EPIDEMIOLOGICAL ASPECTS OF BLOOD EXPOSURE ACCIDENTS WITH THE HEALTHCARE WORKERS STAFF OF A PERIPHERAL HOSPITAL IN BENIN

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Abstract

Aim: To assess the level of Blood Exposure Accidents (BEA) and suggest preventive measures to the health workers.

Methods: It was one descriptive and cross-sectional study carried out in the hospital's technical services from May to July 2014. Both the medical and paramedical staff had filled an anonymous questionnaire related to their socio-demographic profile, their history of BEA and their knowledge thereof.

Results: Out of the 121 workers who took part in the study, 42(34.7%) were nurses, 40 (33.1%) auxiliary nurses, 14 (11.6%) laboratory technicians and 8 (6, 6%) were physicians. The sex ratio of the population is 1.28%.The worker's immunization coverage against hepatitis B is 43.8%. 14.9% cases were reported BEA. The needle sticks injuries were the most frequent accidents (72.2%). Nurses, auxiliary nurses and laboratory technicians were the most affected respectively 33.3%, 27.8% and 16.7% cases. 61.1% of cases had their wounds disinfected immediately, but only 5.5% declared their injury. The main reason being the lack of knowledge of the declaration procedure (70.6%). Universal safety measures are not sufficiently known by the agents.

Conclusion: Healthcare workers are exposed to a higher risk of BEA and most of the injuries are not declared. Sensitization must be carried on the respect of universal safety measures.

Key words: Blood Exposure Accidents –Healthcare workers- HIV- HBV- Benin

Introduction

The Blood Exposure Accidents (BEA) appears nowadays to be a major risk of contamination of the health staff by several pathogens [1, 2]. The health care workers when with the patients forget about their vulnerability and sometimes impose themselves working and living conditions completely contrary to what they can advise their patients. They are, taking into account their expertise and experiences, mistakenly considered as people capable to assure their own protection efficiently. Nevertheless, this staff is exposed to various occupational hazards among which the biologic risks resulting from the blood exposure accidents catching the HIV, the HBV or the HCV [3]. This incidence decreasing in the developed countries is still not well documented in Africa. That is preoccupying insofar as the injuries by pricks of needles are considered as one of the most serious risks in the domain of health. In Benin the frequency of the BEAs and the prevalence of the pathogens such as the viruses of the hepatitis and the Human Immuno-deficiency Vitus (HIV) are not very well documented. In a context of outbreak of the Ebola and Lassa viruses epidemic in West Africa, the health care workers confronted during their practices with the biological risks seriously lack training and good information about the prevention of the BEAs. The interest of this topic arises from the fact that cases of BEAs constitute one of the most preoccupying occupational health and safety issues among the health care workers and not really documented especially in the peripheral hospital centres such as the Departmental Hospital Centre (DHC). The goal of this study is to value the level of risk of Blood Exposure Accidents for the health care staff in the very hospital centre.

1. Study Framework and method

The survey has taken place in a Departmental Hospital Centre (DHC) at the Southeast of Benin. It was an intermediate level hospital in the sanitary pyramid of Benin. With a hospital capacity of one hundred and twenty (120) beds and with a staff of 203 workers in 2014, it was the reference hospital for the patients transferred from the zone hospitals and from the other health care centres in this department and from the neighboring country of Togo. It was a transversal descriptive survey having taken place in the period from May 2 to July 31, 2014.

Our survey included the workers on duty in a technical service exposed to the hazard of BEAs and on duty in the DHC during the period of investigation. They were selected by convenience after a non-probabilistic sampling. In total 121 workers out of the 142 workers in the medico-technical service accepted to answer to all our questions, corresponding to a participation rate of 85.2%. The data were collected with a questionnaire and also through observation of the working conditions. The questionnaire included: the socio - demographic data, the antecedents, the data on the achieved activities, the data on the BEAs (circumstances of occurrence, the actions taken etc.) data on the knowledge of the general principles of prevention and universal precaution. The retained BEAs definition was the accidental exposure to blood or to a contaminated biological liquid, at the time of a cut or a prick or a projection on mucous membranes or on an injured skin [4.5].

The collected data were codified, treated and analyzed with the SPSS 17.0 software. The obtained results were compiled in tables of simple frequency. The Excel software was used to make the diagrams. We tried in a first time to do a descriptive analysis by calculation of proportion, then by comparison of the qualitative variables with the Pearson's Khi square test. The threshold of significance chosen was 5%.

2. Results

The general characteristics of the population of study are represented in table 1.

Table 1: Social and occupational characteristics of the investigated

Variables		Number n = 121	%
Age (years)			
	18 to 29	15	12.4
	30 to 44	76	62.8
	≥45	30	24.8
Sex			
	Male	68	56.2
	Female	53	43.8
Professional qualification			
Medical occupation			
	General praticers	5	4.1
	Surgeon	3	2.5
Occupations para medical			
	Nurses	42	34.7
	Midwives	5	4.1
	Laboratory technicians	14	11.6
	Anaesthetists	3	2 .5
	Biologists	5	4.1
	Nurse's aides	40	33.1
	Cleaning operatives	1	0.8
Others *		3	2.5
Seniority (years)			
	0-5	19	15.7
	6-11	37	30.6
	≥12	65	53.7
Vaccinal status against the hepatitis B			
	Inoculated	53	43.8
	Current vaccination	14	11.6
	Not inoculated	54	44.6

*(Dentist, ophthalmologist)

62.8% of the sample was between 30 and 44 years of age. 53.7% of the workers have a seniority of more than 12 years. The sex - ratio M/W is 1.28 in favor of the men. The male nurses and the caregivers are the more represented with respectively 34.7% and 33.1%. Only 43.8% of the workers were vaccinated against the B hepatitis.

2.2. The prevalence of the BEAs

The overall prevalence of the BEAs with the investigated workers is 14.9%. The epidemiological profile of the victim workers is presented in table 2:

Table 2: Epidemiological profile of BEA victims

Parameters		BEAs		p-value
		Yes	No	
Age (year)	[18 - 29]	3	12	0.647
	] 29 -44]	12	74	
	>44	13	27	
Sex	Male	13	55	0.149
	Female	5	48	
Services	Emmergency	2	7	0.120
	Intensive care	1	4	
	Internal medicine	2	11	
	Surgery	10	23	
	Laboratory	3	16	
Seniority (years)	0-5	7	12	0.014
	6-11	5	32	
	≥12	6	59	

72.2% of the victims of the hospital are males. The most affected services are the services of surgery (55.5%) and the laboratory (16.7%). Les workers of less than 05 years of seniority have a higher frequency of accident than the senior workers (38.9%), p = 0.014.

According to the professional qualifications,the nurses and nurse ‘aid professions are the most exposed ones in respective proportions of 33.3% and 27.8%.

Table 3: The circumstances of BEAs occurrence and the actions taken

Caracteristics	Number (n=18)	%
Circumstances of BEA occurring		
Sampling of blood	4	22.2
Put again the cork of the needle	1	5.6
Handling of soiled materials	4	22.2
Inhalation	1	5.6
Surgery	8	44.4
Declaration of BEA		
Yes	1	5.6
No	17	94.4
Reasons of not declaration	**n=17**	
Complicated procedure	3	17.6
I didn’t knew how to do that	12	70.6
I felt in fault	1	5.9
Others	1	5.9
Specific treatmentafter exposure n=18		
Yes	1	5.6
No	17	94.4

Most BEAs occurred at the time of sutures (33.2%), blood sampling and handling of dirty material (22.2%) each. These accidents are declared only in 5.6% of cases. The main reasons for the non-declaration are the lack of information on the procedure of declaration of occupational accidents (70.6%). Only one worker victim of The BEA benefitted from specific post-exposure treatment after assessment of risks.

Besides, we noted that: 61.1% of the BEAs victims fold or disadapt the needles before their elimination, only 43.8% of the workers is vaccinated against the B hepatitis

The workers' level of knowledge is presented as follows in table N°4:

Table 4: Distribution of the investigated according to their knowledge on the BEA

Categories	Definition of BEA						Total
	Good answer		Good enough answer		Bad answer		
	n= 55	(45.5%)	n= 29	(24%)	n= 37	(30.5%)	121
Medical professionals	6	75%	2	25%	0	00%	8
Ancillary medicals	47	42.7%	27	24.5%	36	32.8%	110
Others	2	66.7%	0	00%	1	33.3%	3

Among the 121 workers involved in this survey, 45.5% have good knowledge on the BEAs. Only 42.7% of the para-medical professionals have good knowledge of the BEAs only against 75% for the medical professionals.

2.3. Practicable measures taken at the time of occurrence of the BEAs

Most victim workers don't have good control of the convenient conduct to be adopted after a BEA. The most ordinary first cares consist in cleaning of the lesion with water and soap (66.7%) then in decontamination (61.1%).The HIV, B Hepatitis and C Hepatitis serology of the source patients are known respectively in 22.2; 16.7 and 11.1% of cases.

The main principles of prevention and universal precautions by the hospital workers are represented in table 5.

2.4. About universal precautions

Table 5: Rate of compliance with the universal precautions

Universal precautions	Yes	No	Total	Rate of best practices (%)
Wash of hands before and after every care	91*	30	121	75.2
Bearing of mask during acts / interventions	22*	99	121	18.2
Bearing gloves adapted to the realized task	114*	7	121	94.2
Attention during the manipulation of potentially contaminated blunt instruments	119*	2	121	98.3
Put again the cork of the needle or fold the needle	77	44*	121	36.4
Mismatch by moment of needles	96	25*	121	20.7
Use of the boxes of safety to eliminate the cutting or prickly objects	118*	3	121	97.5
Immediate decontamination of the soiled instruments	97*	24	121	80.2
Protection of wounds by a bandage to the service(department)	114*	7	121	94.2
Bearing of apron and glasses during acts has risk of splash	18*	103	121	14.9

*= Size of the recommended practices

The analysis of this table helps us to note that the protection masks are worn by 18.2% of the workers at the time of actions with risk of splash, the aprons and googles are used only in 14.9% of cases.

The bad practices like the recapping or folding of needles, their disadaptation after use were noted at 63.6% and 79.3% of all the investigated workers.

3. Discussion

3.1. Socio-professional characteristics

The population of survey concentrates in the following services: Surgery (27.2%), laboratory (15.7%) and maternity wards (12.4%).

The male nurses and the caregivers are the most important categories of this group with respectively 34.7% and 33.1%. This result is close to those by Ehui H, Asseray N, [6, 7] who also found a preponderance of these two categories.

3.2. Prevalence of the BEAs with the health workers

The prevalence of the BEAs in the survey is 14.9%. This result is close to the one obtained by Tarantola A (13.4%) [8]; but weaker than the one by Zannou., in 2006 in Cotonou (39.7%) [9]. in the same way Asseray, Salif in 2000 found higher prevalence with respectively 47.2 and 44.6% [7, 10]. A survey conducted by Cambon-Lalanne C in 2011 with physicians of the Parisian region helps to make a clear difference of prevalence between the data of a survey taking into account the whole professional life of the workers (33%) and the one limited to the last year preceding the survey (8.2%) among the same workers [11]. Thence creating the possibility of slant of information related to oblivion of details with passage of time. That is what explains the choice of the last twelve months in the present survey.

- **Services of the victims**

The most affected services this series are the services of surgery 55.5% and the laboratory 16.7%. On the other hand, Toure F and Asseray found as most affected services the services of stomatology, the pediatrics and the surgery for the first position, and the intensive care unit, the medicine and surgery unit for the last [1]. We can then deduct that the risks of BEAs are not specific to a particular type of service.

- **Ages of the victims**

We noted that 66.6% of the victims were aged between 30 and 44 years. They constitute a young population, therefore the active class. That can be explained by the fact that the young workers without considerable work experiences and especially not well-trained on the risks expose themselves more often to the hazards. Gounongbé had made the same report in 2013 in the North of Benin with an average of age of 35 years [12]. On the other hand, Ndiaye M, in 2011 found in Senegal a population aged between 21 and 35 years. [13].

- **Sex of the victims**

This population is predominantly male with 72.2% of men against 27.8% of women for a sex-ratio of 1.28. In this department men are more numerous than women in the sector. Besides they are the most numerous to answer to our questionnaires.

This result is close to the one by Fanou P in 2003 who found 66.2% of men against 33,8% of women [14], close to those of Kara-Peketia K, in Togo in 2011(65.7%) and close to Sow S., who also noted that this male predominance [14, 15]. On the other hand, Eholié, in 2002 and Gounongbé in Benin in 2013 noted a female predominance with W/M ratios of 1.5 and 1.6 each [16, 12].

- **The socio-professional category of the victims**

The male nurses and the caregivers are the most affected categories with respectively 33.3% and 27.8%. This result is close to those obtained by Kossouoh F, Ehui E, Asseray N who also found a preponderance of these two categories [5, 6, 7]. Zannou, also significantly noted in 2003 a predominance of male nurses [9].

That can be understood insofar as we know that these two categories are the most represented ones in this department and that the national sanitary system relies on them to lead the sector. This report poses the problem of delegation of tasks for caregivers, cares for which they don't have any good qualification [12].

- **Professional seniority of the victims**

Workers with less than 5 years of seniority have a higher frequency (38.9%) of accident than the seniors: $p = 0.014$. That would be due to ignorance of the hazard, and then explains the importance of training on this hazard before recruitment. This observation is similar to those made by Toure F B in 2008 and Asseray N who noted respectively that 64% and 63% of the workers have less than 5 years of professional seniority [7]. It is contrary to the one made by Gounongbé, who found 67.3% with more than 5 years of seniority [12]. Zannou D.M, affirmed in a survey conducted in 2006 that the seniority in service has significantly been associated to the antecedents of BEAs [9].

- **The investigated people's knowledge on the BEAs and on the universal precautions**

45.5% of the investigated persons have a good knowledge on the BEAs. This rate is widely lower than the one obtained by Assaray N, [7] who found 82% and 84.88% of good answers respectively, but superior to the one by Breton I [17] who estimated that only 15.7% of the

staff has good knowledge on the BEAs. This result is understandable because in this hospital no training has been organized for the workers on the BEAs, at least for more than one year. The qualified workers who were able to give good definition said they got this knowledge during the training session on the handling of the HIV organized within various projects.

As for the universal precaution knowledge, we noted that the workers respected better some methods than others. The following precautions were observed in the proportions thereafter: Wearing of mask during the acts or interventions (18.2%), recapping or folding of dirty needles (63.6%), occasional disadaptation of needles (79.3%), wearing of apron and googles during the acts with risk of splash (14.87%). Some other measures were observed in more acceptable proportions, they included the washing of the hands before and after every care (75.2%), wearing of gloves adapted for the task (94.2%), attention during the handling of blunt instruments potentially contaminated (98.3%), use of safety boxes to eliminate the cutting or pungent objects (97.5%), immediate decontamination of dirty instruments (80.2%), protection of the wounds by a bandaging at the office (94.2%).

Asseray N in a survey noted that the overall average of good knowledge on the blood exposure accidents and the universal precautions with the nursing staff is 86% [7]. For Varun, the failure of the universal precautions is the fundamental cause of most BEAs [18].

According to Tarantola the compliance with the universal precautions among which the immediate elimination of the pungent and cutting objects in appropriate containers, the non-recapping of dirty needles would have permitted to avoid the BEAs declared in 44.5% of cases [19]. For Abiteboul on the one hand and Bouvet on the other hand, the respect of these precautions could help to avoid the BEAs in 57% [20] on the one hand and 59% [21] on the other hand.

All the victims in our survey applied the first cares which consisted in washing, rinsing then decontaminating the lesion. But is that sufficient to prevent possible contaminations efficiently?

Besides, the declaration rate of our victim population is 5.6%. This low rate is related to the lack of control of the circuit of declaration of the BEAs (70.6%). This declaration rate is close to the 6.2% found by Zannou, in Cotonou in 2003 [9]. It is mower than the 20.8% found by Ndiaye in Senegal [13]. Rabeau in a survey conducted at UHC of Nancy noted that the

victims of BEAs apply the first cares, but they also noted a lack of declaration of the cases [22]. This lack of declaration is constant in several studies [4, 23, 24].

Besides, it is necessary to note that during the investigation the staff signaled an insufficiency in individual protection facilities such as blouses, disposable and household gloves, boots, bibs, and googles and in maintenance products.

This hospital's workers low knowledge on the BEAs and the non- respect of the precautions by them remains a great concern insofar as we observe in the West African sub-region an outbreak of the Ebola virus epidemic against which good knowledge of those notions stands for the key of success. That is all the more preoccupying that this hospital, showcase of the department, is part of the six (6) departmental hospitals that Benin has. It shows the vulnerability of the country facing the danger of the Ebola virus disease which is now threatening Benin.

3.3. Vicinal status against the hepatitis B

Only 43.8% of the workers are vaccinated against the B hepatitis. This is close to the 44.6% obtained by Zannou [9].

Conclusion

The nursing staff of the survey has high risk of accidental exposure to the viruses transmitted by blood, in spite of a good enough knowledge of the prevention measures. The nonobservance of the general principles of prevention is responsible for most of these accidents. The initial and continuous training sessions for the health care workers and the information given to the health care professionals of this hospital remain insufficient. The heaviness of the procedure hinders the declaration of the BEAs by the staff.

It would then be necessary to focus information on the respect of the recommendations, the identification of an especially simplified circuit of declaration, the importance of the systematic follow-up of the viral serology, the interest of the prophylactic antiviral treatment and the respect of the standard precautions in the context of riposte to the Ebola fever epidemic.

Conflict of interest: The authors declare not to have any conflict of interest

Ethical consideration: We got a written agreement from the direction of the hospital. In the same way, the concerned workers were all informed on the objectives and the finalities of this survey. Everyone gave their free and well-informed consent before the administration of the anonymous questionnaire. The guarantee of confidentiality in relation to the collected information and in relation to the personal data of the workers was given.

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