

Pediatric Influenza: **what you need to know about testing, treatment & prophylaxis**

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Make Small CHOICES, expect BIG things.

BUNCOMBE COUNTY
HEALTH & HUMAN SERVICES
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Learning Objectives

- Understand the basic epidemiology of pediatric influenza and influenza-associated pediatric deaths
- Identify signs/symptoms of pediatric influenza
- Understand the use and limitations of influenza testing
- Understand the use of antiviral medications for the treatment and prevention of pediatric influenza

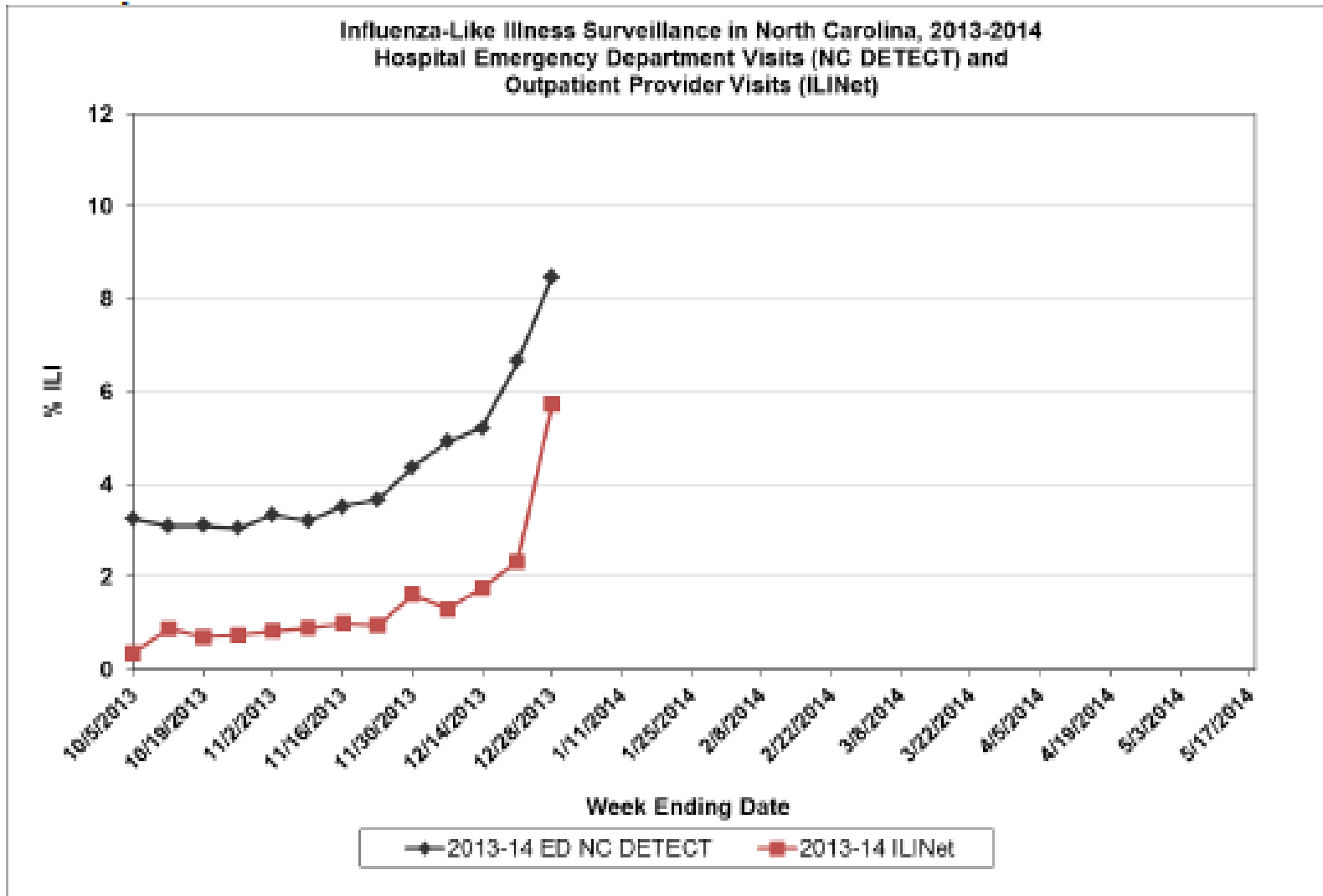
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UPDATE ON CURRENT FLU SEASON

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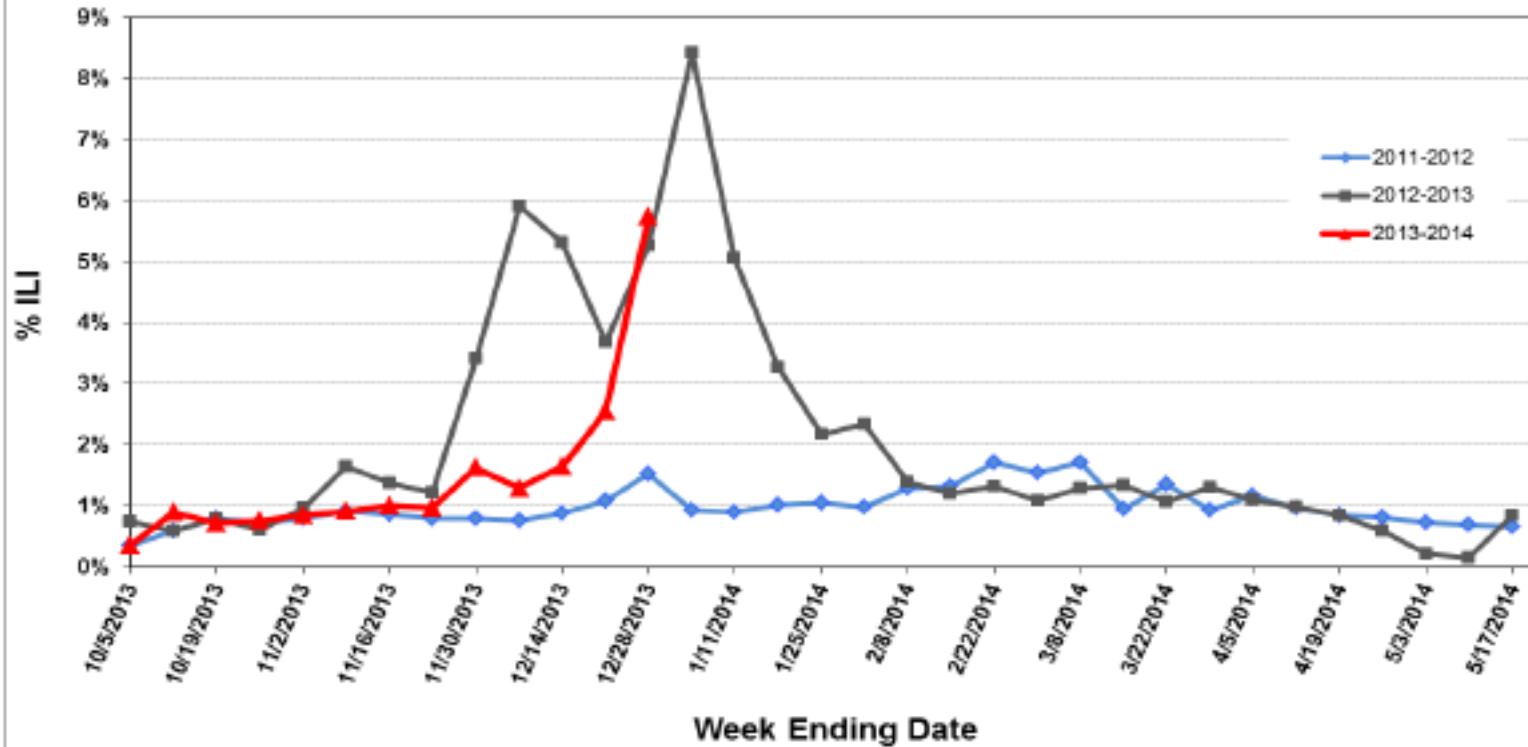
Courtesy of Anita Valiani, NC DHHS

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INFLUENZA SURVEILLANCE, NC 2011-2013

Influenza-Like Illness in ILINet Outpatient Visits, as of December 28, 2013



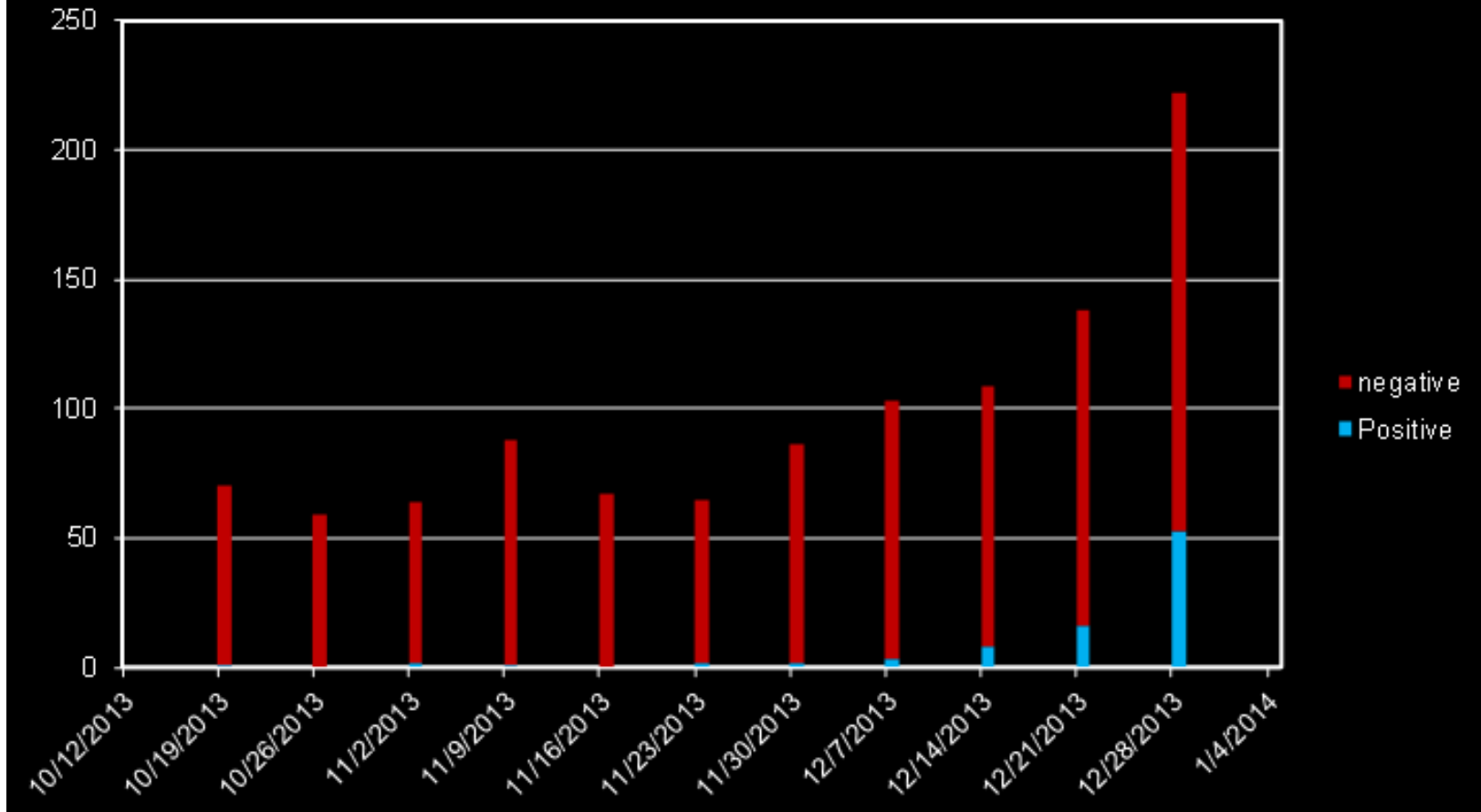
Note: Week ending displayed is for 2013–2014 influenza season. Flu seasons for previous years may have different week ending dates, but these only vary by a few days.

Courtesy of Anita Valiani, NC DHHS

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Number of Influenza Tests Ordered and Number of Positive Results (A and B) by Week



For Mission Health System

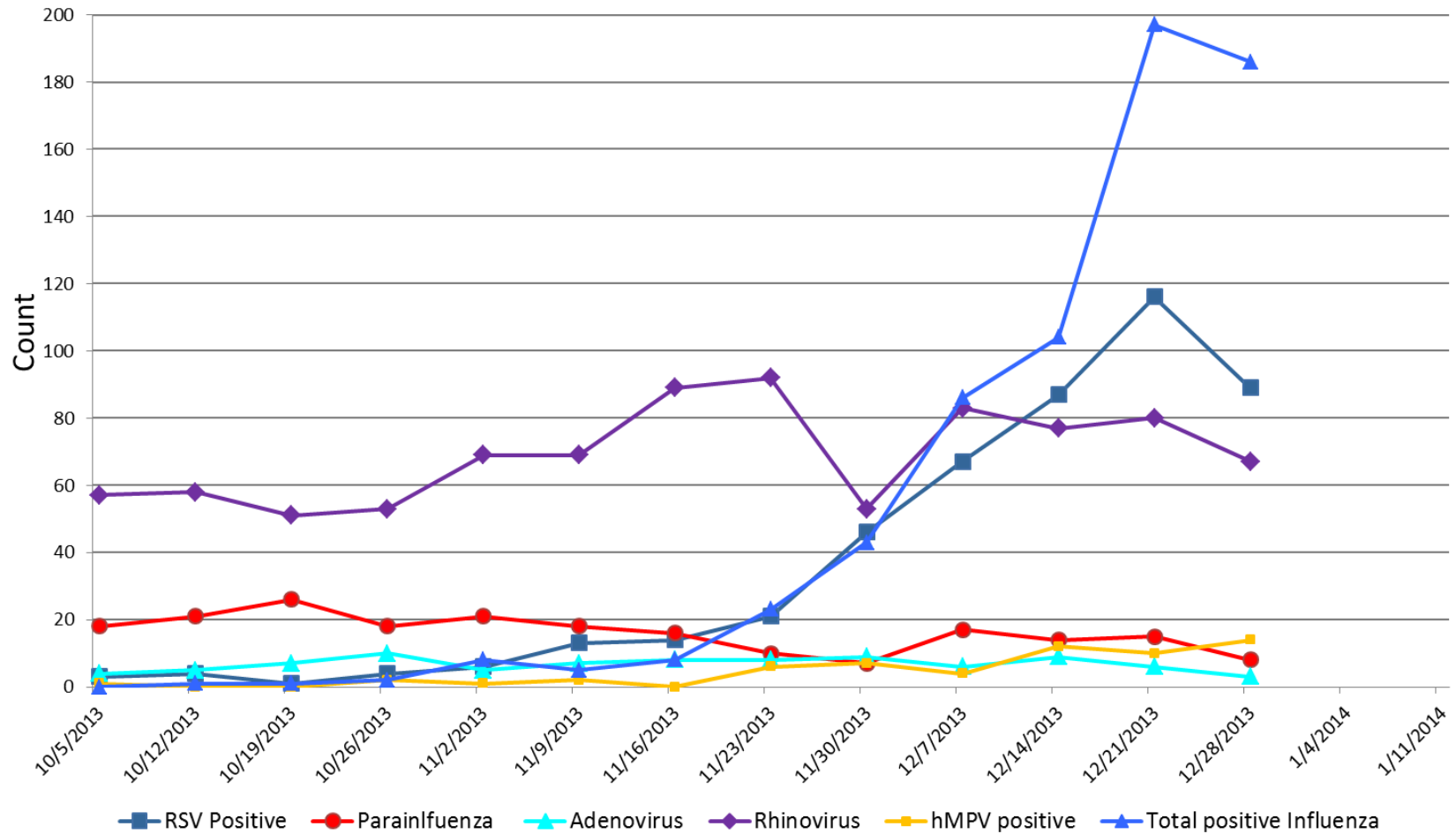
Courtesy of Dr. David Buhner, PHE

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PHE Surveillance: Positive Respiratory Virus Test Results by Week

Data source: NC DETECT

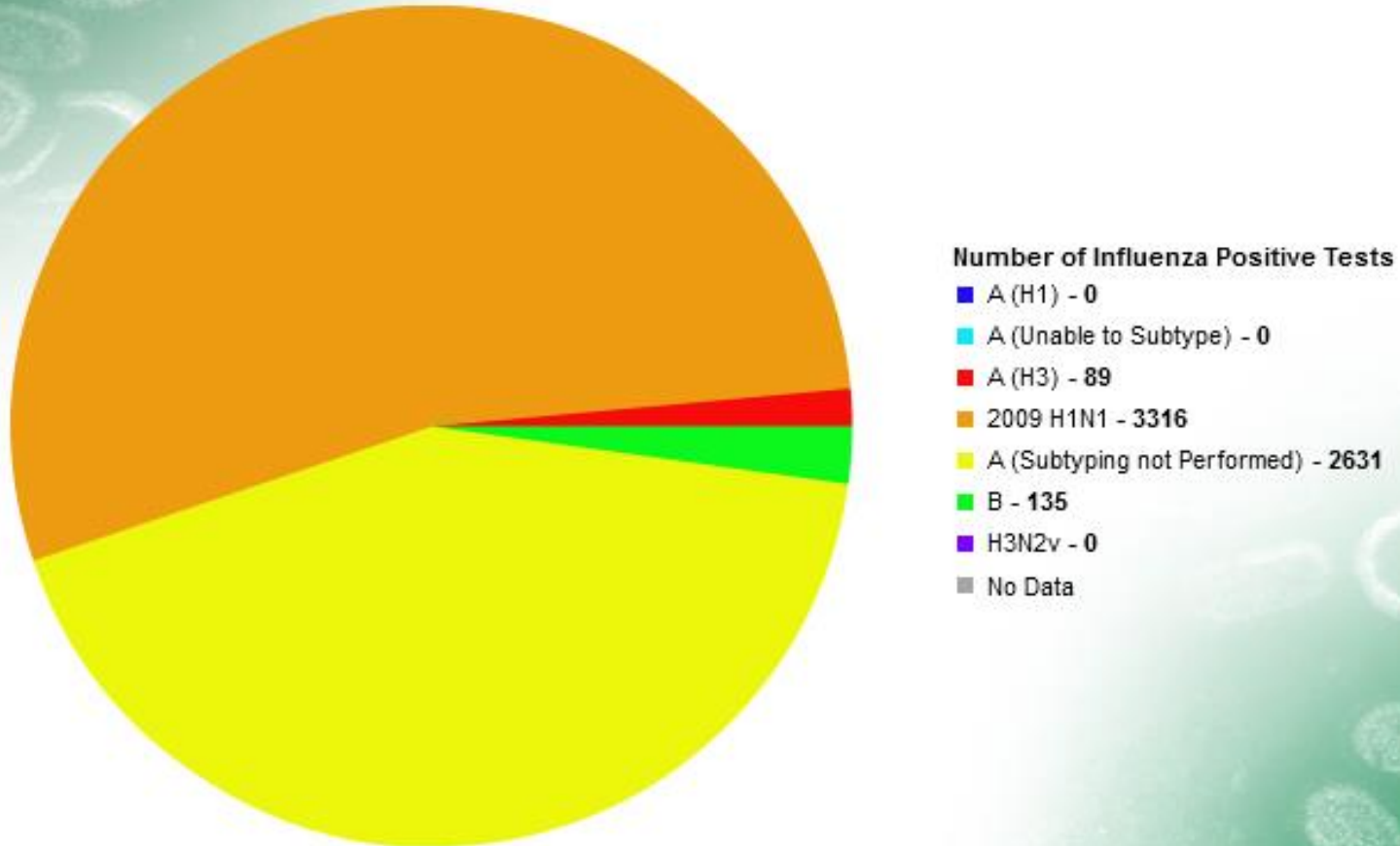


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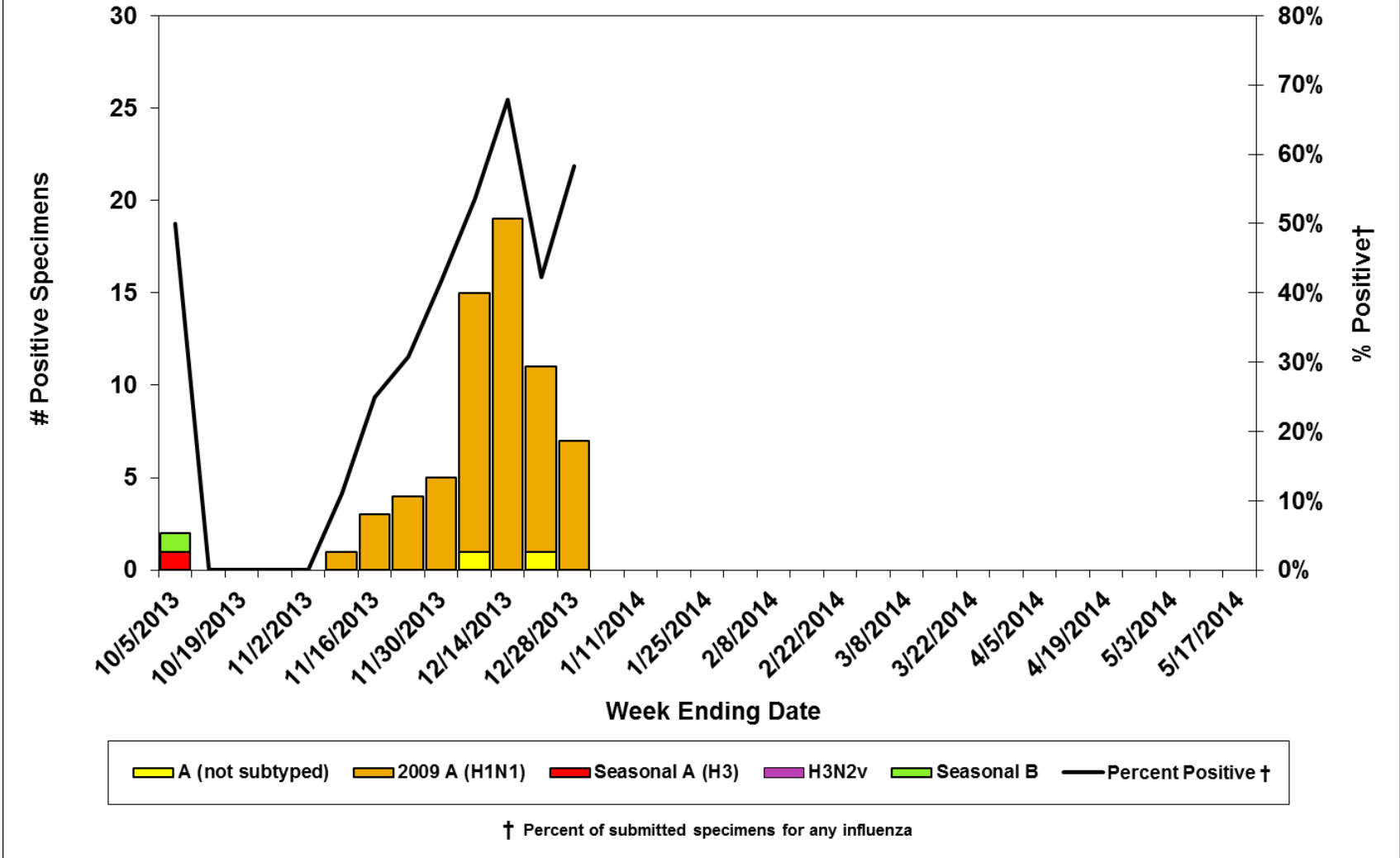
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Influenza Positive Tests Reported to CDC, National Summary, 2013-14 Season,
weeks ending Dec 08, 2013 - Dec 28, 2013
Reported by: U.S. WHO/NREVSS Collaborating Laboratories



Influenza Positive Tests Reported by the N.C. State Laboratory of Public Health (SLPH) by Week Ending Date



Courtesy of Anita Valiani, NC DHHS

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EPIDEMIOLOGY OF PEDIATRIC INFLUENZA

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The Toll of Pediatric Influenza

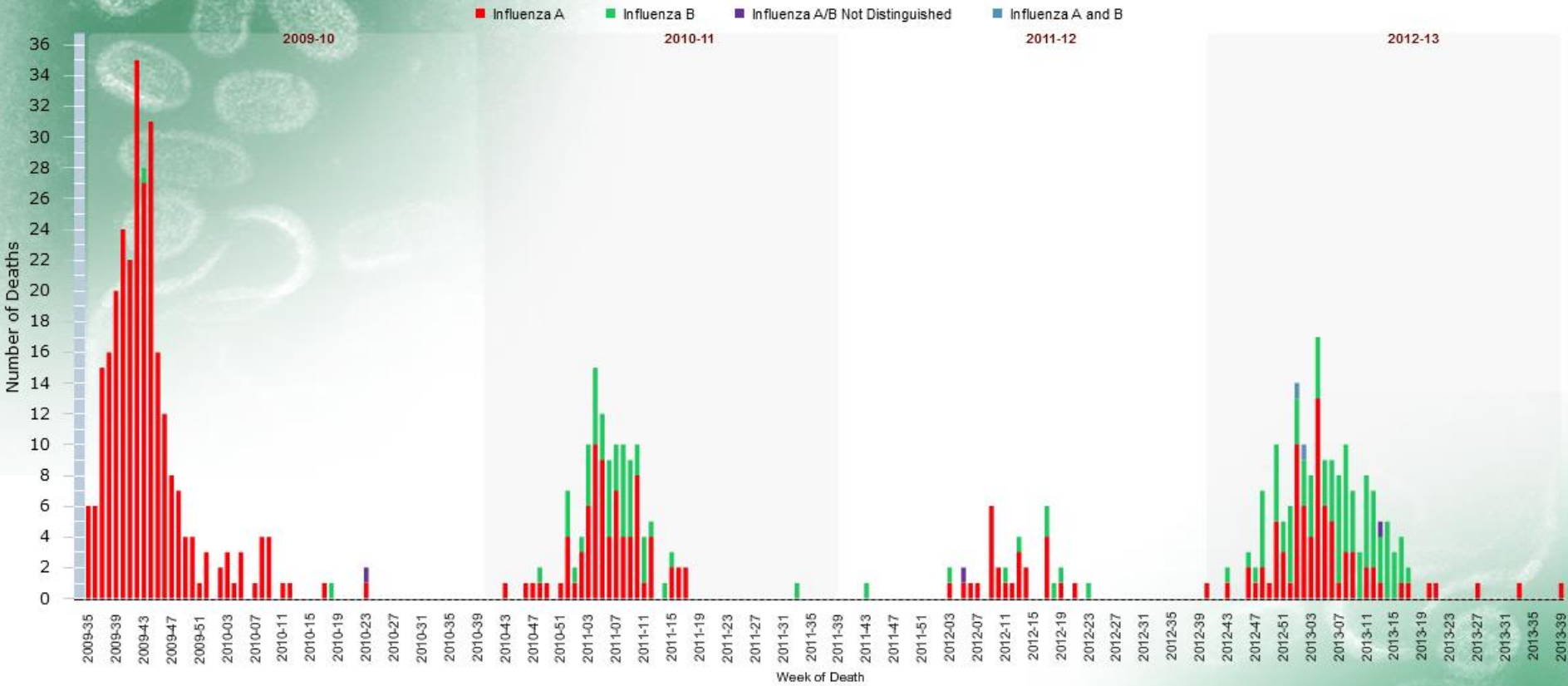
- Average # of children < 5 years of age hospitalized each year for influenza complications = **20,000**
- **Influenza-associated death**
 - Death resulting from a clinically compatible illness confirmed to be influenza through testing
 - No period of complete recovery between illness & death

****Physicians must report this to local health dept.****

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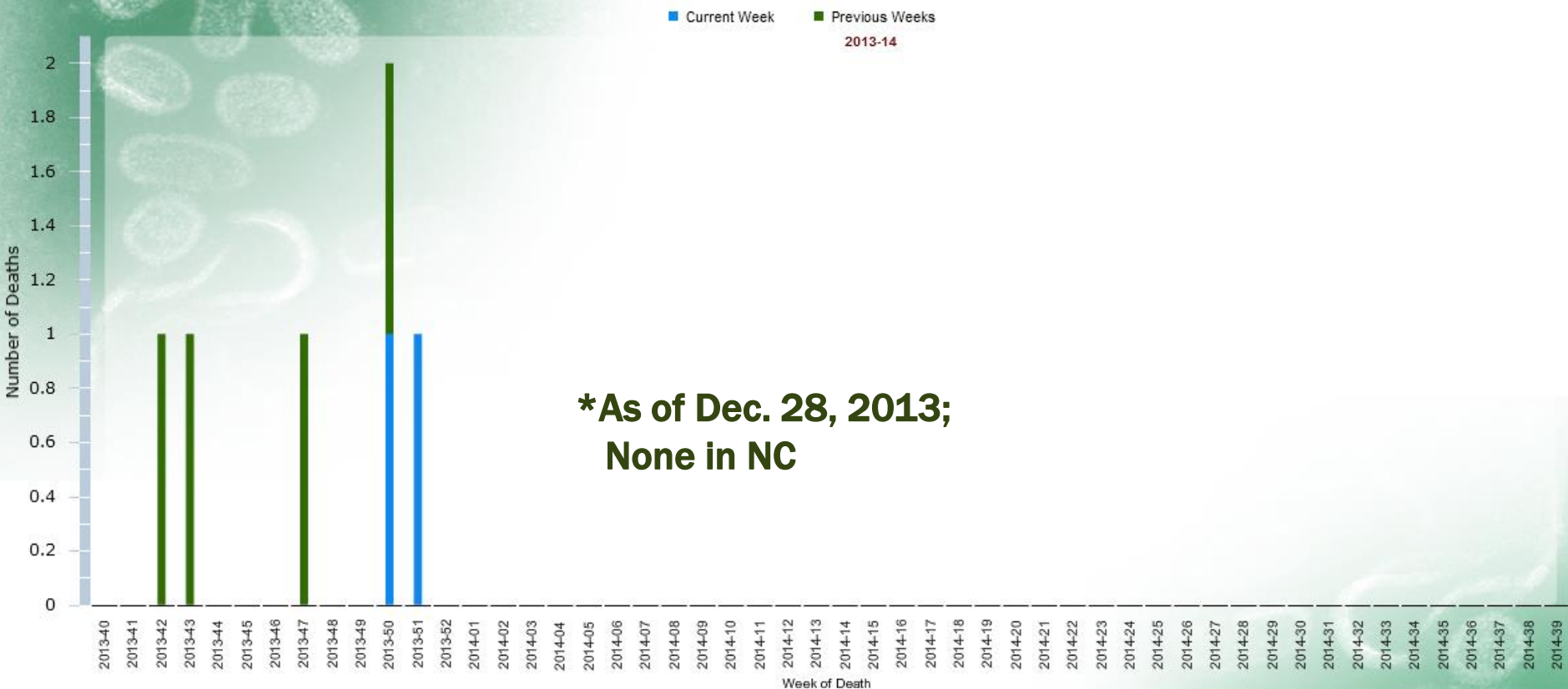


Number of Influenza-Associated Pediatric Deaths by Week of Death



Season	Total Deaths	Influenza A	Influenza B	Influenza A/B Not Distinguished	Influenza A & B
2009-10	282	279	2	1	0
2010-11	123	77	46	0	0
2011-12	35	25	9	1	0
2012-13	171	80	88	1	2

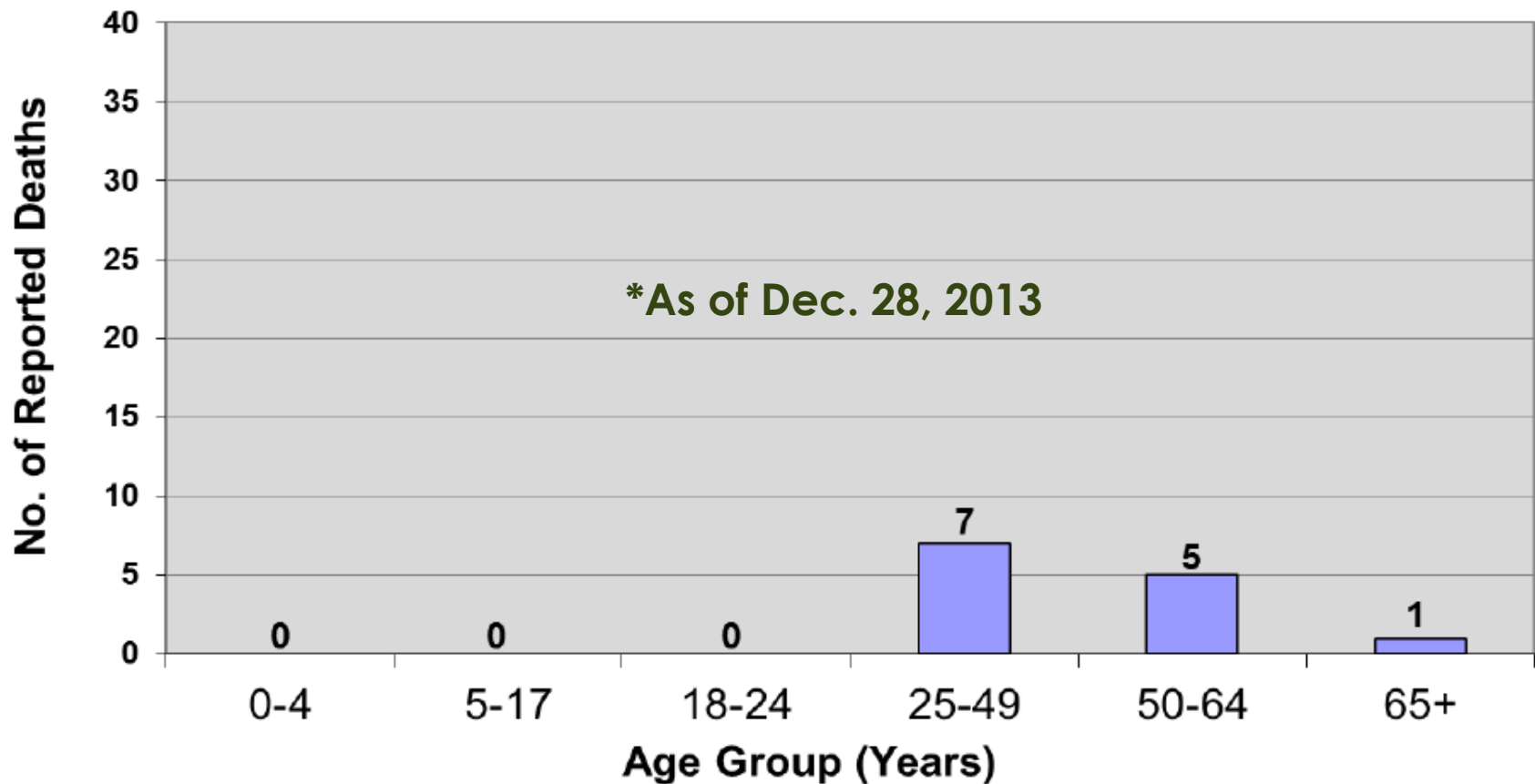
Number of Influenza-Associated Pediatric Deaths by Week of Death



***As of Dec. 28, 2013;
None in NC**

Season	Total Deaths	Influenza A	Influenza B	Influenza A & B
2013-14*	6	5	0	1

Laboratory Confirmed Influenza-Associated Deaths Reported in North Carolina, by Age Group*



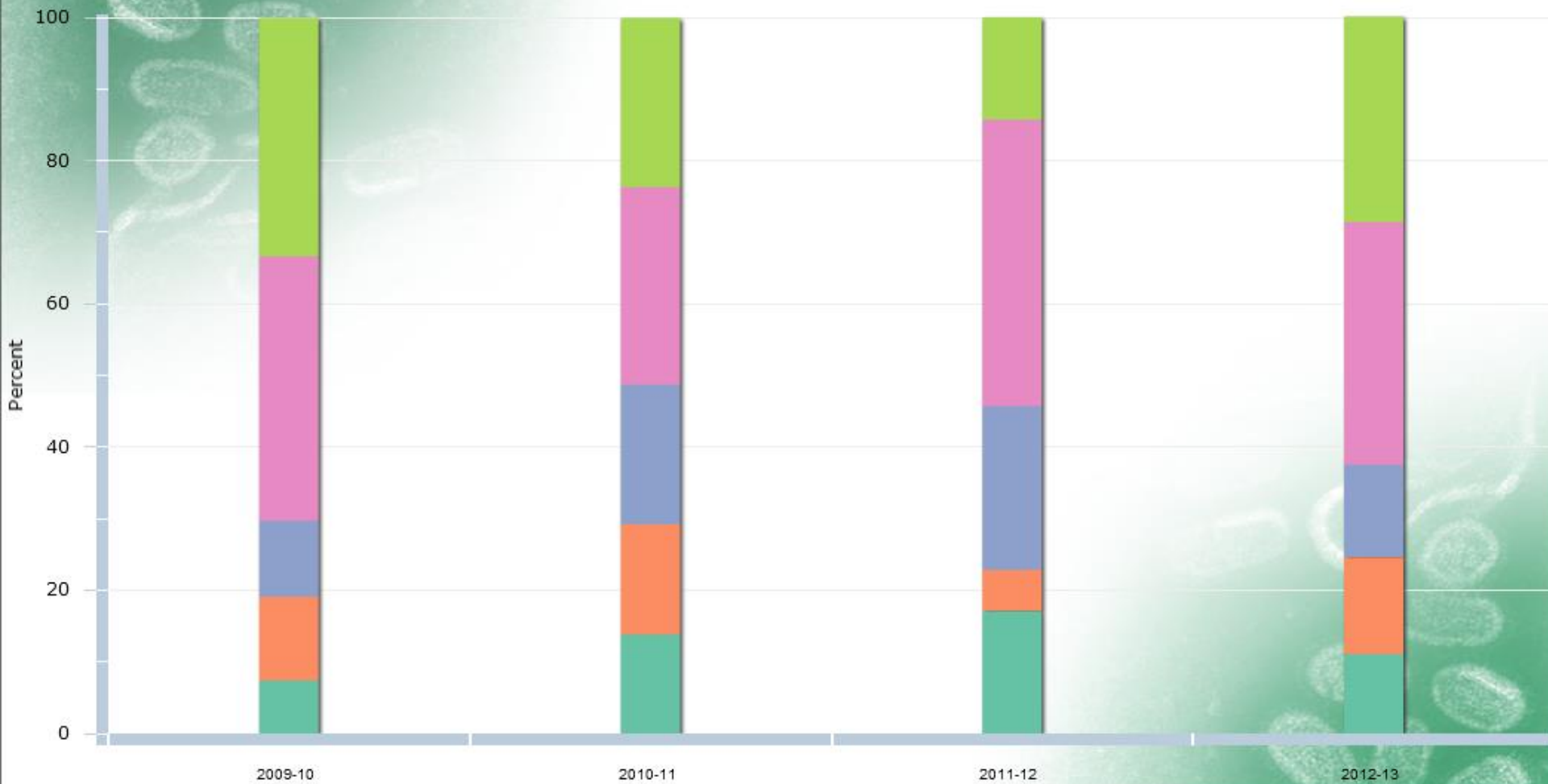
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Characteristics of Influenza-Associated Pediatric Deaths Age Group Breakdown by Season

■ 0-5 mo
 ■ 6-23 mo
 ■ 2-4 yr
 ■ 5-11 yr
 ■ 12-17 yr
 ■ Insufficient Data



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Characteristics of Influenza-Associated Pediatric Deaths Percent of deaths with high risk underlying medical condition

■ Yes ■ No ■ Insufficient Data



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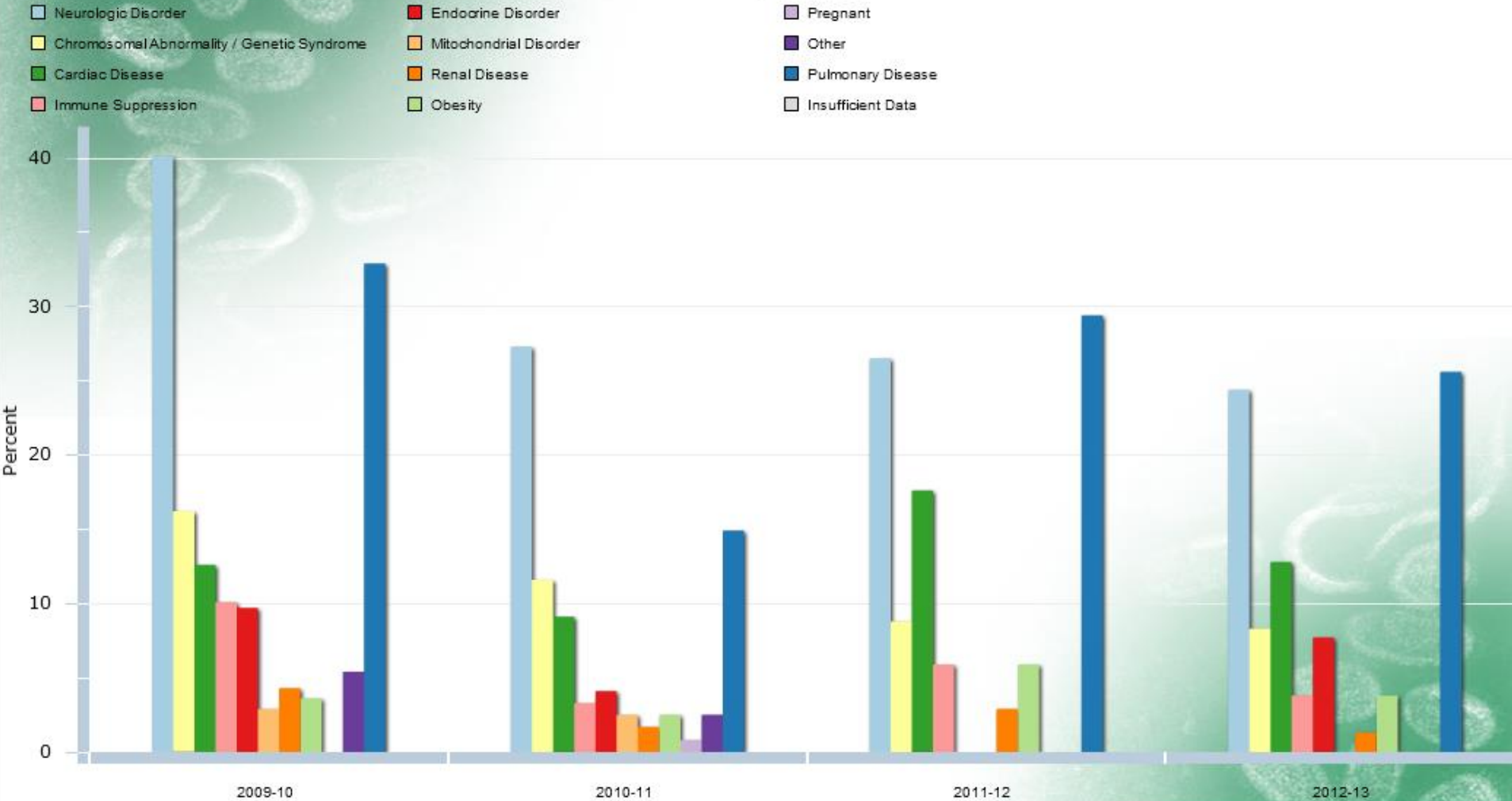
Who is at higher risk for complications from influenza?

- **Children < 5 yo, but especially <2 yo**
- Chronic **lung** diseases (e.g., asthma, CF)
- Chronic **heart** diseases (except HTN only)
- Chronic **kidney** disorders
- Chronic **liver** disorders
- Chronic **blood** disorders (e.g., sickle cell disease)
- Chronic **metabolic** disorders (e.g., diabetes, inherited metabolic disorders)
- Persons w/ **immunosuppression** (e.g., HIV, cancer, chronic steroids)
- Persons who are **morbidly obese**
- Chronic **neurologic** and **neurodevelopmental** conditions (d/o of brain, spinal cord, peripheral nerve, & muscle such as CP, epilepsy, stroke, intellectual disability, moderate to severe developmental delay, muscular dystrophy, or spinal cord injury)
- **Persons < 19 yo on long-term aspirin therapy**
- **American Indians/Alaskan Natives**
- **Pregnant or post-partum (within 2 wks after delivery)**
- **Residents of chronic-care facilities**

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Characteristics of Influenza-Associated Pediatric Deaths Percent of Deaths with Specified Medical Condition



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Signs/Symptoms of Influenza

➤ Abrupt onset of

- **Fever** (commonly 100 to 102°F lasting 3-4 days)
- **Chills**
- **Myalgia** (often severe)
- **Headache**
- **Fatigue/weakness** (often extreme exhaustion)
- **Non-productive cough**
- Sore throat
- Sneezing and/or nasal congestion
- **Nausea, vomiting, otitis media also seen in children**
- **Young children less likely to have typical influenza symptoms (like fever & cough)**

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Basic Epidemiology of Influenza

- **Incubation period:** 1-4 days
- **Contagious period:**
 - Adults from 1 day before symptoms start and for 5-10 days after illness begins
 - Children may be contagious **several days before** illness starts and for **10+ days after** illness begins
- **Illness course:** 3-7 days if uncomplicated
 - Cough, malaise can last > 2 wks

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Influenza Complications

- Influenza viral pneumonia
- Exacerbation of underlying medical conditions
- Secondary bacterial pneumonia, sinusitis, otitis media
- Co-infections with other viral or bacterial pathogens
- Respiratory failure
- Death

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How distinguish flu from other respiratory pathogens?

- Difficult based only on signs/symptoms
- PPV of acute onset of cough & fever in areas with confirmed influenza virus circulation for lab-confirmed influenza infection

Population	PPV
Generally healthy older adolescents & adults	79-88%
Children 5-12 years old	71-83%
Children < 5 years old	64%

From <http://www.cdc.gov/flu/professionals/acip/clinical.htm>



Bottom-line for who to suspect of having influenza

- The diagnosis of influenza illness should be considered in **any patient with respiratory symptoms OR fever during flu season.**
- Influenza surveillance information and diagnostic testing can help clinical judgment.

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TESTING FOR INFLUENZA

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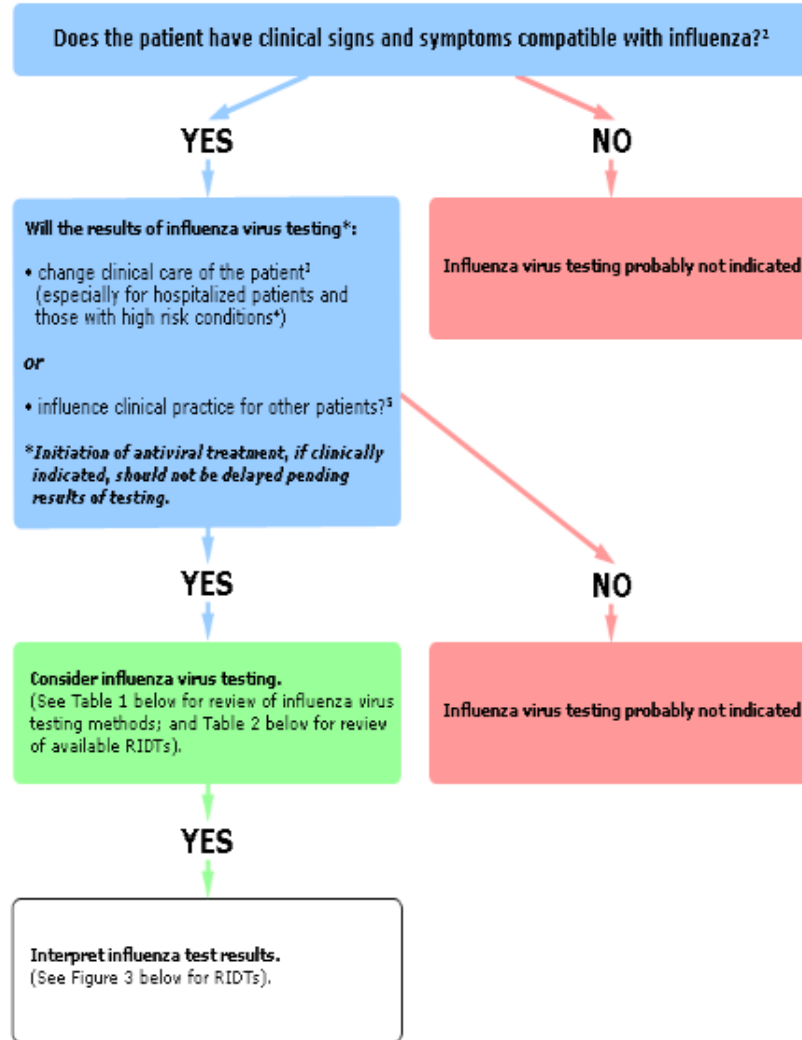
Diagnostic Testing for Flu

1. Tests do **NOT** need to be performed on all patients with s/sx of flu
 - **Once flu activity documented in community (especially during periods of peak activity), a clinical dx can be made for outpatients**
 - Tests are most useful when they are likely to give results that will help with dx and tx decisions
2. **Samples should be collected within the first 4 days of illness**
3. **Follow manufacturer's instructions for testing**

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Figure 1: Guide for considering influenza virus diagnostic tests for individual patients when influenza viruses are circulating in the community¹





http://www.cdc.gov/flu/professionals/diagnosis/clinician_guidance_ridt.htm

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Diagnostic Testing for Influenza

Test method	Potential Uses	Test Time
Viral Culture 	Often for surveillance purposes (for virus strain ID, sub-typing, assessment for antiviral resistance, etc.) or confirmatory testing	3-10 days
Rapid Influenza Diagnostic Tests	Commonly for outpatient testing; can determine type	≤ 15 minutes
RT-PCR 	Used in-house at Mission; able to subtype; preferred for those w/exposure to animals/suspected to have novel influenza infection	1-6 hrs (<i>longer if specimen has to be sent to outside lab</i>)
Immunofluorescence (Direct or Indirect Antibody Staining)	Used for Mission's in-house "Viral Respiratory Panel" which tests for Influenza A & B, RSV, adenovirus, parainfluenzae types 1-3	1-4 hrs

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Rapid Influenza Diagnostic Tests (RIDTs)

- Immunoassays that ID influenza A and B antigens in respiratory specimen
 - Some can distinguish between types A & B
- Qualitative (+/-)
- Results within 15 minutes
- **Sensitivity 40-70%**
- **Specificity >90%**

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Use of RIDTs in Clinical Decision-making

False negative results more common than false positive results, especially during peak flu activity.

- Negative results do NOT rule out influenza infection in someone with s/sx suggestive of flu.
- Do NOT withhold antiviral tx from patients with suspected flu, even if negative RIDT.

False + results can also occur, especially during times when flu activity is low.

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Factors That Influence RIDT Accuracy

1. **Clinical s/sx** of influenza
2. **Prevalence** of influenza activity in population tested
3. **Time** from illness onset to specimen collection
4. **Type of specimen** collected
5. Accuracy of test vs. “gold standard”
 - **Sensitivity & specificity**

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Figure 3: Algorithm to assist in the interpretation of RIDT results and clinical decision-making during periods when influenza viruses are circulating in the community¹



http://www.cdc.gov/flu/professionals/diagnosis/clinician_guidance_ridt.htm



When to Consider Further Influenza Testing beyond RIDT

- Negative RIDT when high community flu activity & laboratory-confirmed influenza dx is desired
- + RIDT when low community flu activity & a false + is a possibility
- Recent close exposure to pigs, poultry or other animals & novel influenza A infection is possible

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Hospitalized Patients

1. **Test for flu if suspect flu**
 - Immunofluorescence, RT-PCR or viral culture
2. **Start empiric antiviral tx ASAP**
 - **Do NOT wait for test results**
 - **Do NOT stop antiviral tx if negative RIDT**
3. **Implement infection control measures upon admission**
(again, even if negative RIDT)
4. **Consider testing specimens from different respiratory sites (e.g., upper & lower respiratory tract) and/or on > 1 day**

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ANTIVIRALS FOR TREATMENT & PROPHYLAXIS

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Antivirals Recommended for Treatment & Chemoprophylaxis of Influenza A & B

Antiviral	Use	FDA Approved for Ages	Not Recommended for Use in	Adverse Events
Oseltamivir (oral suspension or capsules)	Treatment	≥ 2 wks	n/a	Nausea, vomiting (<i>may be less severe if taken w/ food</i>)
	Chemo-prophylaxis	≥ 1 yr	n/a	
Zanamivir (inhaled powder)	Treatment	≥ 7 yrs	People w/ underlying respiratory disease (e.g., asthma)	Diarrhea, nausea, sinusitis, nasal s/sxs, cough, headache, dizziness, ENT infections; Allergic reactions: oropharyngeal or facial edema
	Chemo-prophylaxis	≥ 5 yrs		

Adapted from <http://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm>
(cited Jan. 5, 2014; page last updated Oct. 1, 2013)

When to Give Influenza Antivirals

- ASAP for anyone with *suspected or confirmed* influenza who:
 - is **hospitalized**;
 - has **severe, complicated or progressive illness**; OR
 - is at **higher risk for severe illness/complications**

- *Ideally* start tx within 48 hrs of illness onset
 - May still be beneficial when started after 48 hours

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Antiviral Treatment of Patients NOT at High-Risk

- Antiviral tx can be *considered* for suspected or confirmed influenza in previously healthy, symptomatic outpatients not at high risk
 - Use clinical judgment
 - If tx can be initiated within 48 hours of illness onset

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Key Messages on Treatment with Antivirals

- Focus use on those with severe illness or who are at higher risk for severe disease
- **Do NOT wait on test results**
- Start ASAP after illness onset
- **Do NOT withhold antiviral tx from patients with suspected flu, even if negative RIDT.**
- H/o influenza vaccination does NOT rule out influenza infection – give antivirals if indicated

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Benefits of Influenza Antiviral Treatment

- Treatment with antivirals may:
 - Shorten duration of fever & other symptoms
 - Reduce risk of complications from flu
 - Shorten duration of hospitalization
- Clinical benefit is **greatest when antivirals started within 48 hrs of illness onset**

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Recommended Dosage & Duration of TREATMENT for Influenza Antivirals

Antiviral	Dose	Duration of treatment
Oseltamivir	If < 1 yr old: 3 mg/kg/dose BID <i>(FDA-approved if \geq 2 wks old; requires a different dispenser than what is co-packaged with medicine)</i>	<ul style="list-style-type: none"> •Recommended for 5 days. •Longer treatment courses can be considered for patients who remain severely ill after 5 days of treatment.
	If \geq 1 yr old & weigh \leq 15 kg: 30 mg BID	
	If \geq 1 yr old & weigh > 15-23 kg: 45 mg BID	
	If \geq 1 yr old & weigh > 23-40 kg: 60 mg BID	
	If \geq 1 yr old & weigh > 40 kg: 75 mg BID	
Zanamivir	If \geq 7 yr old: 10 mg (2 inhalations) BID <i>(Not FDA-approved for use in children younger than 7 years of age)</i>	

Taken from table at <http://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm>
(Cited Jan. 5, 2014; page last updated Oct. 1, 2013)

Chemoprophylaxis for Influenza

1. Annual influenza vaccination

2. Antiviral medications

- 70-90% effective at preventing flu
- **NOT recommended if > 48 hrs since last exposure**
- CDC does **NOT recommend widespread or routine use** of antivirals for chemoprophylaxis
- Need to seek medical care if develop s/sxs of influenza

****Alternative = close monitoring/early initiation of antiviral tx**

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Recommendations for Antiviral Chemoprophylaxis of Children

- To control outbreaks among high-risk children in institutional settings
- High-risk children who are close contacts of suspected or confirmed cases (*regardless of vaccination status*)
- High-risk children for whom vaccination is contraindicated or during 2 wks after vaccination (*during outbreak*)

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Recommended Dosage of Influenza Antivirals for CHEMOPROPHYLAXIS in Children

Antiviral	Dose	Duration
Oseltamivir	If < 3 months of age, use not recommended unless situation judged critical. (**Not FDA-approved)	<ul style="list-style-type: none"> •Recommended to be continued until 7 days after last exposure (CDC has additional guidance if outbreak in long-term care facility or hospital)
	If ≥ 3 months of age & < 1 year old: 3 mg/kg/dose once daily (**Not FDA-approved)	
	If ≥ 1 year old & weigh ≤ 15 kg: 30 mg daily	
	If ≥ 1 year old & weigh > 15 – 23 kg: 45 mg daily	
	If ≥ 1 year old & weigh > 23– 40 kg: 60 mg daily	
	If ≥ 1 year old & weigh > 40 kg: 75mg daily	
Zanamivir	If ≥ 5 years old: 10 mg (2 inhalations) once daily (Not FDA-approved for use in children younger than 5 years old)	

Taken from table at <http://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm>

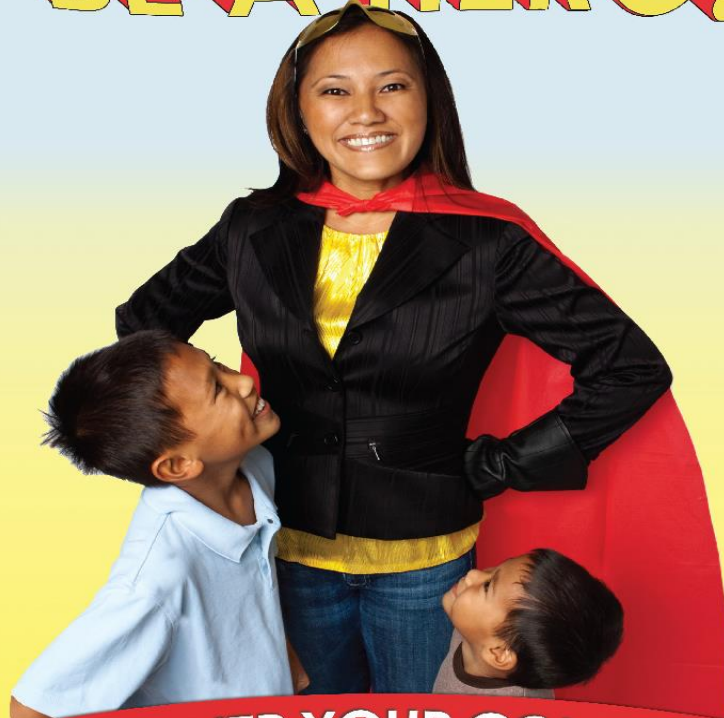
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CONTROL MEASURES

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BE A HERO!



**COVER YOUR COUGH
WASH YOUR HANDS
STAY HOME IF YOU'RE SICK
GET A FLU SHOT**

TAKE THESE SIMPLE STEPS TO PROTECT YOU AND YOUR FAMILY

A message from BUNCOMBE COUNTY HEALTH & HUMAN SERVICES 

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Resources

- CDC – Information for Health Professionals
 - <http://www.cdc.gov/flu/professionals/index.htm>
- NC Division of Public Health – Flu info for providers
 - <http://www.flu.nc.gov/providers/>
- AAP – Recommendations for Prevention and Control of Influenza in Children, 2013–2014
 - <http://pediatrics.aappublications.org/content/early/2013/08/28/peds.2013-2377>
- The Joint Commission – videos demonstrating specimen collection
 - <http://www.youtube.com/watch?v=hXohAo1d6tk>
- The Joint Commission -- Strategies for Improving Rapid Influenza Testing in Ambulatory Settings (CE available)
 - <http://www.jointcommission.org/siras.aspx>
- Buncombe County Health and Human Services – flu posters in English/Spanish/Russian
 - <http://buncombecounty.org/flu>

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