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

REPORT TO THE BILL & MELINDA GATES FOUNDATION

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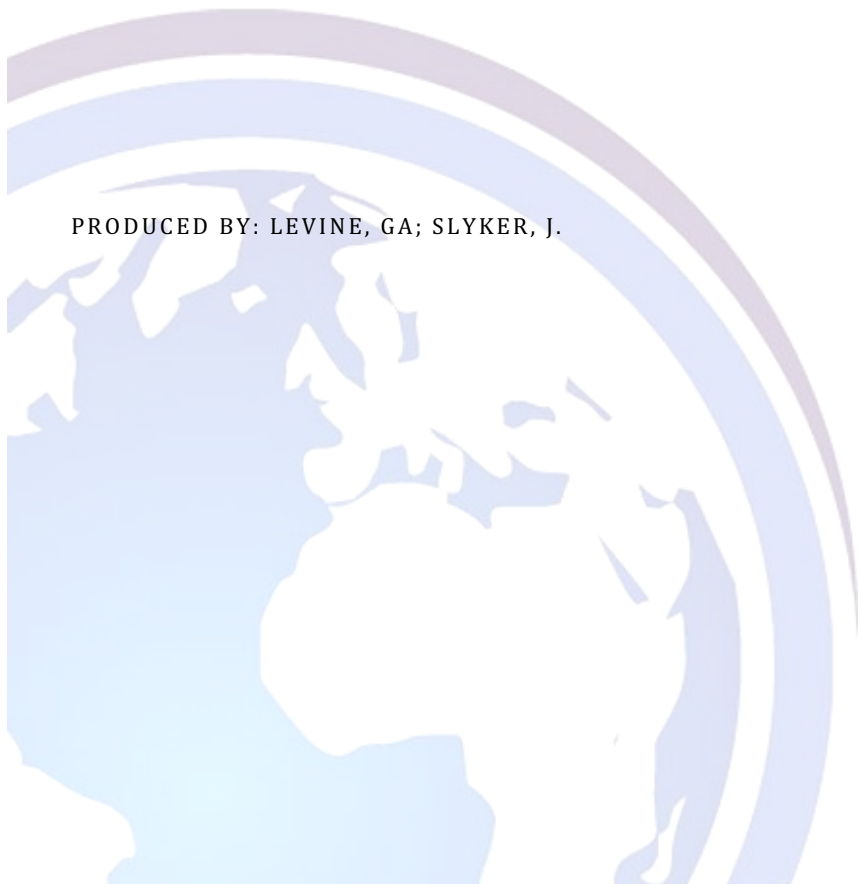


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1. [Social mobilisation, consent and acceptability: a review of human papillomavirus vaccination procedures in low and middle-income countries.](#)

BMC Public Health. 2016 Aug 19;16(1):834.

Kabakama S, Gallagher KE, Howard N, Mounier-Jack S, Burchett HE, Griffiths UK, Feletto M, LaMontagne DS, Watson-Jones D.

PMID: 27543037

ABSTRACT

BACKGROUND: Social mobilisation during new vaccine introductions encourages acceptance, uptake and adherence to multi-dose schedules. Effective communication is considered especially important for human papillomavirus (HPV) vaccine, which targets girls of an often-novel age group. This study synthesised experiences and lessons learnt around social mobilisation, consent, and acceptability during 55 HPV vaccine demonstration projects and 8 national programmes in 37 low and middle-income countries (LMICs) between January 2007 and January 2015.

METHODS: A qualitative study design included: (i) a systematic review, in which 1,301 abstracts from five databases were screened and 41 publications included; (ii) soliciting 124 unpublished documents from governments and partner institutions; and (iii) conducting 27 key informant interviews. Data were extracted and analysed thematically. Additionally, first-dose coverage rates were categorised as above 90 %, 90-70 %, and below 70 %, and cross-tabulated with mobilisation timing, message content, materials and methods of delivery, and consent procedures.

RESULTS: All but one delivery experience achieved over 70 % first-dose coverage; 60 % achieved over 90 %. Key informants emphasized the benefits of starting social mobilisation early and actively addressing rumours as they emerged. Interactive communication with parents appeared to achieve higher first-dose coverage than non-interactive messaging. Written parental consent (i.e., opt-in), though frequently used, resulted in lower reported coverage than implied consent (i.e., opt-out). Protection against cervical cancer was the primary reason for vaccine acceptability, whereas fear of adverse effects, exposure to rumours, lack of project/programme awareness, and schoolgirl absenteeism were major reasons for non-vaccination.

CONCLUSIONS: Despite some challenges in obtaining parental consent and addressing rumours, experiences indicated effective social mobilisation and high HPV vaccine acceptability in LMICs. Social mobilisation, consent, and acceptability lessons were consistent across world regions and HPV vaccination projects/programmes. These can be used to guide HPV vaccination communication strategies without additional formative research.

WEB: <http://dx.doi.org/10.1186/s12889-016-3517-8>

IMPACT FACTOR: 2.26

CITED HALF-LIFE: 3.90

UW EDITORIAL COMMENT: “Interactive” communication methods about HPV vaccination included one-on-one and group meetings at schools and health facilities and home visits by health workers. “Non-interactive” educational messaging methods included distributions of leaflets, posters, loud-speaker, radio and television announcements. Most activities included a combination of interactive and non-interactive communication.

Common rumors about the HPV vaccine included concerns that the vaccine was untested, that vaccination led to infertility, caused cancer or death, and that cures for cervical cancer were available. To dispel emerging rumors, expeditious and direct statements by “credible influencers”, or highly-regarded members of the community, government officials, religious leaders, health-workers, teachers/school personnel, and family members, were highly influential. Delays in responding to rumors were a cause of delay or cessation in vaccination activities.

Authors note that an explanation for lower coverage with opt-in consenting (versus opt-out) was the length of the consenting process, confusion and logistical challenges in the process, rather than refusals. In some countries adolescent girls themselves were able to consent, rather than caregivers. In other countries, adolescent girls were an important influence on a caregiver’s determination to consent.



2. Effectiveness of a smartphone app on improving immunization of children in rural Sichuan Province, China: a cluster randomized controlled trial.

Chen L, Du X, Zhang L, van Velthoven MH, Wu Q, Yang R, Cao Y, Wang W, Xie L, Rao X, Zhang Y, Koepsell JC.

BMC Public Health. 2016 Aug 31;16:909.

PMID: 27581655

ABSTRACT

BACKGROUND: The aim of this study was to assess the effectiveness of an EPI smartphone application (EPI app) on improving vaccination coverage in rural Sichuan Province, China.

METHODS: This matched-pair cluster randomized controlled study included 32 village doctors, matched in 16 pairs, and took place from 2013 to 2015. Village doctors in the intervention group used the EPI app and reminder text messages while village doctors in the control group used their usual procedures and text messages. The primary outcome was full vaccination coverage with all five vaccines (1 dose of BCG, 3 doses of hepatitis B, 3 doses of OPV, 3 doses of DPT and 1 dose of measles vaccine), and the secondary outcome was coverage with each dose of the five individual vaccines. We also conducted qualitative interviews with village doctors to understand perceptions on using the EPI app and how this changed their vaccination work.

RESULTS: The full vaccination coverage increased statistically significant from baseline to end-line in both the intervention (67 % [95 % CI:58-75 %] to 84 % [95 % CI:76-90 %], $P = 0.028$) and control group (71 % [95 % CI:62-79 %] to 82 % [95 % CI:74-88 %], $P = 0.014$). The intervention group had higher increase in full vaccination coverage from baseline to end-line compared to the control group (17 % vs 10 %), but this was not statistically significant ($P = 0.164$). Village doctors found it more convenient to use the EPI app to manage child vaccination and also reported saving time by looking up information of caregivers and contacting caregivers for overdue vaccinations quicker. However, village doctors found it hard to manage children who migrated out of the counties.

CONCLUSIONS: This study showed that an app and text messages can be used by village doctors to improve full vaccination coverage, though no significant increase in vaccination coverage was found when assessing the effect of the app on its own. Village doctors using EPI app reported having improved their working efficiency of managing childhood vaccination. Future studies should be conducted to evaluate the impact of more integrated approach of mHealth intervention on child immunization.

WEB: <http://dx.doi.org/10.1186/s12889-016-3549-0>

IMPACT FACTOR: 2.26

CITED HALF-LIFE: 3.90

UW EDITORIAL COMMENT: The EPI app included the functional capacity to make appointments; record a child's vaccination status; track children who were overdue for vaccination (missed scheduled appointment and > 3 days late for scheduled appointment); and provide education to providers about specific vaccinations. The EPI app was linked with the Child Immunization Register, such that the name, contact information for caregiver, missed vaccination and upcoming appointment date of any child with an "overdue" vaccination was sent daily to the village doctor via the app. Village doctors were provided funding for phone minutes and data packages for phones.

In both intervention and control groups caregivers received automated text message reminders of upcoming vaccination appointment time, date, available locations for receiving vaccinations, and contact information for vaccination administration institutions. This text message procedure was not pre-specified in the protocol for control regions, and was in addition to standard procedures conducted at the time in the region, which may partially explain increases in vaccination coverage from baseline, observed in both arms of the trial.

In most regions in the study, village doctors themselves did not provide vaccination, but rather were responsible for providing vaccination-related education and promotion of vaccination, and "tracking" of vaccination status of children in their villages.



3. Forecasted trends in vaccination coverage and correlations with socioeconomic factors: a global time-series analysis over 30 years.

de Figueiredo A, Johnston IG, Smith DM, Agarwal S, Larson HJ, Jones NS.

Lancet Glob Health. 2016 Oct;4(10):e726-35.

PMID:27569362

ABSTRACT

BACKGROUND: Incomplete immunisation coverage causes preventable illness and death in both developing and developed countries. Identification of factors that might modulate coverage could inform effective immunisation programmes and policies. We constructed a performance indicator that could quantitatively approximate measures of the susceptibility of immunisation programmes to coverage losses, with an aim to identify correlations between trends in vaccine coverage and socioeconomic factors.

METHODS: We undertook a data-driven time-series analysis to examine trends in coverage of diphtheria, tetanus, and pertussis (DTP) vaccination across 190 countries over the past 30 years. We grouped countries into six world regions according to WHO classifications. We used Gaussian process regression to forecast future coverage rates and provide a vaccine performance index: a summary measure of the strength of immunisation coverage in a country.

FINDINGS: Overall vaccine coverage increased in all six world regions between 1980 and 2010, with variation in volatility and trends. Our vaccine performance index identified that 53 countries had more than a 50% chance of missing the Global Vaccine Action Plan (GVAP) target of 90% worldwide coverage with three doses of DTP (DTP3) by 2015. These countries were mostly in sub-Saharan Africa and south Asia, but Austria and Ukraine also featured. Factors associated with DTP3 immunisation coverage varied by world region: personal income (Spearman's $\rho=0.66$, $p=0.0011$) and government health spending (0.66 , $p<0.0001$) were informative of immunisation coverage in the Eastern Mediterranean between 1980 and 2010, whereas primary school completion was informative of coverage in Africa (0.56 , $p<0.0001$) over the same period. The proportion of births attended by skilled health staff correlated significantly with immunisation coverage across many world regions.

INTERPRETATION: Our vaccine performance index highlighted countries at risk of failing to achieve the GVAP target of 90% coverage by 2015, and could aid policy makers' assessments of the strength and resilience of immunisation programmes. Weakening correlations with socioeconomic factors show a need to tackle vaccine confidence, whereas strengthening correlations point to clear factors to address.

WEB: [http://www.dx.doi.org/10.1016/S2214-109X\(16\)30167-X](http://www.dx.doi.org/10.1016/S2214-109X(16)30167-X)

IMPACT FACTOR: 3.61

CITED HALF-LIFE: 1.00

UW EDITORIAL COMMENT: Authors note that Eastern Mediterranean countries, in general, have performed well over the past decade, with high, consistent coverage that has improved over time. However, countries in the region that have sustained conflict are exceptions; Syria, Iraq, Pakistan, Afghanistan, and Yemen performed poorly. Authors estimate the probability of reaching GVAP target has a bi-model distribution; most countries in north America and Europe will easily reach the goal and most countries in sub-Saharan Africa and South Asia will fall substantially short of the target. South America was estimated to be an exception to this bimodal distribution; many countries in the region are estimated to reach levels close to the coverage targets, and thus authors recommend targeted focus in such countries so as to support success.

It should be noted that while a number of socioeconomic factors were correlated with vaccination coverage and the Vaccine Performance Indices (VPI), the analyses were ecological and should not be assumed to be causal. Furthermore, authors note that factors that were correlated with performance differed by setting and changed over time.

Figure 2A is a visual depiction of (VPI) globally for 2001, 2005, 2009, and 2013.



4. [Role of the private sector in vaccination service delivery in India: evidence from private-sector vaccine sales data, 2009-12.](#)

Sharma A, Kaplan WA, Chokshi M, Zodpey SP.

Health Policy Plan. 2016 Sep;31(7):884-96. Epub 2016 Mar 14.

PMID:26976803

ABSTRACT

BACKGROUND: India's Universal Immunization Programme (UIP) provides basic vaccines free-of-cost in the public sector, yet national vaccination coverage is poor. The Government of India has urged an expanded role for the private sector to help achieve universal immunization coverage. We conducted a state-by-state analysis of the role of the private sector in vaccinating Indian children against each of the six primary childhood diseases covered under India's UIP.

METHODS: We analyzed IMS Health data on Indian private-sector vaccine sales, 2011 Indian Census data and national household surveys (DHS/NFHS 2005-06 and UNICEF CES 2009) to estimate the percentage of vaccinated children among the 2009-12 birth cohort who received a given vaccine in the private sector in 16 Indian states. We also analyzed the estimated private-sector vaccine shares as function of state-specific socio-economic status.

RESULTS: Overall in 16 states, the private sector contributed 4.7% towards tuberculosis (*Bacillus Calmette-Guérin* (BCG)), 3.5% towards measles, 2.3% towards diphtheria-pertussis-tetanus (DPT3) and 7.6% towards polio (OPV3) overall (both public and private sectors) vaccination coverage. Certain low income states (Uttar Pradesh, Rajasthan, Madhya Pradesh, Orissa, Assam and Bihar) have low private as well as public sector vaccination coverage. The private sector's role has been limited primarily to the high income states as opposed to these low income states where the majority of Indian children live. Urban areas with good access to the private sector and the ability to pay increases the Indian population's willingness to access private-sector vaccination services.

CONCLUSION: In India, the public sector offers vaccination services to the majority of the population but the private sector should not be neglected as it could potentially improve overall vaccination coverage. The government could train and incentivize a wider range of private-sector health professionals to help deliver the vaccines, especially in the low income states with the largest birth cohorts. We recommend future studies to identify strengths and limitations of the public and private health sectors in each Indian state.

WEB: <http://www.dx.doi.org/10.1093/heapol/czw008>

IMPACT FACTOR: 3.47

CITED HALF-LIFE: 7.20

UW EDITORIAL COMMENT: Estimates of the number of children vaccinated via the private-sector are derived from state-specific sales audits of hospitals and retail pharmacies in the private sector, collected by a private, for-profit company that collects health industry data on medicines, services and technology purchases. Estimated vaccine-shares from the private sector were calculated under the following assumptions: (1) every vaccination course initiated in the private sector is completed, and is completed in the private sector, and (2) the vaccine wastage in the private sector is insignificant. Since it is unrealistic to assume no wastage and no "drop-outs" from multi-dose regimens, authors note that estimates are upper limits of possible private-sector shares, and that the true proportion and number fully vaccinated as the result of vaccines in the private sector is likely lower than reported.

Figure 1 depicts a strong positive correlation between the state-specific per capita income level and private-sector vaccine share for BCG in the state. Figures 2- 4 depict the correlation for measles, DPT, OPV, respectively, across states, and show that the correlation between per-capita income and private-sector vaccine share depends strongly on the specific vaccine.



5. [Potential for Controlling Cholera Using a Ring Vaccination Strategy: Re-analysis of Data from a Cluster-Randomized Clinical Trial.](#)

Ali M, Debes AK, Luquero FJ, Kim DR, Park JY, Digilio L, Manna B, Kanungo S, Dutta S, Sur D, Bhattacharya SK, Sack DA.

PLoS Med. 2016 Sep;13(9):e1002120.

PMID: 27622507

ABSTRACT

INTRODUCTION: Vaccinating a buffer of individuals around a case (ring vaccination) has the potential to target those who are at highest risk of infection, reducing the number of doses needed to control a disease. We explored the potential vaccine effectiveness (VE) of oral cholera vaccines (OCVs) for such a strategy.

METHODS AND FINDINGS: This analysis uses existing data from a cluster-randomized clinical trial in which OCV or placebo was given to 71,900 participants in Kolkata, India, from 27 July to 10 September 2006. Cholera surveillance was then conducted on 144,106 individuals living in the study area, including trial participants, for 5 y following vaccination. First, we explored the risk of cholera among contacts of cholera patients, and, second, we measured VE among individuals living within 25 m of cholera cases between 8 and 28 d after onset of the index case. For the first analysis, individuals living around each index case identified during the 5-y period were assembled using a ring to define cohorts of individuals exposed to cholera index cases. An index control without cholera was randomly selected for each index case from the same population, matched by age group, and individuals living around each index control were assembled using a ring to define cohorts not exposed to cholera cases. Cholera attack rates among the exposed and non-exposed cohorts were compared using different distances from the index case/control to define the rings and different time frames to define the period at risk. For the VE analysis, the exposed cohorts were further stratified according to the level of vaccine coverage into high and low coverage strata. Overall VE was assessed by comparing the attack rates between high and low vaccine coverage strata irrespective of individuals' vaccination status, and indirect VE was assessed by comparing the attack rates among unvaccinated members between high and low vaccine coverage strata. Cholera risk among the cohort exposed to cholera cases was 5-11 times higher than that among the cohort not exposed to cholera cases. The risk gradually diminished with an increase in distance and time. The overall and indirect VE measured between 8 and 28 d after exposure to a cholera index case during the first 2 y was 91% (95% CI 62%-98%) and 93% (95% CI 44%-99%), respectively. VE persisted for 5 y after vaccination and was similar whether the index case was a young child (<5 y) or was older. Of note, this study was a reanalysis of a cholera vaccine trial that used two doses; thus, a limitation of the study relates to the assumption that a single dose, if administered quickly, will induce a similar level of total and indirect protection over the short term as did two doses.

CONCLUSIONS: These findings suggest that high-level protection can be achieved if individuals living close to cholera cases are living in a high coverage ring. Since this was an observational study including participants who had received two doses of vaccine (or placebo) in the clinical trial, further studies are needed to determine whether a ring vaccination strategy, in which vaccine is given quickly to those living close to a case, is feasible and effective.

WEB: <http://dx.doi.org/10.1371/journal.pmed.1002120>

IMPACT FACTOR: 10.35

CITED HALF-LIFE: 5.70

UW EDITORIAL COMMENT: Authors determine that ring vaccination is effective when it can be delivered within 1-2 days and with at least 30% among those within close proximity to the index case; it should be noted that such efficient response may not be feasible in all settings. It should also be noted that the study was conducted in a setting where cholera was endemic, and many individuals may have been previously exposed to cholera. Results would likely differ in a setting of epidemic where baseline pre-existing immunity in the population is lower.



6. Transdermal delivery of vaccines - Recent progress and critical issues.

Biomed Pharmacother. 2016 Aug 18;83:1080-1088. [Epub ahead of print]

Ita K.

PMID: 27544552

ABSTRACT

In 2010, the number of deaths from infectious diseases globally was approximately 15 million. It has been reported that two-thirds of deaths from infections are caused by around 20 species, mainly bacteria and viruses. Transnational migration caused by war and the development of transportation facilities have led to the global spread of infectious diseases. Subcutaneous vaccination, though widespread, has a number of problems: the need for trained healthcare personnel, pain, needle-related injuries as well as storage difficulties. Two layers of the human skin- epidermis and dermis- are populated by dendritic cells (DCs), which are potent antigen-presenting cells (APCs). Transcutaneous immunization has therefore become an attractive and alternative route for vaccination. In this review, the various techniques for enhancing vaccine delivery are discussed. These techniques include iontophoresis, elastic liposomes as well as microneedles. Progress made so far with these techniques and the critical issues facing scientists will be highlighted.

WEB: <http://dx.doi.org/10.1016/j.biopha.2016.08.026>

IMPACT FACTOR: 1.86

CITED HALF-LIFE: 8.50

UW EDITORIAL COMMENT: The advantages and disadvantages of sonophoresis (use of ultra-sound for transdermal vaccine delivery) iontophoresis (use of mild electric current for transdermal vaccine delivery), and microneedles as delivery methods are summarized in Table 2. Key disadvantages of sonophoresis include burning, epidermal necrosis, and the “bulkiness” of the systems and logistical burden of a two-step process (ultrasound plus drug application). Disadvantages of iontophoresis include relative ineffectiveness for neutral molecules and poor transport for high molecular weight drugs. Disadvantages of microneedles include limited ability to deliver high doses, safety concerns, multiple steps to application, expense, and potential poor patient compliance because of the retention of the microneedles in the skin.

Biologics, or particle-assisted vaccine administration, and elastic liposomes (use of lipid-based vesicles for delivery), are also summarized.



7. [The Global Context of Vaccine Refusal: Insights from a Systematic Comparative Ethnography of the Global Polio Eradication Initiative.](#)

Closser S, Rosenthal A, Maes K, Justice J, Cox K, Omidian PA, Mohammed IZ, Dukku AM, Koon AD, Nyirazinyoye L. Med Anthropol Q. 2016 Sep;30(3):321-41.

PMID: 26818631

ABSTRACT

Many of medical anthropology's most pressing research questions require an understanding how infections, money, and ideas move around the globe. The Global Polio Eradication Initiative (GPEI) is a \$9 billion project that has delivered 20 billion doses of oral polio vaccine in campaigns across the world. With its array of global activities, it cannot be comprehensively explored by the traditional anthropological method of research at one field site. This article describes an ethnographic study of the GPEI, a collaborative effort between researchers at eight sites in seven countries. We developed a methodology grounded in nuanced understandings of local context but structured to allow analysis of global trends. Here, we examine polio vaccine acceptance and refusal to understand how global phenomena-in this case, policy decisions by donors and global health organizations to support vaccination campaigns rather than building health systems-shape local behavior.

WEB: <http://dx.doi.org/1111/maq.12254>

IMPACT FACTOR: 1.25

CITED HALF-LIFE: 10.00

UW EDITORIAL COMMENT: Participant observation methods, interviews, review of programmatic and policy documents, were used in case-study sites in Ethiopia, Nigeria, Rwanda, Angola, Pakistan, India, and Nepal, though detailed results are only provided for Rubavu, Rwanda, Kano, Nigeria, Karachi, Pakistan, and Purba Champaran in Bihar, India. In these four sites, Authors found vaccine refusals were common in Kano and Karachi, and rare in Rubavu and Purba, Champaran.

“Political” reasons for vaccine refusal and acceptance were common, and included refusal to “spite” government workers, or due to fear of accepting interventions from western (American) influences which were considered anti-Muslim. Authors note that refusals were more common in regions where frequent campaigns were held but where the health system function overall was extremely poor or other basic services were non-existent; implying that a system that provided only polio vaccination services but failed to provide other basic services wasn’t trusted by the community. In regions where health system function was the most inadequate, less frequent polio campaigns were actually met with less resistance than when more concentrated or frequent campaigns were held. The notable exception was Bihar, India, where refusals were rare despite weak systems and frequent campaigns. Authors posit that community awareness of other efforts to improve health system performance and provide other essential services alleviated skepticism of polio campaigns.



8. [Acceptance of multiple injectable vaccines in a single immunization visit in The Gambia pre and post introduction of inactivated polio vaccine.](#)

Idoko OT, Hampton LM, Mboizi RB, Agbla SC, Wallace AS, Harris JB, Sowe D, Ehlman DC, Kampmann B, Ota MO, Hyde TB.

Vaccine. 2016 Sep 22;34(41):5034-9. Epub 2016 Aug 25.

PMID: 27570237

ABSTRACT

BACKGROUND: As the World Health Organization (WHO) currently recommends that children be protected against 11 different pathogens, it is becoming increasingly necessary to administer multiple injectable vaccines during a single immunization visit. In this study we assess Gambian healthcare providers' and infant caregivers' attitudes and practices related to the administration of multiple injectable vaccines to a child at a single immunization visit before and after the 2015 introduction of inactivated polio vaccine (IPV). IPV introduction increased the number of injectable vaccines recommended for the 4-month immunization visit from two to three in The Gambia.

METHODS: We conducted a cross-sectional questionnaire-based survey before and after the introduction of IPV at 4 months of age in a representative sample of all health facilities providing immunizations in The Gambia. Healthcare providers who administer vaccines at the selected health facilities and caregivers who brought infants for their 4month immunization visit were surveyed.

FINDINGS: Prior to IPV introduction, 9.9% of healthcare providers and 35.7% of infant caregivers expressed concern about a child receiving more than 2 injections in a single visit. Nevertheless, 98.8% and 90.9% of infants received all required vaccinations for the visit before and after IPV introduction, respectively. The only reason why vaccines were not received was vaccine stock-outs. Infant caregivers generally agreed that vaccinators could be trusted to provide accurate information regarding the number of vaccines that a child needed.

CONCLUSION: Healthcare providers and infant caregivers in this resource limited setting accepted an increase in the number of injectable vaccines administered at a single visit even though some expressed concerns about the increase.

WEB: <http://www.dx.doi.org/10.1016/j.vaccine.2016.07.021>

IMPACT FACTOR: 3.62

CITED HALF-LIFE: 5.50

UW EDITORIAL COMMENT: It should be noted that the caregivers who were surveyed in both the pre- and post- IPV phase were those who had sought care for their infants at the 4-month visit and thus were likely aware of and specifically accessing care to receive the 4-month infant vaccinations. Thus the perspective of caregivers who didn't bring infants for the 4-month vaccination visit (and could thus conceivably be more likely to have negative perceptions of the vaccination regimen), would be systematically under-represented in this analysis.

Table 2 and table 4 summarize the attitudes, perception and practices of healthcare providers and infant caregivers, respectively, regarding the infant injection schedule/vaccination practices before and after IPV introduction.

A substantial proportion, approximately 70%, of healthcare workers had previously administered more than 2 injections at one time before the introduction of IPV, which authors state as one explanation for general acceptance of the multi-injection regimen. Recommendations and reassurance from trained healthcare providers of the need for and benefits of multiple injections, along with the logistical ease of eliminating multiple visits, were important reasons for caregiver acceptance of the 3-injection regimen.



9. [Microneedle-mediated delivery of viral vectored vaccines.](#)

Zaric M, Ibarzo Yus B, Kalcheva PP, Klavinskis LS.

Expert Opin Drug Deliv. 2016 Sep 7:1-11. [Epub ahead of print]

PMID: 27591122

ABSTRACT

INTRODUCTION: Microneedle array platforms are a promising technology for vaccine delivery, due to their ease of administration with no sharp waste generated, small size, possibility of targeted delivery to the specified skin depth and efficacious delivery of different vaccine formulations, including viral vectors.

AREAS COVERED: Attributes and challenges of the most promising viral vector candidates that have advanced to the clinic and that have been leveraged for skin delivery by microneedles; The importance of understanding the immunobiology of antigen-presenting cells in the skin, in particular dendritic cells, in order to generate further improved skin vaccination strategies; recent studies where viral vectors expressing various antigens have been coupled with microneedle technology to examine their potential for improved vaccination.

EXPERT OPINION: Simple, economic and efficacious vaccine delivery methods are needed to improve health outcomes and manage possible outbreaks of new emerging viruses. Understanding what innate/inflammatory signals are required to induce both immediate and long-term responses remains a major hurdle in the development of the effective vaccines. One approach to meet these needs is microneedle-mediated viral vector vaccination. In order for this technology to fulfil this potential the industry must invest significantly to further develop its design, production, biosafety, delivery and large-scale manufacturing.

WEB: <http://www.dx.doi.org/10.1080/17425247.2017.1230096>

IMPACT FACTOR: 3.75

CITED HALF-LIFE: 4.40

UW EDITORIAL COMMENT: Authors note a number of limitations to current viral vector vaccines that must be addressed in order for this approach to provide appropriate immunity, including issues of understanding the influence of preexisting immunity, immunogenicity, genetic stability, and genotoxicity of the vaccines. Although microneedle array delivery may be a efficacious delivery platform for viral vector vaccines, remaining challenges include optimization of the loading capacity, reproducibility of the application, dosing variability, and a lack of a platform for industrial manufacturing for viral vector vaccine delivery using microneedle array.

Important areas for future development include determining methods to improve function and quality of T- and B-cell responses by targeted vaccine vectors, understanding how preexisting immunity and innate response to wild-type viruses modifies immune response, development of standardized protocols for large-scale manufacturing of microneedle arrays, determining whether adjuvants and immunomodulatory agents influence response. Authors also point to the need to determine acceptability of this technology among health care providers and end-users.



10. Fractional-Dose Inactivated Poliovirus Vaccine Immunization Campaign - Telangana State, India, June 2016.

Bahl S, Verma H, Bhatnagar P, Haldar P, Satapathy A, Kumar KN, Horton J, Estivariz CF, Anand A, Sutter R. MMWR Morb Mortal Wkly Rep. 2016 Aug 26;65(33):859-63.

PMID: 27559683

ABSTRACT

Wild poliovirus type 2 was declared eradicated in September 2015 (1). In April 2016, India, switched from use of trivalent oral poliovirus vaccine (tOPV; containing types 1, 2, and 3 polio vaccine viruses), to bivalent OPV (bOPV; containing types 1 and 3), as part of a globally synchronized initiative to withdraw Sabin poliovirus type 2 vaccine. Concurrently, inactivated poliovirus vaccine (IPV) was introduced into India's routine immunization program to maintain an immunity base that would mitigate the number of paralytic cases in the event of epidemic transmission of poliovirus type 2 (2,3). After cessation of use of type 2 Sabin vaccine, any reported isolation of vaccine-derived poliovirus type 2 (VDPV2) would be treated as a public health emergency and might need outbreak response with monovalent type 2 oral vaccine, IPV, or both (4). In response to identification of a VDPV2 isolate from a sewage sample collected in the southern state of Telangana in May 2016, India conducted a mass vaccination campaign in June 2016 using an intradermal fractional dose (0.1 ml) of IPV (fIPV). Because of a global IPV supply shortage, fIPV, which uses one fifth of regular intramuscular (IM) dose administered intradermally, has been recommended as a response strategy for VDPV2 (5). Clinical trials have demonstrated that fIPV is highly immunogenic (6,7). During the 6-day campaign, 311,064 children aged 6 weeks-3 years were vaccinated, achieving an estimated coverage of 94%. With appropriate preparation, an emergency fIPV response can be promptly and successfully implemented. Lessons learned from this campaign can be applied to successful implementation of future outbreak responses using fIPV.

WEB: <http://www.dx.doi.org/10.15585/mmwr.mm6533a5>

IMPACT FACTOR: 3.12

CITED HALF-LIFE: 0.00

UW EDITORIAL COMMENT: Authors note the following factors as key to the campaign success: "Strong government leadership at the national and state levels, well-coordinated technical and operational support from GPEI partners, clearly defined standard operating procedures for outbreak response, and experience implementing OPV campaigns."

Authors note that high-quality injection practices and high overall coverage were strongly reliant on determining an adequate number of sites and that selection of appropriate locations for vaccination sites were important. Likewise, the availability of a large number of appropriately trained professionals with experience in intradermal administration, and the facilitation of "rapid refresher trainings" in administration techniques was important to maintain quality in administration.

Authors also note the importance of the cooperation between the Indian government and the emergency response partners and media in the planning, communication, an implementation of the response, and emphasize the importance of comprehensive and rapid communication between these partners throughout all response phases.



APPENDIX: PUBMED 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]) AND ("2016/8/15"[PDAT] : "2016/09/14"[PDAT]))

* On October 3, 2016, this search of English language articles published between August 15, 2016 and September 14, 2016 and indexed by the US National Library of Medicine resulted in 214 unique manuscripts.

