

## **Preventing the Flu...Starring You!**

**Decreasing Missed  
Opportunities for  
Influenza  
Vaccination in the  
Pediatric Inpatient  
Setting**

**Dimple Patel, M.D. and Sarah Mahmood, M.D.  
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# Case Presentation

A 5-year old previously healthy male presents to the ED after two syncopal episodes. Upon arrival to the floor, he suffers from an additional episode of limpness and decreased responsiveness. He is transferred to PICU, where he becomes bradycardic and hypotensive during an LP requiring compressions, epinephrine, and intubation. He is found to have fulminant myocarditis secondary to Influenza B, which led to brain death and his passing 9 days later.

On chart review after ID consultation, he was found to not have received the seasonal flu vaccination that year.

# Influenza Vaccination

Annual influenza vaccination is recommended for all persons aged  $\geq 6$  months.

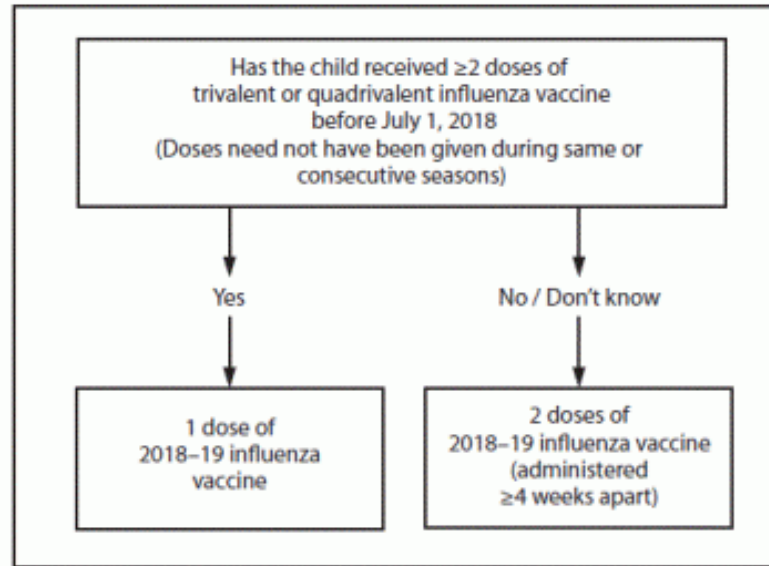


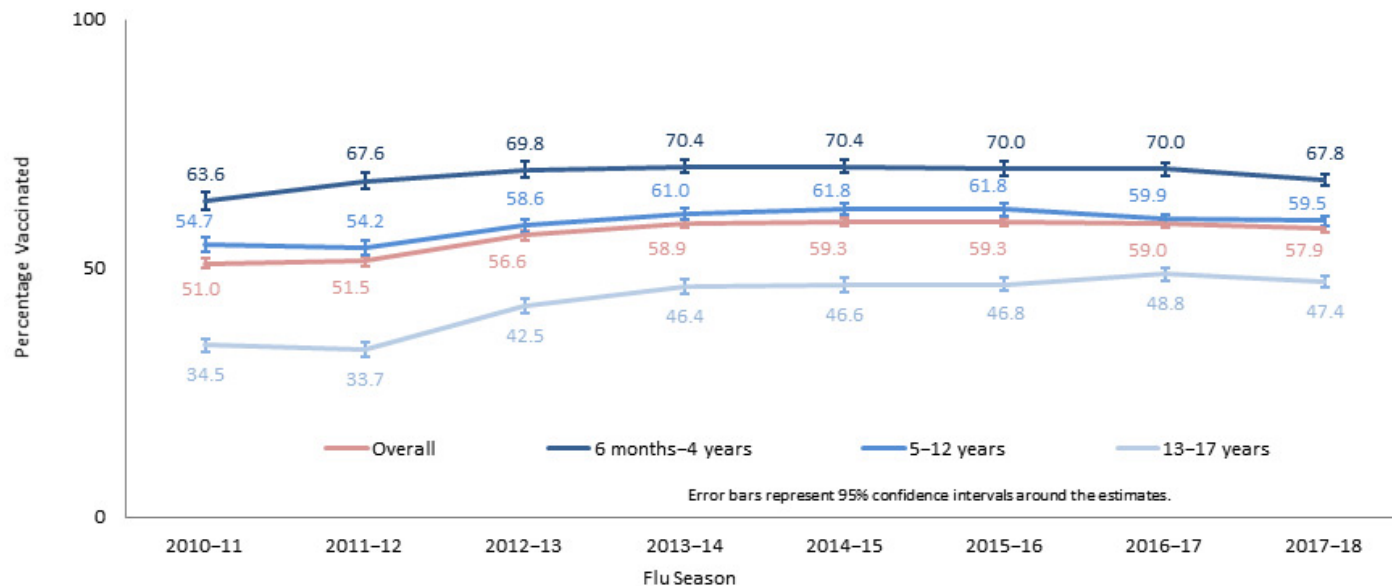
FIGURE. Influenza vaccine dosing algorithm for children aged 6 months through 8 years – Advisory Committee on Immunization Practices, United States, 2018–19 influenza season; <https://www.cdc.gov/mmwr/volumes/67/rr/rr6703a1.htm>

# Special Considerations

- 2-dose series needed for 6 months to 8 years
- OK to administer if history of allergic reaction (mild or severe) to egg, though should be closely monitored afterwards
- History of GBS within 6 weeks is a precaution for use
- Moderate or severe acute illness with or without fever is a general precaution
  
- Contraindications:
  - <6 months
  - History of severe allergic reaction to the flu vaccine or its components

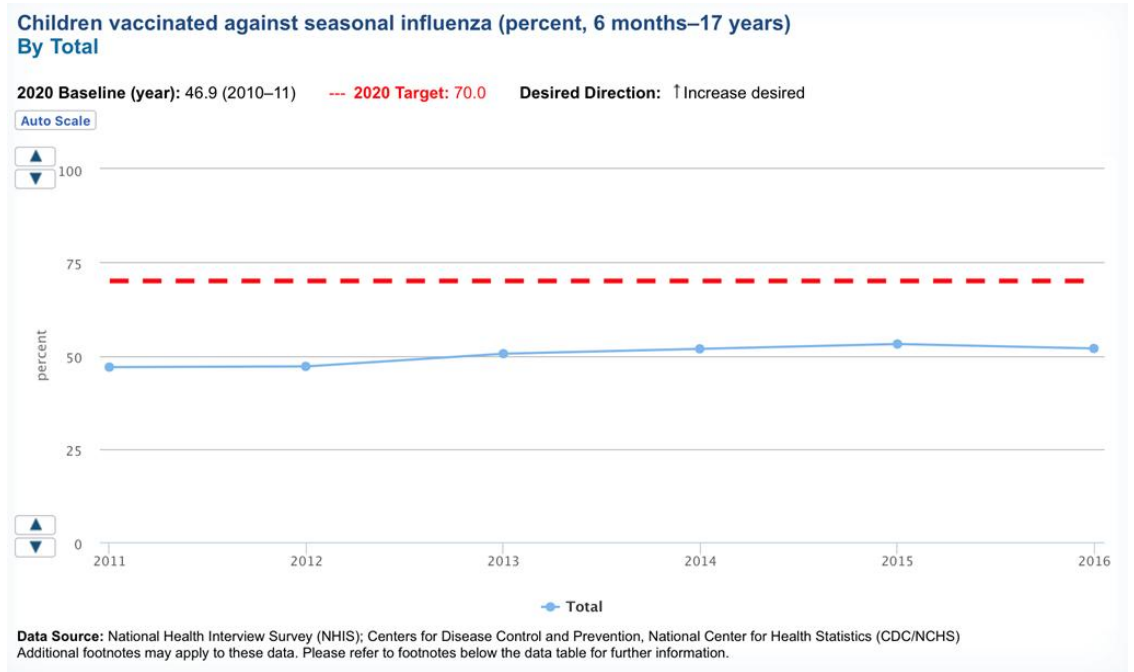
# Vaccination Rates by Age Group

Figure 1. Flu Vaccination Coverage by Age Group and Season, Children 6 Months—17 years, United States, 2010–2018



# Healthy People 2020 Goals

1. **IID-12.11:** Increase the % of children aged 6 months - 17 years who are vaccinated annually against seasonal influenza
2. **Target: 70%**



POPULATIONS	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
<b>TOTAL</b> <a href="#">View Chart</a>	46.9	47.1	50.5	51.8	53.1	51.9

<https://www.healthypeople.gov/2020/data/Chart/6359?category=1&by=Total&fips=-1>

# Flu Vaccination Locations

Reported Place of Influenza Vaccination by Age Group, Children 6 months through 17 years, United States,* National Immunization Survey-Flu (NIS-Flu), 2017-18 Influenza Season†															
Age Group	Unweighted Sample Size	Doctor's Office		Clinic or Health Center		Hospital		Health Department		Pharmacy		School		Other Place‡	
		%§	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
6 mos-17 yrs	64,082	66.8	±0.7	16.2	±0.6	4.3	±0.3	1.9	±0.2	5.5	±0.3	3.8	±0.2	1.5	±0.2
6-23 mos	10,190	76.5	±1.7	15.4	±1.5	5.1	±0.8	1.4	±0.3	0.6	±0.3	---	---	1.0	±0.3
2-4 yrs	13,476	75.1	±1.4	15.2	±1.1	4.8	±0.8	2.1	±0.4	1.6	±0.3	0.5	±0.1	0.9	±0.2
5-12 yrs	27,171	66.0	±1.0	16.1	±0.8	4.0	±0.4	1.8	±0.2	5.3	±0.4	5.3	±0.4	1.5	±0.2
13-17 yrs	13,245	58.3	±1.5	17.5	±1.3	4.3	±0.7	2.2	±0.5	10.9	±0.9	4.9	±0.6	1.9	±0.4
Abbreviation: CI = Confidence Interval															
* Excludes U.S territories.															
† Estimates based on interviews conducted October 2017 through June 2018 and reported vaccinations from July 2017 through May 2018.															
‡ "Other place" includes workplace, other non-medical place, and other medical place.															
§ Percentage of vaccinated children who received their vaccination at this place. Percentages are weighted to the U.S. population. Children with missing place of vaccination are excluded from the denominator.															
Estimates are suppressed because sample size is <30.															

- Hospitals make up only 4-5% of encounters for immunization in 2017-2018, with PCP offices and clinics / health centers making up the majority

# Missed Inpatient Opportunities

- Unavailable records or inconvenient access to CAIR
- Parents unsure if received vaccine this season
- Child is or was recently sick and “this isn’t the right time”
- Families with misconceptions regarding vaccination
- Staff concerns re: fevers prior to discharge, confounding clinical picture

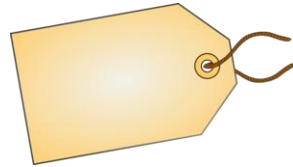


# Inpatient Influenza Vaccination

- **Vaccination during hospitalization is safe!**
  - Mayo Clinic study demonstrated no increased % of readmissions, outpatient visits, fever, or clinical evaluations for infection with vaccinated group compared to controls ([https://mayoclinicproceedings.org/article/S0025-6196\(18\)30943-1/fulltext](https://mayoclinicproceedings.org/article/S0025-6196(18)30943-1/fulltext))
  
- **Missed Opportunities**
  - Children's Hospital of Colorado Study: Among 322 patients hospitalized with influenza, 199 (61%) were undervaccinated, 83 of 199 (42%) had at least 1 missed opportunity for influenza vaccination (<http://hosppeds.aappublications.org/content/6/9/513>)

# Project Description

- Over a three-month period, we trialed 3 different 1-month long interventions targeted at different members of the healthcare team to decrease missed opportunities for influenza vaccination in the pediatric non-ICU setting.



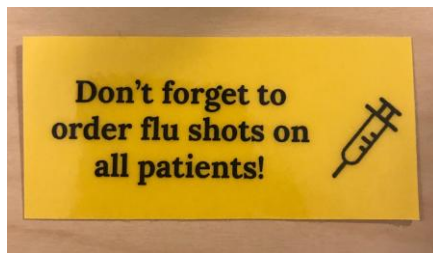
- Number vaccinations administered for all admitted Medical/Surgical patients were calculated at the end of each monthly intervention and compared.

# Interventions

## Chief's Email:

It's **FLU** season! Annual influenza vaccination is the most effective way to prevent the flu and its secondary complications. Inpatient hospitalizations are a great way to get vaccinated, but these opportunities are often missed. Remember to ask **EVERY** patient on their flu **VACCINATION STATUS** on admission and discharge to get them **UP TO DATE!**

## Computer Tags:



## Nursing Huddle Reminder:

It's flu season! Please remember to ask all patients and families regarding their flu vaccine status. Send us a text page or find us in person before discharge. We want to take advantage of every opportunity to vaccinate our patients!

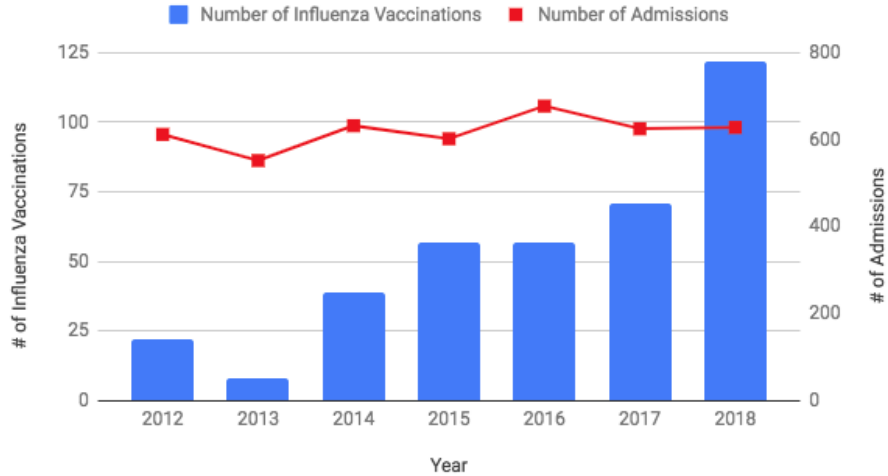
# Setting (CHOC)

Children's Hospital of Orange County (CHOC) in Orange, CA is an academic tertiary care center with 316 beds, of which 82 are Medical/Surgical beds. CHOC serves a diverse racial and socioeconomic patient population.

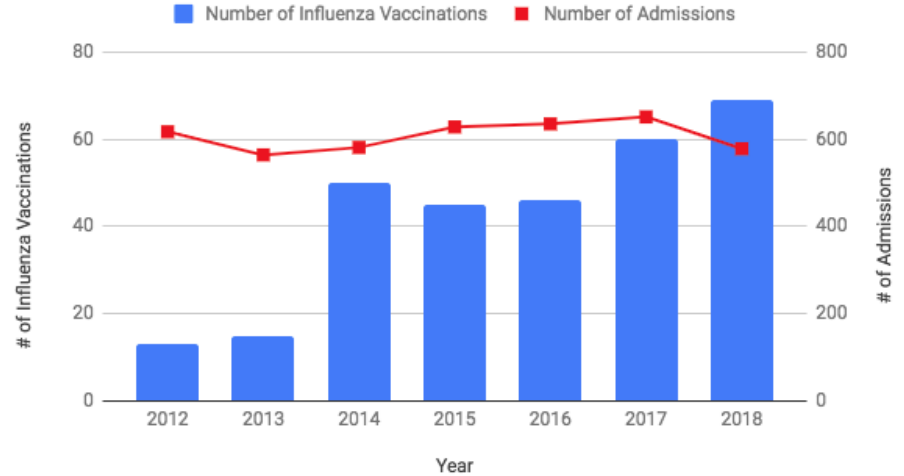


# Results

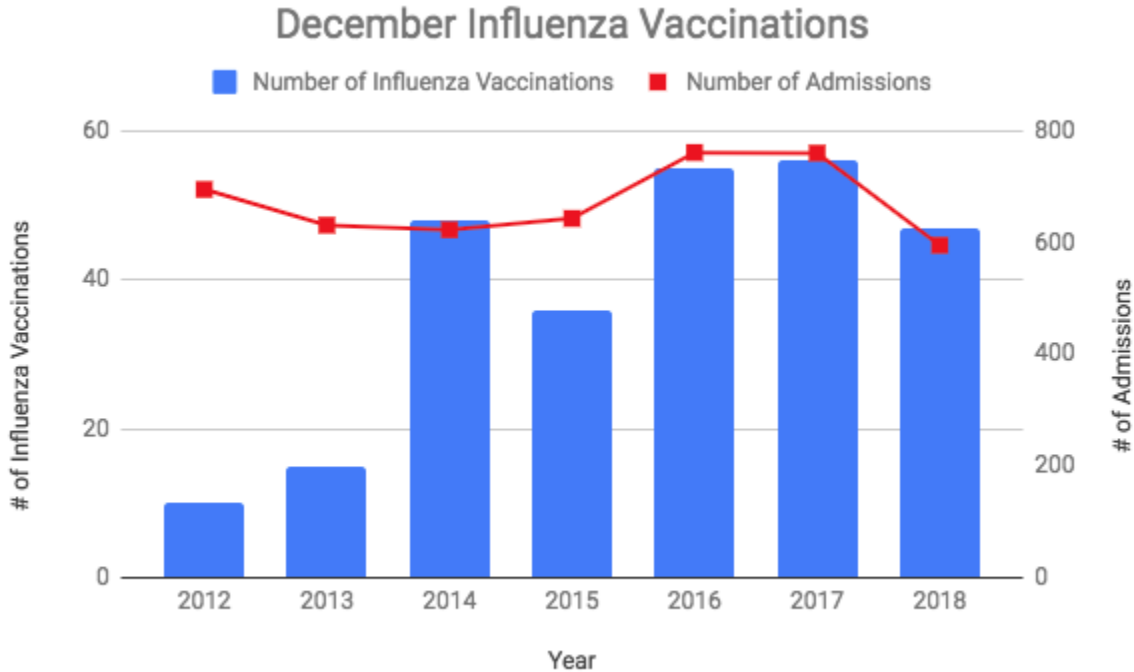
## October Influenza Vaccinations



## November Influenza Vaccinations



# Results



# Limitations

## Limitations To Data Analysis:

- Unclear if patients have received influenza vaccination prior to hospitalization
- As the season progresses, more patients are vaccinated, lessening the impact of an intervention
- No documentation of refusals / true contraindications vs. parental hesitancy
- Flu shot not ordered on admission

## Limitations To Study:

- Not everyone reads the emails
- Unclear how many nurses were at huddle

# Takeaways

- Hospitalization (especially the pediatric inpatient setting) is an oft-forgotten and underutilized opportunity for influenza vaccination
- Multiple barriers re: parental and staff hesitancy still exist
- Low-cost interventions targeting physician / nursing / technology can be effective in reducing missed opportunities



# Next Steps

- CAIR: Unidirectional vs. bidirectional
- EMR reminders (and integration with immunization registries)
- Continuing to address common misconceptions with parents and staff (do not need to wait until last hour of discharge to administer vaccine)

# Thank You

- We'd like to thank ...
  - Our advisors Dr. Jasjit Singh and Dr. Rebecca Barros for their guidance and mentorship
  - Tuan Tran, PharmD for assistance in obtaining data re: vaccination rates at CHOC
  - Kyoto Ide for help in gathering admission data at CHOC
  - Wendi Gornick for data collection and nursing intervention implementation

# References

- CDC: Flu Immunization Guidelines  
(<https://www.cdc.gov/flu/consumer/vaccinations.htm>)
- CDC: FluVaxView (<https://www.cdc.gov/flu/fluvoxview/references.htm>)
- Healthy Goals 2020  
(<https://www.healthypeople.gov/2020/data/Chart/6359?category=1&by=Total&fips=-1>)