Respiratory (Sputum) Cultures - Interpretation

CLS 418/CLS 419
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Interpretation of Sputum Cultures

• Bacterial Pneumonia
  – Pneumonia is suspected from presenting clinical symptoms including physical and radiographic findings
  – Correlated with laboratory findings

Interpretation of Sputum Cultures

• Bacterial Pneumonia
  – Pneumonia diagnostic categories divided by:
    • Clinical setting
    • Presentation of the illness
    • Exposure to specific pathogens
    • Age and type of host infected
  – Physician must consider these categories for a clinical diagnosis
    • Long list of possible pathogens for this type of infection
    • Allows for initiation of empiric therapy while waiting for specific etiologic diagnosis

Interpretation of Sputum Cultures

• Secondary Bacterial Bronchitis
  – Copious amounts of purulent sputum secondary to viral bronchitis
Interpretation of Sputum Cultures

- Expectorated Sputum specimens
  - Collected to identify etiologic agent of bacterial pneumonia/secondary bacterial bronchitis
  - Viruses can cause pneumonia as well
  - Expectorated samples often contaminated with normal orapharyngeal flora
  - Improperly collected samples may actually represent spit rather than lung secretions

- Clinical procedures for diagnosis of bacterial pneumonia
  - Blood cultures
  - Sputum cultures
    - Limited diagnostic value because they are easily contaminated with upper respiratory secretions
    - Useful in extremely ill patients
  - Pleural fluid, Bronchial lavage or wash, Transtracheal aspirate or Lung tissue biopsy cultures may be more useful

- After 24 hours of incubation
  - No growth on CHOC, BAP or MAC plate
    - Reincubate plates for an additional 24 hours
      - Slow growing organisms (Haemophilus species, Strep. pneumonia, Morexella catarrhalis)
  - Visible growth on plate(s)
    - Evaluate growth

- Visible growth on plate(s)
  - Evaluate growth
    - First step is to estimate amounts of each organism
  - Keep in mind the concept of Normal respiratory flora
  - Stop identification when potential pathogens are ruled out
  - Several suspected pathogens can also be considered part of the Normal Respiratory flora in small amounts
Interpretation of Sputum Cultures

• Evaluate growth
  – How much?
  – For each isolate estimate the amount of growth present
• Please see your site’s procedure
  – Guidelines for estimating amount of growth of an individual organism:
    – rare - growth present in first quadrant only (<15 colonies)
    – few - growth present in quadrants 1 and 2 (15–100 colonies in
      quadrant 1 and <15 colonies in 2nd quadrant)
    – moderate - growth in quadrants 1, 2, and 3 (>15 colonies in 2nd
      quadrant and <15 colonies in quadrant 3)
    – many - confluent growth, extending to all 4 quadrants.

Interpretation of Sputum Cultures

• Initial specimen gram stain may be helpful in determining the significance of isolates present.
  – Good sputum sample will contain many PMN’s (in a person with a normal immune system) and relatively few squamous epithelial cells.

Interpretation of Sputum Cultures

• Identification
  – Based on colony morphology test are performed
  – Keep in mind normal upper respiratory flora
  – Streptococcus pyogenes identified and reported in any amount
  – Large amounts of other potential pathogens are identified and appropriate susceptibility testing performed
    • Moderate to many amounts of potential pathogen
    • No other normal flora present
    • Pure culture or predominance of potential pathogen

Interpretation of Sputum Cultures

• Identification
  Example of routine sputum culture
  – Initial specimen gram stain:
    • Few epithelial cells
    • Few WBC’s
    • Many mixed gram positive and negative flora
  – Culture results:
    • Many alpha hemolytic streptococcus
    • Many Non-hemolytic streptococcus
    • Moderate gram negative diplococci
    • Few gram positive rods
  – Interpretation:
    • Many Normal respiratory flora present
    • Could be agent not part of routine respiratory culture

Interpretation of Sputum Cultures

• Identification
  Example of routine bacterial culture:
  – Initial specimen gram stain:
    • Rare epithelial cells
    • Many WBC’s
    • Many gram negative diplococci (intracellular)
    • Few gram positive cocci in pairs
  – Culture results:
    • Few alpha hemolytic streptococcus
    • Few non-hemolytic streptococcus
    • Moderate gram negative diplococci
  – Interpretation:
    • Suspect Morexella catarrhalis – Perform appropriate identification tests
    • Report other organism as part of the normal respiratory flora

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When a sputum culture exhibits a small amount of growth of multiple organisms such as alpha-hemolytic streptococci, coag-neg staphylococci and Neisseria species, should this growth be considered as normal flora or as potential pathogens?

Normal flora – low numbers of multiple organisms generally indicate presence of spit contamination as sputum was collected.
What normal respiratory flora organisms can become pathogens when in large numbers or predominant amounts?

- *Streptococcus pneumoniae*
- *Streptococcus pyogenes*, GNRs,
- *Haemophilus influenzae*, yeast,
  and others

**Review**

- Pneumonia
  - Long list of possible pathogens for this type of infections
  - Caregiver must consider suspected etiologic agent and order appropriate testing
  - Culture interpretation:
    - Must consider normal flora present due to collection non-invasive collection process

**References:**