Development of a travelers’ diarrhea vaccine for the military: how much is an ounce of prevention really worth?
Riddle MS, Tribble DR, Cachafiero SP, Putnam SD, Hooper TI

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The objective was to evaluate the cost-effectiveness of a multiplex vaccine and pathogen-specific vaccines for the prevention of diarrhoea in travellers. The authors concluded that the vaccines against *Campylobacter* and enterotoxigenic *Escherichia coli* appeared to be more favourable than the *Shigella* vaccine. Although the methodology appears to have been appropriate, the results were not clearly reported and were difficult to understand, which makes it impossible to ascertain if the conclusions are valid.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to evaluate the cost-effectiveness of a multiplex vaccine and pathogen-specific vaccines for the prevention of diarrhoea in travellers.

Interventions
The study investigated the use of a multiplex vaccine and pathogen-specific vaccines, which were *Campylobacter*, enterotoxigenic *Escherichia coli* (ETEC), and *Shigella* vaccines. These were all compared against no vaccination and treatment for diarrhoea.

Location/setting
USA/primary care.

Methods
Analytical approach:
A decision analytic model was used to evaluate the cost-effectiveness of a vaccine acquisition strategy compared with the current disease management. The time horizon was 30 years and the authors reported that the perspective was that of the Department of Defence (DoD) medical health system and troop deployment.

Effectiveness data:
The authors reported that the clinical and effectiveness data were derived from a review of the literature and expert opinion. No further details of the methods used to obtain this data were reported. The main effectiveness parameter was the effectiveness of the vaccine in preventing diarrhoea. These estimates were derived from published studies, and the expert opinion of a Delphi panel.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The measure of benefit was the health-related outcome of duty days lost due to diarrhoea.

Cost data:
The direct costs were those of vaccine development, vaccine administration, the vaccine, treatment of adverse events, and ongoing antibiotic treatment when needed. The costs associated with managing diarrhoea and vaccine adverse
events were obtained from a number of sources including US government documents, previous economic studies by the DoD, and DoD accounting system information. The immunisation programme costs were derived from the DoD Military Vaccine Agency and vaccine development costs were obtained from a 2000 report published by an independent committee. All costs were updated to 2006 prices using the consumer price index for inflation. As costs could be incurred over 30 years, they were discounted at an annual rate of 3%. All costs were reported in US dollars ($).

Analysis of uncertainty:
A probabilistic sensitivity analysis was undertaken by assigning distributions to the costs, probabilities, and effectiveness variables, and recording the outputs of 3,000 Monte Carlo simulations.

Results
Compared with no vaccine, vaccinating 147,000 troops generated savings of $700,939 with the multiplex vaccine, $191,947 with *Campylobacter* vaccine, $334,672 with ETEC vaccine, and $196,436 with *Shigella* vaccine.

Vaccination averted the following duty days lost due to diarrhoea: 13,503 with the multiplex, 4,962 with *Campylobacter*, 5,340 with ETEC, and 3,485 with *Shigella* vaccine.

Compared with no vaccine, the cost per averted duty day lost due to diarrhoea was $1,366 for the multiplex, $1,243 for *Campylobacter*, $1,188 for ETEC, and $1,860 for *Shigella* vaccine.

Authors' conclusions
The authors concluded that the vaccines against *Campylobacter* and enterotoxigenic *Escherichia coli* appeared to be more favourable than the *Shigella* vaccine.

CRD commentary
Interventions:
The interventions were clearly described and appeared to be viable options in the authors' setting.

Effectiveness/benefits:
The authors reported that the clinical and effectiveness data were derived from a review of the literature and expert opinion, but they provided no further details of the methods used to obtain this data. As a result, it is not possible to ascertain if all the relevant data were included nor the validity of those estimates that were used.

Costs:
The perspective was clearly reported and it appears that all the relevant cost categories and costs were included for the DoD medical health system perspective. The sources from which the resource use and total costs were derived were clearly reported. In addition, the authors adequately reported the time horizon, the discount rate, and the price year to which the costs related. The generalisability of these costs to other perspectives is likely to be limited and care should be taken when determining which of the costs are relevant to your setting.

Analysis and results:
The decision analytic model was clearly reported, with a diagram, but the results of the analysis were not as clearly presented. It was unclear whether an incremental cost-effectiveness analysis was performed to compare the difference in costs between the interventions with the difference in effects. It was also unclear how the cost-effectiveness ratios were calculated. Therefore, the results should be treated with caution. A probabilistic sensitivity analysis was undertaken, but these results were similarly difficult to understand.

Concluding remarks:
Although the methodology appears to have been appropriate, the results were not clearly reported and are therefore difficult to understand. As a result, it is not possible to ascertain if the authors' conclusions are valid.

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