A Retrospective Analysis of the Impact of FilmArray Respiratory Panel Utilization on the Management of Pediatric Asthma Exacerbations

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Background

Polymerase chain reaction (PCR) respiratory panel testing detects pathogens in a timely manner

- Use associated with decreased hospital length of stay and antimicrobial utilization
- The impact in pediatric asthma exacerbations is not yet well defined

PCR respiratory panel testing does not always correlate with results of other diagnostic tests

- The FilmArray (FA) respiratory panel tests for 17 viruses and 3 bacteria with an overall sensitivity and specificity of 95% and 99%, respectively
- Patient charge is over $2000 per test

Objectives

This study was performed to determine whether the FA respiratory panel affects hospital length of stay and antimicrobial utilization in pediatric patients with asthma exacerbations

- Discordance rates between FA and traditional diagnostic tests were analyzed
- Analysis was performed to assess for any correlation between identified pathogen and severity of illness

Methods

Single center, retrospective analysis

Inclusion criteria:

- <18 years of age
- Admitted to General Pediatrics or PICU
- Asthma exacerbation diagnostic code
- October 1, 2016 to November 30, 2017

Data collected:

- Patient demographics
- Length of stay
- Treatment regimen (including type and duration of antimicrobial agent)
- Diagnostic test results and modality

Analysis

- Descriptive statistics and T-tests
- JMP Statistical Discovery from SAS used for statistical analysis

Results

Of 122 patients reviewed, FA testing was utilized on 79 patients.

Length of Stay

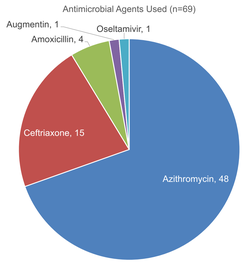
FA testing associated with a statistically significant **increase** in length of stay compared to patients not receiving FA testing (mean 47.6 vs 38.7 hours, p = 0.0255)

Antimicrobial Duration

FA testing **not** associated with a statistically significant difference in duration of antimicrobial treatment compared to patients not receiving FA testing (mean 34.4 vs 28.1 hours, p = 0.3778)

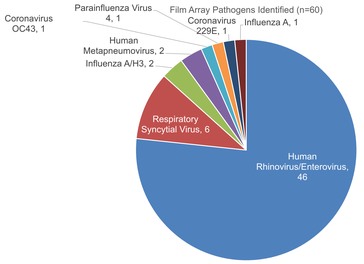
Antimicrobial Utilization

- Zero bacterial infections were identified via FA, yet multiple antimicrobial agents were given
- 58 patients received antimicrobial treatment, some received multiple treatment agents
- Inconclusive impact on antimicrobial treatment based upon FA results



Pathogen

- Rhinovirus/Enterovirus was the most commonly isolated pathogen
- Patients testing positive for Rhinovirus/Enterovirus did not show a statistically significant difference in LOS (mean 40.2 vs 48.3 hours, p=0.2035) or antimicrobial duration (mean 11.9 vs 25.4 hours, p=0.2431) compared to those who tested positive for other pathogens



Discordance Between Testing Modalities

- 10 Rapid RSV tests vs. FA: no discordance
- 26 Rapid Influenza tests vs. FA: no discordance
- 28 Mycoplasma IgM tests vs. FA: 21.43% discordance
  - 6 out of 28 Mycoplasma IgM tests showed discordance
  - In all 6, the IgM test was positive while FA was negative

Conclusion

FilmArray respiratory testing did not demonstrate a decrease in length of stay or antimicrobial utilization in the pediatric asthma population

Limitations

- Cohorts not equally distributed
  - FilmArray n = 79 vs. No FilmArray n = 43
- Small sample size
- Human error
- Documentation variation by providers
- Possibility of Type 1 Error
- Prescriber/practice variability
- Difficulty assessing severity of patient presentation
- Antimicrobial agents given prior to admission were not included

Future Studies

- Assessing treatments in accordance with patient severity, using a standardized scoring method such as the RAD or PASS score
- Incorporating a larger sample size via multiple facilities to evaluate antimicrobial agent usage and differences in pathogen presentation

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References

1. Andrews, Denise et al. "Multiplex PCR Point of Care Testing versus Routine, Laboratory-Based Testing in the Treatment of Adults with Respiratory Tract Infections: A Quasi-Randomised Study Assessing Impact on Length of Stay and Antimicrobial Use." BMC Infectious Diseases 17 (2017): 671. PMC. Web. February. 2018.
2. Azadeh, Natalya, et al. "FilmArray Respiratory Panel Assay: Comparison of Nasopharyngeal Swabs and Bronchoalveolar Lavage Samples." Journal of Clinical Microbiology 53.12 (2015): 3784–3787. PMC. Web. Jan. 2018.
3. FilmArray Respiratory Panel (RP) Instruction Booklet. BioFire Diagnostics, LLC. Salt Lake City, UT. 2015.
4. Gorelick, Marc H., et al. "Performance of a Novel Clinical Score, the Pediatric Asthma Severity Score (PASS), in the Evaluation of Acute Asthma." Academic Emergency Medicine, vol. 11, no. 1, 2004, pp. 10–18., doi:10.1197/j.aem.2003.07.015.
5. Murray CS, et al. "Study of modifiable risk factors for asthma exacerbations: virus infection and allergen exposure increase the risk of asthma hospital admissions in children." Thorax 2006;61:376-382. PMC. Web. Jan. 2018.
6. Rappo, Urania et al. "Impact of Early Detection of Respiratory Viruses by Multiplex PCR Assay on Clinical Outcomes in Adult Patients." Journal of Clinical Microbiology 54.8 (2016): 2096–2103. PMC. Web. Jan. 2018.
7. Waleed H. Albuali. "The use of intravenous and inhaled magnesium sulphate in management of children with bronchial asthma." The Journal of Maternal-Fetal & Neonatal Medicine 27:17, 1809-1815 (2014). PMC. Web. February. 2018.