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Underreporting of work accidents associated with blood-borne risk factors

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Abstract

Background: *Work accidents (WA) due to percutaneous or mucocutaneous injury are frequent among health professionals. Accident notification ensures compliance with legal requirements, enabling health institutions to develop, implement and evaluate prevention strategies. This study aimed to estimate the proportion of underreporting of work accidents caused by percutaneous and mucocutaneous lesions in a hospital setting and its determinants.* **Methods:** *A self-administered questionnaire was made available to all hospital employees. The multivariate logistic regression models computed age, gender, professional category, and type of service adjusted odds ratios (OR) and 95% confidence intervals (95% CI).* **Results:** *Underreporting of WA associated with biological risk factors was high, particularly in accidents by mucocutaneous injury (80.9%). Physicians were the professional category that least reported this type of work accident (OR=4.64; 95% CI 2.20-9.78). The main determinants of underreporting were underestimating the risk of transmission and the excessive bureaucracy.* **Conclusions:** *The underreporting of work accidents associated with biological risk factors was considerable, and it contributes to a high degree of uncertainty on accidents' characterization.*

1. Introduction

Work accidents (WA) due to percutaneous or mucocutaneous injury are frequent among health professionals. The American Federation of State, Country and Municipal Employees estimate that between 600,000 and 800,000 WA by percutaneous lesions may occur annually [1]. The reduction in the risk of transmission of biological agents following a work accident represents one of the biggest challenges faced by occupational health services.

The notification of WA with risk of exposure to pathogenic biological agents ensures compliance with legal requirements and enables health institutions' preparation, implementation, and evaluation of prevention strategies [2]. On the other hand, the professionals who do not notify working accidents associated with biological risk factors have a higher risk of occupational transmission infections of biological agents if the follow-up and clinical treatment are not implemented in the required time [3, 4]. This risk's true magnitude is unknown due to the general underreporting of occupational exposures in health institutions, varying between 29% and 98% [5]. According to Elder et al. [6], the degree of underreporting of these WA scans might be ten times higher than WA

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notifications. Other studies also suggest the underreporting of WA with exposure to biological agents among health professionals [6-8, 10, 12].

Several causes have been associated with underreporting, including: (i) the excess bureaucracy in the notification process [17], (ii) the underestimation of the risk of transmission of infectious diseases following WA [5, 11], and (iii) the lack of knowledge about the legal implications of the notification [14].

Underreporting WA with biological risk limits the estimation, and hence the comparison, of WA incidence among different health professionals [15]. Moreover, this attitude leaves them legally unprotected since it does not allow proper clinical treatment and counselling, endangering their health and family. At the same time, undocumented occupational exposure is a limiting factor for prevention [14] since it doesn't allow the outline of appropriate interventions needed to avoid similar incidences in the future [16]. It may also reduce the motivation of employers to purchase equipment with safety mechanisms and in the implementation of safer work practices for health professionals [4].

The present study aimed to estimate the proportion of underreporting work accidents caused by percutaneous and mucocutaneous lesions and their determinants in a hospital institution during the last five years.

Methods

This observational and cross-sectional study was based on employees working in a hospital setting. The Ethics Committee approved the study of São João Hospital/University of Porto Medical School, and the anonymity of all participants was ensured. The Ethics Committee of the mentioned institution didn't require informed consent once the information was provided anonymously, making it impossible to identify any participant.

The gathering of information regarding the underreporting of WA associated with biological risk factors was carried out by applying a structured questionnaire developed by the authors and self-administered. This questionnaire consisted of ten questions, including socio-demographic variables, the number of WAs that possibly exposed to biological risk factors (both reported and not), WA characterization, the task that the professional was performing at the time of the WA, the time elapsed since the last WA, prophylaxis after potential occupational exposure to biological agents, the WA's causes and the reasons causing the non-reporting. A pilot test was applied to 12 professionals integrated into different professional categories to adjust the questions to ensure their clarity and relevance concerning the proposed objectives. The questionnaires were made available to all the health institution professionals and employees of external companies that provide services.

Between April and November 2014, the questionnaires were made available to all hospital professionals and respective service providers in two distinct formats: paper support and computer support. The distribution regarding the professionals of the institution under study was performed through the health institution's internal internet network, Google Drive and delivered, in paper format, at the services and at the time of consultation at the Occupational Health Service. The WA underreporting questionnaires were also identified with a code number. A database was created using Microsoft Excel software for each questionnaire, where all the information was recorded. All questionnaires were filled out.

The Odds Ratio (OR) for the main determinants of the underreporting of WA were calculated using a logistic regression model adjusted for gender, age, professional category, and workplace. The statistical analysis was carried out using statistical software - Stata version 12.0, adopting the statistical significance level of 5%, assuming a significant difference for the value of "p" inferior to 0.05.

Results

We analyzed 2526 questionnaires about the underreporting of WA associated with biological risk factors in the health institution under study (a response rate of 45.8%). The response limitation rate may be related to the professionals' lack of availability and time to answer the questionnaire. However, the sample obtained was representative of the population of hospital workers.

Of the 2526 professionals surveyed, 1890 were females and 636 males. They mainly were nurses (1064), physicians (526), and operational assistants (421) integrated either into the surgery services (919) or Internal Medicine (613). The age distribution was subdivided into four age groups: 20 to 29 years old, 30 to 39, 40 to 49, and over 50 years. The mean age was 40.1 years ± 9.9 years; 26.0% of them mentioned having suffered at least one WA with risk of exposure to biological agents in the last five years, 16.6% caused by percutaneous lesions and 16.3% due to mucocutaneous lesions.

The mucocutaneous lesion underreporting due to WA was higher (80.9%) than percutaneous lesions (45.0%). Table 1 summarizes the WA's logistic regression model and adjusted ORs with biological risk underreporting. The factors that had a statistically significant association with underreporting of this type of WA were: male gender (OR=1.6; 95% CI 1.03-2.50), age between 40 and 49 years (OR=2.31; 95% CI 1.29-4.15), the professional category of physicians (OR=4.64; 95% CI 2.20-9.78) and professionals in the surgical department (OR=1.59; 95% CI 1.01-2.49). These determinants did not change when considering whether the WA occurred by a percutaneous lesion or an individual's mucocutaneous injury. There was a lower risk of underreporting of WA with biological risk in the Emergency Service and Intensive Care Unit (OR=0.22; 95% CI 0.06-0.75).

Table 1. Association between individual and professional characteristics and the underreporting of WA (odds ratio, OR, and respective 95% confidence interval, CI).

Variable	Biological WA	WA by percutaneous injury	WA by mucocutaneous injury
Gender			
Female	1	1	1
Male	1.60 (1.03-2.50)	2.24 (1.20-4.16)	1.71 (0.84-3.47)
Age group			
20-29 years old	1	1	1
30-39 years old	1.75 (1.03-2.96)	1.36 (0.65-2.85)	1.12 (0.46-2.72)
40-49 years old	2.31 (1.29-4.15)	2.54 (1.15-5.60)	1.44 (0.54-3.84)
≥ 50 years old	1.86 (0.96-3.60)	2.13 (0.90-5.05)	2.35 (0.64-8.61)
Professional category			
OA	1	1	1
Nurs.	1.85 (0.92-3.71)	0.99 (0.38-2.62)	3.86 (1.10-13.45)
Phys.	4.64 (2.20-9.78)	4.49 (1.68-12.00)	5.26 (1.41-19.60)
DTT	3.48 (0.94-12.86)	1.22 (0.13-11.72)	5.28 (0.63-44.00)
Other	2.58 (0.39-16.85)	1.52 (0.10-22.76)	----*
SP	0.61 (0.17-2.20)	1.13 (0.26-4.82)	----*
Service			
Internal Medicine	1	1	1
Surgery	1.59 (1.01-2.49)	2.21 (1.15-4.23)	1.44 (0.66-3.13)
Urgency e ICU	0.42 (0.23-0.76)	0.22 (0.06-0.75)	0.26 (0.11-0.60)
Pediatrics	3.01 (0.91-9.94)	7.93 (1.29-48.78)	1.85 (0.36-9.59)
Laboratory	1.19 (0.41-3.41)	1.17 (0.24-5.57)	1.24 (0.20-7.76)
Other clinic services	0.99 (0.41-3.41)	1.45 (0.24-8.74)	0.91 (0.09-9.31)
Service provider company	----*	----*	----*

** It was not possible to estimate due to the sample size; OR - odds ratio. The adjusted OR for all variables in the table (multivariate logistic regression); CI - confidence interval; UCI - intensive or intermediate care unit; OA - operational assistants; Nurs. - nurses; Phys. - physicians; DTT - diagnostic and therapeutic technicians; SP - service providers.*

When analyzing the major reason concerning the underreporting of WA associated with biological risk factors, most respondents mentioned that the risk of transmission of pathogenic biological agents through occupational exposure to blood or other body fluids is too low or even null (60.5%).

The bureaucracy intrinsic in the process of WA participation in the institution (29.1%) was considered the second reason associated with the underreporting of WA (Table 2).

Discussion

During the period under review, more than 25% of the health professionals of the hospital institution under study were occupationally exposed to biological risk factors through touch with sharp or perforating devices or the contact of mucous membranes with blood or other body fluids. The prevalence of WA underreporting was 61.3%, higher in WA due to mucocutaneous injury (80.9%) than percutaneous injury (45.0%). The risk of underreporting varied considerably according to some factors, specifically gender, professional category, and service.

In the present study, the fact that WA underreporting was so common among physicians, also noted by Doebbeling et al. [9] and Kennedy et al. [17], may be related to the fact that these professionals can carry out their clinical evaluation, once that they have more knowledge about the procedures that should be taken after occupational exposure to biological agents [18] and prefer self-medication [19].

Some factors inherent to the circumstances in which WA occur, especially in surgical wards, may also contribute to the absence of reports regarding these occurrences. For example, in the cases of surgeons pressured to complete surgical intervention, it is not functional nor practical to find another professional who can replace them on time [20]. The percutaneous injuries often occur in the pediatric service once the children are less collaborative, with major psychomotor agitation. On the other hand, it becomes more challenging to perform the invasive procedure.

In the study conducted by Efstathiou et al. [20], nursing professionals stated that the high workload is one of the reasons for not notifying these WA. The lack of time has also been indicated as a major factor in underreporting [21].

Most respondents mentioned that the main reason for underreporting accidents at work was that the risk of infectious disease after occupational exposure to biological agents is too low or even null in certain situations. These results are identical to those found in other studies [4, 22, 23]. Individual risk analyses may underestimate the real risk: health professionals may minimize the risk of infectious diseases in the source patients, many of whom are unaware of their serological status, such as HIV, HBV and HCV. Considering that the prevalence of HIV, HBV and HCV infection is distinct in different countries and even in different country's regions and varies with the type of population treated in each health institution. Even that patients can be admitted for reasons other than those related to these agents, it is plausible that professionals make an incorrect analysis and judgment, underestimating the infectious risk of patients [4]. Underreporting may also be explained by false infectious low-risk perception, particularly when it is based on less objective data such as the amount of blood or other body fluids involved in exposure and certain individual characteristics of the patient, such as advanced age or self-reports of patient life habits.

The bureaucracy existent in the process of the participation of a WA in the health institution was

Table 2. Reasons associated with underreporting of WA.

Reasons	Biological WA n (%)	Percutaneous injury n (%)	Mucocutaneous injury n (%)
Bureaucracy	87 (29.1)	60 (40.5)	75 (29.4)
Lack of information	16 (5.3)	9 (6.1)	11 (4.3)
Transmission risk thought to be low	181 (60.5)	73 (49.3)	156 (61.2)
Own option	6 (2.0)	2 (1.3)	4 (1.6)
Other	9 (3.0)	4 (2.7)	9 (3.5)

indicated as the second main reason associated with the lack of notification. The dissatisfaction of professionals with the bureaucracy of the participation process, the time-lengthy care and the need to travel to various departments and to the insurance company, were pointed out as being demotivating factors for the notification of WA. These results corroborate those found by Benatti [13] and Au et al. [21].

The lack of knowledge about the need and obligation to report these situations, as well as the lack of knowledge about the ways to report them were the third cause associated with the underreporting of these accidents. These results are similar to those found by Napoleão et al. [14].

There may be other causes of the underreporting described in the literature, but not reported by respondents in the present study, including the lack of awareness by hospital unit managers concerning the risk of exposure to biological agents, the fear associated with the possibility of job loss by the health professional, the culpability they feel, at times, in relation to WA, the lack of organization of the service that provides the care and follow-up of the professional, the limited time for the participation of the WA and the desire to hide the true incidence of WA.

Conclusions

The present study showed a high level of underreporting of WA with biological risk in health professionals, especially when associated with WA by mucocutaneous injury. Male health professionals, physicians and those who perform their activity in surgical services were the ones who underreported WA the most. The underestimation of infectious risk after exposure to biological agents, the bureaucracy associated with the notification process and the lack of knowledge about the need and usefulness of TA participation were the main causes for underreporting. Any preventive measures to be put in place to reduce the underreporting of WA associated with biological risk should be put in place considering these factors to be able to manage them.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of São João Hospital/University of Porto Medical School (date of approval 17/10/2013), and the anonymity of all participants was ensured. All participants provided verbal informed consent.

Declaration of Interest: The authors declare no conflict of interest.

References

1. American Federation of State Country and Municipal Employees. Needle points: an AFSCME guide to sharps safety. 2002 (16 Feb 2015); Available from: http://www.afscme.org/news/publications/workplace-health-and-safety/needle-points-an-afscme-guide-to-sharps-safety.
2. Marziale MHP. Subnotificação de acidentes com perfurocortantes na enfermagem. *Rev bras enferm* (online). 2003;56(2):164-8.
3. Zaidi MA, Griffiths R, Beshyah SA, Myers J. Blood and body fluid exposure related knowledge, attitude and practices of hospital-based health care providers in United Arab Emirates. *Saf Health Work*. 2012 Sep;3(3):209-15.
4. Facchin LT. Prevalência de subnotificação de acidentes com material biológico pela equipa de enfermagem de um hospital de urgência. São Paulo: Universidade de São Paulo; 2009.
5. American Nurses Association. Needlestick and Sharps Injuries. 2012 (18 Aug 2014); Available from: http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/SafeNeedles/NeedlestickPrevention.pdf.
6. Elder A, Paterson C. Sharps injuries in UK health care: a review of injury rates, viral transmission and potential efficacy of safety devices. *Occup Med* (Lond). 2006 Dec;56(8):566-74.
7. Bilski B, Kostiukow A, Ptak D. (Risk blood-borne infections in health care workers). *Med Pr*. 2006;57(4):375-9.
8. Brusaferro S, Calligaris L, Farneti F et al. Educational programmes and sharps injuries in health care workers. *Occup Med* (Lond). 2009 Oct;59(7):512-4.
9. Doebbeling BN, Vaughn TE, McCoy KD, et al. Percutaneous injury, blood exposure, and adherence to standard precautions: are hospital-based health care providers still at risk? *Clin Infect Dis*. 2003 Oct 15;37(8):1006-13.
10. Leone A, Magrini A, Pietroiusti A, Vinci F. (Role of the occupational health physician in the evaluation of biological risk and cancer in a hospital setting). *G Ital Med Lav Ergon*. 2007 Jul-Sep;29(3 Suppl):843-4.
11. Faria A. Caracterização e Análise dos Acidentes de Trabalho com Profissionais de Enfermagem numa Unidade Hospitalar: University of Minho; 2008.
12. Cubillos AF, Jemenao I, Ruiz G, et al. Biological risk accidents among undergraduate healthcare students. Five

years experience. *Rev Chil Infect*. 2010;27(1):34-9.
13. Benatti MCC. Acidentes do trabalho entre trabalhadores de enfermagem de um hospital universitário. *Rev esc enferm USP* (online). 2001;35(2):155-62.
14. Napoleão AA, Robazzi ML, Marziale MHP, Hayashida M. Causas de subnotificação de acidentes de trabalho entre trabalhadores de enfermagem. *Revista Latino-Americana de Enfermagem*. 2000;8(3).
15. Falagas ME, Karydis I, Kostogiannou I. Percutaneous exposure incidents of the health care personnel in a newly founded tertiary hospital: a prospective study. *PLoS One*. 2007 Feb 7;2(2):e194.
16. Efstathiou G, Papastavrou E, Raftopoulos V, Merkouris A. Prevalence of Occupational Exposure to Pathogens and Reporting Behaviour among Cypriot Nurses. *International Journal of Caring Sciences*. 2013;6(3):420-30.
17. Kennedy R, Kelly S, Gonsalves S, Mc Cann PA. Barriers to the reporting and management of needlestick injuries among surgeons. *Ir J Med Sci*. 2009 Sep;178(3):297-9.
18. Elmiyeh B, Whitaker IS, James MJ, Chahal CA, Galea A, Alshafi K. Needle-stick injuries in the National Health Service: a culture of silence. *J R Soc Med*. 2004 Jul;97(7):326-7.
19. Mbaisi EM, Ng'ang'a Z, Wanzala P, Omolo J. Prevalence and factors associated with percutaneous injuries and splash exposures among health-care workers in a provincial hospital, Kenya, 2010. *Pan Afr Med J*. 2013;14:10.
20. Ekwobi CC. Under-reporting of needlestick injuries is a universal problem. Rapid Response to: Most US surgeons in training get needlestick injuries, few report them. *BMJ*. 2007;335(10).
21. Au E, Gossage JA, Bailey SR. The reporting of needlestick injuries sustained in theatre by surgeons: are we under-reporting? *J Hosp Infect*. 2008 Sep;70(1):66-70.
22. Lee LK, Hassim IN. Implication of the prevalence of needlestick injuries in a general hospital in Malaysia and its risk in clinical practice. *Environ Health Prev Med*. 2005 Jan;10(1):33-41.
23. Valim MD, Marziale MHP, Hayashida M, Richart-Martínez M. Occurrence of occupational accidents involving potentially contaminated biological material among nurses. *Acta Paul Enferm*. 2014;27(3):280-6.