Session VI

Writing an Outbreak Report

Session Overview

1. Outbreak report function and critical components

2. Case studies
   - *E. coli* 0157:H7 at the NC State Fair, 2004
   - Multistate Outbreak of Monkeypox, 2003
Learning Objectives

• Understand the role of outbreak investigation reports
• Recognize the different types of reports
• Recognize elements to include in outbreak investigation reports

Basic Steps of an Outbreak Investigation

1. Verify the diagnosis and confirm the outbreak
2. Define a case and conduct case finding
3. Tabulate and orient data: time, place, person
4. Take immediate control measures
5. Formulate and test hypothesis
6. Plan and execute additional studies
7. Implement and evaluate control measures
8. Communicate findings

Why Communicate the Findings?

• Document for action
• Share new insights
• Record of performance
• Substantiate recommendations

In order to...
• Prevent future outbreaks
• Assist in investigation and control of similar incidents
• Provide a document for potential legal issues
Why are Outbreak Reports Crucial to Public Health?

Example: Foodborne outbreak

- Hepatitis A contamination of green onions in TN, NC, GA, and PA, Sept-Nov 2003
- Food and Drug Administration (FDA) advisory report and MMWR alerted the public and assisted with traceback

Why are Outbreak Reports Crucial to Public Health?

Example: Respiratory disease outbreak

  - Case-patients were likely exposed by walking by or spending time near the spa
  - The Virginia Department of Health issued recommendations for the inspection and maintenance of display spas

Why are Outbreak Reports Crucial to Public Health?

Example: Respiratory disease outbreak

- Legionnaire’s Disease (LD) outbreak at a flower show in the Netherlands, 1999
  - Source: whirlpool spa on display
  - Lawsuit raised against Dutch government for negligence
  - Failure to act on available knowledge (MMWR 1996)
Some Reports are a Part of History

Morbidity and Mortality Weekly Report (CDC), June 5, 1981

When is the Report Written?

- When the investigation is ‘complete’
- When the investigation is ‘ongoing’
  - “Further analysis of data collected in this investigation may require revision of these findings and recommendations.”
  - “Because of the preliminary nature of this investigation, future correspondence, MMWR articles, or other published reports might present results, interpretations, and recommendations that are different.”
Who Writes the Report?

- The field epidemiology / outbreak team
  - Visiting EIS officer
- Other authors as assigned

All participating agencies must agree with what is in the report.

What are the Types of Reports?

- Complaint form
- Internal report
  - Record that outbreak occurred and investigation was conducted
- State publication
  - Newsletter, Website, statewide alert
- MMWR [http://www.cdc.gov/mmwr/]
- Peer-Reviewed Journals
  - Epidemiology and Infection, Emerging Infectious Diseases, Journal of Hospital Infection

Peer-Reviewed Articles

Research Outbreak Updates

• MMWR mailing list
  www.cdc.gov/mmwr/mmwrsubscribe

• FoodNet
  www.cdc.gov/foodnet/

• ProMED-mail listserve
  www.promedmail.org

Basic Report Structure

• Summary
• Introduction and Background
• Outbreak Description
• Methods and Results
• Discussion
• Lessons Learned
• Recommendations
• Acknowledgements

*Supporting Documentation

~ 2 - 3 pages

Summary

• 1 - 2 paragraphs
• Overview of the investigation
  – WHO, WHAT, WHERE, WHEN, WHY/HOW
• What caused the outbreak or the causal hypothesis based on the evidence
• Key recommendations
• Ongoing actions
• Pending / required actions
Introduction and Background

- Surveillance trends and similar outbreaks
- Include specific events that led to the investigation
  - How the outbreak was first reported
  - Steps taken to confirm the outbreak
  - Those who became involved in the outbreak investigation
- Description of the area / site / facility

Methods

- **Epidemiologic**
  - Case definition and ascertainment
  - Study design
- **Microbiological / Toxicological**
  - Clinical and environmental specimen collection
  - Where specimens sent
  - Types of analyses performed
- **Environmental**
  - Site visit & risk assessment
  - Traceback of food products or other items

Results

- **Epidemiological**
  - No. of questionnaires sent / returned
  - No. of cases and descriptive & clinical data on cases
  - Geographic distribution of cases
  - Epidemic curve
  - Risk factor analysis
  - Attack rates by age, sex, exposure
Results

- Microbiological / Toxicological
  - Laboratory findings, e.g. genotyping, DNA fingerprinting via PFGE, culture results
- Environmental
  - Results of any risk assessments
  - Results of any traceback investigation

Discussion

- Discuss main hypotheses
- Justify conclusions and actions
- Explain action to protect public health

Discussion

- Highlight any lessons learned
  - Problems encountered
  - Mistakes made
  - Limitations of the study
  - Useful lessons for planning future investigations
Recommendations

- Control Measures
  - To control this outbreak
  - To prevent future outbreaks
  - To improve management of future outbreaks

- Be specific about problems
  - Investigation obstacles and shortcomings
  - Outbreak causes

- Aim to educate fellow public health professionals and inform policy makers

Supporting Documentation

Also include the following:
- Graphs and tables
- Inspection reports
- Blank samples of surveys
- Letters to management
- Menus
- Copies of posted notices
- Testing results
- Press releases
- Maps

Case Studies
Case Study 1

Outbreak of *E. coli* O157:H7 at the North Carolina State Fair, 2004

Epi Notes, December 2004-February 2005

Case Study 1

- Condensed version of a more detailed report
- Includes all important components
  - Outbreak description
  - Methods and results
  - Discussion
  - Lessons learned
  - Recommendations

Case Study 1

- October 2004: *E. coli* O157:H7 infection associated with state fair attendance.
- Case-control study design with 45 confirmed cases and 188 controls.
- Data analysis and public health laboratory results (PFGE) revealed petting zoo activities at the fair as the source of infection.
**Case Study 2**

**Multistate Outbreak of Monkeypox – Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin, 2003**

*MMWR June 13, 2003*

[http://www.cdc.gov/mmwrpreview/mmwrhtml/mm5223a1.htm](http://www.cdc.gov/mmwrpreview/mmwrhtml/mm5223a1.htm)
Multistate Monkeypox Outbreak
Background and Outbreak Description

- CDC received reports of patients with a febrile rash illness in Illinois, Indiana and Wisconsin
- As of June 10, a total of 53 cases identified
- Many reported close contact with pet prairie dogs and other animals
- Laboratory tests indicated the causative agent was a poxvirus

Multi-state Monkeypox Outbreak
Methods

- MMWR write-up includes combined data from multiple states
  - Methods are not detailed
- Laboratory investigation to identify the virus
- Case-patient interviews to determine exposures, symptoms, and obtain clinical specimens
- Traceback investigation to identify original source of illness

Multistate Monkeypox Outbreak
Laboratory Results

- CDC tests concluded the virus was monkeypox
Multistate Monkeypox Outbreak
Epidemiologic Results

Demographic information included in report:

- 29 cases (49%) male
- Median age 26 years (range: 4 - 53 years)
- 14 cases (26%) hospitalized
- Earliest onset of illness was May 15
Multistate Monkeypox Outbreak
Results

• All patients had contact with animals
• 51 of 53 cases reported direct or close contact with prairie dogs
• One patient reported contact with a Gambian giant rat
• One patient had contact with a rabbit that became ill after exposure to an ill prairie dog at a veterinary clinic

Multistate Monkeypox Outbreak
Traceback Results

• Common distributor - prairie dogs and Gambian giant rats housed together
• Imported animal records - Gambian giant rats shipped from Ghana to a wildlife importer in TX and sold to the distributor
• The shipment contained ~800 small mammals of 9 different species
Multistate Monkeypox Outbreak
Discussion and Recommendations

• Preliminary findings suggested that the primary route of transmission is from close contact with infected mammalian pets

• However, the possibility of human-to-human transmission cannot be excluded

• Interim guidelines for infection control in the community and in health care settings were issued
Comparison of Case Study Reports

• Both outbreak reports included the major elements:
  – Introduction and Background
  – Outbreak Description
  – Methods and Results
  – Lessons Learned
  – Recommendations

• Complexity of the report depends on the type of investigation, the extent of the outbreak, and the audience of the report.

Summary

• Outbreak reports are the final step in completing your investigation.

• Outbreak reports serve many purposes, both internally and externally.

• Though outbreak reports may differ in purpose and audience, reports generally follow a basic structure.

References and Resources


References and Resources


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• Guidelines for EPI-AID Investigations. Division of Applied Public Health Training, Epidemiology Program Office, CDC.

• Hepatitis A Outbreak Associated with Green Onions at a Restaurant — Monaca, Pennsylvania. MMWR 2003;52(47):1155-1157


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References and Resources


• Reigelman RK. Studying a study and testing a test: how to read the medical evidence. 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2000.
References and Resources


