Economic Evaluation of a Universal Meningitis B Vaccination Programme in Ireland

In November 2013, the National Centre for Pharmacoeconomics (NCPE) completed the evaluation which examined the cost-effectiveness of a universal meningitis B vaccination programme in Ireland in response to a request from the National Immunisation Advisory Committee (NIAC). The purpose of the evaluation was to assess the potential epidemiological impact and cost-effectiveness of introducing the new meningitis B vaccine (Bexsero®, 4CMenB) as part of a universal vaccination programme in Ireland. A summary of the main findings are available in this document.

The NCPE has extensive experience in the economic evaluation of vaccines and has recently completed independent evaluations of the rotavirus and BCG vaccines. To complete the assessment of the meningitis B vaccine, the NCPE adapted an existing meningitis vaccine model to the Irish setting, in collaboration with the team at the School of Social and Community Medicine at the University of Bristol.

Following the advice from the NCPE, NIAC examine all the evidence which may be relevant for the decision. Reimbursement of the vaccine will then be considered by the HSE following a NIAC recommendation.

About the National Centre for Pharmacoeconomics

The NCPE are a team of clinicians, pharmacists, pharmacologists and statisticians who evaluate the benefit and costs of medical technologies and provide advice to the HSE. We also obtain valuable support from clinicians with expertise in the specific clinical area under consideration. Our aim is to provide impartial advice to help decision makers provide the most effective, safe and value for money treatments for patients. Our advice is for consideration by anyone who has a responsibility for commissioning or providing healthcare, public health or social care services.

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SUMMARY

Background

Neisseria *meningitidis* is a major cause of invasive meningococcal disease (IMD). In 2012, 66 cases of IMD were notified in Ireland, with serogroup B accounting for 58 cases (87.9%). Despite the decline in the number of cases in recent years, serogroup B disease remains an important cause of morbidity and mortality, with children under five years of age being most affected.

A new meningococcal vaccine (Bexsero®, 4CMenB) with the capacity to protect against serogroup B disease was licensed in the EU in January 2013. The aim of this evaluation is to estimate the potential epidemiological impact and the cost-effectiveness of introducing a universal meningitis B vaccination programme in Ireland.

Methods

An independently developed transmission dynamic model, which was developed by the University of Bristol, was adapted to the Irish setting by incorporating Irish epidemiological, resource utilisation and cost data. The model was originally developed to examine the potential impact and cost-effectiveness of meningitis B vaccines in England on behalf of Public Health England. The model was updated to address similar questions on the use of Bexsero® in Ireland. A range of vaccination strategies were considered.

The transmission dynamic model assumes the vaccine confers direct protection against disease as well as herd immunity. However, it is uncertain whether Bexsero® will provide direct protection only, or whether the vaccine will be able to also disrupt carriage, with the possibility of inducing herd immunity. For this reason, three scenarios for vaccine efficacy against carriage acquisition were considered (0%, 30% and 60%).

A healthcare payer perspective was adopted and the standard discount rate for costs and benefits (4%) in Ireland was applied. For the base case analysis the average incidence of IMD from 2008-2012 (adjusting for underreporting) was chosen. Direct costs included ambulance transfer, acute care, long-term sequelae and public health response. Vaccination costs included cost per vaccine dose, administration and adverse events. Uncertainty was considered through scenario analysis.

Results

- Greater health benefits are seen when the vaccine is assumed to generate herd effects as well as affording direct protection. In this case strategies targeting

teenagers, where carriage prevalence is high, either through catch-up or as part of a routine programme, maximises case reduction. The greatest short-term reduction in cases is seen with routine infant vaccination with a catch-up in 1-17 year olds.

- Assuming 30% vaccine efficacy against carriage acquisition (VEC), routine infant (2,4,6+12 months) and adolescent (2 doses in 12 year olds) vaccination with catch-up (13-17 years) is most effective (55% cases averted over 100 year time horizon).
- Routine adolescent vaccination with catch-up is most economically favourable, but cases averted are limited in the short term. None of the strategies including infant vaccination could be considered cost-effective at either a €20,000 or €45,000/QALY willingness to pay for any vaccine price. The adolescent vaccination strategies could be cost-effective at the €45,000/QALY threshold if the vaccine price were lowered to €8 per dose or less with a catch-up campaign and €7 per dose without, assuming 60% VEC.

Conclusion

The results of this evaluation highlight that the introduction of a routine immunisation programme with Bexsero® has the capacity to reduce meningococcal disease in Ireland, but at a very high cost. The most economically favourable strategy, assuming the vaccine can disrupt transmission, is routine adolescent vaccination with catch-up.

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