Health Economics of Vaccines

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Editorial

Health Economics of Vaccines: From Current Practice to Future Perspectives

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This special themed section of *Value in Health* with a focus on the health economics of vaccines seems timely with potentially various coronavirus disease 2019 (COVID-19) vaccines being close to market access. Although COVID-19 vaccines will likely not immediately be subject to health economics scrutiny, in the post–COVID-19 peak era there will soon be more emphasis on health economics when broader high-risk groups will be targeted and boosters and revaccinations are to be decided on.[1] Considerations now eminent in controlling COVID-19 (eg, economic impacts, specific cost-effectiveness methodologies, basic reproduction rate estimates, real-world data calibrations, discounting of long-term effects, transmission modeling) have been present for other potentially vaccine-preventable infections for decades. The articles in this themed section address all those issues, with illustrations for meningococcal, varicella, human papilloma, and influenza vaccines. Finally, it is argued that a broader scope (as well as an adapted view) is needed that justifies the specifics that vaccines pose. This is in line with a recent statement of the World Health Organization.[2]

Since the start of the COVID-19 pandemic, similarities with the influenza virus—both seasonal and potential pandemic nature—have been sketched. This theme includes 4 papers on influenza vaccination cost-effectiveness directed toward improving protection of older adults against the complications of influenza infections.[3-6] In particular, for influenza vaccines, such improvements target better-adjuvated, cell-based (rather than egg-based), higher-dosed, and quadrivalent vaccines.[7] Zeevat et al performed a cost-effectiveness analysis of the quadrivalent versus trivalent influenza vaccine for older adults and medical risk groups.[3] Three further articles analyze the potential of pediatric influenza vaccination for further indirect protection of older adults and medical risk groups, presenting detailed data analysis in one article[4] and cost-effectiveness analyses in the next.[5,6] Currently, the United Kingdom is one of few European countries that implemented pediatric influenza vaccination based on favorable cost-effectiveness outcomes,[8] and such information for other countries as presented here is urgently needed. With current health economic influenza vaccination programs being investigated in isolation, this collection of articles also expresses the need to develop integrated health economic models for multiple infections. After all, control strategies for one (eg, COVID-19) influence the others (influenza, respiratory syncytial virus, pneumococcal infections), and infections augment or mitigate each other in seriousness of manifestations, as currently analyzed in the EU project, Vaccine and Infectious Diseases in the Aging Population (VITAL; EU project #806776).

Additionally, new vaccination strategies are continuously considered. Typically, chickenpox reflects an area where many countries are still reluctant to implement protective infant vaccination strategies, largely informed by worries on decremental long-term effects on herpes zoster caused by the same virus.[9] Also, it has often been argued that infant varicella vaccination is not cost-effective, except when a broader societal (instead of a narrower healthcare perspective) is applied.[10] However, Luyten et al argue that favorable cost-effectiveness can already be achieved within the healthcare perspective if alternative social/public preferences for quality-adjusted life-years (QALYs) gained for children versus those for older adults and for side effects are used.[11] Additionally, Rafferty et al analyzed infant varicella vaccination using an innovative approach with an agent-based model and alternative vaccination schedules being investigated and show potential favorable cost-effectiveness already from the healthcare perspective in Canada, notably one of the few countries that often even apply the societal perspective.[12]

Whereas articles in this themed section mostly address the European situation or Canada, 4 other articles explicitly take a global view. Specifically, new analyses with the PRIME model (Papillomavirus Rapid Interface for Modeling and Economics[13]) explicitly relate the implementation of human papilloma virus (HPV) vaccination programs in 179 countries to its cost-effectiveness and country-specific gross domestic product per capita.[14] Obviously, costs of immunization services reflect a core piece of real-world data to populate health economic models. In a targeted literature review, it is found that such data are still lacking for most low- and middle-income countries—specifically, if additionally considering the need to understand costing effects of scaling-up vaccine coverages in such settings.[15] The authors express a call for intensified research into these costs. Responding to this call to the global health community, Sim et al estimate the costs/investment required for keeping up adequate immunization services in 94 countries for 10 vaccines, including rotavirus, HPV, and pneumococcal vaccines.[16] In their next article,[17] those investments are confronted with the potential benefits to be achieved on the costs of the corresponding 10 pathogens, including a value-of-a-statistical-life approach.

Mauskopf et al argue that conventional cost-effectiveness may not incorporate all values of vaccination, for example the capability of vaccines to reduce risks for catastrophic outcomes to

justify taking the value of a statistical life into the analysis.[18] An illustration further broader impacts—possible not fully covered in the QALY—is presented by Beck et al for meningococcal disease, considered a disease of relatively high severity.[19] As in some other disease areas (such as rare diseases[20]), it is consistently argued that relevant value drivers for vaccines are not in the cost-effectiveness per QALY, and, therefore, a broader perspective than conventionally taken is required.[21] For example, in this respect health and productivity effects for caregivers, effects on antimicrobial resistance, and distributive effects have been specifically mentioned.[22-24] These specific issues are addressed in the final article.[25] This article by Annemans et al is a timely and illustrative example of what societies are currently facing with COVID-19, namely its immense macroeconomic impact and enormous drive to implement effective and safe vaccination strategies. In this respect, potential enormous impacts of infectious diseases, heterogeneity of populations with corresponding interdependencies between infectious diseases, and the (cost-) effectiveness of preventive interventions will increasingly be important for future public health investments and allocative efficiency considerations.

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