Appendix 2 (as supplied by the authors): Supplementary methods

Model structure.

We developed a de novo model which included decision tree and Markov model.

For the model for mothers, initial probabilities within a decision tree relate to the probability of the mother not developing pertussis or developing pertussis. For those developing pertussis they are parsed into those with mild symptoms, those with severe symptoms, those developing pneumonia those requiring hospitalization who do not die and those requiring hospitalization who die.

Thus the full list of states are:
No pertussis
Mild pertussis
Severe pertussis
Pneumonia
Pertussis hospitalized – survived
Pertussis hospitalized – death
After the initial twelve month period, patients in all states other than those who die are assumed to have the same life pathway which is depicted by a Markov model with two health states: alive and dead.

For the child model, initial probabilities within the decision tree relate to the probability of a child not developing pertussis or developing pertussis. For those developing pertussis they are parsed into those with mild symptoms not requiring hospitalization and those who do require hospitalization. For those hospitalized, they can either develop no further complications, develop encephalitis, or die. Those who develop encephalitis can recover or develop chronic encephalitis.

Thus the full list of states are:
No pertussis
Mild pertussis
Pertussis hospitalized
Pertussis hospitalized encephalitis – not chronic
Pertussis hospitalized chronic encephalitis
Pertussis hospitalized death

After the initial twelve month period, patients in the No pertussis, Mild pertussis, Pertussis hospitalized and Pertussis hospitalized encephalitis – not chronic states are assumed to have the same life pathway which is depicted by a Markov model with two health states: alive and dead. Patients in the Pertussis hospitalized chronic encephalitis are assumed to have a different life pathway which is depicted by a Markov model with the same two health states: alive and dead: but with greater probability of death and lower utility values.

Search strategy

The search strategy was designed by DC and MS, and conducted separately by DC and MS to identify relevant articles. Searches were conducted in PubMED, MEDLINE, references from identified articles, plus publically available documents

related to pertussis surveillance and/or immunization in pregnancy (for example, various national guidelines and national surveillance reports). No date restriction was used for the searches, but since pertussis immunization in pregnancy has only been widespread in the last ~10 years, most articles were from that time period. The search was restricted to English-language articles.

Data

The dated employed within the analysis follows Canadian guidance for the conduct of economic evaluation. Data for which there is sample uncertainty are represented by probability distributions. For all data within the model the probability distributions are derived from the actual data provided within the data source provided. For example for the probability of pertussis infections in infants for a given year, the data comes from the reference cited: uncertainty is represented by a beta distribution with alpha being the number of events and beta being the number without events. For the example, the proportion of infections which occur for each time period is represented by a Dirichlet distribution with the relevant numbers relating to the number of cases for each time period. Duration of symptoms is represented by a gamma distribution which is characterized by two parameters which are derived through the sample mean and sample standard error.

Cost data were required for the costs of outpatient care and hospitalization for pertussis and chronic encephalitis. For outpatient care, volume of resource use was obtained from the literature [3-4] which was then weighted by Canadian appropriate unit cost data [12,15-17]. Costs of hospitalizations from pertussis were obtained from the Canadian Institute of Health Information Patient Cost Estimator [13]. Costs associated with encephalitis were derived from a recent Canadian study [14].

