhadores de enfermagem. *Rev. Latino-Am. Enfermagem.* [internet]. 2000 [acesso 22 nov 2009];8(3):119-20. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692000000300018&lng=pt&nrm=iso&tlng=pt

Received: May 1st 2010Accepted: Feb. 9th 2011