Planning for Polio Eradication and Preserving Success

Of the three distinguishable types of wild poliovirus, type 1 and type 3 continue to cause new cases of polio in three countries: Afghanistan, Pakistan, and Nigeria. In 2015, only 74 cases of the disease were reported, a marked decrease from the 359 cases reported in 2014. That number dropped further in 2016, with only 37 cases of wild poliovirus.

Thanks to rigorous surveillance, two new cases of polio were detected in the Nigerian state of Borno in 2016, two years after the virus was thought to be eliminated from the country. The response to the Borno cases was a swift, large-scale vaccination campaign, and heightened surveillance in neighboring countries.

Despite this setback, the reality of a polio-free world is closer than ever before. The primary goal of the polio end-strategy is preventing new cases in order to achieve world-wide eradication. However, the strategy must also include transition planning to ensure that the extensive infrastructure developed during the polio era is repurposed to support other health priorities.

Sharing lessons learned from a career devoted to polio eradication, and hopes for the future of a polio-free world, is Jon Kim Andrus, MD, Director, Division of Vaccines and Immunizations at the Center for Global Health, Colorado School of Public Health. Dr. Andrus is an Adjunct Professor of Family Medicine and Pediatrics, University of Colorado School of Medicine, and Adjunct Professor of Epidemiology, Colorado School of Public Health.

Polio primer: experiences from India

In 1993, the Centers for Disease Control assigned Jon Andrus to India in the role of Regional Advisor for Polio Eradication. Five years had elapsed since the World Health Assembly passed the resolution to eradicate polio.

Between 1988 and 1993, however, India made little progress toward elimination, bearing about 50% of the global burden of polio cases. The actual number of cases was unknown because the country had not yet adopted active case-finding practices.

In other countries, stool specimens were being collected from pediatric patients who suffered from acute flaccid paralysis (AFP), and tested for the presence of poliovirus. AFP is the sudden onset of weakness or paralysis in children, and poliovirus is only one of many causes.

Dr. Andrus and his Indian colleagues began implementing active surveillance using stool specimens. They set the objective to obtain specimens from 80% of reported AFP cases. But in order to do so, they had to be sure they were actually detecting cases of AFP as they occurred.

They monitored the AFP reporting rate, knowing there should always be at

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In April 2017, Bijan Ghaffari (Global Health Track), Kara Blaisdell, Allison Strauss (Global Health Track), all students in the School of Medicine and Cristianna Ruple, Child Health Associate/Physician Assistant student in the Global Health Track, at the University of Colorado (CU) Anschutz Medical Campus, were chosen as recipients of The Lancet’s Best Student Poster Competition at the 2017 Consortium of Universities of Global Health (CUGH) Annual Conference held in Washington DC. They were 1 of 3 finalists for the category of “Women’s Health in Global Health: Issues Across the Lifespan” (1 of 6 themes for the conference). There were over 1,000 submissions with 18 finalists and 6 winners in the competition. Congratulations!

Bijan and Kara, both recipients of the 2016 Rotary International Student Scholarship, share their project and next steps for improving child malnutrition through exclusive breastfeeding in Nepal.

After review of the applications and much debate, they knew they had chosen four worthy recipients. These recipients would continue the preliminary work that was performed during the summer of 2014 by University of Colorado medical students, who worked with leaders from Dhulikhel Hospital, community health workers, nurses, and other hospital staff.

Bijan, Kara, Allison, and Cristianna were selected for their strong devotion and experience in global health, and more importantly for how they differed as individuals.

Drs. Bellows and Fauchet knew that in order to have a balanced and productive team, they needed diversity. Each student brought their own skillset to the project: leadership, project management, communication and unique points of view.

Bijan expands, “It was great to have the support of a team during our time in Nepal. We often problem solved amongst ourselves. We all had different previous experiences in global health, and different reasons for wanting to work on this project, and in the end we worked great together towards our common goal.”

In 2013, the World Food Programme published a report indicating that 41% of Nepalese children under five are stunted and infant mortality remains high—some of the highest numbers in the world.

In order to better understand these troubling figures, the CU-Nepal research project aimed to evaluate the intention of pregnant Nepalese women to exclusively breastfeed for the first six months of their child’s life. These intentions were measured via a quantitative survey about general cultural beliefs and factors that influence the mother’s decision.

Additionally, the research team determined the cultural appropriateness of the survey questions through focus groups, and piloted the survey with a target population of pregnant women.

Why exclusive breastfeeding (EBF), you ask? EBF has been proven to reduce stunting, malnutrition, and infant mortality and is defined as giving infants only breastmilk for the first six months of life.

However, the students encountered this same question in Nepal. Bijan and Kara explain, “While we had the support and buy-in by the community health department and hospital leadership, other providers were skeptical of our work. On countless occasions we were asked why we were studying breastfeeding in Nepal as it was known that breastfeeding was very common. Before we started looking at the data, we began to even doubt ourselves.

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least a small number of cases reported, since AFP has many other causes than polio. Together, these two indicators allowed the team to detect new cases of AFP, and to determine whether polio was the cause using stool specimens.

This was only the first step, though. The surveillance data was used to inform vaccination campaigns, social mobilization efforts, and communication strategies. In 1994, the first mass vaccination campaign reached almost 900,000 children under three years of age in the Federal District of New Delhi.

In 1995, the campaign was scaled nationally, targeting 93 million children under four years of age. The following year, a total of 125 million children, all under the age of 5 were targeted. By 1999, transmission of type 2 poliovirus was stopped in India. This remarkable accomplishment succeeded by establishing a foundation of public health practice based on high-quality surveillance and routine immunization.

According to Dr. Andrus, these public health activities require three critical components: strong political commitment, technical expertise in following the evidence and using data, and excellence in supervising program execution (e.g. ensuring proper vaccine storage, ensuring every child is vaccinated). Many countries have succeeded in activating these key elements, eliminating the virus, and becoming certified polio-free.

"Elimination is stopping endemic transmission in a geographic area, but the intervention (vaccination) continues to be required to sustain that achievement because of importations from other parts of the world that still have high rates of transmission. Eradication is stopping endemic transmission globally so the interventions are no longer required."

Jon Andrus, MD, Director, Division of Vaccines and Immunizations at the Center for Global Health

Dr. Andrus elaborates on certification, "It is a process that allows for the determination that endemic transmission has been stopped in a geographic area. The protocol is evidence-based, largely coming from the AFP surveillance data and meeting standards of excellence using the AFP reporting rate and the stool specimen collection rate. Other criteria include, but are not limited to, high levels of vaccination coverage not just nationally, but by district, and quality assurance measures for laboratories. This high-level performance must be maintained three years after the last case."

With more countries achieving certification, what barriers to global eradication remain? For the countries with ongoing transmission (Afghanistan, Pakistan, and Nigeria) it is vitally important to reach socially and geographically inaccessible places.

Surveillance, routine vaccination, and supplemental immunization campaigns are at the core of the polio eradication strategy. However, all these activities are hindered or halted in conflict settings.

"It’s very clear why the last cases are in these three countries,” says Dr. Andrus. “It speaks to the challenging and dangerous circumstances of ongoing civil strife that puts at stake the lives of vaccinators. These hotspots can’t be overlooked, but require a military presence to protect the vaccinator. The margin of error is very small."

The standard challenges of conducting high-quality public health activities in resource-limited settings are compounded by these political and security factors.

Countries that are closer to achieving certification must also innovate new ways of assuring zero cases. Fewer and fewer new cases of polio require even more sensitive surveillance.

Dr. Andrus clarifies, “Previous experience suggested that having high-quality AFP surveillance was sufficient. But environmental surveillance has become a nice adjunct as
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"we learned more about vaccine-derived infection, the challenges of maintaining high surveillance, and about migration and geographically challenging areas."

Not all polio infections lead to paralysis, so this method is separate from AFP surveillance. Environmental surveillance involves testing sewage or other environmental samples for the presence of poliovirus. "In one case in Israel, they found the virus in environmental samples, but they couldn’t find paralytic cases. This led to a vaccination campaign to stop transmission, and later tests showed it was no longer found in the environment," Dr. Andrus explains.

Data from environmental surveillance can be difficult to interpret and act upon. "You’re conducting the surveillance to take action, and the action should be a very complete investigation of the community to detect paralytic cases. Can you identify the infected person that leads to a positive environmental sample? Most likely not," says Dr. Andrus.

However, in the right context, this kind of surveillance provides additional reassurance that other program activities are performing well.

Preserving success and achieving other health goals

Through elevated surveillance and outbreak response capacities, skilled human resources, and intergovernmental cooperation, polio eradication efforts have contributed to a public health infrastructure that benefits many other global health agendas.

As the reality of global eradication draws near, careful attention is being paid to leveraging lessons and legacies to serve other disease prevention initiatives.

Dr. Andrus states, “Polio, and immunization in general, is one of, if not the only program that reaches out to virtually every village in every country. When you think about primary healthcare and public health infrastructure, that’s a unique place to occupy. So how does this reach get sustained? Those assets should not dissipate; they should serve as a springboard for surveillance for emerging infections, strengthening immunization, and other primary care services.”

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Jon Andrus, MD, Director, Division of Vaccines and Immunizations at the Center for Global Health

Funding for polio is already diminishing. Each country must evaluate how to maximize remaining assets and prevent other health services from becoming endangered by the reduction of polio funds. Perhaps the most critical assets are the personnel who have received training and gained valuable experience on the job. Is it possible to retain this talent for other immunization activities? Questions like this are at the forefront of transition planning.

Ensuring that infrastructure remains strong enough to sustain a polio-free world is the number one priority, but building on polio’s successes to catalyze success in other health initiatives ought to be an important part of polio’s legacy, once the disease is relegated to history for good.

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References

♦ By Molly T Moss

Students Working Abroad

Scholarships administered via the Center for Global Health have provided 100+ University of Colorado health sciences graduate students with an opportunity to enjoy a culturally diverse research experience. Check out the 2017 awardees!

Robinson Durst Scholarship
- Erin Aldag (School of Medicine - MD) - Group B Streptococci Colonization in Pregnant Women - Trifinio Region of Guatemala
- Stephanie Chamberlin (College of Liberal Arts & Sciences - PhD) - Measuring Empowerment Through Access: Gendered experiences of HIV health care utilization related to education - Malawi
- Kevin Forey (School of Medicine - MD, MBA) - Development & Implementation of Screening & Treatment Protocol for Moderate & Severe Acute Malnutrition in Pediatrics Population - Kisii and Nyamira, Kenya

Rotary Scholarship
- Brian Adams (School of Medicine - MD) – Improving International Response to Emerging Pathogens Via Network Analysis – Geneva, Switzerland
- Erin Blake (School of Medicine - MD) - Madres Sanas Nutritional Supplement Use Evaluation and Analysis – Trifinio Region of Guatemala
- Jessie Geer (School of Public Health - MPH) - Time Series Analysis of Dengue, Chikungunya and Zika Incidence: Forecasting Models Using Climate Variables as Predictors – Machala, Ecuador
- Laura Grau (School of Public Health - MPH) - Intervention Mapping Regarding Exclusive Breastfeeding Practices – Dhulikhel, Nepal
- Vishnupriya Krishnan (School of Medicine - MD) - Intervention Mapping Regarding Exclusive Breastfeeding Practices – Dhulikhel, Nepal
- Ashley McWilliams (School of Public Health – MPH) Madres Sanas Nutritional Supplement Use Evaluation & Analysis – Trifinio Region of Guatemala
- Calvin L. Wilson Scholarship for Future Leaders in Global Health
  - Andrei Gurau (School of Medicine - MD) - Intervention Mapping Regarding Exclusive Breastfeeding Practices – Dhulikhel, Nepal
  - Ryan Hirata (School of Medicine - MD) - Intervention Mapping Regarding Exclusive Breastfeeding Practices – Dhulikhel, Nepal
  - Taylor Litz (School of Public Health - MPH) – The Effect of Village Health Workers on Common Causes of Death in Economically Productive Age Group – Melghat, India
  - Blake Snyder (School of Medicine - MD) - Cost-Effectiveness of Eye Screening Examinations for Non-Communicable Eye Disease in Resource Poor Settings – Thailand

Learn about the scholarships!
Exploring the Intentions to Exclusively Breastfeed in Nepal

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“But what we found reinforced our original intention for doing the project. While breastfeeding was prevalent, women were not learning about the risks, benefits, and common misconceptions related to infant nutrition. For example, we found that while infants are mainly breastfed, they are also commonly given water, which was found to be unnecessary by the WHO, and potentially hazardous due to water-borne illness.”

Project Barriers

No matter how prepared, it is impossible to foresee all the potential barriers encountered in international research. Bijan and Kara share the barriers their team encountered during their time in Nepal. “Primarily, there was a long delay in our COMIRB approval, as it was dependent on the approval of Dhulikhel Hospital’s institutional review committee (IRC). Upon arrival in June, we were told the IRC had not met since April, and would not be meeting for the entire month of June due to the national board exams. While this caused a large amount of anxiety on our part, we did everything else we could to prepare by making sure there were no questionable areas in our protocol that could further delay approval.”

They continue, “One of the adjustments we had to make was to not gather data from community outreach centers connected to Dhulikhel Hospital. Logistically it would have been too difficult to include, not only because of our limited time, but also due to the low number of antenatal visits that each health center sees. Secondly, we discovered the gifts we intended to give the mothers in exchange for participating in the project were culturally inappropriate since it is not customary to give gifts to an infant before he or she is born. We worked around this by giving a large donation of baby caps to the Delivery ward, where the caps could be gifted to the families after the birth.”

Preliminary Results

Although there was a delay in starting the data collection, the administration of the survey was very successful, and 300 surveys were collected. The mean age of the participants was 24 years (range 18-38), and the mean gestational age was 25 weeks (range 2-42 weeks). The participants were predominantly housewives, and were highly educated compared to the general population of Nepal (Figures 1 and 2).

In response to the primary question about exclusive breastfeeding, 188 (62.7%) of the mothers reported an intention to exclusively breastfeed their infants for the first six months. Forty two (14%) reported they had not thought about their intention adequately enough to give a response, and the remainder planned to give complementary food in addition to breastmilk (Figure 3).

In contrast, only 89 (30%) of the participants reported they had heard about the specific medical term “exclusive breastfeeding”. This is an example that demonstrates a gap in breastfeeding education even when breastfeeding is commonly practiced.

Of the mothers that were aware of EBF, a majority had either heard from a nurse/midwife (51.7%) or a physician (39%). Others reported learning about EBF from various sources ranging from health promoters to the internet (table 1). At Dhulikhel Hospital, nurses and midwives run the antenatal clinic and have the most patient contact, however, there was no formalized protocol in place to educate new mothers about the benefits of EBF.

In Nepal, the main health educators are the government-trained Female Community Health Volunteers, who do receive training on EBF. However, only 9 of the participants reported learning of EBF from one of these resources.

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Want to learn about projects that are currently taking place around the world?

Join us the morning of October 20th - all Students, Faculty, Staff, Community Members and Leaders with an interest in global health work are welcome to attend.

Are you a student looking for a global health project and mentor?

Mark your calendar to join us from 2 to 4 p.m. on October 20th for the Global Health Project Fair and learn about the exciting global health opportunities currently available to you as a CU student enrolled in a graduate program.

Global Health faculty from different CU schools will give overviews of projects and opportunities for student involvement for academic year 2017-2018. Faculty will be available to network and answer your questions.

Friday, October 20th

Details coming this summer!

Both events will take place in the Gossard Auditorium, Fulginiti Pavilion for Bioethics & Humanities Building on the University of Colorado Anschutz Medical Campus
In the preliminary analysis of potential barriers, there were several factors that stood out as gaps in knowledge about breastfeeding. 36.2% of mothers reported a concern regarding lack of breastmilk, followed by 15.1% reporting a concern for the baby falling ill due to only consuming breastmilk, and 13.4% feeling concerned about the baby receiving inadequate nutrition.

The most common misconception shared by 80% of women was the belief that it is okay for a baby to receive water during the first six months. This was followed by 55.3% of the mothers believing that babies need other food and liquid when they are sick. These findings demonstrate a need for formalized education on breastfeeding practices and impact.

**Next Steps**

Since their return to Denver, Bijan and Kara’s team have been conducting further analysis, particularly in relation to stakeholders involved in the mother’s decisions, familial and cultural decisions, and the mother’s attitude about her infant’s care.

In addition to their presentation at CUGH, they have also been sharing their findings with several groups on the CU Anschutz Medical Campus, as well as with the departments of public health, pediatrics, and obstetrics at Dhulikhel Hospital. Their findings will be taken back to Nepal by the new group of students in the CU-Nepal project who will then work together with the Community Health Department at Dhulikhel hospital to develop the most culturally appropriate intervention.

Last, but not least, their team has also been working towards publishing their findings to promote further investigative research in the areas of child malnutrition and exclusive breastfeeding for Nepal and the global health community.

For Bijan and Kara, this trip would have been financially difficult without the generosity of the Rotary International Student Scholarship. Global health experiences have takeaways for our students that we cannot measure.

Kara reflects, “In addition to conducting research, one of the more impactful aspects of the trip for me was the chance to experience a healthcare system that is so different from our own. It was enlightening to see how a hospital cares for so many people with such limited resources, and taught me a lot about how we can reduce waste and streamline our processes here in the United States.”

Bijan concludes, “If we had not looked at this problem from an outside perspective, and used a quantitative approach, our conclusions may have never been realized. It was gratifying to know that despite initial skepticism, our work will provide a basis for future intervention, and provides valuable insight into the patient population that can be used in daily practice.”

Click here to learn more about the Rotary International Student Scholarship.

See the winning poster on page 9

Reference:

Figure 3: Feeding intentions for current pregnancy, numbers represent percentage of total participants. Soft foods include Lito and Cerelac. No participants reported an intent to use artificial formula.
Exploring the Intentions to Exclusively Breastfeed in Nepal

Below is the winning poster!!!

Knowledge, Beliefs, and Attitudes Towards Exclusive Breastfeeding in Dhusikhel, Nepal

Bijan Ghaffari1 BS, Allison Strauss1 BA, Kara Blaisdell1 BA/BS, Cristianna Ruple1 BS, Rachel Wojcik1 BS, Shrinkhala Shrestha1 MPH, Geoffrey Faucher1 MD MPH, Bhagirathi Kayyatha1 MD, Jennifer Bellow2 MD MPH
1University of Colorado School of Medicine, CO/US, 2Dhusikhel Hospital, Nepal

Background:
Malnutrition can be associated with 54% of child mortality in developing countries1.

Malnutrition and Child Mortality Rates in Nepal2:
- Children ≤5: 41% stunted and 29% underweight
- Infant Mortality: 46 per 1000 live births
- ≤5 Mortality: 54 per 1000 live births

WHOUNICEF Breastfeeding recommendations3:
- Initiation within 1 hour of birth
- Exclusive breastfeeding (EBF) for the first 6 months of life
- Complementary feeding for those older than 6 months

Benefits of EBF4:
- Protective against stunting and malnutrition
- 12% reduction in mortality
- Reduction in GI (50%) and pulmonary (33%) illnesses

Conflicting EBF Statistics:
- In 2011, 70% of infants received EBF for 6 months5.
- Small cohort study in central Nepal found only 30% continuation of EBF at 22 weeks5.
- 2016 Global Nutrition Report (GNR) labeled Nepal at risk of reversal in EBF trend, reporting 56.9% of infants exclusively breastfed for 6 months5.

Methods:
Survey was adapted from a tool developed previously to evaluate barriers to EBF in Zimbabwe6.

Contains 93 questions pertaining to:
- Demographics
- BF/EBF Knowledge
- BF Prior Experience
- Intended Feeding Choice
- Attitudes towards EBF
- Barriers towards EBF

Study subjects were randomly selected pregnant women attending the Dhusikhel Hospital antenatal clinic.

The survey was administered verbally by local research assistants.

Table 1: Respondent Characteristics

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>N (%)</th>
<th>Education Level</th>
<th>N (%)</th>
<th>Occupation</th>
<th>N (%)</th>
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<tbody>
<tr>
<td>18-20</td>
<td>52 (57%)</td>
<td>No schooling</td>
<td>21 (7%)</td>
<td>Agriculture</td>
<td>14 (5%)</td>
</tr>
<tr>
<td>21-30</td>
<td>171 (75%)</td>
<td>Grade 1-8</td>
<td>61 (36%)</td>
<td>Business</td>
<td>11 (4%)</td>
</tr>
<tr>
<td>31-40</td>
<td>88 (40%)</td>
<td>Grade 9-12</td>
<td>104 (54%)</td>
<td>Housewife</td>
<td>23 (12%)</td>
</tr>
<tr>
<td>41-40</td>
<td>15 (11%)</td>
<td>Higher education</td>
<td>69 (21%)</td>
<td>Service</td>
<td>55 (36%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Did not answer</td>
<td>4 (1.6%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Finding:
- 89 (30%) had previously heard of “Exclusive Breastfeeding”
- 23% of first time mothers vs 42% of experienced mothers (p<0.01)
- 111 (37%) of participants had previously breastfed
- 54 (49%) of previous mothers reported exclusively breastfeeding their last child for at least 6 months

Figure 1: Feeding Intention

Figure 2: Where women are learning about EBF

Figure 3: Common supplemental foods used before 6 months by experienced mothers

Figure 4: Beliefs and Attitudes Regarding EBF

Interpretation:
- Rates of EBF in Dhusikhel are below the WHO target and consistent with other smaller studies in Nepal, and the GNR
- The lack of EBF knowledge is likely a significant contributor to the low rates of EBF
- Varying misconceptions highlight a gap in standardized education regarding EBF practices
- Despite the high prevalence of breastfeeding, gaps in the knowledge of EBF could cause a decline in the EBF trend as suggested by the GNR
- Implementing a formal EBF intervention tailored to the Dhusikhel community is recommended

References:
5. 2016 Global Nutrition Report (GNR)

Acknowledgements:
Global Health & Disasters Course

October 9 - 20, 2017

October 9 - 13  Global Health Course
October 16 - 19  Pediatrics in Disasters
October 20  Global Health Symposium & Project Fair

Registration is open!

Register early to lock in your participation!

Students, Residents or Fellows:
Students, Residents or Fellows currently in a training program.

Please note: If you are a student with the University of Colorado School of Medicine or Colorado School of Public Health and you are taking the course for credit, you must register for the course via your school. You do not complete this registration form and payment.

Week 1 - $50
Week 2 - $50
Both weeks - $100

External Participants:
An external participant is anyone who is not currently in a training program as a student, resident or fellow or taking the course for credit with the School of Medicine or the Colorado School of Public Health.

Week 1 - $600
Week 2 - $600
Both weeks - $1,000

Deadline for registration is September 4th.

Questions?
Contact Michelle Shiver at michelle.shiver@ucdenver.edu

Click here to register!!
NEW 2nd Edition of HBB has scientific updates to harmonize with 2015 ILCOR Consensus on Science with Treatment Recommendations and the 2012 WHO Basic Newborn Resuscitation Guidelines. It also contains strengthened educational advice and new guidance on program implementation and quality improvement.

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Registration will open late Fall 2017
Make it a Watchathon!

The Global Health Lecture Series is taking a summer hiatus. So, while you are waiting for the new season to begin, get caught up on what you missed!

Click here.

Look for the Fall 2017 Schedule in a future issue of the Global Health link!!