

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?

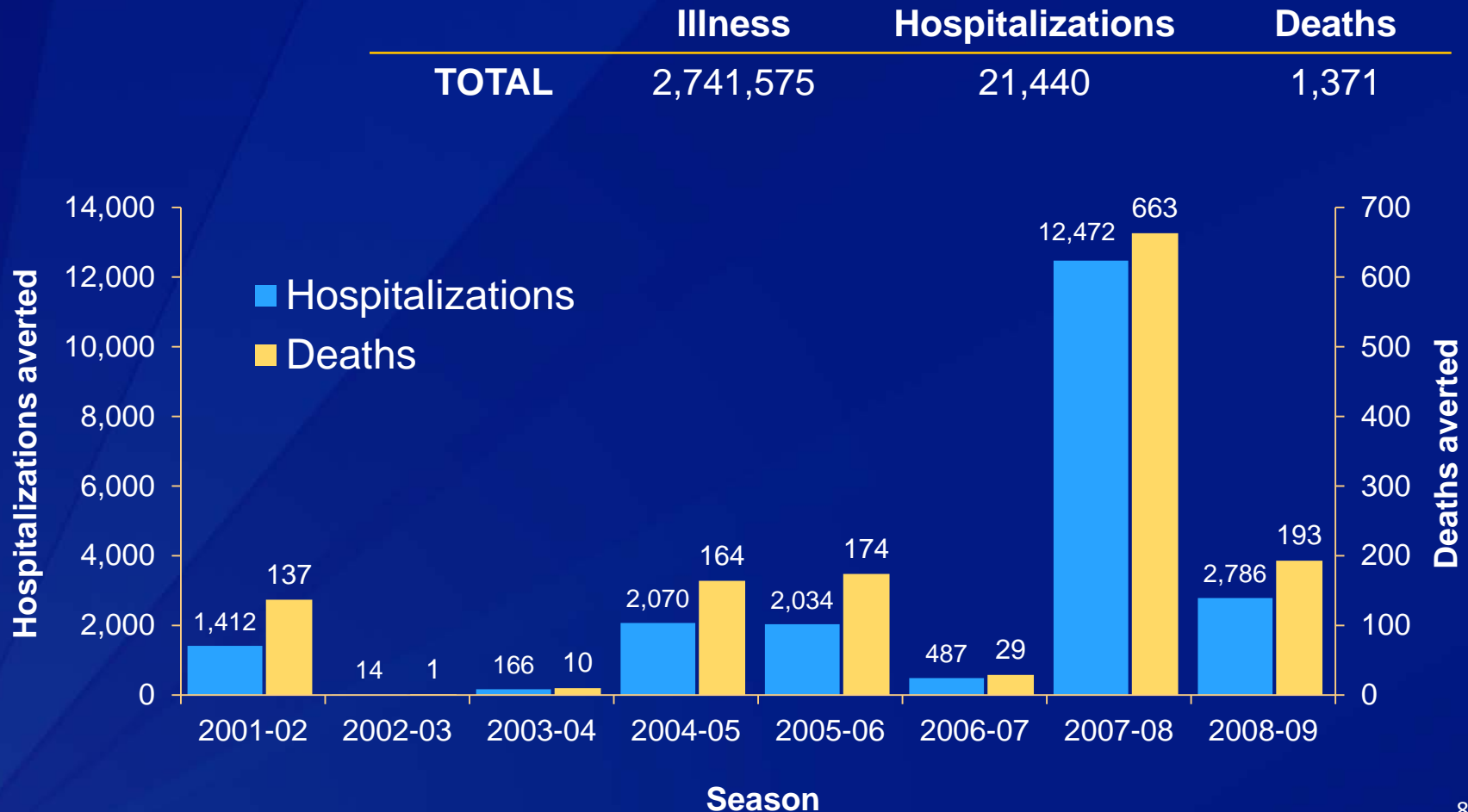
- **Calculates expected burden of influenza during each season**
 - Assuming same vaccine coverage and vaccine efficacy, but now with efficacy against both B lineages
 - Outcomes: rates of illness, hospitalization, death
- **Compares expected rates with QIV to rates observed with TIV**
 - Calculate additional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

DATA NEEDED

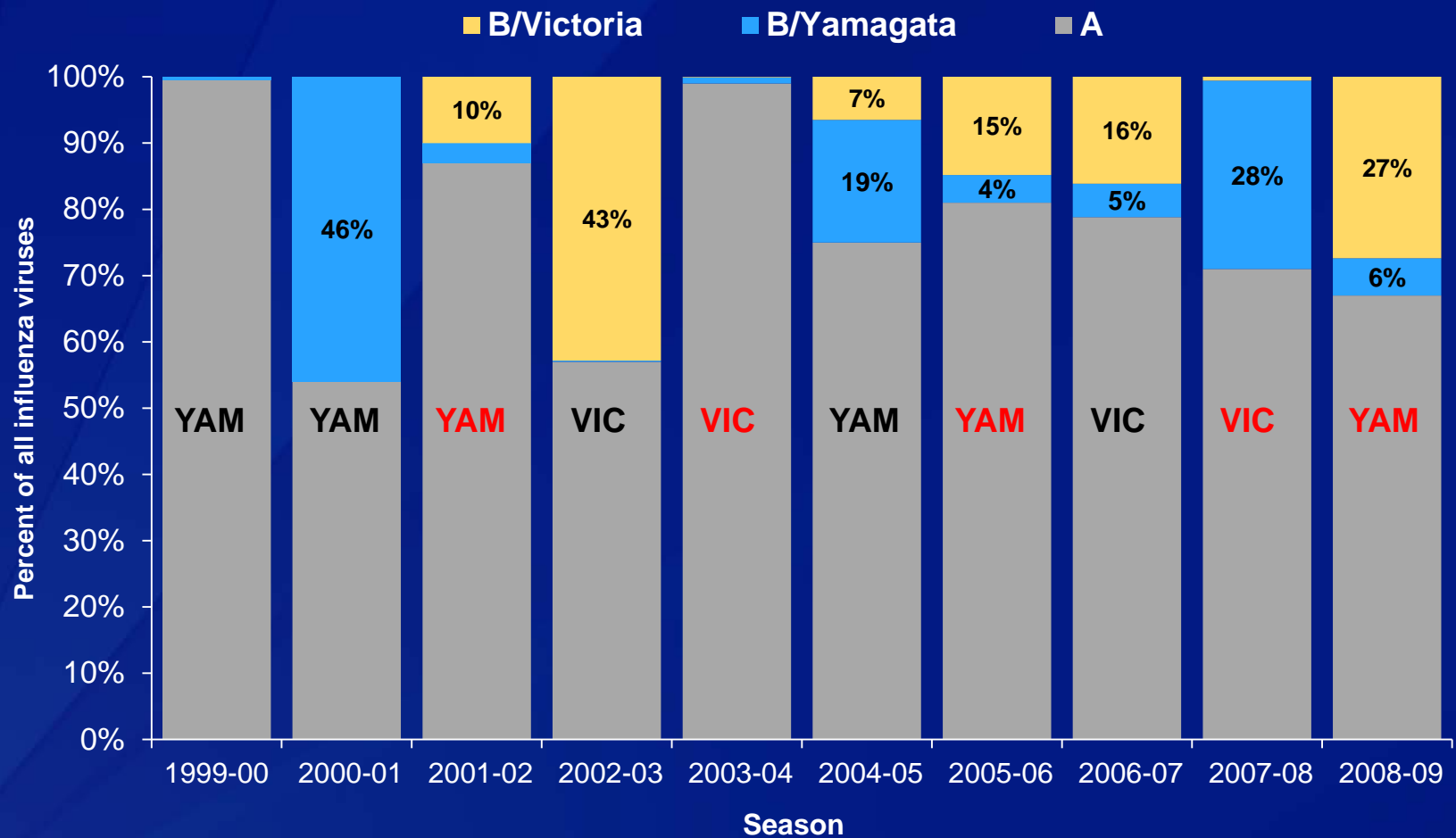
- **Rates of influenza-associated health outcomes**
 - Illness, hospitalization, death
 - By type / subtype / lineage over 10 seasons
- **Vaccine effectiveness**
 - By type / subtype / lineage over 10 seasons
- **Virologic surveillance**
 - Annual distribution of type, subtype, and lineage
- **Vaccine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

RESULTS: IMPACT OF QIV vs. TIV

- Cases averted per US population



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

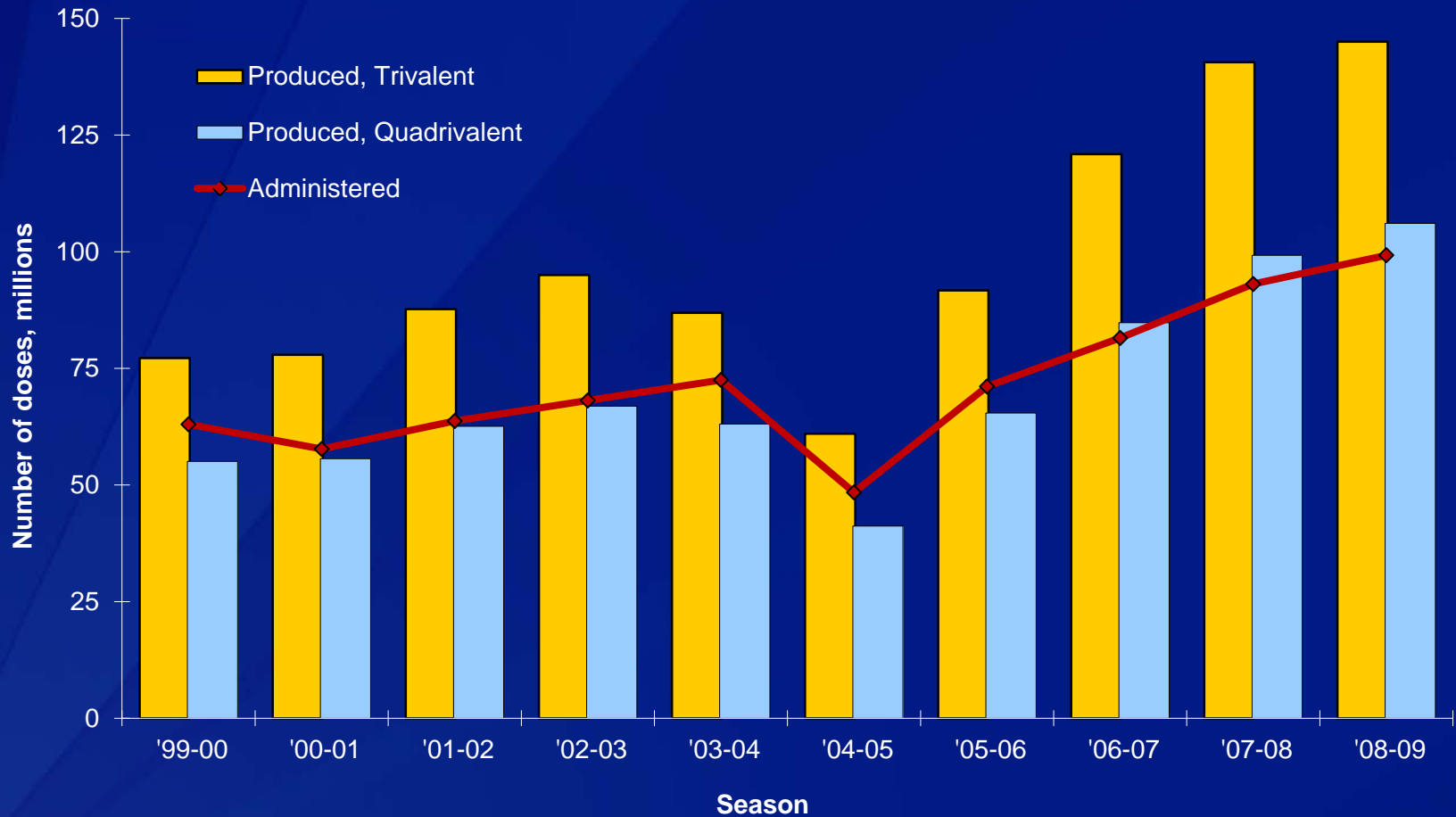
RISK: FEWER DOSES OF QIV?

- **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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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

National Center for Immunization & Respiratory Diseases

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