Influenza Updates:
Reductions in Burden of Disease

Carrie Reed

Influenza Division, Centers for Disease Control and Prevention

August 13, 2015

Influenza vaccination recommendations over time

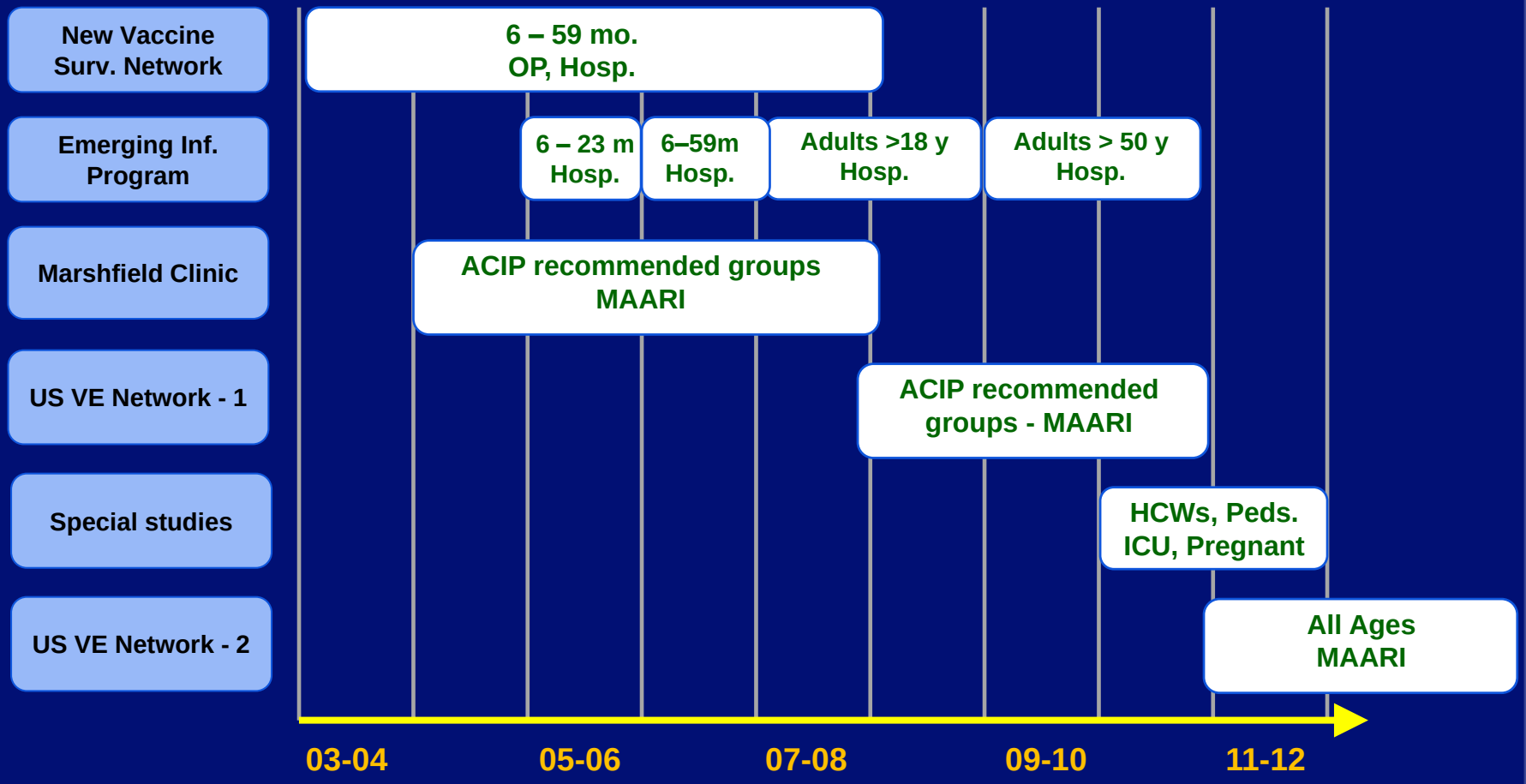
Before 2000:	**Persons aged 65 or older** **Persons with high-risk chronic medical conditions** **Pregnant women in the second or third trimester** **Household contacts of the above** **Health care workers**
2000:	**Adults 50 and older**
2004:	**Children aged 6—23 months** **Household contact of children aged 0--23 months** Women who will be pregnant during influenza season
2006:	**Children aged 6—59 months** **Household contacts of children aged 0—59 months**
2008:	**All children aged 6 months—18 years**
2010:	**All persons > 6 months in the US**

During the last decade…

- More people getting vaccinated with influenza vaccines
- Greater use of vaccines in persons at high risk of complications
- More awareness of the need for vaccination
- Some skepticism of the value of influenza vaccination

Are influenza vaccines effective in preventing influenza-associated illnesses each year?

Measuring influenza vaccine effectiveness in the U.S.



During the last decade…

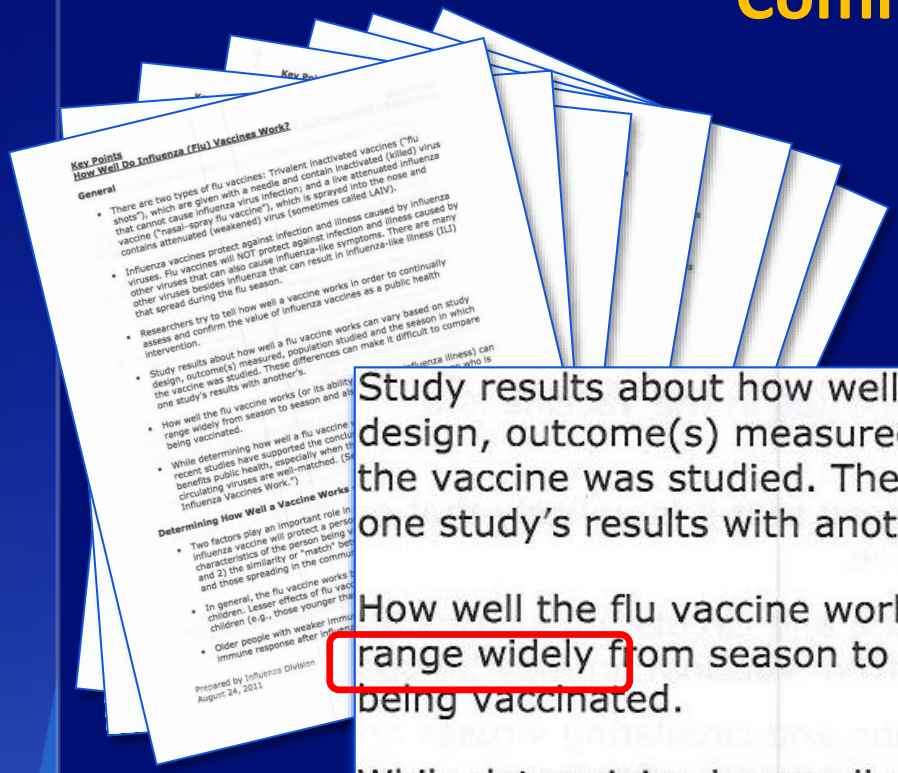
- More people getting vaccinated with influenza vaccines
- Greater use of vaccines in persons at high risk of complications
- More awareness of the need for vaccination
- Some skepticism of the value of influenza vaccination

Are influenza vaccines effective in preventing influenza-associated illnesses each year?

Yes.

… but the effectiveness varies by season, population, and outcome measured

Communicating influenza VE



Study results about how well a flu vaccine works can vary based on study design, outcome(s) measured, population studied and the season in which the vaccine was studied. These differences can make it difficult to compare one study's results with another's.

How well the flu vaccine works (or its ability to prevent influenza illness) can range widely from season to season and also can vary depending on who is being vaccinated.

While determining how well a flu vaccine works is challenging, in general, recent studies have supported the conclusion that influenza vaccination benefits public health, especially when the viruses in the vaccine and circulating viruses are well-matched. (See "Current Efforts to Study How Well Influenza Vaccines Work.")

Impact of influenza vaccination program

- **Question:**

  Are influenza vaccine programs effective in reducing influenza-associated health outcomes in the population?

- **Goal:**

  Estimate the number of averted influenza-associated outcomes that result from influenza vaccination in the United States

Impact of influenza vaccination program

- **Advantages:**
  - Consistent and systematic approach across seasons
  - Uses data collected as core program activities (Influenza Division and Immunization Services Division)
  - Estimates can be updated annually
  - Illness/outcomes averted may be easier and more meaningful way to communicate value of vaccine

Impact of influenza vaccination program

1. **Estimate observed annual burden of influenza-associated outcomes**
2. **Estimate observed risk of influenza-associated outcomes among susceptible individuals**
   - Using data on annual vaccine coverage and vaccine effectiveness
3. **Calculate expected burden of influenza-associated outcomes in population with no vaccination**
4. **Calculate difference in outcomes attributable to vaccination program**

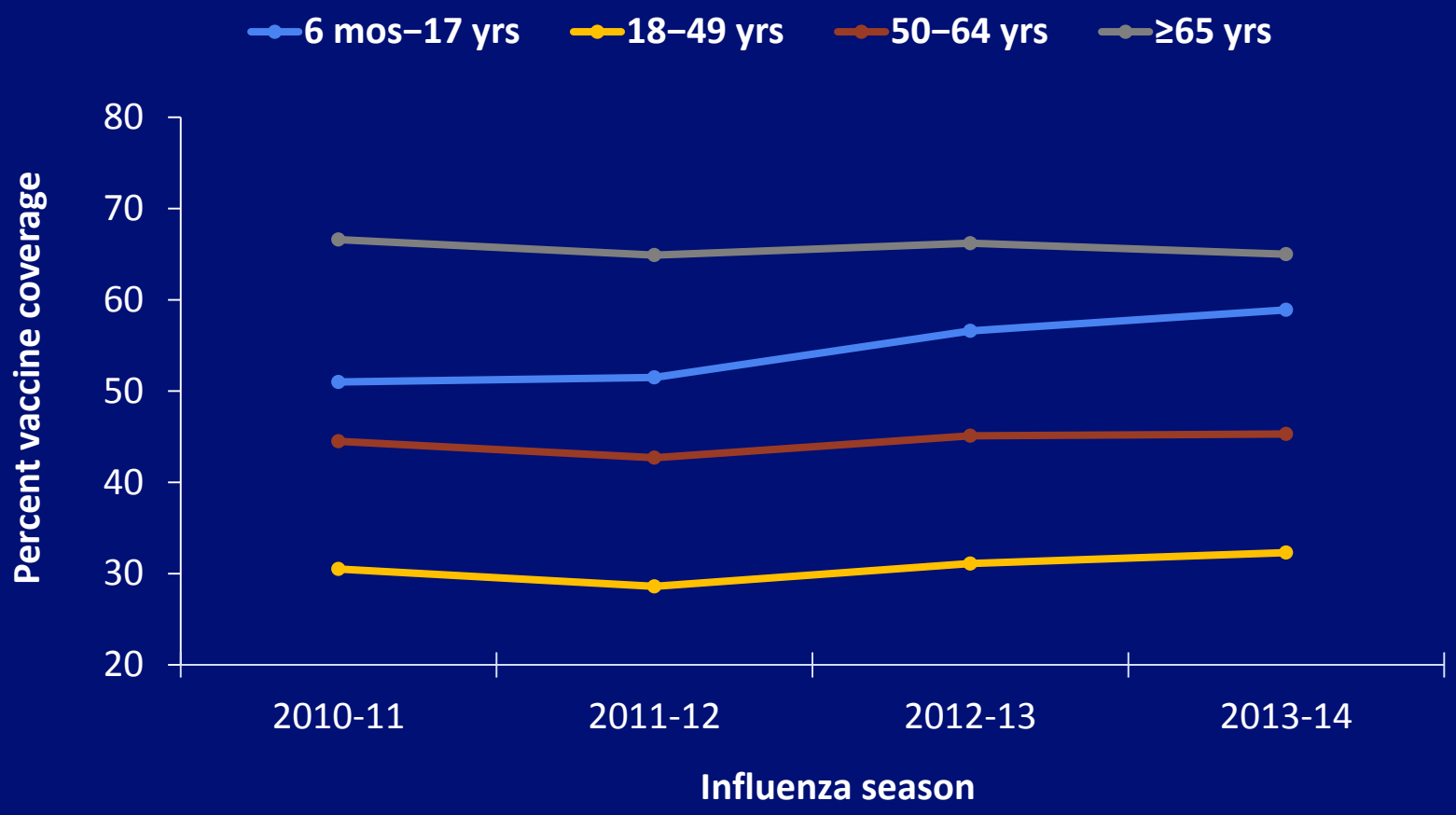
Kostova D, et al. 2013. *PLoS One.* 8(6): e66312.

Burden of Disease

- **Since 2010-11, influenza has led annually to:**
  - 19 – 35 million cases of influenza respiratory disease
  - 3.4 – 15.2 million clinic visits
  - 110,000 – 592,000 hospitalizations
  - 5,300 – 39,000 deaths

Reed C, et al. 2015. *PLoS One.* 10(3): e0118369.
Foppa I, et al. 2015. *Vaccine*. In press.

Vaccine Coverage



http://www.cdc.gov/flu/fluvaxview/reports/reporti1314/trends/index.htm

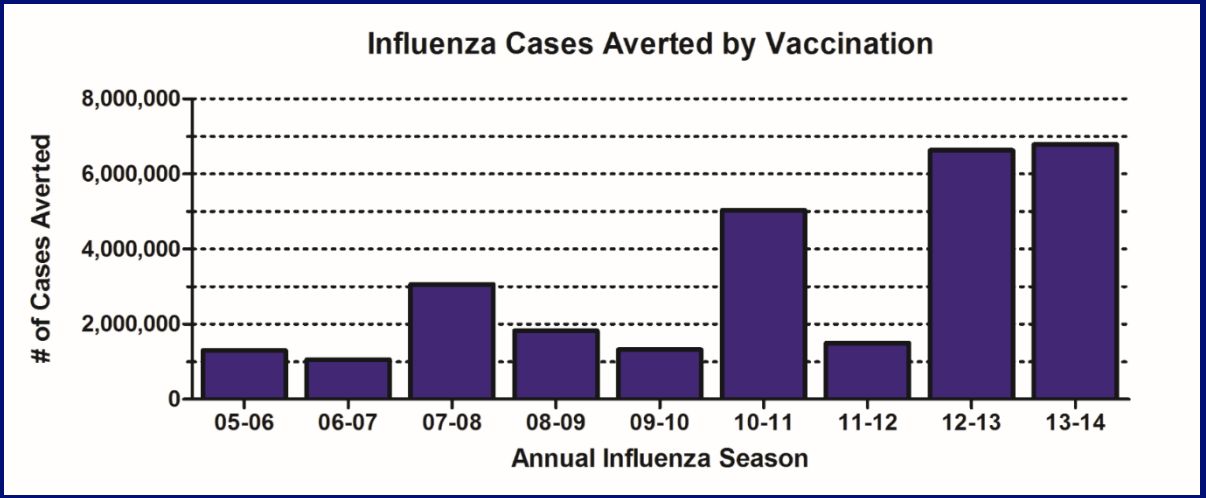
Vaccine Effectiveness

- **Varies by age group and season, *2010 – 2014**:**
  - 6 mos – 4 yrs: 47 – 68%
  - 5 – 19 yrs: 46 – 61%
  - 20 – 64 yrs: 50 – 52%
  - 65+ yrs: 32 – 39%

**US Flu VE network, annual estimates*

Disease Averted by Vaccination

- **Since 2010-11, influenza vaccination has averted annually:**
  - 1.6 – 7.2 million cases of influenza respiratory disease
  - 750,000 – 3.2 million clinic visits
  - 30,000 – 120,000 hospitalizations
  - 2,200 – 16,000 deaths

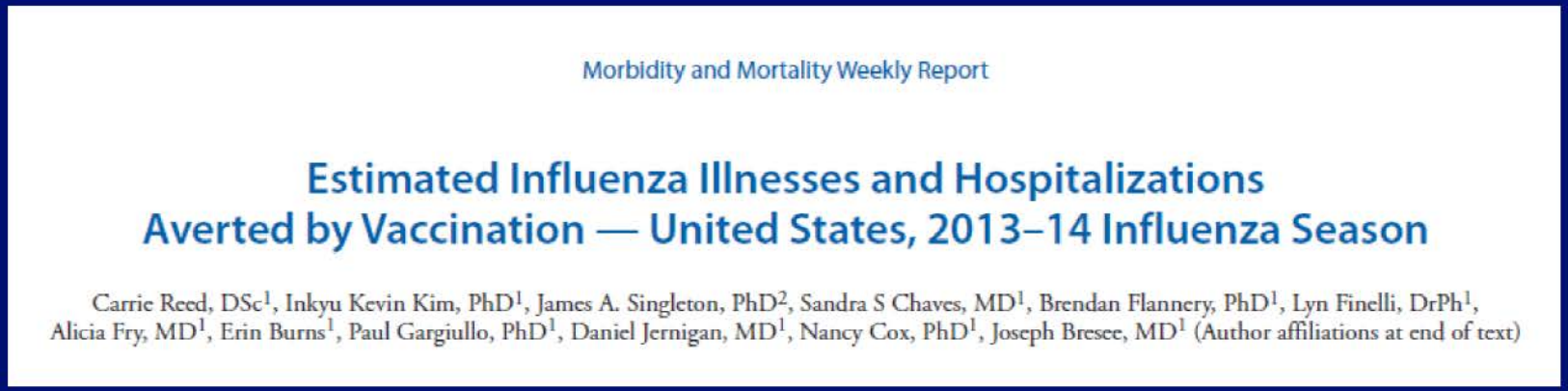


Communicating influenza vaccine impact

Morbidity and Mortality Weekly Report

Estimated Influenza Illnesses and Hospitalizations Averted by Influenza Vaccination — United States, 2012–13 Influenza Season

MMWR Morb Mortal Wkly Rep 2013;62:997–1000



Morbidity and Mortality Weekly Report

Estimated Influenza Illnesses and Hospitalizations Averted by Vaccination — United States, 2013–14 Influenza Season

Carrie Reed, DSc[1], Inkyu Kevin Kim, PhD[1], James A. Singleton, PhD[2], Sandra S Chaves, MD[1], Brendan Flannery, PhD[1], Lyn Finelli, DrPh[1], Alicia Fry, MD[1], Erin Burns[1], Paul Gargiullo, PhD[1], Daniel Jernigan, MD[1], Nancy Cox, PhD[1], Joseph Bresee, MD[1] (Author affiliations at end of text)

MMWR Morb Mortal Wkly Rep 2014; 63:1189–94

the **benefits** of **flu vaccination** 2013-2014

The estimated number of influenza-associated **illnesses prevented** by flu vaccination during the 2013-2014 season:

7.2 million

enough people to form
a line from Maine to Oregon

The estimated number of flu-associated **medical visits prevented** by vaccination during the 2013-2014 season:

3.1 million

more than the population
of the city of Chicago

The estimated number of flu **hospitalizations prevented** during the 2013-2014 season:

90,000

enough to fill Madison Square Garden **more than 4 times**

get **vaccinated**

DATA: Morbidity and Mortality Weekly Report (MMWR), December 12, 2014: Vol. 63, No. 49

NCIRDig-411 | 12.12.2014

www.cdc.gov/flu

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Conclusion

- **Substantial annual averted disease burden from the influenza vaccination program**
  - Varies by VE and annual disease burden
- **Program improvements will be made by**
  - increasing coverage in non-elderly persons
  - improving effectiveness of vaccines, especially in elderly persons

Conclusion

- **Annual estimates provide**
  - Comparison across seasons to examine impact of changes in burden, VE, and VC
  - Help identifying and prioritizing data needed to routinely evaluate program impact
- **Ongoing work to include indirect effects of vaccination**

Vaccine Impact Team:

In Kyu Kim
Joe Bresee
Alicia Fry
Ivo Foppa
Paul Gargiullo
Jim Singleton
Lyn Finelli
Brendan Flannery
Sandra Chaves
Erin Burns
Dan Jernigan

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
Visit: www.cdc.gov | Contact CDC at: 1-800-CDC-INFO or www.cdc.gov/info