Examining the Use of Rapid Polymerase Chain Reaction Assay in Optimizing Antimicrobial Usage in Respiratory Viral Infections

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Background

- Respiratory infections account for over 5 million deaths worldwide.
- Historically, respiratory pathogen testing has included the use of cultures and antigen-testing.
- Rapid polymerase chain reaction (PCR) assay:
  - Fast, effective identification of 17 viral pathogens
  - 95% sensitive and 99% specific
  - Turnaround time ~ 1 hour
- Adenovirus
- Coronavirus HKU1
- Coronavirus NL63
- Coronavirus 229E
- Coronavirus OC43
- Human Metapneumovirus
- Human Rhinovirus/Enterovirus
- Influenza A
- Influenza B
- Influenza A/H3
- Influenza A/H1
- Influenza A/H1-2009
- Para influenza Virus 1
- Para influenza Virus 2
- Para influenza Virus 3
- Para influenza Virus 4
- Respiratory Syncytial Virus

Preliminary Results

- Influenza A & B Antigen Testing
  - Yes: 30.8%
  - No: 70.6%
- Procalcitonin Level
  - Yes: 38.3%
  - No: 61.7%

Objective

- The objective is to examine the use of rapid PCR assays in the management of respiratory viral infections in a community hospital.
- The study will describe viral PCR use in identifying viral pathogens, evaluating appropriate treatment, and de-escalating of antimicrobial therapy when indicated.

Methods

- An exploratory analysis using medical chart reviews will be conducted using daily molecular result reports provided to the pharmacy.
- Inclusion criteria: Adults ≥ 18 years of age who received rapid PCR microbiology testing for respiratory infections between July 1, 2017 and March 31, 2018.
- Exclusion: Patients with a documented viral respiratory infection 2 weeks prior to the time of admission.
- Patients will be randomly selected (every 6th patient) for a total population size of 150 patients.
- Data collection:
  1. Viral PCR results (time of results & pathogen identification)
  2. Diagnostic labs
     - 1. Procalcitonin level (Y-high, Y-low, N)
     - 2. Influenza A & B antigen testing (Y-positive, Y-negative, N)
  3. Initial therapy
     - 1. Antimicrobial and/or antiviral therapy
     - 2. Time of initial therapy
  4. If applicable, antibiotic prescribed and documented indication
  5. Therapy modification upon respiratory results
     - 1. Y/N (e.g., discontinuation of antibiotic or start of antiviral therapy)
     - 2. Time of therapy modification

Conclusion

- Preliminary data demonstrates 26.7% (16/60) of patients who had PCR assay testing were determined to be positive for a respiratory viral infection.
- Most reported viruses: rhinovirus/enterovirus (10/16, 62.5%).
- In addition to PCR testing, 1 in every 3 patients had an influenza A & B antigen test (18/60, 30%) and 61.7% had a procalcitonin level.
- Patients who were positive for respiratory viral infections were managed appropriately taking into account any co-infection.
- When antimicrobial therapy was not indicated, the antimicrobial de-escalation time was approximately 4 hrs.

Implications for Practice

- Optimize treatment using PCR assay as a diagnostic tool.
- Reduce unnecessary diagnostic tests.
- Decrease the inappropriate use of antimicrobials in viral respiratory infections.

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References