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Commentary

Assessing the Cost-Effectiveness of Different Vaccination Strategies for Varicella-Zoster Virus in an Aging Population

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Description

Varicella-Zoster Virus (VZV) reactivation, manifesting as herpes zoster (shingles) and its debilitating complication, Postherpetic Neuralgia (PHN), poses a significant health and economic burden, particularly in aging populations where cell-mediated immunity wanes. Vaccination offers a crucial preventative strategy, and assessing the cost-effectiveness of different vaccination approaches is paramount for informed public health decision-making. Several key perspectives emerge when considering this complex issue.

One fundamental perspective involves defining the target population and the goals of vaccination. Should vaccination be offered universally to all adults above a certain age (e.g., 50 or 60 years), or should it be targeted towards specific high-risk subgroups within the aging population, such as those with comorbidities or known risk factors for severe shingles? The cost-effectiveness of each strategy will depend heavily on the incidence of shingles and PHN within the targeted group, the vaccine efficacy in that specific demographic, and the costs associated with both vaccination and the management of VZV-related disease.

A critical aspect of the analysis is the choice of vaccine and its associated costs and efficacy profile. Currently, two main types of shingles vaccines are available: a live-attenuated vaccine (Zostavax) and a recombinant subunit vaccine adjuvanted with AS01B (Shingrix). Clinical trials have demonstrated superior efficacy and longer-lasting protection with the recombinant subunit vaccine compared to the live-attenuated vaccine, although it typically involves a two-dose regimen and may have a higher per-dose cost. A comprehensive cost-effectiveness analysis must consider the direct acquisition costs of each vaccine, the costs associated with administration (including multiple doses), and the differential efficacy in preventing shingles and PHN across various age groups within the aging population.

The duration of vaccine-induced protection is a crucial variable influencing long-term cost-effectiveness. While the recombinant subunit vaccine has shown sustained efficacy over several years, the exact duration of protection for both vaccines in the very elderly remains under investigation. Models used in cost-effectiveness analyses need to incorporate realistic estimates of waning immunity over time and consider the potential need for booster doses in the future, along with their associated costs and benefits.

The societal versus healthcare payer perspective can yield different results in cost-effectiveness analyses. A societal perspective considers all costs associated with the disease, including direct healthcare costs (e.g., physician visits, medications, hospitalizations for shingles and PHN) as well as indirect costs such as lost productivity due to illness. A healthcare payer perspective typically focuses only on direct medical costs. Given the significant impact of shingles and particularly PHN on quality of life and functional status in older adults, incorporating indirect costs into the analysis can strengthen the case for vaccination from a societal standpoint.

The incidence and severity of shingles and PHN in the specific aging population being considered are key determinants of the potential benefits of vaccination. Incidence rates tend to increase with age, while vaccine efficacy might decrease in the very elderly for some vaccines. Cost-effectiveness models need to utilize age-specific data on disease incidence, the likelihood of developing PHN following a shingles episode, the duration and severity of PHN, and the associated healthcare resource utilization and costs.

The Willingness-To-Pay (WTP) threshold for a Quality-Adjusted Life Year (QALY) gained is another important consideration in interpreting the results of cost-effectiveness analyses. Different countries and healthcare systems have varying WTP thresholds, which represent the maximum cost deemed acceptable for one additional year of life in perfect health. The Incremental Cost-Effectiveness Ratio (ICER) of a vaccination strategy (the additional cost per QALY gained compared to no vaccination or an alternative strategy) is typically compared to this threshold to determine its cost-effectiveness.

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Finally, sensitivity analyses are crucial for assessing the robustness of the cost-effectiveness findings to variations in key input parameters, such as vaccine cost, vaccine efficacy, duration of protection, and disease incidence. These analyses can identify the parameters that have the greatest impact on the results and highlight areas where further research or more precise data are needed to reduce uncertainty.

In conclusion, assessing the cost-effectiveness of different vaccination strategies for VZV in an aging population requires a comprehensive and nuanced approach. It necessitates careful consideration of the target population, the characteristics and costs of available vaccines, the duration of protection, the perspective of the analysis, age-specific disease epidemiology, and the societal value placed on health outcomes. Such analyses are essential for guiding evidence-based recommendations and ensuring the efficient allocation of healthcare resources to protect this vulnerable population from the significant burden of shingles and its complications.