

# Using an IIS to Build Customized Recommendations for Ordering Flu Vaccine

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**BACKGROUND**

# Citywide Immunization Registry

- The Citywide Immunization Registry (CIR) is the Immunization Information System for New York City (NYC)
  - Began in 1997
  - Registry contains > 6.5 million patients
    - > 88 million immunizations
  - Mandatory reporting of immunizations for children <19 years
  - Reporting for adults ≥19 years requires consent
- Methods of reporting to CIR include:
  - Non-standard batch file transfer
  - Online Registry interface (OLR)
  - HL7 Web service

# NYC's Vaccines for Children Program

- NYC's Vaccines for Children (VFC) program has >1,430 enrolled providers
  - Comprises 81% of all pediatric provider sites in NYC
  - 74% of children in NYC aged 0-18 years are eligible
  - NYC distributes > 3 million doses of VFC vaccine annually
    - Valued at > \$140 million
- All VFC vaccines are ordered through CIR's Online Ordering Tool
- VFC vaccine distribution is linked to CIR reporting
  - Incentivizes providers to accurately report VFC vaccine usage

# Flu Vaccine Distribution in NYC

NYC pre-books vaccine from CDC in February

Providers order flu dose quantities for entire season in August

- Can revise their order throughout the season
- Providers may not specify brands for flu vaccine

Providers pre-book vaccine doses by age group and type

- 6-35 months injectable
- 3-18 years injectable
- FluMist (previous seasons)

Partial orders are shipped throughout the season

- Ensures rapid distribution of vaccine to all providers
- Ensures adequate storage is available for flu vaccine

# Problem: Flu Vaccine Coverage in NYC I

- According to CIR estimates, NYC's overall flu coverage falls below Healthy People 2020 flu vaccine coverage goal of 70%

	6-59 months	5-8 years	9-18 years
2014-2015*	67%	50%	34%
2015-2016*	69%	51%	35%

*\*As of the end of each season (June 30)*

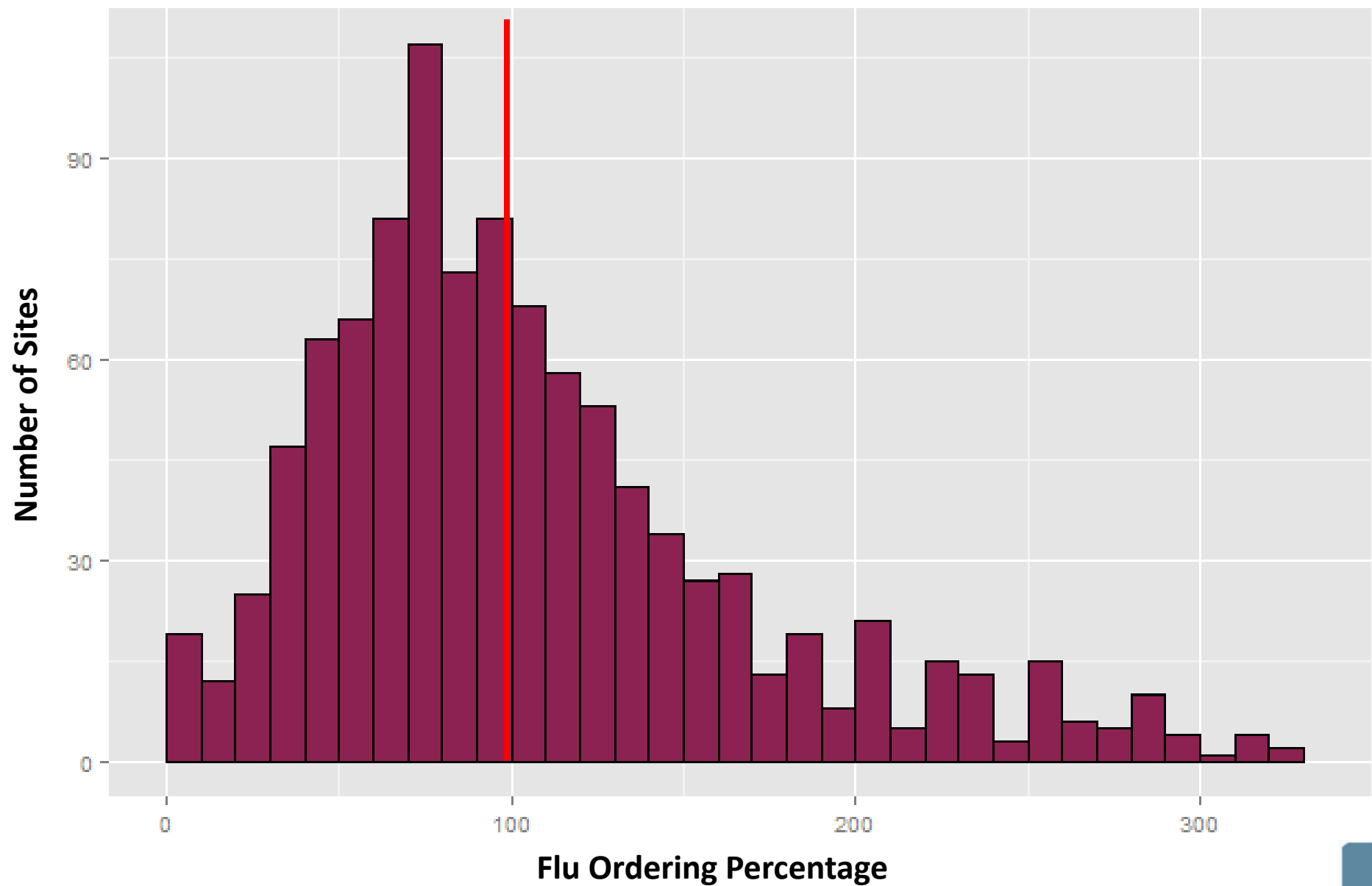
# Problem: Flu Vaccine Coverage in NYC II

- In 2015 an analysis using CIR reporting data and VFC flu vaccine order data was performed
- Examined overall flu vaccine ordering distribution for sites relative to their total VFC-eligible population
  - 2013-2014 data
  - Created and measured flu order percentage variable

$$\text{Flu Order Percentage} = \frac{\text{Total Flu Vaccine Doses Distributed}}{\text{Total VFC Eligible Population}} \times 100$$

- We found that many VFC sites are not ordering enough flu vaccine to provide coverage for their entire eligible population

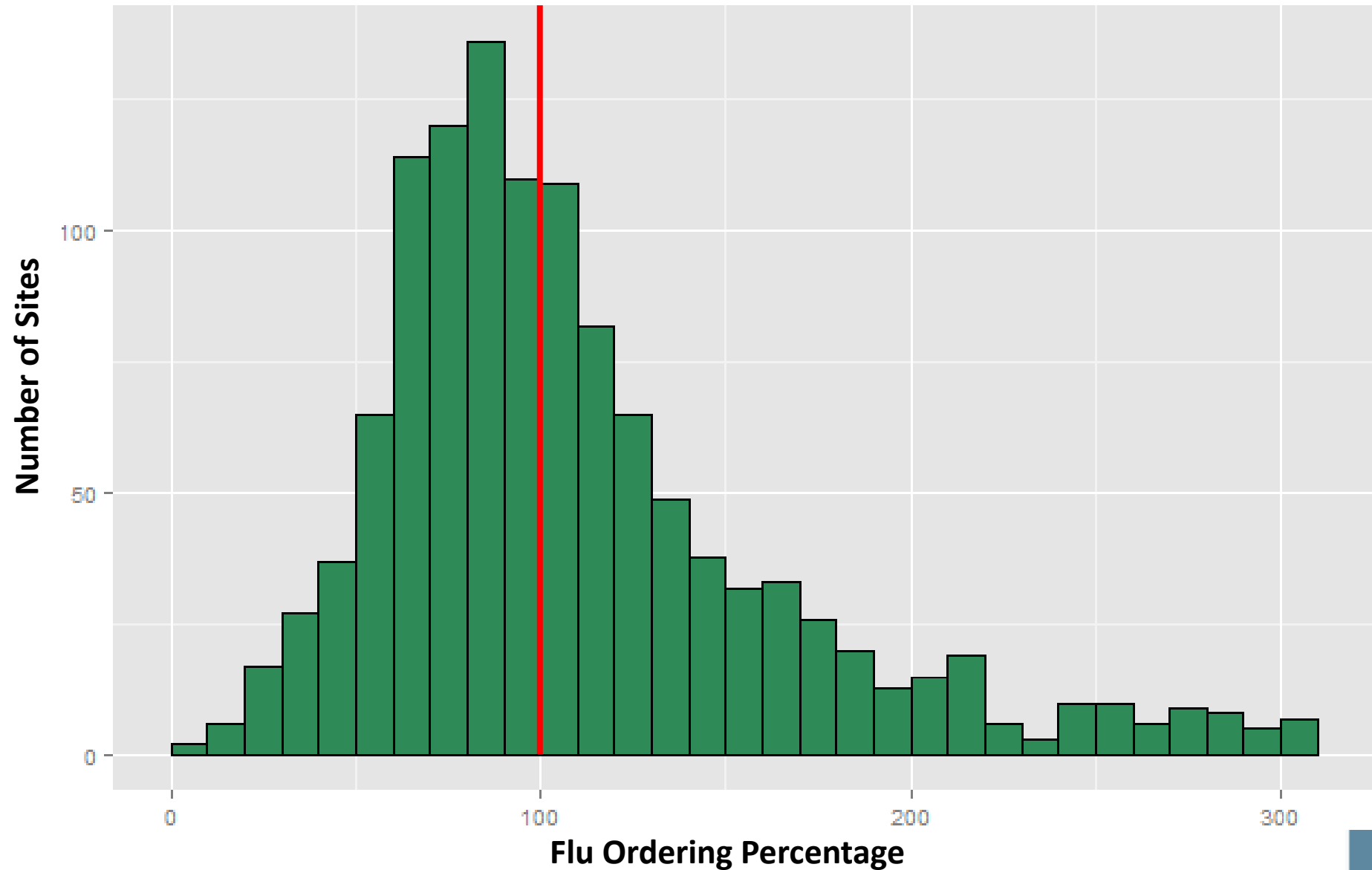
# Flu Order Percentage: 6-35 Months Old



\*(6-35 Month Injectables)\*100/(VFC Eligible Population 0-35 Months Old)



# Flu Ordering Percentage: 3-18 Years Old



\*(3-18 Yr Injectables + Intranasals)\*100/(VFC Eligible Population 3-18 Years Old)

# Previous Interventions

- In an effort to address this disparity, various strategies were used to encourage providers to order more seasonal flu vaccine
- 2014-2015
  - Displayed quantity of flu doses shipped the previous season
- 2015-2016
  - Provided VFC-eligible patient population figures for each site

# 2016-2017 Season Strategy

- The seasonal influenza module *recommends* specific quantities of flu vaccine based on CIR-reported VFC-eligible population estimates
- NYC's VFC vaccine Online Ordering Tool recommends doses
  - Modeled the flu ordering module on this framework
  - Based on reporting

# **METHODS**

# Methods Overview

- To provide accurate recommendations for VFC sites we had to:
  - Step 1: Determine each provider's VFC-eligible population
  - Step 2: Determine number of doses needed for those VFC-eligible patients
  - Step 3: Set flu coverage goals
  - Step 4: Modify flu pre-book screen in the OLR

# Patient Population per Provider

- Created a dataset of all patients who received at least one VFC-funded shot from 7/01/2015-6/30/2016
- Each patient was attributed to the facility where they received their last VFC-funded shot
- For each facility the patient population was broken down by age

# Calculate the Number of Doses Needed for all VFC-eligible Patients

## Dose 1

- All patients need at least 1 dose for the season

## Dose 2

- We estimated the percent of patients under 9 years needing a second dose based on published sentinel site data\*
  - 80% of 6-23 month-olds
  - 40% of 2-8 year-olds

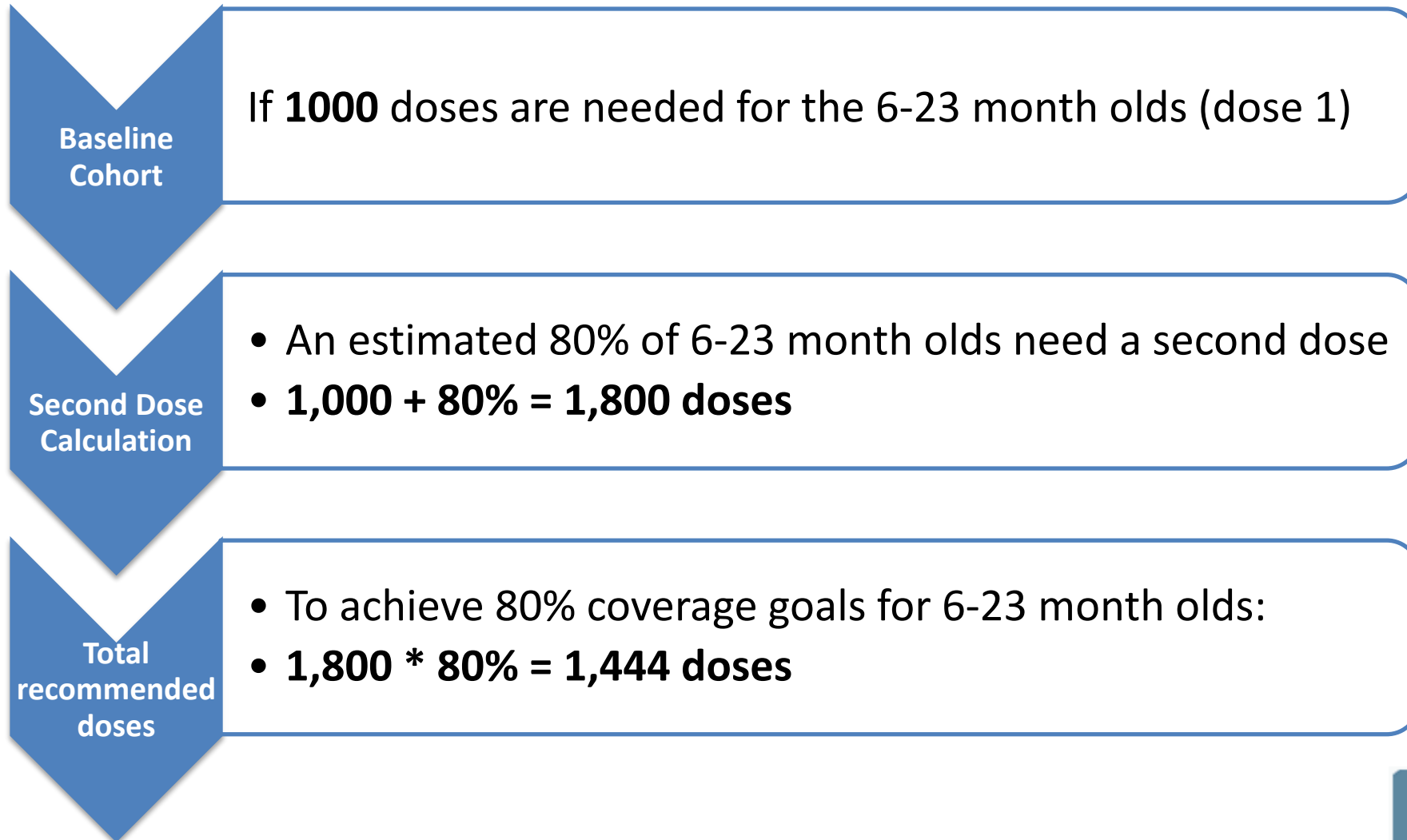
*\*Lin, X., Fiebelkorn, A. P., and Pabst, L. J. Trends in compliance with two-dose influenza vaccine recommendations in children aged 6 months through 8 years, 2010-2015\**

# Flu Coverage Goals

- Set coverage goals
  - 80% of 6-35 month olds
  - 60% of 3-18 year olds
- For VFC-eligible patients at 1,356 sites in NYC we ultimately recommended
  - 6-35 month olds: 151,240 doses
  - 3-18 year olds: 698,880 doses



# Dose Recommendation Calculation Example



# Flu Pre-book Screen Update

- Display recommended doses by age group
- Give provider feedback on requested quantities
  - Order is less than recommended
  - Order total okay
  - Order exceeds recommended
- Intended as a guide to help ensure that providers are pre-booking enough vaccine for the entire season

# Pre-book Influenza Vaccine Screen

Influenza Vaccine	Description
6 - 35 months Injectable	You may receive preservative-free 0.25 ml pre-filled syringes or multi-dose vials (contains preservative). We will only ship multi-dose vials for this age group if preservative-free vaccine is not available.
3 - 18 years Injectable	You may receive 0.5 ml pre-filled syringes or single-dose vials (both of which are preservative-free) or multi-dose vials (contains preservative).

Age	Influenza Vaccine	Enter your Pre-booked Doses	Total Recommended Quantity by Dose for 2016-17 Season	Quantity Evaluation
6 - 35 months	Injectable	<input type="text" value="860"/>	860	Order total okay
3 - 18 years	Injectable	<input type="text" value="3700"/>	3,730	Order is less than recommended
Total		<input type="text" value="4,560"/>	4,590	

\* Required

Submit →

(Clicking Submit will place your order.)

# RESULTS

# Influenza Vaccine Ordering Behavior

## 6-35 Months

As of March 06, 2017

Ordering Behavior	6-35 months Number of Sites (% of total)	Doses Recommended	Doses Ordered (% of total recommended)
Followed Recommendation	504 (47%)	46,860	46,860 (100%)
Ordered More Than the Recommendation	437 (41%)	74,610	115,940 (155%)
Ordered Less Than the Recommendation	124 (12%)	27,070	18,980 (70%)
Total	1,065 (100%)	148,540	181,780

# Influenza Vaccine Ordering Behavior

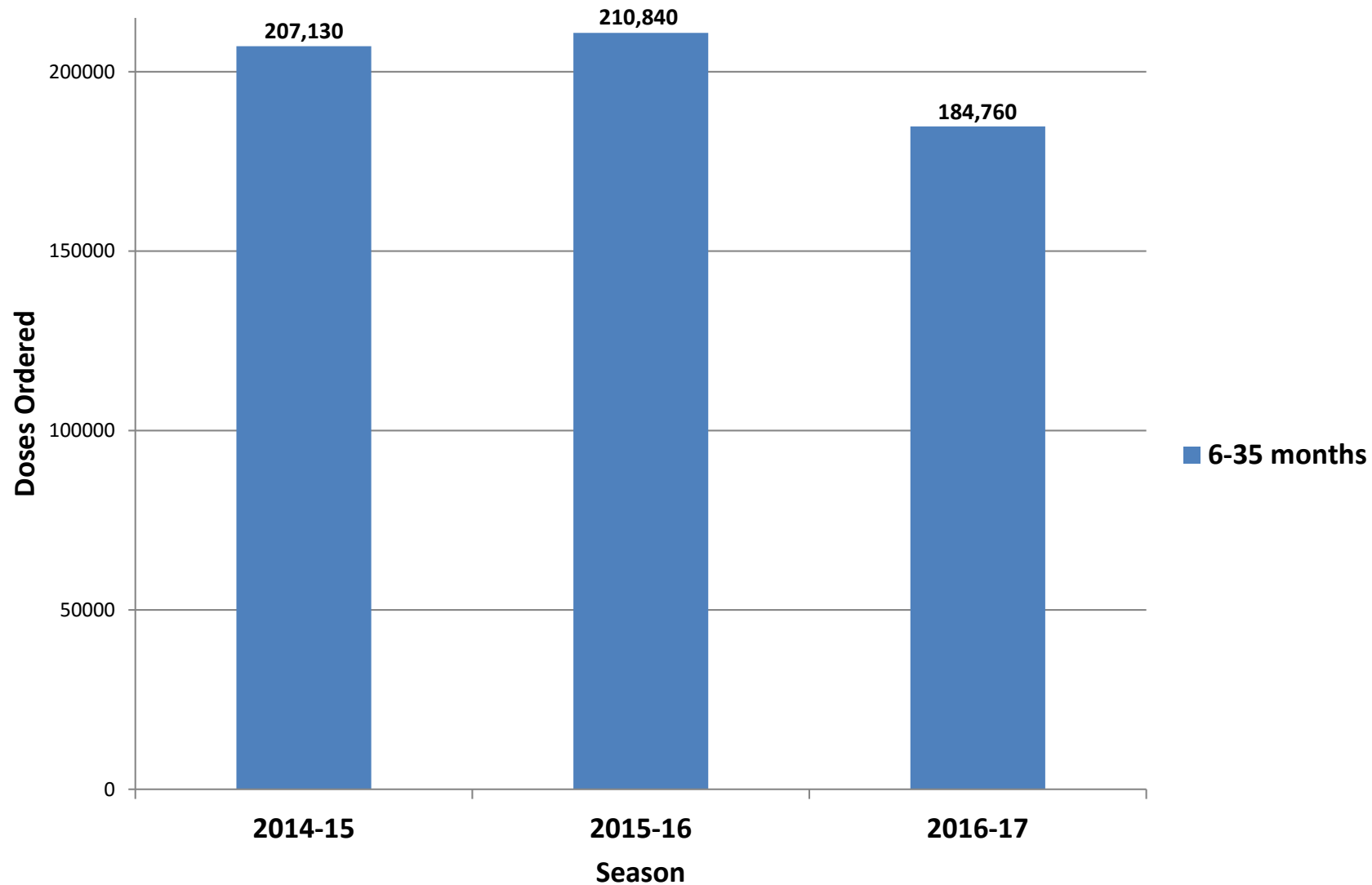
## 3-18 Years

As of March 06, 2017

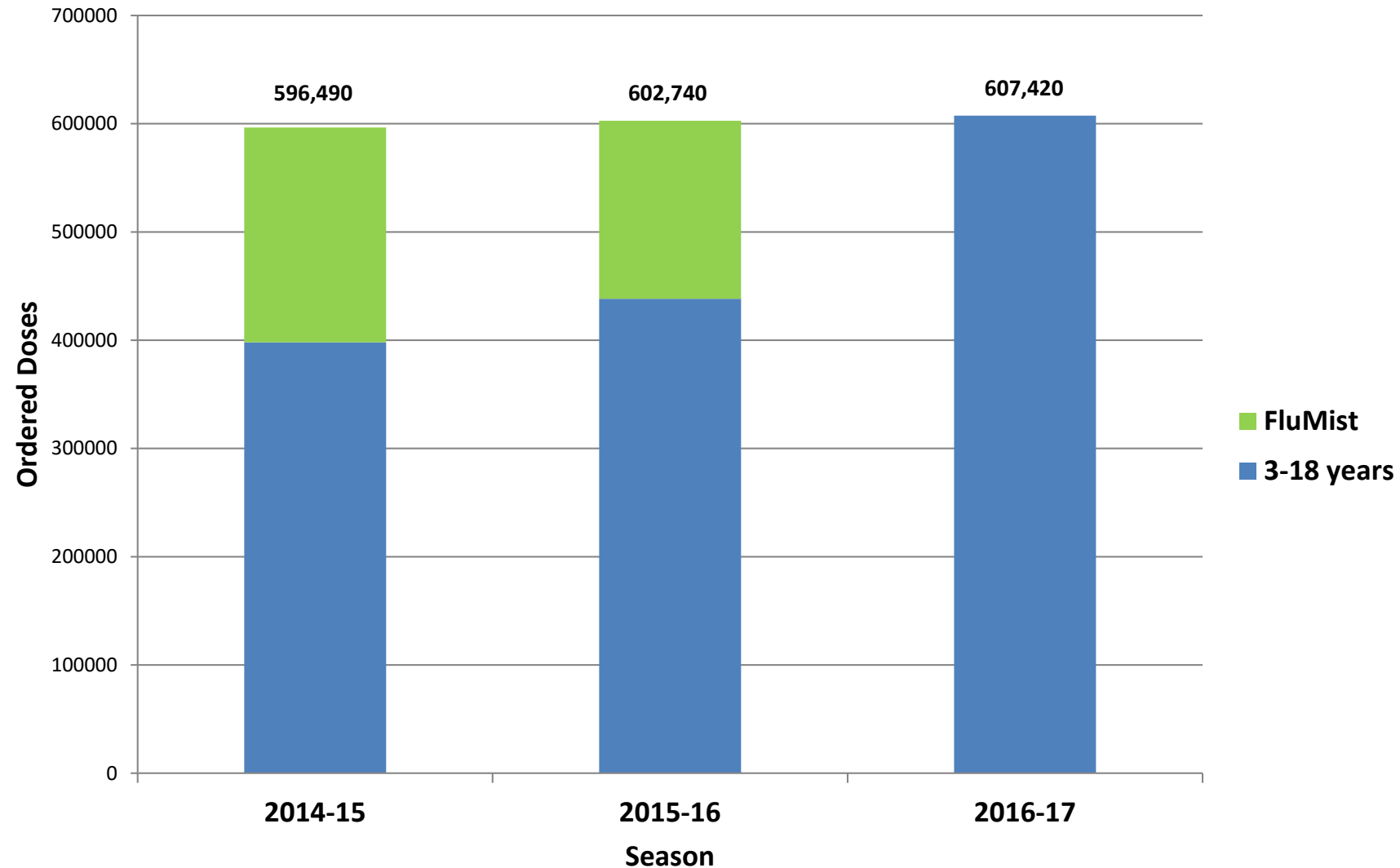
Ordering Behavior	3-18 years Number of Sites (% of total)	Doses Recommended	Doses Ordered (% of total recommended)
Followed Recommendation	501 (39%)	205,350	205,350 (100%)
Ordered More Than the Recommendation	314 (25%)	109,220	139,700 (128%)
Ordered Less Than the Recommendation	467 (36%)	372,560	245,060 (66%)
Total	1,282 (100%)	687,130	590,110

# Flu Doses Ordered 6-35 Months

## 2014-2017



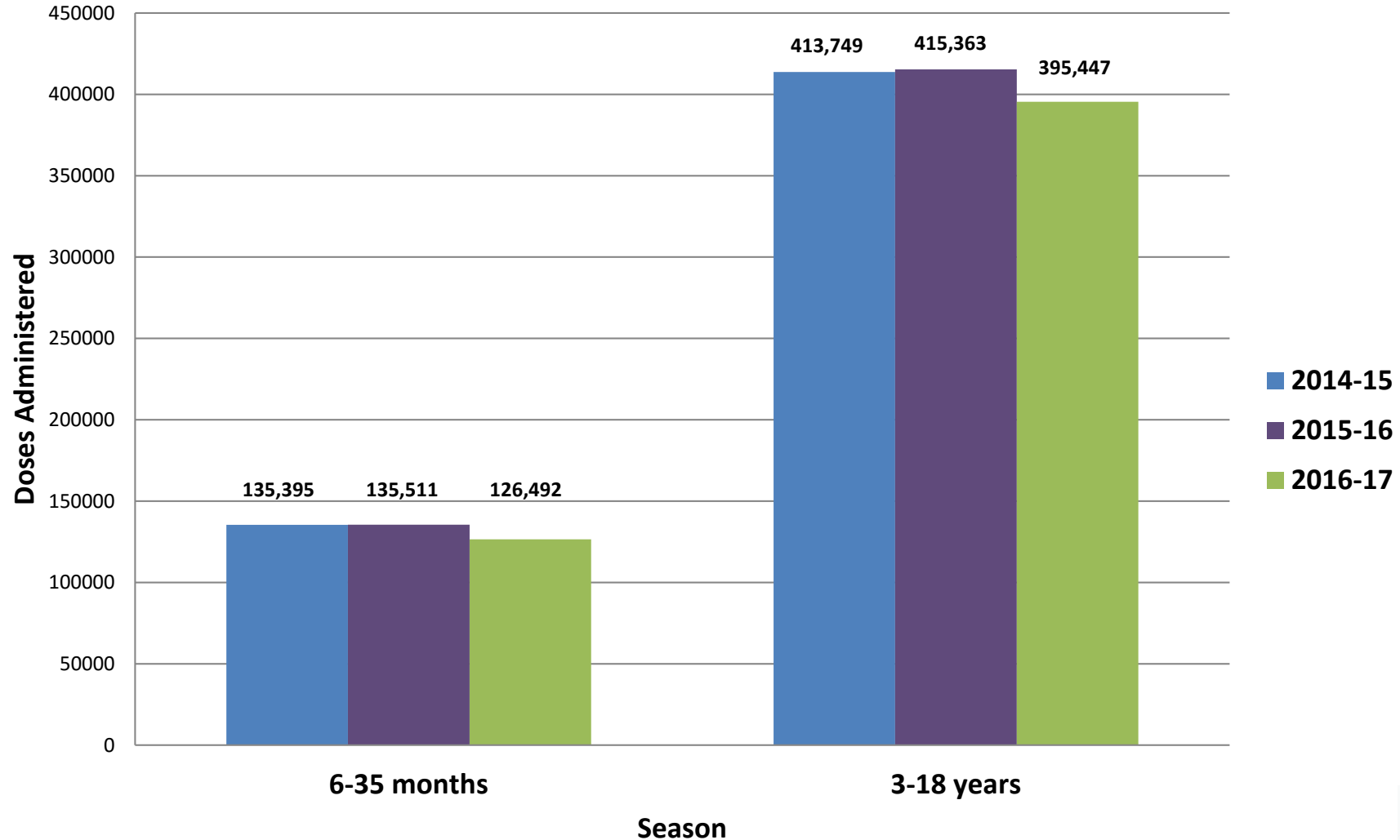
# Flu Doses Ordered 3-18 Years 2014-2017





# Flu Doses Administered by Season

## 2014-2017



*\*As of March 15 of each season*

# Coverage

- Flu coverage in NYC has decreased

	2015-16 Season	2016-17 Season	Difference (Percentage Points)
6-59 months	64.1%	57.3%	-6.8
5-8 years	48.2%	45.4%	-2.8
9-18 years	33.8%	32.9%	-0.9

*\*As of March 31 for the current and previous season*

# CONCLUSION

# Possible Reasons for Lower Uptake

- 2014-15 season: NYC passed mandate requiring children to get flu vaccine to attend pre-school
  - Mandate was suspended December 2015
  - Flu vaccine uptake declined among 3-4 year olds once suspended
- Parental hesitancy to get vaccine
  - Concerns about efficacy and side effects
- FluMist (LAIV) not recommended for current season because of lower than expected vaccine effectiveness
  - Media attention may have affected uptake/coverage

# Limitations

- There may be underreporting of flu vaccine administration
- Flu vaccination is ongoing and coverage will likely change

# Conclusion

- We implemented a new approach to increase flu vaccine distribution and coverage
- Most providers followed or exceeded recommendations:
  - 88% for 6-35 month age group
  - 64% for 3-18 year age group
- However, there was no increase in doses administered or in coverage

# Next Steps

- Continue to track:
  - Recommended doses
  - Ordered doses
  - Administered doses
- Examine flu vaccine return quantities
- Compare flu vaccine coverage by provider
  - Doses ordered 2016-17 compared to 2015-16 season
  - Doses ordered versus reported
- Evaluate current flu vaccine recommendation algorithm to determine if changes are needed for 2017-18 season

# Thank you!

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