

Optimizing Interventions to Prevent Chronic Malnutrition: The Search for the Holy Grail



Chronic malnutrition in children continues to be a significant problem in lower and middle income countries (LMIC). Previously unrecognized extremely poor breastfeeding and complementary feeding practices and lack of comprehensive data on intervention coverage has impacted the current inadequate action to improve child nutrition.¹ The unsettling political instabilities coupled with economic problems in these regions have a major impact on the availability and cost of appropriate food choices needed by women of child-bearing age during pregnancy and young children during their early development. The lack of appropriate nutrition during the critical phases has an impact not only on morbidity and mortality, but also on neurodevelopment leading to poor long term-earning capacity of these children as adults.^{2,3} One of the major issues of governments and funding agencies in these regions is how to provide appropriate nutrition to the vulnerable population in an acceptable form. The supplements should be effective, cheap, easy to distribute, and culturally acceptable for it to be used by the communities.

Micronutrient powders (MNP) that contain essential vitamins and minerals are the most common type of home fortification method used to enrich complementary foods for infants and young children in LMIC. These powders, called “sprinkles,” are sprinkled onto food just before consumption.⁴ When properly made, MNPs do not greatly affect the taste of food and are an effective way to increase the fortification of basic foods. They have become culturally acceptable because the community does not have to drastically change their diet. In populations where the prevalence of anemia in children under 5 years of age is 20% or higher, the World Health Organization recommends point-of-use fortification of complementary foods with iron-containing MNPs in infants and children starting from age 6 months to improve iron status and reduce anemia.⁵ Sprinkles with appropriate amounts of zinc have also been reported to reduce diarrhea and respiratory disease incidence in at-risk children.⁶

A newer approach to decreasing the prevalence of chronic micronutrient deficiency is to provide both micronutrients and some key macronutrients, including essential fatty acids, in small quantity (20 g/d), lipid-based nutrient supplements. This strategy was developed to enrich the local diets of pregnant and lactating women and of infants and young children.^{7,8} These are referred to as small quantity lipid nutrient supplements (SQ-LNS). The advantages of SQ-LNS over MNPs is the provision of essential fatty acids, which have added benefits on growth and neurodevelopment.

Multiple randomized controlled trials have demonstrated the efficacy of SQ-LNS on child development.⁹⁻¹¹

Additional measures have been shown to be needed to increase compliance with breast feeding and appropriate weaning feeding practices for infants and young children. These measures have evolved into Infant Young Child Feeding (IYCF) programs that focus on giving the mothers the skills required to continue to breast feed their infants beyond their first birthdays and introduce appropriate weaning foods at age 6 months.¹²

In this volume of *The Journal*, Addo et al report their efforts to evaluate the potential effectiveness in combining SQ-LNS with IYCF into a programmatic setting.¹¹ The hypothesis was that combining these 2 methods in an enhanced program would improve long-term outcomes. The main outcome measure obtained was child development scores. This study was performed in the Democratic Republic of Congo, which is located in central Africa and is recovering from a longstanding civil war; it has a very high prevalence of child malnutrition. The data was collected from 2 health zones that were in the same province but did not share a border. The study was very well-designed with 1 health zone being the intervention zone in which there was enhanced IYCF along with SQ-LNS, whereas the control zone received the national standard IYCF but no SQ-LNS. The results of the study provide another dimension for planning nutritional interventions that can be sustained. This includes intense education to the community/cluster as an intervention in the form of enhanced IYCF in addition to the supplement. Globally, dietary diversification continues to be essential for improving nutrition and development of children in LMIC.¹¹ Interventions required to reduce malnutrition need to include education in addition to supplementation. The education is provided in the IYCF and the SQ-LNS would provide the essential nutrients that might be missing in the local weaning foods. The improvement in development scores is an important outcome, because children with higher development scores in early life will likely lead to higher IQ as adults and these children are likely to be productive adults.¹¹ Other important outcome measures that are important in this study include hemoglobin and growth variables, which also impact neurodevelopment.

A key limitation of this trial was the inability to have the same mother-child dyads evaluated at baseline and follow-up. However, the authors had recognized this limitation at the design of the trial and accounted for this using appropriate statistical modeling methods. The use of generalized linear mixed models was helpful in using clusters as units of analysis with the mother-child dyads nested within clusters. It was also impossible to blind

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ITCF	Infant Young Child Feeding program
LMIC	Lower and middle income countries
MNP	Micronutrient powder
SQ-LNS	Small quantity lipid nutrient supplement

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the participants in their study because it was set in rural Democratic Republic of Congo. All of the limitations are appropriately accounted for in the analysis and discussion.

Dietary supplementation not only has an impact to prevent malnutrition, but also impacted development in children. The report is provocative and raises the question about what intervention or combination of interventions are likely to be most optimal in LMIC. Is this the Holy Grail to optimize nutrition in children in LMIC? The next generation depends on identifying the appropriate implementation of programs to decrease prevalence of malnutrition to the rates set in the millennium development goals. More evaluation in real settings such as that described by Addo et al will provide the data that will assist with policy development and implementation by governments and agencies. Malnutrition rates remain alarming high and wasting still impacts the lives of far too many young children. ■

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Paracetamol (Acetaminophen) for Patent Ductus Arteriosus: Where Do We Stand?



The patent ductus arteriosus (PDA) closes spontaneously by the end of the first postnatal week in most preterm infants ≥ 28 weeks of gestation.¹ In contrast, 50%-70% of infants < 28 weeks of gestation persist in having a moderate-to-large PDA shunt for weeks after birth.¹ Indomethacin and ibuprofen are currently the only drugs labeled for treatment of the PDA. Paracetamol (acetaminophen) also seems to be an effective agent for inducing PDA closure.²

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Although its mechanism of action has not been fully elucidated, paracetamol's vasoconstrictive effects seem to be mediated through inhibition of the peroxidase moiety of prostaglandin H₂ synthetase.³ With its presumed superior safety profile, paracetamol has the potential to be an excellent substitute for the 2 currently labeled drugs.

PDA Patent ductus arteriosus
RCT Randomized controlled trial

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