

VMC 609: Lecture 5

Vaccine development: Cost-effectiveness of preventive immunization programmes

Dr Manoj Kumar

Assistant Professor

Department of Veterinary Microbiology

Bihar Veterinary College, Patna



Ideal vaccine ...



Acceptably safe for everyone

Effective in inducing a durable protective immune response

Rapidly scalable

Stable at room temperature

Single dose and cost effective

Reduction of infectious disease burden by mass vaccination programme is an important pillar of animal health

Key for success

secured sufficient financial resources

Current context

rising pressure on health care budgets

Success to be guaranteed

correctly understanding the value vaccination

Cost effectiveness of preventive immunisation programme

Immunisation programme requires funding

policy making relies on investment and outcome of due funding

Cost-effectiveness analysis (CEA) → standard framework for estimating the value of healthcare intervention in terms of value for money

What is Cost effective analysis ???

compare incremental costs with their incremental health effects

cost-effectiveness - important predictor of funding decisions

referred to as the “fourth hurdle” after having demonstrating safety, quality, and efficacy

Cost-effectiveness analysis

AIM

- Maximize the health benefits per rupee spent
• → minimize the cost per unit of health benefit gained).

Rationale

- Cost-effectiveness analysis →
- → used as an aid to rational animal health decision making

Limitations of Cost effective analysis

cost-effectiveness analysis wrongly restricts itself to a “narrow” focus

underestimates the longer-term and broader economic effects of vaccines by measuring only short-term health care and productivity costs

considers effects only on vaccinated individual and closely related individuals (such as caregivers) instead of larger populations

herd immunity effects is not included

Cost-effectiveness ratio (CER)

Cost-effectiveness ratio is the ratio of the net costs to the net benefits

Immunization programmes are typically implemented over a long period of time

Costs and the benefits is summed over time & discounted to their present value

Defined as costs and benefits which occur in the future

Valued lower than costs and benefits that occur at present

Mathematical calculation of CER

$$\bullet CER = \frac{\int C(t) e^{-ri} dt}{\int [\phi^* - \phi(t)] e^{-ri} dt}$$

- where

- $C(t)$ is the net cost of the immunization campaign
- $\phi(t)$ is the incidence of infection at time t
- ϕ^* is the pre-vaccination incidence (assumed to be constant)
- r is the discount rate