

Do Respiratory Outpatient Clinics Decrease Bronchiolitis Reevaluation Rates? Observational Data from a Quality Improvement Project

Urgent message: Establishing respiratory outpatient clinics has been shown to decrease reevaluation rates for patients with bronchiolitis, especially in children aged <12 months and/or those who receive suctioning during their initial urgent care encounter.

PREMA D. SOUZA, MD; AIMY PATEL, MD; BRIAN LEE, PHD; and AMANDA NEDVED, MD

Citation: Souza PD, Patel A, Lee B, Nedved A. Do respiratory outpatient clinics decrease bronchiolitis reevaluation rates? Observational data from a quality improvement project. *J Urgent Care Med.* 2021;15(7):30-33.

Introduction

Bronchiolitis is a ubiquitous respiratory illness in the urgent care setting during the winter months. Children present with varying degrees of symptoms ranging from simple upper respiratory tract infection to respiratory failure requiring ventilator support.¹ For those under 12 months of age, bronchiolitis is the most common cause of hospitalization,² with approximately 100,000 admissions annually in the United States at a cost of approximately \$1.73 billion.³ Of the annual readmissions for bronchiolitis, 80% are estimated to be potentially preventable.⁴

As infants are obligate nose breathers, nasopharyngeal secretions caused by bronchiolitis that block the nostrils may cause transient decreases in SpO₂ and lead to respiratory distress.⁵ Suctioning of the nasopharynx to remove mucus and secretions is a common practice in both the inpatient and outpatient management of bronchiolitis. Nasal suction may be associated with an

improvement in SpO₂ in infants with bronchiolitis presenting to the emergency department.⁶ However, due to insufficient data, the American Academy of Pediatrics was unable to make a recommendation about suctioning in its most recent guidelines.⁷

Our institution opened its first respiratory outpatient clinic (ROC) in 2014 within one of our pediatric EDs. In 2019, the ROC model was expanded into all three metro area urgent care centers at our institution. Each ROC is staffed by a registered pediatric respiratory therapist (RT) who provides an airway assessment, suction intervention, and education. The RT also screens patients for complications of bronchiolitis that require further evaluation and management by a provider, such as dehydration, prolonged fever, or respiratory distress, and if necessary will recommend patients to one of our urgent care centers or EDs.

The impact of ROC referrals in the urgent care setting has not been evaluated. This report describes baseline ROC referral patterns. This information will identify gaps and opportunities for improving referrals with the overall aim to decrease reevaluation rates in patients discharged from the urgent care with a diagnosis of bronchiolitis.

Author affiliations: Prema D. Souza, MD, Children's Hospital, Kansas City, MO, University of Missouri Kansas City School of Medicine; Aimey Patel, MD, Children's Hospital, Kansas City, MO, University of Missouri Kansas City School of Medicine; Brian Lee, PhD, Children's Hospital, Kansas City, MO; Amanda Nedved, MD, Children's Hospital, Kansas City, MO, University of Missouri Kansas City School of Medicine. The authors have no relevant financial relationships with any commercial interests.

Table 1. Patient Demographics and Referral Type				
	ROC visit	ROC referral, no visit	No referral	p-value
Age (months)				<0.0001
0.0-3.99 months	107(15.9%)	30(4.5%)	537(79.7%)	
4.0-7.99 months	291(21.6%)	43(3.2%)	1013(75.2)	
8.0-11.99 months	139(15.7%)	24(2.7%)	722(81.6%)	
12.0-15.99 months	74(13.2%)	9(1.6%)	476(85.2%)	
16.0-19.99 months	28(7.7%)	4(1.1%)	331(91.2%)	
20.0-23.99 months	17(8.3%)	4(1.9%)	185(89.8%)	
Gender				0.848
Female	264(16.2%)	49(3.0%)	1316(80.8%)	
Male	392(16.3%)	65(2.7%)	1948(81.0%)	
Race				0.001
American Indian or Alaska Native	0(0.0%)	0(0.0%)	9 (100.0%)	
Asian	9(12.0%)	8(10.7%)	58 (77.3%)	
Black or African American	58(11.8%)	14(2.8%)	420 (85.4%)	
Declined/refused	7(15.6%)	1(2.2%)	37 (82.2%)	
Hispanic	34(13.9%)	6(2.5%)	204 (83.6%)	
Multiracial	53(16.0%)	10(3.0%)	268 (81.0%)	
Native Hawaiian or Pacific Islander	0(0.0%)	1(4.0%)	24 (96.0%)	
Other	10(15.4%)	2(3.1%)	53 (81.5%)	
Respondent not available	0(0.0%)	1(8.3%)	11 (91.7%)	
Unknown to respondent	0(0.0%)	0(0.0%)	13 (100.0%)	
White	485(17.8%)	71(2.6%)	2,162 (79.5%)	
Blank	5			
Insurance type				<0.0001
Commercial	413 (21.4%)	63 (3.3%)	1455 (75.3%)	
Medicaid	212 (13.8%)	47 (3.1%)	1278 (83.1%)	
Other	13 (19.4%)	0 (0.0%)	54 (80.6%)	
Self-pay	16 (7.9%)	2 (1.0%)	184 (91.1%)	
Unknown	2 (0.7%)	2 (0.7%)	293 (98.7%)	
Referral Location				<0.0001
BV Urgent Care	285 (20.1%)	43 (3.0%)	1092 (76.9%)	
EC Urgent Care	229 (14.0%)	45 (2.7%)	1367 (83.3%)	
NC Urgent Care	142 (14.6%)	26 (2.7%)	805 (82.7%)	
Suction treatment in UC				<0.0001
Nasopharyngeal suction	42 (4.9%)	9 (1.0%)	810 (94.1%)	
Nasal aspirator	350 (24.4%)	54 (3.8%)	1031 (71.8%)	
No suction	264 (15.2%)	51 (2.9%)	1423 (81.9%)	
Vitals				0.0001
Respiratory rate	44 (36,52)	40 (33,48)	40 (32,48)	0.6594
SpO2	98 (97,100)	98 (97,100)	98 (97,99)	

Method

Setting

There are three freestanding pediatric urgent care centers at the authors' institution located within a large metro area. The urgent care centers are staffed with general pediatricians and advanced-practice registered nurses who have approximately 90,000 patient encounters annually.⁷

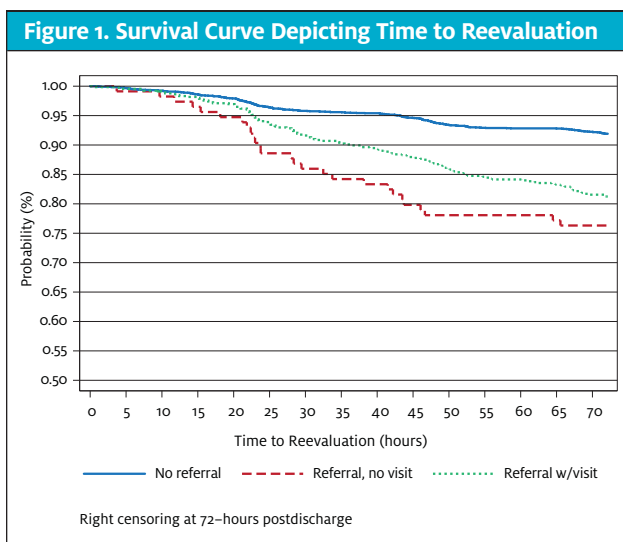
Project design

Baseline data were obtained via retrospective chart review of patients discharged from the urgent care center with a diagnosis of bronchiolitis from November 1,

2018 through February 29, 2020. All children aged 8 weeks to 24 months seen at an urgent care center with a documented discharge diagnosis of bronchiolitis (ICD-10 J21.1, J21.8, J21.0, J21.9, and J84.115) as one of the top three diagnoses were included in the study. We excluded infants less than 8 weeks of age and those who were admitted or transferred from urgent care during the same visit.

Data analysis

Patients were assigned to mutually exclusive groups for the analysis: A, ROC referral with visit (ROC visit group);



B, ROC referral without visit (ROC referral/no visit); and C, no ROC referral. Reevaluation was defined as a documented patient encounter within the authors' institution's ED, urgent care center, or inpatient unit within 72 hours of discharge from the index urgent care visit. Frequency distributions of patient demographics, suction treatment during the urgent care encounter, and reevaluations were compared across the ROC groups using Pearson's chi-square test. Non-parametric summary distributions of respiratory rate and oxygen saturation levels were calculated, and the Kruskal-Wallis test was used to compare across groups. A Kaplan-Meier survival analysis was performed to evaluate the time from urgent care encounter discharge to reevaluation for the three ROC referral groups; survival times were compared using the log-rank test for equality, and patients were right-censored after 72 hours post-discharge. Unadjusted logit models, stratified by select patient demographics (ie, patient age, gender, race, and insurance type), were used to evaluate for the presence of effect modification of the relationship between ROC referral group and reevaluations; contrasts between referral groups were adjusted for multiple comparisons. All analyses were completed using Stata (StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC).

This study was deemed nonhuman subject research by the Children's Mercy Kansas City Institutional Review Board.

Results

There were 4,034 patient encounters that met inclusion criteria during our study period. Of the patients in these

encounters, 656 (16.3%) had an ROC visit, 114 (2.8%) had an ROC referral but no visit, and 3,264 (80.9%) had no ROC referral. Characteristics of the patient encounters are included in **Table 1**. The majority of patients (72%) were <12 months of age, and 59.6% were male. Patients with commercial insurance were more likely to present for an ROC visit than patients with other types of insurance. ROC referral was highest among patients who received nasopharyngeal (NP) suctioning during their index visit (28.2%). Patients who received no suctioning during the index visit were least likely to visit the ROC following their index visit (5.9%) ($p < 0.001$). The median respiratory rate at the index visit differed across groups ($p < 0.001$) and was highest among patients with an ROC visit (group A, 44 breaths per minute; interquartile range: 36–52). Oxygen saturation, however, was not significantly different among the three groups, with a median of 98% in all groups.

Reevaluation within 72 hours occurred in 415 (10.3%) of the encounters. Among these reevaluations, 220 (53.0%) occurred in the urgent care sites, 122 (29.4%) in the ED, and 73 (17.6%) resulted in patient admission. Seventy-eight percent of those reevaluated were under the age of 12 months. Additionally, 12.8% of patients who received NP suctioning were reevaluated, compared with 10.4% of patients receiving NA suctioning and 6% of those who received no suctioning. Only 17.4% of patients who were reevaluated were admitted to an inpatient unit (**Table 2**).

The rate of reevaluations was highest for patients who received a referral but no ROC visit (23.7%). Patients with no ROC referral had the lowest rate of reevaluation (8.1%). The follow-up time to reevaluations differed across groups (p -value < 0.001), with patients who received an ROC referral but no visit having the shortest time to reevaluation. Patients without an ROC referral had the longest time to reevaluation (**Figure 1**).

Discussion

In our study, most patients who received an ROC referral visited the ROC at least one time during the referral period. ROC visits were associated with longer duration between index visit and reevaluation, as well as an overall decrease in reevaluation rates for encounters in which an ROC referral was provided.

Although suctioning was associated with increased ROC referral, 77% of patients for whom suctioning at the urgent care was ordered did not receive an ROC referral. Patients who received NP suctioning at the index visit and were <12 months of age were more likely to receive an ROC referral; however, they were also more

likely to be reevaluated. These data suggest that encounters for patients who are <12 months or receive suctioning at the index visit are more likely to be reevaluated during their bronchiolitis illness. These patients may benefit the most from an ROC referral when available.

Clinical research on suctioning in bronchiolitis is limited,⁸ but our preliminary data suggest that ROC referrals can reduce reevaluation. This study supports previous findings that early interventions can mitigate the risk of prolonged hospitalization in bronchiolitis and reduce the rate of reevaluation.⁹ Patients for whom an ROC referral was ordered but no ROC visit was recorded were more likely to be reevaluated and had the shortest duration of time between the index visit and reevaluation. Patients who did not receive a referral were the least likely to require reevaluation within 72 hours. This finding is probably related to a selection bias, as those patients may have had a milder degree of illness. However, some patients in this group were reevaluated. Providing an ROC referral to eligible patients, regardless of illness severity at the index

visit, may further decrease the frequency of reevaluation in the urgent care center or ED.

Limitations

Our study is limited by its retrospective design. There is significant variation in diagnostic labeling of patients with lower respiratory tract infection,¹⁰ and the data set is entirely dependent on the diagnoses chosen by the treating providers. Because this is a single-center study, results may not be generalizable to all care settings. It is likely that this study population is a representative sample with rates of repeat hospitalization similar to those found in real practice. Patients were not eligible for ROC referral if they had chronic pulmonary conditions, such as chronic aspiration or cystic fibrosis; airway abnormalities, such as cleft palate, choanal atresia, or laryngomalacia; cardiac history, such as cyanotic heart disease; or home medical device use, such as nasogastric tube or gastrostomy tube. However, due to the complexity of identifying these patients, they were not excluded from the study.



CORE CONTENT IN URGENT CARE MEDICINE

Earn CME Credits From The #1 Urgent Care Training Program

- We have the only program developed by leaders in urgent care medicine and modeled after urgent care medicine fellowships.
- Our 62 hour, 8 module course spans the topics commonly seen in an urgent care setting, providing refresher content for urgent care veterans and preparing new providers for their first day.
- Meet CME requirements easily, where and when you choose.
- \$750. Group pricing is also available, contact us at info@urgentcarecme.com



Accreditation Statement: This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of Case Western Reserve University School of Medicine and Institute of Urgent Care Medicine. Case Western Reserve University School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

Case Western Reserve University School of Medicine designates this enduring material for a maximum of 62 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Save 15% with coupon code **JUCM15**

Table 2. Reevaluation rates by patient demographics and referral type				
	ROC visit	ROC referral, no visit	No referral	p-value
Overall	123 (18.7%)	27 (23.7%)	265 (8.1%)	<0.001
Age (in months)				
0.0-3.99 months	27 (25.2%)	6 (20.0%)	65 (12.1%)	0.002
4.0-7.99 months	50 (17.2%)	13 (30.2%)	74 (7.3%)	<0.001
8.0-11.99 months	28 (20.1%)	3 (12.5%)	58 (8.0%)	<0.001
12.0-15.99 months	13 (17.6%)	2 (22.2%)	36 (7.6%)	0.008
16.0-19.99 months	3 (10.7%)	2 (50.0%)	21 (6.3%)	0.015
20.0-23.99 months	2 (11.8%)	1 (25.0%)	11 (5.9%)	0.106
Gender				
Female	52 (19.7%)	15 (30.6%)	104 (7.9%)	<0.001
Male	71 (18.1%)	12 (18.5%)	161 (8.3%)	<0.001
Race				
American Indian or Alaska Native			0 (0.0%)	-----
Asian	1 (11.1%)	2 (25.0%)	5 (8.6%)	0.246
Black or African-American	10 (17.2%)	1 (7.1%)	26 (6.2%)	0.013
Declined/refused	1 (14.3%)	0 (0.0%)	3 (8.1%)	0.557
Hispanic	8 (23.5%)	0 (0.0%)	19 (9.3%)	0.056
Multiracial	8 (15.1%)	5 (50.0%)	24 (9.0%)	0.001
Native Hawaiian or Pacific Islander		0 (0.0%)	2 (8.3%)	0.999
Other	3 (30.0%)	0 (0.0%)	3 (5.7%)	0.075
Respondent not available		0 (0.0%)	0 (0.0%)	-----
Unknown to respondent			0 (0.0%)	-----
White	92 (19.0%)	19 (26.8%)	183 (8.5%)	<0.001
Blank			0 (0.0%)	-----
Insurance type				
Commercial	71 (17.2%)	14 (22.2%)	132 (9.1%)	<0.001
Medicaid	48 (22.6%)	12 (25.5%)	115 (9.0%)	<0.001
Other	3 (23.1%)		3 (5.6%)	0.082
Self-pay	1 (6.3%)	1 (50.0%)	12 (6.5%)	0.149
Unknown	0 (0.0%)	0 (0.0%)	3 (1.0%)	0.999
Referral Location				
BV Urgent Care	56 (19.6%)	10 (23.3%)	82 (7.5%)	<0.001
EC Urgent Care	42 (18.3%)	10 (22.2%)	117 (8.6%)	<0.001
NC Urgent Care	25 (17.6%)	7 (26.9%)	66 (8.2%)	<0.001
Suction treatment in UC				
No suction	5 (11.9%)	1 (11.1%)	46 (5.7%)	0.129
Nasopharyngeal suction	65 (18.6%)	11 (20.4%)	107 (10.4%)	<0.001
Nasal aspirator	53 (20.1%)	15(29.4%)	112 (7.9%)	<0.001

Conclusion

The ROC is a novel care model for the medical neighborhood to provide supportive management of bronchiolitis in a timely manner. Our baseline data suggest that ROC referrals decrease the rate of reevaluation to the urgent care center or ED in patients who receive the referral at the index visit. These preliminary data will be used to improve ROC referral rates for patients with bronchiolitis. Future Plan-Do-Study-Act cycles will focus on encouraging ROC referrals in eligible encounters regardless of illness severity. ■

References

1. Lambert L, Sagfors AM, Openshaw PJ, Culley FJ. Immunity to RSV in early-life. *Front Immunol.* 2014;5:466.

2. Hasegawa K, Tsugawa Y, Brown DF, et al. Trends in bronchiolitis hospitalizations in the United States 2000-2009. *Pediatrics.* 2013; 132(1):28-36.

3. Hall CB, Weinberg GA, Blumkin AK, et al. Respiratory syncytial virus-associated hospitalization among children less than 24 months of age. *Pediatrics.* 2013; 132(2):e341-348.

4. Gay JC, Agrawal R, Auger KA. Rates and impact of potentially preventable readmissions at children's hospitals. *J Pediatr.* 2015;166(3):613-619.e5.

5. Piedimonte G, Perez MK. Respiratory syncytial virus and bronchiolitis. *Pediatr Rev.* 2014; 35(12):519-530.

6. Moschino L, Mario F, Carraro S. Is nasal suctioning warranted before measuring O₂ saturation in infants with bronchiolitis? *Arch Dis Child.* 2016;101(7):114-115.

7. Children's Mercy Kansas City. Annual Report 2017. Available at: <https://www.childrens-mercy.org/siteassets/media-documents-for-depts-section/documents-for-about-us/quality-and-safety/annual-report.pdf>. Accessed March 8, 2021.

8. Ralston SL, Lieberthal AS, Meissner HC, et al. Clinical practice guideline: the diagnosis, management, and prevention of bronchiolitis. *Pediatrics.* 2014;134(5):e1474-e1502.

9. Weisgerber MC, Lye PS, Li SH, et al. Factors predicting prolonged hospital stay for infants with bronchiolitis. *J Hosp Med.* 2011;6(5):264-270.

10. Mansbach JM, Espinola JA, Macias CG, et al. Variability in the diagnostic labeling of nonbacterial lower respiratory tract infections: a multicenter study of children who presented to the emergency department. *Pediatrics.* 2009;123(4):e573-e581.