Ebola Care Guideline

by Xinyu Liu, Juhan Sonin, Emily Twaddell ● Involution Studios

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On 8 August 2014, the World Health Organization (WHO) declared an international emergency in relation to the outbreak of Ebola Virus Disease (EVD), stating that a coordinated response would be essential to stop the spread of the virus. Since then, caregivers have contracted EVD in the US, Spain, and other parts of Africa. Protecting those who care for EVD victims is critical. Yet resource-rich countries are scrambling to create safe conditions and provide appropriate supplies and education for medical personnel on the front lines.

This is an open source, publicly available, three-ward care plan for evaluation and treatment of EVD patients. Data and examples have been gathered from the Centers for Disease Control (CDC), WHO, National Institutes of Health (NIH), Massachusetts General Hospital, and other global resources (see References). This is a living document that will be regularly updated when new, clinically relevant information is vetted.

Email us at **stopebola@goinvo.com** with your feedback.

1. *Ebola Standard of Care* (Version 0.79, 9 October 2014).
2. "Case Definition for Ebola Virus Disease (EVD)," last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/hcp/case-definition.html
3. "When Caring for Suspect or Confirmed Patients with Ebola," last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/hcp/caring-for-ebola-suspects.html
4. "Safe Management of Patients with Ebola Virus Disease (EVD) in U.S. Hospitals," last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/hcp/patient-management-us-hospitals.html
5. "Interim Guidance for Specimen Collection, Transport, Testing, and Submission for Persons Under Investigation for Ebola Virus Disease in the United States" last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html
6. "Interim Guidance for Monitoring and Movement of Persons with Ebola Virus Disease Exposure," last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/hcp/monitoring-and-movement-of-persons-with-exposure.html
7. "Treatment," last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/treatment/index.html
8. "Interim Guidance for Healthcare Workers Providing Care in West African Countries Affected by the Ebola Outbreak: Limiting Heat Burden While Wearing Personal Protective Equipment (PPE)," last modified Oct 20, 2014, http://www.cdc.gov/vhf/ebola/hcp/limiting-heat-burden.html
9. "Protection from Ebola: A complicated procedure," last modified Oct 20, 2014, http://apps.washingtonpost.com/g/page/national/protection-from-ebola-a-complicated-procedure/1374/
10. "How does an American nurse contract Ebola? With directions like these," last modified Oct 20, 2014, http://www.vox.com/2014/10/13/6968775/ebola-nurse-united-states-texas-directions-protocol-breach

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1

INITIAL PATIENT EVALUATION[1,2,3,4,5,6]

Identify Symptoms:

Fever > 100.4 °F / 38.0 °C AND
- **Wet symptoms: diarrhoea, vomiting, unexplained bleeding**/bruising OR
- Dry symptoms: severe headaches, abdominal pain, sore throat, breathing difficulties, muscle pain, joint pain, weakness, hiccups.

Identify EVD Exposure Risk:
- Direct contact with symptomatic or deceased Ebola patient in past 21 days
- Residence in/travel to area where EVD transmission is active
- Direct handling of infected animals or meat from disease-endemic areas

High Risk:

*Body fluids include blood, vomit, urine, feces, sweat, semen, saliva, and other fluids
- Percutaneous (e.g., needle stick) or mucous membrane exposure or direct skin contact with body fluids of a confirmed EVD patient without appropriate personal protective equipment (PPE)
- Laboratory processing of body fluids of a confirmed EVD patient without appropriate PPE or standard biosafety precautions
- Direct contact with a dead body without appropriate PPE in a region where an EVD outbreak is occurring*

Low Risk:

*Close contact is defined as (a) being within approximately 1m/3ft. of an EVD patient or within the patient's room or care area for a prolonged period of time while not wearing recommended PPE or (b) having direct brief contact (e.g., shaking hands) with an EVD patient while not wearing recommended PPE. (Brief interactions, such as walking by a person or moving through a hospital, do not constitute close contact.)
- Residence in the same house with a confirmed EVD patient
- Caring for EVD patient in health care facility or community setting

No Recognized Risk:

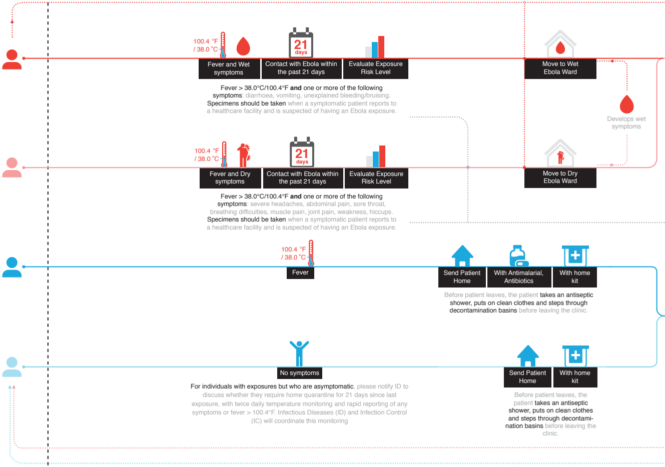
There is no identified risk exposure for those who were present in a country in which an EVD outbreak occurred within the past 21 days, but who have had no high or low risk exposures.

Provider Protocol

These recommendations are intended only to
organizational policies apply.

If a patient meets Ebola suspect-case criteria

1. Call the Emergency Department (ED) imm
for EVD so that emergency personnel can
2. If the patient is at home, tell the patient to
by a physician to be transported to the ED
3. If applicable, call the Infection Control Uni
4. As soon as possible, move the patient into
closed. If AII room is used, validate negativ
5. Limit staff contact with the patient. All pers
    a. Disinfect their hands with alcohol-based
    b. Put on the following PPE: cone-shaped
    fluid-resistant or impermeable gown, full-fa
6. If the ED confirms that the patient meets s
the ED via wheelchair or stretcher. ED staf
evaluation.
7. Before moving patient from AII room, plac
8. Where applicable, contact clinic Security.
    a. Security personnel must clear the travel
    b. Security personnel do not require the us
    the patient.
    c. Police and Security will determine the be
9. After patient leaves the facility, close the r
germicidal cleaner per EVD Discharge Cle



Fever > 38.0°C/100.4°F **and** one or more of the following **symptoms**: diarrhoea, vomiting, unexplained bleeding/bruising. **Specimens should be taken** when a symptomatic patient reports to a healthcare facility and is suspected of having an Ebola exposure.

Fever > 38.0°C/100.4°F **and** one or more of the following **symptoms**: severe headaches, abdominal pain, sore throat, breathing difficulties, muscle pain, joint pain, weakness, hiccups. **Specimens should be taken** when a symptomatic patient reports to a healthcare facility and is suspected of having an Ebola exposure.

Before patient leaves, the patient **takes an antiseptic shower, puts on clean clothes and steps through decontamination basins** before leaving the clinic.

For individuals with exposures but who are asymptomatic, please notify ID to discuss whether they require home quarantine for 21 days since last exposure, with twice daily temperature monitoring and rapid reporting of any symptoms or fever > 100.4°F. Infectious Diseases (ID) and Infection Control (IC) will coordinate this monitoring

Before patient leaves, the patient **takes an antiseptic shower, puts on clean clothes and steps through decontamination basins** before leaving the clinic.

provide a guideline for your healthcare organization. Government, local, and

based on symptoms, travel history, and exposure risk, take the following steps.
nediately and indicate that the patient needs to be transported to the ED with concern
use appropriate precautions.
call Emergency Medical Services (EMS) and indicate that he/she has been instructed
with concern for Ebola so that emergency personnel can use appropriate precautions.
t to report the suspect case.
o an Airborne Infection Isolation (AII) room, if available, or a private room. Keep the door
ve airflow.
sonnel entering the room must:
hand rub.
surgical mask, 2 pair gloves (one under and one over the cuff of the gown),
ace shield for eye protection.
suspect case criteria, coordinate transport of the patient directly from provider location to
f will provide guidance on who will accompany patient from provider to ED for

e a cone-shaped surgical mask on patient and cover patient with a clean sheet

route and facilitate transport.
se of personal protective equipment (PPE) because they will not have direct contact with

est route to the ED
oom and do not use until it is cleaned and disinfected with hospital-approved, bleach
aning Protocol.

2 TREAT PATIENT[17]

Standard

Symptoms of Ebola are treated as they appear. The following basic interventions, when used early, can significantly improve the chances of survival:

- Providing intravenous fluids (IV) and balancing electrolytes (body salts) • Maintaining oxygen status and blood pressure
- Treating other infections if they occur

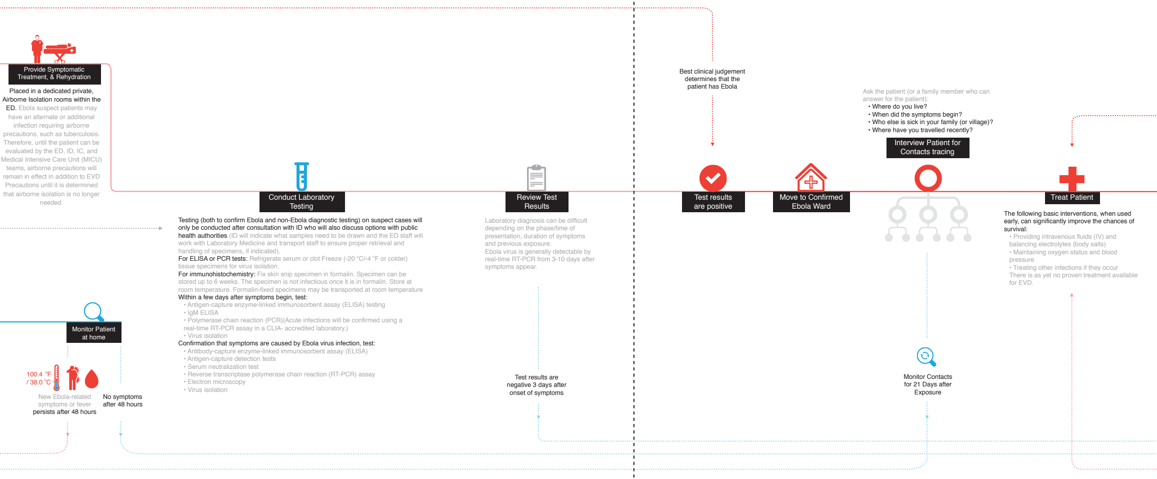
There is as yet no proven treatment available for EVD.

Experimental

Some experimental treatments developed for Ebola have been tested and proven effective in animals but have not yet been tested in randomized trials in humans.

- ZMapp, being developed by Mapp Biopharmaceutical Inc., is an experimental treatment, for use with individuals infected with Ebola virus. It has not yet been tested in humans for safety or effectiveness. The product is a combination of three different monoclonal antibodies that bind to the protein of the Ebola virus.
- Tekmira and Biocryst Pharmaceuticals, receive funding from the Department of Defense's Defense Threat Reduction Agency and have therapeutic candidates for Ebola in early development.
- BioCryst, with NIH support, is working to develop an antiviral drug to treat Ebola virus that is expected to begin Phase 1 testing later this year.

However, a range of potential treatments including blood products, immune therapies and drug therapies are currently being evaluated.



Provide Symptomatic Treatment, & Rehydration

Placed in a dedicated private, Airborne Isolation rooms within the ED. Ebola suspect patients may have an alternate or additional infection requiring airborne precautions, such as tuberculosis. Therefore, until the patient can be evaluated by the ED, ID, IC, and Medical Intensive Care Unit (MICU) teams, airborne precautions will remain in effect in addition to EVD Precautions until it is determined that airborne isolation is no longer needed.

Conduct Laboratory Testing

Testing (both to confirm Ebola and non-Ebola diagnostic testing) on suspect cases will only be conducted after consultation with ID who will also discuss options with public health authorities (ID will indicate what samples need to be drawn and the ED staff will work with Laboratory Medicine and transport staff to ensure proper retrieval and handling of specimens, if indicated).

For ELISA or PCR tests: Refrigerate serum or clot Freeze (-20 °C/-4 °F or colder) tissue specimens for virus isolation.

For immunohistochemistry: Fix skin snip specimen in formalin. Specimen can be stored up to 6 weeks. The specimen is not infectious once it is in formalin. Store at room temperature. Formalin-fixed specimens may be transported at room temperature

Within a few days after symptoms begin, test:
- Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing
- IgM ELISA
- Polymerase chain reaction (PCR)(Acute infections will be confirmed using a real-time RT-PCR assay in a CLIA- accredited laboratory.)
- Virus isolation

Confirmation that symptoms are caused by Ebola virus infection, test:
- Antibody-capture enzyme-linked immunosorbent assay (ELISA)
- Antigen-capture detection tests
- Serum neutralization test
- Reverse transcriptase polymerase chain reaction (RT-PCR) assay
- Electron microscopy
- Virus isolation

Monitor Patient at home

100.4 °F / 38.0 °C

New Ebola-related symptoms or fever persists after 48 hours

No symptoms after 48 hours

Review Test Results

Laboratory diagnosis can be difficult depending on the phase/time of presentation, duration of symptoms and previous exposure.
Ebola virus is generally detectable by real-time RT-PCR from 3-10 days after symptoms appear.

Test results are negative 3 days after onset of symptoms

Best clinical judgement determines that the patient has Ebola

Test results are positive

Move to Confirmed Ebola Ward

Ask the patient (or a family member who can answer for the patient):
- Where do you live?
- When did the symptoms begin?
- Who else is sick in your family (or village)?
- Where have you travelled recently?

Interview Patient for Contacts tracing

Monitor Contacts for 21 Days after Exposure

Treat Patient

The following basic interventions, when used early, can significantly improve the chances of survival:
- Providing intravenous fluids (IV) and balancing electrolytes (body salts)
- Maintaining oxygen status and blood pressure
- Treating other infections if they occur

There is as yet no proven treatment available for EVD.

3

EVALUATE PATIENT[1]

Discharge of an alert case is done on the following conditions:

- Patients have been reviewed by the VHF clinical management team and found to not meet the case definition of a suspected case, with no epidemiological link to any suspected or confirmed case.
- Have a conclusive diagnosis that is not VHF, recognizing that co- infections do occur.
- Have responded to specific treatment
- Be in good health condition and able to go back home
- Discharge of a VHF-confirmed case or suspected cases is based on the clinical presentation and the correct interpretation of the laboratory findings. Consider discharge when the following criteria are met:

Three or more days without fever or any significant symptom.

Symptoms that suggest ongoing shedding of virus (e.g. diarrhea, coughing, bleeding) should have completely disappeared.

Viral shedding known to occur in the semen of male patients, and probably in the breast milk of lactating females, need not preclude discharge, but must be taken into consideration when providing instructions to the patient

AND significant improvement in clinical condition

AND In a relatively good general condition: independently feeding and to carry out other activities of daily life, like washing and walking, without assistance, taking into account any previous disabilities.

AND, if laboratory testing is available: a negative blood PCR for VHF (regardless of any other serologic tests) on day 3 or later following onset of symptoms; for patients with previous positive blood PCR tests, this means a subsequent negative test 48 hours from the initial test (regardless of serology); for previously blood PCR positive mothers, that are breast feeding, it may be safer to delay discharge until PCR on breast milk turns negative as well (to be discussed with the clinicians and laboratory present).

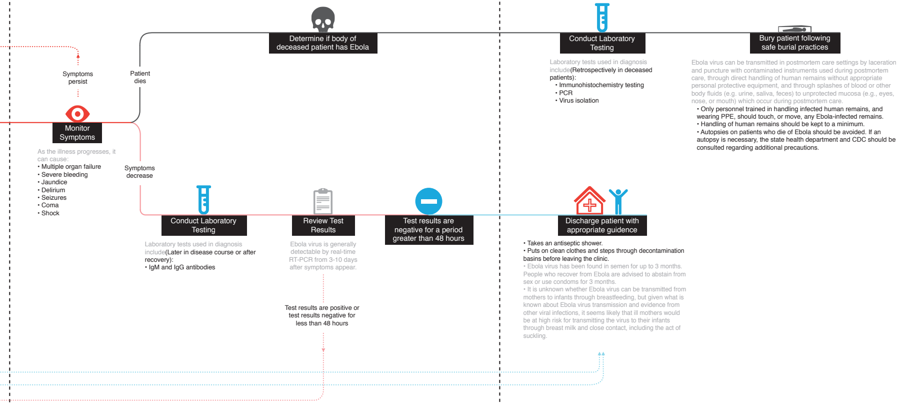
4

DISCHARGE PATIENT[1]

Patients can be discharged if they meet all following clinical criteria:

- Clinical criteria:
  3 days without fever or significant symptoms AND
  A significant improvement in clinical condition AND
  Able to feed, wash, and walk independently
- Laboratory support:
  Antigen or PCR is negative on day 4 or later after the onset of the symptoms OR
  PCR turned negative after having been positive AND patient is clinically cured OR

If patient suffers symptoms, but these are not thought to be due to FHF(Filovirus Hemorrhagic Fever), 2 negative blood PCR's 48 hrs apart can be used as discharge criteria. the patient might be referred to another ward.



Symptoms persist

Monitor Symptoms

As the illness progresses, it can cause:
- Multiple organ failure
- Severe bleeding
- Jaundice
- Delirium
- Seizures
- Coma
- Shock

Patient dies

Determine if body of deceased patient has Ebola

Conduct Laboratory Testing

Laboratory tests used in diagnosis include(Retrospectively in deceased patients):
- Immunohistochemistry testing
- PCR
- Virus isolation

Bury patient following safe burial practices

Ebola virus can be transmitted in postmortem care settings by laceration and puncture with contaminated instruments used during postmortem care, through direct handling of human remains without appropriate personal protective equipment, and through splashes of blood or other body fluids (e.g. urine, saliva, feces) to unprotected mucosa (e.g., eyes, nose, or mouth) which occur during postmortem care.
- Only personnel trained in handling infected human remains, and wearing PPE, should touch, or move, any Ebola-infected remains.
- Handling of human remains should be kept to a minimum.
- Autopsies on patients who die of Ebola should be avoided. If an autopsy is necessary, the state health department and CDC should be consulted regarding additional precautions.

Symptoms decrease

Conduct Laboratory Testing

Laboratory tests used in diagnosis include(Later in disease course or after recovery):
- IgM and IgG antibodies

Review Test Results

Ebola virus is generally detectable by real-time RT-PCR from 3-10 days after symptoms appear.

Test results are positive or test results negative for less than 48 hours

Test results are negative for a period greater than 48 hours

Discharge patient with appropriate guidence

- Takes an antiseptic shower.
- Puts on clean clothes and steps through decontamination basins before leaving the clinic.
- Ebola virus has been found in semen for up to 3 months. People who recover from Ebola are advised to abstain from sex or use condoms for 3 months.
- It is unknown whether Ebola virus can be transmitted from mothers to infants through breastfeeding, but given what is known about Ebola virus transmission and evidence from other viral infections, it seems likely that ill mothers would be at high risk for transmitting the virus to their infants through breast milk and close contact, including the act of suckling.

Protection from Ebola[8 9 10]

The recommended PPE that healthcare workers wear in Ebola treatment areas—waterproof apron, surgical gown, surgical cap, respirator, face shield, boots, and two layers of gloves—significantly reduces the body's normal way of getting rid of heat by sweating. The PPE holds excess heat and moisture inside, making the worker's body even hotter. In addition, the increased physical effort to perform duties while carrying the extra weight of the PPE can lead to the healthcare worker getting hotter faster. Wearing PPE increases the risk for heat-related illnesses.

To reduce the risk of heat-related illnesses, healthcare workers who wear PPE should do the following in collaboration with site coordinators:

- **Take time to acclimatize (adjust to the climate)**
- **Stay well hydrated**
- **Watch for signs and symptoms of heat-related illnesses**
- **Take time to rest and cool down**

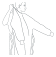
When putting on equipment, workers should adjust for comfort and should not adjust in the treatment center because of the risk of exposure and contamination.

* Each person puts on their own gear, but each worker has a buddy. The buddy spot-checks for tears in equipment or open areas of skin that could become contaminated.

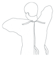
Wash hands

Wash bare hands with soap and water or a 0.05% chlorine solution.

Gown

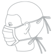


1 Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back.



2 Fasten in back at neck and waist.

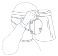
Respirator



1 Secure respirator.

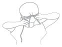
2 Fit flexible band to nose bridge, face, and below chin.

Face shield



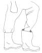
1 Place face shield over face.

Surgical cap

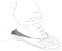


1 Tie at the back of the head.

Boots

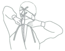


1 Put on boots over the gown.



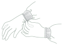
2 *Put on shoe covers.

Apron

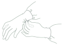


1 Tie at the back.

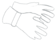
Gloves



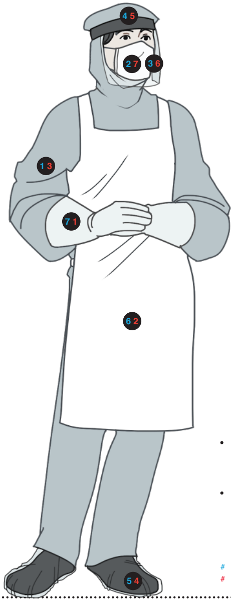
1 Wear the first pair of gloves under the cuffs of the gown.



2 Wear the second pair of gloves over the cuffs of the gown.



3 Have gloves taped to gown, with no gaps, by others.



DRESSING

IN THE TREATM

When treating patients, workers should not touch their own faces, should limit the number of surfaces they touch, change their gloves if heavily contaminated and wash their gloved hands often.

Depending on the organization or the availability of gloves, workers must either change the outer layer of gloves when moving from patient to patient or wash gloved hands with soap and water.

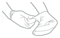
The number of steps for preparation
The number of steps for undressing

Basin

Leaving the treatment facility, step into a chlorine basin, or spray front and back of apron with a water solution containing 0.5% chlorine.

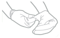
Gloves

Outsides of gloves are contaminated. If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer.

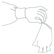


1 Using a gloved hand, grasp the palm area of the opposite-gloved hand and peel off the first of the two gloves.

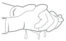
2 Hold removed glove in double-layer gloved hand.



3 Using the one-layer gloved hand, grasp the palm area of the other gloved hand and peel off the first of the two gloves.



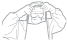
4 Place the two removed gloves in a biohazard container to be treated and incinerated.



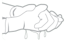
5 Wash gloved hands with 0.5% chlorine solution.

Apron

Outside of apron is contaminated. If your hands get contaminated during apron removal, immediately wash your hands or use an alcohol-based hand sanitizer.



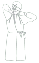
1 Carefully remove apron.



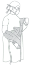
2 Wash gloved hands with 0.5% chlorine solution.

Gown

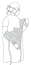
Gown front, sleeves, and the outside of gloves are contaminated. If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer.



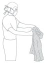
1 Unfasten gown ties, **taking care that sleeves don't contact your body when reaching for ties.**



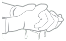
2 Push gown away from body by **touching the inside only.**



3 Turn gown inside out and roll down and over boots.



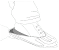
4 Fold and roll into a bundle and discard in a biohazard container.



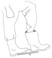
5 Wash gloved hands with 0.5% chlorine solution.

Boots

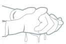
The outsides of boots are contaminated. If your hands get contaminated during boot removal, immediately wash your hands or use an alcohol-based hand sanitizer.



1 *Carefully remove shoe covers **by using opposite foot instead of using hands.**



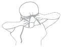
2 Remove boots with a boot remover.



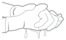
3 Wash gloved hands with 0.5% chlorine solution.

Surgical cap

The outside of surgical cap is contaminated. If
cap removal, immediately wash your hands or use



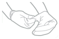
1 Carefully remove surgical cap.



2 Wash gloved han
0.5% chlorine solution

Gloves

Outsides of gloves are contaminated. If your ha
alcohol-based hand sanitizer.

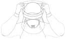


1 Using a gloved hand, grasp the palm area of the other gloved hand and peel off glove.

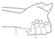
2 Hold removed glove in gloved hand.

Face shield

The outside of goggles or face shield is conta
goggles or face shield removal, immediately wash



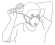
1 Remove face shield from the back by lifting head band.



2 Wash bare hands with 0.05% chlorine solution.

Respirator

Front of mask/respirator is contaminated. If you
removal, immedia.tely wash your hands or use an



1 Grasp bottom ties or elastics of the respirator, then the ones at the top, and **remove without touching the front.**

2 Place in a biohazard container to be treated and incinerated.

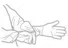
IENT AREA

UNDRESSING

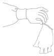
your hands get contaminated during surgical
an alcohol-based hand sanitizer.

ds with
.

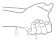
nds get contaminated during glove removal, immediately wash your hands or use an



3 Slide fingers of ungloved hand under remaining glove at wrist and peel off glove.



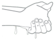
4 Place gloves in a biohazard container to be treated and incinerated.



5 Wash bare hands with 0.05% chlorine solution.

minated. If your hands get contaminated during
your hands or use an alcohol-based hand sanitizer.

r hands get contaminated during mask/respirator
alcohol-based hand sanitizer.



3 Wash bare hands with 0.05% chlorine solution.