Epidemiology of Pediatric RSV-Associated Illness in FDA's Sentinel System

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Background

- Respiratory Syncytial Virus (RSV)-associated illness (RSV-AI) is a major public health concern for children worldwide.[1]
- RSV is the most common cause of bronchiolitis, which is the leading cause of hospitalization of infants and young children in the United States.[2]
- Therapies for prevention and treatment of RSV-AI are currently limited, and new products are needed.[3]
- Drug and vaccine development can benefit from the study of RSV epidemiology.
- FDA's Sentinel System is a robust active surveillance system that uses electronic healthcare data comprised primarily of administrative claims. Data partners, most of which are commercial insurers, provide information from members across the US.
- Sentinel has focused on post-market safety of medical products, mostly in adults.[4]
- This project demonstrates the utility of Sentinel for pediatric epidemiology research and anti-infective drug development, which are more novel applications.

Objectives

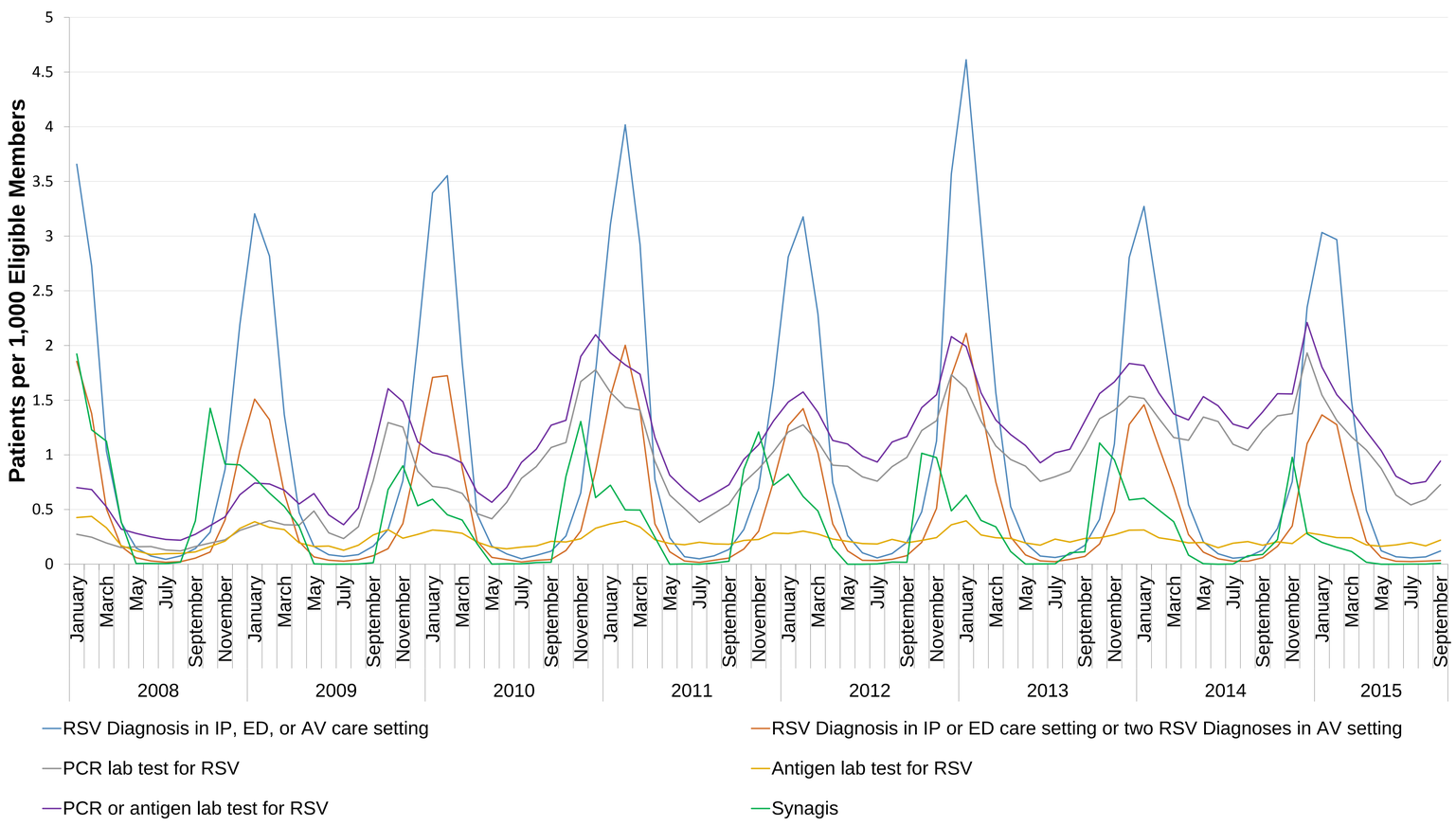
- To collect epidemiologic information about RSV-AI in the United States, which may be used to inform future development of novel drugs for the treatment and prevention of RSV-AI.
- To demonstrate that the Sentinel database can be used to generate robust epidemiological data for common, acute pediatric medical conditions, using RSV-AI as a case example.

Methods

- Two analyses were conducted in the Sentinel database using data from 16 data partners.
- In the first analysis, we examined trends in the timing of RSV cases, palivizumab dispensing, and diagnostic testing among children 1 to 24 months (mo) of age. Data from 1/1/2008 to 9/30/2015 were included.
- The second analysis examined clinical features of RSV-AI cases in children <5 years of age, such as baseline characteristics, RSV risk factors (prematurity, chronic lung disease (CLD), chronic heart disease (CHD), and care setting. Data from 1/1/2008 to 6/30/2016 were included.
- For both queries, RSV-AI cases were defined as patients with incident RSV ICD-9/ICD-10 diagnosis codes.

Results

Figure 1: Seasonality trends of RSV Cases in Any Care Setting, January 1, 2008 to September 30, 2015



Analysis 1:

- 89,537 cases of RSV-AI were identified in the inpatient and outpatient setting.
- Timing of RSV-AI cases followed an expected seasonal pattern consistent with published data[5] (Figure 1).
- RSV diagnostic testing was also seasonal but continued year round, even when RSV-AI cases were infrequent.
- As expected, palivizumab dispensation occurred prior to peak RSV season. A notable decrease in palivizumab use was noted in the 2014-2015 RSV season, which coincides with the revised 2014 guidelines from the American Academy of Pediatrics.[1]

Analysis 2:

- 317,928 RSV-AI cases were identified in the inpatient and outpatient setting
- The majority of RSV-AI cases were managed in the ambulatory setting: 81% for infants 1-6 mo old, 84% for children 7-60 mo old
- Patients with traditional risk factors for RSV-AI comprise a small proportion of total RSV cases in both the inpatient and outpatient setting (Table 1).

Table 1. Baseline Characteristics of Patients with Incident RSV-AI in Any Care Setting, January 1, 2008 - June 30, 2016*

	Any Care Setting		Inpatient Care Setting		Outpatient Care Setting	
	Age 1-6 mo N=138,669	**Age 7-60 mo N=179,259**	**Age 1-6 mo N=24,192**	**Age 7-60 mo N=20,002**	**Age 1-6 mo N=119,363**	**Age 7-60 mo N=156,019**
Demographics						
Mean Age in Years (SD)	0.3 (0.1)	1.6 (1.0)	0.3 years (0.1)	1.7 (1.0)	0.3 (0.1)	1.6 (1.0)
Male Sex	79,344 (57%)	98,837 (55%)	14,000 (58%)	11,106 (56%)	67, 805 (57%)	85,589 (55%)
RSV Risk Factors						
Chronic Lung Disease	301 (0.2%)	979 (0.5%)	135 (0.6%)	547 (2.7%)	164 (0.2%)	687 (0.4%)
Congenital Heart Disease	1,526 (11%)	2757 (1.5%)	613 (2.5%)	1,082 (5.4%)	1,101 (0.9%)	2,110 (1.4%)
Extremely Preterm (<29 weeks)	816 (0.6%)	2,288 (1.3%)	261 (1.1%)	882 (4.4%)	605 (0.5%)	1,797 (1.2%)
Very Preterm (29 to <32 weeks)	2094 (1.5%)	3,244 (1.8%)	562 (2.3%)	811 (4.1%)	1,666 (1.4%)	2,697 (1.7%)
Moderate to Late Preterm (32 to <37 weeks)	8760 (6.3%)	9,551 (5.3%	2,326 (9.6%)	1,644 (8.2%)	7,324 (6.1%)	8127 (5.2%)
Prescribed Palivizumab	1,458 (1.1%)	993 (0.6%)	388 (1.6%)	303 (1.5%)	1,167 (1.0%)	792 (0.5%)

Limitations

- Results are only descriptive in nature
- Observational data, including claims data in Sentinel, are subject to inherent limitations such as differences in coding practices
- Since these data come primarily from commercially insured children, the findings may not be generalizable to the US population at large.

Conclusions

- While acknowledging the significance of CLD, CHD, and prematurity as risk factors for RSV-AI, we also highlight that the majority of RSV-AI coded cases occurred in children without traditional risk factors.
- To lessen the overall public health burden of RSV-AI, future development of new prophylactics and therapeutics may need to be inclusive of both healthy and high-risk groups.
- Our results demonstrate the ability of Sentinel to provide useful epidemiologic data regarding a common pediatric illness.

References

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