



Adventist Medical Center
Hinsdale Family Medicine Residency



A RETROSPECTIVE STUDY: ASSESSING COMPLIANCE OF THE 2014 AAP BRONCHIOLITIS GUIDELINES FOR THE DIAGNOSIS AND MANAGEMENT OF BRONCHIOLITIS IN FOUR COMMUNITY HOSPITALS

AMITA Health Adventist Hinsdale Family Medicine Residency

Project by: Uzma Kothawala, MD, Emanuela Kulach, DO, MS, Robyn Gutierrez, DO, Elizabeth Bockhold, MD

Presented by: Uzma Kothawala, MD and Emanuela Kulach, DO, MS

DISCLOSURES

- The authors of this presentation have no disclosures, including financial, to make



OUTLINE

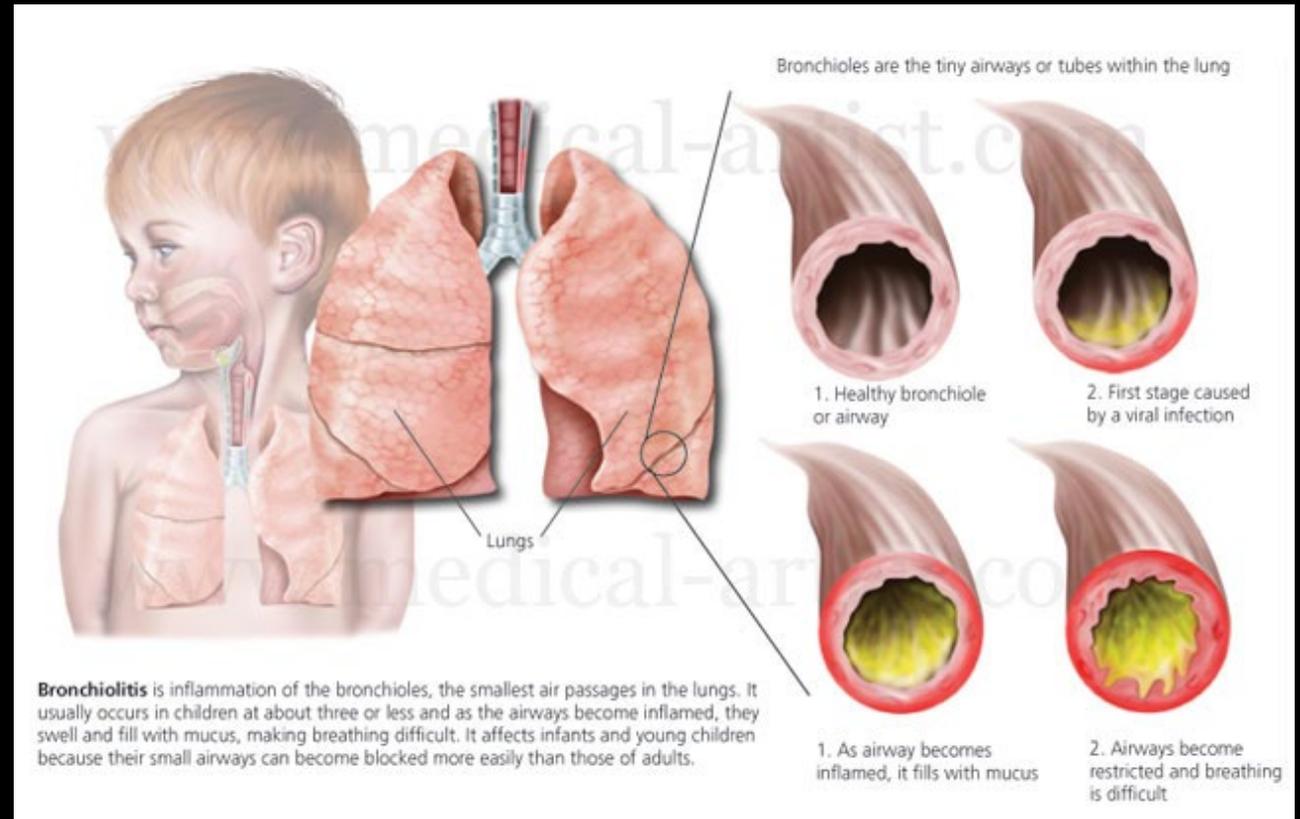
- Research Background
- Goals / Objectives / Clinical Relevance
- Methods / Study Design
- Results, Conclusions
- References
- Acknowledgements



RESEARCH BACKGROUND

WHAT IS BRONCHIOLITIS?

- Common lower respiratory tract infection in the first two years of life
- RSV is the most common cause of this infection
 - Vigorous T cell derived cytokine release, inflammation, and increased mucus production → hyperinflation and atelectasis
- Peaks highest from November to April



RESEARCH BACKGROUND CLINICAL MANIFESTATIONS

- 2-4 days OF URTI followed by LTRI

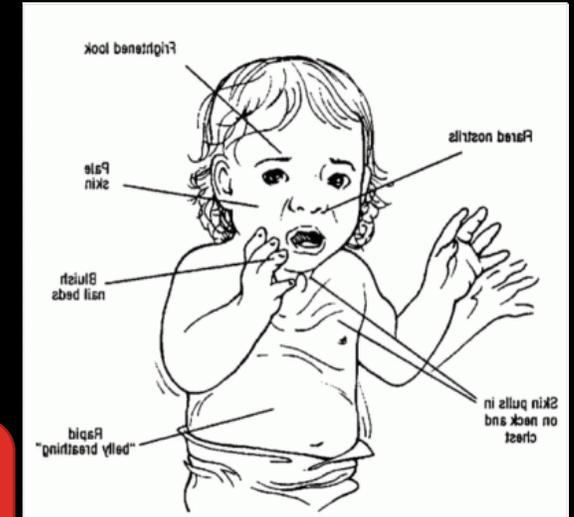
Fever Rhinorrhea Congestion

Cough

Tachypnea, dyspnea,
increased work of breathing,
and difficulty feeding

- Physical exam:

- Wheezing, crackles
- Grunting, nasal flaring, **retractions**



ASSESSING Disease Severity: MENTAL STATUS, FEEDING, AND HYDRATION

BRONCHIOLITIS LONG TERM RISKS AND EPIDEMIOLOGY



- >100,000 hospitalizations and 2.1 million outpatient visits are associated with RSV in children less than 5 years of age
- admissions occur annually in the U.S. at a cost of \$1.73 billion
- A large multicenter, multiyear prospective study found that 30% of hospitalized children had multiple pathogen infections with RSV
 - with human rhinovirus being the most common
- Few long term risks associated, but infection with Rhinovirus or severe RSV is associated with increased risk of asthma that can persist into adulthood

2014 AAP GUIDELINES HIGHLIGHT:

KEY RECOMMENDATIONS FOR PRACTICE

- Routine viral testing and chest imaging **are not recommended** for patients with presumed RSV bronchiolitis.
- **Bronchodilators, systemic or inhaled corticosteroids, and epinephrine should not be administered to infants and children with bronchiolitis. (A Rating)**
- Antibiotics should not be administered to children with RSV bronchiolitis unless a bacterial infection is confirmed or suspected.

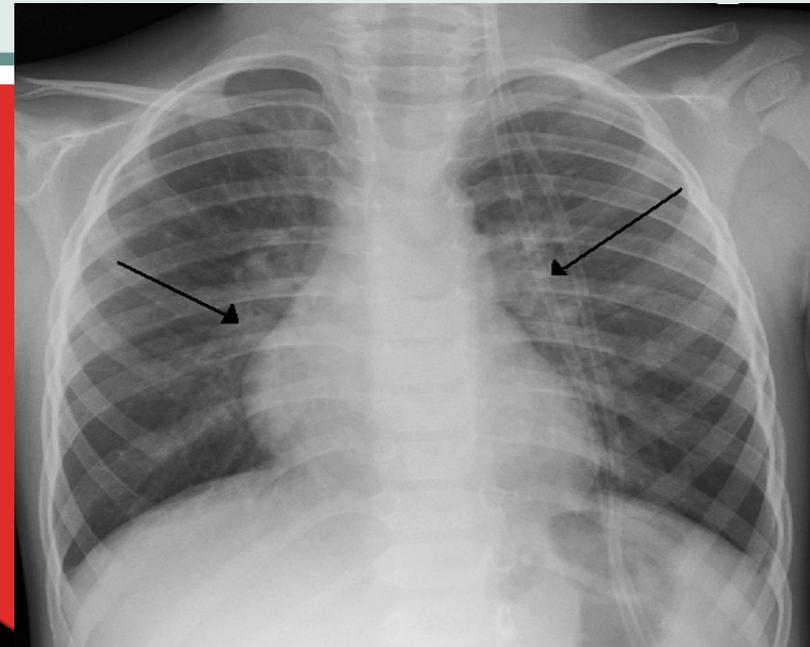


RESEARCH BACKGROUND: IMAGING? PULSE OX? OXYGEN SUPPLEMENT? HOSPITALIZE OR NOT?

- Imaging? NO; findings are nonspecific, w/ peribronchial markings, hyperinflation, and atelectasis
 - It does not improve clinical outcomes!
 - Increases risk of antibiotic use
- Continuous pulse oximetry? No
 - Increase rates of hospital admissions
 - Increase prolonged length of stay
 - Anxiety and alarm fatigue for families
- No data supports use of Supplemental oxygen to maintain higher oxygen saturation
 - Only prolongs hospitalization
 - Normal transient desaturation in infants
 - However, if prolonged hypoxemia, high flow is an option
- Use of guidelines will decrease total cost and hospital stay → avoid cxr, RSV testing, albuterol use

Table 1. Predictors of Severity in Bronchiolitis

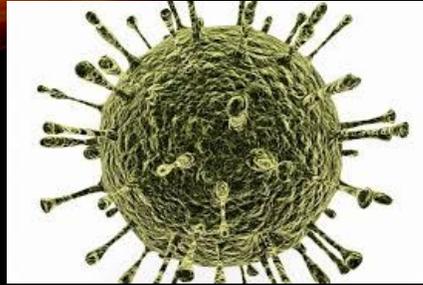
Increased severity¹²	Mild disease¹³
Age (younger age predicts increased risk)	Adequate oral intake
Dehydration	Age ≥ two months
Increased work of breathing (retractions)	History of eczema
Tachycardia (heart rate > 97% for age)	Initial oxygen saturation of at least 94%
	Lower respiratory rate
	No history of intubation
	No or mild retractions



BRONCHIOLITIS TREATMENT

- Supportive care: **Hydration!** Nasal suction





PREVENTION

- According to clinical practice guidelines from the AAP
 - “RSV, as well as many other viruses, can survive **better on hard surfaces** than on porous surfaces or hands.”
 - Secretions from patients infected with RSV or other causative agents of bronchiolitis can be found on beds, crib railings, tabletops, and toys
- RSV, as well as many other viruses, can remain infectious **on gowns or paper tissues for 20 to 30 minutes.**
 - infectious on skin for up to 20 minutes
 - on counter tops for more than 6 hours
- Alcohol based rubs to disinfect, Frequent handwashing, avoid tobacco smoke, promote breastfeeding, reducing exposure to other children (keep sick siblings away from baby or encourage them to “kiss baby’s feet”), and immunizations

GOALS AND OBJECTIVES OF STUDY

- Assessing the compliance of national guidelines (2014 AAP Bronchiolitis Guidelines) for the diagnosis and management of bronchiolitis in 4 small community hospitals.
 - Data was analyzed by looking at the non-compliance rates of the guidelines from physicians (ED, FP, or pediatricians) over time from 2015 to 2018 among four separate small community hospital settings in similar suburban communities. Non-compliance will be reflected as those who did not follow guidelines and ordered 1) chest x rays 2) steroids 3) antibiotics 4) bronchodilators

CLINICAL RELEVANCE

- By revisiting the official [American Academy of Pediatrics guidelines](#), we will be providing better and efficacious care to our patients by avoiding excessive testing and unnecessary interventions.
- Provide education about powerplans in Cerner for physicians to easily access evidence based guidelines for diagnosis and management of bronchiolitis in the appropriate age groups.

RETROSPECTIVE STUDY DESIGN AND METHODS

- **Target population:** pediatrics, 28 days old to 23 months old
- **Inclusion criteria:** 28 days old to 23 months old and Diagnostic impression of bronchiolitis: rhinorrhea , cough, tachypnea , rales, wheezing , increase work of breathing, +/- fever
- **Exclusion criteria:** No cardiovascular/pulmonary disease or other CLD ; family hx of asthma or allergies, auscultation of wheezing only (no rhonchi/rales), moderate to severe respiratory distress
- Data was obtained from Cerner (EMR utilized by hospital system) during the time period of RSV season in year 2015-2018.
- **Statistics:** Analyzed with the assistance of Dr. Stein, Chi-square test analysis and Bonferroni method was used. This looked to see if the proportion of non-compliance is the same across the 4 hospitals for each method and across the 3 time periods. If the p-value was significant, individual comparisons to see exactly which hospitals are significantly different from one another was further assessed. These comparisons were adjusted for multiple comparisons with the Bonferroni method.

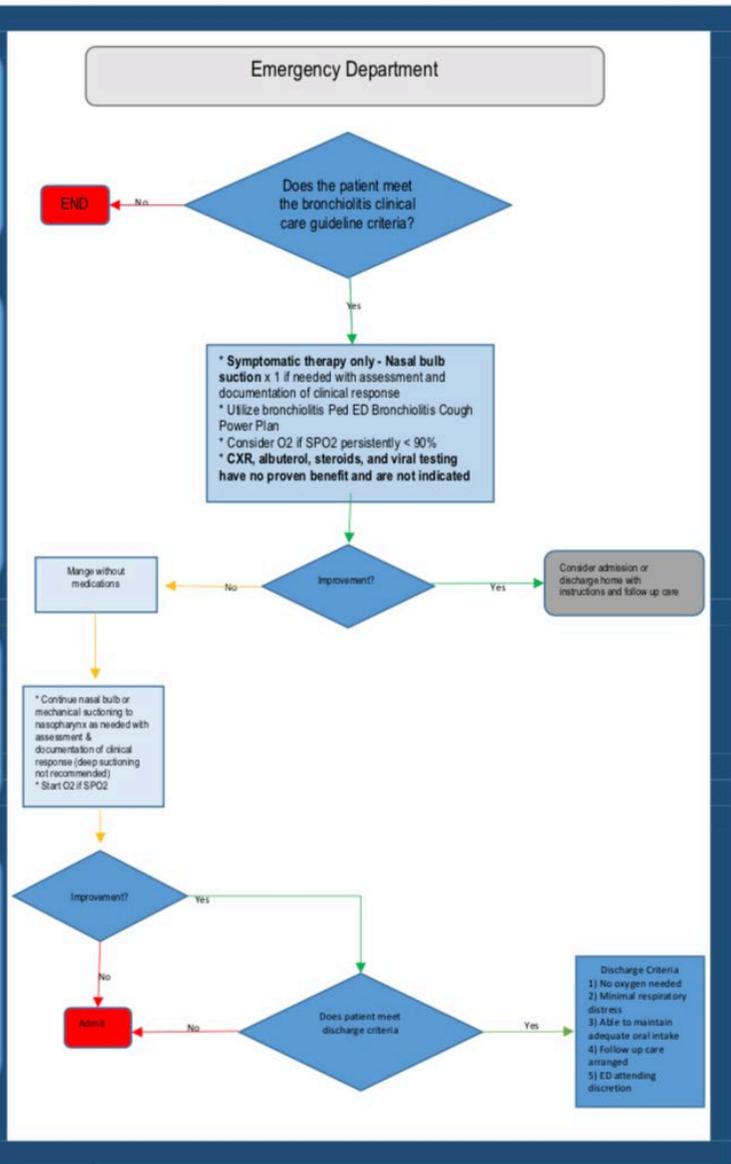
Emergency Department Bronchiolitis Protocol

INCLUSION
 -28 d/o - 2 y/o
 - Impression bronchiolitis: rhinorrhea, cough, tachypnea, rales, wheezing, inc WOB, ± fever

EXCLUSION
 -No CV/Pulm disease or other chronic disease
 -FH of asthma or allergies
 -Auscultation of wheezing only (i.e. no rhonchi/rales)
 -Moderate to severe respiratory distress

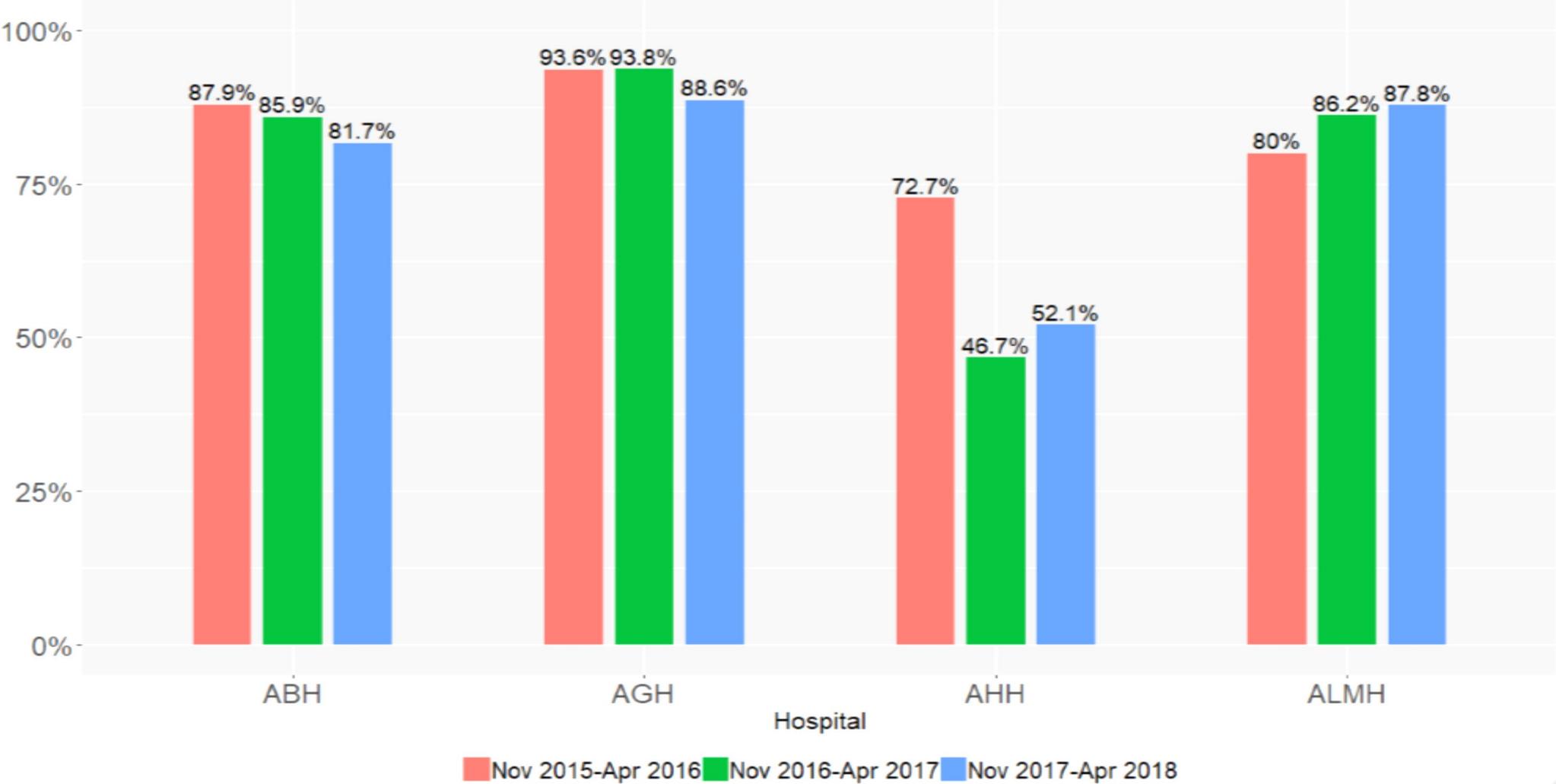
CONSIDERATIONS
 -2014 AAP Bronchiolitis Guidelines do not recommend CXR or use of albuterol and/or racemic epinephrine

TRANSFER TO TERTIARY CARE
 1) Intubation
 2) NCPAP
 3) O2 Requirement >50% O2

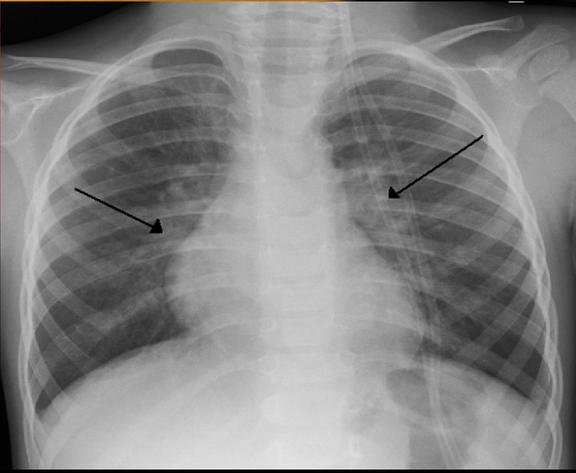


CHEST X RAYS

Bronchiolitis % with X-Ray

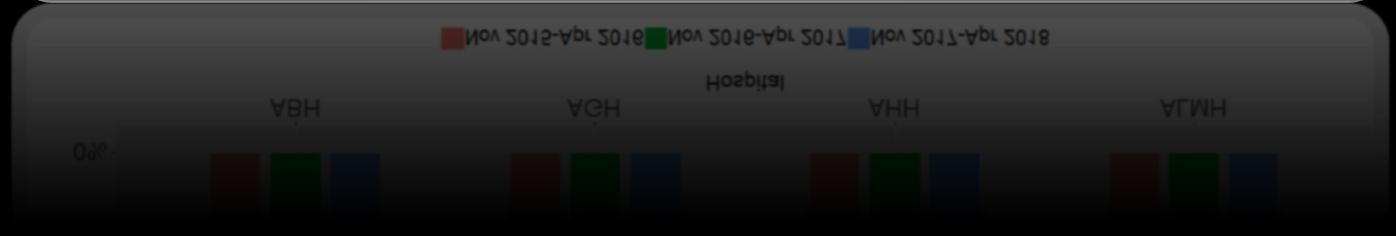
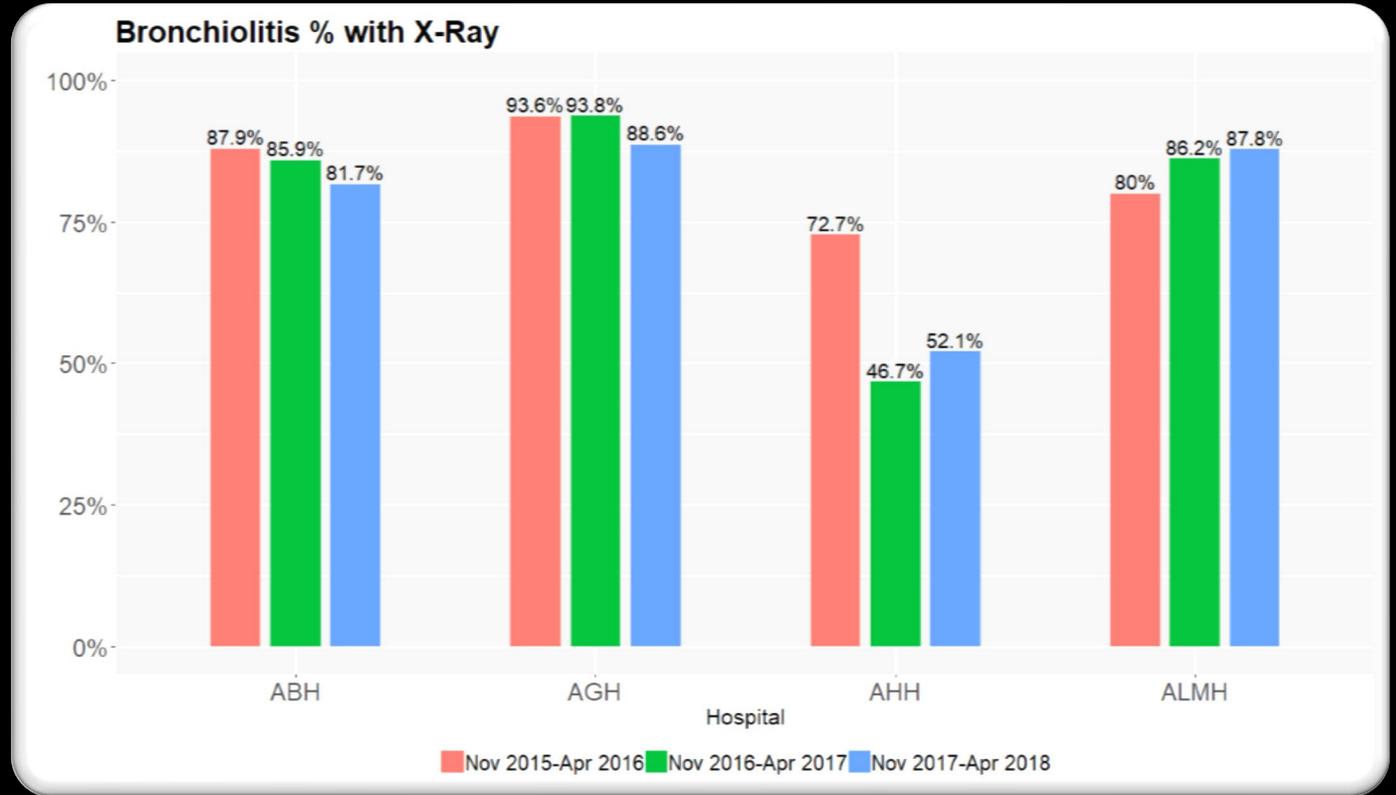


ABH (Bolingbrook Hospital) , AGH (Glen Oaks Hospital), AHH (Hinsdale Hospital), ALMH (La Grange Hospital)
In chronological order (ABH n=68, 78, 71) , (AGH n= 47, 32, 44) , (AHH n= 99, 60, 73) , (ALMH n= 35, 29, 41)



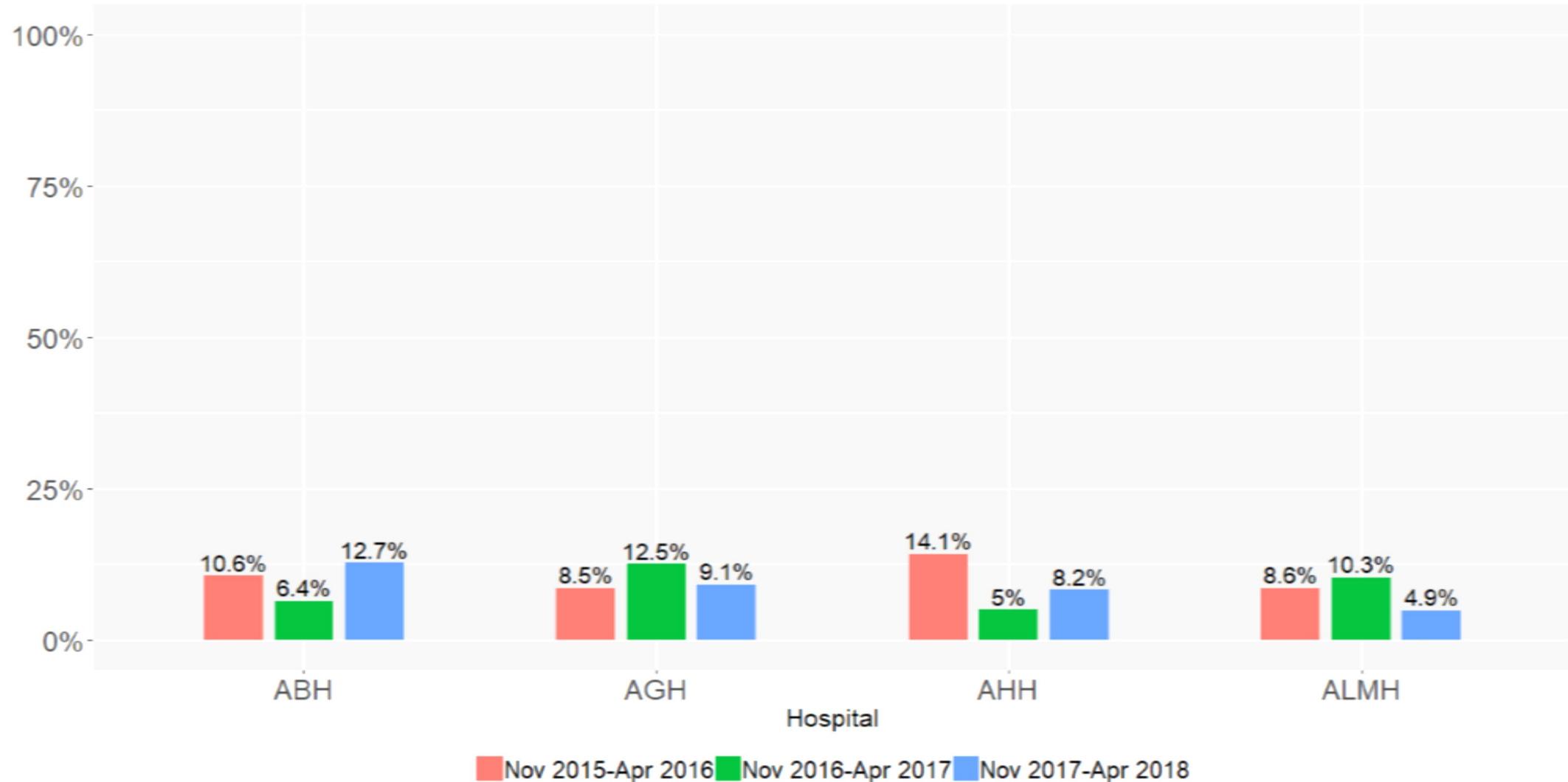
CHEST X RAYS

- From these results one can deduce a decrease in the ordering of chest x-rays over the years at ABH, AGH, and AHH with average percentages of 85%, 92% and 57% respectively.
- At ALMH, on the other hand, there was an increase of orders with an 85% average.
- It was observed at AHH that there was a significant statistical difference in the amount between non-compliance rates (with a measured p-value <.0001) when compared to the other three hospitals during the last two measured RSV seasons.



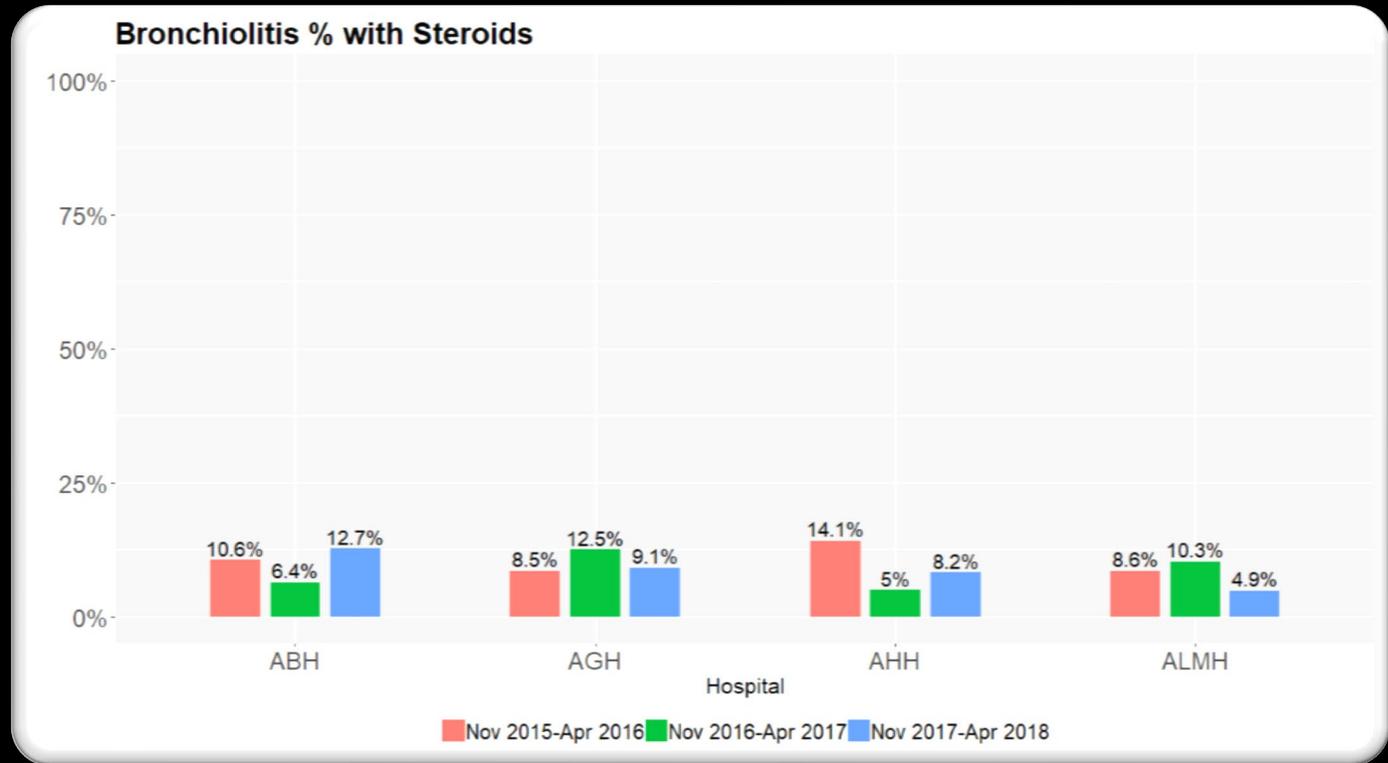
STEROIDS

Bronchiolitis % with Steroids



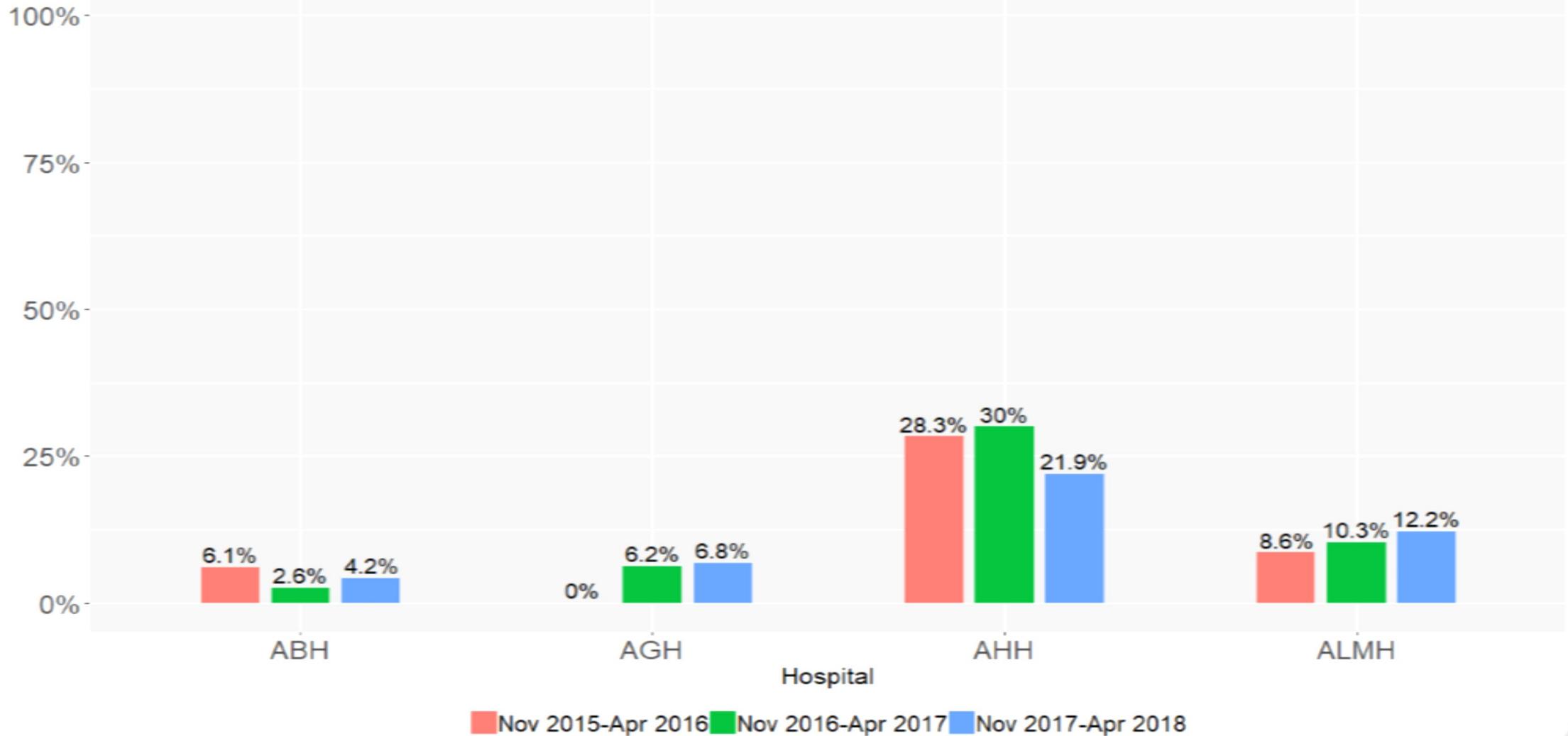
STERIODS

- We observed a downward trend in administered steroids at AHH, ALMH, and AGH over the three RSV seasons.
- The noted averages being 9.1%, 7.9%, and 10% respectively. At the same time there was an observed increase of steroid usage at ABH with an average of 9.2%.



ANTIBIOTICS

Bronchiolitis % with Antibiotics

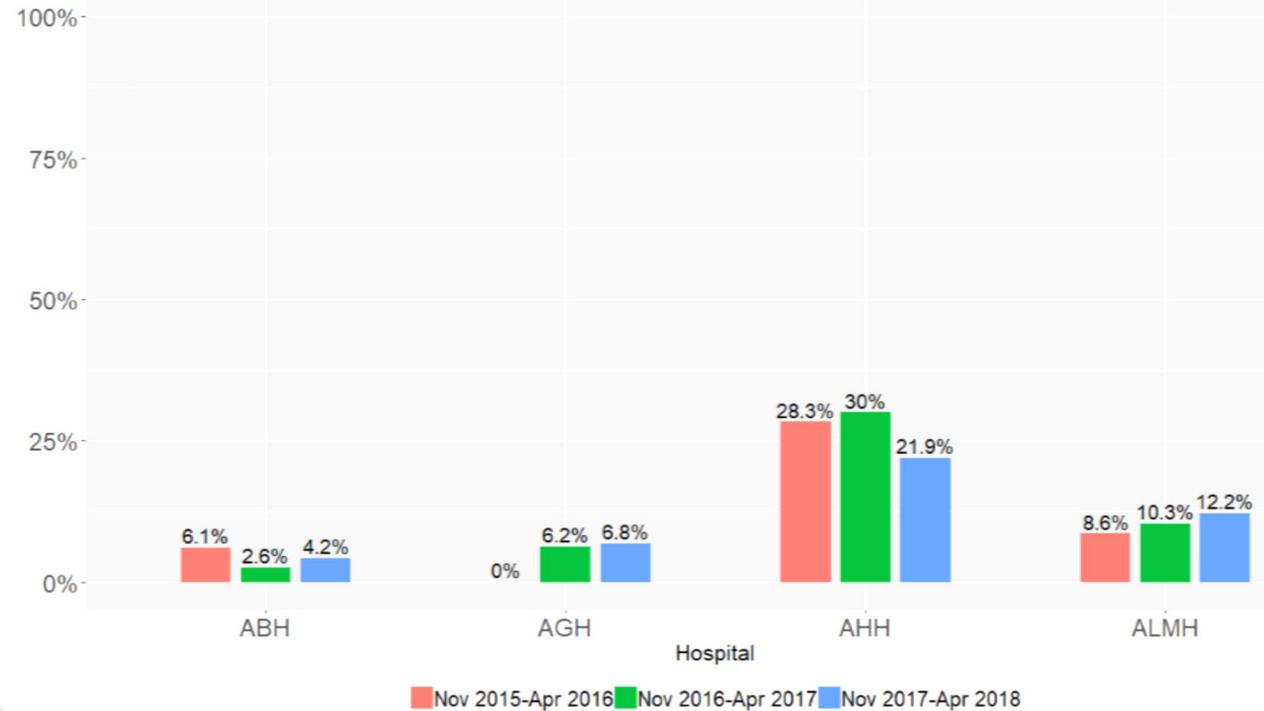




ANTIBIOTICS

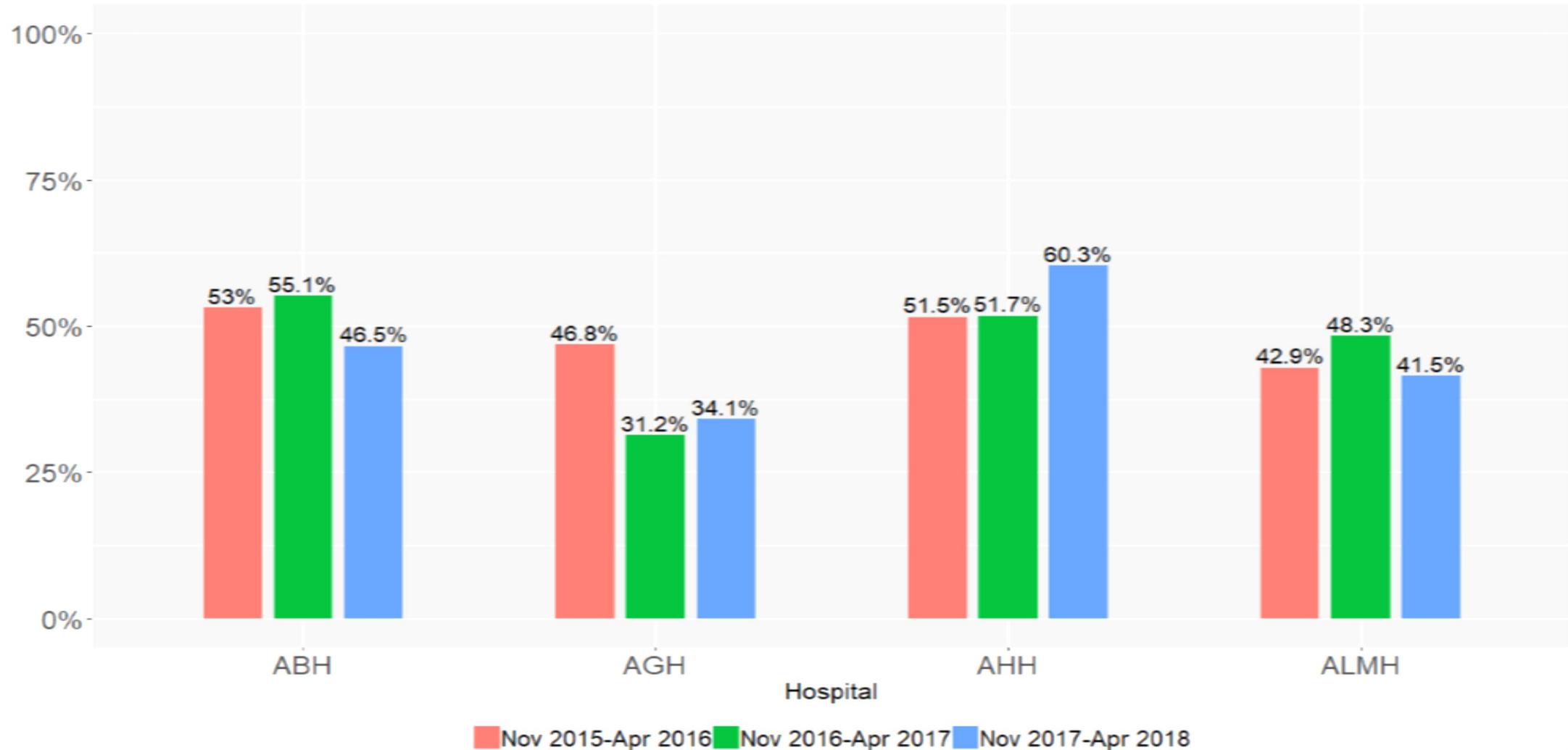
- We noted a downward trend with administered antibiotics at ABH and AHH. With a 4.3% and 26.7% average respectively.
- Also noted was an increase trend at ALMH and AGH with an average of 10.4% and 4.3% each.
- We noted a statistical significance between AGH and ABH against AHH during the second and third measured RSV seasons. Although the overall downward trend observed is most significant at AHH, it also has the highest percent of usage of antibiotics.

Bronchiolitis % with Antibiotics



BRONCHODILATORS

Bronchiolitis % with Bronchodilators

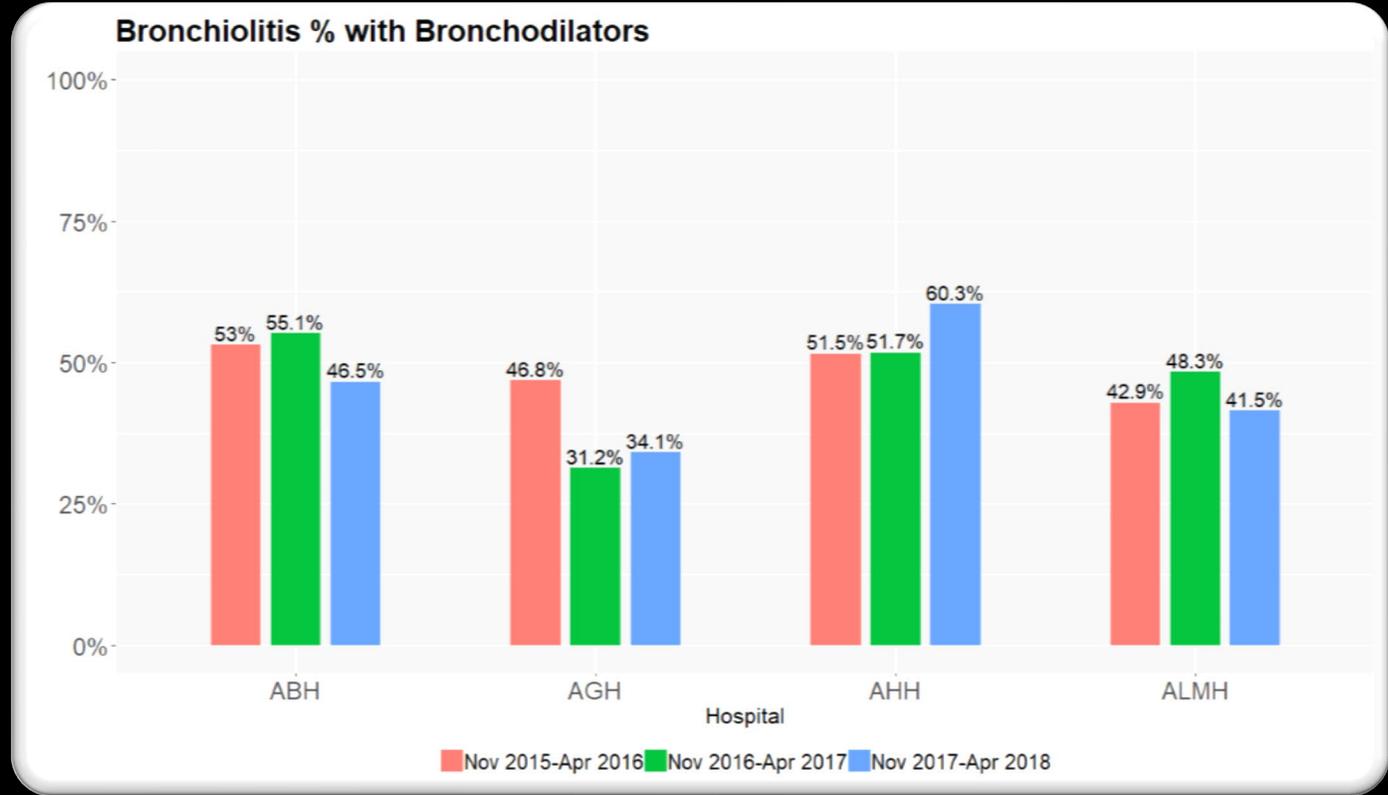


Nov 2015-Apr 2016 Nov 2016-Apr 2017 Nov 2017-Apr 2018



BRONCHODILATORS

- Overall we observed a downward trend at AGH, ALMH and ABH, with average administered rates of 37.4%, 44.2%, and 53.1%.
- We also noted an upward trend at AHH with an average of 54.5%.



RESULTS

Outcome	Time Period	P-value	Post Hoc Comparisons (Bonferroni Adjusted p-values)
X-Ray	Nov 2015 – Apr 2016	0.0089	AHH vs AGH (0.0417)
X-Ray	Nov 2016 – Apr 2017	<.0001	AHH vs AGH (0.0001) AHH vs ALMH (0.0052) AHH vs ABH (<.0001)
X-Ray	Nov 2017 – Apr 2018	<.0001	AHH vs AGH (0.0007) AHH vs ALMH (0.0017) AHH vs ABH (0.0019)
Antibiotics	Nov 2015 – Apr 2016	<.0001	AHH vs AGH (0.0008) AHH vs ABH (0.0051)
Antibiotics	Nov 2016 – Apr 2017	<.0001	AHH vs ABH (0.0001)
Antibiotics	Nov 2017 – Apr 2018	0.0069	AHH vs ABH (0.0231)
Steroids	Nov 2015 – Apr 2016	0.6939	
Steroids	Nov 2016 – Apr 2017	0.5408	
Steroids	Nov 2017 – Apr 2018	0.5654	
Bronchodilators	Nov 2015 – Apr 2016	0.7446	
Bronchodilators	Nov 2016 – Apr 2017	0.1461	
Bronchodilators	Nov 2017 – Apr 2018	0.0355	

STATISTICS:

- Analyzed with the assistance of Dr. Stein, using Chi-square and the Bonferroni method .
- This looked to see if the proportion of non-compliance is the same across the 4 hospitals for each method and across the 3 time periods.
- If the p-value was significant, individual comparisons to see exactly which hospitals are significantly different from one another was further assessed. These comparisons were adjusted for multiple comparisons with the Bonferroni method.

CONCLUSIONS

- In general, we can conclude that 2014 AAP guidelines for diagnosis and management of bronchiolitis has improved compliance rates over the RSV seasons of 2015 to 2018 in terms of **ordering less chest x rays** in at least three of the four community hospitals.
- This is **reflected in the downward trends**.
- Furthermore, in terms of administering steroids we see a **downward trend** in at least three of the four community hospitals.
- We also observed a **downward trend** in administering antibiotics in at least 2 of the 4 hospitals.
- Lastly, we can conclude a **downward trend** in administering bronchodilators in at least 3 of the 4 hospitals.
- Interestingly enough, the hospital AHH saw a downward trend of ordering steroids, antibiotics, and chest x rays . Yet, a 8% increase in ordering bronchodilators in the most recent RSV season NOV. 2017-APR. 2018.

CONCLUSIONS

- The biggest benefit in this research was to: 1. See our potential to improve healthcare management and cost of bronchiolitis, and 2. to educate physicians and staff about the most up to date 2014 AAP Guidelines for bronchiolitis.
- We still have room for improvement in reaching our goals of ordering unnecessary antibiotics, x rays, steroids, and bronchodilators for the diagnosis and management of bronchiolitis.
 - Our question is what is that goal; ideally 0% ?
 - However we encounter hurdles such as: patient satisfaction, fear of medical error , physician experience, etc.
 - We could propose to continue education of these guidelines in order to empower clinicians diagnostic confidence to prevent unnecessary radiation exposure and contributing to unnecessary antibiotic resistance.

ACKNOWLEDGEMENTS

- Acknowledgements and special thanks go to:
- Primary PI Dr. Elizabeth Bockhold
- Lurie's Children Hospital and the Pediatric team – Ms. Antonette Cesarz and Dr. Robyn Gutierrez in helping initiate this endeavor
- Dr. Amy Stein for her helping with the statistics and analysis of our data
- IRB team, including Shivi Stanley for review process
- Quality Data Specialist Megha Patel helping with data retrieval and labels
- Lastly, AMITA health- Adventist Medical Centers for this opportunity

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