Assessment of the need for notification of Carbapenem-resistant Enterobacteriaceae in Tasmania

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Background

- Emerging clinical and public health problem
- CRE often resistant to multiple classes of antimicrobials.
- Enterobacteriaceae are common pathogens.
- High mortality.
- Carbapenems - last class with near universal Gram negative activity.
- Australia not yet seen large numbers of CRE cases.

National notification practices

- Not nationally notifiable disease.
- No alternative national surveillance system.
- Of the other healthcare associated infections (HAI) or multi-drug resistant organisms (MDROs):
  - Tasmania lists Staphylococcus aureus bacteraemia (SAB) and Vancomycin Resistant Enterococci (VRE).
  - Western Australia list Methicillin resistant Staphylococcus aureus (MRSA) infection.

International notification practices

United States:

- CDC encourages state health departments to lead surveillance and prevention.
- A number of States have made CRE reportable.
- Two surveillance systems:
  - the Emerging Infections Program and the National Healthcare Safety Network (NHSN).

Europe:

- Countries with no or sporadic CRE: report all cases to public health.
- Countries with endemic or ongoing outbreaks of CRE: hospitals send daily census.

Context

Locally:

- No systematic surveillance.
- Two new local cases appeared linked.

Case 1: hospitalised male (PHx surgery in India).

Case 2: previously well 18 month old child in the community with a UTI and no travel history.

Case 3: child's mother (asymptomatic).

Context

Broader context:

- Outbreak in Victoria.
- On the national agenda.
- Tasmania does transfer hospitalised patients to and from interstate hospitals (e.g. transplant recipients).

Aim

- To determine the need for carbapenem-resistant Enterobacteriaceae (CRE) to be added to the Tasmanian notifiable disease list.

Objectives

- Assess need for state-wide surveillance and notification of CRE against nationally endorsed criteria.
- Determine prevalence of CRE in acute care facilities in Tasmania.
- Assess the current methods used to screen and diagnose CRE in Tasmanian pathology laboratories.

Method

- Working group convened.

Scoring system 1

- In 2008, the CDNA developed a set of criteria that are based on the Centres for Disease Control and Prevention surveillance goals to guide assessment of the need for inclusion of a disease on the NNDL.

Assessment of the need for state notification of CRE against CDNA endorsed scoring system 1.

Criteria / Surveillance Goal	Applies	Applies somewhat	Does not apply
To control the spread of disease	✓		
Outbreak potential	✓		
Changes in incidence and/or morbidity and mortality	✓		
To estimate the burden of disease	✓		
To monitor trends in the burden over time	✓		
Feasibility of collection		✓	
Vaccine preventability			✓
To assess the effectiveness and immediacy of interventions (e.g. vaccines)	✓		
To monitor changes in disease characteristics over time	✓		
To enhance understanding of the epidemiology and clinical course of the disease	✓		
To provide a basis for epidemiological research	✓		
Community and political concern	✓		

Assessment of the need for state notification of CRE against CDNA endorsed scoring system 1 (cont'd)

Criteria / Surveillance Goal	Applies	Applies somewhat	Does not apply
International concern	✓		
Importance to Indigenous health			✓
To inform policy makers	✓		
To review and assess that proposed surveillance systems are adequately sensitive and specific to achieve these aims		✓	
To review assessment and refinement of existing control programs	✓		
A developed surveillance strategy			✓
Post-marketing surveillance			✓
Laboratory characterisation of organism		✓	

Result – scoring system 1

- Working group members applied criteria independently.
- Disagreements resolved by discussion.

Applying scoring system 1:

- 13/20 surveillance goals applied to CRE.

Method – scoring system 2

- In 2012: adapted scoring system developed by the Public Health Agency of Canada.

- Current diseases listed on the NNDL were scored:
  - 11 security or quarantine interest - no further consideration.
  - Scores ranged between 7 and 26.
  - Influenza highest (26/41).
  - Hepatitis A, Pertussis and Dengue each scored 25/41.

Assessment of the need for state notification of CRE - scoring system 2.

Criterion #1. Diseases of Interest to Organisations to Inform Prevention and Regulatory Programs

0	No national/international regulatory/prevention program interest
2	Interest to regulators and/or WHO CSR (but not internationally notifiable)
3	Emerging disease -there is potential to develop national prevention programs if data available (and data would not otherwise be available and/or timely)
4	Directly prevented though notification (otherwise recognition of a problem would not be timely enough for action)

Criterion # 2: 5-Year Average Incidence

0	**No cases reported**
1	More than 0 but less than or equal to 0.01/100,000 per year
2	More than 0.01 but less than or equal to 0.45/100,000
3	More than 0.45 but less than or equal to 6.96/100,000
4	More than 6.96/100,000
5	“Critical incidence”

Criterion #3: Severity

1	short-term illness, &/or complete recovery in majority of cases, &/or case-fatality 0%
2	short - longer-term illness, &/or lengthy recovery in some cases, &/or case-fatality <10%
3	long-term disability, &/or recovery rare, &/or death more likely, &/or case-fatality 1-10%
4	severe illness, and/or death is most likely outcome, and/or case fatality 10% to 100%

Criterion #4: Communicability/Potential Spread to the General Population

0	not communicable
1	low communicability: requires very high infectious dose; not environmentally stable; seldom transmitted to even close (e.g. sexual) contacts; enteric organisms not known to be transmitted person-to-person
2	low-medium communicability: transmissible to very close contacts only; respiratory pathogens that require prolonged (e.g. shared sleeping arrangement) contact; enteric pathogens that may be transmitted via high dose in food or water, or (for person-to-person) require recognizable contact with fecal material
3	medium communicability: transmissible to casual contacts; respiratory pathogens that are transmitted by droplets and may be passed to persons sharing the same airspace for several hours; enteric pathogens that require a low dose to be transmitted by food OR may be passed person to person without recognizable contact with fecal material (e.g. hepatitis A; Shigella)
4	highly communicable: respiratory pathogens that are transmitted through fine aerosol, are potentially transmitted to anyone sharing the same airspace with the case

Criterion #5: Potential for Outbreaks

0	no potential to cause outbreaks
1	at least one past outbreak documented in the literature
2	small infrequent outbreaks possible; low transmissibility; low rate of exposure
3	large or frequent outbreaks possible; readily transmissible; large proportion of the population is potentially exposed and susceptible
4	potential to cause large, widespread, ongoing, devastating outbreak; very readily transmissible; long period of communicability; potential for widespread exposure; high level of susceptibility

Criterion #6: Socioeconomic Burden

1	low cost to heath care system, no disability
2	low to medium costs, disability rare to somewhat common
3	medium to high costs, disability more likely
4	high costs to health care system and severe disability

Criterion #7: Preventability

0	no preventive measure
1	preventive measure available but low efficacy
2	preventive measure with moderate efficacy/high side effects
3	preventive measure with moderate efficacy/low side effects
4	preventive measure with high efficacy/low side effects

Criterion #8: Risk Perception

1	no to low perception of risk
2	low to medium perception of risk
3	medium to high perception of risk
4	high perception of risk/perceived “crisis” situation when cases identified

Criterion #9: Necessity of Public Health Response

0	not important for public health to know about a case
1	case reporting important for describing trends only
2	case reporting important for detecting outbreaks that require investigating
3	case reporting important to detect outbreaks of cases and investigate contacts that require immediate intervention to prevent fatalities or severe outcomes
4	a single case can be considered an outbreak and requires immediate follow-up

Criterion #10: Increasing or Changing Patterns

0	has been stable over past 5 years
1	exhibiting slow changes over past 5 years
2	exhibiting medium degree of change over past 5 years
3	exhibiting dramatic changes over past 5 years
4	new, emerging disease of high public health importance

Result – scoring system 2

Applying scoring system 2:

- CRE scored 32/41.

Limitations of the scoring systems:

- Some criteria are subjective and ill-defined.
- Some criteria consist of multiple parts, each component may not apply.
- Neither considered the practical or policy aspects of notification.

Method - Determine the prevalence of CRE in acute care facilities in Tasmania.

- Survey questions adapted from CDC CRE toolkit survey.
- Emailed to infection, prevention and control personnel.
- Represented public, private and rural hospitals.

Survey of healthcare facilities

- Do you have a policy/ procedure for managing patients colonised with CRE?
- Do you use the DHHS policy/ procedure for surveillance screening of patients for CRE?
- Have you screened any patients in the last 12 months?
- Were these patients:
  - transferred from an overseas hospital;
  - admitted overnight to an overseas hospital or resided in an overseas residential aged care facility in the last 12 months;
  - people identified as a CRE contact during hospitalisation;
  - patients with past CRE colonisation or infection;
  - other?
- In the past 12 months, have any CRE infected or colonised patients been admitted to your facility; how many?
- Did they acquire CRE in a Tasmanian, interstate or international healthcare facility?
- In the past 12 months, did anyone acquire CRE at your facility:
  - How many, did you conduct surveillance screening; what measures were put in place?

Results – survey of healthcare facilities.

- Represented all public and 2/5 private hospitals.
- All facilities had policy/ procedures for management of patients infected or colonised with CRE.
- One hospital actively screened patients for CRE in the past 12 months.
- CRE was not acquired within any of the surveyed hospitals.

Method - Assess current method used to screen and diagnose CRE in Tasmanian pathology laboratories.

- Survey emailed to the four Tasmanian laboratories operating in Tasmania.
- Requested a commitment to a standardised approach.

Survey of laboratories

Does your laboratory currently receive screening specimens for the detection of CRE?	Yes	No
What media does your laboratory currently use for this purpose?		
What methodology does your laboratory currently use to detect the presence of C-R in Enterobacteriaceae? (e.g. EUCAST, CLSI, CDS, other)		
Does your laboratory currently perform direct sensitivity testing of urine? If no, go to question 6	Yes	No
Is C-R currently tested for as part of this process?	Yes	No
Does your laboratory use a phenotypic confirmation method if a CRE is suspected? If no, go to question 8	Yes	No
What method do you use for phenotypic confirmation? (e.g. Carba NP test, Hodge Test, other)		
Does your laboratory have the capacity to perform molecular testing to determine the presence of carbapenamase genes?	Yes	No
Would your laboratory support the development of a common approach and methodology for the detection of CRE within Tasmanian microbiology laboratories?	Yes	No
Would you be willing to participate in this process?	Yes	No

Result – survey of laboratories.

- Three out of four responded.
- Two laboratories already use similar methodology
  - As per ASQHC document guidelines
  - ESBL detecting media initially
- All three committed to using a standardised approach.

Implementation implications

- Emerging MDRO's most effectively dealt with when first recognised
- Aggressive approach required once identified
- Screening and pre-emptive precautions
- Facilitate/legitimise ability to limit and contain transmission
- Well established systems in place for other HAI
- Cost

Consensus recommendation

Make the isolation of carbapenem-resistant Enterobacteriaceae a laboratory-reportable event.

Interim case definition:

Suspected CRE: Elevated Meropenem MIC defined as:

- EUCAST/CLSI disc zone diameter <25mm (10ug Meropenem disc)
- CDS disc zone diameter <6 mm (10ug Meropenem disc)
- MIC >0.25 mg/l (Etest, VITEK 2, Phoenix)

Confirmed CRE:

- Enterobacteriaceae isolate with carbapenemase gene detected.

Recommendation

Laboratory protocols

- Ensure standardisation.

State reference laboratory

- In principle agreement.

Internal Public Health Services CRE notification procedure

- "Screen patients transferring from Australian hospitals with known outbreaks" added to DHHS MDRO Procedure.
- Draft chapter - Tasmanian Notifiable Disease Manual.