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

JULY 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 Health and economic benefits of single-dose HPV vaccination in a Gavi-eligible country
{Abstract & START Commentary} {Full article}

- A three-tiered hybrid modeling study that assessed the health and economic impact of a one-dose HPV vaccination strategy compared with no vaccination and a two-dose vaccination strategy in Uganda.

2 Model-estimated effectiveness of single dose 9-valent HPV vaccination for HIV-positive and HIV-negative females in South Africa
{Abstract & START Commentary} {Full article}

- A modeling study that assessed the impact of the 9-valent HPV vaccine in a population of HIV-positive and HIV-negative women in South Africa.

3 Immunogenicity and protection from a single dose of internationally available killed oral cholera vaccine: a systematic review and metaanalysis
{Abstract & START Commentary} {Full article}

- A systematic review and meta-analysis of the immunogenicity of one dose of oral cholera vaccine.

4 MenACWY-TT is immunogenic when co-administered with Tdap and AS04-HPV16/18 in girls and young women: Results from a phase III randomized trial
{Abstract & START Commentary} {Full article}

- A phase III randomized trial that assessed the immunogenicity of a quadrivalent (serogroups A, C, W, and Y) tetanus toxoid-conjugate meningococcal vaccine co-administered with human papillomavirus 16/18 AS04-adjuvanted vaccine and tetanus-diphtheria-acellular pertussis vaccine in female adolescents and young adults.

5 Quadrivalent influenza vaccines in low and middle income countries: cost-effectiveness, affordability, and availability
{Abstract & START Commentary} {Full article}

- A commentary for policymakers when considering the transition from trivalent influenza vaccine to quadrivalent influenza vaccine in LMIC settings.

6 Cost-effectiveness of the controlled temperature chain for the hepatitis B virus birth dose vaccine in various global settings: a modelling study

{Abstract & START Commentary} {Full article}

- A modeling study that assessed the cost-effectiveness of a controlled temperature chain strategy for the hepatitis B birth dose vaccine in 72 countries.

7 Determining the pneumococcal conjugate vaccine coverage required for indirect protection against vaccine-type pneumococcal carriage in low and middle-income countries: a protocol for a prospective observational study

{Abstract & START Commentary} {Full article}

- A protocol for a hospital-based observational study in Lao, Mongolia, and Papua New Guinea that will investigate the relationship between PCV coverage and indirect effects of PCV immunization on nasopharyngeal pneumococcal carriage.

8 Childhood vaccines in Uganda and Zambia: Determinants and barriers to vaccine coverage

{Abstract & START Commentary} {Full article}

- A multi-survey-based analysis that used Bayesian Structural Equation Modeling to investigate determinants of vaccine coverage in Uganda and Zambia.

9 Breaking the inertia in coverage: mainstreaming under-utilized immunization strategies in the Middle East and North Africa region

{Abstract & START Commentary} {Full article}

- A non-systematic review of three under-utilized strategies to improve vaccine coverage in the Middle East and North Africa region.

10 Vaccines, inspiring innovation in health

{Abstract & START Commentary} {Full article}

- A report describing the 18th Annual General Meeting of the Developing Countries Vaccine Manufacturers' Network.

Appendix

Details of Articles

1. Health and economic benefits of single-dose HPV vaccination in a Gavi-eligible country

Burger EA, Campos NG, Sy S, Regan C, Kim JJ.

Vaccine. 2018 May 25. [Epub ahead of print]

PubMed ID: 29807710

ABSTRACT

BACKGROUND:

Although guidelines for prophylactic human papillomavirus (HPV) vaccination recommend two doses for girls ages 9-14 years, several studies have demonstrated similar protection with one dose. Our objective was to evaluate the long-term health and economic impacts of routine one-dose HPV vaccination compared to (1) no vaccination and (2) two-dose HPV vaccination in a low-income country.

METHODS:

We used a three-tiered hybrid modeling approach that captured HPV transmission, cervical carcinogenesis, and population demographics to project long-term health and economic outcomes associated with one-dose HPV vaccination (assuming 80% efficacy against HPV-16/18 infections under three waning scenarios) and two-dose HPV vaccination (assuming 100% efficacy over the lifetime) in Uganda. Costs included the vaccine program (dosage and delivery) costs over a 10-year period and cervical cancer costs over the lifetimes of the current population of Ugandan women. Health outcomes included number of cervical cancer cases and disability-adjusted life years (DALYs). Incremental cost-effectiveness ratios (i.e., cost per DALY averted) were calculated and compared against the Ugandan per-capita gross domestic product.

RESULTS:

Routine one-dose HPV vaccination of 9-year-old girls required substantial upfront investment but was cost-saving compared to no vaccination when accounting for the cost-offsets from future cancers averted. Forty years after initiating routine vaccination and depending on assumptions of vaccine waning, one-dose HPV vaccination with equivalent coverage (70%) averted 15-16% of cervical cancer cases versus 21% with two-dose vaccination but required only half the upfront economic investment. Vaccination with two doses had an attractive cost-effectiveness profile except if one-dose vaccination enabled higher coverage (90% vs. 70%) and did not wane.

CONCLUSIONS:
One-dose HPV vaccination resulted in cost-savings compared to no vaccination and could be cost-effective compared to two-dose vaccination if protection is longstanding and higher coverage can be achieved.

WEB: 10.1016/j.vaccine.2018.04.061
IMPACT FACTOR: 3.29
CITE HALF-LIFE: 5.50

START COMMENTARY

Using a three-tiered mathematical model and three waning protection scenarios, Burger et al. found routine one-dose HPV vaccination was cost-saving when compared with no vaccination. Two-dose vaccination was cost-effective when compared to one-dose vaccination, except in a scenario of expanded one-dose vaccination coverage (90% vs. 70%), making one-dose vaccination cost-saving compared with two-dose vaccination. This study demonstrated how differences in coverage and duration of protection can impact the relative benefit and costs of different vaccination scenarios in Uganda. The authors described several limitations in their study, including the use of U.S. sexual behavior data to inform the HPV agent-based tier of the model, which may make the indirect effects of the vaccine not generalizable to Uganda or other low-income settings. The authors also cautioned interpretation of results from the expanded coverage sensitivity analysis as they did not factor in program costs for increased coverage. Other limitations included a relatively short costing timeframe (i.e., first ten years for vaccination program costs and up to age 50 for disease costs and health benefits in women), restricting vaccine protection to HPV-16/18, and not accounting for HIV co-infection, among others. Nonetheless, modeling studies, such as this one, add to the body of information that can help public health officials from low-income countries make decisions regarding HPV vaccination programs in the absence of one-dose vaccine trial results.

Return to List of Articles

2. Model-estimated effectiveness of single dose 9-valent HPV vaccination for HIV-positive and HIV-negative females in South Africa

Tan N, Sharma M, Winer R, Galloway D, Rees H, Barnabas RV.

Vaccine. 2018 Jun 8. [Epub ahead of print]

PubMed ID: 29891348

ABSTRACT

BACKGROUND:

Women in sub-Saharan Africa have high dual burden of HPV and HIV infections, which can interact to increase cervical cancer (CC) risk. The 9-valent HPV (9vHPV) vaccine has high demonstrated effectiveness against HPV types causing 90% of CC. Additionally, one dose of the 9vHPV vaccine has the potential to achieve greater coverage at lower costs than a two-dose schedule. However, the potential impact of single-dose 9vHPV vaccine accounting for HPV-HIV interactions has not been estimated.

METHODS:

We adapted a dynamic HIV transmission model to include HPV acquisition and CC pathogenesis and projected the impact of a single dose 9vHPV preadolescent vaccination in KwaZulu-Natal, South Africa. We report health impacts of HPV vaccination separately for HIV-positive women stratified by HIV treatment and CD4 count and HIV-negative women.

RESULTS:

At 90% coverage of females age 9 years with 80% lifelong vaccine efficacy, single dose HPV vaccination was projected to reduce CC incidence by 74% and mortality by 71% in the general female population at 70 years after the start of the vaccination program. Age-standardized CC incidence and mortality reductions were comparable among HIV-negative women, HIV-positive women, and HIV-positive women on ART. Health benefits were reduced when assuming waning protection at 10, 15 and 20 years after vaccination.

DISCUSSION:

Single dose 9vHPV vaccination is projected to avert substantial CC burden in South Africa and similar high HIV prevalence settings. Health benefits were comparable across all female subpopulations stratified by HIV status, CD4 count, and ART status.

WEB: 10.1016/j.vaccine.2018.02.023

IMPACT FACTOR: 3.29

CITE HALF-LIFE: 5.50

START COMMENTARY

Tan et al. developed a compartmental model to assess the averted cervical cancer burden in South Africa due to one-dose nine-valent HPV vaccination. They found reductions in cervical cancer incidence and mortality and that those reductions were comparable between HIV-positive and HIV-negative females, even under varying coverage and waning protection assumptions. By combining an HIV model with an HPV model, Tan et al. accounted for the impact of HIV status, CD4 count, and ART status on HPV infection and disease progression. The authors discussed a few limitations to the study, including only modeling three HPV types (i.e., HPV16/18, other 9v types, and non-9v types); not measuring precancerous lesions, which are more common in HIV-infected women than HIV-negative women and could have implications for the efficacy of cervical cancer screening; not assessing costs, an important driver for vaccine implementation; and uncertainty in HPV disease progression and vaccine impact in conjunction with HIV infection. Upper and lower bounds for underlying measures were not provided in the article, but can be found in the supplementary document.

Return to List of Articles

3. Immunogenicity and protection from a single dose of internationally available killed oral cholera vaccine: a systematic review and metaanalysis

Lopez AL, Deen J, Azman AS, Luquero FJ, Kanungo S, Dutta S, et al.

Clin Infect Dis. 2018 Jun 15;66(12):1960–71.

PubMed ID: 29177437

ABSTRACT

In addition to improved water supply and sanitation, the 2-dose killed oral cholera vaccine (OCV) is an important tool for the prevention and control of cholera. We aimed to document the immunogenicity and protection (efficacy and effectiveness) conferred by a single OCV dose against cholera. The metaanalysis showed that an estimated 73% and 77% of individuals seroconverted to the Ogawa and Inaba serotypes, respectively, after an OCV first dose. The estimates of single-dose vaccine protection from available studies are 87% at 2 months decreasing to 33% at 2 years. Current immunologic and clinical data suggest that protection conferred by a single dose of killed OCV may be sufficient to reduce short-term risk in outbreaks or other high-risk settings, which may be especially useful when vaccine supply is limited. However, until more data suggest otherwise, a second dose should be given as soon as circumstances allow to ensure robust protection.

WEB: 10.1093/cid/cix1039

IMPACT FACTOR: 9.12

CITE HALF-LIFE: 7.00

START COMMENTARY

Lopez et al. conducted a systematic review and meta-analysis of one-dose oral cholera vaccine (OCV) immunogenicity and protection studies to investigate how well one-dose OCV protects against cholera. All studies in the analysis were assessed for quality by GRADE guidelines and were graded moderate or high scores (see Supplement). Seventeen studies contributed to the immunogenicity meta-analysis. A second dose of OCV did not show marked increases in overall seroconversion compared to the first dose; however, a sub-analysis among children under 5 years (4 studies) showed higher proportion of seroconversion of the Ogawa serotype after dose 2 compared to dose 1 (85% [95% CI, 79%–89%; I^2=0] vs. 67% [95% CI, 61%–72%; I^2=0], *P*=0.002 for difference after adjusting for baseline geometric mean titers). Six studies informed the vaccine protection results, with a 2015 study in South Sudan providing the 87% at 2 months figure and a

2011 study in India providing the 33% at 2 years figure. Differences in protection may be due to different study settings rather than length of follow-up time as authors noted that protection in the South Sudan study may have been boosted from natural exposure due to a large epidemic year. Authors stated the most important limitation to their study was the inability to "assess exactly when protection from a single dose starts, the additional boosting that a second dose provides, or the interval between vaccine doses that maximizes the duration of protection."

Return to List of Articles

4. MenACWY-TT is immunogenic when co-administered with Tdap and AS04-HPV16/18 in girls and young women: Results from a phase III randomized trial

Rivera L, Chanthavanich P, Põder A, Suryakiran PV, Jastorff A, Van der Wielen M.

Vaccine. 2018 Jun 22 ;36(27):3967–3975.

PubMed ID: 29789243

ABSTRACT

BACKGROUND:

Co-administration of vaccines in adolescents may improve coverage. We assessed co-administration of quadrivalent meningococcal serogroups A, C, W and Y tetanus toxoid-conjugate vaccine (MenACWY-TT), human papillomavirus 16/18 AS04-adjuvanted vaccine (AS04-HPV16/18) and tetanus-diphtheria-acellular pertussis vaccine (Tdap) in girls and young women.

METHODS:

In this phase IIIb study (NCT01755689), 1300 healthy 9-25-year-old females were randomized (1:1:1:1:1) to receive: MenACWY-TT at month (M) 0 and AS04-HPV16/18 at M1, M2, M7; MenACWY-TT and AS04-HPV16/18 at M0 and AS04-HPV16/18 at M1, M6; AS04-HPV16/18 at M0, M1, M6; MenACWY-TT, Tdap and AS04-HPV16/18 at M0 and AS04-HPV16/18 at M1, M6; Tdap and AS04-HPV16/18 at M0 and AS04-HPV16/18 at M1, M6. Immunogenicity, safety and reactogenicity were evaluated.

RESULTS:

Immunogenicity of MenACWY-TT and AS04-HPV16/18 when co-administered was non-inferior to that of the 2 vaccines given separately. Co-administration of MenACWY-TT, AS04-HPV16/18 and Tdap was non-inferior to MenACWY-TT administered alone or to Tdap co-administered with AS04-HPV16/18 in terms of immunogenicity for all vaccine components, except pertussis antigens. Post-vaccination, ≥89.5% of participants reached antibody levels above the pre-specified threshold for all antigens. No safety concerns were identified.

CONCLUSION:

Our data support co-administration of MenACWY-TT with Tdap and AS04-HPV16/18 vaccines in adolescents.

WEB: 10.1016/j.vaccine.2018.05.051

IMPACT FACTOR: 3.29

CITE HALF-LIFE: 5.50

START COMMENTARY

In this phase III trial, Rivera et al. conducted the first study to assess the immunogenicity of the quadrivalent meningococcal (MenACWY-TT) vaccine co-administered with a human papillomavirus (HPV) vaccine and tetanus-diphtheria-acellular pertussis vaccine (Tdap) in female adolescents and young adults. The trial was conducted in Estonia, Thailand, and the Dominican Republic. Authors noted that results are generalizable to Latin American, European, and Asian girls and young women; however, individual countries should assess need by examining country-specific disease burden when considering co-administration of vaccines. Authors used pertussis toxoid, filamentous hemagglutinin, and pertactin to measure pertussis immunogenicity. Since there are no established correlates of pertussis protection, authors questioned to what extent the pertussis immunogenicity results correlate with vaccine efficacy against pertussis disease.

Return to List of Articles

5. Quadrivalent influenza vaccines in low and middle income countries: cost-effectiveness, affordability, and availability

Hendriks J, Hutubessy RCW, Grohmann G, Torelli G, Friede M, Kieny MP.

Vaccine. 2018 Jun 27;36(28):3993–3997.

PubMed ID: 29866617

ABSTRACT

In high-income countries, there is an increased tendency to replace inactivated seasonal trivalent influenza (TIV) vaccines with quadrivalent (QIV) vaccines as these are considered to give a greater public health benefit. In addition, several recent studies from the USA and Europe indicate that replacement with QIV might also be cost-effective; however, the situation in low- and middle-income countries (LMIC) is less clear as few studies have investigated this aspect. The paper by de Boer et al. (2008) describes a dynamic modelling study commissioned by WHO that suggests that in LMICs, under certain conditions, QIV might also be more cost-effective than TIV. In this commentary, we discuss some important aspects that policymakers in LMICs might wish to take into account when considering replacing TIV by QIV. Indeed, from the data presented in the paper by de Boer et al. it can be inferred that replacing QIV for TIV would mean a 25-29% budget increase for seasonal influenza vaccination in South Africa and Vietnam, resulting in an incremental influenza-related health impact reduction of only 7-8% when a 10% symptomatic attack rate is assumed. We argue that national health budget considerations in LMIC might lead decision-makers to choose other investments with higher health impact for a budget equivalent to roughly a quarter of the yearly TIV immunization costs. In addition to an increased annual cost that would be associated with a decision to replace TIV with QIV, there would be an increased pressure on manufacturers to produce QIV in time for the influenza season requiring manufacturers to produce some components of the seasonal vaccine at risk prior to the WHO recommendations for influenza vaccines. Unless the current uncertainties, impracticalities and increased costs associated with QIVs are resolved, TIVs are likely to remain the more attractive option for many LMICs. Each country should establish its context-specific process for decision-making based on national data on disease burden and costs in order to determine whether the health gains out-weigh the additional cost of moving to QIV. For example, immunizing more people in the population, especially those in higher risk groups, with TIV might not only provide better value for money but also deliver better health outcomes in LMICs. Countries with local influenza vaccine manufacturing capacity should include in their seasonal influenza vaccine procurement process an analysis of the pros- and cons- of TIV versus QIV, to ensure both feasibility and sustainability of local manufacturing.

WEB: 10.1016/j.vaccine.2018.05.099
IMPACT FACTOR: 3.29
CITE HALF-LIFE: 5.50

START COMMENTARY

In response to the de Boer et al. study (results in Table 1), Hendriks et al. discussed factors other than cost-effectiveness that governments should consider when exploring implementation of quadrivalent influenza vaccine (QIV) versus trivalent influenza vaccine (TIV). Hendriks et al. graphed influenza cases averted for TIV, QIV, and extra TIV scenarios (extra TIV from the additional costs that would have been incurred from QIV implementation) in Figure 1, showing greater cases averted under extra TIV compared to QIV. They stressed that decisions should be made in the context of a country's specific health burden and financial landscape. Furthermore, Hendriks et al. commented on feasibility challenges in production and implementation if countries were to adopt QIV, namely the timeliness with which vaccines would need to be produced each year given the additional component.

Return to List of Articles

6. Cost-effectiveness of the controlled temperature chain for the hepatitis B virus birth dose vaccine in various global settings: a modelling study

Scott N, Palmer A, Morgan C, Lesi O, Spearman CW, Sonderup M, et al.

Lancet Glob Health. 2018 Jun;6(6):e659–e667.

PubMed ID: 29773122

ABSTRACT

BACKGROUND:

The controlled temperature chain (CTC) strategy allows vaccines to be kept outside the cold chain for a short period of time. In remote rural areas, the CTC strategy for the hepatitis B virus (HBV) birth dose vaccination could improve its geographical coverage and timeliness of delivery, but with additional outreach costs. We assessed the cost-effectiveness of the CTC strategy for the HBV birth dose across six world regions and 72 countries according to their HBV prevalence, delivery costs, and birth dose coverage and timing.

METHODS:

By use of a mathematical model of perinatal HBV transmission and disease progression, we calculated per 1000 births the total HBV-related disability-adjusted life-years (DALYs) and costs, including vaccine delivery costs and costs associated with HBV-related disease, with and without the CTC strategy.

FINDINGS:

A CTC strategy produced health benefits in all regions and was cost-saving in the regions of east Asia and Pacific, Latin America and Caribbean, sub-Saharan Africa, and north Africa and Middle East. The CTC strategy cost US$0·15 (IQR -7·11 to 4·75) per DALY averted in the central and eastern Europe and central Asia region and $79·72 (66·47 to 94·47) in the south Asia region. Within individual countries, more savings were achieved and more DALYs averted in areas with above average HBV prevalence, below average birth dose coverage, or later than average birth dose delivery.

INTERPRETATION:

A CTC outreach strategy that improves the timing and coverage of the HBV birth dose vaccination is likely to be cost-saving and reduce the burden of HBV infection associated with perinatal transmission.

WEB: 10.1016/S2214-109X(18)30219-5

IMPACT FACTOR: 18.71

CITE HALF-LIFE: 1.00

START COMMENTARY

In their mathematical model of perinatal hepatitis B virus (HBV) transmission, Scott et al. examined the cost-effectiveness of a controlled temperature chain (CTC) strategy compared to a standard cold chain strategy, finding CTC was cost-saving in some regions. Several sensitivity analyses were conducted to explore different assumptions, such as HBsAg prevalence among women of reproductive age, effectiveness of vaccine delivery via CTC, and additional costs for vaccine delivered via CTC. Results were primarily driven by HBsAg prevalence and vaccine coverage. Authors emphasized the purpose of this study was to provide evidence for HBV vaccination using CTC, not to calculate costs by governments and so additional analyses would be needed to satisfy that objective. Limitations to this study included lack of granularity of data for region heterogeneity, exclusion of areas that have not implemented HBV vaccine, and not examining which specific HBV vaccines would be best-suited for CTC.

Return to List of Articles

7. Determining the pneumococcal conjugate vaccine coverage required for indirect protection against vaccine-type pneumococcal carriage in low and middle-income countries: a protocol for a prospective observational study

Chan J, Nguyen CD, Lai JYR, Dunne EM, Andrews R, Blyth CC, et al.

BMJ Open. 2018 May 18;8(5):e021512.

PubMed ID: 29776921

ABSTRACT

INTRODUCTION:

Pneumococcal conjugate vaccines (PCVs) prevent disease through both direct protection of vaccinated individuals and indirect protection of unvaccinated individuals by reducing nasopharyngeal (NP) carriage and transmission of vaccine-type (VT) pneumococci. While the indirect effects of PCV vaccination are well described, the PCV coverage required to achieve the indirect effects is unknown. We will investigate the relationship between PCV coverage and VT carriage among undervaccinated children using hospital-based NP pneumococcal carriage surveillance at three sites in Asia and the Pacific.

METHODS AND ANALYSIS:

We are recruiting cases, defined as children aged 2-59 months admitted to participating hospitals with acute respiratory infection in Lao People's Democratic Republic, Mongolia and Papua New Guinea. Thirteen-valent PCV status is obtained from written records. NP swabs are collected according to standard methods, screened using lytA qPCR and serotyped by microarray. Village-level vaccination coverage, for the resident communities of the recruited cases, is determined using administrative data or community survey. Our analysis will investigate the relationship between VT carriage among undervaccinated cases (indirect effects) and vaccine coverage using generalised estimating equations.

ETHICS AND DISSEMINATION:

Ethical approval has been obtained from the relevant ethics committees at participating sites. The results are intended for publication in open-access peer-reviewed journals and will demonstrate methods suitable for low- and middle-income countries to monitor vaccine impact and inform vaccine policy makers about the PCV coverage required to achieve indirect protection.

WEB: 10.1136/bmjopen-2018-021512

IMPACT FACTOR: 2.41

CITE HALF-LIFE: 2.00

START COMMENTARY

Chan et al. described the protocol for a prospective observational study that will assess the relationship between pneumococcal conjugate vaccine (PCV) coverage and vaccine type nasopharyngeal (NP) carriage and density among under-vaccinated children to understand how PCV vaccine coverage impacts indirect effects of PCV. Authors described the use of a novel method to measure indirect effects of PCV by examining NP carriage with the assumption that reductions in NP carriage of vaccine serotypes coincides with reductions in invasive vaccine type disease; however, authors acknowledged that NP carriage of pneumococci may not be indicative of disease. The authors highlighted the Bill & Melinda Gates Foundation's interest in research that investigates the effectiveness of a lower dosing schedule (1+1) and, therefore, understanding how a lower dosing schedule might impact indirect effects of the vaccine is important. A potential limitation the authors discussed was the variation in methods and setting across the three study sites, which could impact their ability to make comparisons between the sites.

Return to List of Articles

8. Childhood vaccines in Uganda and Zambia: Determinants and barriers to vaccine coverage

Phillips DE, Dieleman JL, Shearer JC, Lim SS.
Vaccine. 2018 Jul 5;36(29):4236–4244.
PubMed ID: 29885772

ABSTRACT

BACKGROUND:
Improving childhood vaccine coverage is a priority for global health, but challenging in low and middle-income countries. Although previous research has sought to measure determinants of vaccination, most has limitations. We measure determinants using a clearly-defined hypothetical model, multi-faceted data, and modeling strategy that makes full use of the hypothesis and data.
METHODS:
We use linked, cross-sectional survey data from households, health facilities, patients and health offices in Uganda and Zambia, and Bayesian Structural Equation Modeling to quantify the proportion of variance in childhood vaccination that is explained by key determinants, controlling for known confounding.
RESULTS:
We find evidence that the leading determinant of vaccination is different for different outcomes. For three doses of pentavalent vaccine, intent to vaccinate (on the part of the mother) is the leading driver, but for one dose of the vaccine, community access is a larger factor. For pneumococcal conjugate vaccine, health facility readiness is the leading driver. Considering specifically-modifiable determinants, improvements in cost, facility catchment populations and staffing would be expected to lead to the largest increase in coverage according to the model.
CONCLUSIONS:
This analysis measures vaccination determinants using improved methods over most existing research. It provides evidence that determinants should be approached in the context of relevant outcomes, and evidence of specific determinants that could have the greatest impact in these two countries, if targeted. Future studies should seek to improve our analytic framework, apply it in different settings, and utilize stronger study designs. Programs that focus on a particular determinant should use these results to select an outcome that is appropriate to measure their effectiveness. Vaccination programs in these countries should use our findings to better target interventions and continue progress against vaccine preventable diseases.

WEB: 10.1016/j.vaccine.2018.05.116
IMPACT FACTOR: 3.29

CITE HALF-LIFE: 5.50

START COMMENTARY

Building upon previous work, Phillips et al. created a structural model hypothesizing that these latent variables—*intent to vaccinate*, *facility readiness*, and *community access*—were three determinants of vaccine utilization (see Figure 1). A more detailed model was depicted in Figure 2 that outlined the observed variables that made up the latent variables for modeling vaccine coverage of three dose Pentavalent vaccine in Uganda (see Appendix 4 for Zambia). These models were used to investigate determinants of coverage for four vaccine scenarios—at least one dose of pentavalent vaccine, three doses of pentavalent vaccine, one dose of pneumococcal conjugate vaccine, and three doses of pneumococcal conjugate vaccine—measured by child vaccine cards. Study strengths included the evidence-based framework guiding the analysis and use of several data sources to better adjust for confounding. The study was limited in that the model selected may not represent reality and data used were cross-sectional; authors cautioned about inferences made from this model.

Return to List of Articles

9. Breaking the inertia in coverage: mainstreaming under-utilized immunization strategies in the Middle East and North Africa region

Sadr-Azodi N, DeRoeck D, Senouci K.

Vaccine. 2018 Jul 16;36(30):4425–4432.

PubMed ID: 29859804

ABSTRACT

Vaccination coverage rates have stagnated in the past several years in many middle-income countries (MICs), especially in the UNICEF Middle East and North Africa region, with political and economic turmoil as contributing factors. This paper reviews country experiences with three under-utilized strategies aimed at increasing vaccination coverage and reducing disparities between socio-economic and geographic groups in MICs. These strategies include: (1) identifying and accounting for displaced, mobile and neglected populations; (2) assessing and addressing missed opportunities for vaccination, including by expanding immunization into the second year of life and beyond; and (3) engaging effectively with the private/nongovernmental health providers in the coordination, provision and reporting of immunization services. The examples focus primarily on quality data collection, analysis, use and reporting aspects of the strategies. While data are limited, there is evidence from MICs that each of these strategies can have a positive impact on vaccination coverage, especially among marginalized populations.

WEB: 10.1016/j.vaccine.2018.05.088

IMPACT FACTOR: 3.29

CITE HALF-LIFE: 5.50

START COMMENTARY

Sadr-Azodi et al. reviewed challenges and potential solutions to improving vaccine coverage in countries in the Middle East and North Africa region where improvements in vaccination coverage slowed in recent years. Underserved populations included refugees, internally-displaced populations, residents of urban slums, and nomads and transient groups. The authors discussed microplans as a strategy to specifically identify, enumerate, and target special populations, as well as training health workers to avoid missed opportunities to vaccinate children (e.g., vaccinating children missing immunization documentation or who are older than 12 months). The authors also

described the role of private health providers and suggested governments supply private providers with free vaccines in exchange for robust reporting of vaccine usage back to governments.

Return to List of Articles

10. Vaccines, inspiring innovation in health

Pagliusi S, Dennehy M, Kim H, DCVMN AGM Organizing Committee

Vaccine. 2018 May 19. [Epub ahead of print]

PubMed ID: 29789241

ABSTRACT

This report covers the topics of pandemics, epidemics and partnerships, including regulatory convergence initiatives, new technologies and novel vaccines, discussed by leading public and private sector stakeholders at the 18th Annual General Meeting (AGM) of the Developing Countries Vaccine Manufacturers' Network (DCVMN). Contributions of Gavi and the vaccine industry from emerging countries to the growing global vaccine market, by improving the supply base from manufacturers in developing countries and contributing to 58% of doses, were highlighted. The Coalition for Epidemic Preparedness Innovations (CEPI), the International Vaccine Institute (IVI) and others reported on new strategies to ensure speedy progress in preclinical and clinical development of innovative vaccines for future MERS, Zika or other outbreak response. Priorities for vaccine stockpiling, to assure readiness during emergencies and to prevent outbreaks due to re-emerging diseases such as yellow fever, cholera and poliomyelitis, were outlined. The role of partnerships in improving global vaccine access, procurement and immunization coverage, and shared concerns were reviewed. The World Health Organization (WHO) and other international collaborating partners provided updates on the Product, Price and Procurement database, the prequalification of vaccines, the control of neglected tropical diseases, particularly the new rabies elimination initiative, and regulatory convergence proposals to accelerate vaccine registration in developing countries. Updates on supply chain innovations and novel vaccine platforms were presented. The discussions enabled members and partners to reflect on efficiency of research & development, supply chain tools and trends in packaging technologies improving delivery of existing vaccines, and allowing a deeper understanding of the current public-health objectives, industry financing, and global policies, required to ensure optimal investments, alignment and stability of vaccine supply in developing countries.

WEB: 10.1016/j.vaccine.2018.05.035
IMPACT FACTOR: 3.29
CITE HALF-LIFE: 5.50

START COMMENTARY

In September 2017, SK Chemicals and the International Vaccine Institute co-hosted the 18th Annual General Meeting of the Developing Countries Vaccine Manufacturers' Network for over 270

participants. At the meeting, participants discussed progress, challenges, and successes in vaccine development, procurement, and distribution for epidemics and pandemics. Of note, Pagliusi et al. reported, “UNICEF procure[d] 2.5 billion doses of 40 WHO-prequalified vaccines, […] distribute[d] these to around 100 countries,” and responded to about 300 humanitarian crises (see Figure 3). S. Bhaskaran from the Bill & Melinda Gates Foundation shared Reliance, Re-engineering, and Regionalization as key principles to ensure an efficient and reliable regulatory pathway for vaccines. Challenges included responding in a timely manner to vaccine development and distribution in outbreak situations and inconsistencies in prequalification procedures that lead to inefficiencies (e.g., incomplete dossiers, lack of data, non-registration of clinical trials, etc.). Pagliusi et al. described the success in the PAHO Revolving Fund and the innovation of the African Vaccine Manufacturing Initiative, highlighting a study on manufacturing and procurement in Africa.

Return to List of Articles

Appendix

The literature search for the July 2018 Vaccine Delivery Research Digest was conducted on June 27, 2018. We searched English language articles indexed by the US National Library of Medicine and published between May 15, 2018 and June 14, 2018. The search resulted in 244 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]) ("2018/5/15"[PDAT] : "2018/6/14"[PDAT]))