



Commentary

Rotavirus vaccines: The role of researchers in moving evidence to action

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ARTICLE INFO

Keywords:

Rotavirus vaccines
Advocacy
Diarrheal disease

ABSTRACT

Evidence generated through years of research has built a solid scientific foundation on the safety and efficacy of rotavirus vaccines, and has served to raise awareness of global rotavirus disease burden and the potential impact of vaccination. In this commentary, we explore the role that researchers can play in closing key gaps of knowledge, demand, and financing to support decision-making on introduction of new vaccines in developing countries. With safe and efficacious rotavirus vaccines now on the verge of widespread adoption, researchers can be vital advocates for their uptake into routine immunization programs.

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1. Rotavirus vaccines: the role of researchers in moving evidence to action

Along the spectrum from discovery to public health impact, gaps in knowledge, demand, and financial resources can impede progress in bringing new vaccines to developing countries. Researchers can play an important role in shrinking these gaps by ensuring the evidence they generate reaches the decision-makers responsible for turning science into public policy. Today, as rotavirus vaccines move toward introduction in low-income countries, the scientific community that, through its research, advanced this important technology has a clear and important voice in the advocacy for accelerating access to the children who need the vaccines most.

The realms of science and policy, while ultimately aimed toward the same goal of contributing to the public good, often operate in isolation and in very different time horizons. Researchers are generally removed from the policy mechanisms that translate their scientific discoveries from bench to bedside. Likewise, policymakers evaluate potential impacts and investments in a sphere far from the laboratory.

In the case of rotavirus vaccines, the progress from discovery and isolation of a particularly resilient virus in an Australian laboratory 35 years ago [1] has advanced to life-saving protection for millions of children through the use of safe and efficacious vaccines. At each step, researchers have generated invaluable evidence that has not only deepened scientific knowledge about the virus, but raised awareness of its devastating burden in the developing world and the potential impact of vaccination. With new rotavirus

vaccines now on the verge of widespread adoption and use in developing countries around the world, researchers can continue to play a pivotal role, speaking out as advocates to catalyze the vaccines' uptake into routine public health practice.

Since the 2006 publication of landmark studies demonstrating the safety and efficacy of modern rotavirus vaccines [2,3], policy-makers in several countries of the Americas and European regions have taken the decision to provide them through national routine immunization programs. In other parts of the world, including Africa and Asia, challenges remain to ensure that the vaccines' reach extends to the settings where rotavirus claims the most lives. The growing availability of surveillance information represents an auspicious start, and recently completed clinical trials will provide key data. Since the most compelling arguments for rotavirus vaccine introduction are based on solid evidence and focused research, scientific investigators in these regions stand poised to offer distinct public health value by adding to the evidence base while contributing their voices to the community of rotavirus vaccine advocates and educators.

2. Shrinking the knowledge gap

The need for information when establishing appropriate health policy is particularly acute in resource-constrained environments, as multiple health interventions often compete for attention and resources. With regard to rotavirus vaccines, as well as other interventions to curb diarrheal disease, knowledge gaps have impeded action; however, researchers are rapidly bridging that gap.

Understanding the burden of disease is a critical part of decision-making and is especially important for diseases for which basic information and disease awareness are limited, as in the case of rotavirus. Recent data on rotavirus disease burden collected through routine surveillance in regional networks revealed it to

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be the leading cause of severe diarrheal disease worldwide [4]. In Asia, close to half of all acute diarrhea hospitalizations in children under five are attributed to rotavirus [5]. However, public health decision-makers and providers unexposed to this information have demonstrated low awareness of the disease [6] and, correspondingly, the potential for vaccination to markedly reduce morbidity.

The decision by developing country decision-makers to introduce a new vaccine requires a commitment to a long-term public health vision supported by sustainable finances and infrastructure. To make that commitment, decision-makers must have a clear understanding of the long-term impact of their decision, both from the perspective of reduced mortality and morbidity, and the associated costs. Adequate and well-controlled trials of rotavirus vaccines were undertaken in Africa and Asia to generate needed information about the public health benefit of vaccination. The studies concluded earlier this year, and results were presented to the World Health Organization's Strategic Advisory Group of Experts, which subsequently issued a universal recommendation that rotavirus vaccines be included in all national immunization programs [7]. Publication of complete results is forthcoming. Recent modelling of the public health impact of widespread use of rotavirus vaccines have shown that this intervention is cost-effective and holds the promise to save countless children's lives in developing countries [8].

Beyond generating critical data on disease burden, efficacy and safety, and cost-effectiveness, scientists can also play a key role in the next step, translating available information and helping decision-makers understand how to extrapolate and contextualize data in the context of their local settings.

3. Overcoming the demand gap

Countries with robust and well-functioning systems are often able to rapidly introduce new health technologies, including vaccines, as soon as the intervention is commercially available and demonstrated to be safe and effective. For developing countries with constrained health systems, however, timelines for policymaking and resource allocation, and, consequently, vaccine introduction, are often extended for more than 10 years [9].

The factors contributing to the delays between availability of a new vaccine and its use for public health impact are multi-fold; however, one clear contributor is the failure to create demand. In developing countries where knowledge about progress in medical science and health among the general population is limited, the opportunity for creating demand at the patient level is limited. Many developing countries do, however, have a natural constituency committed to improving children's health, including paediatric associations, child survival advocate groups, and non-governmental organizations. If this constituency can be mobilized, the demand for vaccines will be voiced.

The control of diarrheal disease by any cause is already a high public health priority in developing countries [3], which provides an established context for educating and building awareness about rotavirus vaccines among decision-makers and advocates alike. Placing rotavirus vaccines in the framework of diarrheal disease management provides an opportunity to introduce rotavirus data into the diarrheal disease agenda, as well as to leverage the promise of prevention to invigorate the broader diarrheal disease effort. In addition to information on rotavirus disease burden, vaccine efficacy, and cost-effectiveness, policymakers prioritizing diarrheal disease control are eager for evidence on the impact of oral rehydration therapy and zinc treatment, the latest developments in sanitation and hygiene, and the potential of new vaccine tech-

nologies against bacterial causes of diarrheal disease. As trusted local, national, and international experts, researchers are an obvious choice to offer this education.

4. Filling the financial gap

Decision-making on resource distribution to achieve health impacts lies not only with national governments but among international donors as well. National prioritization of diarrheal disease control has declined since the mid-1990s [10], and current trends in global donor activity reflect a similar shift, leaning toward horizontal and systemic approaches, rather than disease-specific support.

In a recent research survey, for example, respondents from funding and policymaking arenas indicated the importance of increased evidence around interventions in stimulating funding for diarrheal disease control. Stakeholders voiced concern that the success of diarrheal disease control programs in the 1980s and 1990s, alongside increased attention to other diseases like AIDS and malaria, have created a misperception that the burden of diarrheal disease has been overcome [11]. Successfully reinvigorating the priority of diarrheal disease control with interventions that include rotavirus vaccines requires commitment from global financial donors matched with support from country decision-makers.

Scientists have a unique opportunity to influence the typical health funding cycle—in which donors aim to respond to country leaders while country leaders prioritize the programs they expect will receive external support—by offering an unbiased perspective based on hard data. Indeed, surveyed stakeholders highlighted credible data demonstrating potential impact as the most important factor for motivating donors and policymakers [11]. They called for an advocacy focus on data addressing disease burden, coverage rates, cost-effectiveness, and implementation to inform investment in diarrheal disease control programming. In addition, respondents highlighted vaccines as a key intervention that could spur donor funding to address diarrheal disease.

5. Calling scientists to action

Many scientists who have dedicated their professional careers to expanding the evidence base for rotavirus disease have expressed an eagerness to contribute more. They recognize that publishing results in peer-reviewed journals is an important start to a much broader policy agenda. In response to this motivation and to offer support to other researchers who want to actively engage in applying science to benefit the broader public good, we offer the following suggestions:

- (i) *Make messages relevant to those you are trying to reach.* Scientists can further the scope of their data by increasing their comfort level in communicating with a non-scientific audience, distilling data to support key messages and tailoring them for particular interactions. Tailored information that responds directly to the needs of specific decision-makers has the potential to achieve more expedient uptake of a new intervention [12]. Policymakers often seek expert recommendations following a scientific brief. However, given the common resistance to opinion and bias in traditional dissemination of scientific results, this may be a difficult bridge for researchers to cross. Additionally, scientists may fear that simplifying the results of their research will reduce its relevance. However, considering the audience's perspective can ultimately increase the salience and impact of the evidence. If a decision-maker is unable to understand data, the opportunity to contribute to a key policy decision may slip away. Often removed from the requirements and challenges of imple-

mentation of new technologies in the field, scientists may find it difficult to translate complex data for impact in the policy setting. Seeking opportunities to learn about the realities associated with the deployment of vaccines, such as cold chain management and social mobilization, will improve the ability of researchers to provide the necessary information in a context that is relevant and expedient for decision-makers.

- (ii) *Partner with organizations advocating for child survival.* Advocacy is a learned skill, and strong advocates often have both experience interacting with, and ready access to, the decision-makers who will utilize data. This partnership can be reciprocal, in that advocates are often hungry for data that support their platforms. Scientists, in turn, bring a depth of knowledge and information with the potential to bring together the power of education and advocacy.
- (iii) *Seek broader channels for disseminating messages.* Peer-reviewed journals address an important, but specific, audience. Their reach in terms of policy-setting can be limited. In today's Internet age, however, the opportunities for a researcher to send messages to a broader audience are abundant. Messages can be made relevant for on-line newsletters and discussion groups hosted by relevant organizations. Opinion-editorials in newspapers are optimal for reaching a broad range of international and local stakeholders. Gatherings of health workers or local politicians present another opportunity to present research and recommendations.

6. Conclusion

Researchers have already had a profound effect on moving the rotavirus vaccine agenda from evidence to action, and the data generated to date have played a critical role in global and country decisions regarding adoption, funding, and sustained use. Coupled with this unique and unprecedented period in the availability of new vaccines and technologies to address one of the world's leading causes of child mortality, targeted advocacy that harnesses the voice of science will ensure that these data reach critical audiences who may apply it toward achieving the greatest possible public health benefit. To achieve maximal impact for rotavirus vaccines, the science and policy that surround them must work hand-in-hand. Scientists can be vital contributors in closing the gaps that currently divide.

Acknowledgements

We would like to thank the GAVI Alliance for its funding support of the PATH Rotavirus Vaccine Program.

Conflict of interest

None

Funding sources

This article was developed under a project funded by the GAVI Alliance.

References

- [1] Bishop RF, Davidson GP, Holmes IH, Ruck BJ. Virus particles in epithelial cells of duodenal mucosa from children with acute non-bacterial gastroenteritis. *Lancet* 1973;2(7841):1281–3.
- [2] Ruiz-Palacios GM, Perez-Schael I, Velazquez FR, Abate H, Breuer T, Clemens SC, et al. Safety and efficacy of an attenuated vaccine against severe rotavirus gastroenteritis. *New Engl J Med* 2006;354(1):11–22.
- [3] Vesikari T, Matson DO, Dennehy P, Van Damme P, Santosham M, Rodriguez Z, et al. Safety and efficacy of a pentavalent human-bovine (WC3) reassortant rotavirus vaccine. *New Engl J Med* 2006;354(1):23–33.
- [4] Parashar U, Gibson C, Bresee J, Glass R. Rotavirus and severe childhood diarrhea. *Emerg Infect Dis* 2006;12(2).
- [5] Bresee J, Hummelman E, Nelson EAS, Glass R. Rotavirus in Asia: the value of surveillance for informing decisions about the introduction of new vaccines. *J Infect Dis* 2005;192(Suppl.):S1–5.
- [6] Simpson E, Wittet S, Bonilla J, Gamazina K, Cooley L, Winkler J. Use of formative research in developing a knowledge translation approach to rotavirus vaccine introduction in developing countries. *BMC Public Health* 2007;7:281.
- [7] World Health Organization. Meeting of the immunization Strategic Advisory Group of Experts, April 2009 - conclusions and recommendations. *Wkly Epidemiol Rec* 2009;84(23):232–6.
- [8] Atherly D, Dreifelbis R, Parashar U, Levin C, Wecker J, Rheingans RD. Rotavirus vaccination: cost-effectiveness and impact on child mortality in the developing world. *J Infect Dis*; in press.
- [9] McKinsey & Company. Accelerated development and introduction of priority new vaccines: the case of pneumococcal and rotavirus vaccines; 2002.
- [10] Forsberg BC, Petzold MG, Tomson G, Allebeck P. Diarrhoea case management in low- and middle-income countries—an unfinished agenda. *Bull World Health Organ* 85(1):42–8.
- [11] FSG Social Impact Advisors. Diarrheal disease advocacy: findings from a scan of the global funding and policy landscape; 2008.
- [12] Dobbins M, Rosenbaum P, Plews N, Law M, Fysh A. Information transfer: what do decision makers want and need from researchers? *Implementation Sci* 2007;2:20.