

Public Health Congress 2018: Risk factors for bacteremia in severely malnourished pneumonic children and their outcome - Abu Sadat Mohammad Sayeem Bin Shahid - International Centre for Diarrhoeal Disease Research

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Statement of the Problem: Bacteremia is quite common in Severe Acute Malnourished (SAM) children with pneumonia, who often experience a fatal outcome, especially in developing countries. There is limited information in the medical literature on the risks of bacteremia in SAM children with pneumonia. We have examined the factors associated with bacteremia and their outcome in under-five children who were hospitalized for the management of pneumonia and SAM. **Methodology & Theoretical Orientation:** In this unmatched case-control study, SAM children of either sex, aged 0-59 months, admitted to the Dhaka Hospital of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) with cough or respiratory distress and radiological pneumonia during April 2011 to July 2012 were enrolled (n=405). Those with pneumonia as well as bacteremia constituted the cases (n=18) and randomly selected SAM children with pneumonia without bacteremia constituted controls (n=54). **Findings:** A wide range of bacterial pathogens were isolated among the cases of which 13 (72%) were gram negatives. Death rate was higher among the cases than the controls (28% vs. 9%) but the difference was not statistically significant (p=0.111). In logistic regression analysis, after adjusting for potential confounders, such as the lack of DPT/oral polio/HIV/hepatitis vaccination, measles vaccination, vomiting and clinical dehydration (some/severe) the SAM children with pneumonia as well as bacteremia more often had the history of lack of BCG vaccination (95% CI=1.17-29.98) and had diastolic hypotension (<50 mm of Hg) (95% CI=1.01- 12.86) not only after correction of dehydration but also in its absence. **Conclusion & Significance:** The results of our study suggested that history of lack of BCG vaccination and presence of diastolic hypotension in absence of dehydration on admission are the independent

predictors of bacteremia in SAM children with pneumonia. The results indicated the importance of continuation of BCG vaccination is to produce benefits beyond the primary benefits.

Background

Risks of death are high when children with pneumonia also have severe acute malnutrition (SAM) as a comorbidity. However, there is limited published information on risk factors of death from pneumonia in SAM children. We evaluated clinically identifiable factors associated with death in under-five children who were hospitalized for the management of pneumonia and SAM.

Methods

For this unmatched case-control design, SAM children of either sex, aged 0-59 months, admitted to the Dhaka Hospital of the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) during April 2011 to July 2012 with radiological pneumonia were studied. The SAM children with pneumonia who had fatal outcome constituted the cases (n=35), and randomly selected SAM children with pneumonia who survived constituted controls (n=105).

Results

The median (inter-quartile range) age (months) was comparable among the cases and the controls [8.0 (4.9, 11.0) vs. 9.7 (5.0, 18.0); p=0.210]. In logistic regression analysis, after adjusting for potential confounders, such as vomiting, abnormal mental status, and systolic hypotension (<70 mm of Hg) in absence of dehydration, fatal cases of severely malnourished under-five children with pneumonia were more often hypoxemic (OR=23.15, 95% CI=4.38-122.42), had

clinical dehydration (some/severe) (OR=9.48, 95% CI=2.42–37.19), abdominal distension at admission (OR=4.41, 95% CI=1.12–16.52), and received blood transfusion (OR=5.50, 95% CI=1.21–24.99) for the management of crystalloid resistant systolic hypotension.

Discussion

We observed that blood transfusion used for the management of refractory systolic hypotension revealed as the independent predictor for death in under-five SAM children with pneumonia – a very important information for clinicians in critical care wards of developing countries. WHO recommends blood transfusion in severely malnourished children who do not recover from septic shock even after infusion of consecutive two boluses of isotonic fluid. The protocolized management of such children in our hospital followed this recommendation. Systolic hypotension, in addition to features of sepsis (defined by our local guideline), are used as the marker of septic shock in SAM children, especially in resource limited settings. Children with systolic hypotension and unresponsive to crystalloid received blood transfusion but did not receive diuretics and had frequent fatal outcome. We do not have any ready explanation for this finding. All of our study children received blood transfusion due to septic shock refractive to fluid therapy, which might be due to septic myocardial dysfunction characterized by decrease in ejection fraction with dilatation of ventricles. Death in this special population is often very high even with adequate treatment not only in developing countries but also in developed countries. However, the impact of blood transfusion on deterioration in heart function in SAM children is unclear to us. Recent data suggest that reduction of alveolar epithelial sodium and chloride transport in pneumonic SAM children impedes clearance of fluid from the alveolar exudates. This may contribute to development of interstitial edema/heart failure in our study children who received blood transfusion in addition to receiving crystalloid fluids. However, clinical evidence of fluid overload/heart failure was not different among the cases and controls. Thus, pulmonary edema, a common etiology for death in pneumonic children with SAM, might not be responsible for the detrimental effect of blood

transfusion in our study population. Although an earlier study conducted in Mulago hospital, Uganda experienced significant higher deaths after blood transfusion related to pulmonary edema in SAM children compared to those who did not receive blood transfusion, most of the indications of blood transfusions in that study were other than septic shock and often the use of blood transfusion was not judicious. We did not evaluate the cardiac function of these children to exclude fluid overload as a consequence of blood transfusion. A recent study has reported cardiovascular collapse rather than fluid overload to contribute to excess death from rapid fluid resuscitation in well nourished children with septic shock; however, cardiac function in SAM children with septic shock has not been explored yet, which needs to be addressed in carefully conducted patho-physiologic studies in future.

Conclusion and Significance

We identified hypoxemia, clinical dehydration, and abdominal distension as the independent predictors of death in SAM children with pneumonia. SAM children with pneumonia who required blood transfusion for the management of crystalloid resistant systolic hypotension were also at risk for death. Thus, early identification and prompt management of these simple clinically recognizable predictors of death and discourage the use of blood transfusion for the management of crystalloid resistant systolic hypotension may help reduce deaths in such population.

Biography

Abu Sadat Mohammad Sayeem Bin Shahid has his experience in public health especially in nutrition and other emerging problems like childhood TB and pneumonia in developing world. He has been involved in different epidemiological research starting from observational study to clinical trial for the last 8 years. He also published his different work in different journals.

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