NATIONAL HEALTH LABORATORY SERVICE

Outbreaks of communicable diseases in hospital settings

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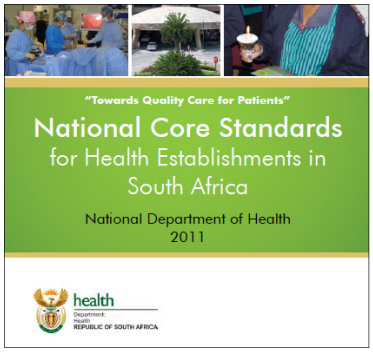
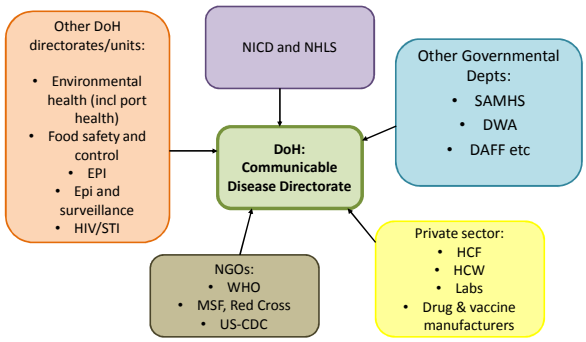
Hospital outbreaks – who, why and how?



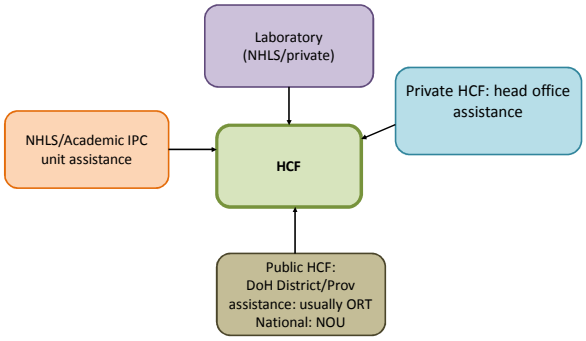
Available at www.doh.gov.za

2.6 Infection prevention and control	2.6.1 An Infection Prevention and Control Programme is in place to reduce health care associated infections	2.6.1.1. An infection prevention and control policy outlines the health establishment's approach to managing health care associated infections
		2.6.1.2 A qualified health professional is responsible for infection control
		2.6.1.3 A formal surveillance and reporting system is in place
		2.6.1.4 A formal system is in place to monitor infection prevention and control and ensure appropriate actions are taken to minimise infection rates
		2.6.1.5 The health establishment reports health care associated infections and notifiable diseases to appropriate public health agencies
		2.6.1.6 Staff and patients and, as appropriate, family and other caregivers, are educated on infection control practices

Communicable disease outbreak response and investigation: typical roleplayers



Hospital outbreaks?



Hospital outbreaks – role of DoH?

- Infection prevention and control unit at NDoH under reconstruction
  - Staff recruitment
  - Placement: possible move to CDC directorate
  - Strong links with NCS and quality assurance
- Increasing participation and assistance from CDC directorate across all levels:
  - District, province and national: through ORTs and NOU
  - NOU: functional integration of NDoH CDC directorate and NICD ORU

Hospital outbreaks: implications of the revised Notifiable Medical Conditions Act

- Three categories of NMC
  - Labs have to notify lab-confirmed NMC in categories 1 and 2 directly to DoH
  - Category 3 makes provision for lab reporting of priority MDROs of public health importance
- Healthcare workers to notify all outbreaks in HCF, whether on NMC list or not
- Failure (both by labs and healthcare workers) to notify NMC to DoH in stipulated time period can result in fine and/or imprisonment

Outbreak management in a nutshell…

First, get the cow out of the ditch.

Second, find out how the cow got into the ditch.

Third, make sure you do whatever it takes so the cow doesn't go into the ditch again.

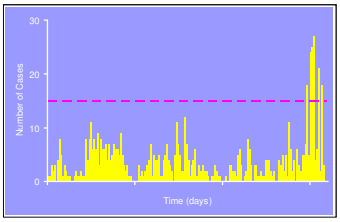
Anne Mulchay

Step 1: Confirm the outbreak

- Is this an outbreak?
  - More cases than expected?
- Historical data required
  - Hospital-specific data: hospital IPC, labs
    - Historical and current surveillance data critical
  - Routine surveillance data: community/nationwide surveillance programmes
  - Colleagues in neighbouring healthcare facilities: local experience

Using thresholds to confirm outbreaks

- What is a threshold?
  - A marker or cutoff that alerts you to take action
  - Use past data to calculate a baseline and decide if an event is abnormal (cutoff is set at certain level above expected)
  - Help identify possible outbreaks with surveillance data



Caution! Pseudo-outbreaks

- Laboratory factors
  - Introduction of new test which was previously unavailable locally
  - Improved lab techniques for identification
  - Introduction of new lab test with poor specificity/sensitivity
  - Contamination during processing in the lab eg due to contamination of media or cross-contamination of specimen during processing
- Ward level
  - Incorrect diagnosis of clinical entity
  - Mislabelling of specimens. If in doubt – ask for a repeat specimen!
  - Contamination during collection if the correct procedure for collection of specimens is not followed.
  - Failure to distinguish community- vs hospital-acquired infection
- Environmental factors
  - Use of poor quality water in washer disinfectors
  - Contamination of endoscopes with enviromental water bacteria (eg Mycobacterium spp, Legionella spp)

Step 1: Verify the diagnosis

- Laboratory confirmation and information critical!
- Clinical diagnosis: meet attending physicians, examine some cases
- Microbiologists (essential) and infection disease specialists (if available)
- Consider additional testing
  - Molecular characterisation to assess organism relatedness i.e. do these isolates belong to one strain? Can you confirm a clonal outbreak?
  - Exclude pseudo-outbreaks
  - Environmental investigations if warranted

Step 2: Case definition

- Standard set of criteria for deciding if a person should be classified as suffering from the disease under investigation
- Criteria for building a case definition:
  - clinical and/or biological criteria,
  - time
  - place
  - Person
- Simple, practical, objective
- Sensitive? Or Specific?

Step 3: Case finding and recording

- Retrospective case finding
  - Search in clinic / hospital records for cases that could meet your definitions
  - Search in lab database
- Prospective case finding
  - Systematic and standardised systems for collecting information
  - Line listing
  - Questionnaires/CIF

What is a line listing?

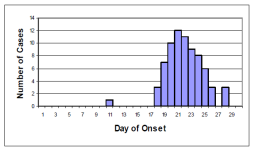
- Line listing = rectangular database similar to spreadsheet
  - Provides summary of key data about cases in an outbreak
  - Each row represents data for one case
  - Each column represents one variable
  - Can be paper-based or electronic (commonly: excel spreadsheet)
  - Can be quickly reviewed and updated
  - Can be easily understood and shared by all persons working on the investigation

Step 4: Descriptive epidemiology

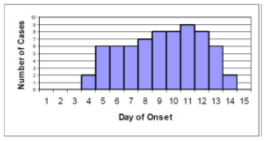
- Should be done for every outbreak
- Used to inform:
  - Magnitude + extent of the outbreak
  - Sub-populations that are most affected
  - How pathogen behaves in the population under study (epidemiology)
  - Target interventions for control + prevention
  - Generate hypotheses about source / cause
- Time, Place, and Person Analyses

Time: examples of epi-curves

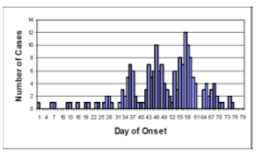
Common point source



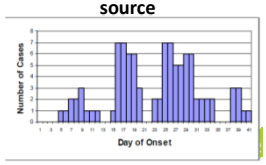
Common persistent source



Propagated (person to person)



Common intermittent source



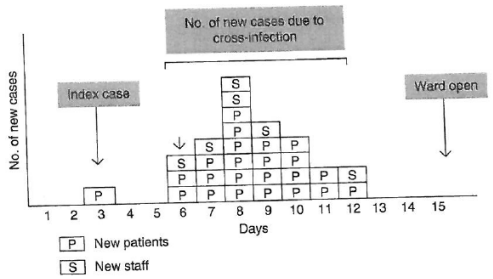


Fig. 4.1 Epidemic curve showing a *point source* outbreak with a bell-shaped curve. A patient is admitted with norovirus gastroenteritis and subsequently infected both patients and staff (secondary and tertiary cases). After implementation of infection control measures, the number of cases was decreased and ward was opened to new admission after 72 hours of the last symptomatic case as the incubation of norovirus is between 24–72 hours.

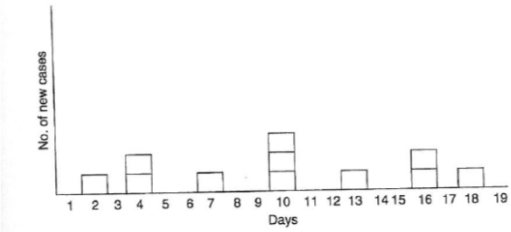


Fig. 4.2 Epidemic curve showing a *continuous source* outbreak in which the epidemic cure is relatively flat as the numbers of cases are spread over long periods due to intermittent exposure of microorganisms.

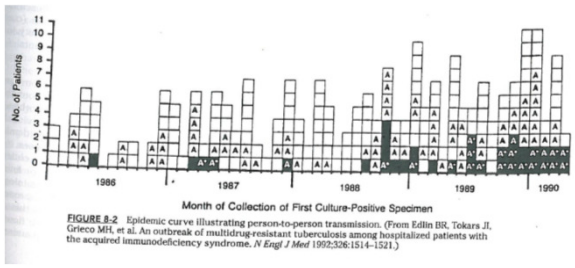
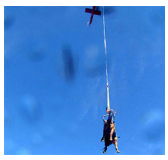


FIGURE 8-2 Epidemic curve illustrating person-to-person transmission. (From Edlin BR, Tokars JI, Grieco MH, et al. An outbreak of multidrug-resistant tuberculosis among hospitalized patients with the acquired immunodeficiency syndrome. *N Engl J Med* 1992;326:1514–1521.)

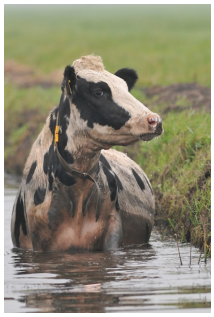
Institute immediate control measures

- Be guided by the Epidemiological triangle:
  - Agent.
  - Host.
  - Reservoir.
- Deal with the reservoir (if any).
- Interrupt transmission.
- Reduce susceptibility of the host (vaccination, chemo-prophylaxis, improve limit invasive medical devices, strict antimicrobial stewardship).
- Treat cases.
- Alert neighbouring healthcare facilities



Intensify surveillance

- Maintain daily updates (cases, deaths, number admitted, number discharged, areas affected, etc) until end of the outbreak.
- Use opportunity to enhance, even institute long-term surveillance activities



Communication is key…

- Convey report to all stakeholders – feedback very important at all levels!
- Ensure outbreak investigation team and key stakeholders are well informed
  - Communicate findings rapidly and frequently (e.g. daily Situation Reports (SitReps) and/or meetings)
  - Do not wait until all info is gathered. Stakeholders should understand that info provided is preliminary
- Inform health professionals of:
  - the likely causes
  - the risk of contracting the disease
  - the essential control/intervention steps
- Ensure acceptability and effectiveness of control measures

Conclusion

- Microbiologists and ID specialists critical to successful investigation and response to outbreaks in hospitals
  - Roles will be strengthened and more visible in future with revised legislation
  - Accountability will increase as a result
- Advice:
  - Get practical experience: actively participate in hospital outbreak investigations
  - Basic mastery of Excel: construct and manage a line list, do basic descriptive epi
  - Assist/ initiate construction and maintenance of baseline lab data for key HAI and MDRO organisms in target areas (e.g. ICU, NICU, burns units, oncology units)
- ?role for SASCM/IDSA/ICSSA to host workshops for basic outbreak response and investigation skills