

# **Public Health Impact of Including Two Influenza B Strains in Seasonal Influenza Vaccines**

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**ACIP  
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# INFLUENZA B VIRUSES

- **Circulate globally every year**
- **Subdivided into two lineages; currently co-circulate annually**
  - B/Yamagata
  - B/Victoria
- **Severe complications and deaths caused by influenza B do occur in all age groups**

## INFLUENZA B VIRUS LINEAGE AND TIV

- Protection after vaccination with one lineage against other lineage is unclear
- Co-circulation of both lineages means some degree of mismatch between vaccine and circulating strain is inevitable
  - Reduces overall trivalent vaccine effectiveness
  - Reduces public confidence in value of influenza vaccine

# THE QUESTION

- **Compared to TIV, what would be the additional public health impact from QIV on influenza disease outcomes in the US?**
- **The approach:**
  - Historical perspective – What if QIV had been used instead of TIV over the last 10 years?
  - Calculate impact on estimates of influenza-associated cases, hospitalizations, and deaths

*Reed C, Meltzer MI, Finelli L, Fiore A. Public health impact of including two lineages of influenza B in a quadrivalent seasonal influenza vaccine. Vaccine. 2012;30(11):1993-8.*

# METHODS

- **Include data from last 10 influenza seasons**
  - Characteristic natural variability between seasons
- **Population average, all ages**
  - May not capture variability by age group
- **Spreadsheet-based tool**
  - User can change inputs
    - e.g., assumptions; age-specific data; update to future influenza seasons

# WHAT DOES THE TOOL DO?

- **Calculates expected burden of influenza during each season**
  - Assuming same vaccine coverage and vaccine efficacy, but now with efficacy against both B lineages
  - Outcomes: rates of illness, hospitalization, death
- **Compares expected rates with QIV to rates observed with TIV**
  - Calculate additional averted outcomes

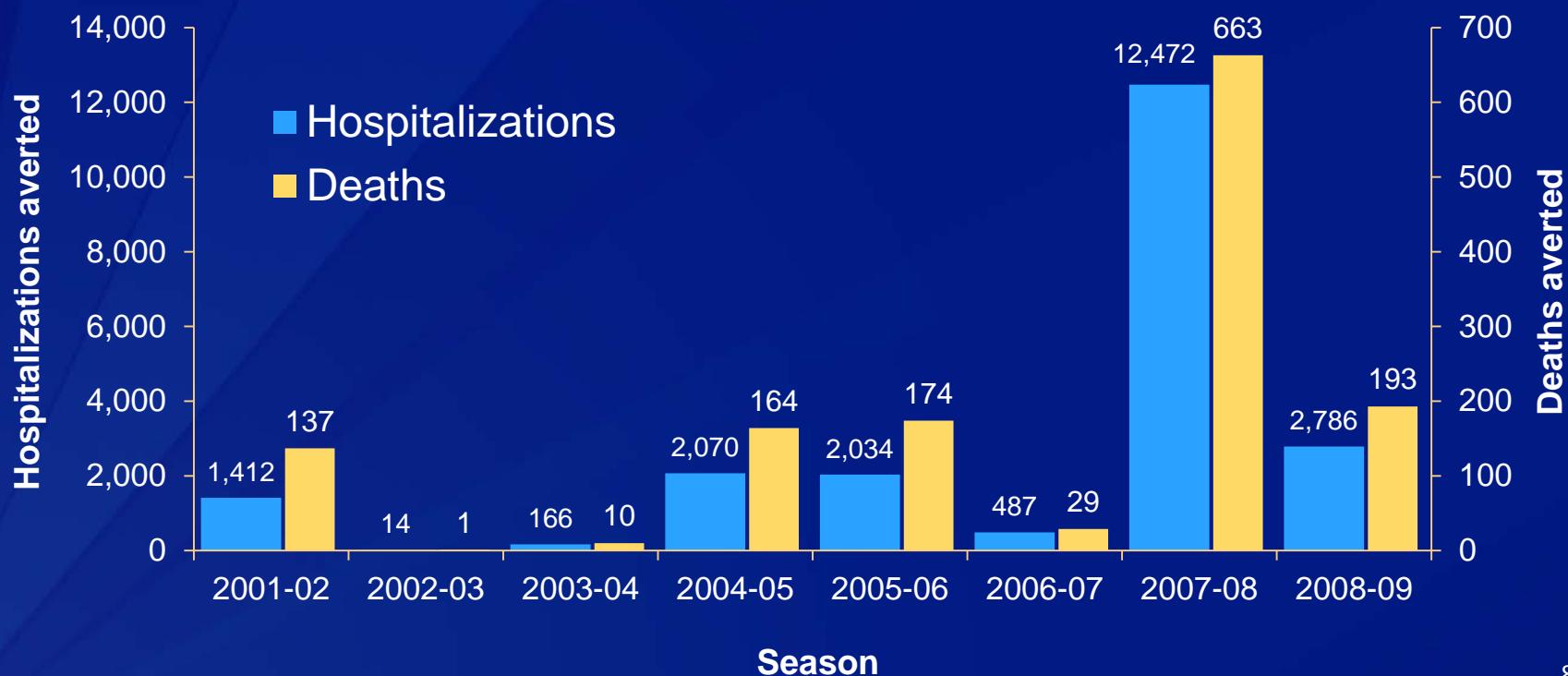
## DATA NEEDED

- **Rates of influenza-associated health outcomes**
  - Illness, hospitalization, death
  - By type / subtype / lineage over 10 seasons
- **Vaccine effectiveness**
  - By type / subtype / lineage over 10 seasons
- **Virologic surveillance**
  - Annual distribution of type, subtype, and lineage
- **Vaccine coverage**

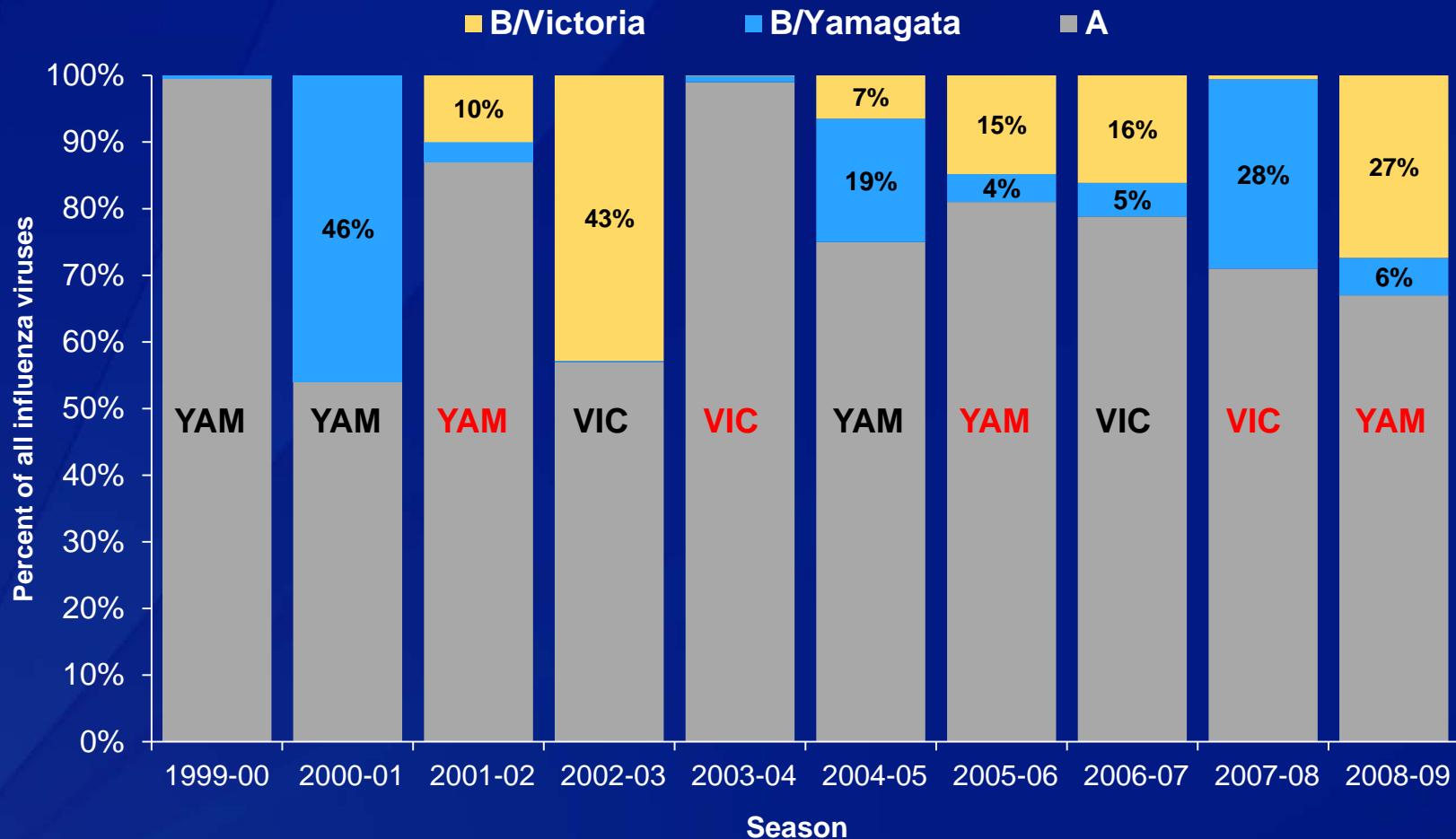
# RESULTS: IMPACT OF QIV vs. TIV

- Cases averted per US population

	Illness	Hospitalizations	Deaths
TOTAL	2,741,575	21,440	1,371



# IMPACT OF QIV VARIES BY SEASON



\* Virologic surveillance, based on MMWR influenza season summaries

## EXAMPLE 1, 2007–2008

- **Additional outcomes averted with QIV:**
  - 1.1 million fewer cases
  - 7500 fewer hospitalizations
  - 300 fewer deaths
- **Virologic surveillance:**
  - 29% of virus tested were type B;
  - 98% were not the lineage in vaccine
- **TIV supply greatly exceeded demand**
  - No impact of potentially fewer doses of QIV

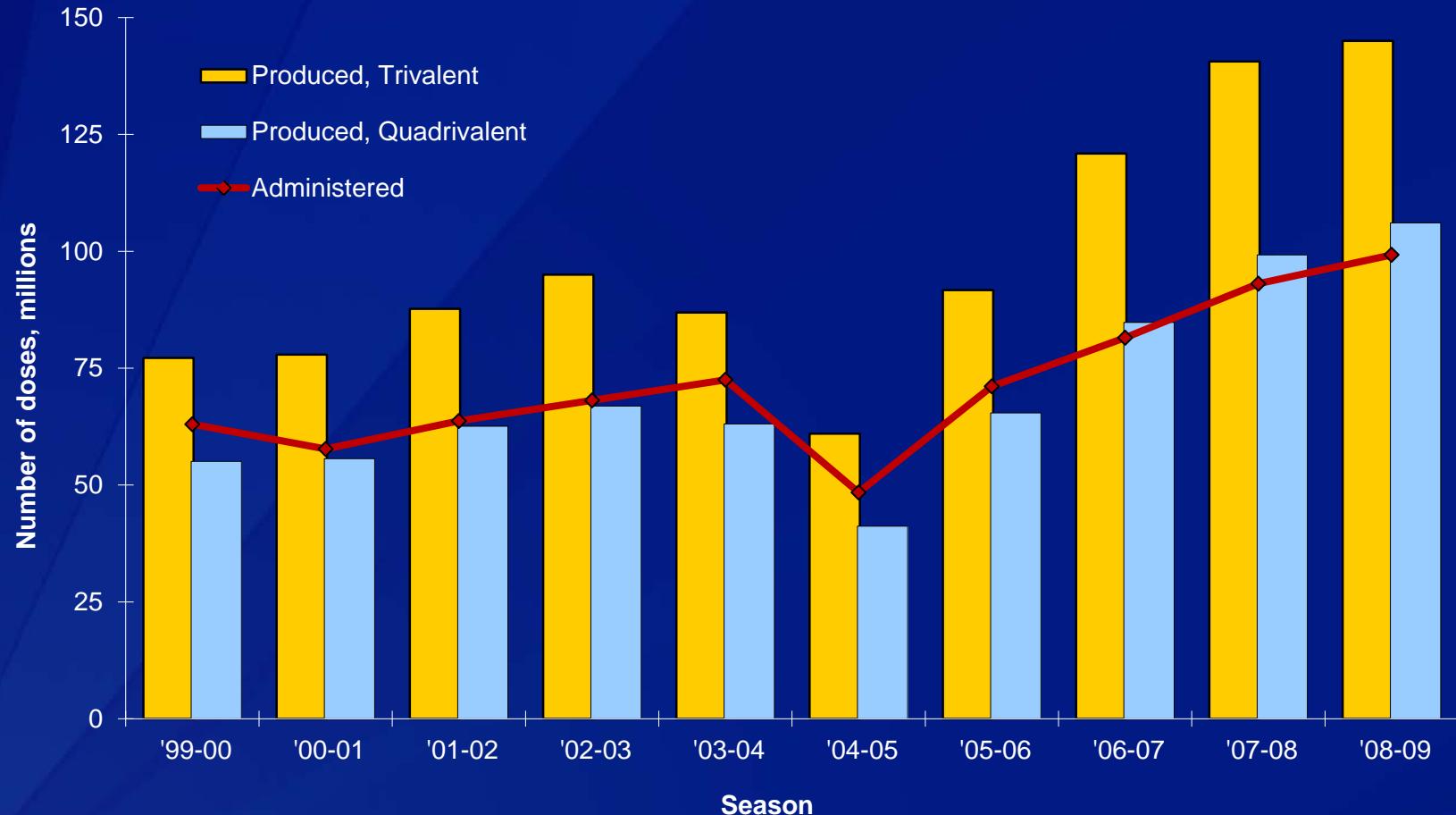
## RISK: FEWER DOSES OF QIV?

- Potential risk: Use of resources for four viruses instead of three = Fewer doses available
  - Only concern if doses available wouldn't meet demand
  - Decreased coverage may result in net increase in cases of influenza

## PART 2: VACCINE PRODUCTION

- **Question: Over past 10 seasons, how many doses of QIV could have been produced?**
  - Optimizes number of doses of QIV that may be produced with same production capacity as TIV
- **Question: How does this relate to the number of doses administered that year?**
  - Compared number of QIV doses available to TIV doses administered

# PRODUCTION AND ADMINISTRATION OF VACCINE



## EXAMPLE 2, 2004–2005

- **Virologic surveillance:**
  - 25% of circulating strains were influenza B viruses;
  - 26% not the lineage in vaccine
- **Problems with production led to decreased supply and administration of vaccine**
- **Loss in coverage if fewer doses of QIV available (15% fewer persons vaccinated)**
  - Net increase of 151,566 cases with QIV

# LIMITATIONS

- **Assumptions from limited data and to simplify**
  - Data entered as population average, but may vary:
    - Age
    - Health impact (cases, hospitalizations, deaths)
    - Strain / lineage
  - Spreadsheet model can be adapted to reflect most current data

## ADDITIONAL CONSIDERATIONS

- **Economic costs**
- **Potential differences in adverse events**
- **Alternative strategies for reducing influenza impact**
  - e.g., efforts to increase TIV coverage or improve immunogenicity

## CONCLUSIONS

- When TIV vaccine supply was similar to demand (e.g., 2002-2005)
  - Fewer doses of QIV potentially produced than doses of vaccine administered
    - Range: 2%-15% fewer vaccinated
  - Fewer persons vaccinated with QIV, could have led to modest increases in morbidity or mortality

# CONCLUSIONS

- When TIV supply exceeds demand (e.g., 2005-2009)
  - Vaccine-induced protection against both B lineages using QIV could have led to modest reduction in morbidity and mortality
  - Absolute impact varies by season
    - Depending on amount and distribution of influenza B viruses

# Thank you

**For more information please contact Centers for Disease Control and Prevention**

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