Current status and high-risk factors of blood-borne occupational exposure among midwives in China: A cross-sectional survey

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Highlights

- Blood-borne occupational exposure among midwives in China: A cross-sectional survey
- A total of 2743 midwives were investigated in this study; the incidence rate of blood-borne occupational exposure was 46.77%
- Midwives are at high risk of blood-borne occupational exposure, and midwives with $\leqslant$ 5 years of service had the highest risk
- The treatment after occupational exposure is not standardized

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Ethical statement

This study complied with the requirements of the Declaration of Helsinki. Human research ethics approval was obtained from Beijing Ditan Hospital affiliated with Capital Medical University. Consent was implied through the completion of the survey. The anonymity of participants was assured as no name-related data were collected.

Authors' contributions

Jing Li and Haixia Zhang carried out the studies, participated in collecting data, and drafted

the manuscript. Meiling Chen and Li Li performed the statistical analysis and participated in its design. Yanhua Zhang and Lijuan Wang participated in acquisition, analysis, or interpretation of data and draft the manuscript. All authors read and approved the final manuscript.

Abstract

Background: To identify the problems and high-risk factors of blood-borne occupational exposure among midwives in China.

Methods: Midwives from the obstetrics department and delivery room of hospitals in institutions. The self-compiled questionnaire on the current status of blood-borne occupational exposure of Chinese midwives was used for data collection.

Results: The incidence rate of blood-borne occupational exposure was 46.77%. The independen risk factors were working years≤ 5 years (p=0.001), unable to take standard prevention at work (p=0.000), unaware of HIV treatment procedures (p=0.000), and average daily working hours of 8 hours (p=0.002), the high risk of blood-borne occupational exposure at work (p=0.000), and contact with patient fluids, blood without gloves (p=0.000).

Discussion: Midwives are at high risk of blood-borne occupational exposure, and midwives with ⩽ 5 years of service are the focus group.Failure to achieve standard prevention ,the length of working hours and the ignorance of the treatment process of AIDS have a certain impact on the occurrence of blood-borne occupational exposure.

Conclusion: It is necessary to focus on cultivating high-level midwifery talents to overcome the shortage of midwives and rationally use midwifery resources, as well as to strengthen standard prevention and improve the occupational protection and guarantee system for midwives.

Keywords: Midwives; Blood-borne occupational xposures; Questionnaires; Cross-sectional studies

Background

Blood-borne occupational exposure of medical personnel refers to the harm caused by the exposure of medical and health workers to blood, body fluids, and laboratory culture fluids in the process of diagnosing, treating, nursing, preventing, testing and managing diseases [1]. Nurses are especially at high risk for blood-borne occupational exposure. According to a previous one-year cross-sectional study, the incidence of occupational exposure of nurses after exposure to blood and body fluids is as high as 65.3% [2]. Due to the specific nature of their work, midwives are more frequently exposed to patients' blood, bodily fluids, secretions, amniotic fluid, and sharps than general ward nurses, and their risk of blood-borne occupational exposure is greater [3]. Once midwives are exposed to blood, it increases their perceived stress and may even lead to psychological stress disorders such as post-traumatic

stress disorder, anxiety, and depression, which can seriously affect work and quality of life [4]. The occupational safety of midwives has attracted increasing attention. Considering these midwives are facing occupational hazards, researching practical measures to ensure the occupational safety of midwives is of great importance. Therefore, in order to understand the current situation of blood-borne occupational exposure of midwives in China and to identify the problems and risk factors of blood-borne occupational exposure of midwives, we investigated the blood-borne occupational exposure of midwives across 29 provinces, municipalities, and autonomous regions so as to provide a relevant reference for the education, training and security system of occupational protection of midwives in the future.

Material and methods

Subjects

This study adopted the judgment sampling method. Between February 2019 and February 2021, experts from the Infectious Diseases Nursing Professional Committee of the Chinese Nursing Association decided to investigate the provinces, autonomous regions, and municipalities directly under the Central Government according to the research purposes. The survey units were selected from the institutions where some members of the Nursing Professional Committee belonged(they tended to skew more towards academic centers, cities, etc.). A questionnaire survey was conducted covering obstetric departments and delivery rooms of hospitals across 29 provinces, municipalities, and autonomous regions in China. Inclusion criteria were the following: (i) registered nurse midwives employed in hospitals; (ii)

informed of the scope of the survey and volunteered to participate. Exclusion criteria were: (i) long-term sick leave (> 6 months), leaving the post of midwives; (ii) training midwives and trainee midwives.

This study complied with the requirements of the Declaration of Helsinki. Human research ethics approval was obtained from XXX Hospital. Consent was implied through the completion of the survey. The anonymity of participants was assured no identifying information were collected.

Measures

After consulting domestic and foreign policies, regulations, guidelines, and other relevant books and literature[4,5,6,7,] the researchers made the first draft of the questionnaire and consulted 5 experts in related fields of the Infectious Disease Nursing Professional Committee of the Chinese Nursing Association through the Delphi method, including 2 with intermediate titles, 2 with senior deputy titles, and 1 with senior titles so as to design a questionnaire on the current situation of blood-borne occupational exposure of midwives in China. In the form of on-site answers, 200 questionnaires were distributed for pre investigation. After collecting and sorting out the data, they were revised again according to the feedback content, and finally a formal occupational exposure management questionnaire was formed, a questionnaire on the current situation of blood-borne occupational exposure of Chinese midwives was formed. The content included: (i) the general information of the midwives, including the title, working years, nature of the hospital, etc.; (ii) basic knowledge of blood-borne occupational exposure: knowledge of standard precautions, blood-borne occupational exposure treatment procedures,

HIV post-exposure prophylaxis medication time, needle stick injury Wound treatment, post-treatment of mucosal exposure; (iii) the risk assessment status of blood-borne occupational exposure: the number of people who were exposed to blood-borne occupational exposure, the location of blood-borne occupational exposure, the method of blood-borne occupational exposure, the route of blood-borne occupational exposure, cause of exposure and whether to report it. The Content validity index（CVI）and Cronbach′sαof the questionnaire were 0.87 and 0.82, respectively.

Data collection

The heads of the infectious disease nursing committee of the Chinese Nursing Association, who underwent unified training, distributed and collected the questionnaire online. The questionnaire was filled out by the midwife in the delivery room/obstetrics department, who were asked to carefully read the purpose of the study and the precautions for filling in the questionnaire before completing the questionnaire. If they had any questions, they could consult the person in charge by e-mail or telephone. All of the online questionnaire questions were set as mandatory questions, and the questionnaire could only be submitted after all the filling was completed. The questionnaires were screened for logic after they were completed, and the questionnaires with obvious errors were eliminated. Among a total of 2850 distributed questionnaires, 2743 valid questionnaires were obtained, resulting in an effective rate of 96.24%.

Statistical analyses

A database was established using Epidata. SPSS 22.0 was used for all statistical analyses.

Qualitative were described by frequency and rate, and the Chi-square test was used for comparison between groups. Significant factors in univariate analysis were analyzed by binary logistic regression method, and $p < 0.05$ was considered statistically significant.

Results

The basic situation of blood borne occupational exposure of midwives

A total of 2743 midwives were investigated in this study; the incidence rate of blood-borne occupational exposure was 46.77% (1283/2743). There were 305 (23.77%) people with working years ⩽5 years, 444 (34.60%) people with 5-10 years of experience, 336 (26.19%) people in 10-20 years, 198 (15.43%) people in >20 years.The main body parts affected by blood-borne exposure and respective incidence rates were as follows: hands, 97.66% (1253/1283). The main reasons for the occurrence of blood-borne occupational exposure among midwives were improper handling of sharp instruments (60.80% (780/1283)) . The main methods of blood-borne occupational exposure of midwives were: discarded sharps in 55.73% cases (715/1283), needles in 52.14% cases (669/1283). The routes of blood-borne occupational exposure of midwives were skin exposure in 96.80% (1242/1283) cases. The main reasons why midwives did not report blood-borne exposure in a timely manner were the fact that patients were clearly without infectious diseases in 69.47% of cases (339/1283) (**Table 1**).

Table 1. Investigation of blood-borne occupational exposure

Variable	Number	Proportion（%）	Variable	Number	Proportion（%）
Reason for not wearing gloves			Cause of occupational exposure		
Busy, too late	76	59.84%	Operational inattention	527	41.08%
Unconscious gloving	15	11.81%	No safe injection device in hospital	254	19.80%
Inconvenient operation	87	68.50%	Safe injection device in hospital but not used	145	11.30%
Departmental cost control	31	24.41%	Operation environment disorder or insufficient light	359	27.98%
Other	5	3.94%	Improper sharps handling	780	60.80%
Occupational			Non-standard	414	32.27%

exposure site			operation		
Hand	1253	97.66%	Uncooperative patient	710	55.34%
Foot	105	8.18%	Other	68	5.30%
Eye	276	21.51%	Mode of Occupational Exposure		
Forearm	144	11.22%	Needle Double Cap	539	42.01%
Other	17	1.33%	When disposing of waste sharps	715	55.73%
Reasons for not timely reporting			Upon Needle Removal	669	52.14%
Not aware of an escalation process	33	6.76%	At suture	358	27.90%
Cumbersome procedure	173	35.45%	When passing sharps	217	16.91%
Definitely not an infectious disease	339	69.47%	Accidental injury by others	352	27.44%
Patient fluke psychology, will not infect	128	26.23%	Secretion/blood splashing	660	51.44%

Fear of being criticized	30	6.15%	Patient scratch	361	28.14%
Fear of discrimination	8	1.64%	Other	27	2.10%
Other	33	6.76%	Routes of Occupational Exposure		
			Dermal Exposure	1242	96.80%
			Mucosal exposure	662	51.60%
			Other	20	1.56%

A one-factor analysis of blood-borne occupational exposure in midwives

The general data of midwives with blood-borne occupational exposure and midwives without blood-borne occupational exposure were analyzed for influencing factors. The results showed that midwives' professional title, working years, whether they could do standard prevention at work, whether they knew about the treatment process of AIDS, the duration of prophylactic drug use after HIV blood-borne occupational exposure and the longest duration of prophylactic use after HIV blood-borne occupational exposure, the average daily working hours, risk of blood-borne occupational exposure at work, exposure to patient body fluids, and whether midwives wore gloves when coming in contact with blood were nine single factors affecting the occurrence of blood-borne occupational exposure of midwives; the observed difference was statistically significant ($p<0.05$) (Table 2).

Table 2. Univariate analysis of blood-borne occupational exposure in midwives

Variable	Yes n=1283 （%）	No n=1460 （%）	χ2	*p*	Variable	Yes n=1283 （%）	No n=1460 （%）	χ2	*p*
Title					For how long the prophylactic medication should be given after HIV blood-borne occupational exposure				
Primary	825 （42.6）	1110 （57.4）	46.459	0.000	2 hours	554 （44.2）	669 （55.8）	22.508	0.000

Intermediate	402（56.0）	316（44.0）			4 hours	160(41.6)	225(58.4)	
Sub-high and above	56（62.25.5）	34（37.8）			24 hours	452(50.4)	444(49.6)	
Years of work					The maximum duration of prophylaxis after blood-borne occupational exposure to HIV			
≤5	305（35.9）	544（64.1）	70.571	0.000	2 hours	72（46.2）	84（53.8）	23.712	0.000
5-10	444	473			4 hours	26	39		

	（48.4）	（51.6）				（40.0）	（60.0）	
10-20	336（52.3）	307（47.7）			24 hours	603（43.6）	779（56.4）	
>20	198（59.3）	136（40.7）			72 hours	435（48.8）	457（51.2）	
Hospital nature					Unknown	147（59.3）	101（40.7）	
Public hospital	1240（46.8）	1412(53.2)	0.013	0.994	Correct handling of wounds after needle stick exposure			
Private Hospital	32（47.1）	36(52.9)			Unknown	338（52.0）	312（48.0）	0.514	0.473

Other	11（47.8）	12（52.2）			Aware	1122（53.6）	971（46.4）	
Awareness Standard Prevention					Correct handling of wounds after mucosal exposure			
No	94（48.5）	100（51.1）	0.236	0.627	Unknown	643(45.4)	773(54.6)	2.187	O.139
Yes	1189（46.6）	1360（53.4）			Aware	640(48.2)	687(51.8)		
Standard prevention can be achieved					Working hours per day			
No	284（59.2）	196（40.8）	35.899	0.000	8 hours	608（42.5）	824（57.5）	3.000	0.000
Yes	999	1264			8-10	555	511		

	（44.1）	（55.9）			hours	（52.1）	（47.9）	
Process for Handling Occupational Exposure to AIDS					10-12 hours	85（51.5）	80（48.5）	
Unknown	188（57.0）	142（43.0）	15.642	0.000	More than 12 hours	35（43.8）	45（56.3）	
Aware	1095（45.4）	1318（54.6）			Job Hazard Level			
Process for Handling Occupational Exposure to HBV					Low	29（35.4）	53（64.6）	42.486	0.000

Unknown	54（39.1）	84（60.9）	3.444	0.067	General	289（37.8）	476（62.2）		
Aware	1229（47.2）	1376（52.8）			High	965（50.9）	931（49.1）		
Process for Handling Occupational Exposure to HCV					Wearing gloves when contacting patient's body fluid and blood				
Unknown	399（49.1）	414（50.9）	2.461	0.117	No	78(61.4)	49(38.6)	78.929	0.000
Aware	884（45.8）	1046（54.2）			Occasionally	370(60.6)	241(39.4)		
Process for Handling					Yes	835(41.6)	1170(58.4)		

Occupational Exposure to RPR				
Unknown	251（52.6）	226(47.4)	7.912	0.005
Aware	1032（45.5）	1234(54.5)		

Multifactorial analysis of blood-borne occupational exposure in midwives

Binary Logistic model was used for regression analysis, with the occurrence of blood-borne occupational exposure of midwives as the dependent variable and the variables with statistical significance in the $\chi 2$ test as independent variables. The pseudo R2 of this regression model was 0.175, and the overall correct percentage of the model is 65%. It was comprehensively judged that the model fitting effect was good. Regression analysis revealed that 6 factors, i.e., working years $\leq$ 5 years, failure to achieve standard prevention at work, lack of awareness of the treatment process of AIDS, average daily working hours of 8 hours, high risk of blood-borne occupational exposure at work, contact with patients' bodily fluids and blood without gloves, were independent risk factors affecting the occurrence of hematogenic occupational exposure in midwives (**Table 3**).

Table 3. Logistic regression analysis of hematogenous occupational exposure in midwives

	Variable	β	SE	Wald	*p*	OR	95%CI
	constants	-0.048	0.438	0.012	0.912	0.953	
Title	Primary			3.884	0.143		
	Intermediate	-0.414	0.278	2.213	0.137	0.661	0.383-1.140
	Sub-high and above	-0.190	0.257	0.550	0.458	0.827	0.500-1.367
Years of work	≤5			15.941	0.001		
	5-10	-0.663	0.375	3.125	0.077	0.515	0.247-1.075
	10-20	-0.183	0.354	0.268	0.605	0.833	0.416-1.666
	>20	0.018	0.328	0.003	0.957	1.018	0.535-1.935
Awareness Standard Prevention	No			25.259	0.000		
	Yes	0.749	0.141	28.183	0.000	2.115	1.604-2.788
Process for Handling Occupational Exposure to AIDS	Unknown			11.135	0.000		
	Aware	0.379	0.129	8.705	0.003	1.461	1.136-1.880
Working hours per day	8 hours			14.393	0.002		
	8-10 hours	-0.148	0.247	0.356	0.551	0.863	0.531-1.401
	10-12 hours	0.139	0.249	0.312	0.577	1.149	0.705-1.873

	More than 12 hours	0.300	0.290	1.071	0.301	1.349	0.765-2.380
Job Hazard Level	Low			34.968	0.000		
	General	-0.582	0.248	5.528	0.019	0.559	0.344-0.908
	High	-0.524	0.093	31.879	0.000	0.592	0.494-0.710
Wearing gloves when contacting patient's body fluid and blood	No			50.378	0.000		
	Occasionally	0.656	0.197	11.109	0.001	1.928	1.310-2.836
	Yes	0.671	0.100	44.550	0.000	1.956	1.606-2.381

Discussion

Midwives are at high risk of blood-borne occupational exposure, and midwives with ≤ 5 years of service are the focus group

The results showed that midwives were a high-risk group of blood-borne occupational exposure, and the incidence of bloodborne occupational exposure among midwives was 46.77%. The regression analysis revealed that working years ≤ 5 years was an independent risk factor for blood-borne occupational exposure in midwives, which was associated with insufficient awareness of the severity of blood-borne diseases, lack of experience, irregular operation, unskilled technique, unstable psychological quality, lack of awareness of

occupational protection, and lack of relevant knowledge in junior midwives. In addition, needle stick injuries and skin injuries were more likely to occur among midwives with ≤ 5 years of working experience. Among the departments with higher occupational hazards, the delivery room ranks second [8], as midwives are frequently exposed to various risk factors such as blood, amniotic fluid, secretions, and sharp instruments (suture needles, knives, and scissors) [9]. Our results showed that 97.66% of blood-borne occupational exposure sites in midwives were on hands (including fingers, wrists, and palms), 96.80% on the skin, while 55.73% occurred when sharp waste was handled, which was basically consistent with previous studies [10]. Midwives engage in more hand operations, especially during vaginal examination, delivery process, perineal nerve trunk block anesthesia, episiotomy suture, umbilical cord blood withdrawal, mikostatin injection perineal surgery, oxytocin injection, and other operations, which are associated with sharp instrument injury and blood and body fluid exposure [11]. Valls *et al* [12] found that 93% of occupational injuries could be reduced by operational training. Therefore, occupational protection training should be used as one of the essential courses for midwives' pre-employment training to strengthen their knowledge and skills related to blood-borne occupational exposure. The midwives should be regularly assessed on their occupational protection knowledge, processing procedures, and infectious disease prevention and control so as to ensure that occupational safety and health protection education is always at the highest levels throughout the career of the midwives [13].

Failure to achieve standard prevention at work and contact with patient's body fluids and blood without wearing gloves is a high-risk behavior during which blood-borne occupational exposure occurs

Our results showed that the failure to achieve standard prevention at work, and contact with patients' bodily fluids and blood without gloves, were independent risk factors for midwives to develop blood-borne occupational exposure. It was found that 34.91% of midwives were exposed to bodily fluids and blood without or occasionally wearing gloves, which is basically consistent with Olubyide's findings [14]. The blood-borne occupational exposure of midwives mainly occurred during needle extraction, accounting for 52.14% of exposure cases, and secretion/blood spattering accounted for 51.44% of exposure cases. In their study, Gershonn *et al* [15] showed that the incidence of sharps injury was related to compliance with standard prophylaxis. Standard precautions are recognized worldwide as the most basic and effective method for preventing and controlling nosocomial infections, protecting health care workers, patients, and public safety [16,17]. The Guidelines for Safe Instruments for Muscular, Intradermal and Subcutaneous Injection in Medical Institutions issued by WHO in 2015 [18] state that the use of safe needles can reduce the incidence of needle stick injuries by 27%-76%. E.g., during the perineal wound suture, the anti-puncture needle designed by 0.012 cm needle tip does not only obtain better tissue penetration but is also less likely to puncture the operator's glove, thus avoiding the risk of needle stick injury to the greatest extent [19]. Previous studies have shown that double gloves can reduce exposure to 95% of the blood on the surface of sharp instruments, and wearing protective glasses can prevent pollutants such as blood and amniotic fluid from directly splashing into the eyes [20]. It is recommended to use safety appliances and correctly select personal protective equipment (including double-layer gloves, medical-surgical mask, protective eyewear, anti-penetration surgical clothes, and shoes) to prevent exposure to blood, body fluids, and amniotic fluid

during delivery for parturients with blood-borne diseases.

The length of working hours in midwifery and the high degree of job risk have a certain impact on the occurrence of blood-borne occupational exposure

Our regression analysis revealed that working some 8 hours per day (47.38%) and high job risk level were independent risk factors for blood-borne occupational exposure ($p<0.05$). In addition, the number of midwives with blood-borne occupational exposure was higher than that without blood-borne occupational exposure during the working hours at each time period, which was related to the shortage of human resources of midwives. According to the 2014 report on the status of midwifery in the world [21], providing professional midwifery services for every pregnant woman is the most effective measure to reduce maternal and neonatal mortality. According to World Health Organization (WHO) recommendations, six midwives are needed for every 1000 births. The ratio of midwives to births in China is only 1/4 000, and there is a serious shortage of midwifery human resources [22]. Currently, the problem of "imbalance of midwifery human resources" is widespread in many countries around the world, and the human resources crisis has become an urgent global health problem [22]. When there is unbalanced resource allocation of midwives and insufficient capital chain allocation, in order to save human resource costs, midwives are forced to sacrifice their rest time to improve work efficiency. The results showed that the number of blood-borne occupational exposures in midwifery posts with high risk was 33 (965/29) times higher compared to posts with low risk, which may be related to the different work categories of midwives. The International Confederation of Midwives (ICM) defines midwives as trusted professionals who, through

partnerships with women, provide women with essential support, care, and counseling during pregnancy and during and after delivery. They also provide midwifery, newborn care, and continuous services for pregnant women within the scope of their responsibilities [23]. The risk degree of midwives responsible for counseling and education during pregnancy is relatively low, while the risk degree of midwives responsible for delivery and postpartum delivery and caring for newborns is relatively high, as they have more contact with blood-borne occupational exposure sources such as blood, body fluids and amniotic fluid, and a higher proportion of blood-borne occupational exposure. Accordingly, midwifery institutions should establish cooperative relations with universities to cultivate midwifery talents in a targeted manner. At the same time, nursing managers should adopt a dynamic, flexible scheduling system according to the maternal situation so as to achieve a rational use of midwifery resources and further optimize the allocation of human resources for midwives.

The treatment after occupational exposure is not standardized, and the ignorance of the treatment process of AIDS has a certain impact on the occurrence of blood-borne occupational exposure

Our results revealed that the reporting rate of midwives after occupational exposure was 45.05%, which was lower than the reported 75.62% of medical staff in 101 hospitals in Shanghai, China, in 2018 [24]. Also, this was an improvement over the 32% reported rate in the study of Salelka et al. [25]. The main reasons for failure in timely reporting were that 69.47% of patients with infectious diseases could not be identified, and 35.45% were cumbersome procedures. Midwifery institutions should strengthen perinatal health care and standardize the

results of prenatal infectious disease screening and blood tests for pregnant and lying-in women. For those with infectious diseases, isolated and clearly marked delivery rooms should be arranged. The information-based occupational exposure reporting process is adopted to increase the timeliness of reporting and achieve refined management after occupational exposure [26]. Unawareness of HIV management (14.63%) resulted as an independent risk factor for blood-borne occupational exposure, which is slightly higher than that reported by Sin *et al* (10.4%)[27]. Jiao *et al* [28] found that 24.59% of the medical staff in Tianjin, China, did not have the relevant knowledge on AIDS prevention and treatment. HIV accounts for 4.90% of blood-borne exposure sources, and midwives are a high-risk group for human immunodeficiency virus (HIV) infection [27]. Since there is no effective vaccine for the prevention of AIDS, the current specific treatment methods for prevention of HIV infection are routine topical treatment within 24 hours and post-exposure prophylaxis (PEP) medication. UNAIDS Annual World AIDS Day Report clearly states that the global epidemic of AIDS needs to be ended in 2030 to maximize the detection of infected individuals and reduce transmission. The increasing number of visits to HIV-infected people increases the risk of hematogenous occupational exposure to HIV. HIV-infected people are still largely discriminated in society, which causes serious physical and mental damage and a great psychological burden. Therefore, midwives who have potential HIV occupational infection risk may be under much stress. It is particularly important for midwives to timely self-assess and correct treatment after HIV blood-borne occupational exposure. Accordingly, it is necessary to combine simulation technology and information software to deliver diversified and multi-form knowledge training, thus improving the awareness rate of occupational

exposure protection knowledge such as AIDS treatment processes.

This study has also a few limitations. The mental health of midwives was not investigated, so future prospective high-quality studies are needed to examine the effect of psychosocial factors on occupational protection of midwives. Currently, there is no multi-center cross-sectional study on midwives' personality traits, psychological resilience levels, and social support effects. Future studies should use psychological techniques to reduce the group pressure of midwives. Also, the psychological capital construction of midwives should be longitudinally studied to reduce blood-borne occupational exposure and strengthen the effectiveness of occupational protection, thus achieving the best occupational protection effect at reasonable socioeconomic costs.

Conclusion

Our results revealed that the incidence of blood-borne occupational exposure among midwives was high, and the occupational protection level of midwives working ≤ 5 years needs to be improved. At the same time, it is necessary to cultivate high-level midwifery talents to overcome the shortage of midwives, rationalize the use of midwifery resources, strengthen standard protection, and improve the occupational protection guarantee system for midwives. It is especially important to establish the protection system and focus on the effective use and innovation of protective equipment and the development of the protection knowledge system and perfection.

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