

Asthma control during the coronavirus 2019 (COVID-19) pandemic in pediatric severe asthma patients

David H. Seto, PharmD, BCPS

PGY2 Pediatric Pharmacy Resident

Pharmacy Trainee

Banner – University Medical Center Tucson/Diamond Children's Medical Center

University of Arizona Pediatric Pulmonary Center




Disclosures

- The investigators of this project (Seto DH, Mollon LE, and Hobart CB) have no conflicts of interests to disclose.
- This project was approved by the Banner Health Investigational Review Board:
 - Project # 01-21-0009
 - Impact of COVID-19 on medication adherence patterns in pediatric severe asthma patients

Objectives

1. Discuss asthma as a risk factor for SARS-CoV-2 infections
2. Evaluate asthma control among pediatric severe asthma patients during the COVID-19 pandemic
3. Describe the medication adherence in pediatric patients with severe asthma during the COVID-19 pandemic

Abbreviations

- ACT = asthma control test
 - COVID-19 = coronavirus disease 2019
 - FENO = fractional exhaled nitric oxide
 - FEV₁ = forced expiratory volume in the first second
 - FVC = forced vital capacity
 - MPR = medication possession ratio
 - SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2
 - URI = upper respiratory infection
 - %pred = percent predicted
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Background: Asthma

- Chronic disease characterized by chronic airway inflammation
- Goal of asthma management: to control symptoms and minimize risks (e.g., exacerbations)
- Asthma control can be affected by medication adherence, physical activity, and exposure to environmental allergens

Medication Adherence in Asthma

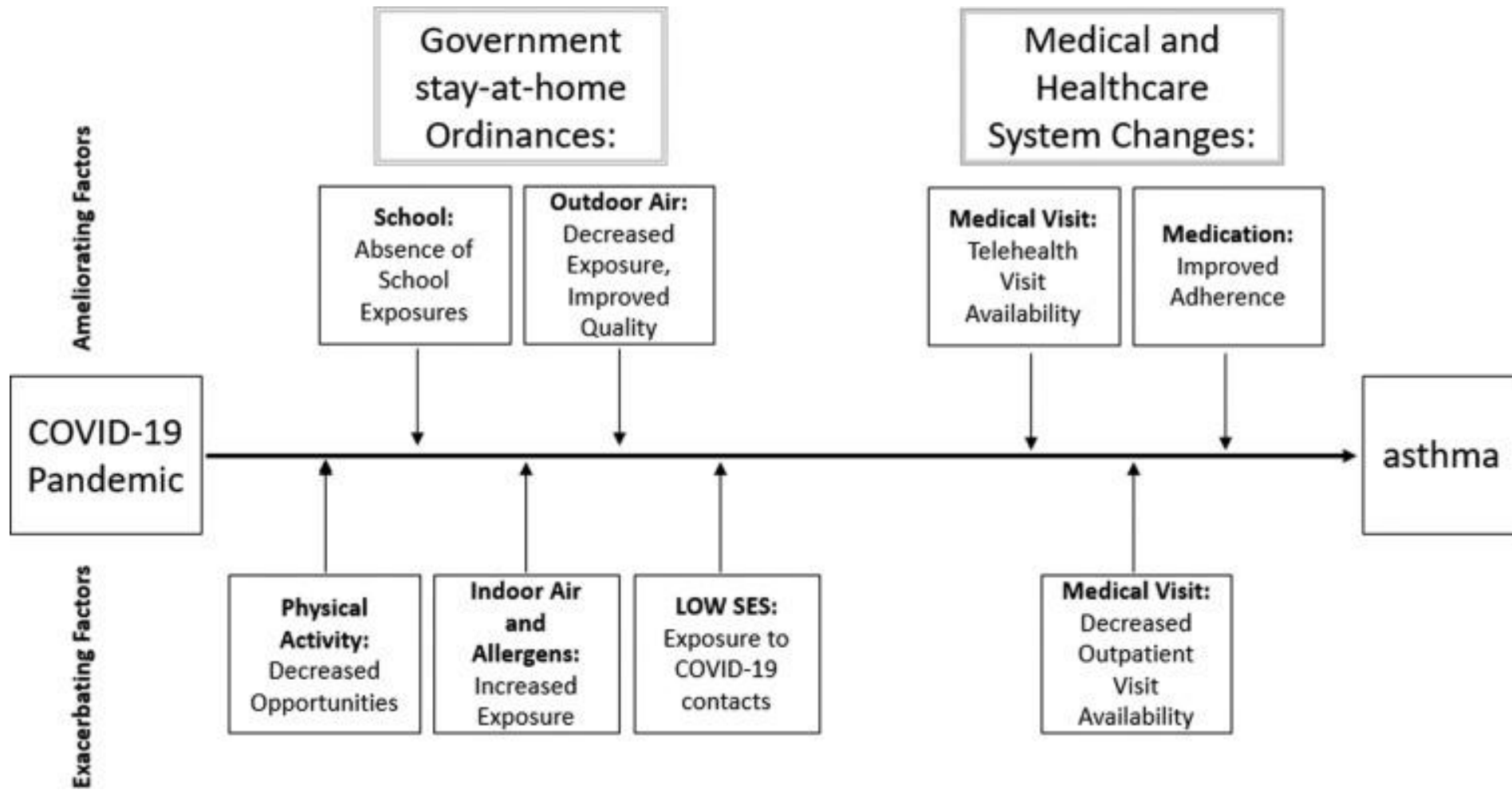
- Patients that do not engage in asthma medication administration as prescribed experience more complications
- Medication adherence during COVID-19 has increased
 - Mean daily controller adherence improved by 14.5%¹
 - Provider perceived asthma control improved in 20% of patients²

1. Kaye L, Theye B, Smeenk I, et al. *J Allergy Clin Immunol Pract.* 2020;8(7):2384-2385.

2. Papadopoulos NG, Custovic A, Deschildre A, et al. *J Allergy Clin Immunol Pract.* 2020;S2213-2198(20)30599-7.

Asthma During COVID-19

- Asthma is one of the many risk factors for increased mortality and poor outcomes of SARS-CoV-2 infections
- Stay-at-home ordinances may create barriers to accessing care and/or impact exposure to asthma triggers



Asthma During COVID-19: Lee, et al. (2020)

- **Purpose:** to determine the potential risk of respiratory failure and mortality in COVID-19 patients with pre-existing asthma
- **Inclusion:** adult patients diagnosed with COVID-19 with history of asthma in South Korea (n = 686)
- **Pertinent Findings:**
 - Asthma patients with acute exacerbation(s) in the previous year before COVID-19 showed higher COVID-19-related mortality

Asthma control during COVID-19 in pediatric severe asthma patients



Methods: Study Design

Project Design: Single-site retrospective chart review

Inclusion Criteria:

- Patients <18 years of age enrolled into the severe asthma clinic
- Prescribed maintenance medications for asthma control
- Minimum of one severe asthma clinic visit before COVID-19 (3/2019 – 2/2020) and during COVID-19 (3/2020 – 3/2021)

Methods: Study Outcomes


Asthma Control Outcomes:

- Asthma-related healthcare utilization
- Systemic steroid courses
- ACT scores
- Asthma control assessment
- Pulmonary function test

Exploratory Outcomes:

- MPR during COVID-19
- Patient reported environment changes

Methods: Statistical Analysis

- Descriptive and qualitative statistics
 - Comparative statistics:
 - Paired student t-test
 - Wilcoxon signed-rank
 - McNemar's
 - Paired Poisson or Friedman
 - Alpha priori set at 0.05
 - STATA version 16.0
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Demographics

Demographic	N = 40
Age in years, median (range)	12 (6 – 17)
Sex, n (%)	
Male	26 (65)
Female	14 (35)
Race, n (%)	
Black or African American	7 (17.5)
White or Caucasian	25 (62.5)
Other	8 (20)
Ethnicity, n (%)	
Hispanic or Latino	21 (52.5)
Not Hispanic or Latino	19 (47.5)
Positive COVID-19 Test, n (%)	3 (7.5)

Healthcare Utilization

	Before COVID-19 (N = 40)	During COVID-19 (N = 40)	P-Value
Number of patients with at least one... , n (%)			
Pulmonary-related general pediatric clinic visit	15 (37.5)	2 (5)	--
Emergency department and/or urgent care visit	8 (20)	7 (17.5)	--
Hospitalization	9 (22.5)	2 (5)	--
Visits per patient, median (range)			
Severe asthma clinic	2 (1 – 7)	1 (1 – 4)	0.439
Pulmonary-related general pediatric clinic	0 (0 – 5)	0 (0 – 1)	<0.001
Emergency department and/or urgent care	0 (0 – 3)	0 (0 – 2)	0.380
Hospitalization	0 (0 – 3)	0 (0 – 3)	0.012

p<0.05 is considered statistically significant.

Systemic Steroid Courses

	Before COVID-19 (N = 40)	During COVID-19 (N = 40)	P-Value
Systemic Steroid Courses, n (%)			
Patients with systemic steroid course(s)	26 (65)	16 (40)	0.011
Patients with 1 systemic steroid course	15 (37.5)	11 (27.5)	
Patients with 2 systemic steroid courses	7 (17.5)	3 (7.5)	
Patients with 3 systemic steroid courses	1 (2.5)	1 (2.5)	
Patients with 4 or more systemic steroid courses	3 (7.5)	1 (2.5)	

p<0.05 is considered statistically significant.



Asthma Control

	Before COVID-19 (N = 36)	During COVID-19 (N = 37)	P-Value
Asthma Control Test Scores, n (%)			
≤19 (not controlled)	15 (37.5)	9 (22.5)	0.125
≥20 (controlled)	21 (52.5)	28 (70)	
Not completed or documented	4 (10)	3 (7.5)	

	Before COVID-19 (N = 40)	During COVID-19 (N = 40)	P-Value
Assessment of Asthma Control, n (%)			
Well controlled	21 (52.5)	29 (72.5)	0.057
Not well controlled	10 (25)	7 (17.5)	
Very poorly controlled	9 (22.5)	4 (10)	

p<0.05 is considered statistically significant.

Pulmonary Function Tests

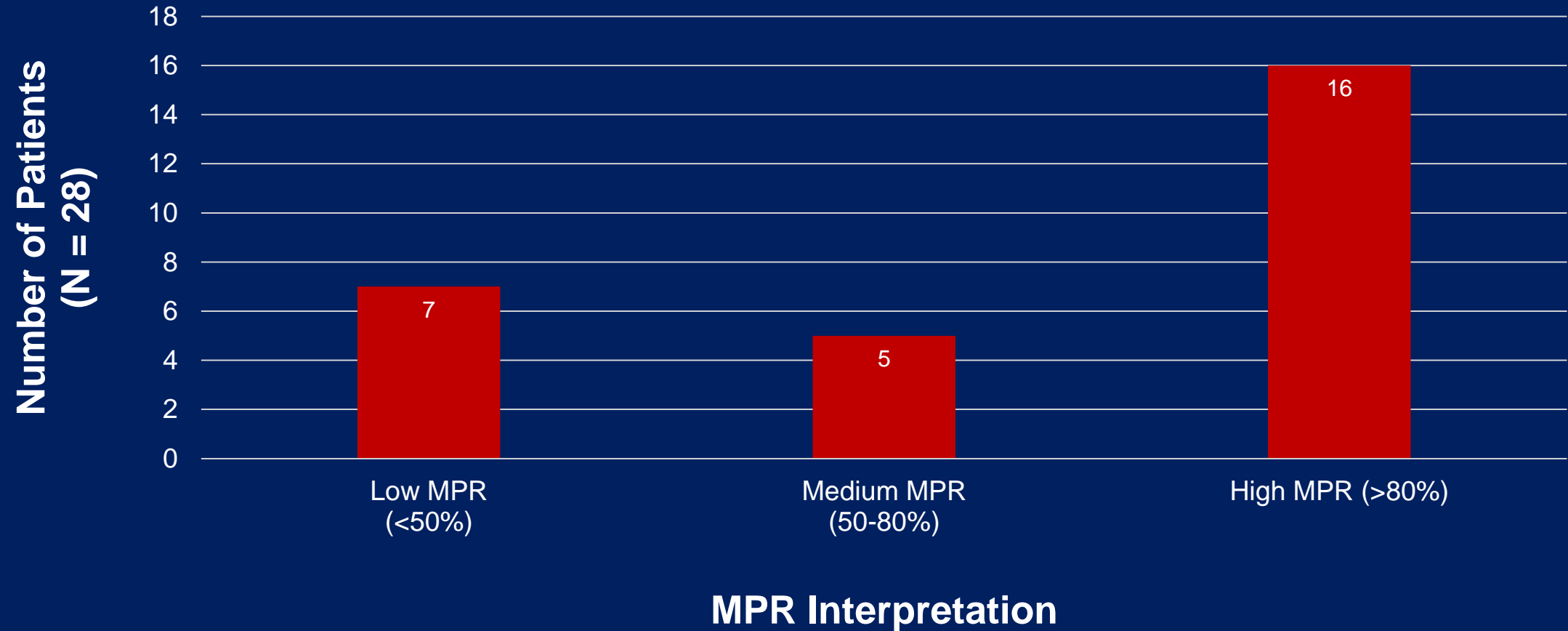
	Before COVID-19 (N = 40)	During COVID-19 (N = 21)	P-Value
Spirometry Results, median (range)			
FEV ₁ %pred	88.5 (41 – 123)	93.5 (70 – 129)	0.335
FVC %pred	92.5 (41 – 125)	100.5 (83 – 138)	0.432

	Before COVID-19 (N = 28)	During COVID-19 (N = 7)	P-Value
FENO			
Average	23.9	49.9	0.581
Median	19	52	
Range	<5 – 168	<5 – 151	

p<0.05 is considered statistically significant.

FEV₁ = forced expiratory volume in the first second; FVC = forced vital capacity, FENO = fractional exhaled nitric oxide

Medication Adherence During COVID-19



MPR = medication possession ratio

Patient Reported Changes

Before COVID-19



Exposure to individuals
with URI

During COVID-19



Exposure to individuals
with COVID-19



Isolation due to concerns
with COVID-19

Conclusions¹

During COVID-19, there was a decrease in...



**Healthcare
Utilization²**



**Patients with
Systemic Steroid
Courses³**




**Patients with
Uncontrolled
Asthma**

¹Results based on descriptive statistics (unless otherwise noted).

²Statistically significant for pulmonary-related general pediatric clinic and hospitalizations.

³Statistically significant finding.

Limitations

- Single-site retrospective study
 - Asthma control may be affected by variables that may or may not be related to COVID-19
 - Information limited to that in the medical records
 - Data outside of health system may not be captured
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Acknowledgements

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- Lea E. Mollon, PharmD, PhD, BCPS

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Thank you.

Questions? seto@pharmacy.arizona.edu



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