Syndromic Testing for Infectious Diseases
Part 1: Respiratory Infections

Presenter:
Matthew Binnicker, PhD(ABMM)
Director of Clinical Virology and Vice Chair of Practice

Department of Laboratory Medicine and Pathology
at Mayo Clinic, Rochester, Minnesota
Disclosures

• None

Upper respiratory tract infections

• One of the leading causes of morbidity and mortality worldwide
• Cause a range of symptoms, from mild to life-threatening
• Extremely common (17.2 B cases in 2015):  
  • <5 years old: mean 6.1 episodes/year
  • >40 years old: mean 4.1 episodes/year

https://phil.cdc.gov/phil/details.asp
Upper respiratory tract infections

- Caused by a variety of infectious pathogens, including:
  - Viruses
    - Coronaviruses, rhinovirus, influenza, parainfluenza
  - Bacteria
    - *Streptococcus pyogenes*, *Bordetella pertussis*

Laboratory Diagnosis

- Historically, performed using a “mixed bag” approach:
  - Culture
    - Bacterial, viral tube/shell vial
  - Antigen testing
    - Influenza, RSV, group A strep
  - Individual or duplex molecular tests
    - Influenza A/B and RSV PCR
Laboratory Diagnosis

- Syndromic testing: The next frontier of diagnosing respiratory infections?
- Sample-to-answer
- Rapid (some <60 minutes)
- Broad coverage
  - Viral
  - Bacterial

Syndromic Panels: Broad Coverage

- Viral
  - Adenovirus
  - Coronavirus
    - HKU1, NL63, 229E, OC43
  - Metapneumovirus (hMPV)
  - Rhinovirus/Enterovirus
  - Influenza A/B
    - H1, H1-2009, H3
  - Parainfluenza (1-4)
  - RSV

- Bacterial
  - *Bordetella pertussis*
  - *Chlamydia pneumoniae*
  - *Mycoplasma pneumoniae*
Syndromic Panels

Faster…Bigger…must be BETTER, right?

Case #1

- A 7-year-old, otherwise healthy male presents in November to his primary care provider with a 3-day history of fever, cough, headache and myalgia.

Should a respiratory panel be considered in this case?
Case #1, continued:

- In an otherwise healthy individual without severe disease, targeted testing would be most appropriate
- Consider:
  - Influenza A/B PCR
  - *S. pyogenes* (Group A Strep) PCR

Case #2

- A 35-year-old female undergoes an allogeneic stem cell transplant, and 3 weeks later, develops a cough and fever. She is admitted to the intensive care unit due to respiratory distress.

  Should a respiratory panel be considered in this case?
Case #2, continued:

• Yes – a multiplex respiratory panel could be considered in this case.
• Rapid and broad testing may inform management decisions, including:
  • Infection Prevention and Control (e.g., isolation)
  • Antibiotic/antiviral use

Syndromic panels: Advantages

• Rapid results (some in <60 minutes)
• Allow for detection/identification of viruses (i.e., hMPV, coronaviruses) not routinely detected by conventional methods
• Multiplex respiratory panels should be considered in:
  • Immunosuppressed patients (i.e., transplant recipients)
  • Critically ill
Syndromic panels: Limitations

- Higher cost than conventional laboratory methods
  - However, may be cost effective if multiple routine methods would have been ordered
  - May reduce downstream costs (i.e., hospital stay)
- More information does not always equate to improved patient management/outcomes
  - Example: How should a positive result for rhinovirus be interpreted in an immunosuppressed host?

Summary

- Respiratory infections are common and associated with high morbidity and mortality worldwide
- Syndromic panels offer a rapid (some <60 min) and broad (some ~20 targets) approach to testing for causes of respiratory infection
- The cost of syndromic panels (both to the lab and patient) is typically higher than conventional methods (e.g., culture, antigen testing)
Summary

• Issues to consider prior to ordering a syndromic respiratory panel:
  • Is the patient otherwise healthy or immunosuppressed/critically ill?
  • Will I manage my patient differently based on the results of this test (e.g., What if I get a positive)?
  • Is targeted testing (e.g., influenza) prudent due to the clinical presentation and/or seasonality?

References

4. Images courtesy of BioFire Diagnostics (www.biofiredx.com), GenMark Diagnostics (www.genmarkdx.com) and Luminex Corporation (www.luminexcorp.com)
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