Cost-effectiveness of HPV primary screening: summary of existing evidence

A targeted literature search was conducted using the NHS Economic Evaluations Database[1] (NHS EED) in order to identify previous economic evaluations of HPV primary screening. Details are provided in Appendix A. Seven papers [1-7] that included relevant cost-effectiveness analyses reporting incremental cost per quality—adjusted life years in the base case analysis were retained after applying inclusion and exclusion criteria (described in appendix A).

Cost-effectiveness evidence from the UK

Two economic analyses for HPV primary screening have been performed in the UK – both alongside the ARTISTIC trial [1, 2]. We consider only the most recent economic analysis based on follow-up data from the ARTISTIC trial extension [1]. The economic analyses featured several HPV primary screening strategies in an English screening setting. This review focuses on the results from Strategy 1 and Strategy 2, as summarised in Appendix B, compared to current practice of cytology-based screening. Screening intervals were at 3-yearly (ages 25-49) and 5-yearly (ages 50-64) for both comparators. Extensive model validation, scenario and sensitivity analyses were performed.

Strategy 1 was found to result in a QALY gain (73.92 QALYs gained per 100 000 women) and to be cost saving (17.8% cost reduction) compared to current practice. Strategy 2 was also found to result in both a QALY gain (126.84 QALYs gained per 100 000 women) and a cost saving (16.3% cost reduction) compared to current practice.

Overall the authors noted that a range of potential primary HPV screening strategies (including the exploratory modelling of additional strategies not directly assessed in the ARTISTIC trial, and adjusting screening intervals for women of different ages) were found to be cost-saving and resulted in QALY gains. The authors conclude that replacing cytology with HPV testing for primary screening is likely to be cost-effective.

Additional evidence from non-UK based studies

Germany

A model-based economic evaluation in the German health care setting [3] compared several primary HPV based strategies to conventional cytology-based screening. The authors concluded that HPV based screening is more effective than current practice (cytology based screening). In terms of cost-effectiveness, HPV based screening dominated current practice in Germany (i.e. was less costly and more effective) for annual screening. Any extension in screening interval resulted in a decrease in costs but no decrease in effectiveness. The authors found that HPV based strategies were likely to be cost-effective at screening intervals of 2 years or more.

Netherlands

Two studies were identified that presented cost-effectiveness results for the Netherlands [4, 5]. Both were based on the MISCAN-CERVIX patient level simulation model. The studies found in favour of switching from cytology to HPOV testing based on the cost-effectiveness results. The authors also found that extending the screening interval improves effectiveness and decreases costs.

[1] The NHS Economic Evaluations Database is managed by the Centre for Reviews and Dissemination at the University of York. http://www.crd.york.ac.uk/CRDWeb/AboutPage.asp

Norway

One study was identified that assessed HPV primary screening in Norway [6]. The authors analysed potential algorithms for switching the HPV primary screening at older ages in the screening population (aged 31-34 years). Switching to HPV based screening for older age groups was found to result in decreased costs and increased effectiveness of screening.

Canada

One study based in Canada [7] looked at a range of screening strategies including cytology + HPV triage every three years, and HPV primary + cytology triage every three years. Comparing the results presented for these two strategies only gives an increase in QALYs of 0.0048 per person, and an increase in costs of $59 per person. The incremental cost per QALY gained was therefore $12,291 for HPV primary screening compared to cytology + HPV triage.

Conclusions

HPV primary screening has been found to be cost-effective or cost saving and associated with an increase in quality adjusted life years in a range of studies across various countries. The most recent cost-effectiveness analysis for the UK setting, based on a trial of HPV primary screening strategies, considered many scenario and sensitivity analyses. HPV was found to be cost-effective or cost-saving across many of these.

Based on the existing literature there is evidence to suggest that HPV primary screening may be cost effective compared to current cytology based screening practice in the UK, however further analyses using data from the NHS Cervical Screening Programme primary HPV screening pilot would determine whether these outcomes are replicated when implementing primary HPV screening in the UK screening setting.

Appendix A - Literature search methods

NHS EED search – results only until the end of 2014 due to changes in funding

"HPV" AND "PRIMARY" AND "SCREENING" in NHS EED, HTA databases: 97 results

Filtering criteria

Papers were excluded if any of the following criteria were met:

- did not present base case cost-effectiveness results in terms of cost per QALY gained
- did not compare HPV primary screening to current practice cervical screening
- not English language

Appendix B – HPV primary screening strategies in [1]

Strategy 1: "The strategy can be summarised as follows: women positive for any oncogenic infection receive reflex cytology triage testing. Cytology-positive women (borderline dyskaryosis or worse) are referred to colposcopy. Cytology-negative women are sent for repeat HPV testing with cytology triage in 24 months, and any women who are HPV positive and borderline dyskaryosis or worse are referred to colposcopy at that point. HPV-positive, triage-negative women are sent for a repeat HPV testing in another 24 months, and HPV-positive women at that point are referred to colposcopy. HPV-negative women are returned to routine screening at each stage."

Strategy 2: "The strategy can be summarised as follows: women with any oncogenic HPV-positive infection have reflex cytology triage. Cytology-positive women (borderline dyskaryosis or worse) are referred to colposcopy. HPV-positive, cytology-negative women have repeat HPV and reflex cytology in 24 months with partial genotyping and any HPV 16/18 positive or borderline dyskaryosis or worse are referred to colposcopy at that point. Cytology-negative women and/or women negative for HPV 16/18 are sent for a repeat HPV test in another 24 months, with any HPV-positive women referred to colposcopy at that point. HPV-negative women are returned to routine screening."

References

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4. de Kok, I.M., et al., *Primary screening for human papillomavirus compared with cytology screening for cervical cancer in European settings: cost effectiveness analysis based on a Dutch microsimulation model.* BMJ, 2012. **344**: p. e670.
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7. Vijayaraghavan, A., et al., *Cost-effectiveness of high-risk human papillomavirus testing for cervical cancer screening in Quebec, Canada.* Can J Public Health, 2010. **101**(3): p. 220-5.