Chapter 14
Outbreak Investigations

CHS 446

Communication Skills for the Healthcare Professional

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- **Epidemic refers to the outbreak of a disease in a localized group of people; it can be infectious and spread from one person to another.**
- **Epidemic nosocomial infections are defined as hospital-acquired infections that represent an increase in incidence over expected rates.**

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- **Epidemic associated infections usually are clustered temporally or geographically, suggesting that infections are from common source or are secondary to increased person-to-person transmission.**
- **These outbreaks are often associated with specific procedures or devices.**

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- **Epidemics are important because they account for substantial percentage of nosocomial infections.**
- **Approximately 5% of nosocomial infections occur in epidemics.**
- **Most of these infections occur in small clusters of two to three patients.**

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- **If infection control personnel thoroughly investigate nosocomial epidemics, they may identify new agents, reservoir, or mode of transmission.**
- **To accomplish these goals, infection control personnel must evaluate data obtained from epidemiologic studies and from microbiologic and molecular studies.**

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Recognizing Outbreaks

Hospitals must have reliable, sensitive surveillance systems that allow the infection control personnel to detect increased infection rates in a defined time period and geographic area, suggestive of epidemic transmission.

Sometimes outbreaks are easy to recognize.

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Recognizing Outbreaks

Sometimes outbreaks are easy to recognize.

Fore example, even one episode of an uncommon infection, such as group A streptococcal surgical site infection, can indicate an out break.

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Recognizing Outbreaks

Sometimes outbreaks are easy to recognize.

In other cases, an increased incidence of infection caused by unusual organisms, such as multidrug-resistant *Mycobacterium tuberculosis*, indicate epidemic transmission.

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Steps in Outbreak Investigation

Preliminary Investigation and descriptive Study

- **Review existing information**
- **Determine the nature, location, and severity of the disease problem**
- **Verify the diagnosis**
- **Establish a case definition**
- **Find and ascertain case-patients.**

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Steps in Outbreak Investigation

Preliminary Investigation and descriptive Study

- **Request that the laboratory save isolates from affected patients and from suspected sources or vehicles**
- **Draw an epidemic curve**
- **Summarize data in a line-listing**
- **Establish the existence of an outbreak**
- **Institute or assess adequacy of emergency control measures.**

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Steps in Outbreak Investigation

Comparative Study and Definitive Investigation

- Review records of existing case-patients
- Develop hypotheses
- Test hypotheses in comparative (case-control or cohort) studies
- Conduct microbiologic or other laboratory studies and surveys
- Conduct additional studies, including observational studies, surveys, or experiments, to confirm the mode of transmission

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Emergency Measures

Once the outbreak is confirmed we decide immediately whether to:

- **Conduct a full epidemiological study**
- **Obtain cultures from equipment or suspected vehicles**
- **Call local, or central agencies**
- **Institute emergency control measures**

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Emergency Measures

When making these decisions we should consider the following factors:

- **The mortality associated with the epidemic**
- **The public health importance of the outbreak**
- **The frequency of infection versus colonization**
- **The possibility of a common source**
- **The size of the outbreak**
- **The characteristics of the pathogen**
- **Local and government regulation that may require healthcare facilities to report epidemics**

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Closing the Ward

The epidemiology staff must weight carefully the benefits of closing a ward or a unit against the risk of decreased access to care.

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Reporting Outbreaks

Epidemiology ICP should report to the local health officials all outbreaks that have potential public health implications at the local or national level.

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Reporting Outbreaks

In addition, ICP should report suspected intrinsic contaminations, infections caused by contaminated blood transfusion reactions, infections associated with defective devices to the hospital infections programs, and local health officials.

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Conducting an Epidemiologic Study

Reviewing the Line-Listing

Before conducting a comprehensive epidemiologic study, ICP should review line-listing and the epidemic curve, because these tools may suggest the cause of the outbreak.

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Comparative Studies

In many outbreaks, a putative risk factor can be confirmed only if it meets certain criteria.

- **First the risk factor must have been present before the onset of the disease.**
- **Second the risk factor generally will be associated with the condition statistically.**

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Comparative Studies

To confirm the second point, epidemiology staff must either compare affected patients with patients who did not acquire the condition (control) or compare the rate of the condition among patients with certain putative risk factor to the rate among patients without the risk factors (a cohort study).

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Observational Studies

ICP should observe health care workers perform procedures, particularly patient-care techniques that might be related to outbreaks.

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Culture Surveys

Organisms that cause nosocomial outbreaks can be isolated frequently from nonsterile environmental sources or from staff.

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Demonstrating Biological Plausibility

The investigators should design and conduct additional studies to confirm that the reservoir and the mode of transmission are biologically plausible.

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Acting on Results

- ICP should focus their interventions on the immediate cause of an outbreak and should institute the simplest measures that will correct the problem.
- ICP should develop a plan and timeline for implementing the control measures.
- ICP must determine whether the measures are effective.

THANK YOU