Forensic Pathology and Emerging Infectious Diseases

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Chief Medical Examiner/Coroner
Objectives

- History of death investigation
- Forensic pathology
- Emerging infectious diseases
- Surveillance by medical examiners
History of Death Investigation

• “Coroner” system began in 1194 in England under King Richard the Lionheart
  – “Crowners” or keepers of the pleas of the crown
  – Attended deaths scenes and investigated deaths; held inquests
  – Ensured the crown would get money/tax/property from the dead as well as investigate murders
History of Death Investigation

- 1860—Maryland law allowed coroner to require a physician be present at an inquest
- 1877—Massachusetts used the term “medical examiner” for the physician who was used
- 1890—Baltimore physicians who performed autopsies were called medical examiners
- 1918—First true “medical examiner system” established in New York City
Forensic Pathology

• Branch of medical science which uses medical knowledge for legal purposes
• Subspecialty of Anatomic Pathology
• Primary responsibilities
  – Determine cause and manner of death
  – Identify individuals who have died
  – Perform autopsies
  – Collect evidence
  – Testify in court
## Difference between a Medical Examiner and a Coroner

<table>
<thead>
<tr>
<th>Medical Examiner</th>
<th>Coroner</th>
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<tbody>
<tr>
<td>• Usually a pathologist</td>
<td>• Not necessarily a doctor (depends on state)</td>
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<td>– Most are forensic pathologist</td>
<td>– May be any other profession</td>
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<td>• Appointed position</td>
<td>– Limited training</td>
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<td>• Typically employed by government entity (city, county, state)</td>
<td>• Usually elected position</td>
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<tr>
<td>• Performs autopsies</td>
<td>• Usually county or district</td>
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<td>• Does not perform autopsies</td>
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<td>– Hires a pathologist to do autopsy if needed</td>
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Types of Deaths Referred to a Forensic Pathologist

- Sudden or unexpected deaths in previously healthy individuals, whether it is by natural or violent (accidental, suicidal, or homicidal) means
- Sudden or unexpected death in an infant or child
- Deaths of individuals without a physician to sign the death certificate
- Deaths of individuals in police custody
- Deaths due to disease which are a threat to public health
- Deaths occurring on-the-job
- Deaths due to any suspicious or unusual circumstances
- Deaths of individuals where identity is an issue
  - Decomposed bodies
  - Burned bodies
What is an Autopsy?

• Detailed examination of the external (outside) and internal (inside) of a person after he/she has died
  – All internal organs examined both grossly (with the naked eye) and histologically (under the microscope)
  – Additional tests (toxicology, microbiology) on fluids or tissue

• Goal: Determine cause of death
  – Secondary goal: Determine other diseases or health conditions present at the time of death
    • Hereditary conditions which may be of concern for family members
    • Diseases which may affect the public
What is a Forensic Autopsy?

- Detailed examination of an individual who has died with emphasis on determining manner of death in addition to cause of death
  - Medicolegal cases
Forensic Autopsy

• Does not require family consent
• Is typically not performed on an embalmed body
What is an Autopsy?

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Emerging Infectious Diseases

- Considered “emerging” if incidence has increased in previous 20 years or may increase in the near future
  - Do so for many reasons:
    - Evolution of the organism
    - Spread to new populations/areas
    - New infections in areas with significant environmental change

Medical Examiners’ Roles

• ME/Coroners have important role in conducting surveillance for fatal infectious diseases

• Early example – 1934, Dr. Milton Helpern
  – Chief ME in New York City
  – Recognized outbreak of fatal malaria in IV drug abusers

*Handbook of Forensic Pathology, 2nd ed. RC Froede, ed. 2003.*
Surveillance

- Systematic collection and analysis of outcome-specific data used to develop and evaluate public health practice
Surveillance

• Surveillance of mortality data can be difficult
  – Mortality rates derived from DCs and ICD codes may not depict true burden of disease

• Several inherent flaws
  – ICD codes assigned by non-physicians
    • Not designed to characterize new infectious disease
    • Not arranged in manner that facilitates aggregation of mortality data
  – DCs may be inaccurate due to lack of training of physicians
    • Low autopsy rate contributes
ME Surveillance - Advantages

- Well-defined geographic jurisdiction
- Data is often autopsy-verified
  - Contributes to information about pathogenesis
- May be 1\textsuperscript{st} physician to see an individual with a fatal disease
ME Surveillance - Advantages

• Autopsy population is over-represented by groups associated with emerging or re-emerging infectious diseases
  – Children under the age of 2
  – Alcoholics
  – Intravenous drug abusers
  – Homeless population
ME Surveillance - Limitations

• Bias of the system toward investigation of violent deaths
• Depends on acceptance of jurisdiction for natural deaths
• Level of satisfaction with general diagnoses instead of organism-specific
  – E.g. “bronchopneumonia” vs. “Streptococcus pneumoniae pneumonia”
• Diagnostic tests may not be performed for variety of reasons