Life After Culture

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Where Are We Now? Updates on Culture-Independent Diagnostic Tests (CIDTs) and Their Impact on Public Health Surveillance

From my perspective, the discussion began with the respiratory viruses!
Top 10 Reasons Why Patients Come to Primary Care

Why Patients Visit PCPs: Top 10 Diagnosis Groups

1. Respiratory
2. Circulatory
3. Endocrine
4. Musculoskeletal
5. Nervous system and sense organs
6. Genitourinary
7. Mental disorders
8. Injury/poison
9. Skin and subcutaneous tissue
10. Infections and parasitic diseases

#1. Respiratory Diseases Are the Primary Concern

- Respiratory diseases, the #1 diagnosis group for PCP visits, accounted for 77 million visits
- Leading respiratory concerns included asthma, bronchitis, acute pharyngitis, acute sinusitis, and "other acute respiratory infections."
- More than 60% of ambulatory care visits for respiratory diseases were to PCP offices; medical specialty offices ranked second, at less than 15%

- CDC 2015 Fast Stats -
Human Respiratory Viruses

**Orthomyxoviridae**
INFLUENZA TYPE A (*2 major subtypes, new strains each year*)
INFLUENZA TYPE B (*new strains periodically*)

**Paramyxoviridae**
RESPIRATORY SYNCYTIAL VIRUS (*2 groups*)
PARAINFLUENZA VIRUS (*4 types; 2 subtypes of type 4*)
HUMAN METAPNEUMOVIRUSES

**Picornaviridae**
RHINOVIRUSES (*> 100 serotypes*)
ENTEROVIRUSES (*71 serotypes*)

**Adenoviridae**
ADENOVIRUSES (*16 respiratory types*)

**Coronaviridae**
CORONAVIRUSES (*6 serotypes*)

**Parvovirus**
BOCAVIRUS (*4 genotypes*)
## Diagnostic Virology Evolution

### Comparison of Test Methods for Viruses

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<th>Serology</th>
<th>Culture</th>
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<th>Ag Det (EIA-like)</th>
<th>PCR</th>
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- 😊: Excellent
- 😊 😊: Good
- 😊 😊 😊: Average
- 😊 😊 😊 😊: Poor
- 😊 😊 😊 😊 😊: Very Poor
Human Respiratory Viruses

The Evolution of Diagnostic Testing Panels

Virus Culture

↓

Indirect Immunofluorescence

↓

Multi-pathogen Molecular Panels
The Range of Respiratory Pathogen Panels

www.cdc.gov/flu/professionals/diagnosis/molecular-assays.htm

From...
- Influenza A
- Influenza B
- RSV

To...
- Influenza A
- Subtype H1
- Subtype H3
- Subtype 2009 H1
- Influenza B
- Parainfluenza 1-4a,4b
- RSV A, RSV B
- Human metapneumovirus
- Adenovirus
- Coronavirus
  - 229e, HKU1, NL63, OC43
- Rhinovirus/enterovirus
- Human Bocavirus
- C. pneumoniae
- M. pneumoniae
- L. pneumophila
Respiratory Pathogen Panels

What is Their Value?

- Outbreak response
- Surveillance
  - “All that is the flu is not influenza”
  - Background for disease emergence detection
- QA indicator
- Background info for clinical judgment
- Clinical practice
Respiratory Pathogen Panels

Challenges/Concerns

• New or lesser known bugs: What do the results mean?
• What do mixed infections mean? How to interpret?
• PH relevance/usefulness of the panel analytes?
• Diagnostic performance characteristics for each pathogen
• Potential issues with reimbursement
  • CMS proposal for non-coverage
Respiratory Pathogen Panels

The Future?

We need to work to make a very valuable tool BETTER!