Effectiveness of the trivalent influenza vaccine

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Clinical question

Does the seasonal trivalent influenza vaccine (flu shot) prevent influenza or its complications in adults and seniors?

Bottom line

For healthy adults, the flu shot reduces the influenza rate when the vaccine is well matched (number needed to treat [NNT] of 12 to 37). A poorly matched vaccine has diminished effectiveness. For community-dwelling seniors, the NNT to prevent 1 case of influenza is 40. The flu shot has not been shown to decrease hospitalizations. Evidence that the flu shot decreases mortality is likely biased.

Evidence

For those aged 16 to 65 years:

- Meta-analysis of 17 flu-shot RCTs in 38 800 adults.[1]
  -Influenza with well-matched vaccine (matches ≥80% of circulating virus) = 1.2% and with control = 3.9%; NNT = 37.
  -Influenza with poor or uncertain vaccine match = 1.1% and with control = 2.4%; NNT = 77.
  -Number of sick days decreased (by about half a day) when vaccine was matched.
  -Hospitalization (2 trials) and pneumonia rates (1 trial) were not affected and mortality rates were not reported.
  -Limitations: most studies examined 1 influenza season, many included health care workers or children, and some examined epidemics from 30 years ago.
- Systematic review of 8 RCTs reported NNT = 67 for flu shot.[2]
- The most generalizable RCT involved American factory workers during 2 influenza seasons.[3]
  -Influenza with well-matched vaccine = 1.4% and with placebo = 10.2%; NNT = 12.
  -No statistical difference for poor vaccine match.

For seniors aged 65 years or older:

- Authors of a meta-analysis concluded they were unable to determine the flu shot's effectiveness in seniors.[4]
- The highest-quality flu-shot RCT in 1838 community-dwelling seniors found influenza with vaccine = 1.7% and with placebo = 4.2%; NNT = 40.[5]

Context

- The flu shot is updated annually to match predicted strains and, in Canada, was well matched in 7 of the past 14 years (calculated with data from **www.phac aspc.gc.ca/fluwatch**).
- Localized (pain) and systemic (fever or myalgia) adverse events are more common with the flu shot than with placebo.[1,4]
- Observational evidence that the flu shot reduces hospitalizations and mortality[6] is biased by healthier patients more often choosing vaccination.[4,7]
- Canadian guidelines recommend universal flu shots.[8]

Implementation

Influenza is prevented primarily through hand washing and vaccination.[9] In the past, only about 30% of Canadians and 40% of health care workers received flu shots.[10,11] Influenza treatment is primarily supportive. The apparent effectiveness of neuraminidase inhibitors such as oseltamivir in treating influenza (symptom resolution about 1 day earlier; 6.7 vs 5.8 days) is likely biased; most oseltamivir trials are not published and there is selective reporting of adverse events.[12,13] To increase vaccination, public campaigns and personal reminders might be beneficial.[12] Patient education addressing myths (eg, the flu shot causes influenza; the vaccine is unsafe) is essential.

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