VACCINE DELIVERY RESEARCH DIGEST

UNIVERSITY OF WASHINGTON STRATEGIC ANALYSIS, RESEARCH & TRAINING (START) CENTER

REPORT TO THE BILL & MELINDA GATES FOUNDATION

PRODUCED BY: ARAKAKI L, BABIGUMIRA JB

DECEMBER 2018

Want the Vaccine Delivery Research Digest delivered directly to your inbox?
Subscribe on the Digest website: http://uwstartcenter.org/publication-digests/vaccine-digest/

START CENTER
STRATEGIC ANALYSIS, RESEARCH & TRAINING CENTER
Department of Global Health | University of Washington

List of Articles

1 Oral polio vaccine response in the MAL-ED birth cohort study: Considerations for polio eradication strategies

{Abstract & START Commentary} {Full article}

- A multi-site observational study of the MAL-ED birth cohort that examined the association between failure to seroconvert after oral poliovirus vaccination and factors such as vaccination history, enteropathogen scores, diarrhea, nutritional status, socioeconomic status, and home environment.

2 Characterization of Household and Community Shedding and Transmission of Oral Polio Vaccine in Mexican Communities With Varying Vaccination Coverage

{Abstract & START Commentary} {Full article}

- A study that assessed household and community oral polio vaccine virus shedding over time in three Mexican communities where inactivated polio vaccine is part of the routine childhood vaccination schedule.

3 Assessing the Risk of Vaccine-derived Outbreaks After Reintroduction of Oral Poliovirus Vaccine in Postcessation Settings

{Abstract & START Commentary} {Full article}

- A study estimating household transmission rates of oral poliovirus vaccine in a postcessation setting using an individual-based stochastic epidemiological model developed from data obtained from three Mexican communities.

4 Cost-effectiveness of rotavirus vaccination in Ghana: Examining impacts from 2012 to 2031

{Abstract & START Commentary} {Full article}

- A cost-effectiveness analysis of using the TRIVAC model to estimate the impact of rotavirus vaccination as Ghana transitions from low to lower-middle income status.

5 Re-evaluating the cost and cost-effectiveness of rotavirus vaccination in Bangladesh, Ghana, and Malawi: A comparison of three rotavirus vaccines

{Abstract & START Commentary} {Full article}

- An economic impact analysis of Rotarix, ROTAVAC, and ROTASIIL by using three previously conducted studies in Bangladesh, Ghana, and Malawi.

6 Direct and possible indirect effects of vaccination on rotavirus hospitalisations among children in Malawi four years after programmatic introduction
{Abstract & START Commentary} {Full article}

- A hospital-based study assessing rotavirus prevalence and hospitalizations pre- and post-vaccine implementation, vaccine effectiveness, and indirect effects of vaccination in Blantyre, Malawi.

7 A rapid qualitative assessment of oral cholera vaccine anticipated acceptability in a context of resistance towards cholera intervention in Nampula, Mozambique
{Abstract & START Commentary} {Full article}

- A qualitative assessment of barriers and levers for oral cholera vaccination acceptability in Mozambique through semi-structured interviews and focus groups of 143 individuals.

8 Pneumococcal carriage in households in Karonga District, Malawi, before and after introduction of 13-valent pneumococcal conjugate vaccination
{Abstract & START Commentary} {Full article}

- A study assessing pneumococcal carriage among mothers and infants in northern Malawi using cross-sectional and longitudinal data.

9 Vaccine programme stakeholder perspectives on a hypothetical single-dose human papillomavirus (HPV) vaccine schedule in low and middle-income countries
{Abstract & START Commentary} {Full article}

- A qualitative study of advantages and challenges of a single-dose human papillomavirus vaccine schedule from immunization program managers and advisors.

10 Improving immunization data quality in Peru and Mexico: Two case studies highlighting challenges and lessons learned
{Abstract & START Commentary} {Full article}

- Case studies of an electronic immunization registry in Mexico and a children population registry in Chile as part of the Pan American Health Organization's Improving Data Quality for Immunization project.

Appendix

Details of Articles

1. Oral polio vaccine response in the MAL-ED birth cohort study: Considerations for polio eradication strategies

Pan WK, Seidman JC, Ali A, Hoest C, Mason C, Mondal D, et al.

Vaccine. 2018 Nov 12 [Epub ahead of print].

PubMed ID: 30442479

ABSTRACT

BACKGROUND:

Immunization programs have leveraged decades of research to maximize oral polio vaccine (OPV) response. Moving toward global poliovirus eradication, the WHO recommended phased OPV-to-IPV replacement on schedules in 2012. Using the MAL-ED prospective birth cohort data, we evaluated the influence of early life exposures impacting OPV immunization by measuring OPV response for serotypes 1 and 3.

METHODS:

Polio neutralizing antibody assays were conducted at 7 and 15 months of age for serotypes 1 and 3. Analyses were conducted on children receiving ≥3 OPV doses (n = 1449). History of vaccination, feeding patterns, physical growth, home environment, diarrhea, enteropathogen detection, and gut inflammation were examined as risk factors for non-response [Log2(titer) < 3] and Log2(titer) by serotype using multivariate regression.

FINDINGS:

Serotype 1 seroconversion was significantly higher than serotype 3 (96.6% vs. 89.6%, 15 months). Model results indicate serotypes 1 and 3 failure was minimized following four and six OPV doses, respectively; however, enteropathogen detection and poor socioeconomic conditions attenuated response in both serotypes. At three months of age, bacterial detection in stool reduced serotype 1 and 3 Log2 titers by 0.34 (95% CI 0.14-0.54) and 0.53 (95% CI 0.29-0.77), respectively, and increased odds of serotype 3 failure by 3.0 (95% CI 1.6-5.8). Our socioeconomic index, consisting of Water, Assets, Maternal education, and Income (WAMI), was associated with a 0.79 (95% CI 0.15-1.43) and 1.23 (95% CI 0.34-2.12) higher serotype 1 and 3 Log2 titer, respectively, and a 0.04 (95% CI 0.002-0.40) lower odds of serotype 3 failure. Introduction of solids, transferrin receptor, and underweight were differentially associated with serotype response. Other factors, including diarrheal frequency and breastfeeding practices, were not associated with OPV response.

INTERPRETATION:

Under real-world conditions, improved vaccination coverage and socio-environmental conditions, and reducing early life bacterial exposures are key to improving OPV response and should inform polio eradication strategies.

WEB: 10.1016/j.vaccine.2018.05.080
IMPACT FACTOR: 3.29
CITED HALF-LIFE: 5.50

START COMMENTARY

Seven sites were included in the study with sample sizes ranging from 186 to 260 children. In four of the seven sites, over 95% of children enrolled received at least three doses of the oral poliovirus vaccine (OPV) by 7 months of age. Table 1 describes the oral poliovirus vaccination (OPV) schedule for each site and proportion of children enrolled who received at least three doses of OPV by 7 months, 15 months, and 24 months. Sites observed greater than 95% of enrolled children receiving at least three doses of OPV by 15 months with the exception of two sites (Fortaleza, Brazil and Haydom, Tanzania). Authors stated limitations to their study included the “inability to evaluate serotype 2 interference, inability to assess mucosal immune responses preventing transmission, and the lack of data on maternal antibodies” as well as blood collection restricted to only two time points due to the design of the study.

Return to List of Articles

2. Characterization of Household and Community Shedding and Transmission of Oral Polio Vaccine in Mexican Communities With Varying Vaccination Coverage

Altamirano J, Purington N, Behl R, Sarnquist C, Holubar M, García-García L, et al.

Clin Infect Dis. 2018 Oct 30;67(suppl_1):S4-S17.

PubMed ID: 30376097

ABSTRACT

BACKGROUND:

The World Health Assembly 2012 Polio Eradication and Endgame Strategic Plan calls for the eventual cessation of all oral polio vaccines (OPVs), to be replaced with inactivated polio vaccine (IPV); however, IPV induces less robust mucosal immunity than OPV. This study characterized household and community OPV shedding and transmission after OPV vaccination within primarily IPV-vaccinated communities.

METHODS:

Households in 3 IPV-vaccinated Mexican communities were randomized to receive 3 levels of OPV vaccination coverage (70%, 30%, or 10%). Ten stool samples were collected from all household members over 71 days. Analysis compared vaccinated subjects, household contacts of vaccinated subjects, and subjects in unvaccinated households. Logistic and Cox regression models were fitted to characterize transmission of OPV by coverage and household vaccination status.

RESULTS:

Among 148 vaccinated children, 380 household contacts, and 1124 unvaccinated community contacts, 78%, 18%, and 7%, respectively, shed OPV. Community and household contacts showed no differences in transmission (odds ratio [OR], 0.67; 95% confidence interval [CI], .37-1.20), in shedding trajectory (OR, 0.61; 95% CI, .35-1.07), or in time to shedding (hazard ratio, 0.68; 95% CI, .39-1.19). Transmission began as quickly as 1 day after vaccination and persisted as long as 71 days after vaccination. Transmission within unvaccinated households differed significantly across vaccination coverage communities, with the 70% community experiencing the most transmissions (15%), and the 10% community experiencing the least (4%). These trends persisted over time and in the time to first shedding analyses.

CONCLUSIONS:

Transmission did not differ between household contacts of vaccinees and unvaccinated households. Understanding poliovirus transmission dynamics is important for postcertification control.

WEB: 10.1093/cid/ciy650
IMPACT FACTOR: 9.12
CITED HALF-LIFE: 7.00

START COMMENTARY

To assess associations between shedding and vaccination coverage and household vaccination status over time, Altamirano et al. conducted longitudinal logistic modeling using quadratic time. For the time to first shedding analysis, Altamirano et al. used an exchangeable correlation structure. Models accounted for household cluster effects and repeated measures over time. Authors stated a limitation to their study was the inability to conduct genomic sequencing to allow for greater insight in transmission dynamics; authors assumed intrahousehold transmissions originated from the household's vaccinated child. Another limitation was the inability to take daily samples, which may result in the underestimation of shedding and transmission. Authors also state that men were less likely to participate in the study compared to women and, therefore, transmission among men may also be underestimated. Strengths of the study include the large sample size and a study environment that may reflect future transition from oral polio vaccine and inactivated polio vaccine schedules.

This article was part of a supplement "Polio endgame and beyond: Vaccine choices, transmission dynamics, and surveillance implications," sponsored by The Bill & Melinda Gates Foundation.

Return to List of Articles

3. Assessing the Risk of Vaccine-derived Outbreaks After Reintroduction of Oral Poliovirus Vaccine in Postcessation Settings

Fu R, Altamirano J, Sarnquist CC, Maldonado YA, Andrews JR.

Clin Infect Dis. 2018 Oct 30;67(suppl_1):S26-S34.

PubMed ID: 30376087

ABSTRACT

BACKGROUND:

The Polio Eradication and Endgame Strategic Plan 2013-2018 calls for the gradual withdrawal of oral poliovirus vaccine (OPV) from routine immunization. We aimed to quantify the transmission potential of Sabin strains from OPV when it is reintroduced, accidentally or deliberately, in a community vaccinated with inactivated poliovirus vaccine alone.

METHODS:

We built an individual-based stochastic epidemiological model that allows independent spread of 3 Sabin serotypes and differential transmission rates within versus between households. Model parameters were estimated by fitting to data from a prospective cohort in Mexico. We calculated the effective reproductive number for the Mexico cohort and simulated scenarios of Sabin strain resurgence under postcessation conditions, projecting the risk of prolonged circulation, which could lead to circulating vaccine-derived poliovirus (cVDPV).

RESULTS:

The estimated effective reproductive number for naturally infected individuals was about 1 for Sabin 2 and Sabin 3 (OPV2 and OPV3) in a postcessation setting. Most transmission events occurred between households. We estimated the probability of circulation for >9 months to be (1) <<1% for all 3 serotypes when 90% of children <5 years of age were vaccinated in a hypothetical outbreak control campaign; (2) 45% and 24% for Sabin 2 and Sabin 3, respectively, when vaccine coverage dropped to 10%; (3) 37% and 8% for Sabin 2 and Sabin 3, respectively, when a single active shedder appeared in a community.

CONCLUSIONS:

Critical factors determining the risk of cVDPV emergence are the scale at which OPV is reintroduced and the between-household transmission rate for poliovirus, with intermediate values posing the greatest risk.

WEB: 10.1093/cid/ciy605

IMPACT FACTOR: 9.12

CITED HALF-LIFE: 7.00

START COMMENTARY

Parameters were estimated using approximate Baysian computation. Two scenarios of OPV introduction were modeled—introduction of OPV through an outbreak response and introduction of a single active case shedding Sabin virus. Limitations to the study include the limited number of samples collected, which impacted the authors' to estimate parameters. Authors used simplifying assumptions based on literature to create a parsimonious model. For example, authors assumed transmission between the 3 Sabin strains were independent and that communities were isolated (i.e., no births and migrations). Authors caution generalizing results of this study to other settings as transmission rates may differ, though offer results of sensitivity analyses for lower and upper bounds.

This article was part of a supplement "Polio endgame and beyond: Vaccine choices, transmission dynamics, and surveillance implications," sponsored by The Bill & Melinda Gates Foundation.

Return to List of Articles

4. Cost-effectiveness of rotavirus vaccination in Ghana: Examining impacts from 2012 to 2031

Nonvignon J, Atherly D, Pecenka C, Aikins M, Gazley L, Groman D, et al.

Vaccine. 2018 Nov 12;36(47):7215-7221.

PubMed ID: 29223486

ABSTRACT

BACKGROUND:

Diarrhea causes about 10% of all deaths in children under five years globally, with rotavirus causing about 40% of all diarrhea deaths. Ghana introduced rotavirus vaccination as part of routine immunization in 2012 and it has been shown to be effective in reducing disease burden in children under five years. Ghana's transition from low to lower-middle income status in 2010 implies fewer resources from Gavi as well as other major global financing mechanisms. Ghana will soon bear the full cost of vaccines. The aim of this study was to estimate the health impact, costs and cost-effectiveness of rotavirus vaccination in Ghana from introduction and beyond the Gavi transition.

METHODS:

The TRIVAC model is used to estimate costs and effects of rotavirus vaccination from 2012 through 2031. Model inputs include demographics, disease burden, health system structure, health care utilization and costs as well as vaccine cost, coverage, and efficacy. Model inputs came from local data, the international literature and expert consultation. Costs were examined from the health system and societal perspectives.

RESULTS:

The results show that continued rotavirus vaccination could avert more than 2.2 million cases and 8900 deaths while saving US$6 to US$9 million in costs over a 20-year period. The net cost of vaccination program is approximately US$60 million over the same period. The societal cost per DALY averted is US$238 to US$332 with cost per case averted ranging from US$27 to US$38. The cost per death averted is approximately US$7000.

CONCLUSION:

The analysis shows that continued rotavirus vaccination will be highly cost-effective, even for the period during which Ghana will assume responsibility for purchasing vaccines after transition from Gavi support.

WEB: 10.1016/j.vaccine.2017.11.080

IMPACT FACTOR: 3.29

CITED HALF-LIFE: 5.50

START COMMENTARY

The analysis assessed the impact of rotavirus vaccine for 20 birth cohorts from birth to five years of age. Tables 1-3 and the appendix show main model parameters. Two scenarios were modeled; Scenario 1 represents the vaccine price paid by Ghana and Scenario 2 represents the vaccine price paid by both Gavi and Ghana. In both scenarios, rotavirus vaccination was found to be cost-effective. Authors conducted sensitivity analyses and found the main drivers of the cost-effectiveness ratio were case-fatality ratio, disease severity, and delivery cost per dose. Limited data on burden of rotavirus and disease severity and reliance on tariff data for costs were limitations to the study. Another limitation was the inability to account for herd effects in the model. Despite using conservative estimates for uncertain data, rotavirus vaccine was estimated to be a cost-effective intervention in Ghana.

Return to List of Articles

5. Re-evaluating the cost and cost-effectiveness of rotavirus vaccination in Bangladesh, Ghana, and Malawi: A comparison of three rotavirus vaccines

Pecenka C, Debellut F, Bar-Zeev N, Anwari P, Nonvignon J, Shamsuzzaman M, et al.

Vaccine. 2018 Nov 26;36(49):7472-7478.

PubMed ID: 30420039

ABSTRACT

INTRODUCTION:

Diarrhea is a leading cause of mortality worldwide and rotavirus accounts for many of these deaths. As of August 2018, 96 countries have introduced rotavirus vaccines into their immunization programs. Two rotavirus vaccines, Rotarix® and RotaTeq®, have been WHO-prequalified since 2009, with Rotarix® being the preferred product of most Gavi-supported countries. ROTAVAC® and ROTASIIL® have both been prequalified recently.

MATERIALS AND METHODS:

We reevaluated the costs and cost-effectiveness of rotavirus vaccination in Bangladesh, Ghana, and Malawi and compared Rotarix®, ROTAVAC®, and ROTASIIL® in each country. For consistency with previously published analyses in these countries, we used the same Excel-based cohort model and much of the same data as the original analyses. We varied the expected price (with and without Gavi subsidy), wastage, and incremental health system costs associated with each vaccine. We assumed the same efficacy and waning assumptions following administration of two or three doses for the respective product.

RESULTS:

The discounted cost per DALY averted compared to no vaccination ranged from 0.3 to 1.3 times GNI per capita for each vaccine. With the Gavi subsidy, the average cost-effectiveness ratios were below 0.3 times GNI per capita in all three countries. Though critical empirical cost data are not yet available, Rotarix® is the least costly and most cost-effective product in the countries examined in this modelling study. However, small decreases in the incremental health system cost for other products could result in cost and cost-effectiveness outcomes that match or surpass those of Rotarix®.

CONCLUSION:

Countries may wish to consider new rotavirus vaccines entering the market. Countries should carefully examine multiple product attributes including price and the incremental health system costs

associated with each vaccine. These costs will vary by country and may be a defining factor in determining the least costly and most cost-effective product for the population.

WEB: 10.1016/j.vaccine.2018.10.068
IMPACT FACTOR: 3.29
CITED HALF-LIFE: 5.50

START COMMENTARY

Tables 1-3 show model parameters and each analysis used the TRIVAC model. ROTAVAC and ROTASIIL were modeled with 3 doses. ROTAVAC had higher wastage than the other two vaccines at 25%. Limitations of the study included lack of information for the newer products. Vaccine effectiveness and waning were assumed to be the same for each product, so comparisons were based on pricing. The analysis was also limited in that it did not assess all Gavi countries. Threshold analyses were conducted to address uncertainty of the estimates. Table 5 shows what changes to incremental health system costs would be needed in order for a product to be as cost-effective as Rotarix. While all products were deemed to be cost-effective, authors note that uncertainty of parameter values and sensitivity to shifts in cost-effectiveness warrant country-specific analyses of individual products to determine what product may be most beneficial to a country's vaccination strategy as products become available.

Return to List of Articles

6. Direct and possible indirect effects of vaccination on rotavirus hospitalisations among children in Malawi four years after programmatic introduction

Bennett A, Pollock L, Jere KC, Pitzer VE, Parashar U, Tate JE, et al.

Vaccine. 2018 Nov 12;36(47):7142-7148.

PubMed ID: 29887320

ABSTRACT

INTRODUCTION:

Despite increased use of vaccine in routine immunisation, rotavirus remains a major cause of acute gastroenteritis (AGE) in low-income countries. We describe rotavirus prevalence and hospitalisation in Malawi pre and four years post vaccine introduction; provide updated vaccine effectiveness (VE) estimates; and assess rotavirus vaccine indirect effects.

METHODS:

Children under five years of age presenting to a referral hospital in Blantyre with AGE were recruited. Stool samples were tested for rotavirus using Enzyme Immunoassay. The change in rotavirus prevalence was evaluated using Poisson regression. Time series analysis was used to further investigate trends in prevalence over time. VE against rotavirus diarrhoea of any severity was estimated using logistic regression. Indirect effects were estimated by evaluating rotavirus prevalence in unvaccinated children over time, and by comparing observed reductions in incidence of rotavirus hospitalisation to those expected based on vaccine coverage and trial efficacy estimates.

RESULTS:

2320 children were included. Prevalence of rotavirus in hospitalised infants (<12 months) with AGE decreased from 69/139(49.64%) prior to vaccine introduction to 197/607(32.45%) post-vaccine introduction (adjusted RR 0.67[95% CI 0.55, 0.82]). Prevalence in children aged 12-23 months demonstrated a less substantial decline: 15/37(40.54%) pre- and 122/352(34.66%) post-vaccine introduction (adjusted RR 0.85, 95% CI 0.57, 1.28). Adjusted VE was 61.89%(95% CI 28.04-79.82), but lower in children aged 12-23 months (31.69% [95% CI -139.03 to 80.48]). In hospitalised infants with rotavirus disease, the observed overall effect of the vaccine was 9% greater than expected according to vaccine coverage and efficacy estimates. Rotavirus prevalence among unvaccinated infants declined post-vaccine introduction (RR 0.70[95% CI 0.55-0.80]).

CONCLUSIONS:

Following rotavirus vaccine introduction in Malawi, prevalence of rotavirus in hospitalised children with AGE has declined significantly, with some evidence of an indirect effect in infants. Despite this,

rotavirus remains an important cause of severe diarrhoea in Malawian children, particularly in the second year of life.

WEB: 10.1016/j.vaccine.2018.04.030
IMPACT FACTOR: 3.29
CITED HALF-LIFE: 5.50

START COMMENTARY

The pre-vaccination period was from January to June 2012, so Bennett et al. restricted prevalence and indirect effect analyses to the first six months of the year to remain consistent with the pre-vaccination period. Time series analysis included locally weighted smoothers to assess seasonal and secular trends. Indirect effects were estimated for children under 5 years of age. Interestingly, authors found an increase in incidence of test-negative diarrheal cases following vaccine introduction. The cause of this increase was unclear, but could have implications on the interpretation of test-positive diarrheal cases. Authors also note the potential for under-ascertainment of cases, especially given that hospitalized cases make a small proportion of rotavirus burden.

Return to List of Articles

7. A rapid qualitative assessment of oral cholera vaccine anticipated acceptability in a context of resistance towards cholera intervention in Nampula, Mozambique

Démolis R, Botão C, Heyerdahl LW, Gessner BD, Cavailler P, Sinai C, et al.

Vaccine. 2018 Oct 22;36(44):6497-6505.

PubMed ID: 29174106

ABSTRACT

INTRODUCTION:

While planning an immunization campaign in settings where public health interventions are subject to politically motivated resistance, designing context-based social mobilization strategies is critical to ensure community acceptability. In preparation for an Oral Cholera Vaccine campaign implemented in Nampula, Mozambique, in November 2016, we assessed potential barriers and levers for vaccine acceptability.

METHODS:

Questionnaires, in-depth interviews, and focus group discussions, as well as observations, were conducted before the campaign. The participants included central and district level government informants (national immunization program, logistics officers, public health directors, and others), community leaders and representatives, and community members.

RESULTS:

During previous well chlorination interventions, some government representatives and health agents were attacked, because they were believed to be responsible for spreading cholera instead of purifying the wells. Politically motivated resistance to cholera interventions resurfaced when an OCV campaign was considered. Respondents also reported vaccine hesitancy related to experiences of problems during school-based vaccine introduction, rumors related to vaccine safety, and negative experiences following routine childhood immunization. Despite major suspicions associated with the OCV campaign, respondents' perceived vulnerability to cholera and its perceived severity seem to override potential anticipated OCV vaccine hesitancy.

DISCUSSION:

Potential hesitancy towards the OCV campaign is grounded in global insecurity, social disequilibrium, and perceived institutional negligence, which reinforces a representation of estrangement from the central government, triggering suspicions on its intentions in implementing the OCV campaign. Recommendations include a strong involvement of community leaders, which is important for successful social mobilization; representatives of different political parties should be

equally involved in social mobilization efforts, before and during campaigns; and public health officials should promote other planned interventions to mitigate the lack of trust associated with perceived institutional negligence. Successful past initiatives include public intake of purified water or newly introduced medication by social mobilizers, teachers or credible leaders.

WEB: 10.1016/j.vaccine.2017.10.087
IMPACT FACTOR: 3.29
CITED HALF-LIFE: 5.50

START COMMENTARY

Authors used semi-structured interviews or focus groups to obtain information about oral cholera vaccine (OCV) acceptability. Where possible, responses were tape-recorded and transcribed. Participants were selected from three of six neighborhoods targeted for the OCV campaign with a purposive, convenience, and chain-referral sampling method. Tables 2 and 3 describe the study participants. Authors note that the sampling method may limit the representativeness of the responses to the target population. Furthermore, the pollical and social context described may not be generalizable to other areas and time frames. Despite these limitations, authors suggest actions to address barriers that stem from negative political or social perceptions and to partner with trusted groups to carry out immunization and other health campaigns.

Return to List of Articles

8. Pneumococcal carriage in households in Karonga District, Malawi, before and after introduction of 13-valent pneumococcal conjugate vaccination

Heinsbroek E, Tafatatha T, Phiri A, Swarthout TD, Alaerts M, Crampin AC, et al.

Vaccine. 2018 Oct 29;36(45):6850-6857.

PubMed ID: 30352744

ABSTRACT

BACKGROUND:

Thirteen-valent pneumococcal conjugate vaccine (PCV13) was introduced in Malawi in November 2011 and is offered to infants at 6, 10 and 14 weeks of age as part of routine immunisation. PCV13 is expected to reduce vaccine type (VT) nasopharyngeal carriage, leading to reduced transmission and herd protection.

METHODS:

We compared pneumococcal carriage in rural Karonga District, Malawi, pre-vaccine in 2009-2011 and post-vaccine in 2014 using a combination of cross-sectional and longitudinal analyses. Nasopharyngeal swabs were collected from a cohort of mother-infant pairs and household members <16 years. Pneumococci from 2009 to 2011 were serogrouped using latex agglutination and serotyped by Quellung reaction. In 2014, latex agglutination was used for both steps. Carriage prevalence ratios using prevalence data from before and after vaccine introduction were calculated by log-binomial regression, adjusted for age, seasonality and household composition. Participating infants in 2014 received PCV13 as part of routine immunisation.

RESULTS:

VT carriage prior to PCV-13 introduction was 11.4%, 45.1%, 28.2%, 21.2% and 6.6% for 6-week old infants, 18-week old infants, children 1-4 years, children 5-15 years and mothers, respectively. After vaccine introduction, VT carriage decreased among vaccinated 18-week old infants (adjusted prevalence ratio 0.24 (95%CI 0.08-0.75)), vaccinated children 1-4 years (0.54 (0.33-0.88)), unvaccinated children 5-15 years (0.37 (0.17-0.78)) and mothers (0.34 (0.15-0.79)). No decrease in VT carriage was observed for 6-week old infants too young to be vaccinated (1.07 (0.38-3.02)) and PCV-13 ineligible children 1-4 years (0.84 (0.53-1.33)). Non-VT carriage increased only among vaccinated children 1-4 years (1.58 (1.21-2.06)).

CONCLUSIONS:

There is evidence of reduced VT pneumococcal carriage three years after vaccine introduction in this rural Malawian population with good vaccine coverage using a 3 + 0 schedule. However carriage

was sustained among 6-week-old infants and PCV13 ineligible 1-4 year olds, and there was some indication of serotype replacement in vaccinated 1-4 year olds.

WEB: 10.1016/j.vaccine.2018.10.021
IMPACT FACTOR: 3.29
CITED HALF-LIFE: 5.50

START COMMENTARY

Figure 1 shows a flowchart of recruitment and data availability, noting the source of sample (e.g., children 1-4 years, HIV-negative mothers) and which samples were available for cross-sectional and longitudinal analysis. Cross-sectional analyses were season-matched (April-August) due to remain consistent with the limited availability of data in the post-PCV13 period. Based on a study in Malawi, authors hypothesized that decreases in vaccine type carriage among 6-week old infants and PCV-13 ineligible children 1-4 years would develop over time. Limitations of the study include bias from potential unmeasured secular changes that may have occurred from pre- to post-PCV13 implementation, though authors are confident results are due to the vaccine. Authors were also unable to measure colonization of multiple serotypes and the study was not powered to measure serotype-specific changes.

Return to List of Articles

9. Vaccine programme stakeholder perspectives on a hypothetical single-dose human papillomavirus (HPV) vaccine schedule in low and middle-income countries

Gallagher KE, Kelly H, Cocks N, Dixon S, Mounier-Jack S, Howard N, et al.

Papillomavirus Res. 2018 Oct 21;6:33-40.

PubMed ID: 30352297

ABSTRACT

BACKGROUND:

The World Health Organization (WHO) recommends a 2-dose HPV vaccine schedule for girls aged 9-14 years. As randomised controlled trials assessing the immunogenicity and efficacy of a 1-dose schedule are ongoing, we interviewed immunisation programme managers and advisors in low and middle-income countries (LMIC) about a hypothetical, future reduction in the HPV vaccine schedule.

METHODS:

We conducted semi-structured interviews with LMIC immunisation programme managers and national immunisation technical advisory group members (key informants; KIs) in 2017, recruited for their knowledge/experience in national HPV vaccine policy and provision. Data were analysed thematically.

RESULTS:

We conducted 30 interviews with KIs from 18 countries. Perceived advantages of a 1-dose schedule included reduced logistical and financial resources needed for vaccine delivery, fewer cold chain requirements and easier integration into routine immunisation services. Perceived challenges included health worker hesitancy, resources needed to re-mobilise communities and re-train health workers, potential misrepresentation of schedule changes by anti-vaccine groups or the media. Half of interviewees suggested a WHO recommendation would be necessary prior to policy change.

CONCLUSIONS:

We found wide-ranging support among LMIC immunisation managers and advisors for a 1-dose vaccine schedule if research demonstrated immunological and clinical evidence of efficacy, and WHO provided a formal recommendation.

WEB: 10.1016/j.pvr.2018.10.004

IMPACT FACTOR: n/a

CITED HALF-LIFE: n/a

START COMMENTARY

Purposive sampling of members of the National Immunization Technical Advisory Group (NITAG), Expanded Programme on Immunization (EPI) managers and/or human papillomavirus (HPV) focal points within the EPI program, or EPI country partners and/or international bodies) were interviewed. Table 1 summarizes participating countries and key informants. Tables 2 and 3 summarize the advantages and barriers to a one dose HPV schedule. Authors note that a limitation of the study was not obtaining responses from nine of the 27 countries approached to participate in the study. Furthermore, findings were based on opinion, not consensus; authors caution that conclusions may differ to those developed during country decision-making processes.

Return to List of Articles

10. Improving immunization data quality in Peru and Mexico: Two case studies highlighting challenges and lessons learned

Trumbo SP, Contreras M, García AGF, Díaz FAE, Gómez M, Carrión V, et al.

Vaccine. 2018 Nov 29;36(50):7674-7681.

PubMed ID: 30414780

ABSTRACT

INTRODUCTION:

The Global Vaccine Action Plan and the Regional Immunization Action Plan of the Americas call for countries to improve immunization data quality. Immunization information systems, particularly electronic immunization registries (EIRs), can help to facilitate program management and increase coverage. However, little is known about efforts to develop and implement such systems in low- and middle-income countries. We present the experiences of Mexico and Peru in implementing EIRs.

METHODS:

We conducted case studies of an EIR in Mexico and of a population registry in Peru. Information was gathered from technical documents, stakeholder focus groups, site visits, and semi-structured interviews of national stakeholders. We organized findings into narratives that emphasized challenges and lessons learned.

RESULTS:

Mexico built one of the world's first EIRs, incorporating novel features such as local-level tracking of patients; however, insufficient resources and poor data registration practices led to the system's discontinuation. Peru created an information system to improve affiliation to social programs, including the immunization program and quality of demographic data. Mexico's experience highlights lessons in failed sustainability of an EIR and a laudable effort to reform a country's information system. Peru's demonstrates that attempts to improve health and other data may strengthen health systems, including immunization data. Major challenges in information system implementation and sustainability in Peru and Mexico related to funding, clear governance structures, and resistance among health workers.

DISCUSSION:

These case studies reinforce the need for countries to ensure adequate funding, plans for sustainability, and health worker capacity-building activities before implementing EIRs. They also suggest new approaches to implementation, including economic incentives for sub-national administrative levels and opportunities to link efforts to improve immunization data with other health and political priorities. More information on best practices is needed to ensure the successful adoption and sustainability of immunization registries in low- and middle-income countries.

WEB: 10.1016/j.vaccine.2018.10.083
IMPACT FACTOR: 3.29
CITE HALF-LIFE: 5.50

START COMMENTARY

Tables 1 and 3 provide descriptions of Mexico's PROVAC immunization information system and Peru's Padrón Nominal immunization information system, respectively. Tables 2 and 4 outline the challenges and lessons learned from each system. Despite the efforts made to ensure study rigor through qualitative methods, authors note the potential for other investigators to reach different conclusions. Country-specific evaluations should be conducted to consider country context. This study fills a gap in assessing the use of electronic immunization records in low- and middle- income countries.

Return to List of Articles

Appendix

The literature search for the December 2018 Vaccine Delivery Research Digest was conducted on December 6, 2018. We searched English language articles indexed by the US National Library of Medicine and published between October 15, 2018 and November 14, 2018. The search resulted in 240 items.

Search Terms

(((((vaccine[tiab] OR vaccines[tiab] OR vaccination[tiab] OR immunization[tiab] OR immunisation[tiab] OR vaccine[mesh] OR immunization[mesh]) AND (logistics[tiab] OR supply[tiab] OR "supply chain"[tiab] OR implementation[tiab] OR expenditures[tiab] OR financing[tiab] OR economics[tiab] OR "Cost effectiveness"[tiab] OR coverage[tiab] OR attitudes[tiab] OR belief[tiab] OR beliefs[tiab] OR refusal[tiab] OR "Procurement"[tiab] OR timeliness[tiab] OR systems[tiab])) OR ("vaccine delivery"[tiab])) NOT ("in vitro"[tiab] OR "immune response"[tiab] OR gene[tiab] OR chemistry[tiab] OR genotox*[tiab] OR sequencing[tiab] OR nanoparticle*[tiab] OR bacteriophage[tiab] OR exome[tiab] OR exogenous[tiab] OR electropor*[tiab] OR "systems biology"[tiab] OR "animal model"[tiab] OR cattle[tiab] OR sheep[tiab] OR goat[tiab] OR rat[tiab] OR pig[tiab] OR mice[tiab] OR mouse[tiab] OR murine[tiab] OR porcine[tiab] OR ovine[tiab] OR rodent[tiab] OR fish[tiab])) AND (English[LA]) ("2018/10/15"[PDAT] : "2018/11/14"[PDAT]))