

Evaluating the Alternative Strategies for Hepatitis A and B Vaccination in Bangladesh: An Economic Analysis

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Objective: Compare the costs and benefits of adopting alternative strategies for hepatitis A and B vaccination in Bangladesh to determine the most cost-effective approach of preventing the infection.

Methodology: Three alternative strategies that have been evaluated are: (a) vaccinate all individuals in the society without testing, (b) vaccinate only those who are not immune to hepatitis A and B, and (c) vaccinate the non-immune cases among the high-risk population. A simple economic model, explaining the costs and benefits associated with screening and vaccination, was developed to examine the alternatives. The model predicts the costs and benefits at different levels of prevalence, cost of identification of the high-risk groups, sensitivity and specificity of the tests, the direct and indirect economic cost of infections, and effectiveness of the vaccinations in Bangladesh context. Costs of tests and vaccinations were obtained through the private provider survey in Dhaka, and the direct medical benefits of preventing the infections were derived from the expert opinion surveys. The indirect economic costs were estimated by considering the degree and duration of morbidity, and case-specific fatality information was obtained either from literature or through expert opinion surveys. The costing implicitly assumed that successive three doses of immunization would provide life-long immunity to an individual.

Results: Hepatitis A vaccination, due to its low direct and indirect cost, turned out to be a low-priority intervention for Bangladesh. Hepatitis B-screening tests and vaccinations are relatively costly. However, the benefit of preventing hepatitis B is also high. Despite the high cost of screening and vaccination, the prevention of hepatitis B remains a highly desirable intervention for Bangladesh.

Conclusion: Immunization against hepatitis B appears beneficial to the society at a reasonable range of prevalence. Economic benefits of preventing hepatitis B are high, but the intervention appears too costly to be funded through the public sector alone. Alternative methods of funding hepatitis B vaccination (HBV) should be considered. Therefore, in the short run, a mass campaign on HBV will not be feasible due to the financial resource constraints.

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Evaluation of Rice-based Reduced Osmolarity Oral Rehydration Solution in Children with Severe Persistent Diarrhoea

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Objective: Evaluate and compare the efficacy of a standard (WHO) oral rehydration solution (ORS) and a rice-based reduced osmolarity ORS in children with severe persistent diarrhoea. Persistent diarrhoea accounts for 7-21% of all childhood diarrhoeal episodes and 32-62% of all diarrhoea-related deaths in developing countries. Fluid and electrolyte balance is an important part in the management of persistent diarrhoea.

Methodology: This randomized controlled clinical trial was conducted on 64 children with severe persistent diarrhoea (duration >14 days, stool output >80 mL.kg.d). After a one-day observation period to confirm the diagnosis and severity, they were assigned to either standard WHO-ORS (sodium 90, potassium 20, chloride 80, citrate 10, glucose 111, osmolarity 311; all in mmol/L or to a rice-based reduced osmolarity ORS (rice powder 33 g; sodium 60, potassium 14, chloride 57, citrate 6, osmolarity 137; all in mmol/L) for replacement of ongoing stool loss for seven days. Stool output and frequency, ORS, and food intakes were monitored daily. Serum electrolytes were also

determined on study day 3 and 7. Daily and total (day 1-7) food intakes were comparable among the study groups. The stool volume (mL.kg.d) mean±SEM) was significantly less in infants receiving rice-based reduced osmolality ORS than the WHO-ORS on day 4 (86±11 vs. 44±28, p=0.05), 5 (73±10 vs. 144±31, p=0.04), 6 (60±9 vs. 139±31 p=0.02), 7 (59±11 vs. 120±59, p=0.04), as well as for the entire (1-7 d) study period (523±54 vs. 932±177, p=0.04). The median stool frequency (number/d) during the entire study period in children receiving reduced osmolality ORS was also significantly less than those in the WHO-ORS group (70±5 vs. 92±10, p=0.05). Furthermore, the children belonging to reduced osmolality ORS required less amount of ORS in total compared to the WHO-ORS groups. Children in both the groups maintained normal serum electrolytes as determined on day 3 and 7.

Conclusion: It is concluded that rice-based reduced osmolality ORS is more effective than WHO-ORS for replacement and reducing ongoing stool loss, and therefore, may be useful in the management of children with persistent diarrhoea.

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Intestinal Transport of Different Electrolyte Solutions Across Small Intestine of Rabbit *in vivo*

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Objective: Determine the relative effects of different electrolyte solutions in optimizing intestinal absorption of water and electrolytes.

Methodology: The rice electrolyte solutions, called CeraLyte 90 contained 40 g rice and 90 mM sodium, and CeraLyte 70 contained 40 g rice and 70 mM sodium per litre of solution. Different concentrations of carboxymethyl cellulose CMC (10.0, 5.0, and 2.5 g/L) were added to standard oral rehydration solutions (Std ORS) to increase its viscosity. Fifty-centimetre small intestinal segments were perfused with different electrolyte solutions, containing 6 g/L polyethylene glycol (MW 4000) as a non-absorbable marker.

Results: Mean±SE of water and sodium ion absorption with standard ORS vs. CeraLyte 90 was 1.53±0.11 vs. 1.59±0.09 mL/min/g of dry intestine (NS) and 0.24±0.21 vs. 0.58±0.09 mM/min/g of dry intestine respectively. The absorption of potassium and chloride ions was not different when compared among Std ORS, CeraLyte 90, and CeraLyte 70. Secretion of sodium ion was found when the rabbit was perfused with the electrolyte solutions, containing different concentrations of CMC. Water absorption and sodium ion secretion from electrolyte solution with 5 g/L CMC was significantly different when compared with the solution with 10 g/L CMC (p=0.01 and 0.0004).

Conclusion: It is concluded that CeraLyte 90 and CeraLyte 70 have no additional absorption-promoting effect on water and electrolytes transport. Increasing viscosity of electrolyte solution may cause stimulation of secretion across the small intestine of rabbit.

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