Outbreak management in hospital settings

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Outbreak?

- Occurrence of more cases of a disease / event than expected during a specified period of time in a given area or among a specific group of people (even just one rare)
- Infectious diseases: pathogens; syndromal; systemic
- Healthcare setting: patients (visitors) and staff; surveillance (in HA hospitals)
  - Pathogens (accurate identification & resistance pattern): laboratory – LIS
    - → timely notification on alert organisms for prompt patient management and IC measures: dual reporting to ICT; rare organisms alerted by lab technologists, microbiologists, clinicians
    - → periodic data analysis (know your baseline): CDARS, other IT platforms for cluster reporting
  - Syndromal: SESAS (staff), ILI, GE
  - Systemic (nosocomial infections): SSI, CRBSI (bacteremia), CA-UTI, HAP
    - Surveillance criteria Vs Diagnostic criteria (clinical judgment)

Hospital settings: Early detection / investigation, prevention and control

- Fluidic dynamic (interface) between community (esp. OAHs) and hospitals
- Clustering of infections (with or without known pathogens: ILI, GE, scabies, etc) at OAHs (alerted by CGAT, VMOs, outreach teams) → AED of receiving hospital → prompt isolation precautions without waiting for laboratory confirmation
- Surge in uncommon organisms identified at hospitals → alert CHP for control in the community

Common clustering of MDROs / nosocomial pathogens in hospital settings

- MRSA (settings: acute Vs convalescent; adult Vs neonatal; general Vs immuocompromised); CA-MRSA)
- Coagulase-negative Staph
- MDRA
- *S. maltophilia*
- CPE
- VRE
- *C. difficile*
- *C. auris*

Common clustering of microorganisms in hospital settings

- Respiratory viruses: influenza virus, RSV, parainfluenza viruses, adenovirus, rhinoviruses, coronaviruses including SARS-CoV-2
- GE viruses: norovirus, rotavirus
- Scabies (Norwegian!)

Uncommon clustering or surge in uncommon microorganisms: community Vs hospital / specialized care centres

- *B. cepacia* (bacteremia, osteomyelitis in IVDA; nosocomial bacteremia, SSI)
- GBS (freshwater fish)
- NTM (renal: HD, PD; bronchoscopy; *M. chimaera* in heater-cooler device use in cardiothoracic surgery)
- GAS

Not uncommon pathogens demanding prompt isolation in hospitals – Airborne or highly pathogenic

- TB
- Chickenpox
- Measles
  - Timely isolation upon clinical suspicion: suspected TB, fever & rash
- Meningococcus
- SARS-CoV-2

Not uncommon pathogens demanding timely and thorough investigation in hospital

- Hospital-onset LD
- Hospital-onset aspergillosis

Rare but highly pathogenic and/or highly transmissible pathogens with great potential of hospital outbreaks

- Bioterror microorganisms
- Ebola
- MERS
- SARS CoV
- HPAI

What to know about them?

- Clinical presentations; pathogenicity; risk factors
- Incubation period
- Infectious period
  - Source finding Vs victim finding
  - Carriage
- Mode(s) of transmission → isolation precautions
  - Role of environmental surfaces → effective disinfectant
  - Role of HCW hands → effective hand hygiene product
- Diagnostics (microbiology laboratory)
  - Clinical management: ability for accurate identification / isolation; type of specimens, specific tests, TAT, further lab analysis – molecular typing (PFGE, MLST, spa, WGS, etc)
  - Screening (human; environmental)

Steps / highlights in investigation in hospitals

- Accurate identification of pathogen: e.g. MALDI-TOF for *C. auris*
- Verify diagnosis: contamination (pseudo-outbreak)? Colonisation or infection? Invasive infection? – talk to the clinicians
- Confirming an outbreak
- Preliminary lab records review
- Preliminary epidemiological investigations: Time, Place, Persons
  - Patient bed movement: Bed No. change but no bed change?
  - Other significant personal care equipment / furniture: arm chair
  - Line-listing
  - Spot map (ward floor plan with patient journey)
  - Epi-curve of onset date: common source or propagated outbreak
- Site visit and discussion with ward managers and interview with frontline staff
- Inform relevant parties and convene HOCT meeting: all potentially involved clinical depts, cleansing team, admin, HR, PR, CHP, HAHO)

Steps / highlights in investigation in hospitals

- Define case
- Decide on scope of detailed investigations, screening, active case finding and extent of patient/staff contact with balance on operation in providing clinical service
- Control measures: isolation and environmental disinfection
- Patient management (mitigate risk of subsequent invasive infection) and discharge plan, FU screening
- Manage concern from patients' care takers, staff, public

Sharing on clustering and control of Candida Auris in NLTH

UVD Robot disinfection in NLTH

1

Environmental preparation after manual terminal cleansing

2

Apply Candida Albican on designated site with marking and pre-environmental sampling

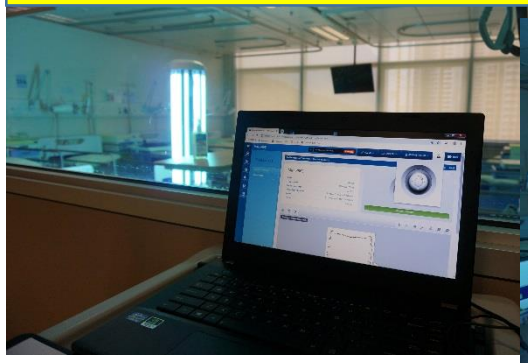
UVD Robot disinfection in NLTH

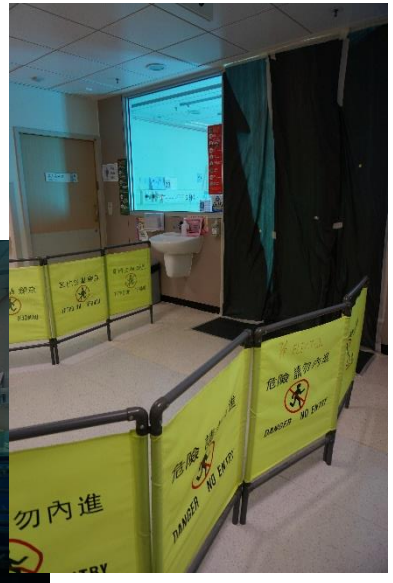
3

Apply test strip by manufacturer

4

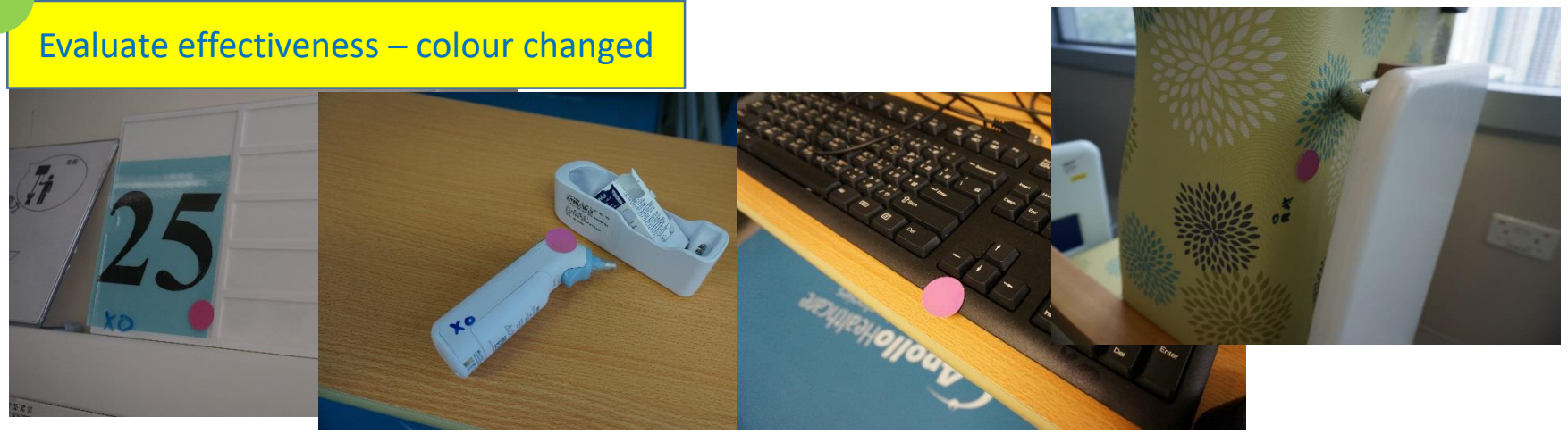
Starting UVD robot disinfection





UVD Robot disinfection in NLTH

Evaluate effectiveness – colour changed



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Evaluate effectiveness – partial or no colour change

7

Post environmental sampling

Lessons to learn from infrequent *C. auris* outbreaks since then…

- Screening of high risk groups of patients transferred from high risk hospitals / admitted from high risk OAHs / overseas countries
- Need improved lab diagnostic methods and TAT (culture Vs PCR) with affordable cost
- Contact tracing extended to thorough environmental disinfection instead of patient discharge
- Scope of contact tracing (cubicle Vs ward) according to risk factors (level of care, devices, bedside procedures, duration of stay); preemptive CP for other MDROs might not obviate the need for screening
- Period of tagging for screening might need to be prolonged to avoid early false negatives
- Beware of the claimed efficacy of antimicrobial curtains
- Need cost-effective disinfection method for room & equipment (HPV, UVC)
- Need effective hand hygiene product: alcohol HR or povidone iodine handwash for staff
- In search of effective and safe body wash (Manuka honey) for reducing bioburden for patients

Thank you!

Q & A