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Pioneering

Web Conference Series
December 3, 2014

Experienced

Independent

Ebola: Medical Devices and Personal Protective Equipment Preparedness

MODERATOR:
Jeremy Suggs
Engineering Manager
Health Devices
ECRI Institute

Evidence-based

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Christian Lavanchy, BSME, BS Biol

Engineering Director,
Health Devices
ECRI Institute

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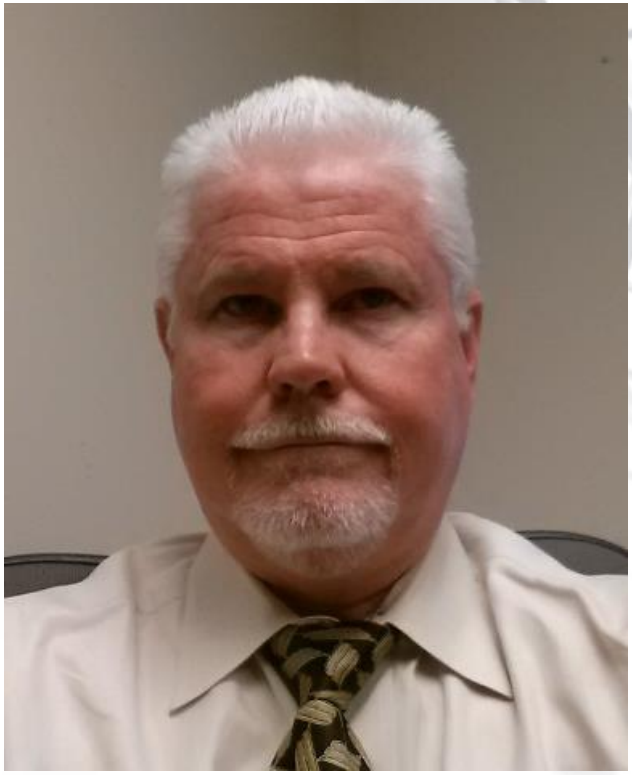
Randy Peacock

Director,
Biomedical Engineering
Nebraska Medicine



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Thomas Nowicki, MD, FACEP

Director of Cognitive Simulation,

CESI (Center for Education, Simulation and Innovation)

Hartford Hospital

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Materials

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User Name: Ebola.Webinar@ecri-clients.com

Password: EbolaSafety! **(case sensitive)**

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ECRI's Survey on Ebola Equipment Preparedness

December 3, 2014

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Ebola Preparedness

- Low probability/ High consequence events do occur

- Where do hospitals stand on their Ebola preparedness?
- Good survey response rate suggests many are looking at this

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Ebola: Medical Devices and Personal Protective Equipment Preparedness

- How prepared are you?
- PPE
- Medical equipment
- Waste disposal
- Patient isolation

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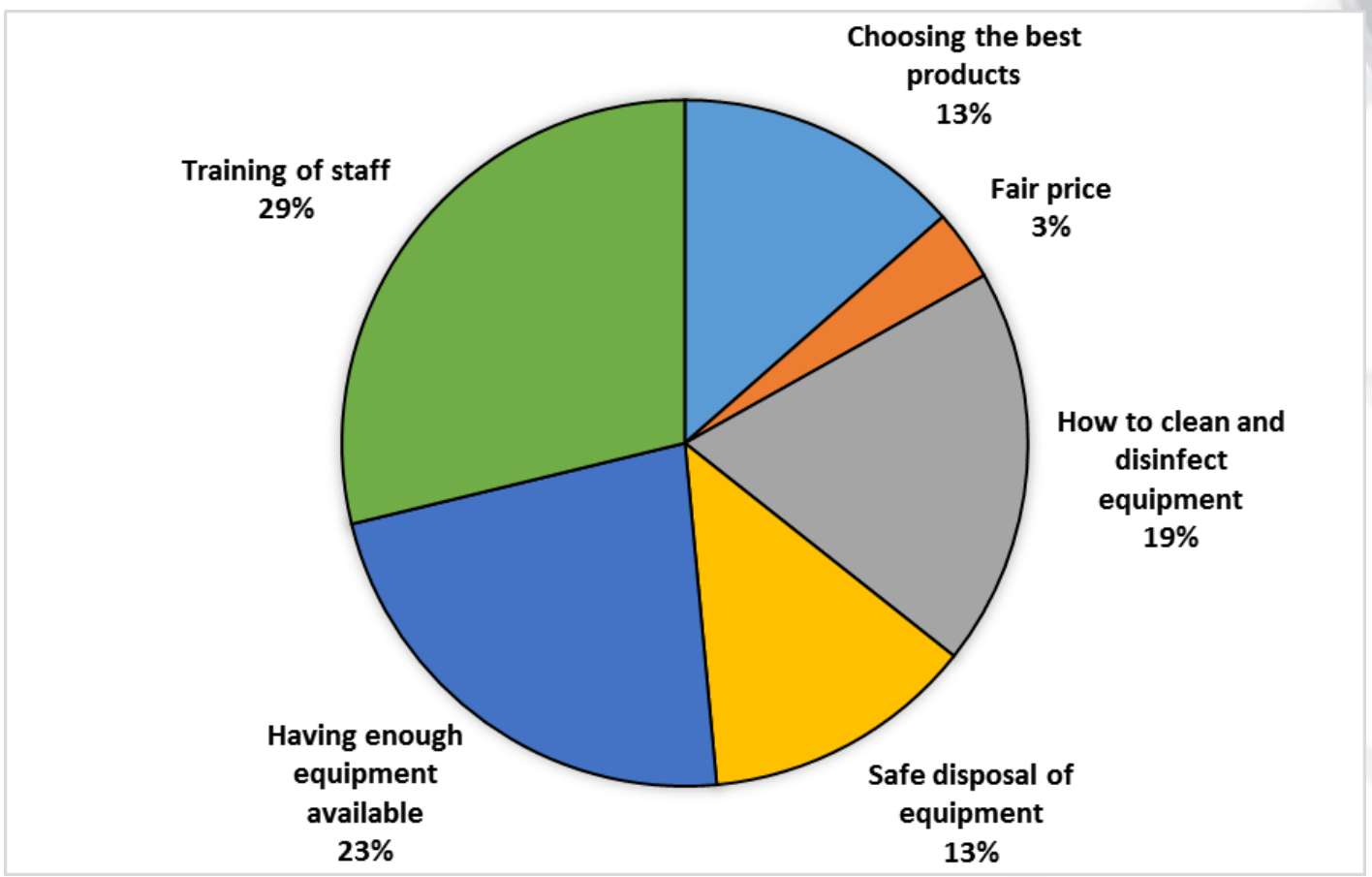
ECRI Survey

- How would you judge the equipment preparedness of your organization?
- Good news…!!
  - 81% report they are partially or completely finished
  - 9% are in the process of thinking about it
  - 10% are just getting started
- Who is in charge of equipment/technology selection?
  - Infection control
  - Nursing
  - Materials Management

ECRI Survey

- Most pressing equipment/technology concerns –



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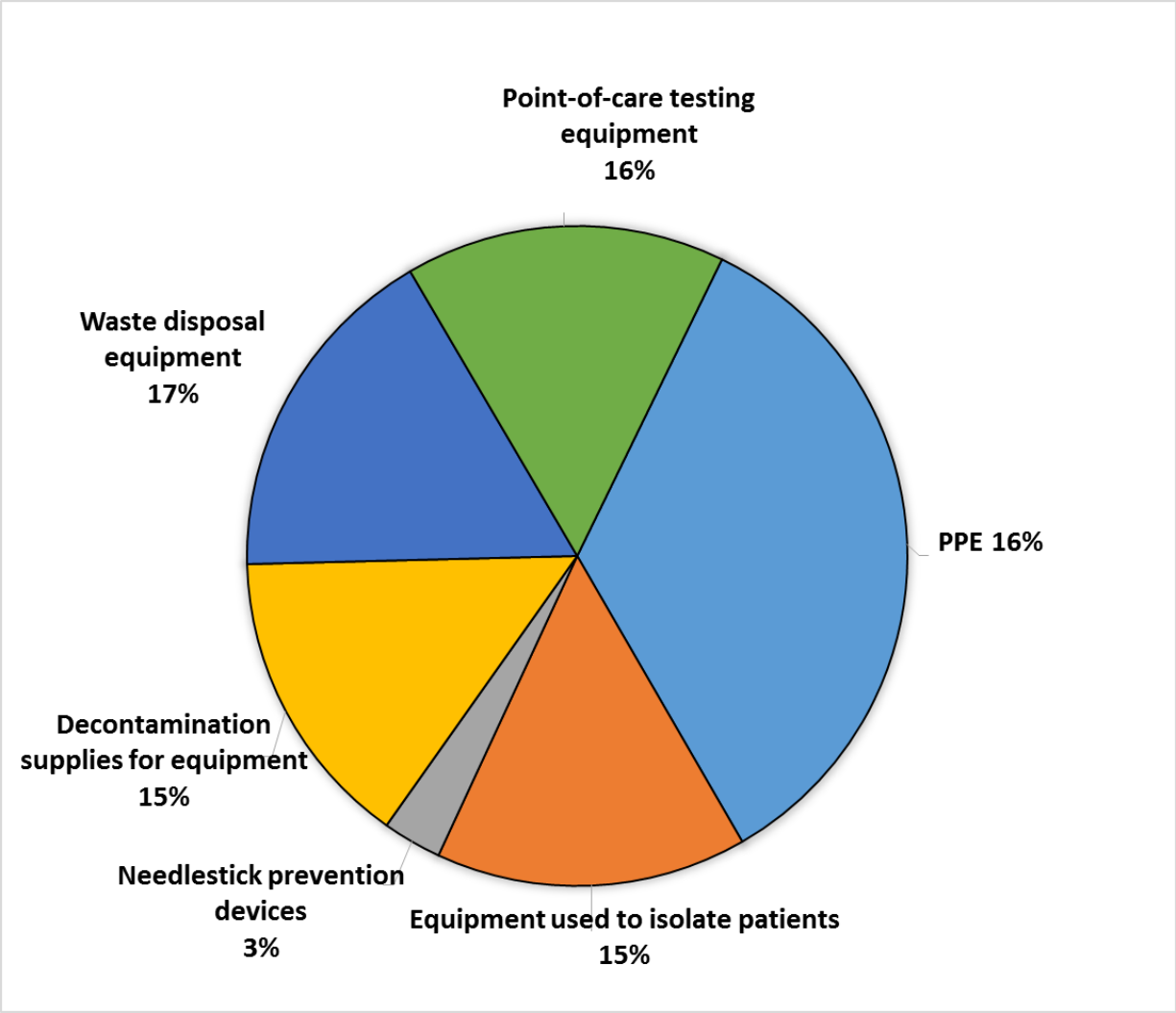
ECRI Survey

- What equipment presents the greatest selection challenges?



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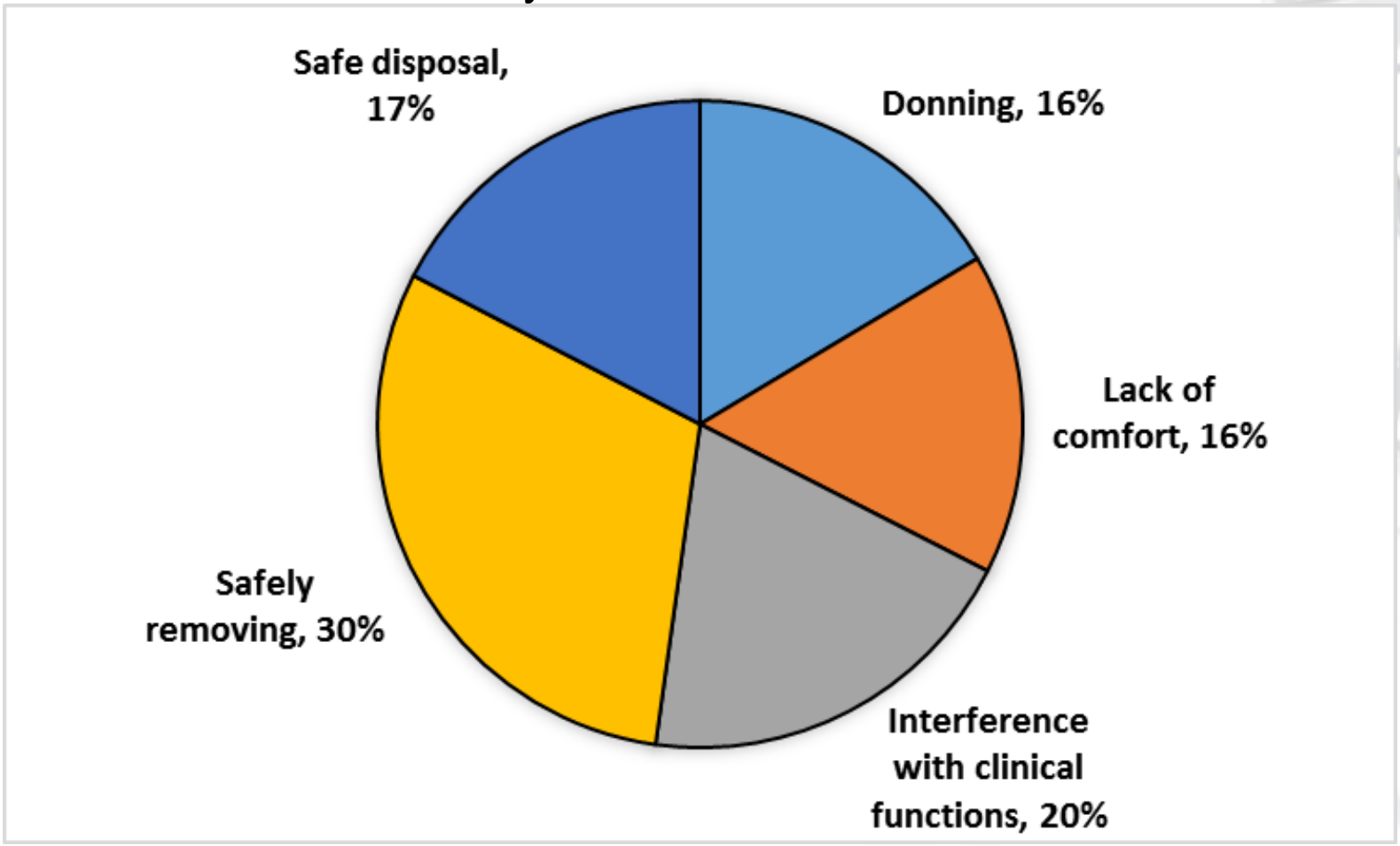
ECRI Survey

- What concerns do you have about PPE?



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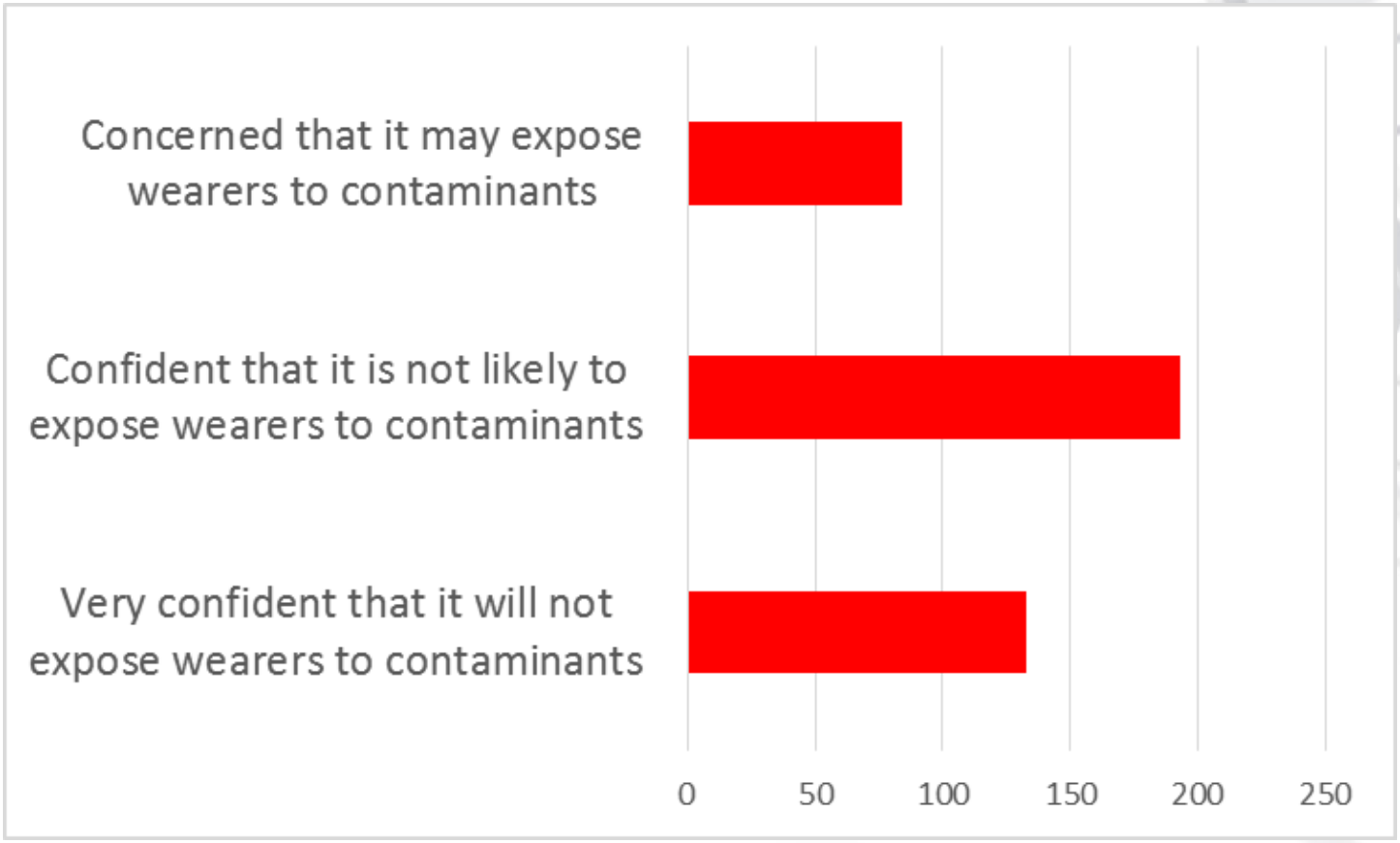
ECRI Survey

- Rate the protection provided by the PPE you selected.



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ECRI Survey

- Additional equipment concerns…
  - Safely decontaminating capital equipment
  - Inability to obtain recommended PPE with highest safety rating
  - High cost of stockpiling necessary supplies
  - Changing guidance from CDC and other authorities

Useful Resources

- ECRI Institute – https://www.ecri.org/Pages/Ebola.aspx
- CDC - http://www.cdc.gov/vhf/ebola/
- OSHA - https://www.osha.gov/SLTC/ebola/control_prevention.html
- EPA registered disinfectants - http://www.epa.gov/oppad001/list-l-ebola-virus.html#newproduct
- American Society of Nephrologists - http://www.asn-online.org/news/2014/ASN_FAQs_Ebola_Virus_Disease_and_Dialysis.pdf

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Checklist – Equipment-Related Preparedness

Ensure Effective Cleaning and Disinfection of Reusable Devices

Reusable medical equipment like patient monitors, infusion pumps, ventilators, and beds will require careful cleaning and disinfection if used during the care of Ebola patients. Contact your device manufacturers for specific instructions related to their devices. Make sure to account for any reusable accessories associated with these devices, such as patient monitoring cables, ultrasound probes, and bed remote controls. Also, determine whether devices have internal components like filters or tubing that may become contaminated. Use appropriate precautions when removing or otherwise touching these components.

Investigate the use of disposable drapes to cover medical devices in Ebola treatment areas (if practical) to ease the burden of device cleaning and disinfection following patient treatment. Clear plastic sheeting may be an alternative if disposable drapes will cover essential displays.

Checklist – Equipment-Related Preparedness

Safely Manage Dialysis Equipment

Some Ebola patients are likely to require dialysis, either continuous renal replacement therapy or conventional hemodialysis. Since these procedures involve circulation of patient blood through the dialysis equipment, the risk of device contamination is higher than with other devices. Instruct staff to pay close attention to device pressure alarms and other signs that dialysis tubing may be leaking (e.g., into the device). Consider replacing transducer protectors—which are designed to keep blood from contaminating the device's pressure transducers—following treatment and during cleaning and disinfection of the device. Keep in mind that some transducer protectors may be located inside the machine and should also be replaced following treatment. The U.S. Centers for Disease Control and Prevention offers detailed and helpful guidance for safely performing acute hemodialysis on Ebola patients.

THANK YOU

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Nebraska Medicine

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Learning Objectives

1. Proposed biomedical equipment listing for a biocontainment unit
2. The role a biomedical engineering department plays supporting a biocontainment unit
3. Equipment cleaning procedures in a biocontainment unit
4. Takeaways from lessons learned working in the biocontainment environment

Providing care for patients with highly contagious diseases, the biocontainment unit is an environment that maximizes the safety for staff and the community at large. A full spectrum of care is provided – from quarantine to intensive care treatment – for patients of all ages. The unit is designed to handle infections such as viral hemorrhagic fevers (eg, Ebola virus), as well as smallpox, SARS, monkeypox and avian influenza, whether acquired in a bioterrorist attack, in a laboratory accident or as a naturally occurring infection.

Nebraska Medicine

The threat of *bioterrorism* in the United States is very real.

Nebraska is prepared.

The Nebraska Biocontainment Patient Care Unit is a collaborative project involving Nebraska Department of Health and Human Services, The Nebraska Medical Center and University of Nebraska Medical Center.

It is one of only a few biocontainment patient care units in the United States and is the largest with a 10-bed capacity. In addition to providing medical care for patients with hazardous diseases, the unit also has active research and outreach training programs for the region.

Unit personnel consist of approximately 40+ highly trained staff of physicians, nurses, techs, infection preventionists and respiratory therapists who have special training in disaster management, cardiac life support and bioterrorism. They work full-time in other areas of The Nebraska Medical Center but remain on call to report to the unit promptly.

The NEBRASKA BIOCONTAINMENT PATIENT CARE UNIT IS THE LARGEST BIOCONTAINMENT PATIENT CARE UNIT IN THE UNITED STATES

The Nebraska Biocontainment Patient Care Unit is a secured area with a self-contained, negative-pressure airflow system.

Other features include:

- Negative air flow with greater than 15 air exchanges per hour
- High-Efficiency Particulate Air (HEPA) filtration system
- Secured access, double door air lock main entrance
- Separate staff entrances and exits
- Staff decontamination shower
- Pass through sterilizer to disinfect materials leaving the unit
- Dunk tank to decontaminate lab specimens leaving the unit
- Video phone for patient communication
- Close proximity to the Nebraska Public Health Laboratory (NPHL) BSL III Lab
- HEPA patient transport system allows for safe transport of patients to the unit

The Nebraska Ebola Method: Online Training

The College of Public Health at the University of Nebraska Medical Center offers online professional education and training to meet the needs of the Public Health Workforce

The facts on this site are "as is" for you to learn about the Ebola virus and are not for medical advice. If you have any questions about a health issue or care for a person that you think may have the Ebola virus, find help from a trained health care provider. The University of Nebraska Medical Center and Nebraska Medicine have tried very hard to make sure that the site has facts about Ebola that are true at this time, but cannot promise the accuracy of this information. The site is not meant to replace the care from a trained health care provider.

http://www.unmc.edu/publichealth/news/ebola-community.html

Technology Planning and Management Aspects of Ebola **Preparedness**

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Preparation: Proposed Equipment List

Suction Unit, Wall Mounted Regulator
Monitor System, Central Station
Monitor, Physiological, Multi-parameter
Oximetry, Pulse
Bed, General Care, Electric
Defibrillator/Monitor, Automatic
UPS Unit, 0 To 0.9 KVA
Sealer, Package
Sterilizer, Steam, Medium
Oto/Ophthalmoscope
Incubator, Test Tube
Nurse Call System
Monitor, Transport
Analyzer, DNA Sequencer, Multi
Centrifuge, Refrigerated

Chairs
Televisions
Exercise Bike
Bedside Tables
Bed, Critical/Intensive
X Ray Film, Viewer, Standard
EMR Docking Station
EMR Interface
Ventilator
Site-Rite Ultrasound
Thermometers, Portable
Hood, Biological
Dialysis Unit

Biomedical Engineering

- If/when equipment malfunctions, backup units in place for equipment replacements
- Designated BMET III level technicians only to respond to calls when the unit is active (Biomedical Engineering Director also notified)
- We do not enter the patient room when occupied by patient/patients; only enter clean spaces when allowed or requested and supervised by BCU personnel
- Utilize video communications when assisting with troubleshooting problems
- Switch to video communications system if nurse call system fails
- Only enter clean areas, except with sterilizer problems; this requires full PPE suit when entering the soiled area for repairs, always accompanied by support personnel trained for the BCU

Equipment Decontamination and Cleaning Procedures

- Prior to patient admission, all medical equipment is prescreened by Physician / Nursing team and held in a clean isolation room designated for clean equipment and draped with a large plastic bag.
- When room is available, let all equipment sit idle for 2 days to allow the virus to desiccate on its' own
- Wipe down everything with 10% bleach water using cleaning cloths, mop cloths, and wipes (performed by trained BCU personnel and supervised by NDHHS)
- When performing the wipe down have two additional individuals who's sole responsibility is quality control assuring every square inch is wiped
- Use UVGI (Ultraviolet germicidal irradiation) on all equipment and spaces that achieves an exposure greater than 5 times the sporicidal exposure using 4 UVGI units placed around the medical equipment to maximize efficiency long enough to kill spores
- Let all equipment sit idle again for at least 2 days insuring desiccation
- Of note, the terminal cleaning protocol was initiated at least 5 days after patients were clear of virus.
- Perform equipment operational checks on all items after room is cleared for admission

Sterilization Process


V. Mueller

Radiology Portable Protection for Cleaning Purposes

Exploring Options for cleaning limitations using a corrosive material such as bleach on the imaging units

Philip W. Smith, MD
Medical Director
Nebraska Biocontainment
Patient Care Unit
402.559.8650
pwsmith@unmc.edu

Angela Hewlett, MD
Associate Medical Director
Nebraska Biocontainment
Patient Care Unit
402.559.8650
alhewlett@unmc.edu

Shelly Schwedhelm, MSN, RN
Director, Emergency Department, Trauma and Preparedness Services
402.559.8766
sschwedh@nebraskamed.com

Kate Boulter, RN, BS
Lead, Registered Nurse
Nebraska Biocontainment
Patient Care Unit
402.559.4727
kboulter@nebraskamed.com

Nebraska Biocontainment Patient Care Unit
984550 Nebraska Medical Center Omaha, NE 68198-4550

Joseph Acierno, MD, JD
Chief Medical Officer
Nebraska Department of Health and Human Services
402.471.8566 (business hours)
402.471.2400 (after hours)

NEBRASKA
BIOCONTAINMENT
PATIENT CARE

Nebraska Department of Health and Human Services, The Nebraska Medical Center and University of Nebraska Medical Center

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Ebola: Medical Devices and Personal Protective Equipment Preparedness.

Thomas Nowicki, MD, FACEP
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(CESI) Center for Simulation, Education and Innovation

The Situation:

There was an *urgent* need to become truly prepared to provide potential care to Ebola Patients in a manner that would *ensure* safety for our caregivers.

Hospital System-wide response

- Involved every element of patient care
- Unclear/Rapidly evolving recommendations
- Required a “new” skill to utilize proper PPE

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Barriers

- Anxiety
  - Ensure staff safety
  - High demand for training
  - Scheduling
- Equipment
  - Standardization
  - Availability
- Educational process and expertise

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“Enhanced” PPE

- Beyond standard contact and droplet precaution
  - N95 Respirator
  - Enhanced facial protection (Hood/shield)
  - Multiple glove layers
  - Full body coverage

- Donning and Doffing Process

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The Process

- Utilize the strengths of our Simulation Center (CESI)
- Start with best practices/recommendations

- A Focus on the “EPPE” training
  - Ground the process
    - Educational theory
    - High Reliability (HRO)
  - Develop the tools in real time
  - Disseminate the training
  - Assess for competence
  - Test the environment
  - Assess maintenance of competence

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Simulation Medicine – CESI

(Center for Education, Simulation and Innovation) at Hartford Hospital

10,000 Sq. ft. Medical Training Center

>12,000 Learners/year

- Wide range of training programs
  - Procedural, Cognitive, Team, Communication
- Diverse Learner Population
  - All medical specialties
  - Students, Residents, Physicians, Nurses, Allied Health
  - Military, Pre-Hospital, Police

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Educational Development

- Mastery Learning Model
- Deliberate Practice
  - *Highly motivated learners*
  - Defined learning objectives
  - Appropriate level of difficulty
  - *Focused, repetitive practice*
  - Reliable measurements
  - *Informative feedback (Debriefing)*
  - Monitoring, error correction, continued deliberate practice
  - *Evaluation of performance to set standard*
  - Advancement to the next task

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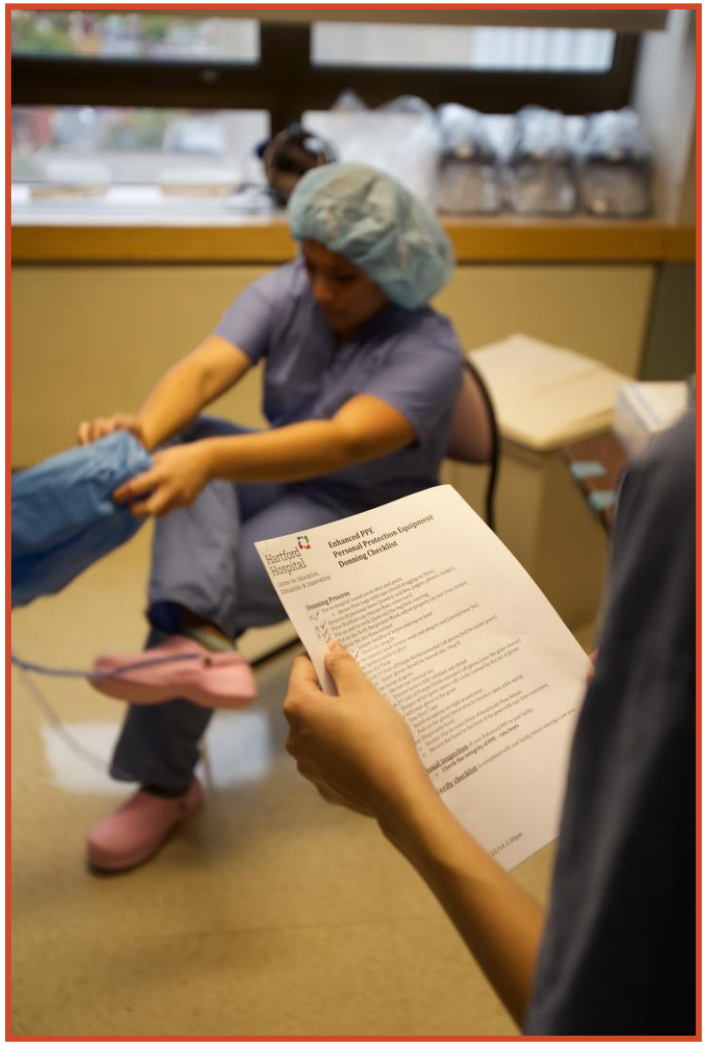
High Reliability Training

- Checklist Based
- “Buddy System”
- Trained observer



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Donning/Doffing Procedure

- Repetitive Practice
- Experiential Learning
  - Input from the experts and novices
  - “Creating” the solution to the problem
  - Trial and Error

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Donning/Doffing Procedure

- Example: Glove/Gown interface
  - **Concern:** extending the arm could pull the gown away from the gloves, exposing the wrist
  - **Principle:** Highest risk steps occur during doffing, minimize any difficulties removing EPPE
  - **Solution:** Tape the joint in a non-restrictive fashion
  - **Lesson Learned:** “Overtaping”

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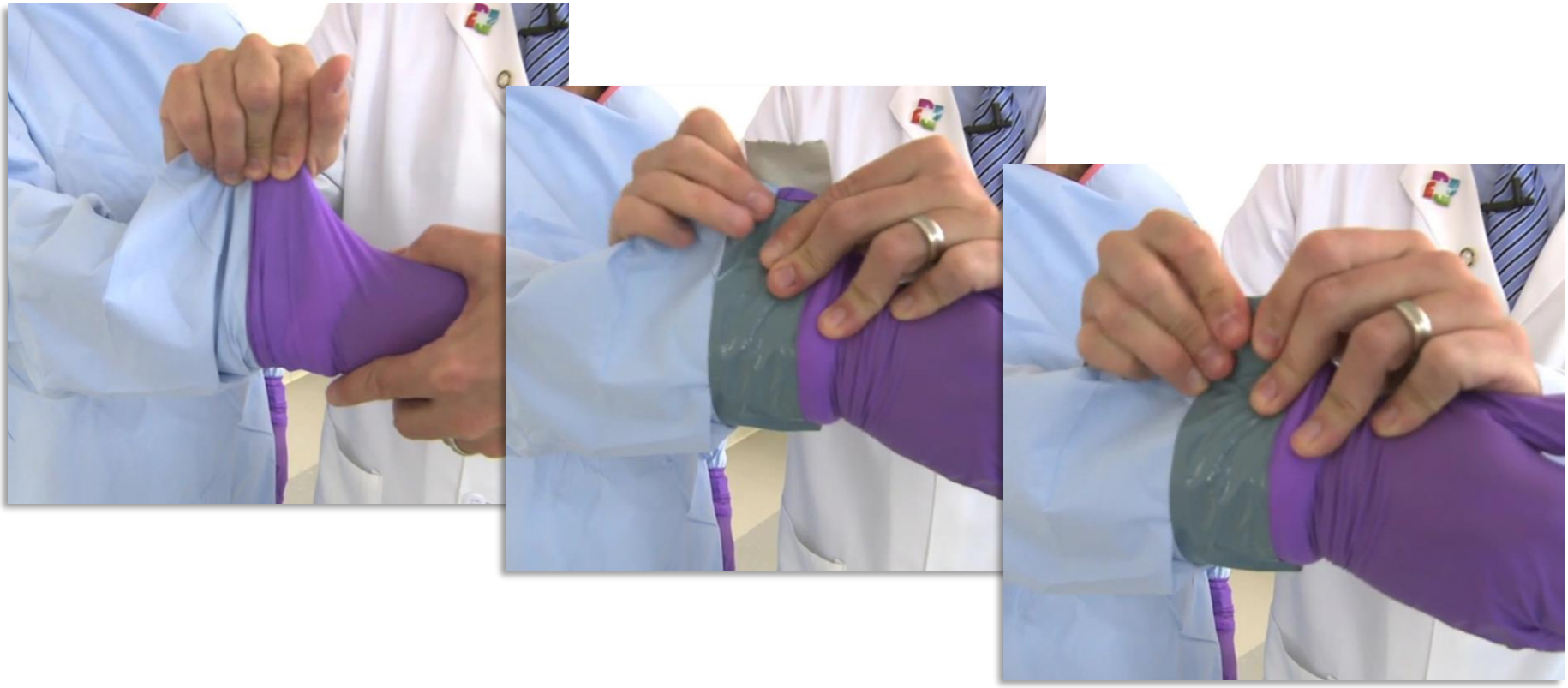
Wrist Taping



Tented while taping to ensure a ***LOOSE*** *fit.*

http://1drv.ms/1uIsji8

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Wrist Taping Incorrect

Wrapped **TIGHTLY** *around wrist.*

http://1drv.ms/1uIsji8

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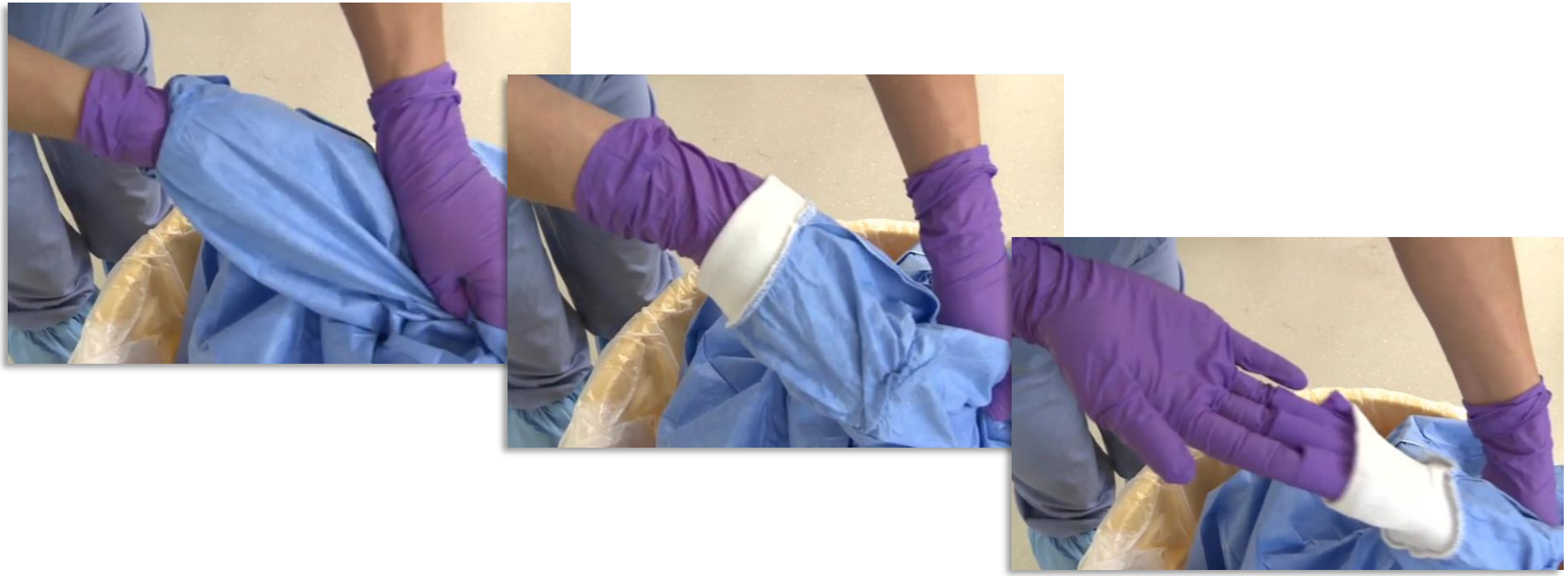
Glove Removal



Outer glove **INVERTS** *and is pulled off with gown.*

http://1drv.ms/1uIt2jf

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Glove Removal Incorrect

Tape **TOO TIGHT** *to pass over hand.*

http://1drv.ms/1uIsGZO

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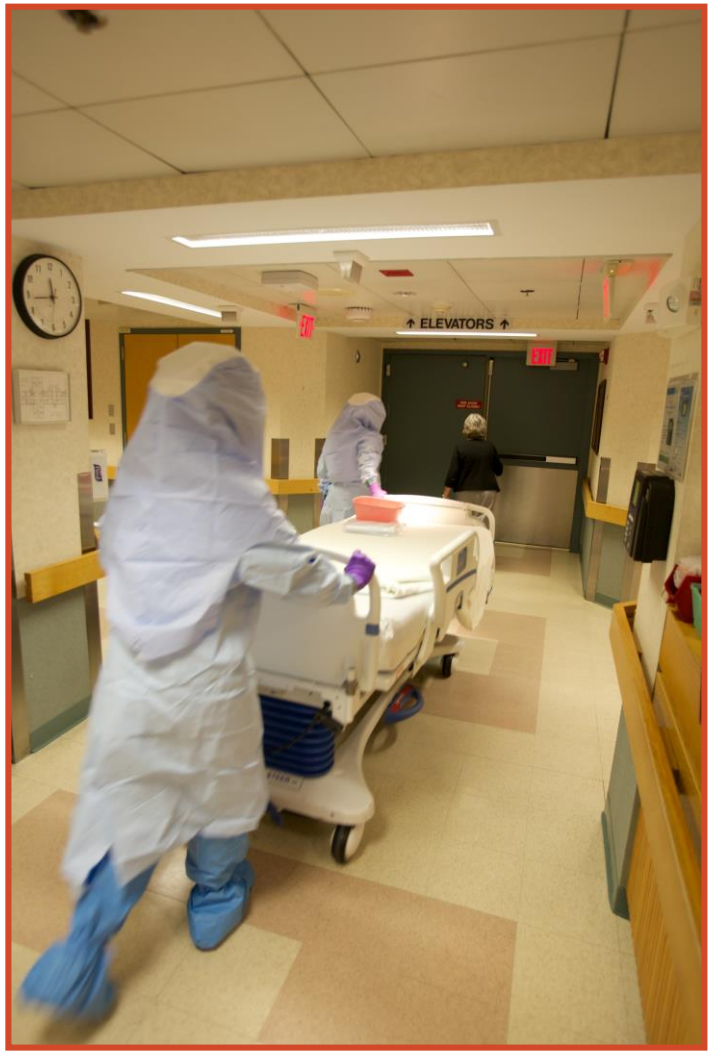
Training location

- Simulation Center Based
  - Controlled environment
  - Centralized location
  - Staff and Equipment
  - *Donning/Doffing Procedure*

- “In-situ” (On site training)
  - Fluid environment
  - Multiple locations
  - *Test the care environment*
  - *Communication*



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Questions

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