Guidelines for the Economic Evaluation of Vaccination Programs in Canada

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Background

- In Canada, the mandate of the National Advisory Committee on Immunization (NACI) was expanded to evaluate cost-effectiveness of vaccination programs.
- Existing guidelines are either not specific to the universal healthcare context, or not specific to vaccination programs.
- Guidelines will inform best practices on how to conduct and report economic evaluations; and promote standardized and high-quality evidence

Objective: To develop Guidelines for the Economic Evaluation of Vaccination Programs in Canada

Who is Canada's National Advisory Committee on Immunization (NACI)?

- Multidisciplinary body of experts since 1964
  - Assesses vaccines currently or newly approved for use in Canada
  - Provides evidence-informed, non-binding recommendations
  - Advises the Public Health Agency of Canada
  - Informs publicly funded programs at provincial and territorial levels
  - Traditionally reviewed vaccine characteristics (e.g., safety, immunogenicity, efficacy) and disease burden
- Mandate expanded in 2019 to assess ethics, equity, feasibility, acceptability, and health economics (via economic evaluations)

Methods & Rationale

- Task group was convened with expertise in health economics, guidelines development, childhood health, infectious diseases modelling
- Task group included FPT liaisons
- Recommendations made through consensus, informed by literature reviews (Figure 1)

Figure 1: Development process and knowledge translation

Vaccines:

Vaccines differ from other health technologies because they have broad impacts that are unique to or are unusually large with vaccination programs (see Impact Inventory):

- Affect both vaccinated and unvaccinated individuals (i.e., via non-health spillovers and externalities)
- Have vaccine-specific indirect effects (e.g., herd immunity, age-shifting of disease, serotype replacement, disease eradication)
- Have non-health impacts such as to productivity, consumption and education

Hence, excluding broader impacts can undervalue vaccination programs

Guideline Highlights

Types of Evaluation	Use cost-utility analysis (CUA) as reference case; May consider cost-benefit analysis (CBA) alongside CUA
Study Populations	(1) Population(s) intended for the vaccination program (2) Population(s) at risk for the disease of interest, and (3) Populations that may be indirectly affected either through externalities or spillover effects
Comparators	Consider both preventive approaches (e.g., vaccination, screening, non-medical) and treatment-based approaches
Perspectives	Two reference case analyses: (1) Publicly funded health system perspective – includes healthcare clinical services and public health (2) Societal perspective
Time Horizon	Should be long enough to capture all relevant differences in the future costs and outcomes
Discounting	Constant at 1.5% per year for costs and outcomes; Sensitivity analyses: 0% and 3% per year
Modelling	Consider dynamic models when vaccines are associated with externalities such as prevention of human-to-human transmission of infection and age-shifting of disease
Effectiveness	When assessing vaccine effectiveness, consider dose and time (e.g., waning protection); pathogen variation-specific effectiveness (i.e., serotypes, serogroups, strains); and geographic and vaccine recipient factors
Measurement and Valuation of Health	Search comprehensively for health preferences that reflect general Canadian population; Assess fitness for purpose, credibility, and consistency
Resource Use and Costs	Search comprehensively for data and assess fitness for purpose, credibility, and consistency Note: • Include productivity loss and costs of non-health-related consumption in numerator of the ICER • Loss of paid work: Use human capital approach using age-specific (not gender-specific) average income; Test using naïve friction cost approach (account for production changes for one year only)
Analysis	Probabilistic analysis, where possible
Equity	Explore using methods such as distributional cost-effectiveness analysis and extended cost-effectiveness analysis where possible

Highlights of Impact Inventory (based on US 2nd Panel)

Health Outcomes

Individual - persons vaccinated
- Mortality
- Health-related quality of life
- Safety (i.e., adverse events)
- Health impacts not captured by QALYs

Individual - informal caregivers
- Health-related quality of life

Population
- Incidence of infection and disease in vaccinated and unvaccinated
- Age-shifting
- Serotype replacement
- Disease eradication

Health System Costs

Publicly funded
- Healthcare services
- Future related and unrelated healthcare costs
- Public health: program- and intervention-related

Not publicly funded
- Some medications
- Formal caregiver services
- Out-of-pocket and ancillary costs

Non-Health

Productivity
- Paid work - Time off work; Lifetime consequences; Presenteeism
- Unpaid work – Time off informal labour market; Uncompensated household production
- Informal caregiver productivity - Time off work; Presenteeism
- Macroeconomic consequences

Consumption
- Future individual non-medical consumption
- Changes in household consumption
- Health impacts of consumption (e.g., associated with job loss)

Direct out-of-pocket costs
- Transportation costs
- Accommodation costs

Education
- Educational achievement
- Costs of special education needs
- Disruptions to learning

Environment
- E.g., antibiotic use
- Food and non-food waste
- Carbon consumption

Comparison to Other Major Guidelines

Guidelines	Jurisdiction	Technology	Recommendation on perspective(s)
WHO, 2019	Any	Vaccines	Follow national guidelines; if none, societal
2nd Panel, 2016	US	Any	Healthcare sector AND societal
CADTH, 2017	Canada	Any	Publicly funded health care payer

Conclusions

- The NACI guidelines fill an unmet need and promote standardized economic evaluations
- They advocate for transparency, allowing evidence to be used across different jurisdictions, even beyond Canada.

English French

Chapters not highlighted: Foreword; Introduction; Decision problem; Uncertainty; Reporting

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CBA = cost-benefit analysis; CUA = cost-utility analysis; FPT = federal/ provincial/ territorial; HTA = health technology assessment; NACI = National Advisory Committee on Immunization; QALY = quality-adjusted life year

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