



Cost-effectiveness of adult vaccinations: Results from two literature reviews

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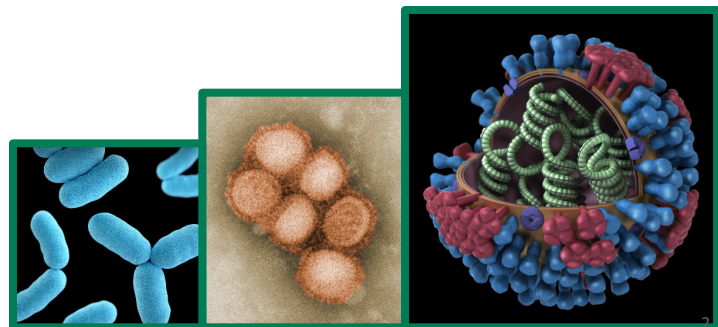
National Adult and Influenza Immunization Summit

May 14, 2019

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

Outline

- Background on cost-effectiveness
- Study 1: “Cost-effectiveness of adult vaccinations: A systematic review”
- Study 2: “A review of the cost-effectiveness of adult influenza vaccination and other preventive services” (with contractor Battelle)



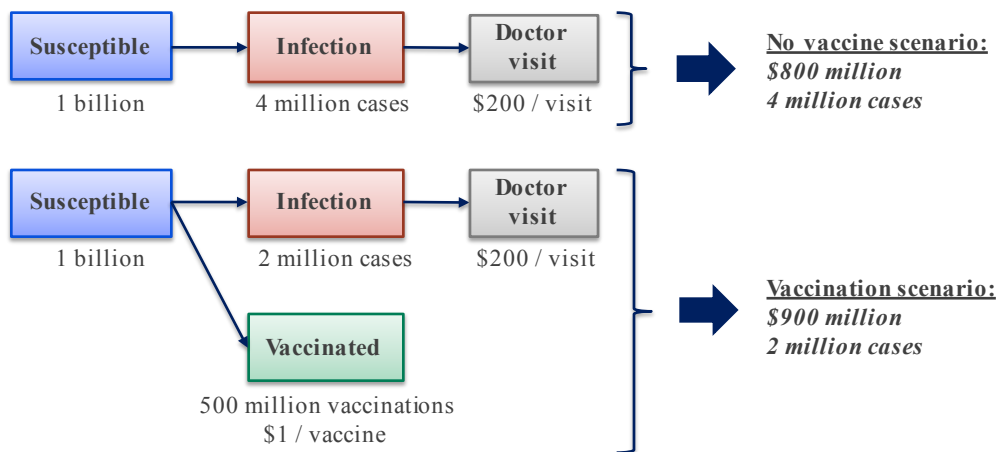
Cost-effectiveness analysis

- Purpose
 - Evaluate two or more strategies (or interventions) designed to improve health
 - Vaccination vs. no vaccination
 - Estimate a cost per health outcome gained for an intervention
- Important terminology
 - Cost-effectiveness ratios
 - Quality-adjusted life-years

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Cost-effectiveness analysis

- Simple cost-effectiveness model



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Cost-effectiveness analysis

Vaccination scenario:
\$900 million
2 million cases averted

No vaccine scenario:
\$800 million
0 cases averted

- What is a cost-effectiveness ratio?
 - An estimated cost per health outcome gained, comparing two strategies

$$\frac{\text{Costs}_{\text{Vaccination}} - \text{Costs}_{\text{No Vaccination}}}{\text{Outcomes}_{\text{Vaccination}} - \text{Outcomes}_{\text{No Vaccination}}} = \frac{\text{Change in costs}}{\text{Change in outcomes}} = \$ / \text{outcome}$$

$$\frac{\$900\text{M} - \$800\text{M}}{2\text{M averted cases} - 0 \text{ averted cases}} = \frac{\$100\text{M}}{2\text{M averted cases}} = \$50 / \text{case averted}$$

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Common health outcomes

- Cases averted
- Deaths averted
 - Assumption: death of a 5 year old is equal to death of a 90 year old
- Life years
 - Based on life expectancy
- Quality-adjusted life-years (QALYs)
- Disability-adjusted life-years (DALYs)

Least abstract outcomes to use, very common in early CE studies

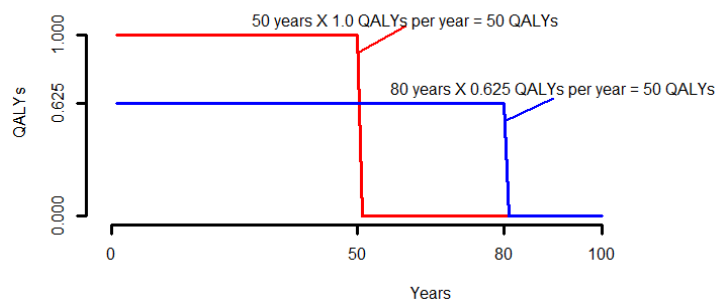
Only considers mortality disease burden, not morbidity

Considers morbidity and mortality disease burden

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Quality-adjusted life-years (QALYs)

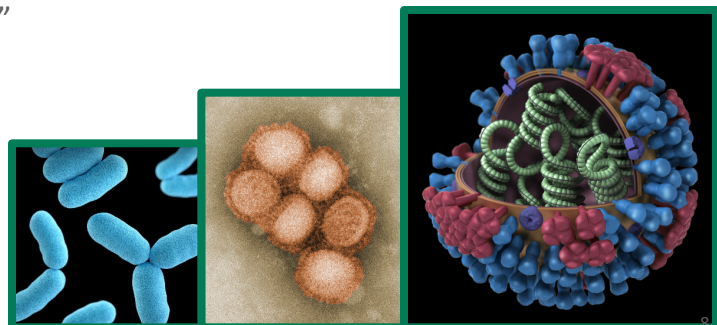
- Accounts for length of life and quality of life
 - One year of perfect health = 1.0 QALY
 - One year of death = 0.0 QALY
 - One year of non-perfect health > 0.0 and < 1.0



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Outline


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 - Results presented as costs effectiveness ratios (\$/QALY)
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Study 1


Vaccine 37 (2019) 226–234

Contents lists available at [ScienceDirect](#)

 **ELSEVIER**

Vaccine


journal homepage: www.elsevier.com/locate/vaccine



Review

Cost-effectiveness of adult vaccinations: A systematic review

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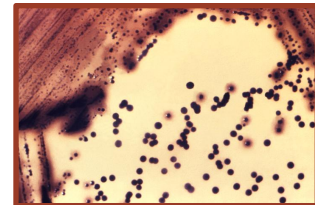
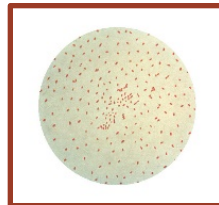
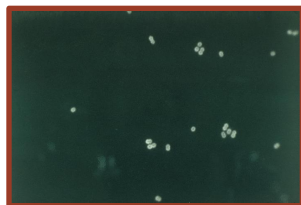
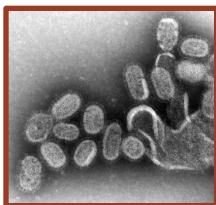
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Objectives

Cost-effectiveness of adult vaccinations: A systematic review (Study 1)

- Assess the research literature since 1980 to summarize economic evidence for vaccinations included on the recommended adult schedule
 - Vaccination groups: Influenza, pneumococcal, human papillomavirus (18-26 year olds only), herpes zoster, hepatitis B, Td/Tdap



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Methods

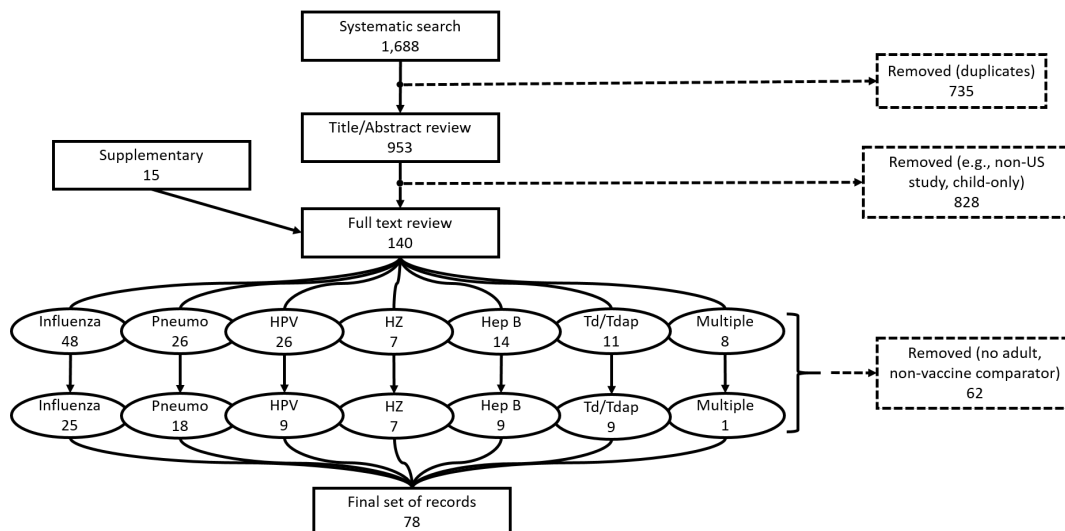
Cost-effectiveness of adult vaccinations: A systematic review (Study 1)

- Searched PubMed, EMBASE, EconLit, and Cochrane Library from 1980 to 2016 for cost-effectiveness analyses on vaccinations of persons 18 years or older in the US or Canada
- Excluded publications based on reviews of title/abstract, and full text reviews conducted by two independent reviewers
- Final set of publications compared vaccination to “no vaccination” scenarios
- Identified multiple cost-effectiveness estimates or ranges of estimates from each study, depending on how results were presented

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Methods

Cost-effectiveness of adult vaccinations: A systematic review (Study 1)

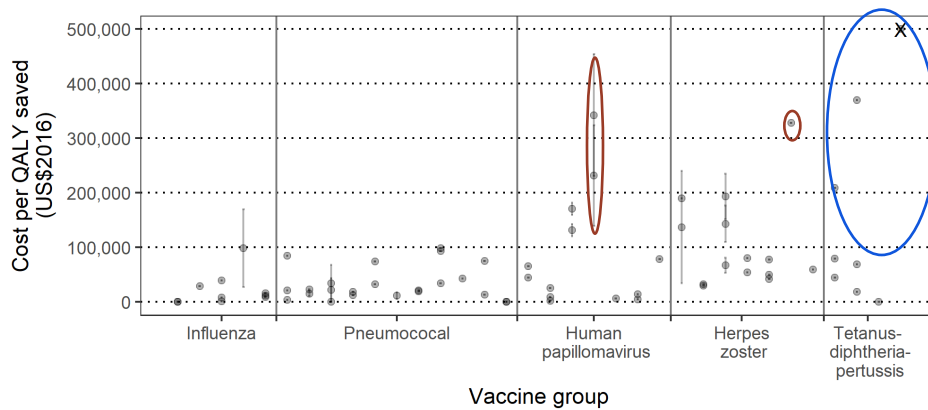


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Results

Cost-effectiveness of adult vaccinations: A systematic review (Study 1)

- Vaccinations recommended based on age



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Summary

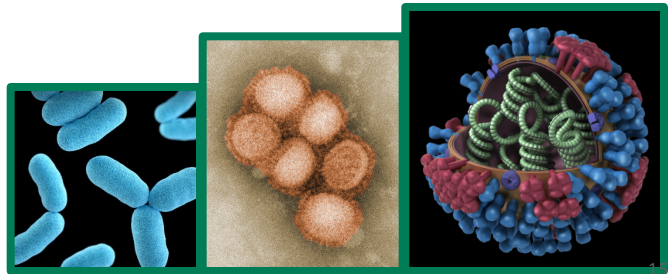
Cost-effectiveness of adult vaccinations: A systematic review (Study 1)

- Some vaccinations had estimates that were cost-saving
 - 56% of influenza
 - 31% of pneumococcal
 - 23% of Td/Tdap
- Many estimates cost less than \$100,000 per QALY
 - 100% of influenza and pneumococcal
 - 69% of human papillomavirus
 - 71% of herpes zoster
 - 50% of Td/Tdap

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Outline

- Background on cost-effectiveness analyses
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- Study 1: “Cost-effectiveness of adult vaccinations: A systematic review”
- Study 2: “A review of the cost-effectiveness of adult influenza vaccination and other preventive services”



Study 2

A Review of the Cost-Effectiveness of Adult Influenza Vaccination and Other Preventive Services

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Background

A Review of the Cost-effectiveness of Adult Influenza Vaccination and Other Preventive Services (Study 2)

- Influenza vaccination
 - 43.3% of adults ≥ 18 years old were vaccinated in the U.S. in the 2016-17 influenza season
- Other preventive services
 - 71.5% of women aged 50-74 undergoing mammography
 - 62.4% of adults aged ≥ 50 undergoing colorectal cancer screening
 - 82.8% of adults aged ≥ 18 screened for high blood pressure

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Objectives

A Review of the Cost-effectiveness of Adult Influenza Vaccination and Other Preventive Services (Study 2)

- Objectives: Summarize the research on the cost-effectiveness of adult influenza vaccinations as well as other preventive services relevant to adults
 - Other preventive services included: breast cancer screening, colorectal cancer screening, and hypertension screening and treatment



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Methods

A Review of the Cost-effectiveness of Adult Influenza Vaccination and Other Preventive Services (Study 2)

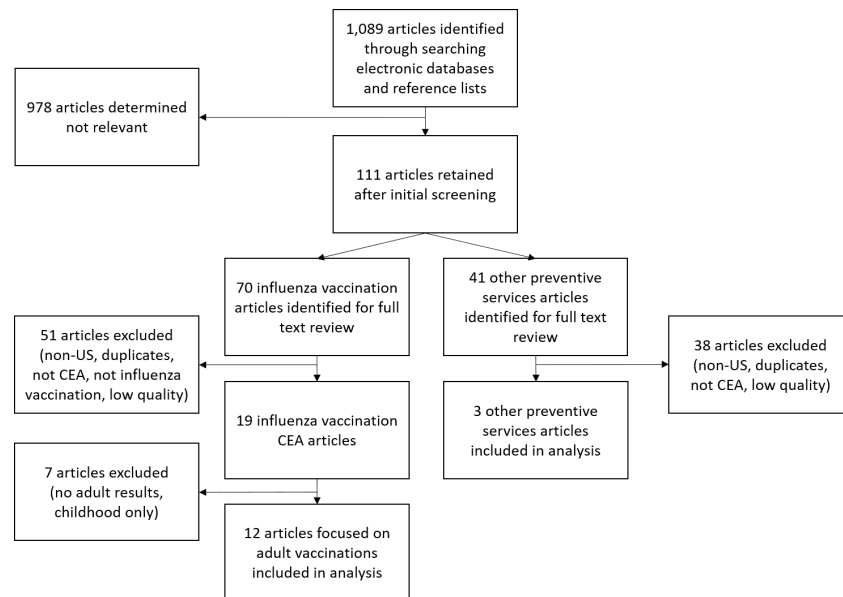
- Searched for cost-effectiveness research on adult influenza vaccines, colorectal cancer screening, mammography, hypertension screening and treatment
 - 12 medical and public health research literature databases
 - 1996 to 2016



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Methods

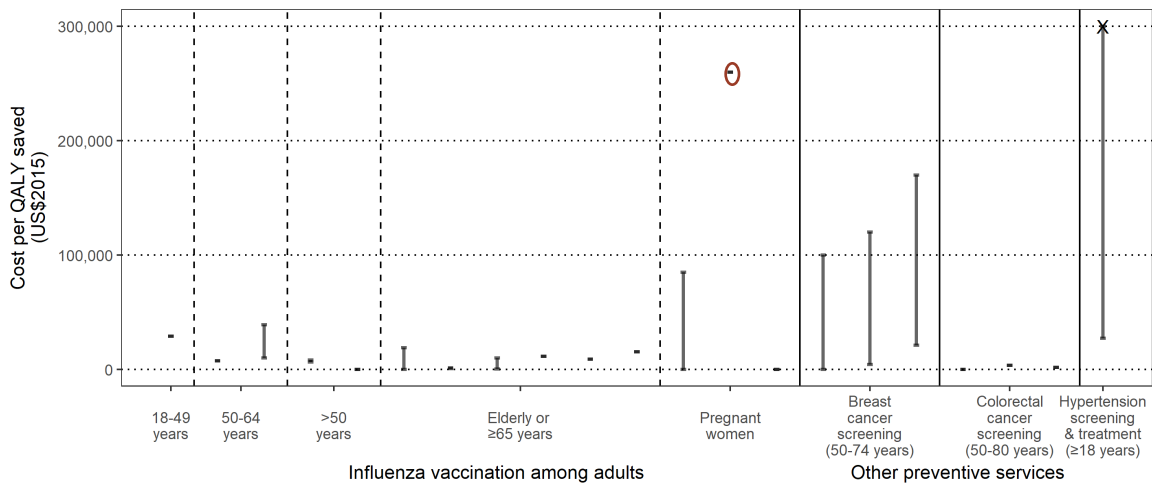
Study 2



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Results

A Review of the Cost-effectiveness of Adult Influenza Vaccination and Other Preventive Services (Study 2)



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Summary

A Review of the Cost-effectiveness of Adult Influenza Vaccination and Other Preventive Services (Study 2)

- Influenza vaccination in adults appears to have a similar cost-effectiveness profile as other commonly utilized preventive services for adults
- Adult-patient providers, healthcare systems and payers may want to implement measures to improve influenza vaccination of adult patients

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Overall summary



- Study 1 looked at all adult vaccinations and found generally favorable cost-effectiveness estimates, including some estimates of cost-savings
- Study 2 found cost-effectiveness of adult influenza vaccinations was generally comparable to other common preventive services for adults
- Adult vaccinations were associated with cost-effectiveness values that would be generally considered to be a good value

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Thanks and acknowledgements

- Study 1 coauthors
 - Neil Murthy, Harrell Chesson, Matthew Biggerstaff, Charles Stoecker, Aaron Harris, Anna Acosta, Kathleen Dooling, Carolyn Bridges
- Study 2 coauthors
 - Nazila Debastani (Battelle), Eric Seiber, Hyoshin Kim (Battelle), Sam Graitcer, Ivo Foppa (Battelle), Carolyn Bridges
- Colleagues from CDC/NCIRD/Immunization Services Division
 - Bo-Hyun Cho, Zana Somda, Jamie Pike, Fangjun Zhou, Yuping Tsai, Cindy Weinbaum, Ram Koppaka
- Most of the photos in this presentation were taken from the Public Health Image Library: <https://phil.cdc.gov/phil/home.asp>

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

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TTY: 1-888-232-6348 www.cdc.gov

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Extra slides

Results

Cost-effectiveness of adult vaccinations: A systematic review (Study 1)

- Vaccinations recommended based on indications

