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## **Establishing Routine Multiple Micronutrient Supplementation During Pregnancy in an Impoverished Guatemalan Community**

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## **Executive Summary**

### **Introduction of Problem**

Nutrition is a vital component of health. Poor maternal nutrition during pregnancy is associated with many poor perinatal outcomes, including maternal anemia, preterm delivery, stillbirth, and inadequate fetal growth (Keats et al., 2021). Traditional pregnancy recommendations include iron and folic acid (IFA) supplementation to support maternal health and ideal fetal growth. Recent updates to recommendations by the World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) have shown clear benefits to utilizing multiple micronutrient supplements (MMS)—which contain iron, folic acid, and 13 other vitamins and minerals—as an alternative to IFA to improve maternal and child health in areas where dietary quality is poor (UNICEF, 2022).

Early discussions with stakeholders at ER Abroad, a non-profit organization serving communities like the Land of Hope (LOH) in Escuintla, Guatemala, highlighted poor nutrition and sanitation as key problem areas. Patients attending the LOH clinic have limited access to healthy food and clean water, exacerbated by barriers including low literacy levels, limited health knowledge, and poor sanitation practices. ER Abroad frequently provides care for families with malnutrition, both during medical mission trips to the Land of Hope and through ongoing international telehealth calls.

While ER Abroad identified poor nutrition and low birth weight as major community health issues, they had not yet established a process to consistently provide prenatal supplementation at the clinic. For these reasons, stakeholders agreed that providing consistent MMS supplementation, along with nutrition and sanitation teaching, would best support the future of this community. To increase the sustainability of this project, a “teach the teacher”

method was chosen, focusing on bolstering the knowledge of on-the-ground community health workers (CHWs) at LOH. This project aims to assess the feasibility of this MMS intervention.

## **Literature Review**

A strong evidence base demonstrates immense benefits to women and children receiving micronutrient supplementation in low- and middle-income countries. Compared with IFA, MMS supplementation is associated with increased gestational weight gain (Liu et al., 2022b), reduced rates of preterm birth, preterm rupture of membranes, and low birth weight (WHO, 2020). Some studies even show greater intellectual development, higher IQ scores, and improved procedural memory in adolescence (Zhu et al., 2018; Young & Ramakrishnan, 2021). When compared to no prenatal supplementation at all, the effects of MMS are even greater. Overall reduced perinatal mortality, fewer small-for-gestational-age (SGA) infants, and lower rates of maternal anemia are major benefits of prenatal supplementation. Side effects, such as nausea and constipation, are minimal and comparable to those of traditional IFA supplements (Kashi, 2019). Common barriers to adherence of both IFA and MMS supplementation include forgetting doses and difficulty swallowing pills (Clermont et al., 2018). The literature recommends increasing patient and provider education to improve adherence (Clermont et al., 2018).

Several modifiers may affect the success of MMS implementation. Target MMS initiation dates varied from 12 to 20 weeks, with overall conclusions supporting initiation of daily MMS dosing as early as possible for maximal impact on childhood outcomes and intellectual development (Zhu et al., 2018; Park et al., 2019; Bourassa et al., 2019). Evidence supports a goal of at least 180 days of MMS supplementation in pregnancy, and initially providing an entire 180-day supply has demonstrated increased adherence to this plan (Bourassa et al., 2019). Free MMS and appropriate counseling may also contribute to increased compliance (Bourassa et al., 2019).

## **Project Methods**

This project aimed to assess the feasibility of a comprehensive MMS intervention. The project team created a decision tree algorithm to identify LOH patients that qualify for MMS (see figure 1). The team then performed in-person teaching to the clinic staff, including both Guatemalan CHWs and visiting American providers and pharmacy staff. Teaching points included information about MMS, managing potential side effects, and prenatal nutrition. During a 7-day site visit, project members brought MMS bottles each containing 180 pills. The team supported the implementation process, concluding with a group reflection about facilitators and barriers to implementation. The number of MMS bottles was counted at the end of this visit. The project team remained available for support to on-site CHWs after implementation via WhatsApp. After 1 month, the number of MMS bottles was re-counted to determine the total number of bottles administered. CHWs were interviewed again to discuss facilitators and barriers, as well as their insight on future interventions. Project materials were funded in part by Southern Illinois University Edwardsville's Research Grants for Research Doctoral Students (RGRDS) and a stipend from ER Abroad. This quality improvement project received IRB approval from both Southern Illinois University Edwardsville and the ER Abroad Board of Research and Development.

## **Evaluation**

The MMS decision tree was provided to support the designation of MMS recipients and reinforcement of MMS and maternal nutrition teachings. Of the 84 bottles of MMS supplied to the Land of Hope clinic, 22 were administered in the week the project team was on-site. Another 36 bottles of MMS were administered in the subsequent month, meaning 58 total MMS bottles were administered during implementation. In the final project meeting, no side effects or

concerns were reported by the on-site CHWs. MMS reception was overwhelmingly positive. However, some key limitations must be addressed.

First, due to international travel safety hazards, the implementation of this project was delayed from October 2023 to December 2023. This is a risk of any international project, but fortunately, this allowed the team more time to gather donations. The team was able to provide donated reusable water bottles to each MMS recipient. The team also provided lactation beads to the CHWs, which demonstrated the size of newborns' stomachs to promote conversations about breastfeeding. Another key barrier faced in this project was organizational change. Because of recent changes in the structure of the organization, the project team was unaware of a new supply of MMS made available at a local Guatemalan government health agency. Although the women's clinic had access to this MMS supply, the administration of MMS was not standardized. Furthermore, supply was given to patients in quantities of 30 tablets, despite evidence supporting 180-tablet bottles as the best practice to support patient access and adherence.

Despite initial barriers identified in the early project stages, the project team recognized the CHWs' strong pre-existing knowledge about the planned prenatal teaching points. The team used the on-site interview as an opportunity to expand the discussion and fill in other maternal and infant knowledge gaps, including infant feeding practices and hand expression of breast milk.

### **Impact on Practice**

In pursuing the enhancement of healthcare initiatives at LOH, this project significantly impacted the practices employed by ER Abroad and other volunteers at the site. The foremost achievement is successfully bridging the gap between ER Abroad and CHWs, fostering a collaborative and cohesive approach to healthcare initiatives, specifically prenatal care. Furthermore, the project facilitated a crucial connection between LOH and local government

facilities, ensuring free access to UNIMMAP MMS. This initiative addressed immediate needs and set the stage for sustainable practices by establishing the administration of MMS as a standard of care for ER Abroad and Land of Hope.

To augment these standardization efforts, the project focused on knowledge-building, providing education on essential topics such as MMS, colostrum, breastfeeding, sanitization, and proper nutrition during pregnancy. In alignment with the evidence presented in the literature review, the administration of MMS was streamlined. This involved the shift from a monthly supply to the practical approach of providing a full 180-tablet bottle, ensuring more consistent and efficient distribution.

This quality improvement project identified additional maternal and infant health needs within the community and uncovered related educational barriers, laying the foundation for forthcoming initiatives. Doing so further enhanced the potential to impact LOH and aligned with ER Abroad's organizational mission. The transferability of this model to other impoverished communities in low and middle-income countries is evident, with future projects equipped to replicate its success. Introducing a decision tree (see Figure 1) promises to instill consistent, evidence-based practices regarding the administration of MMS, facilitating a positive trajectory towards improved maternal and child health outcomes. Beyond procedural changes, the project catalyzed a more informed and engaged healthcare environment at LOH, fostering increased dialogue and collaboration among various stakeholders. Moreover, the groundwork laid by this project sets the stage for future implementation initiatives, such as additional breastfeeding interventions, the provision of breastfeeding pumps, and the establishment of monthly maternal education topics delivered by CHWs.

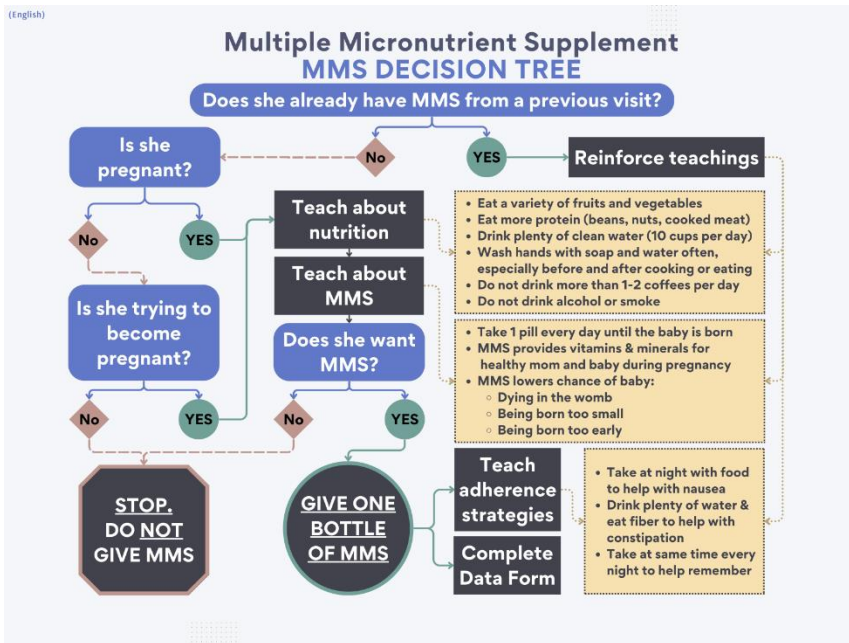
## **Conclusion**

This quality improvement intervention at the Land of Hope in Escuintla, Guatemala addressed critical maternal and child health challenges, including the stakeholders' key concerns about poor nutrition and sanitation practices. A thorough literature review established that MMS holds significant promise in improving perinatal outcomes, especially in areas with poor dietary quality. Methods included the creation of a decision tree algorithm and in-person teaching sessions. Despite barriers of international travel safety hazards and organizational changes, the project team successfully administered 58 of the 84 donated bottles of 180 MMS tablets during the month-long intervention. The CHWs' positive reception and lack of reported side effects underscore the feasibility and acceptability of this intervention.

This project promoted evidence-based practice, strengthened collaboration between ER Abroad, CHWs, and the Land of Hope community, and encouraged further community health discussions. Furthermore, this project has laid the groundwork for future change. The decision tree is a valuable tool that may guide future interventions in other impoverished communities. This project exemplifies the potential for transformative healthcare initiatives driven by collaboration, education, and a commitment to addressing the unique challenges faced by vulnerable communities.

**Figure 1.**

(English)



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