

OCCUPATIONAL ACCIDENTS WITH BIOLOGICAL MATERIAL AMONG HEALTHCARE WORKERS*

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ABSTRACT: The present study aimed at characterizing occupational accidents with biological material among healthcare workers. A retrospective, quantitative study of accidents involving biological material, conducted in a secondary reference hospital located in the northeastern region of the state of Paraná. Data were collected between December 2013 and June 2014 from 1,061 medical records of health professionals and registration sheets for the Notifiable Diseases Information System, and were analyzed using descriptive statistics. Among 1,061 occupational accidents with biological material, 58.1% occurred among nursing aides and technicians, of whom 82.7% were women. The main organic material present in 86.1% of the accidents was blood; 88.2% occurred through percutaneous exposure, 66.1% involved the use of needles with lumen, and 21.9% resulted from inappropriate disposal of sharps. It is necessary to implement preventive measures directed to the nursing team.

DESCRIPTORS: Occupational accidents; Occupational health; Occupational exposure; Exposure to biological agents.

ACIDENTES DE TRABALHO COM MATERIAL BIOLÓGICO EM TRABALHADORES DE SERVIÇOS DE SAÚDE

RESUMO: Objetivou-se caracterizar os acidentes de trabalho com material biológico em trabalhadores de serviços de saúde. Estudo retrospectivo, quantitativo, realizado em um hospital secundário referência para o atendimento de acidentes com material biológico, localizado no norte do Paraná. Os dados foram coletados de dezembro de 2013 a junho de 2014, em 1.061 prontuários de trabalhadores da saúde e nas fichas de registro no Sistema de Informação de Agravos de Notificação, analisados por meio de estatística descritiva. Dentre os 1.061 acidentes de trabalho com material biológico, 58,1% ocorreram com auxiliares e técnicos de enfermagem, dos quais 82,7% eram do sexo feminino. O principal material orgânico presente em 86,1% dos acidentes foi o sangue, 88,2% ocorreram por meio de exposição percutânea, 66,1% envolveram a utilização de agulhas com lúmen e 21,9% foram decorrentes do descarte inadequado de material perfurocortante. Faz-se necessário implementar medidas preventivas, direcionadas à equipe de enfermagem.

DESCRIPTORES: Acidentes de trabalho; Saúde do trabalhador; Exposição ocupacional; Exposição a agentes biológicos.

ACCIDENTES DE TRABAJO CON MATERIAL BIOLÓGICO EN TRABAJADORES DE SERVICIOS DE SALUD

RESUMEN: Se objetivó caracterizar los accidentes laborales con material biológico en trabajadores de servicios de salud. Estudio retrospectivo, cuantitativo, realizado en hospital de referencia secundaria para atención de accidentes con material biológico, en el norte de Paraná. Datos recolectados de diciembre de 2013 a junio de 2014, de 1.061 historia clínicas de trabajadores de salud y en fichas de registro del Sistema de Información de Afecciones de Notificación, analizados por estadística descriptiva. De los 1.061 accidentes de trabajo con material biológico, 58,1% del sucedieron a auxiliares y técnicos de enfermería, 82,7% de los cuales era de sexo femenino. El material orgánico más presente en 86,1% de los accidentes fue la sangre, 88,2% sucedieron por exposición percutánea, 66,1% involucró utilización de agujas con lumen, y 21,9% derivó del descarte inadecuado de material punzocortante. Resulta necesario implementar medidas de prevención, orientadas al equipo de enfermería.

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

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● INTRODUCTION

Occupational accidents with biological material (OABM) represent a global public health problem, resulting in economic and social damage, since injured workers often need to be absent from productive activities. Brazil currently occupies the fourth position in the ranking of occurrence of fatal occupational accidents. In 2013, these accidents generated a cost of US\$ 7 billion for the country⁽¹⁻³⁾.

Health workers are the main professionals involved in occupational accidents with biological material. This reality is mainly related to complexity of the activities executed while providing care, working conditions, and low adherence of the individuals to preventive strategies such as appropriate disposal of sharps⁽⁴⁾.

Research has shown that occupational accidents may occur through exposure of individuals to potentially contaminated fluid, percutaneous exposure by sharps, and mucous membrane presenting rupture of integrity. In addition to experiencing emotional changes due to concerns related to possible seroconversion and contamination of their family members, injured workers are exposed to various diseases, including hepatitis B, hepatitis C, and the human immunodeficiency virus (HIV)^(2,4-5).

Therefore, immediately after work accidents with biological material, individuals should receive care appropriate for the type of occurrence; institutions are responsible for referring them for that care. It is necessary that injured workers get the necessary prophylactic measures within a short period of time in order to minimize the risks of transmission of diseases such as HIV and hepatitis B⁽⁵⁾.

One study pointed out that most accidents can be avoided, because workers are made aware of the importance of adopting safety measures, such as the use of personal protective equipment (PPE)⁽⁶⁾. To this end, institutions should implement continuing education policies and actions that contribute to safe care by acquiring high-quality products and equipment⁽⁵⁾.

Knowing the characteristics of occupational accidents with biological material represents an important management tool for establishing measures to improve working conditions and reduce occupational risks. In addition, it provides support for identifying professionals, among the nurses who are qualified to provide care, who are higher risk of exposure, and for planning preventive actions focused on the main causes of these occurrences.

The present study aimed to characterize occupational accidents with biological material among healthcare workers.

● METHOD

This was a retrospective, descriptive study with a quantitative approach developed in a secondary hospital located in the northeastern region of the state of Paraná. This hospital is a reference center for providing care for workers who have suffered occupational accidents with biological material in the public and private health services of the cities that make up this 17th health region of the state. The area covered by this region consists of 21 municipalities and has an estimated population of 871,267⁽⁷⁾.

Medical records of healthcare workers who suffered accidents with biological material and filed reports with the Notifiable Diseases Information System (SINAN) were included in the study. Accidents that occurred in health services with their own flow of service without follow-up in the reference hospital were excluded.

Data collection was conducted in three stages between December 2013 and June 2014. In the first stage the information was obtained from the medical record archives of the reference hospital; all cases from the beginning of the implementation of care protocols to occupational accidents with biological material from October 2010 to December 2013 were analyzed.

In the second stage data were collected from the electronic medical records of health care workers who suffered occupational accidents with biological material and received care at the Intermunicipal Consortium of Central Paranapanema Valley (CISMEPAR). The variables were related to medical exams

performed in the period between 2010 and 2013, clinical behavior, and outcome of the cases.

In the third stage data were collected from data in the Notifiable Diseases Information System (SINAN) that was obtained from the Workers Care Center of the 17th Health Region of the State of Paraná. Complementary information related to the characterization of the cases of occupational accidents with biological material was identified.

Healthcare workers were categorized according to their training: more highly educated professionals, including physicians, nurses, and other graduated health professionals; technicians, including nursing technicians and aides; and others, including nine occupations, such as pharmacy assistants, community health agents, emergency attendants, and others. Data were analyzed using the Statistical Package Social Science (SPSS), Version 20.0; absolute and relative frequencies were calculated, as well as mean, median, and standard deviation values.

The study was approved in October 2014 by the Human Research Ethics Committee in compliance with protocol 780.787.

● RESULTS

Among the 1,061 occupational accidents with biological material identified between 2010 and 2013, 344 (32.4%) occurred in 2013, followed by 320 (30.2%) in 2011, 297 (28.0%) in 2012, and 100 (9.4%) in 2010. Of these, 877 (82.7%) involved female workers. Their age ranged between 24 and 44 years old, with a mean age of 34 years old, a median of 32 years old, and a standard deviation of 10 years.

Regarding the training of the individuals who were exposed to accidents with biological materials, 616 (58.1%) were technicians, followed by 253 (23.8%) professionals with higher education degrees, 114 (10.7%) general service assistants, and 78 (7.4%) other professionals. In relation to the workplace of the injured workers, 604 (56.9%) worked in hospitals; 138 (13.0%) in Basic Health Units (UBS); 95 (9.0%) in dental clinics; 56 (5.3%) in specialized medical clinics and outpatient clinics; 27 (2.5%) in pharmacies; and 141 (13.3%) in other health services. The predominant organic material was blood, present in 914 (86.1%) cases. The workers were exposed through percutaneous perforation in 936 (88.2%) cases, followed by 109 (10.3%) cases of contact with mucous membranes, and 16 (1.5%) cases of other types.

In relation to causative agents, there was a predominance of lumen needles in 701 (66.1%) cases, followed by 90 (8.5%) cases of needles without lumen, 69 (6.5%) cases of blades/lancets, and 172 (16.2%) other causative agents. In 29 (2.7%) cases the agents were not identified. Regarding the circumstances, disposal of sharps presented the highest frequency, with 232 (21.9%) cases, followed by 220 (20.7%) cases that occurred during medical/dental surgical procedures, 203 (19.1%) resulting from parenteral administration of medication, and 199 (18.8%) from venous and arterial punctures, among other occurrences.

Regarding the use of PPE at the time of the accident, safety gloves only were widely used by the workers, in 662 (62.4%) cases. Facial shields and boots were not used in 973 (91.7%) and 942 (88.8%) occurrences, respectively, as shown in Table 1.

Table 1 - Use of personal protective equipment by healthcare workers at the time of accidents with biological material. Londrina, PR, Brazil, 2014

Personal Protective Equipment	Yes		No		No information	
	N	%	N	%	N	%
Apron	335	31.6	694	65.4	32	3
Boots	83	7.8	942	88.8	36	3.4
Gloves	662	62.4	369	34.8	30	2.8
Mask	184	17.4	846	79.7	31	2.9
Safety glasses	154	14.5	875	82.5	32	3
Face shield	53	5	973	91.7	35	3.3

At the time of the accidents, 956 (90.1%) workers reported being up-to-date on the three-shot scheme for hepatitis B vaccine, 39 (3.7%) reported incomplete knowledge of the scheme, and in 66 (6.2%) cases this information was not available in the records of SINAN.

Among the injured workers, 2 (0.2%) presented serological reactive results for the anti-HIV marker and HbsAg (hepatitis B surface antigen). No anti-HCV (hepatitis C) reactive serology was observed. Only 256 (24.1%) of the workers had been immunized against hepatitis B, identified through positive anti-HBS, as shown in Table 2.

Table 2 – Result of the serology of healthcare workers at the time of occupational accidents with biological material. Londrina, PR, Brazil, 2014

Serology of injured workers	Reactive		Non-reactive		Not performed		No information	
	N	%	N	%	N	%	N	%
Anti-HIV	2	0.2	576	54.3	30	2.8	453	42.7
HbsAg	2	0.2	546	51.5	31	2.9	482	45.4
Anti-HBS	256	24.1	305	28.7	35	3.3	465	43.9
Anti-HCV	-	-	544	51.3	36	3.4	481	45.3

The source patient was known in 825 (77.8%) of the reported accidents. Among these cases, 21 (2%) had reactive serology for the anti-HIV marker, 15 (1.4%) for HbsAg, and 7 for anti-HCV, as shown in Table 3.

Table 3 – Results of the serology of the source patients at the time of occupational accidents with biological material. Londrina, PR, Brazil, 2014

Serology of source patients	Reactive		Non-reactive		Not performed		No information	
	N	%	N	%	N	%	N	%
Anti-HIV	21	2	765	72.1	258	24.3	17	1.6
HbsAg	15	1.4	769	72.5	258	24.3	19	1.8
Anti-HBS	-	-	36	3.4	1008	95	17	1.6
Anti-HCV	7	0.7	773	72.9	264	24.8	17	1.6

The serology of the sources for HbsAg, anti-HIV, and anti-HCV were unknown (inconclusive, not performed, or no information) in 278 (26.2%) cases, and in 1,025 (96.6%) cases for anti-HBS.

In relation to the clinical course after accidents, vaccine against hepatitis B was indicated in 16 (1.5%) cases. Human anti-hepatitis B immunoglobulin was administered to 3 (0.3%) injured workers.

In addition, prophylaxis with antiretroviral drugs was prescribed in 268 (25.3%) cases; in w (0.2%) cases the injured workers refused the medication. In 267 (99.6%) cases, a combination of by AZT+3TC+Kaletra prescribed.

In relation to outcomes, abandonment of treatment after outpatient consultation with specialists was observed in 306 (28.8%) cases; 353 (33.3%) injured workers were discharged from treatment upon confirmation that the patients had no communicable diseases, as shown in Table 4.

Table 4 – Outcomes of cases of occupational accidents with biological material among healthcare workers. Londrina, PR, Brazil, 2014

Outcome	N	%
Abandonment after clinical consultation	306	28.8
Abandonment without clinical consultation	211	19.9
Negative source-patient discharge	353	33.3
Discharge without serological seroconversion	103	9.7
No information	88	8.3

● DISCUSSION

Most of the workers were young and female. This result is similar to other studies of occupational accidents with biological material⁽⁸⁻⁹⁾, as well as to data revealed in a study conducted by the Federal Council of Nursing in partnership with the Oswaldo Cruz Foundation, which presented the profile of nursing in Brazil. Despite the trend toward masculinizing the profession, it was shown that women still represented 84.6% of the professionals in the area⁽¹⁰⁾.

Mid-level professionals, including nursing technicians and aides, presented higher rates of involvement in occupational accidents with biological material. Nursing teams are the groups of professionals with longer permanence in healthcare services. Because of the large number of procedures they perform, they are more vulnerable to exposure to biological materials, and have higher levels of risk of being involved in accidents and acquiring infectious diseases⁽¹¹⁾.

A study conducted in the city of Teresina, Piauí with the participation of 30 health institutions showed that most accidents with biological material occurred among nursing team professionals⁽⁴⁾. Another study conducted in reference services of a city in the state of São Paulo also identified this professional category as the main one involved in cases of accidents with biological material⁽¹²⁾.

In the present study, the hospital environment was the main place of occurrence for work accidents with biological material, which may be related to the fact that it is an environment in which complex activities are carried out and there are higher levels of contact with invasive procedures. Therefore, the adoption of special measures to protect workers is necessary. Biosafety is a way of reducing existing risks, and it is applied through educational and preventive actions aimed at minimizing the occurrence of accidents among these professionals⁽¹³⁾.

Blood was the organic material that presented higher prevalence in the accidents included in the present study; the main cause was the use of lumen needles, through percutaneous exposure. These results are consistent with the literature and may be related to the complexity and high number of invasive procedures conducted in healthcare services⁽¹⁴⁻¹⁵⁾.

Lumen needles represent a major cause of OABM, so health institutions should make them available with safety devices and qualify workers in their proper use and disposal in accordance with National Resolution 32⁽¹⁶⁾. Moreover, adequate continuing education policies are needed regarding organizing work processes; such efforts should, above all, raise awareness of the importance of adopting safe practices⁽¹⁷⁾.

Although the disposal of sharps represented the main situation in the OABM in the present study, this may differ depending on the characteristics of institutions and work processes. Some studies have had similar results^(3,18), while others have found that the incidents occurred during the performance of laboratory, dental, and surgical procedures, followed by parenteral administration of medication, resheathing of needles, venous puncture, and administration of medication^(10,12,19-20).

Therefore, the present study emphasizes the importance of personal protective equipment in the prevention of OABM, and the importance of using such equipment according to the type of activity carried out. Gloves protect workers' skin (intact or not) from exposure to biological material; safety

glasses and masks prevent the contact of the ocular and buccal mucous membranes with organic fluids; face shields are indicated during mechanical cleaning of instruments; aprons provide protection to workers' clothes and skin, and boots cover workers' feet in wet places containing infectious materials⁽²¹⁾.

Despite its relevance, low frequency of use of PPE by injured workers was observed. Research with health professionals has found that the major difficulties in the use of PPE are related to handling materials and performing procedures using some types of PPE, such as gloves. Workers also report that in emergency situations there is no time for proper use of PPE⁽²²⁾.

Additional measures should be adopted by workers to prevent infections by pathogens after OABM, including keeping the vaccine schedule against hepatitis B up-to-date. In the present study, a majority of the workers (90.1%) reported that their vaccination schedules were up-to-date. This is below 95% immunization rate recommended by the Ministry of Health⁽²³⁾.

Despite the unavailability of a vaccine against hepatitis C, this disease should not be ignored. Standard precautions are important in the prevention of viral hepatitis, but the results of anti-HCV serology are needed so that treatment, when necessary, may be initiated as soon as possible⁽²³⁾.

Occupational accidents with biological material affect not only the health of workers, but also the institutions in which they work. In some cases, injured workers need medical leave due to the use of chemoprophylactic drugs and the psychic and emotional repercussions⁽¹⁷⁾. Therefore, follow-up on workers becomes essential, because many abandon treatment after initiation of prophylaxis with antiretroviral drugs due to adverse effects⁽²⁴⁾.

According to a qualitative approach study conducted in a high-complexity hospital in the state of São Paulo, nursing professionals presented feelings of fear, guilt, and despair after accidents, particularly due to the possibility of infection by the viruses of hepatitis B, hepatitis C, and the human immunodeficiency virus⁽⁵⁾. Therefore, in order to prevent abandonment of follow-up care, it is necessary to implement strategies to increase adherence by workers, with an emphasis on critical consciousness and awareness, from the time of the accident until medical discharge, regardless of whether the serology of source-patients is non-reactive.

Limitations of the present study include incomplete completion of SINAN records and the high rate of abandonment of treatment, since these hinder the analysis of the outcomes of OABM.

● CONCLUSION

Occupational accidents with biological material were frequent among workers of productive age and women. Most professionals affected by OABM were nursing technicians and aides, a result that reinforces the importance of investments in preventive actions, since these individuals are directly involved in patient care.

Blood was the main organic material found in the cases, and the main cause of accidents was related to the disposal of sharps in inappropriate places, mostly lumen needles. This situation may be related to low use of personal protective equipment by workers, requiring higher levels of surveillance by health institutions through the implementation of educational actions to make them aware of its importance.

A significant rate of abandonment of treatment by workers that suffered OABM was observed. Therefore, further studies are necessary to understand why individuals abandon treatment after accidents in order to contribute to the adaptation and development of effective strategies to improve therapeutic adherence.

● REFERENCES

1. Brasil. Portal Brasil. Brasil e Alemanha discutem impacto dos acidentes de trabalho. [Internet] Brasília: MTE; 2014 [acesso em 21 abr 2016]. Disponível: <http://www.brasil.gov.br/economia-e-emprego/2014/03/brasil-e-alemanha-discutem-impacto-dos-acidentes-de-trabalho>

2. Giancotti GM, Haeffner R, Solheid NLS, Miranda FMD, Sarquis LMM. Caracterização das vítimas e dos acidentes de trabalho com material biológico atendidas em um hospital público do Paraná, 2012. *Epidemiol. Serv. Saúde*. [Internet] 2014;23(2) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.5123/S1679-49742014000200015>
3. Julio RS, Filardi MBS, Marziale MHP. Work accidents with biological material occurred in municipalities of Minas Gerais. *Rev. bras. enferm.* [Internet] 2014;67(1) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.5935/0034-7167.20140016>
4. Santos SS, da Costa NA, Mascarenhas MDM. Caracterização das exposições ocupacionais a material biológico entre trabalhadores de hospitais no Município de Teresina, Estado do Piauí, Brasil, 2007 a 2011. *Epidemiol. Serv. Saúde*. [Internet] 2013;22(1) [acesso 16 jun 2016]. Disponível: <http://dx.doi.org/10.5123/S1679-49742013000100017>
5. Magagnini MAM, Rocha SA, Ayres JA. O significado do acidente de trabalho com material biológico para os profissionais de enfermagem. *Rev. gauch. enferm.* [Internet] 2011;32(2) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S1983-14472011000200013>
6. de Lima BFR, Waffae MC, de Figueiredo EN, Filipinni R, Luz MCB, Azzalis LA, et al. Infecção ocupacional pelo vírus da hepatite B: riscos e medidas de prevenção. *Rev. bras. crescimento desenvolv. hum.* [Internet] 2013;23(2) [acesso 16 jun 2016]. Disponível: <http://www.revistas.usp.br/jhgd/article/view/61294/64233>
7. Instituto Brasileiro de Geografia e Estatística (IBGE). Cidades@. [Internet] 2010 [acesso em 16 jun 2016]. Disponível: <http://www.cidades.ibge.gov.br/xtras/home.php>
8. Valim MD, Marziale MHP. Avaliação da exposição ocupacional a material biológico em serviços de saúde. *Texto Contexto Enferm.* [Internet] 2011;20(n. esp) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S0104-07072011000500018>
9. Vieira M, Padilha MI, Pinheiro RDC. Analysis of accidents with organic material in health workers. *Rev. Latino-Am. Enfermagem*. [Internet] 2011;15(2) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S0104-11692011000200015>
10. Conselho Federal de Enfermagem (COFEN). Pesquisa inédita traça perfil da enfermagem no Brasil. [Internet] 2015 [acesso em 16 jun 2016]. Disponível: http://www.cofen.gov.br/pesquisa-inedita-traca-perfil-da-enfermagem_31258.html
11. Cavalcante CAA, Cavalcante EFO, Macêdo MLAF, Cavalcante ES, Medeiros SM. Acidentes com material biológico em trabalhadores. *Rev. Rene* [Internet] 2013;14(5) [acesso em 16 jun 2016]. Disponível: <http://www.revistarene.ufc.br/revista/index.php/revista/article/viewFile/1267/pdf>
12. Dias MAC, Machado AA, Santos BMO. Acidentes ocupacionais com exposição a material biológico: retrato de uma realidade. *Medicina (Ribeirão Preto)*. [Internet] 2012;45(1) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.11606/issn.2176-7262.v45i1p12-22>
13. Sousa LPT, da Silva MA. Produção científica da enfermagem sobre acidentes com material biológico. *Estudos, Goiânia* [Internet] 2014;41(n. esp) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.18224/est.v41i0.3809>
14. de Araújo TM, Caetano JA, Barros LV, Lima ACF, da Costa RM, Monteiro VA. Acidentes de trabalho com exposição a material biológico entre os profissionais de Enfermagem. *Rev. Enf. Ref.* [Internet] 2012;serIII(7): [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.12707/RIII1182>
15. Marziale MHP, Rocha FLR, Robazzi MLCC, Cenzi CM, dos Santos HEC, Trovó MEM. Organizational influence on the occurrence of work accidents involving exposure to biological material. *Rev. Latino-Am. Enfermagem* [Internet] 2013;21(n esp) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S0104-11692013000700025>
16. Ministério do Trabalho e Emprego (BR). Portaria n. 1.748, de 30 de agosto de 2011. Norma Regulamentadora 32. Dispõe sobre a Segurança e Saúde no Trabalho em Serviços de Saúde. *Diário Oficial da União*, [Internet] 31 ago 2011 [acesso em 16 jun 2016]. Disponível: http://www.trtsp.jus.br/geral/tribunal2/ORGaos/MTE/Portaria/P1748_11.html
17. Oliveira JS, Nery AA, Morais RLGL, Robazzi MLCC. Acidentes com perfurocortante entre trabalhadores de saúde. *Rev. APS.* [Internet] 2015;18(1) [acesso em 16 jun 2016]. Disponível: <http://aps.ufjf.emnuvens.com.br/aps/article/view/2392>

18. Soares LG, Sarquis LMM, Kirchhof ALC, Felli VLA. Multi-causality in nursing work accidents with biological material. *Rev. bras. enferm.* [Internet] 2013;66(6) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S0034-71672013000600007>
19. de Lima LM, de Oliveira CC, de Rodrigues, KMR. Exposição ocupacional por material biológico no hospital santa casa de pelotas - 2004 a 2008. *Esc. Anna Nery.* [Internet] 2011;15(1) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S1414-81452011000100014>
20. Marziale MHP, dos Santos HEC, Cenzi CM, Rocha FLR, Trovó MEM. Consequências da exposição ocupacional a material biológico entre trabalhadores de um hospital universitário. *Esc. Anna Nery* [Internet] 2014;18(1) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.5935/1414-8145.20140002>
21. Ministério da Saúde (BR). Hospital Federal de Bonsucesso. Comissão de Controle de Infecção Hospitalar. Rotina A2. Equipamento de proteção Individual (EPI) na prevenção do risco biológico e químico na área da saúde. Rio de Janeiro; 2010 [acesso em 16 jun 2016]. Disponível: <http://www.hgb.rj.saude.gov.br/ccih/pag1.asp>
22. Rondon EC, Tavares MS, dos Santos WL. Fatores dificultadores e facilitadores que os profissionais de enfermagem enfrentam relacionados ao uso de EPI's. *Revista Gestão & Saúde.* [Internet] 2012;3(3) [acesso em 16 jun 2016]. Disponível: <http://gestaoesaude.unb.br/index.php/gestaoesaude/article/view/213>
23. Jardim EMA, Carvalho PAM, da Silva RP, de Souza, AC. Vacinação contra hepatite e resposta vacinal em trabalhadores da área da saúde envolvidos em acidentes com material biológico. *Acta de Ciências e Saúde* [Internet] 2013;2(2) [acesso em 16 jun 2016]. Disponível: <http://www.ls.edu.br/actacs/index.php/ACTA/article/view/58/64>
24. Pimenta FR, Pimenta FR, Ferreira MD, Gir E, Hayashida M, Canini SRMS. Care and specialized clinical follow-up of nursing professionals who have been victims of accidents with biological material. *Rev. Esc. Enferm. USP* [Internet] 2013;47(1) [acesso em 16 jun 2016]. Disponível: <http://dx.doi.org/10.1590/S0080-62342013000100025>