Evaluation of Undernutrition, Diarrheal Diseases, Rotavirus-Immune Competence and Cost-Effectiveness in Vaccine-Eligible Infants in La Paz, Bolivia

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Populations/communities served:
Infants and mothers served by Hospital Los Andes, Hospital Corea, and the Senkata Clinic in El Alto, La Paz, Bolivia. Population of Cochabamba.

Background:
Bolivia is one of the least developed countries in Latin America (per capita GDP $4,800). Out of every 1,000 live births, 51 die before the age of five, and 16% of these under-five deaths are attributable to diarrhea illness. Up to 40% of pediatric diarrhea is caused by rotavirus. In order to combat the disease and economic burden of rotavirus, the country introduced the rotavirus vaccine into the immunization schedule in 2008. While there is ample data on the efficacy of the vaccine in developed countries, there is little information on its effectiveness in a developing setting like Bolivia, where malnutrition is common. From 2012 through 2013, Emory University, in collaboration with RVSP and the Universidad Mayor de San Andrés, will implement a cohort study to assess the effects of severe malnutrition on RV vaccine efficacy. In order to prepare for this study, we need to validate the study instruments and the prevalence of malnutrition at the potential study sites. Therefore, one goal of this project was to act as a pilot for the later cohort study.

As successes are achieved with the deployment of rotavirus vaccination, norovirus may soon overtake rotavirus as the leading cause of severe gastroenteritis in children (<1). Because RVSP also collected data on other etiologies of diarrhea, Bolivia’s pediatric norovirus cost burden could be assessed here. An analysis of healthcare costs to the state may provide data for future intervention strategies to make inroads into the UN Millennium Development Goal #4 of reducing childhood mortality.

Project goals:
1. Examine the nutritional status of rotavirus-eligible but unvaccinated Bolivian infants and their mothers
2. Characterize the frequency and etiology of diarrhea illness in rotavirus-eligible but unvaccinated Bolivian infants and evaluate methods of tracking the frequency of diarrhea illness in these infants
3. Quantify the direct costs to the state, including bed-day costs, medications and diagnostic tests of norovirus-related diarrhea in hospitalized Bolivian children under 5 years of age using Bolivian and international reference pricing

Project Timeline:
December 2010: Formed team; developed project goals and methods
January-March 2011: Developed and finalized proposal; submitted for IRB approval
April-May 2011: Finalized research instruments and methods; received IRB approval
June-July 2011: Fieldwork; enrolled infants/mothers; collected and entered; obtained medical record number of norovirus-positive children; abstracted medical record data; reviewed pediatricians and hospital administrators
August-October 2011: Finalized enrollment, data collection, and data entry; abstracted medical record data, interviewed pediatricians and hospital administrators
November-December 2011: Clean data and conduct preliminary data analysis; present data to Los Andes, Corea and Senkata

Expected Outcomes:
1. Nutritional Aim:
   - Collection of nutritional intake and anthropometric data indicative of malnutrition, as well as socioeconomic data, facilitating the identification of hospital and clinic sites for the longitudinal study
   - Pilot testing and revision of the nutritional assessment survey and anthropometric tools
   - Validation of the food frequency questionnaire tool using comparison 24-hour recall
   - Creation and distribution of culturally appropriate nutrition education materials for mothers
2. Diarrhea Aim:
   - Testing and evaluation of procedures for optimizing collection of human biological samples and gathering information on diarrheal illness
   - Collection of infant stool samples to quantify frequency of diarrheal illness
   - Identification of key enteric pathogens causing diarrheal illness
3. Norovirus Aim:
   - Assessment of direct medical costs for norovirus diarrhea
   - Evaluation of cost burden of norovirus diarrhea in disability-adjusted life years (DALYs)

Progress to Date:
1. Nutritional Aim:
   - Completed double data entry and cross-check
   - Add individual costs to database to calculate direct medical costs
   - Have begun entering data
2. Diarrhea Aim:
   - Quantified the direct costs to the state, including bed-day costs, medications and diagnostic tests of norovirus-related diarrhea
3. Norovirus Aim:
   - Obtained demographic and clinical data of 186 pediatric patients
   - Database of medications, diagnostics and clinical data cleaned and ready for analysis

Next Steps:
1. Nutritional Aim:
   - Complete data cleaning and conduct preliminary descriptive analyses on nutritional status and vitamin-taking behaviors, for reporting to clinical partners
   - Develop regression models for predicting nutritional status in infants; submit for publication
   - Finalize dietary database and conduct analyses; submit for publication
2. Diarrhea Aim:
   - Finalize data entry
   - Write up study description and submit as report
3. Norovirus Aim:
   - Add individual costs to database to calculate direct medical costs
   - Perform descriptive analysis of total cost burden of pediatric norovirus diarrhea in Bolivia

References:

WHR, Bolivia (governmental stats): Health Profile, 2011.

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