

# Influenza vaccine hesitancy in hospitalized children, before and during the COVID-19 pandemic

Marisa Orbea, MD<sup>a,b</sup>; Jose Rafael Dominguez<sup>a</sup>; Rachel M. Cunningham, MPH<sup>c</sup>; Catherine Mary Healy, MD<sup>a,b</sup>; Julie A. Boom, MD<sup>a,c</sup>; Claire Bocchini, MD<sup>a,b</sup>  
 Texas Children's Hospital | Baylor College of Medicine<sup>a</sup>, Department of Pediatric Infectious Disease<sup>b</sup>, Department of Academic General Pediatrics<sup>c</sup>

Address correspondence to Marisa Orbea, MD at 1102 Bates Ave, Suite 1120, Houston TX 77030  
 Tel.: 832-824-1780  
 Fax: 832-825-1048  
 E-mail: marisa.orbea@bcm.edu

## BACKGROUND

- The American Academy of Pediatrics and the CDC recommend influenza vaccination for all individuals 6 months of age and older without contraindications
- Influenza vaccine coverage remains sub-optimal and influenza continues to cause significant morbidity and mortality<sup>1-2</sup>
- Although almost 1 in 15 US parents are hesitant about routine childhood vaccines, more than 1 in 4 are hesitant about the influenza vaccine<sup>3</sup>
- Little data on influenza vaccine hesitancy exists – especially with regard to influenza vaccination programs in hospitalized children
- Vaccinating children in the inpatient setting is an important opportunity for children who are at high risk for complications
- Inpatient influenza vaccination programs became even more important during the COVID-19 pandemic

## PURPOSE

We aimed to quantify child influenza vaccine coverage and identify factors associated with influenza vaccine hesitancy (VH) before and during the COVID-19 pandemic.

## METHODS

- Cross-sectional survey-based study
- Convenience sample of English- and Spanish-speaking primary caregivers of children aged 6 months – 18 years admitted to general inpatient pediatric services from December 11, 2019 to January 31, 2020, from December 8, 2020 to April 5, 2021, and again from November 30, 2021 to February 18, 2022
- Caregivers were excluded if they did not speak English or Spanish, if they had already enrolled in the study, if their child was in Child Protective Services custody, and if they were SARS-CoV-2 positive or had a SARS-CoV-2 PCR pending in order to protect study personnel
- A 21 item survey was designed by the study team based on content expertise and adaptations from existing literature
- We assessed VH using the validated Parent Attitudes about Childhood Vaccine (PACV) survey

- 917 and 913 caregivers completed the influenza survey and PACV
- In 2019-2020, 93.7% of parents answered that their children were up-to-date with their vaccines not including the influenza vaccine; 91% in 2020-2021, and 90.4% in 2021-2022
- 73.2%, 68%, and 70% of children received or were going to receive their influenza vaccine in 2019-2020, 2020-2021, and 2021-2022 respectively
- Based on PACV score, 13% of parents were vaccine hesitant in 2019-2020 vs. 17% in 2020-2021 vs. 19% in 2021-2022 (p=0.15)
- Fewer parents thought that influenza can be a dangerous infection in children and that otherwise healthy children can die from the flu, and fewer parents were scared of their child getting the flu after the pandemic (p<0.001).

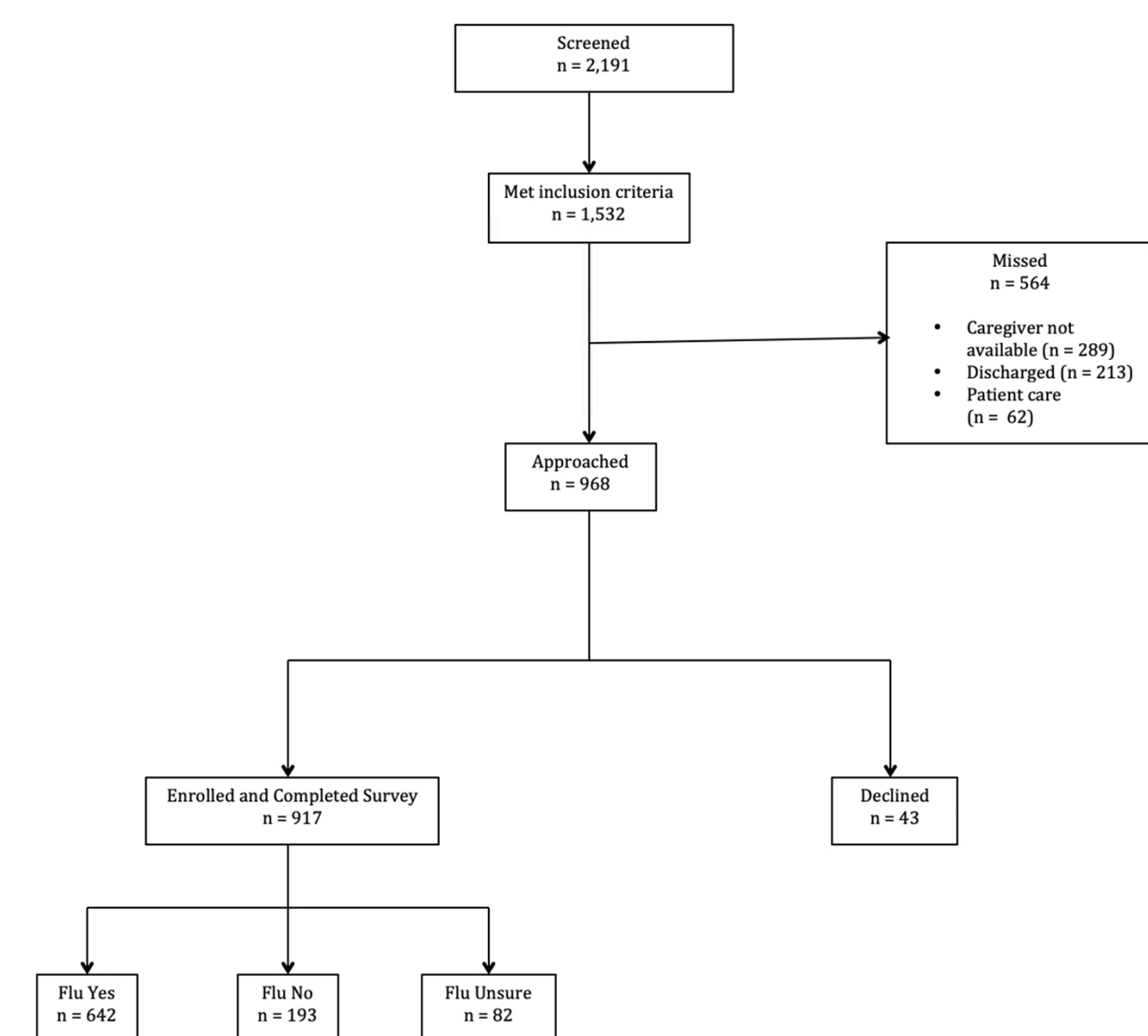


Fig 1: Participant flow chart from 2019-2022

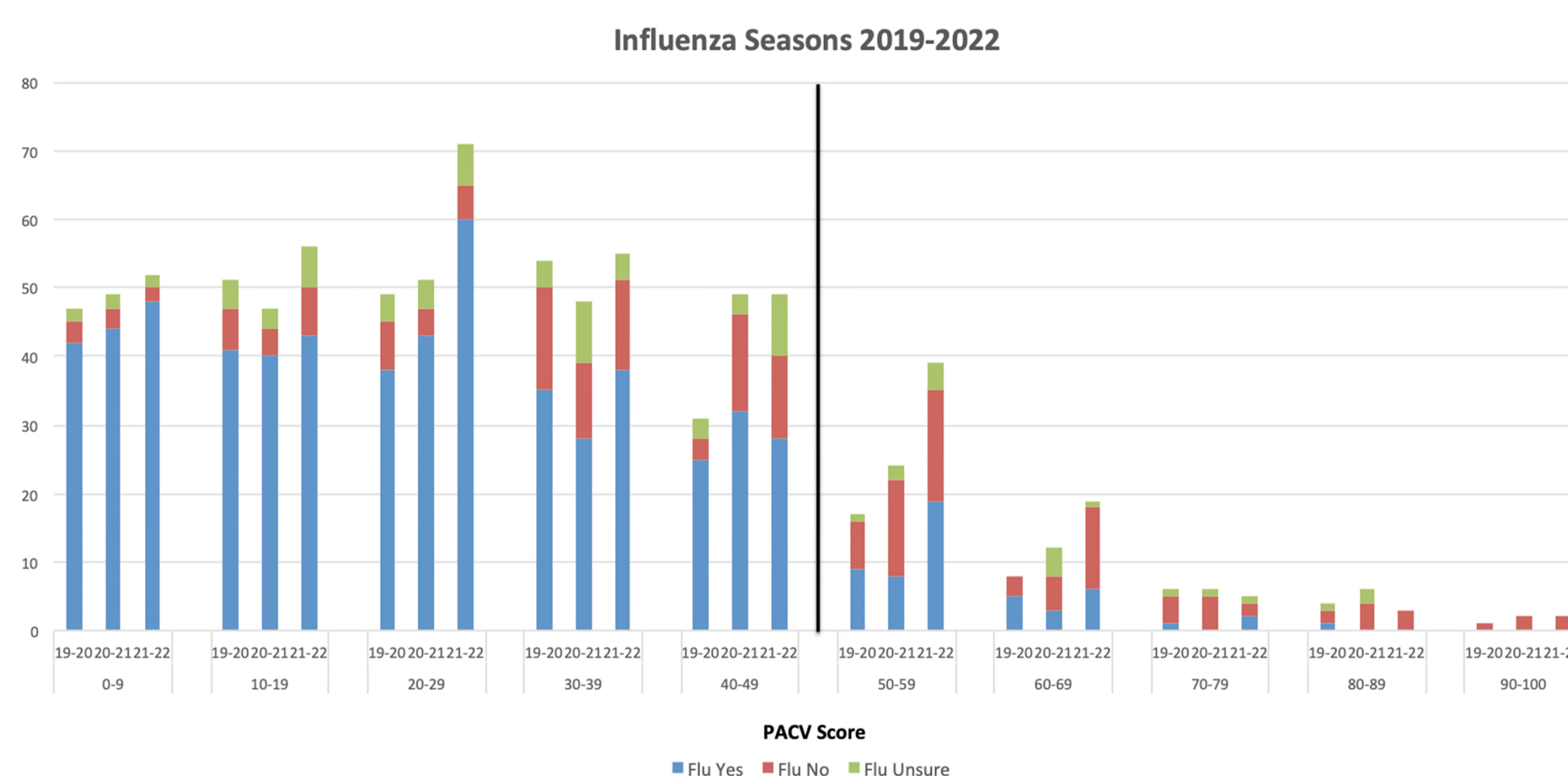


Fig 2: Intention to give influenza vaccine by PACV score during 2019-2020, 2020-2021, and 2021-2022 seasons

## RESULTS

Characteristic	Total n (%) N = 917	Caregivers of children who have received or will receive the influenza vaccine N (%) N = 642	Caregivers of children who will not receive the influenza vaccine N (%) N = 275	p-value
Reason for hospitalization <sup>a</sup>				
Pneumonia	89 (9.7)	68 (10.6)	21 (7.6)	0.17
Asthma	63 (6.9)	52 (8.1)	11 (4.0)	<b>0.03</b>
Bronchiolitis	76 (8.3)	61 (9.5)	15 (5.5)	0.04
Gastroenteritis	50 (5.5)	34 (5.3)	16 (5.8)	0.75
Other infection	404 (44.1)	271 (42.2)	133 (48.4)	0.09
Other non-infection	355 (38.7)	242 (37.7)	113 (41.1)	0.33
Sibling(s)				
Yes	750 (81.8)	521 (81.2)	229 (83.3)	
No	167 (18.2)	121 (18.8)	46 (16.7)	0.45
Household income				
\$30,000 or less	356 (39.0)	270 (42.3)	86 (31.4)	
\$30,001-50,000	160 (17.5)	108 (16.9)	52 (19.0)	
\$50,001-75,000	130 (14.2)	78 (12.2)	52 (19.0)	
\$75,001-or more	267 (29.2)	183 (28.6)	84 (30.7)	<b>&lt;0.01</b>
Race/ethnicity <sup>a</sup>				
White	326 (35.7)	212 (33.2)	114 (41.6)	0.09
Black or African American	180 (19.7)	114 (17.8)	66 (24.1)	<b>0.03</b>
Hispanic/Latino	404 (44.2)	306 (47.9)	98 (35.8)	<b>&lt;0.01</b>
Asian	55 (6.0)	50 (7.8)	5 (1.8)	<b>&lt;0.01</b>
Native Hawaiian or other Pacific Islander	2 (0.2)	2 (0.3)	0 (0)	>0.99
American Indian or Alaska Native	11 (1.2)	6 (0.9)	5 (1.8)	0.32
Other	22 (2.4)	12 (1.9)	10 (3.6)	0.11

<sup>a</sup>Parents could select more than one answer choice, percentages might not add up to 100%

Table 1: Demographics of Study Population

Item	Parent response	Total n (%) N = 917	Caregivers of children who have received or will receive the influenza vaccine N (%) N = 642	Caregivers of children who will not receive the influenza vaccine N (%) N = 275	p-value
I am scared of my child getting the flu shot	Strongly agree/agree	173 (18.9)	66 (10.3)	107 (38.9)	<b>&lt;0.01</b>
	I do not agree nor disagree	177 (19.3)	98 (15.3)	79 (28.7)	
	Strongly disagree/disagree	567 (61.8)	478 (74.5)	89 (32.4)	
I am able to openly discuss my concerns about the flu shot with my doctors	Strongly agree/agree	753 (82.1)	570 (88.8)	183 (66.5)	<b>&lt;0.01</b>
	I do not agree nor disagree	124 (13.5)	49 (7.6)	75 (27.3)	
	Strongly disagree/disagree	40 (4.4)	23 (3.6)	17 (6.2)	
Children should get the flu shot in the hospital before they are discharged home	Strongly agree/agree	311 (33.9)	284 (44.2)	27 (9.8)	<b>&lt;0.01</b>
	I do not agree nor disagree	361 (39.4)	261 (40.7)	100 (36.4)	
	Strongly disagree/disagree	245 (26.7)	97 (15.1)	148 (53.8)	

Table 2: Caregiver knowledge and attitudes about seasonal influenza vaccine

Item	2019-2020 N (%) N = 269	2020-2021 N (%) N = 295	2021-2022 N (%) N = 353	p-value	
Has your child or will your child receive the influenza vaccine this season	Yes	197 (73.2)	199 (67.5)	246 (69.7)	0.65
	No	52 (19.3)	67 (22.7)	74 (21.0)	
	Unsure	20 (7.4)	29 (9.8)	33 (9.3)	
PACV score	PACV score < 50	232 (86.6)	244 (83.0)	283 (80.6)	0.15
	PACV score ≥ 50	36 (13.4)	50 (17.0)	68 (19.4)	
The flu can be a dangerous infection in children	Strongly agree/agree	226 (84.0)	209 (70.8)	241 (68.3)	<b>&lt;0.01</b>
	I do not agree nor disagree	28 (10.4)	65 (22.0)	74 (21.0)	
	Strongly disagree/disagree	15 (5.6)	21 (7.1)	38 (10.8)	
I am scared of my child getting the flu	Strongly agree/agree	192 (71.4)	158 (53.6)	204 (57.8)	<b>&lt;0.01</b>
	I do not agree nor disagree	38 (14.1)	71 (24.1)	58 (16.4)	
	Strongly disagree/disagree	39 (14.5)	66 (22.4)	91 (25.8)	
You can get the flu from the flu shot	Strongly agree/agree	96 (35.7)	106 (35.9)	104 (29.5)	0.24
	I do not agree nor disagree	87 (32.3)	100 (33.9)	117 (33.1)	
	Strongly disagree/disagree	86 (32.0)	89 (30.2)	132 (37.4)	

Table 3. Comparison of study population, 2019-2020 versus 2020-2021 versus 2021-2022

## CONCLUSION

- Influenza vaccine uptake continues to be lower compared to routine childhood vaccines
- During the COVID-19 pandemic, caregivers were less concerned about influenza than pre-pandemic; misinformation about influenza persisted
- Decreased concern might explain, at least in part, why increased access did not translate into increased influenza vaccine uptake
- There was no significant difference comparing the 2019-20, 2020-21 and 2021-22 influenza seasons with regard to VH overall, but our results suggest a trend that may need continued monitoring
- Influenza VH is different from VH towards routine childhood vaccines
- Increased efforts, with strategies unique to the influenza vaccine, may be needed to educate caregivers about the importance of influenza immunization moving forward

## REFERENCES

- Hill, H.A., et al., Vaccination Coverage Among Children Aged 19-35 Months – United States, 2017. *MMWR Morb Mortal Wkly Rep.* 2018. 67(40): p. 1123-1128
- Walker, T.Y., et al., National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years – United States, 2018. *MMWR Morb Mortal Wkly Rep.* 2019. 68(33): p. 718-723
- Kempe A, Saville AW, Albertin C, et al. Parental Hesitancy About Routine Childhood and Influenza Vaccinations: A National Survey. *Pediatrics.* 2020;146(1)e20193852