BIOLOGICAL SAFETY & PPE FOR WASTEWATER WORKERS

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The 2014-2015 Ebola Epidemic
The Ebola Wastewater Panic of 2014

• The first U.S. Ebola patients are brought for treatment to Atlanta, GA:

Georgia county threatened to cut off hospital sewer lines over Ebola, doctor says
DeKalb Co. denies threat to disconnect Emory hospital sewer service due to Ebola (VIDEO)


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A DeKalb County spokesman says DeKalb never threatened to disconnect Emory University Hospital from the county’s sewer system after the hospital began treating Ebola patients.  
The New York Times reported Monday that
CDC’s initial response:

- Q: Is it safe for Ebola patients to use the bathroom?

- A: Yes. Sanitary sewers may be used for the safe disposal of patient waste. Additionally, sewage handling processes (e.g., anaerobic digestion, composting, and disinfection) in the United States are designed to inactivate infectious agents.
CDC preparing Ebola guidance for wastewater sector in the U.S.

The Water Environment Federation (WEF; Alexandria, Va.), in collaboration with many water and public health organizations, has been seeking credible Ebola information to address concerns and questions within the water sector. Although there is limited data on the fate and transport of Ebola in wastewater collection systems, the development of protective precautions is essential. As such, the organizations have reached out to appropriate federal agencies to discuss wastewater worker safety and the inactivation of Ebola by wastewater treatment processes.

During a conference call, organized by WEF on Oct. 16, a spokesman for the U.S. Centers for Disease Control and Prevention (CDC) shared that CDC has prepared and is conducting an internal review of an interim guidance. The guidance, titled *Interim Guidance for Workers Handling Untreated Sewage from Ebola Cases in the United States*, will address basic hygiene practices, personal protective equipment (PPE) use, and PPE disposal actions. Specifically, this guidance will provide recommendations and protocols for:

- workers who perform sewer maintenance,
- construction workers who repair or replace live sewers,
- plumbers, and
- workers who clean portable toilets.

CDC stated that the guidance review would be expedited and indicated that guidance could be released as soon as late October. WEF will communicate when CDC releases the guidance or as new information becomes available.

CDC is the lead federal agency for Ebola containment and prevention. For the best information on Ebola, visit [www.cdc.gov/ebola](http://www.cdc.gov/ebola). Also see the National Institute for Occupational Safety and Health for general Ebola guidance focused on workplace safety and health at [www.cdc.gov/niosh/topics/ebola](http://www.cdc.gov/niosh/topics/ebola).

*(updated Oct. 20, 2014)*
CDC’s Response

• Interim Guidance for Managers and Workers Handling Untreated Sewage from Individuals with Ebola in the United States

• Released Nov. 20, 2014

• http://www.cdc.gov/vhf/ebola/prevention/handling-sewage.html
Ebola's ability to survive in the environment poorly understood

The means by which Ebola virus transmits through direct contact with body fluids of infected individuals is well covered in scientific literature. But little is known about the life the virus has - if any - outside the body. For example, does Ebola remain active on glass surfaces and countertops? Does it persist in sewage and wastewater systems?

Such questions are rarely addressed in currently published literature, say engineers from the University of Pittsburgh (Pitt) and Drexel University, Philadelphia.

They report their findings - or lack of them - and why it is important to find some answers, in a paper published in the Journal Environmental Science & Technology Letters.

The current Ebola epidemic in West Africa, cases for which were first notified to the World Health Organization (WHO) in March 2014, is the largest and most complex outbreak since the virus was first discovered in 1976. So far, there have been more than 11,000 lab-confirmed cases and over 6,300 deaths.

The size and scale of the epidemic have raised significant unanswered questions for the scientific and engineering communities.
So what did the CDC say?

STAY TUNED!
Topics

- Wastewater worker exposure to pathogens
- Vaccinations
- Hygiene
- PPE
- CDC Ebola Guidance
Wastewater Worker Exposure to Pathogens

- Are wastewater workers exposed to harmful pathogens more than the general public?
  - In theory; yes

- Studies indicate that occupational infection is not common

- Some indication that new workers (first few years) experience more frequent gastrointestinal and respiratory symptoms

- Some studies suggest that wastewater workers “build immunity over time against these types of illnesses and are generally healthier than the general population.”

Source: WEF - Frequently Asked Questions & Answers about Wastewater and Biosolids Worker Health & Safety
Wastewater Worker Exposure to Pathogens

• **What is the most common cause of infection?**
  poor personal hygiene.

• Three basic routes that may lead to infection:
  • ingestion through splashes, contaminated food, or cigarettes
  • inhalation of infectious agents or aerosols
  • Infection due to an unprotected cut or abrasion

• **Ingestion** generally the major route of wastewater worker infection.
  • Hand-to-mouth habits
  • At highest risk: workers who eat or smoke without washing their hands

• **Personal hygiene practices including frequent washing of the hands** will minimize these potential exposures

Source: WEF - Frequently Asked Questions & Answers about Wastewater and Biosolids Worker Health & Safety
Vaccinations

• CDC: Standard adult vaccinations for the general public are adequate for sewer workers in the U.S.
  • Tetanus & diptheria (T-dap) every 10 years
  • All childhood vaccinations up to date (e.g., polio)

• CDC statement for sewer workers in Haiti (recent, third-world environment):

  “Tetanus vaccinations should be up to date, with consideration also given to the need for polio, typhoid fever, Hepatitis A and Hepatitis B vaccinations.”
Vaccinations

• Hepatitis A:
  • Not routinely recommended for wastewater or biosolids workers in the U.S.
  • Only recommended where there has been direct exposure to wastewater splashed into an open wound or the mouth or a severe outbreak has occurred in the community.

• Hepatitis B:
  • Not recommended
  • Bloodborne disease; exposure in sewage extremely unlikely
  • Only recommended for workers who may be directly exposed to medical wastes, blood, and medical sharps
Hygiene

The following hygiene tips are compiled from sources including the CDC, NIOSH, EPA, WEF, AFSCME, and eCLOSH

• Washing Hands:
  • before you eat, drink, or smoke
  • before and after using the bathroom.
  • With soap and water after contact with wastewater.
    • Germicidal/antibacterial soap is preferable
  • Use hand sanitizer if running water and soap not available
    • Not as effective if hands very dirty
  • Keep fingernails short, and clean underneath with stiff brush & soap
Hygiene

CDC Hand washing video:
http://www.cdc.gov/cdctv/handstogether/

CDC Handwashing page: http://www.cdc.gov/handwashing/
Hygiene

• CDC Handwashing tips (soap and water):
  • Wet your hands with clean, running water (warm or cold), turn off the tap, and apply soap.
  • Lather your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers, and under your nails.
  • Scrub your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.
  • Rinse your hands well under clean, running water.
  • Dry your hands using a clean towel or air dry them.

CDC Handwashing page: http://www.cdc.gov/handwashing/
Hygiene

- CDC Handwashing tips (Hand Sanitizers):

If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol. Alcohol-based hand sanitizers can quickly reduce the number of microbes on hands in some situations, but sanitizers do not eliminate all types of germs.

- Hand sanitizers are not as effective when hands are visibly dirty or greasy.
- How do you use hand sanitizers?
  - Apply the product to the palm of one hand (read the label to learn the correct amount).
  - Rub your hands together.
  - Rub the product over all surfaces of your hands and fingers until your hands are dry.

CDC Handwashing page: http://www.cdc.gov/handwashing/
Hygiene

• Avoid touching face, mouth, eyes, nose, genitalia, or open sores and cuts while working with wastewater.

• Eat in designated areas away from wastewater activities.

• Do not smoke or chew tobacco, betelnut or gum while working around wastewater.

• Use barriers between skin and surfaces exposed to wastewater (wear proper clothing & PPE)
Hygiene

FIRST AID:

• Consider all cuts or abrasions to be infected!
  • Flush immediately with large quantities of clean water and antiseptic soap
  • Keep wounds covered with clean, dry bandages.

• Thoroughly but gently flush eyes with water if wastewater contacts eyes.

• Seek medical attention when you have diarrhea or are ill, and inform your physician of your occupation and exposure to wastewater!
  • You may not receive proper treatment without this information
Hygiene

WORK CLOTHING AND LAUNDRY

• Keep work and street clothing & footwear separate
  • Dual lockers, if possible
• Change out of street clothing and into clean work clothing & footwear every start of shift
• Do not wear work clothes home or outside the work environment.
• Change out of work clothing as soon as job is completed
• Launder work clothing at work, never at home
  • Use commercial washing machines capable of 160°F; or
  • Launder with 0.05% chlorine solution (1 part bleach to 100 parts water)
Wastewater PPE

The following PPE is recommended for workers handling untreated sewage:

• Goggles or face shield: to protect eyes from splashes of untreated sewage

• Face mask (e.g., surgical mask): to protect nose and mouth from splashes of human waste.
  • If undertaking cleaning processes that generate aerosols, a NIOSH-approved N-95 respirator should be used.

• Impermeable or fluid-resistant coveralls: to keep untreated sewage off clothing

• Waterproof gloves (such as heavy-duty rubber outer gloves with nitrile inner gloves) to prevent exposure of hands to untreated sewage

• Rubber boots: to prevent exposure of feet to untreated sewage.

Source: CDC 2014
Wastewater PPE

• The N95 Respirator may just look like a dust mask, but it is a respirator. By law, you must be provided training and fit testing before you can use one on the job.
Wastewater PPE

• Use common sense in selecting PPE
  • You probably don’t need Tyvek coveralls to handle a vacuum truck hose or operate a belt filter press.
  • But you probably should consider a respirator and goggles if you commonly get exposed to the aerosol mist from the cleaning jet, or if you are spraying the belt press down using high-pressure effluent wash water.

• Other Examples?
  • Collecting wastewater samples
  • Replacing lift station submersible pump
  • Cleaning bar screen

Wastewater PPE

• A possible, correct and safe procedure for donning and doffing (removing) wastewater PPE:
  (Loosely based on CDC Ebola Health Care Worker Guidelines)
Wastewater PPE

• **Donning PPE (order)**
  1. Hand hygiene
  2. Inner gloves
  3. Rubber boots
  4. Coverall
  5. N-95 respirator
  6. Hood
  7. Goggles or face shield
  8. Outer gloves

Tip: tape cuff of coverall pants over top of rubber boot. Do not tuck inside!
Wastewater PPE

• **Doffing PPE (order)**
  1. Outer gloves
  2. Goggles or face shield
  3. Hood
  4. Coverall
  5. Rubber boots
  6. Disinfect inner gloves (if possible)
  7. N-95 respirator
  8. Remove inner gloves
  9. Hand hygiene
Wastewater PPE


• UCLA: Glove Removal Safety  https://www.youtube.com/watch?v=dyLEd9cng5U
Wastewater PPE

- Demonstration time!
CDC’s Ebola Guidance for Wastewater Workers

KEY POINTS:

• Ebola virus is more fragile than many enteric viruses that cause diarrheal disease or hepatitis.

• The envelope that covers Ebola makes it more susceptible to environmental stresses and to chemical germicides than non-enveloped viruses, such as hepatitis A, poliovirus, and norovirus.
CDC’s Ebola Guidance for Wastewater Workers

To protect workers against Ebola

- Educate them on
  - What PPE to use to protect broken skin and mucous membranes
  - How to properly use the PPE, including how to put it on and take it off.

- Develop and fully implement routine protocols that ensure workers are protected against potential exposures (i.e., prevent contact with broken skin, eyes, nose or mouth) when handling untreated sewage.

- Ensure all workers always practice good personal hygiene, including frequent hand washing to reduce potential exposures to any of the pathogens in sewage.
CDC’s Ebola Guidance for Wastewater Workers

“There has been no evidence to date that Ebola can be transmitted via exposure to sewage.”

Some workers come in contact with untreated sewage before it enters the wastewater treatment plant and could be at very low risk of exposure to Ebola virus. These workers include:

- Plumbers in hospitals that are currently treating an Ebola patient
- Sewer maintenance workers working on the active sewer lines serving the hospital with an Ebola patient
- Construction workers who repair or replace active sewer lines serving the hospital with an Ebola patient
CDC’s Ebola Guidance for Wastewater Workers

- PPE recommendations:
  - Identical to that presented here, but without donning and doffing instructions

- Personal Hygiene recommendations:
  - Same as presented here, but with less detail
Summary

- Wastewater workers are exposed to pathogens through contact with sewage
- Good hygiene practices are the most important preventive measures that can be taken
  - Hand washing
  - Hand-to-mouth habits
  - Care of cuts & scrapes
- PPE should be used to provide additional protection
  - Must be made available
  - Must be used properly
References


