

# SYSTEMATIC OR INTEGRATIVE REVIEW

## RECOMMENDATIONS FOR PREVENTION AND CONTROL FOR THE CARE OF PATIENTS WITH EBOLA IN HEALTH INSTITUTION

RECOMENDAÇÕES DE PREVENÇÃO E CONTROLE PARA O CUIDADO DE PACIENTES COM EBOLA EM INSTITUIÇÕES DE SAÚDE

RECOMENDACIONES PARA LA PREVENCIÓN Y EL CONTROL DE LA ATENCIÓN DE PACIENTES CON ÉBOLA EN LAS INSTITUCIONES SANITARIAS

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### ABSTRACT

A review study of national and international databases was conducted to identify the best prevention and control recommendations for direct care of patients with Ebola. For the research articles from national and international databases were used. The study sample consisted of 14 articles. Ebola hemorrhagic fever has epidemic characteristics and therefore the implementation of prevention and control strategies directly influence the risk of infection and disease transmission. The use of standard precaution measures, contact prevention and droplets, as well as proper care of medical equipment and materials are essential and should be adopted. Training of health professionals, as well as providing resources for the work by the health institutions are ethical ways to ensure that healthcare staff have a safe work environment with minimal risk of contamination and are able to provide the best care to patients.

**Keywords:** Hemorrhagic Fever, Ebola; Nursing Care; Clinicals Protocols.

### RESUMO

*Estudo de revisão em base de dados nacionais e internacionais foi conduzido para identificar as melhores recomendações de prevenção e controle para o cuidado direto a pacientes com ebola. Para a pesquisa foram utilizados artigos de bases de dados nacionais e internacionais. A amostra do estudo foi constituída de 14 artigos. A febre hemorrágica ebola tem características epidêmicas e, portanto, a implementação de estratégias de prevenção e controle influenciam diretamente o risco de infecção e transmissão da doença. A utilização de medidas de precauções-padrão, de prevenção por contato e via perdigotos, além de cuidados com equipamentos e materiais médico-hospitalares, é imprescindível e deve ser adotada. A capacitação e treinamento contínuo dos profissionais de saúde, bem como o fornecimento de recursos para o trabalho por parte das instituições de saúde, são formas éticas de garantir aos profissionais um atuar seguro com mínimos riscos de contaminação e propiciar aos pacientes o melhor cuidado.*

**Palavras-chave:** Febre Hemorrágica do Ebola; Cuidados de Enfermagem; Protocolos Clínicos.

### RESUMEN

*Se trata de una revisión de la literatura nacional e internacional para identificar las mejores recomendaciones sobre prevención y control en la atención directa de pacientes con Ébola. Para la investigación se utilizaron artículos de bases de datos nacionales y extranjeras. La muestra estuvo compuesta por 14 artículos. La fiebre hemorrágica del Ébola tiene características epidémicas y, por lo tanto, la implementación de estrategias de prevención y control influye directamente sobre el riesgo de infección y de transmisión de la enfermedad. Medidas de precauciones estándar, de prevención de contacto y del contagio a través de las gotas de saliva al toser, además del cuidado con equipos y material médico hospitalario, son esenciales y deben ser adoptadas. La capacitación y formación continua de los profesionales de la salud, así como la provisión de recursos para el trabajo por parte de las instituciones sanitarias son formas éticas correctas para garantizar seguridad a los profesionales, con poco riesgo de contaminación, y mejor atención a los pacientes.*

**Palabras clave:** Fiebre Hemorrágica Ébola; Atención de Enfermería; Protocolos Clínicos.

## INTRODUCTION

Ebola Hemorrhagic Fever (EHF) is a rare, serious and fatal disease that affects humans and primates like monkeys, gorillas and chimpanzees. The disease has manifested itself sporadically as epidemics in many countries in Africa since its discovery in 1976, around the Ebola River, now the Democratic Republic of Congo.<sup>1</sup>

The 2014 epidemic is the largest in history, affecting several countries in West Africa with worldwide repercussions. Two imported cases, including one death and two cases locally acquired in health care workers have been reported in the United States, and a confirmed case was reported in Spain. In Brazil, there haven't yet been any confirmed cases.<sup>2,3</sup>

This illness/disease is caused by infection of a species of the Filoviridae virus family, Ebolavirus genre. There are five currently identified virus species, four of them known to cause disease in humans such as the Ebola virus (Zaire ebolavirus), Sudan virus (Sudan ebolavirus), Tai Forest virus (Tai Forest ebolavirus) and Bundibugyo virus (Bundibugyoebolavirus). The fifth species, the Reston virus has only caused infection in primates.<sup>1</sup>

The natural source/reserve of the Ebola virus remains unknown. Based on evidence and other similar viruses, researchers believe that the virus can be transmitted by animals native to Africa and the frugivorous bats may be the most likely reserve.<sup>1</sup>

The virus is transmitted through direct or indirect contact with the blood or body fluids (including sweat, tears, vomit, feces, urine, breast milk, semen and mucus) of infected persons, living/alive or dead, through the eyes of the mucous membranes, nose, mouth, and skin with continuity of injury (cuts, wounds and abrasions) of healthy people. Transmission can also occur through objects (needles, syringes, clothes, bedding, medical equipment) that have been contaminated with the virus. It is not spread by air, water, or by food. However, in Africa the virus has been known in some past pandemics to have spread as a result of handling and consuming/eating the meat of some animals such as monkeys and also from contact with infected bats.<sup>4</sup>

There is no evidence that mosquitoes or other insects can transmit the Ebola virus. Only a few mammalian species such as humans, bats and monkeys have demonstrated the capability of becoming infected with Ebola virus and transmit it to healthy people.<sup>4</sup> The transmission from person to person can lead to a large number of people being affected.

The signs and symptoms of Ebola hemorrhagic fever initially include high fever, severe headache, muscle pain, weakness, fatigue, and sore throat. The infected person may also have a rash, diarrhea, vomiting, stomach pain, dark spots on the skin, kidney and liver dysfunction and internal bleeding. Symptoms may appear between 2 and 21 days after exposure to the Ebola virus, but the average is 8-10 days.<sup>5</sup> Patients transmit the virus only when they start to have symptoms.

There is no vaccine or antiviral drug available for Ebola hemorrhagic fever yet. Clinical symptoms of Ebola and its complications are treated as they appear. The basic interventions when the infection is caught early can significantly improve the survival chances of sick patients. Patients may receive intravenous fluid support for replacement of electrolytes, oxygen therapy, blood pressure control, and antibiotic treatment for secondary infections, among others.<sup>6</sup>

The recovery of patients with an established infection depends on good clinical care support and immune response of the patient. Patients who have recovered from an Ebola virus infection have developed antibodies against the disease for a minimum of 10 years.<sup>5</sup>

The Ebola virus can be detected in blood only after the onset of symptoms. As a fever provides an increase of the virus circulating, it may take up to three days after the onset of symptoms for the virus to reach detectable levels. Within a few days of the onset of symptoms, laboratory tests may be used and these include Antigen-capture enzyme-linked immunosorbent assay – ELISA, Immunoglobulin – IgM ELISA, Polymerase Chain Reaction (PCR) and the isolation of the virus.<sup>7</sup>

Although the virus has not been transmitted through the air, droplets of respiratory secretions present in sneezing or other secretions of a sick person can be infectious, and therefore contaminate objects and surfaces that can be manipulated. On dry surfaces the virus can survive for several hours, and in body fluids such as blood it can survive up to several days at ambient temperatures.<sup>4</sup>

Thus, certain precautions (standard, contact and droplets) are recommended for use in health care settings to prevent transmission of Ebola virus from ill/infected patients to health professionals, other patients and family. These are the people who are most at risk of becoming infected by contact with secretions in proximity of a patient.<sup>4</sup>

It is known that some viruses such as Ebola hemorrhagic fever can spread to other geographical areas by accessibility to air transport. Intercontinental travel of people who had contact with the sick or inadvertently with secretions of a sick person can facilitate the rapid spread of these viruses such as Ebola hemorrhagic fever and place the world population at risk. Epidemics constitute a major challenge for international and national health systems.

To confront the Ebola epidemic in progress in West Africa, the Brazilian health system, health institutions and especially health professionals need to be prepared, equipped and well-trained to identify the signs and symptoms of Ebola hemorrhagic fever, take care of infected people and prevent the spread of infection.

This study aims to answer the following research question: What are the measures of prevention and control to be ad-

opted by health professionals for care of patients admitted to health institutions with Ebola?

## MATERIALS AND METHODS

A systematic survey of current information on the topic was conducted in the form of a comprehensive literature review. The best evidence was sought to subsidize the daily clinical practice of health professionals which could help establish prevention and control of Ebola virus infection in the provision of nursing care in health institutions.

The review was conducted between September and November 2014. The survey was conducted in the virtual databases of the Virtual Health Library – BVS, Publisher Medline – PubMed and Cumulative Index to Nursing & Allied Health Literature – CINAHL. In BVS, we used articles identified in the following electronic databases: Health Information Locator – LIS, Evaluation in Health Technology – HTA, Scientific and technical publications of the Department of Health of São Paulo – SES-SP, the World Health Organization Library Information System – WHOLIS.

Complete, available and published articles that addressed the recommendations for the care of patients with Ebola were used as inclusion criteria for publications in the study, regardless of the date of publication, in English, Spanish, Portuguese and French.

The following keywords were used in Portuguese, English and Spanish: “Ebola Hemorrhagic Fever,” “Ebola,” “Ebolavirus,” “Care,” “Nursing Care” and “Health Care,” according to strategies in the three databases as shown in Table 1.

375 articles distributed in research databases were found. 149 Medline articles were excluded due to repetition and 13 after full reading by not addressing the topic under study. A reverse search was carried out trying to find the most relevant publications on the subject and identified 05 international and national publications. The number of items found at each database and the selection process can be seen in the Figure 1 flowchart.

Thus, for purposes of this review 14 items were selected to compose the sample of this study.

## RESULTS

The review sample consisted of 14 studies, and of these 11 (78.57%) were published in English and 03 (21.43%) in Portuguese. Most publications are international (78.57%) and originated from countries like the United States, Belgium and Switzerland. Among the 11 international studies, 09 (81.8%) were from the United States. Of the 14 articles for review, 07 (50%) were classified as literature review, 01 (7.14%) as reporting experience, 01 (7.14%) a technical note from the State Department of Health of São Paulo and 05 (35.7%) were information contained in “Guidelines” from the CDC and the World Health Organization. All items were classified as level of evidence VI.<sup>8</sup>

The control of Ebola hemorrhagic fever is an important and necessary strategy but complex from an operational point of view. Prevention and control measures should be employed to prevent person to person transmission and the spread of the virus among healthy people.<sup>9</sup>

The risk of Ebola virus transmission from a sick patient to a health professional depends on the available infrastructure for this professional for attending to a patient with suspicion or confirmation of the infection. This professional must be prepared to screen/triage this patient in relation to the exposure of signs and non-specific symptoms of the sickness. Transmission of the virus is directly related to the time and degree of exposure to blood or infectious body fluids without personal protective equipment (PPE) and is dependent on the severity of disease symptoms. Severe haemorrhagic fever is strongly associated with higher virus production levels. In addition, close contact with the patient and invasive medical care may increase opportunities for transmission.<sup>10,11</sup>

Table 1 - Search strategies in each database

Database	Search Strategies
PubMed	(((((“Hemorrhagic Fever, Ebola”[Mesh]) OR “Ebolavirus”[Mesh])) AND (((“Critical Pathways”[Mesh]) OR “Delivery of Health Care”[Mesh]) OR “Nursing Care”[Mesh]))) OR (((ebola OR Ebolavirus OR “ebola hemorrhagic fever”[Title/Abstract])) AND (“Critical Pathways” OR “Delivery of Health Care” OR “Nursing Care” OR care[Title/Abstract]))
BVS	(mh: C02.782.417.415\$ OR “Hemorrhagic Fever, Ebola” OR “Fiebre Hemorrágica Ebola” OR “Febre Hemorrágica do Ebola” OR “ebola hemorrhagic fever” OR MH: B04.820.455.300.200\$ OR Ebolavirus OR EBOLA) AND (MH: E02.760.611 OR “Nursing Care” OR “Atención de Enfermería” OR “Cuidados de Enfermagem” OR cuidado* OR care OR MH:N04.590.374\$ OR MH: N05.300\$ OR MH: SP2.016\$ OR MH: VS3.003\$ OR “Delivery of Health Care” OR “Prestación de Atención de Salud” OR “Assistência à Saúde” OR MH: N04.590.233.624.625 OR “Critical Pathways” OR “Medios Críticos” OR “Procedimentos Clínicos”)
CINAHL	(mh: C02.782.417.415\$ OR “Hemorrhagic Fever, Ebola” OR “Fiebre Hemorrágica Ebola” OR “Febre Hemorrágica do Ebola” OR “ebola hemorrhagic fever” OR MH: B04.820.455.300.200\$ OR Ebolavirus OR EBOLA) AND (MH: E02.760.611 OR “Nursing Care” OR Fiebre Hemorrágica Ebola ” OR “ Fiebre Hemorrágica Ebola ” OR cuidado* OR care OR MH:N04.590.374\$ OR MH: N05.300\$ OR MH: SP2.016\$ OR MH: VS3.003\$ OR “Delivery of Health Care” OR “Prestación de Atención de Salud” OR “Assistência à Saúde” OR MH: N04.590.233.624.625 OR “Critical Pathways” OR “Medios Críticos” OR “Procedimentos Clínicos”)

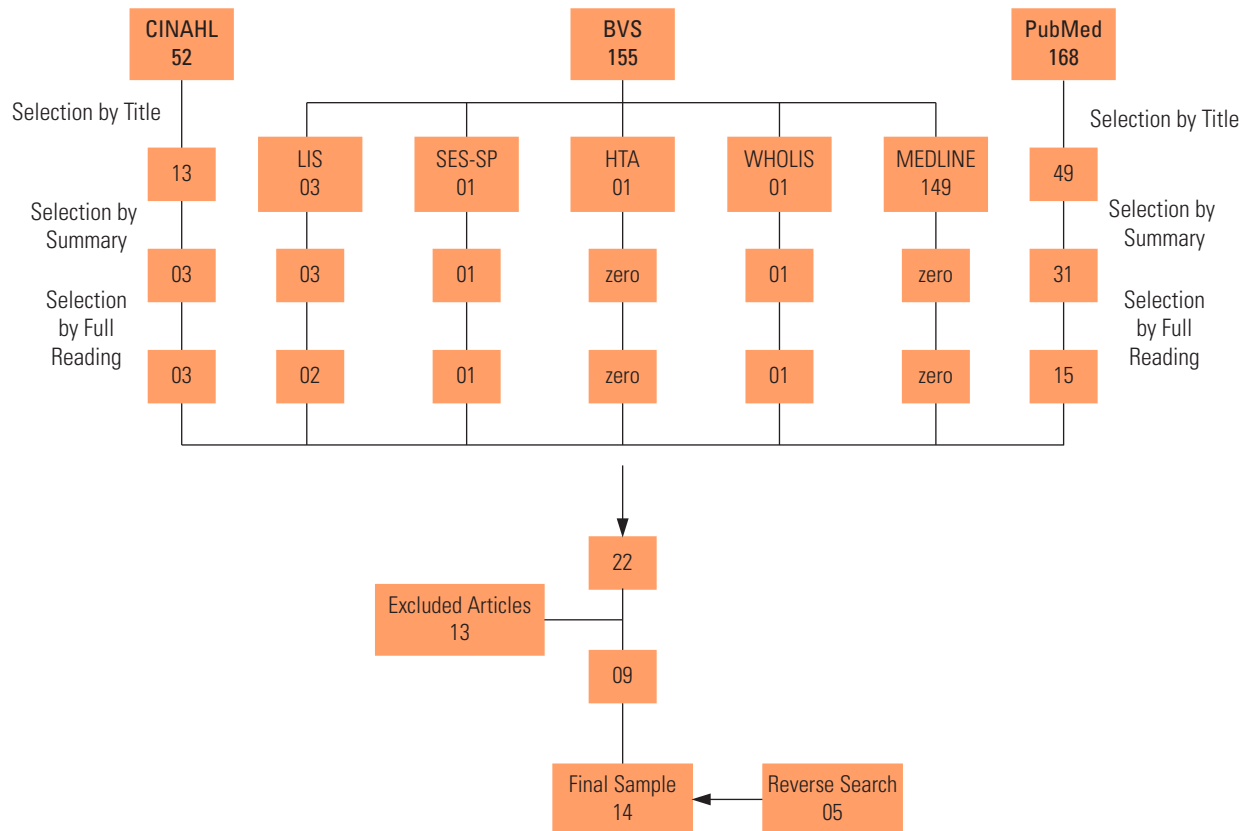


Figure 1 - Flowchart of Selection Process Searches of Articles.

For the care of suspected or confirmed cases of infection associated with the Ebola virus, measures of precaution by contact and by droplets are recommended for the management of these patients coming to the hospital.<sup>9</sup>

It is emphasized that the recommendations for prevention and control of Ebola virus infection in hospitals are applicable to any health care environment and provide guidance for all health professionals.

For ease of presentation and organization of the results, four thematic categories were established. The results were categorized into recommendations for prevention and control directed to the health professional, the patient in relation to the environment and other recommendations. As already said above, all items included in these four themes presented evidence level VI. Importantly, the review of studies included had information based on the recommendations for prevention and control of infectious diseases, specific to the Ebola virus developed by the CDC and the World Health Organization, thus containing highly reliable information for clinical application.

Recommendations for prevention and control directed to the health professional:<sup>12-22</sup>

- restriction of the number of health professionals with access to the isolated (quarantined) area;

- continuous training of health professionals;
- psychological care/support for professionals involved in caring for patients with Ebola for support and demystification of the disease;
- mandatory and correct use of PPE by health professionals in contact with the patient and with body fluids. PPE must include cap with facial extension, goggles or face shield, surgical mask or respirator mask type N95 / N99, waterproof coat over hospital clothing, waterproof apron, two pairs of gloves, rubber boots or waterproof shoe protectors. If they choose to use mask N95 / N99, the professional must be extra careful not to touch the face skin while handling the patient or during removal of PPE;
- PPE must be used correctly, remaining in place and should not be adjusted for patient care;
- hygienic washing of hands as protocol after each manipulation of the patient and removal of gloves; frequent disinfecting of gloved hands (outer gloves and inner gloves) with chlorinated or alcoholic solution;
- establish protocols (algorithms) of care to be followed by professionals: triage, transportation, cleaning of the rooms and attached rooms, isolation/quarantine, control professionals in contact with the patient, family contact (visits),

treatment, putting on and removing PPE, cleaning and disinfecting the room and hospital medical supplies, storage and collection of clothes, waste destinations, and non-invasive and invasive care, among others;

- protocol implementation for putting on and removing personal protective equipment, making them visible to the professionals;
- PPE use requirements step by step: collect all the necessary items of PPE; put on a hospital gown underneath; then the waterproof coat, wear boots or waterproof shoe protectors, place the mask respirator on the face, the goggles / face shield, the cap on the head, hygienically wash hands and put on the double gloves and finally a waterproof apron over top of the waterproof coat;
- it is recommended that a trained health professional is responsible for observing and monitoring the health professional (the care provider) in the walkthrough of putting on and removing the PPE;
- removing PPE is a high-risk process that requires a structured procedure, with well-defined stages. The observer will read aloud for the professional every step to follow. PPE should be removed slowly in the correct sequence to reduce the possibility of contamination or other self-exposure to the Ebola virus;
- to remove PPE, the following protocol must be adhered to: before entering the removal area of the PPE, inspect if there is any visible contamination on the external area of the PPE/clothing, and if any is spotted, disinfect; disinfect the outer gloves with disinfectant and allow them to dry; remove the waterproof apron from the inside out (if using) and discard the apron taking care to avoid contamination; inspect the PPE again; disinfect the outer gloves with disinfectant solution again; remove and discard without touching hands on the rubber boots or waterproof protection of the shoes; if you are using rubber boots, disinfect before removal; disinfect and remove the pair of outer gloves and discard them in a proper container, taking care not to contaminate the inner sleeve during the removal process; inspect and disinfect inner gloves, and let them dry; then remove the inner coat from the inside to avoid contamination with the outside; to disinfect the inner gloves, remove them and wash your hands with soap and water and then 70%rubbing alcohol gel; put on a new pair of gloves; remove the goggles / face shield, the hat and the mask; disinfect the gloves, remove the inner clothing; remove the gloves and hygienically wash hands with friction with 70%alcohol gel before leaving the change room; if necessary the professional should take a shower with soap and water at the end of each shift;
- minimize invasive procedures on the patient;
- optimize care to remain in isolation/quarantine for the shortest possible time;
- the material (blood or tissue) should be transported at room temperature in the triple boxes designated as Category "A" infectious substances to a reference laboratory;
- all PPE should be used for taking care of the body/corpse after death,. Surfaces and equipment in contact with the body must undergo cleaning with soap and water and disinfected with a chlorine or alcohol solution. The body must be packed in a sealed bag to be placed in a sealed coffin.

Patient-related recommendations to prevent and control Ebola:<sup>14,15,21,22</sup>

- immediate isolation/quarantine of the suspected infected patient;
- keep the restricted patient in the isolated environment; a private / local closed room with closed doors, air conditioning, sink, private bathroom, next to a support room with two rooms, one considered clean and other potentially contaminated;
- advise the patient regarding the use of condoms for three months after recovery from illness. Although the Ebola virus has been detected in the semen of recovered patients, it is unknown whether the virus can be transmitted through sexual intercourse (including oral sex).

Recommendations for prevention and control related to the environment:<sup>12-17, 20-22</sup>

- isolation/Quarantine area must be geographically separated from other hospital care units;
- ID alerts outside the door. Distribution of posters with the flowcharts and protocols established for handling the patient and use of Personal Protective Equipment – PPE;
- dispensers with soap / detergent and 70% alcohol gel must be made available in the room;
- professionals with cutaneous or percutaneous exposure to blood, body fluids, secretions or excretions of a person suspected of EHF should immediately wash the affected area with soap and water. Mucous membranes should be irrigated thoroughly with water. The efficacy of antiseptics is unknown;
- use alcoholic solutions or chlorine-based disinfectant for surfaces and equipment according to the manufacturer's instructions;
- medical and hospital equipment such as thermometers, stethoscopes, pressure vessels and others must be only used on the patient and need to be cleaned and scrubbed after each use with alcohol solution;
- daily cleaning of equipment and surfaces of the room furniture with detergent / soap and water, followed by disinfecting (with friction) with alcoholic or chlorine based solutions;

- cleaning and disinfecting of surfaces with blood spatter or body fluids should be done by covering the area with an absorbent paper towel, removing any secretion, cleaning with detergent / soap and water, then disinfecting (with friction) with alcohol-based or chlorine-based solution, then let the area dry;
- provide waterproof containers for the disposal of used/worn PPE;
- supplies must be provided for hygienically disinfecting the PPE worn by the professional in the PPE removal area;
- clean and disinfect the PPE removal area environment after finishing the procedure;
- utensils such as cutlery, glasses, etc. should be disposable;
- Waste arising from attending to patient infected with the Ebola virus should be treated before disposal;
- bedding and clothing used by the patient in the hospital should be handled with caution and using PPE; they must be packaged in hampers, closed, identified, and properly transported to the hospital laundry facilities, where they should be handled with care and be processed in a machine with hot water and chlorine solution according to the laundry protocol.

Other prevention and control recommendations:<sup>19, 21,22</sup>

- immediate reporting of suspected and confirmed cases;
- implementation of standard precautions, contact and droplets;
- restriction of patient visits; Supervised visits; Orientation and training for the family to visit.

## FINAL CONSIDERATIONS

Ebola Hemorrhagic Fever caused by the Ebola virus is a rare infectious disease with epidemic characteristics sporadically occurring in countries in Africa. It has a high rate of illness/infection and 90% mortality.

The appearance of Ebola virus outbreaks is directly related to poor living conditions, hunger, lack of access to health services and the health conditions of the affected population. In these countries, the control of these epidemics is difficult and complex because they depend on changes in habits and customs deeply rooted in the culture of the people such as hunting and consuming the meat of monkeys and funeral rituals.

Preventive measures should be taken by local health authorities, as well as continuous guidance and social mobilization campaigns for clarification directed at the highest risk populations, on hygiene / health to minimize the development of new epidemics and consequent geographical spread through travelers coming from epidemic areas.

Once the virus is established in an area, prevention and control strategies and care protocols should be implemented. Among the measures of prevention and control of infection are the strengthening of physical resources, materials and human health institutions to receive suspected cases and patients, and training of health professionals for the early identification and management of the infections with the use of standard precautions of contact and of droplets, in addition to caring for the hospital environment, materials and medical equipment.

It is known that poorly equipped hospitals whose medical staff is unprepared for invasive procedures for patients with Ebola may/will expose their health professionals to contamination by bodily fluids of a patient in the period when they are at a high viral contamination. This is worrying and challenging for authorities and health professionals.

Even with the small chance of Ebola becoming an epidemic in Brazil, it is necessary that health institutions and their staff are operationally, technically and scientifically prepared and trained to efficiently respond to occupational risks of contamination inherent in caring for patients with Ebola.

Important ethical issues surrounding the virus, patients and health professionals should be considered. How to provide safe care in the twenty-first century? Is saving lives a threat to the safety and lives of nurses and medical professionals? Are we really prepared and organized to face the threat of an Ebola epidemic?

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