Gender (in)equality in Human Papilloma Virus (HPV) vaccinations and treatment

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HPV virus: a gender neutral killer

• Four out of five (80%) of the world's population will contract some type of the virus once in their life via sexual contact [1]

• High risk types of HPV can cause cervical cancer in women as well as other cancers such as anal, mouth/throat and cancer of the penis in men [2]
HPV infection can be prevented

- Individuals who are not sexually active almost never develop genital HPV infections [3]
- HPV vaccination before sexual activity can reduce the risk of infection by the HPV types targeted by the vaccine [4]
Debate on vaccination strategies

Gender neutral vaccination
• Physicians recommend to vaccinate girls and boys

Selective vaccination
• Most of the National Health Systems in Europe continue to implement the selective immunization of 12-year-old girls only
• This policy decision is based purely on cost-effectiveness
How are boys protected if they are not vaccinated?

Herd immunity

• The presence of enough immune (vaccinated) individuals in a community interrupts the transmission of an infective agent, thereby providing indirect protection to unvaccinated (susceptible) persons [5].
Our research: critical review of cost effectiveness studies (n=8)

What is cost-effectiveness?

• Form of economic analysis that compares the relative costs and outcomes (effects) of different interventions.

• If the incremental cost of a new intervention results below a given threshold, then it is cost-effective.
Outcome 1: a matter of price

Sensitivity to boundary conditions

• All the cost-effectiveness studies resulted extremely sensitive to the inputs used to inform the models

• In particular, adding boys to HPV vaccination became cost effective in all models at a threshold price/vial

Threshold price per vaccine vial

€28

at 2015 values
Outcome 2: ecological validity

How well the models reflect our society?

• Closed population or cohort models: no immigration allowed
• Behaviours relevant to sexual mixing [6] ignored:
  • Sexual identity
  • Concurrent partnerships
  • Sex abroad
  • Pay for sex
  • Frequency of unprotected sex

Implications

• The non-modelled behaviours related to sexual mixing may have produced an over-estimation of the impact of herd immunity [7]
• When we tested a credible hypothesis of 5% to 20% over-estimation of herd immunity, most of the scenarios including gender neutral vaccination became cost-effective.
About a 12 year old boy

Lifetime probabilities [6]

- To have sex with an immigrant born abroad: 4%
- To be gay: 3%
- To have occasional same sex experiences: 8%
- To have sex abroad: 8%
- To pay for sex: 4%
In his life, an unvaccinated boy has a 4 to 5% possibility to be unprotected by herd immunity...
...when it counts the most

up to $44x$ risk of HPV infection vs. general population [8]
Conclusions

• The published cost effectiveness studies on HPV vaccination to boys are likely to over-estimate the benefits of herd effects on the unvaccinated population.

• A relatively small (15 to 20%) over-estimation of herd immunity obtained with selective immunisation could induce a significant error in the estimate of the cost-effectiveness of gender neutral immunisation.

Offering the HPV vaccination to both boys and girls would be the most effective option for improving public health.

[Research Council UK, 2013]
References


