

Knowledge, attitudes, and practices of the staff at Maradi Reference Hospital (HRM) regarding blood exposure accidents (BEAs).**Connaissances, attitudes et pratiques du personnel de l'Hôpital de Référence de Maradi (HRM) sur les accidents d'exposition au sang (AES)**

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Summary

Introduction: Blood exposure accident refers to any percutaneous contact (through a needle or cut with a scalpel blade or any sharp object), or any skin or mucous membrane contact by splashing onto damaged skin or mucous membranes (eye, mouth) with blood or a biological fluid containing blood or potentially infectious. The aim of the study was to assess the knowledge, attitudes, and practices of Maradi Reference Hospital staff regarding BEAs. **Methodology:** This is a cross-sectional study with prospective data collection conducted from February 12 to 21, 2025, using a confidential self-administered questionnaire. **Results:** A total of 258 agents were included, representing 75% of the personnel. The average age of the respondents was 39.42±8, 58 years. Nurses were the most represented group, with a proportion of 31.74%. The risk of blood exposure accidents related to the work environment was recognized by 77.82% of agents. In 27.94% of cases, respondents reported having already experienced a blood exposure accident, but only 63.08% had officially reported the accident. The average knowledge level about blood exposure accidents was estimated at 70,97±19,80%. Preventive equipment was generally available and used efficiently in 68.92% of cases. **Conclusion:** The analysis of the results from this study highlights an insufficient level of knowledge about blood exposure accidents and a lack of compliance with standard precautions.

Keywords: Blood exposure accident, knowledge, attitudes, practices, Maradi Reference Hospital

Résumé

Introduction : On entend par accident d'exposition au sang, tout contact percutané (par piqûre ou coupure avec une aiguille, une lame de bistouri ou tout objet vulnérant), ou tout contact cutanéomuqueux par projection sur une peau lésée ou sur une muqueuse (œil, bouche) avec du sang ou un liquide biologique contenant du sang ou potentiellement contaminant. L'objectif de l'étude était de faire l'état des lieux des connaissances, des attitudes et des pratiques du personnel de l'Hôpital de Référence de Maradi sur les accidents d'exposition au sang. **Méthodologie :** Il s'agit d'une étude CAP à collecte prospective sur la période du 12 au 21 février 2025 à travers un questionnaire auto-administré confidentiel. **Résultats :** Au total, 258 agents ont été inclus, soit 75%. L'âge moyen des enquêtées était de 39,42±8,58ans. Les infirmiers étaient les plus représentés avec une proportion de 31.74%. Le risque d'accidents d'exposition au sang en lien avec le cadre de travail était appréhendé par 77,82 % des agents. Dans 27,94 % des cas, les enquêtées avaient signalé avoir été déjà victime d'un accident d'exposition au sang, mais seul 63,08 % avaient déclaré l'accident. Le niveau de connaissance moyen sur les accidents d'exposition au sang était évalué à 70,97±19,80%. Le matériel de prévention était globalement disponible et il est utilisé de façon efficiente dans 68,92 %. **Conclusion :** L'analyse des résultats issus de cette étude fait ressortir un niveau insuffisant des connaissances sur les accidents d'exposition au sang et une carence dans le respect des précautions standards.

Mots clés : Accident d'exposition au sang, connaissances, attitudes, pratiques, Hôpital de Référence de Maradi

INTRODUCTION

A blood exposure accident (BEA) is any percutaneous contact, such as a needlestick or cut with a syringe, scalpel blade, or sharp object. It also includes any skin or mucous membrane contact through splashing onto damaged skin or a mucous membrane (eye, mouth) with blood or potentially infectious biological fluids [1].

About three million healthcare workers (HCWs) worldwide have been exposed to bloodborne pathogens through percutaneous injuries. In the United States, the Centers for Disease Control and Prevention (CDC) reports more than 385,000 needle-stick injuries (NSI) each year among hospital healthcare professionals. The European Agency for Safety and Health at Work reports over one million NSI cases annually. In developing countries, especially sub-Saharan Africa, where 90% of these accidents occur, healthcare workers face a higher risk of infection from bloodborne pathogens [2].

In Niger, in general, and in Maradi in particular, very little data has been found on BEAs. A behavioral survey conducted in 2008 in two healthcare facilities in Zinder, namely the National Hospital (HNZ) and the Regional Blood Transfusion Center (CRTS), estimated a BEA prevalence of 19.80% [3].

The prevalence of infectious diseases resulting from needlestick injuries among healthcare professionals is influenced by several factors, including vaccination rates, access to appropriate protective equipment, and post-exposure prophylaxis [4].

Many infectious agents can be transmitted during occupational exposure to blood (OEB); however, some of the most dangerous are hepatitis C (HCV), hepatitis B virus (HBV), and the human immunodeficiency virus (HIV). In developing countries, 40 to 60% of HBV infections among healthcare workers were attributed to occupational risk, whereas in developed countries, the attributable fraction was less than 10% [5].

The Maradi Reference Hospital established a committee in 2024 to combat blood exposure accidents. As part of the implementation of this committee, given the lack of data on BEAs and the absence of a framework for managing these accidents, it was considered useful to conduct this study to assess the knowledge, attitudes, and practices of HRM staff regarding BEAs.

PATIENTS AND METHOD

This is a cross-sectional, descriptive and analytic study with prospective data collection conducted over a period of 10 days (from February 12 to 21 2025).

The study took place at the Maradi Reference Hospital, a level 3 hospital located in the Ali Dansofo district, covering an area of 32 hectares with a capacity of 500 beds. It has 53 departments spread across 4 divisions: Administrative and Financial Affairs, Medicine and Medical Specialties, Surgery and Surgical Specialties, and Medical-Technical Support. All departments of the hospital were involved, including the administrative and security services. The staff at HRM is estimated at 344 personnel across all categories. The study population consisted of all staff working at HRM, regardless of their technical level or work role, including administrative personnel and security agents. Sampling was empirical and based on voluntary participation.

We included in the study all staff present during the study period who had given prior informed consent. We did not include staff who were absent during the survey period. A confidential self-administered questionnaire was given to each person surveyed.

As for the assessment of knowledge, it was conducted through a series of 33 questions that focused on risky circumstances of occupational exposure to blood, transmissible pathogens, preventive measures, and the actions to take in case of exposure. Each correct answer was scored one point, and an incorrect answer scored zero.

The following variables were analyzed: sociodemographic data, history of occupational exposure to blood, previous vaccinations, hepatitis B and C virological status; knowledge about circumstances of contamination by pathogens, means of prevention, attitude to adopt in case of risk of occupational exposure, practical conduct if exposure occurs, preventive equipment and its use.

The data were entered using Excel 2013 and analyzed with Epi-info 7.2.6 softwares.

Informed consent from all surveyed staff was a prerequisite. They were clearly and thoroughly informed about the purpose of the study, the guarantee of confidentiality of the collected data, and their right to withdraw from the study. The protocol was approved by the hospital administration including the technical advisory committee and the action and research committee.

RESULTS

A total of 258 staff members were included, representing 75% of the hospital's total workforce (n=344). The average age of the respondents was $39.42 \pm 8,58$ years. The age group of 35 to 44 years was the most represented, accounting for 40.33% of the staff (table I).

Table I : Distribution of staff by age group

Age group	Number (n)	Percentage (%)
15 - 24	7	2,88
25 - 34	65	26,75
35 - 44	98	40,33
45 - 54	66	27,16
55 - 64	7	2,88
Total	243	100

The male sex was the most represented, accounting for 67.98% of cases (n=172) with a sex ratio of 2.12 (figure1). The professional category of nurses was the most represented, with a proportion of 31.74% (Table II).

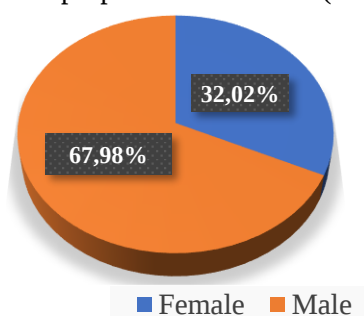


Figure 1: Distribution of staff by gender

Tableau II : Distribution of respondents by job title/qualification

Function	n	%
Nurse	73	31,74
Hygiene worker	56	24,35
Doctor	28	12,17
Security	17	7,39
Senior Biology Technician	12	5,22
Radiologist	9	3,91
Senior technician in general surgery, obstetrics, and otorhinolaryngology	9	3,91
Senior technician in general and obstetric surgery (TSCGO)	8	3,47
Laundry worker	5	2,17
Administrator	3	1,30
Stretcher-bearer	3	1,30
Driver	2	0,87
Instrumentalist	2	0,87
Debt collector	1	0,43
Senior physiotherapy technician	1	0,43
Senior anesthesia technician	1	0,43
Total	230	100

In 80.63% of cases (n=204), the respondents had heard of BEAs. Slightly more than half (52.04%) of these staff who had heard about

BEAs, received related information during training. Regarding awareness of the risk of occupational exposure, of the respondents (n=239) who answered this question, 77.82% (n=186) appear to understand the risk of BEAs in relation to the work environment.

In 27.94% of cases (n=69), the respondents reported having already been victims of an BEA during their careers. Among these previous victims of BEAs, 63.08% (n=41) had reported the accident, and 67.47% (n=42) had undergone viral serologies for hepatitis B (HBV), C (HCV) and Human Immunodeficiency Virus (HIV). Among these victims of BEAs, only 20.97% (n=13) had received medical follow-up.

It appears that 45.06% (n=114) had undergone at least one HBV screening, among whom eight (8) had a positive HBV serology, representing 7.14%. Hepatitis B vaccination had been administered to 33.76% (n=79) of the participants included in the study. The HBV vaccination was complete in 62.50% (n=25). A check of the vaccine response was carried out in only 21.87% (n=14) of cases. For HCV, only 11.65% (n=29) of respondents had previously undergone HCV screening, among whom only one (3.45%) had a positive HCV serology.

The evaluation showed that the average knowledge level on occupational exposure to blood was $70,97 \pm 19,80\%$, with extremes ranging from 0% to 93.94%. In 66.28% of cases (n=171), the knowledge level was greater than 70% (Table III, IV, figure 2).

Prevention equipment was generally available, although there are disparities depending on the type of equipment. Its use was reported in 86.05% (n=222) of cases, and in more than two-thirds of these cases [68.92% (n=153)] this use was "correct."

In 88.37% (n=228), a response was given regarding working conditions in relation to the risk of occupational exposure to blood (OEB). For 81 respondents (35.52%), the working conditions were considered satisfactory. The risk of OEB was statistically significant for nurses and cleaning technicians, with p-values of 0.0070 and 0.0129, respectively (Table V). There is also a strong association between the work sector and history of OEB, with high exposure in the operating room and in the sanitation department, accounting for 10.45% and 13.43%, respectively, with corresponding p-values of 0.0153 and 0.0262 (Table VI).

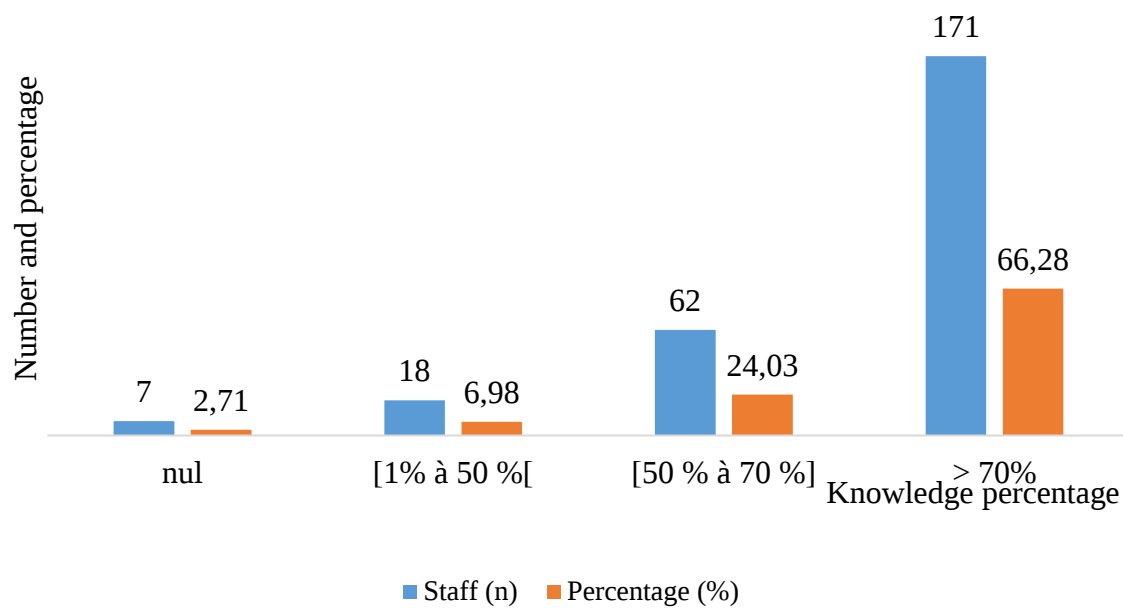


Figure 2 : overall knowledge of BEAs

Table III : risk circumstances for BEA exposure and transmissible pathogens

	Expected response	Respondents' answers		
		Yes	No	Knowledge level (%)
Risk circumstances				
Projection of biological fluid onto broken skin or mucous membrane	Yes	210	31	87,14
Simple contact of the gloves with blood	No	85	150	63,83
Skin break resulting from an injury, cut, or puncture caused by sharp or piercing objects	Yes	213	32	86,94
Needle stick or cut with new or sterilized equipment that has not yet been used	No	55	185	77,08
Skin and mucous membrane contact with a non-contaminated biological fluid	No	93	146	61,09
Experience eliminates all risk	No	46	178	79,46
A needlestick injury can occur when handling healthcare waste	Yes	231	14	94,29
Recapping syringes protects against a possible needlestick injury	No	118	117	49,79
Transmissible pathogenic agents				
Hepatitis A Virus	Yes	182	44	80,53
Hepatitis B Virus	Yes	224	13	94,51
Hepatitis C Virus	Yes	216	17	92,70
Hepatitis D Virus	Yes	181	36	83,41
Hepatitis E Virus	Yes	166	50	76,85
Human Immunodeficiency Virus 1 and 2	Yes	227	8	96,60
Various bacteria	Yes	156	59	72,56
Malaria pathogen	Yes	30	190	13,64

Table IV: Level of knowledge on BEAs prevention methods and measures to take in case of BEA

	Expected response	Respondents' answers		
		Yes	No	Knowledge level (%)
Preventive measures				
Systematic recapping of syringes after use	No	107	128	54,47
Hepatitis B vaccination	Yes	194	35	66,49
Availability of appropriate protective equipment	Yes	216	19	91,91
Application of standard precautions in care	Yes	233	6	97,49
Compliance with good practices in the disposal of healthcare waste	Yes	232	10	95,87
Checking the patient's medical record before treatment	No	160	74	31,62
When picking up bulk bags, grab them from the top to avoid any risk of punctures or cuts	Yes	196	43	82,01
Handle reusable equipment carefully when it is soiled and promptly ensure proper treatment.	Yes	205	28	87,98
Dissemination of a procedure to follow in case of accidental exposure to blood, which must be known by all staff	Yes	211	23	90,17
Use of specific containers for infectious healthcare waste	Yes	217	17	92,74
Measure to be taken				
Apply a tourniquet and bleed in the event of a puncture or cut by soiled equipment	No	102	124	54,87
Wait to finish the gesture before taking any other action	No	43	185	81,14
See the staff doctor	Yes	219	16	93,19
Start HIV treatment immediately	No	79	147	65,04
Never report the accident to avoid being punished	No	15	214	93,45
Rinse eyes thoroughly in case of splashes	Yes	207	23	90,00
Put your trust in God and do nothing	No	27	206	88,41

Tableau V : correlation between the function and BEA's antecedent

Function	BEA's antecedent				OR	IC	P
	Yes	%	No	%			
Administrator	0	0,00	3	1,69	1,92	ND	0,1701
Stretcher-bearer	0	0,00	3	1,69	1,92	ND	0,1701
Laundry worker	0	0,00	5	2,81	3,21	ND	0,0821
Driver	1	1,49	1	0,56	0,64	[0,14-38,11]	0,3004
Nurse	30	44,78	43	24,16	27,56	[1,17-3,86]	0,0070
Instrumentalist	0	0,00	2	1,12	1,28	ND	0,2442
Doctor	11	16,42	17	9,55	10,90	[0,70-3,64]	0,1333
Debt collector	0	0,00	1	0,56	0,64	ND	0,3497
Radiologist	2	2,99	7	3,93	4,49	[0,13-3,23]	0,3242
Sécurité	0	0,00	15	8,43	9,62	ND	0,0018
Hygiene worker	9	13,43	42	23,60	26,92	[0,19-0,92]	0,0129
Senior physiotherapy technician	0	0,00	1	0,56	0,64	ND	0,3497
Senior anesthesia technician	1	1,49	0	0,00	0,00	ND	0,1502
Senior Biology Technician	5	7,46	7	3,93	4,49	[0,52-5,61]	0,1927
TSCGO*	4	5,97	4	2,25	2,56	[0,58-9,94]	0,1230
TSCGO/ORL**	4	5,97	5	2,81	3,21	[0,49-7,37]	0,1815
Total	67	100,00	156	100,00	100,00		

*Senior technician in general and obstetric surgery

** Senior technician in general surgery, obstetrics, and otorhinolaryngology

Tableau VI : correlation between the sector and BEA's antecedent

Sector	BEA's antecedent				OR	IC	P
	Yes	%	No	%			
Home	0	0,00	2	1,18	0,00	ND	0,2559
Administration	1	1,49	3	1,78	0,8384	[0,08-8,20]	0,4704
Pathological Anatomy	2	2,99	2	1,18	2,5692	[0,35-18,62]	0,1949
Operating Room	7	10,45	5	2,96	3,8265	[1,16-12,51]	0,0153
Laundry	0	0,00	5	2,96	0,00	ND	0,0925
Kitchen	1	1,49	3	1,78	0,8384	[0,08-8,20]	0,4704
Hygiene	9	13,43	42	24,85	0,4692	[0,21-1,02]	0,0262
Imaging	2	2,99	10	5,92	0,4892	[0,10-2,29]	0,1927
Laboratory	3	4,48	9	5,33	0,8333	[0,21-3,17]	0,4143
Maintenance	0	0,00	3	1,78	0,00	ND	0,1826
Billing	0	0,00	2	1,18	0,00	ND	0,2559
Intensive Care	5	7,46	5	2,96	2,6452	[0,74-9,45]	0,0762
Security	0	0,00	14	8,28	0,00	ND	0,0039
Surgical Specialty	11	16,42	20	11,83	1,4634	[0,65-3,24]	0,1780
Medical Specialty	17	25,37	27	15,98	1,7880	[0,89-3,55]	0,0524
Sterilization	0	0,00	3	1,78	0,00	ND	0,1826
Surgical Emergency	4	5,97	3	1,78	3,5132	[0,76-16,14]	0,0618
Medical Emergency	5	7,46	11	6,51	1,1584	[0,38-3,47]	0,3899
Total	67	100,00	169	100,00			

DISCUSSION

The study was conducted to assess the knowledge, attitudes, and practices of the HRM staff. It is a preliminary study following the creation of a committee responsible for the fight against occupational exposure to blood in the HRM. The participation rate of 75% of the staff is quite significant. Similar studies conducted in other countries, particularly in Mali in 2024 [6], in Morocco in 2017 [7], in Congo Brazzaville in 2018 [8], and in Benin in 2024 [9], reported varying rates of 65,3%, 90.2%, 69.9%, and 85.2%, respectively.

The average age was relatively young at 39.42 ± 8.58 years and the age group from 35 to 44 years was the most represented, accounting for 40.33% of the individuals. This same observation has been made in several other studies, notably in Mali in 2024 [6], in Morocco in 2014 [10], in Congo in 2020 [11], and in Tunisia in 2023 [12], with respective averages of 32 years, 43 years, 43.2 years, and 38.79 years. This youthfulness of our study population can be explained by the demographic distribution of our country's population. Indeed, according to the demographic study conducted in 2020, over

50% of the Nigerien population was under 25 years of age.

The assessment of the staff shows that 80.63% of respondents (n=204) had heard of BEAs, with just over half (52.04%) through training. More than a third (36.82%) of the staff considered their level of knowledge about BEAs to be average, while 23.43% considered their level of knowledge insufficient.

Regarding awareness of the risk of occupational exposure, 239 people responded to this question, among whom 77.82% (n=186) seem to perceive the risk of occupational exposure to blood or body fluids related to the work environment; however, 22.28% stated that they perceived no risk related to the work environment. Sagodogo et al. in Mali [13] reported that 78.31% of healthcare workers seemed aware of the risk incurred, compared to 21.69% who were not aware of the risk of contamination related to an BEA.

The significant proportion of agents with insufficient knowledge and unaware of the risks involved, underscores the urgent need to improve staff knowledge in order to minimize the risk of BEAs.

In 27.94% of cases (n=69), respondents reported having already been the victim of an

occupational exposure to blood (OEB) during their career, of which 63.08% had reported the incident. Sanou et al. in Mali [6], C.D. Fanou in Benin [9] reported that 88.30% and 38.60% of staff had been victims of OEB, respectively; however, only 35.90% and 8.20% had reported the incident. Lower proportions of OEB reporting were reported by M.C. Koné in Mali [14] and Hanane B in Morocco [7], with 6.10% and 24.70%, respectively. This low rate of OEB history in our context could be due to underestimation. Indeed, many staff members do not report OEB incidents. Non-reporting could be related to fear of stigmatization, lack of awareness of its mandatory nature, absence or unawareness of the care pathway in case of OEB, or fear of being sanctioned. This non-reporting could lead to seroconversions among the victims.

Regarding viral and vaccination history, it appears that 45.06% (n=114) of individuals had undergone at least one hepatitis B virus (HBV) screening test, of which eight cases were positive, representing 7.14%. As for hepatitis C virus (HCV), only 11.65% (n=29) of respondents had previously undergone a screening test, with one case (3.45%) showing a positive serology. This rate of performing viral hepatitis B and C serologies may be related to the fact that they are not mandatory for entering the healthcare sector. It would be desirable for every healthcare worker or anyone working in a healthcare facility to be aware of their status regarding these viruses.

Hepatitis B vaccination had been carried out in 33.76% (n=79) of the staff included in the study. Benali B et al in Algeria [15] reported higher rates of hepatitis B vaccination, ranging from 48.49% to 64.64% depending on staff categories. This low vaccination rate in our context could be related to the non-mandatory nature of screening and vaccination, as well as the cost or unavailability of the hepatitis B vaccine.

Nurses and cleaning technicians were the most represented categories among the respondents, with 31.74% and 24.35%, respectively. The bivariate analysis between a history of occupational exposure to blood (OEB) and professional category shows a statistically significant link between the two variables ($P < 5\%$). Sanou F et al. in Mali [6] also found nurses and support staff to be the most represented categories of health workers, with 47.6% and 11.7%, respectively. Benali B et al. in Algeria

[15] reported that comparing OEB incidents reported by housekeepers and paramedics revealed a statistically significant difference ($p < 5\%$). The predominance of nurses could be explained by their higher representation in care units, and due to their role, they are one of the categories most exposed to the risk of OEB.

The assessment of the current knowledge level of the surveyed individuals regarding the circumstances of the occurrence of blood exposure accidents, transmissible pathogens, preventive measures, and actions to take in case of an BEA (Tables III, IV) reveals an average knowledge level of $70.97 \pm 19.80\%$. In 66.28% of cases (n=171), the knowledge level was $> 70\%$ (figure 2). Although this knowledge level is generally satisfactory, some responses highlight the urgent need to strengthen competencies in this area. Indeed, systematically recapping syringes after use and checking the patient's status before providing care after an BEA were identified as means of preventing BEAs, with 54.47% and 31.62% respectively. The same applies to applying a tourniquet and performing a bloodletting in the case of a needle stick or cut from contaminated material, which are considered actions to adopt in the event of an BEA.

Preventive equipment, particularly personal protective equipment (PPE), appeared to be generally available, though there were disparities depending on the type of equipment. However, their use was not always consistent. In fact, only 68.92% (n=153) of respondents reported using PPE daily. This deviates from the standard precautions established for occupational exposures to blood (OEB); hence, there is a need to strengthen staff awareness regarding compliance with these precautions to minimize the risk of OEB.

CONCLUSION

The analysis of the results from this study highlights a number of issues, notably a low level of knowledge about occupational exposures to blood (OEB) and a deficiency in the implementation of preventive measures, particularly insufficient use of personal protective equipment (PPE), gaps in post-exposure management, and shortcomings in screening and vaccination against HBV. These results demonstrate the urgent need to raise awareness and train staff, ensure the constant availability of PPE, promote guidelines for

managing OEB, and ensure adherence to standard precautions.

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