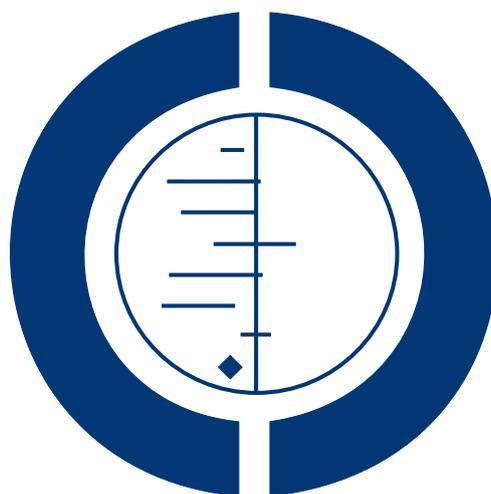


Vaccines for preventing influenza in healthy adults (Review)

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[Intervention Review]

Vaccines for preventing influenza in healthy adults

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Editorial group: Cochrane Acute Respiratory Infections Group.

Publication status and date: Edited (no change to conclusions), comment added to review, published in Issue 1, 2015.

Review content assessed as up-to-date: 24 May 2013.

Citation: Demicheli V, Jefferson T, Al-Ansary LA, Ferroni E, Rivetti A, Di Pietrantonj C. Vaccines for preventing influenza in healthy adults. *Cochrane Database of Systematic Reviews* 2014, Issue 3. Art. No.: CD001269. DOI: 10.1002/14651858.CD001269.pub5.

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ABSTRACT

Background

Different types of influenza vaccines are currently produced worldwide. Vaccination of pregnant women is recommended internationally, while healthy adults are targeted in North America.

Objectives

To identify, retrieve and assess all studies evaluating the effects (efficacy, effectiveness and harm) of vaccines against influenza in healthy adults, including pregnant women.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* 2013, Issue 2), MEDLINE (January 1966 to May 2013) and EMBASE (1990 to May 2013).

Selection criteria

Randomised controlled trials (RCTs) or quasi-RCTs comparing influenza vaccines with placebo or no intervention in naturally occurring influenza in healthy individuals aged 16 to 65 years. We also included comparative studies assessing serious and rare harms.

Data collection and analysis

Two review authors independently assessed trial quality and extracted data.

Main results

We included 90 reports containing 116 data sets; among these 69 were clinical trials of over 70,000 people, 27 were comparative cohort studies (about eight million people) and 20 were case-control studies (nearly 25,000 people). We retrieved 23 reports of the effectiveness and safety of vaccine administration in pregnant women (about 1.6 million mother-child couples).

The overall effectiveness of parenteral inactivated vaccine against influenza-like illness (ILI) is limited, corresponding to a number needed to vaccinate (NNV) of 40 (95% confidence interval (CI) 26 to 128). The overall efficacy of inactivated vaccines in preventing confirmed influenza has a NNV of 71 (95% CI 64 to 80). The difference between these two values depends on the different incidence of

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ILI and confirmed influenza among the study populations: 15.6% of unvaccinated participants versus 9.9% of vaccinated participants developed ILI symptoms, whilst only 2.4% and 1.1%, respectively, developed laboratory-confirmed influenza.

No RCTs assessing vaccination in pregnant women were found. The only evidence available comes from observational studies with modest methodological quality. On this basis, vaccination shows very limited effects: NNV 92 (95% CI 63 to 201) against ILI in pregnant women and NNV 27 (95% CI 18 to 185) against laboratory-confirmed influenza in newborns from vaccinated women.

Live aerosol vaccines have an overall effectiveness corresponding to a NNV 46 (95% CI 29 to 115).

The performance of one-dose or two-dose whole virion pandemic vaccines was higher, showing a NNV of 16 (95% CI 14 to 20) against ILI and a NNV of 35 (95% CI 33 to 47) against influenza, while a limited impact on hospitalisation was found (NNV 94, 95% CI 70 to 1022).

Vaccination had a modest effect on time off work and had no effect on hospital admissions or complication rates. Inactivated vaccines caused local harms. No evidence of association with serious adverse events was found, but the harms evidence base was limited.

The overall risk of bias in the included trials is unclear because it was not possible to assess the real impact of bias.

Authors' conclusions

Influenza vaccines have a very modest effect in reducing influenza symptoms and working days lost in the general population, including pregnant women. No evidence of association between influenza vaccination and serious adverse events was found in the comparative studies considered in the review. This review includes 90 studies, 24 of which (26.7%) were funded totally or partially by industry. Out of the 48 RCTs, 17 were industry-funded (35.4%).

PLAIN LANGUAGE SUMMARY

Vaccines to prevent influenza in healthy adults

Review question

We evaluated the effect of immunisation with influenza vaccines on preventing influenza A or B infections (efficacy), influenza-like illness (ILI) and its consequences (effectiveness), and determined whether exposure to influenza vaccines is associated with serious or severe harms. The target populations were healthy adults, including pregnant women and newborns.

Background

Over 200 viruses cause influenza and ILI, producing the same symptoms (fever, headache, aches, pains, cough and runny noses). Without laboratory tests, doctors cannot distinguish between them as both last for days and rarely lead to death or serious illness. At best, vaccines may only be effective against influenza A and B, which represent about 10% of all circulating viruses. Annually, the World Health Organization estimates which viral strains should be included in the next season's vaccinations.

Inactivated vaccine is prepared by treating influenza viruses with a specific chemical agent that "kills" the virus. Final preparations can contain either the complete viruses (whole vaccine) or the active part of them (split or subunit vaccines). These kind of vaccines are normally intramuscularly administered (parenteral route)

Live attenuated vaccines is prepared by growing the influenza viruses through a series of cell cultures or animal embryos. With each passage, the viruses lose their ability to replicate in human cells but can still stimulate the immune system. Live attenuated vaccine are administered as aerosol in the nostrils (intranasal route).

The virus strains contained in the vaccine are usually those that are expected to circulate in the following epidemic seasons (two type A and one B strains), accordingly to the recommendations of the World Health Organization (seasonal vaccine).

Pandemic vaccine contains only the virus strain that is responsible of the pandemic (i.e. the type A H1N1 for the 2009/2010 pandemic).

Study characteristics

The evidence is current to May 2013. In this update, 90 reports of 116 studies compared the effect of influenza vaccine with placebo or no intervention. Sixty-nine reports were clinical trials (over 70,000 people), 27 were comparative cohort studies (about eight million people) and 20 were case-control studies (nearly 25,000 people). Of the 116 studies, 23 (three case-control and 20 cohort studies) were performed during pregnancy (about 1.6 million mother-child couples).

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Key results

The preventive effect of parenteral inactivated influenza vaccine on healthy adults is small: at least 40 people would need vaccination to avoid one ILI case (95% confidence interval (CI) 26 to 128) and 71 people would need vaccination to prevent one case of influenza (95% CI 64 to 80). Vaccination shows no appreciable effect on working days lost or hospitalisation.

The protection against ILI that is given by the administration of inactivated influenza vaccine to pregnant women is uncertain or at least very limited; the effect on their newborns is not statistically significant.

The effectiveness of live aerosol vaccines on healthy adults is similar to inactivated vaccines: 46 people (95% CI 29 to 115) would need immunisation to avoid one ILI case.

The administration of seasonal inactivated influenza vaccine is not associated with the onset of multiple sclerosis, optic neuritis (inflammation of the optic nerve of the eye) or immune thrombocytopenic purpura (a disease that affects blood platelets). The administration of pandemic monovalent H1N1 inactivated vaccine is not associated with Guillain-Barré syndrome (a disease that affects the nerves of the limbs and body).

Evidence suggests that the administration of both seasonal and 2009 pandemic vaccines during pregnancy has no significant effect on abortion or neonatal death.

Quality of the evidence

The real impact of biases could not be determined for about 70% of the included studies (e.g. insufficient reporting details, very different scores among the items evaluated). About 20% of the included studies (mainly cohorts) had a high risk of bias. Just under 10% had good methodological quality.