

Introduction

Respiratory infections are a leading cause for emergency room visits and hospitalization in the pediatric population.^{1,2,3} Infections are predominantly caused by viruses, but can appear similar to bacterial infections.^{1,2,3} Appropriate diagnosis of the etiology is necessary to optimize utilization of antimicrobials and prevent the development and/or spread of antimicrobial resistance.^{1,2,3} In August 2015, Williamson Medical Center (WMC) implemented a multiplex polymerase chain reaction (PCR) Respiratory Panel (RP). The test is available for use without restriction in the pediatric population. Samples are processed 24 hours a day, 7 days a week by the in-house laboratory. The PCR RP identifies 20 common respiratory pathogens:⁴

Viruses

Adenovirus
Coronavirus HKU1
Coronavirus NL63
Coronavirus OC43
Human Metapneumovirus
Human Rhinovirus/ Enterovirus
Influenza A (H1, H1-2009, H3)
Influenza B
Parainfluenza 1, 2, 3, 4
Respiratory Syncytial Virus (RSV)

Bacteria

Bordetella pertussis
Chlamydomphila pneumoniae
Mycoplasma pneumoniae

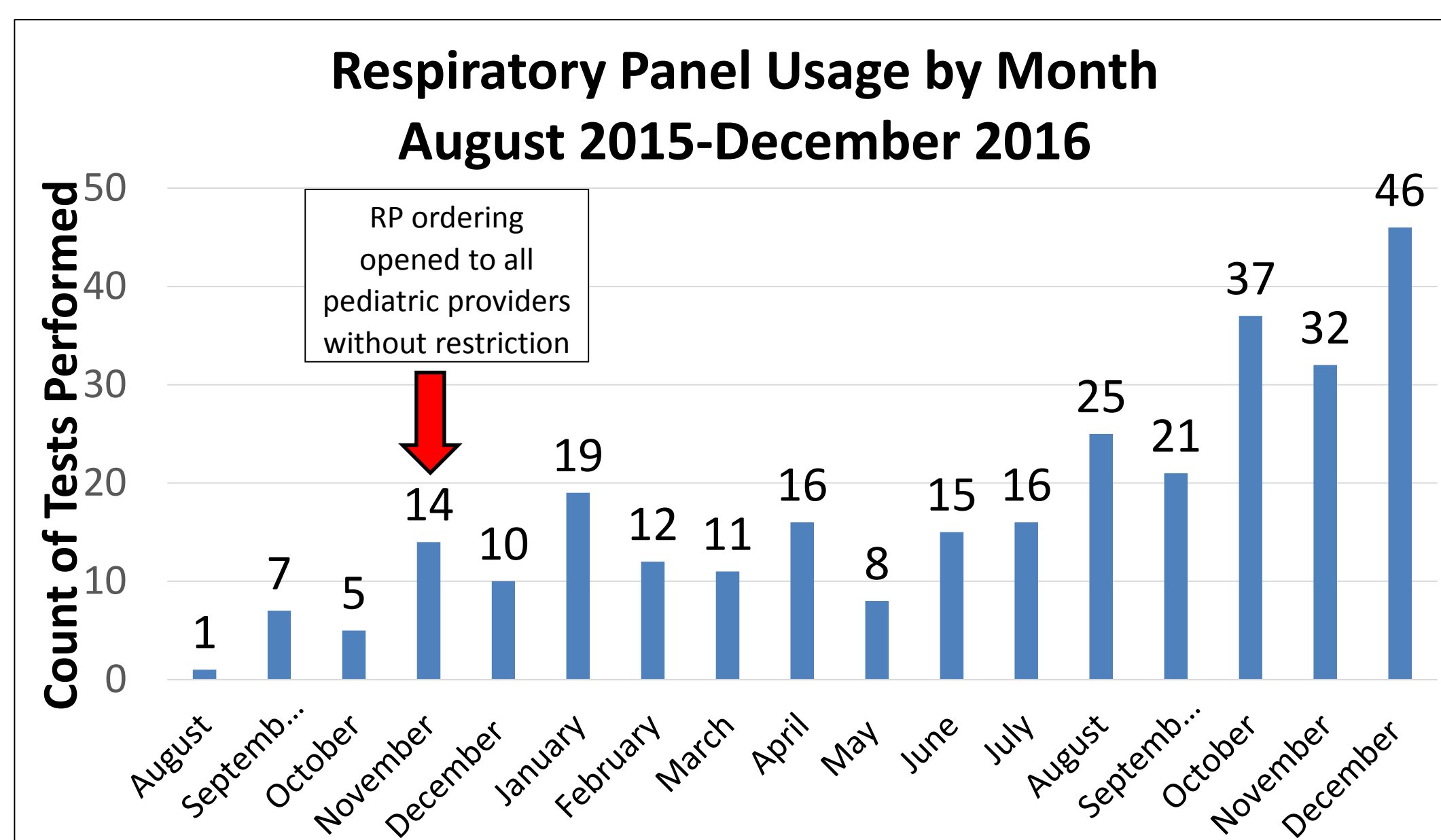
Objective

To review the use of the PCR test and the impact of this test on healthcare utilization in a pediatric community hospital. Impact of healthcare utilization was determined by inpatient admissions, use of antibiotics, and further workup or procedures conducted.

Methods

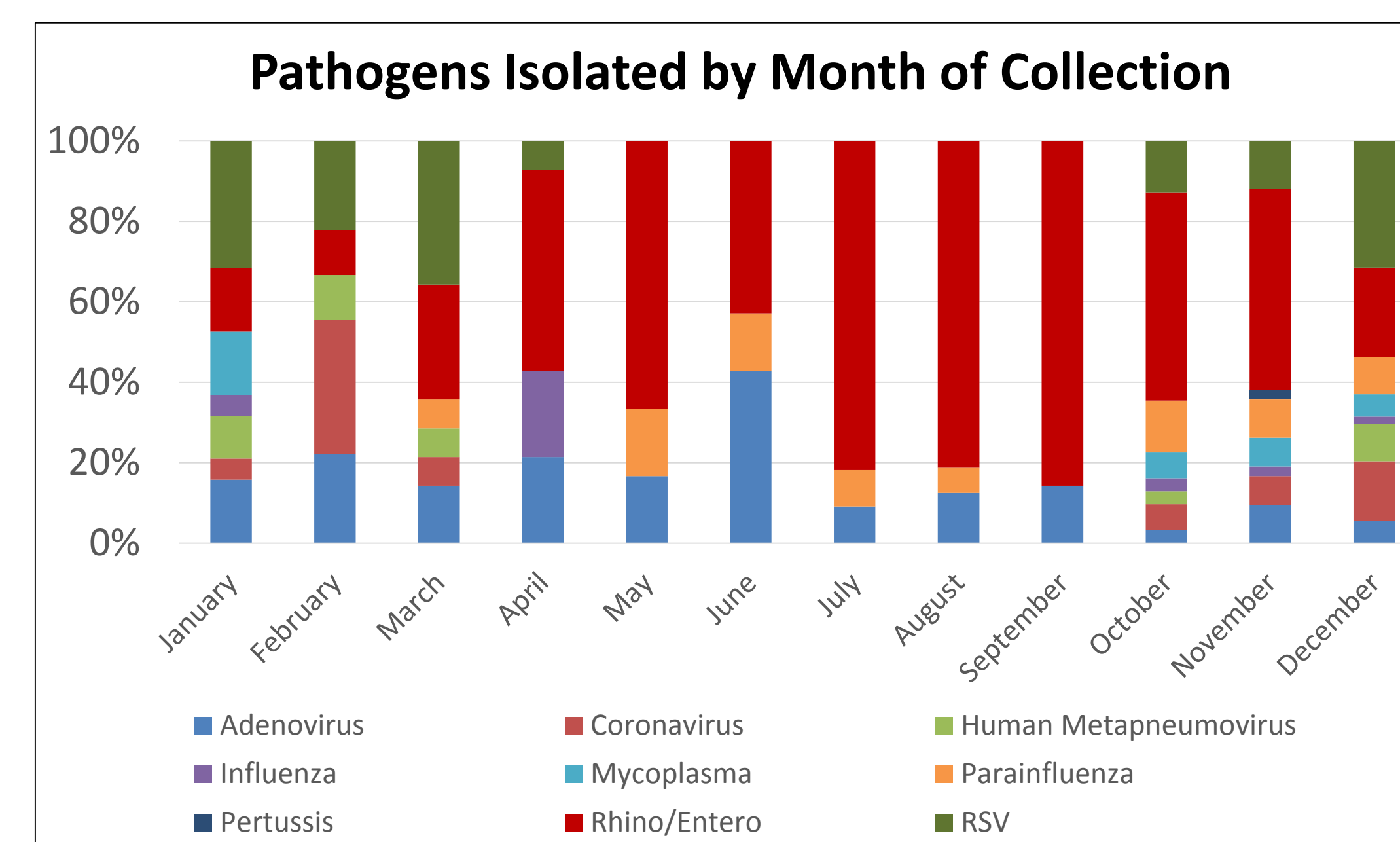
A retrospective chart review was conducted of all patients aged 0 to 17 years with RP specimens collected August 2015 through December 2016. An evaluation of the impact of RP results was completed through review of duration or change in antimicrobial therapy, change in patient management, and avoidance of further workup, antimicrobial therapy, or hospital admission. A subgroup analysis was performed for patients less than 60 days of age.

Results



Validation testing was performed prior to November 2015. RP ordering increased over time, and viral pathogen detection was also highest in the months October-January.

Results



RSV and rhinovirus/enterovirus were the most commonly detected pathogens. RSV season lasts from November to March in Tennessee (Region 4).

Respiratory Panel Collection 0-17 Years of Age

Samples Collected	295
Patient Age, years (median, range)	1 (0-17)
Test Appropriate Based on Symptoms (%)	284 (96%)
Pathogen Detected on RP (%)	196 (66%)
Result Changed Management (%)	145 (49%)
Interventions*	
Avoid Admission	44
Reduce Further Procedures/Workup	33
Avoid Antibiotics	89
Narrow/Decrease Antibiotic Duration	20
Target Antimicrobial Therapy	14

*patients may be classified in more than one category

Results

Respiratory Panel Collection 0-60 Days of Age

Samples Collected	40
Test Appropriate Based on Symptoms (%)	40 (100%)
Pathogen Detected on RP (%)	21 (52.5%)
Respiratory Syncytial Virus	8
Rhinovirus/Enterovirus	10
Other	4
Negative Result	19 (47.5%)
Result Changed Management (%)	22 (55%)
Interventions	
Narrow/Decrease Duration of Antibiotics	3
Avoid Antibiotics	12
Avoid Admission	3
Decrease Length of Stay	1
Reduced Further Procedures/Workup	7 (Avoided LP)

Conclusion

The use of a RP was beneficial in this pediatric population to decrease hospital admissions, avoid further unnecessary procedures, avoid unnecessary antibiotic therapy, decrease duration of antibiotics, and target antimicrobial therapy.

References

- Xu M, Qin X, Astion M, et al. Implementation of FilmArray respiratory viral panel in a core laboratory improves testing turnaround time and patient care. *Am J Clin Pathol.* 2013; 139: 118-123.
- Byington CL, Castillo H, Gerber K, et al. The effect of rapid respiratory viral diagnostic testing on antibiotic use in a children's hospital. *Arch Pediatr Adolesc Med.* 2002; 156: 1230-34.
- Doan Q, Enarson P, Kisson N, Klassen TP, Johnson DW. Rapid viral diagnosis for acute febrile respiratory illness in children in the Emergency Department. *Cochrane Database of Systematic Reviews* 2014, Issue 9. Art. No.: CD006452. DOI: 10.1002/14651858.CD006452.pub4.
- FilmArray Respiratory Panel. Biofire Diagnostics' website. <http://www.biofire.com/wp-content/uploads/2016/04/IS-MRKT-PRT-0229-05-FilmArray-Respiratory-Panel-Information-Sheet.pdf>. Accessed September 25, 2017.