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Developing and implementing a personal protective equipment training programme for high consequence infectious disease preparedness

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Disclosure

- I have no actual or potential conflict of interest in relation to this presentation

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Acknowledgements

- Dr Mary Wyer, Westmead Institute for Medical Research and WSLHD
- State of Biopreparedness Committee, Westmead Hospital
- Infection Prevention and Control Team WH
- Westmead staff who trained in high-level PPE
- Professor Lyn Gilbert, University of Sydney

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Background

- Using video-reflexive ethnography to improve PPE use
- Invited to use VRE in high-level PPE training
- IPC and educator expertise
- Developed a comprehensive training programme for high-level PPE
- Current roles are federal-funded positions for NSW biopreparedness

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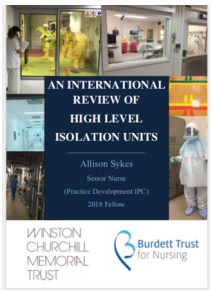
Key influential documents

- Alison Sykes 2019: *An International Review of High Level Isolation Units*
- Alberta Health Services & University of Calgary 2015: *Human Factors Evaluation of Simulated Ebola Virus Disease Patient Scenarios: System Factors Associated with Donning and Doffing During Triage, Treatment and Transport*
- *NETEC* - The National Ebola Training and Education Center - https://netec.org/
- Numerous research articles related to safe doffing and PPE



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Outline of presentation

- Introduction to HCID
- What we have done so far to prepare for HCID
  - Hierarchy of controls
    - Facility
    - Policy
    - PPE
- Developing and implementing the training programme

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High Consequence Infectious Diseases (HCID) [1]

- Acute infectious disease
- Typically has a high case-fatality rate
- May not have effective prophylaxis or treatment
- Often difficult to recognise and detect rapidly
- Ability to spread in the community and within healthcare settings
- Requires an enhanced individual, population and system response to ensure it is managed effectively, efficiently and safely

[1] UK Government 2019

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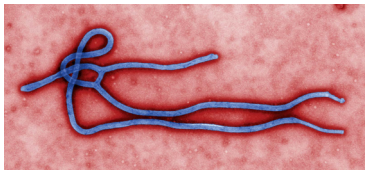
HCID

Contact transmission

- Viral Haemorrhagic Fevers
  - Ebola virus disease (EVD)
  - Lassa fever
  - Marburg virus disease (MVD)



Airborne transmission

- 2019-nCoV acute respiratory disease
- Avian influenza A
  - H5N1
  - Other novel human pathogenic influenza
- Severe acute respiratory syndrome (SARS)
- Middle East respiratory syndrome (MERS)
- Monkeypox

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HCID threat

- *2014-2016: West Africa Ebola Zaire outbreak*
  - *28,616 people affected, 11,310 deaths*
- 2014: MERS outbreaks
  - Middle East but also S Korea
  - Hospital transmission
- 2018 – present: EVD Democratic Republic of the Congo
  - Public Health Emergency of International Concern (WHO 2019)
  - 3421 cases / 2242 deaths / 1154 survivors (as of 28/1/20)
- 2019 – present 2019-nCoV acute respiratory disease

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Local HCID preparedness

- Westmead Hospital in Sydney – state facility for NSW (adults)
- Isolation facilities - existing and new
- HCID policies and procedures
- PPE
- Staff training

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Local HCID preparedness

- Build on work done in 2014-2015 and with SOB project team
- DRC outbreak renewed efforts to be prepared as the state facility
- Training programme linked to other HCID preparedness activities e.g. policies revised
- Appointment of small multi-disciplinary team

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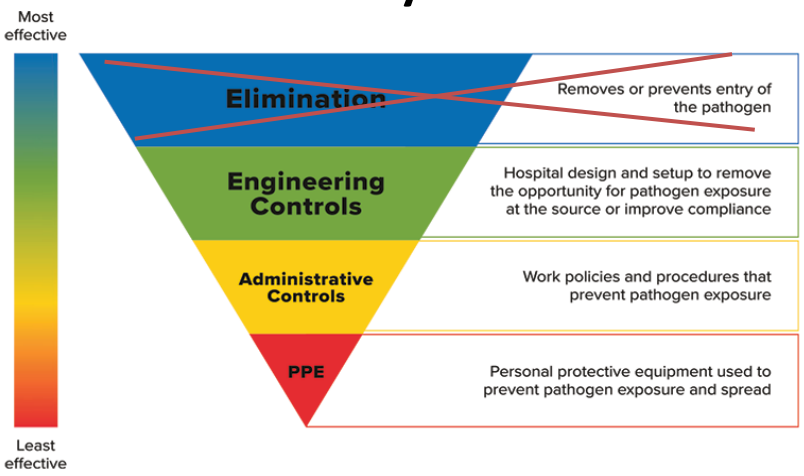
Preventing transmission – hierarchy of controls



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Engineering Controls
Hospital design and setup to remove the opportunity for pathogen exposure at the source or improve compliance

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Engineering controls

- Europe - high level isolation units
  - 4 in UK
- USA - biocontainment units
  - 10 regional
- Australia – infectious disease units / biocontainment units
  - 1 per state
- NZ – I purpose built

Trexler isolator – Royal Free Hospital, UK

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Engineering Controls

Hospital design and setup to remove the opportunity for pathogen exposure at the source or improve compliance

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Westmead engineering controls

- Current: 2 Q-class rooms for adults
  - Dedicated beds in the ICU
  - Anteroom, patient room with ensuite
  - Utility room A
  - Staff shower
  - Utility B for transfer of waste, blood samples etc.
- New: state of the art biocontainment unit
  - Paediatric and adult beds

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Engineering Controls

Hospital design and setup to remove the opportunity for pathogen exposure at the source or improve compliance

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Q-class rooms

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Engineering Controls — Hospital design and setup to remove the opportunity for pathogen exposure at the source or improve compliance

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Engineering controls

- Organisation of PPE supplies in donning area
- Build upon existing dirty and clean zones
- Tape on floor for doffing
- Minimal equipment/supplies in room
  - Checklist with photos
- Signage
- Hands free ABHR dispenser
- Cuff first gloves dispenser

I64 BINS
(used for patients with high-consequence infectious diseases)

RED labelled I64 Bins **MUST NOT** leave the Q-Class rooms without being double bagged in hazardous waste bags

High Consequence Infectious Diseases Westmead Hospital September 2019

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Administrative Controls — Work policies and procedures that prevent pathogen exposure

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Administrative controls

- Operational procedures to prevent/minimise exposure
  - Buddy system
  - Change in practice to minimise entries
    - ↓ number of people exposed
    - ↓ doffing risks
  - Clinical interventions – radiology, IV, dialysis
  - Waste
  - Environmental cleaning
- Training
  - Donning and doffing PPE
  - Procedures

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Administrative Controls

Work policies and procedures that prevent pathogen exposure

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Operational procedures – doing the job

- The safety of staff MUST take precedence over patient safety
  - **BUT,** the patient is a person
- Confidence in PPE protection
- Understanding transmission routes
- Adapting IPC principles to the physical space
- Using a Buddy

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Administrative Controls

Work policies and procedures that prevent pathogen exposure

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Buddy responsibilities

- Being vigilant in spotting defects or breaches in PPE while HCWs are in the patient room
- Observing HCWs for heat stress or fatigue related to PPE
- Monitoring compliance with PPE protocols
- Guiding, correcting, and assisting during donning and doffing
- Adhering to the **Call / Do / Respond** method
- Warning HCWs of potential risky actions (e.g., touching face)
- Being informative, supportive and well-paced in issuing instructions or advice
- Protecting themselves through proper PPE use during doffing
- Anticipating and planning for risks

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Administrative Controls

Work policies and procedures that prevent pathogen exposure

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Specific procedures

- Cleaning up a blood or body fluid spillage
- Phlebotomy and preparing the samples for transport to the laboratory
- Transferring waste bags from the dirty zones
- Procedure for changing outer gloves

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Administrative Controls

Work policies and procedures that prevent pathogen exposure

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Training

Train specifically for knowledge and skills relating to:

- **Self-awareness** of habitual behaviours and the importance of minimizing them
- **Hazard identification**, awareness of where contamination may occur and knowledge of how to respond appropriately should contamination occur.
- **Familiarity with PPE,** specifically how it will affect HCW mobility and dexterity, as well as how their body reacts to heat stress.
- **Procedural competency**, repetitive training including appropriate technique for the motions associated with doffing PPE and checklist use.
- **Buddy roles** that support HCW including the management of PPE breaches, minimising the spread of contamination, and avoiding high risk behaviours.

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PPE

Personal protective equipment used to prevent pathogen exposure and spread

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Personal Protective Equipment

- PPE based models of delivery
  - Different PPE ensembles
  - No global consensus on individual PPE items
- PPE is unfamiliar and constraining
- High probability of error when doffing – self contamination

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PPE

Personal protective equipment used to prevent pathogen exposure and spread

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PPE checklists

- Checklists used for both donning and doffing
  - Used video reflexivity to improve checklists and doffing procedures
  - Learn from healthcare workers
- Buddy system used (trained observer)
  - Consider a third person if resources allow
- **CALL, DO, RESPOND** method
  - Physically tick the check list
  - Include regular reassurance (doffing)
- Minimise steps that require the Buddy to touch the HCW when doffing

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PPE — Personal protective equipment used to prevent pathogen exposure and spread

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Selection of PPE

- Availability – currently / in global emergency
- Gowns versus coveralls with mask or PAPR
- Adequate coverage
- Protection for mucous membranes
- Ability to move and work in PPE
- Ease in doffing – minimises breaches
- Staff acceptance

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PPE — Personal protective equipment used to prevent pathogen exposure and spread

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Gowns & Coveralls

Gown

- Surgical gown
  - knitted cuffs
  - wrap around (coverage)
- AAMI 4 level - whole gown
- Weight - comfort
- Length
- Fit & sizing
- Neck fastening (doffing)

Coverall

- Protection level
- ? Hood or no hood
- Integral finger loops (middle finger)
- No integral feet (trip hazard)
- Covered zipper
- Zipper cord

Additional plastic apron or gown?

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PPE

Personal protective equipment used to prevent pathogen exposure and spread

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Gloves

- Different colours for inner and outer
- Long cuffs e.g. chemotherapy gloves
- Thickness – dexterity
- 2 pairs or 3 pairs
- Taping of gloves
  - ease of removing tape – no scissors
  - longitudinal or circumference
  - risk of tearing gown
- Glove dispenser – cuff first

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PPE

Personal protective equipment used to prevent pathogen exposure and spread

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Face and head cover

- Mask over or under hood
- Goggles and/or face visor
- Hood with shroud
  - Material
  - Fit
  - Availability
- PAPR
  - Availability of suitable hood
  - Motor outside or concealed
- Disposable versus reusable

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PPE — Personal protective equipment used to prevent pathogen exposure and spread

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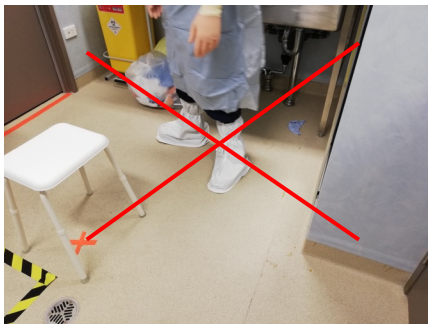
Foot coverings

- Plastic shoes
  - Colour coded for size
  - Easily disinfected
- Booties
  - Long enough with gown
  - Non-slip sole
  - Ties versus elastic
  - 2 sizes



Note: The booties are the trickiest item to remove

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PPE — Personal protective equipment used to prevent pathogen exposure and spread

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Other PPE items

- Scrubs – disposable scrubs were transparent
- Sports bands for personal glasses
- Non-slip socks
- Hair ties and clips
- Anti-fog spray
- Tape
- Permanent marker

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Training programme

- Aims and learning outcomes
  - To equip participants with the ability to understand and demonstrate safe donning and doffing of high-level PPE
  - To give clinicians the experience of performing common procedures while wearing full PPE
  - To understand the role of the Buddy
- Use of WSLHD lesson plans
- Incorporate video-reflexive ethnography as a learning tool

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Video reflexive ethnography

- Video clinicians working in and doffing PPE
- Show the footage to them individually or in groups for reflexive discussion
- Makes explicit the complex realit of high-level PPE
- Assists clinicians make sense of their own PPE practices and contexts – self-awareness
- Leads to improvements in individual behaviour and procedures

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Planning

- Attendees
  - Emergency Department
  - Infectious Diseases
  - Critical Care
  - Public Health
  - IPC
- Content:
  - Theory
  - Classroom
  - Simulation
  - Debrief
- Numbers limited by:
  - Space for demo and practical component in classroom
  - Opportunities in Q-class rooms
  - Expert feedback

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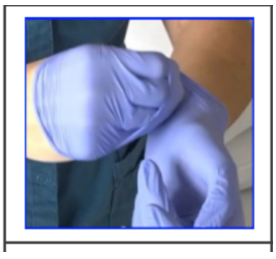
Planning (cont.)

- Training time:
  - Pre-training - watch video for safe glove removal methods
  - 8 hours initial training day
  - 4 hours credentialing session
  - 1 hour 3-month refresher
- Admin
  - Training day preparations
  - Data entry – PPE sizes, credentialing etc

Beak method of glove removal



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8-hour day - morning

- PPT intro – 1hr
- PPE sizing and collection of items & brief tour of Q-class rooms
- Demonstration of donning and doffing PPE then practice
- Videos of procedures

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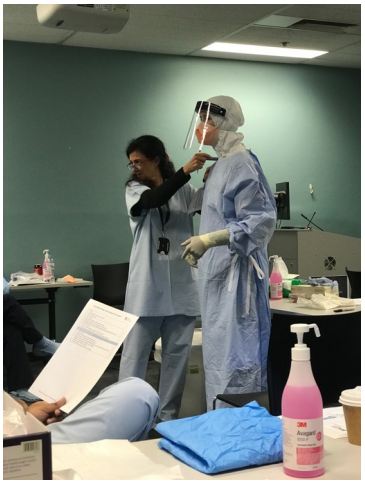
Classroom demo and practice



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8-hour day - afternoon

- Practice donning and doffing in real space
- Practice being a Buddy
- Practice undertaking procedures in PPE
- Debrief
- Evaluation

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4 hours for credentialing

- Requires 5 practices
  - 1 counted from 8-hour day
- Don and doff 4 times
  - Assessed on final
  - Re-use gown, hood, visor and booties
- Maximum 4 people
  - 2 persons per session per Q-class room
  - 2 assessors (experts)
- Competency tool based on state but revised in-house
- Include research follow up

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Refresher training

- 3 month in normal time
  - More frequently if alert locally/nationally
- Don and doff x 1
- Act as doffing Buddy
- Ideally 2 persons
- In real space
- Incorporate other procedures if time allows
- Minimum 1 hour

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Summary

- >50 people have now completed the initial training, credentialing and 3-month refresher
- Resource intensive – time!
- Benefit by having a dedicated space always available
- Inclusion of research useful and clinician opinion critical to confidence of staff in using PPE

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Conclusion

- Preparation for HCID is important for public health and protection
- Training in routine and high level safe donning and doffing PPE is an essential component of preparedness
- Planning should allow for resources and sustainability

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A bit of fun – a pandemic limerick

- There was an infectious disease
- Which brought the whole world to its knees
- When they sneezed and they coughed
- We donned and we doffed
- And survived with barely a sneeze

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February 27, 2020	ANTIBIOTIC STEWARDSHIP IN NURSING HOMES Speaker: **Prof. Patricia Stone**, Columbia University, School of Nursing
March 3, 2020	*(European Teleclass)* THE EFFICACY OF INFECTION PREVENTION AND CONTROL COMMITTEES IN AFRICAN SETTINGS Speaker: **Eltony Mugomeri** , Africa University, Zimbabwe
March 12, 2020	*(FREE Teleclass)* THE BUZZ AROUND MOSQUITOES AND MOSQUITO-BORNE DISEASES Speaker: **Dr. Marcia Anderson**, Environmental Protection Agency
March 19, 2020	INFECTION PREVENTION AND CONTROL IN HOME CARE AND HOSPICE: COMMON COMPLIANCE ISSUES Speaker: **Mary McGoldrick**, Home Health Systems, Inc.
April 16, 2020	WATERBORNE PATHOGENS: WHY IS THEIR PROFILE CHANGING? Speaker: **Prof. Syed A Sattar**, Centre for Research on Environmental Microbiology, Canada
April 29, 2020	*(South Pacific Teleclass)* SHARPES INJURIES – WHY AREN'T WE AT ZERO? Speaker: **Terry Grimmond**, Grimmond and Associates, New Zealand
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