Ebola: Practical Aspects of PPE

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Disclaimer

- My knowledge - like you
  - Evolving much like 9/11
  - Based on reliable sources - not always final word
  - Government and experts
  - Fellows and professional societies
  - The internet is a remarkable asset
San Ysidro massacre

Gunman storms border restaurant; 20 die, 20 wounded — killer slain

By Vicki Torres

Twenty people were killed and 21 injured outside a McDonald's restaurant in San Diego yesterday and fled a bandit of sorts from three weapons.

Two of the restaurant patrons and employees said that the first food worker, and that they were killed instantly when the shots were fired and the patron fled away. It was the worst massacre by a gun in a U.S. history.

The gun, I killed thousands and

Conventional Disasters:
Trauma System Principles
Unconventional Problem
Chemical, Nuclear, Biological
Unconventional Problems

- Problem
  - Provider knowledge may be minimal
    - Surveillance
    - Protection techniques
    - S&S of disease
    - Treatment
College Efforts

- Website
- New communities
- Email and Newscope
- Calls to fellows
- Calls with Government
- Calls with Experts
- Guideline for surgery
- Todays session
White House & State Dept.: International Priorities

- Control Outbreak
  - Facilities
- Mitigate Economic Instability
  - Work with IMF
- Provide International Coordination
- Strengthen Global Security
International Incident Command

Incident Command

- PIO
- Safety Officer
- Liaison Officer

Operations
Plans/Intelligence
Logistics
Finance

Monrovia
CDC, HHS, DoD: USA readiness

- Epidemiology
- Public policy/ infection and disease control
- EMS and Hospital readiness
- Treatment guidelines and PPE
What We Can Do

- Help create an organized response
- Increase our knowledge
- Teach others
- Provide surgical leadership
  - Teamwork, safe practice
  - Sound judgment, common sense
- Provide reassurance
PPE - Controversies

- Original advice inadequate
- Proven by healthcare workers infections
- Better understanding of disease
  - Doctors Without Borders
  - WHO
- New aerosol information
PPE - Controversies

- Many fellows - excellent input
- Face, ankles and wrists incompletely protected
- Aerosol vulnerability
- Inadequacy with vomiting and diarrhea
- Underappreciated self contamination potential
With Clinical Progression of Ebola, Reasonable Protection May Change

**DISEASE PROGRESSION**

- **EXPOSURE**
- **EARLY STAGES**
  - **SYMPTOM ONSET**
    - Incubation period is 2-21 days following exposure. Symptoms appear on average 3-10 days following exposure. (CDC)
    - Weakness
    - Fever - greater than 101.5°F
    - Headache
    - Muscle Pain
    - Joint Pain
    - Conjunctivitis
    - Nausea
    - Throat Pain
    - Abdominal Pain
    - Diarrhea
    - Hiccups
- **LATE STAGES**
  - Confusion
  - Irritability
  - Chest Pain
  - Diarrhea
  - Vomiting
  - Skin Rash
  - Internal/External Bleeding
  - DIC
  - Miscarriage
  - Respiratory Distress
  - Shock
  - Convulsions
- **POST-INFECTION**
  - Visual Complications
  - Joint Pain
  - Anemia
  - Risk for transmission up to 3 months in tears and semen

*Early and late stage symptoms may overlap; all symptoms may not manifest in all infected patients*

Source: Jonathan B. Perlin, MD, PhD and HCA Clinical Excellence Knowledge Center, 2014
<table>
<thead>
<tr>
<th>DIRECT CONTACT</th>
<th>AIRBORNE</th>
<th>VECTOR-BORNE (mosquito)</th>
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<tr>
<td>Ebola</td>
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Is Ebola Airborne ???

- CIDRAP – U. of Minn. Report
  - Potential via exhaled breath
  - Infectious aerosol particles
  - Action to “relative risk” should not await scientific certainty
Is Ebola Airborne ???

“Virus laden body fluids can be aerosolized and inhaled while in proximity to an infectious person and a wide range of particle sizes can be inhaled and deposited throughout the respiratory tract”
A Concerned Position

- Abundance of caution
- No pre or post exposure treatment modality
- High case fatality rate (>70%)
- Unclear modes of transmission
- Ethical issues emerging
Facility Administrative & Environmental Controls

- Implement **triage protocols** - identify potential patients and institute precautions.

- Designate site managers overseeing implementation of safety precautions:
  - Site managers **monitor supply and evaluate** care in isolation area.
  - At least one **site manager always on-site** where Ebola patient is being treated.

- **Identify ahead** of time critical care functions and essential workers:
  - For Ebola patient care
  - For collection of laboratory specimens
  - For environmental management and waste

- Ensure **workers are trained** in all recommended protocols and PPE.

- Workers should **practice donning/doffing procedures and demonstrate competency** during training before caring for patients.

- Use **trained observers to monitor correct PPE** use and protocol adherence and guide workers using a checklist for every donning/doffing procedure.

- **Document** observer and worker training in donning/doffing and performing necessary care-related duties while wearing PPE.

- **Designate spaces** so that PPE can be donned and doffed **in separate areas**.
Facility Administrative & Environmental Controls

- Isolate patient in room with closed door and private bathroom as soon as possible
- Limit contact with patient and restrict non-essential personnel and visitors
- Monitor patient care area and log entry and exit of all workers
- Ensure trained observer watches each donning and doffing procedure and provides supervisory assurance
- Ensure workers have sufficient time to don and doff PPE correctly
- Ensure practical precautions taken during patient care:
  - keeping hands away from the face
  - limiting touch of surfaces and body fluids
  - preventing needle stick and sharps injuries
  - performing frequent disinfection of gloved hands using an alcohol-based hand rub
- Disinfect visibly contaminated PPE, surfaces, or equipment
- Perform regular cleaning and disinfection of patient care area surfaces
  - Performed by nurses/physicians - part of patient care activities - limit room workers
  - Implement worker observation in the patient room, if possible
- Establish exposure management plan that addresses decontamination and follow-up of an affected worker. Training on plan and follow-up should be part of the worker training.
Rigorous & Repeated Training

- All aspects of infection control – not just PPE
- Practice – particularly donning and doffing PPE
- ACS Training Institutes Ideal
- Training videos
Recommended PPE

- Key to all PPE is consistent implementation - repeated training and practice
- Facility should select and standardize PPE for all essential workers directly interacting with Ebola patients
- Provide written protocol outlining procedures for donning and doffing of PPE, and review and monitor by trained observer
- CDC recommends facilities use a powered air-purifying respirator (PAPR) or an N95 or higher respirator in the event of an unexpected aerosol-generating procedure.
- For healthcare workers who spend extended periods in PPE, safety and comfort are critical. Standardizing attire under PPE (e.g., surgical scrubs or disposable garments and dedicated washable footwear) facilitates donning and doffing process and eliminates concerns of contamination of personal clothing.
- If facilities elect to use different PPE from what is outlined by CDC (e.g., coveralls with either an integrated hood or a surgical hood with integrated full face shield), they must train workers and ensure that donning and doffing procedures are adjusted and practiced accordingly.
A Conservative Position

Progressive evolution
A Conservative Position

No Skin, Full Coverage
A Conservative Position

No Skin, Full Coverage, No goggles, Separate Hood
Recommended PPE

- Single-use (disposable) fluid-resistant or impermeable gown that extends to at least **mid-calf or coverall without integrated hood**. Coveralls with or without integrated socks are acceptable. Consideration should be given to gowns or coveralls with **thumb hooks to secure sleeves over inner glove**.
- Single-use (disposable) **nitrile examination gloves with extended cuffs**. Two pairs of gloves should be worn. At a minimum, **outer gloves should have extended cuffs**.
- Single-use (disposable), fluid-resistant or impermeable boot covers that extend to at least **mid-calf** or single-use (disposable) shoe covers.
- Single-use (disposable) fluid-resistant or **impermeable shoe covers are acceptable only if they will be used in combination with a coverall with integrated socks**.
- Single-use (disposable), fluid-resistant or impermeable apron that covers torso to level of mid-calf should be used if Ebola patients have **vomiting or diarrhea**. If a PAPR worn, consider selecting an **apron that ties behind the neck** to facilitate easier removal during the doffing procedure.
Recommended PPE

- PAPR or N95 Respirator
  - PAPR: A PAPR with a **full face shield**, helmet, or headpiece.
    - A PAPR with a **self-contained filter and blower unit integrated inside the helmet** is preferred.
    - A PAPR with **external belt-mounted blower unit** requires adjustment of the sequence for donning and doffing.
  - N95 Respirator: Single-use (disposable) N95 respirator in combination with single-use (disposable) surgical hood extending to shoulders and single-use (disposable) full face shield. **If N95 respirators are used instead of PAPRs, careful observation is required to ensure workers are not inadvertently touching faces under face shield during care.**
Ebola General PPE Principles

- Prior to patient contact, all workers must have repeated training and demonstrated competency specifically donning/doffing proper PPE.

- While working in PPE no skin should be exposed.

- Safe care must be overseen by trained onsite manager at all times, and each step of every PPE donning/doffing procedure supervised.

- Ebola is spread through direct contact: full body coverage PPE is recommended to reduce the risk of self-contamination.

- To protect workers, facilities must provide onsite management and oversight on safe use of PPE and implement administrative and environmental controls.
Summary Safety Pillars

- Facility Leadership has responsibility
- Designated on-site Ebola site manager
- Clear, standardized procedures
- Trained healthcare personnel
- Oversight of practices