Forging Effective Strategies to Combat Iron Deficiency

Iron Supplementation: Overcoming Technical and Practical Barriers1,2,3

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ABSTRACT  Iron supplementation is probably the best available option to effectively address iron deficiency in pregnant women and young children because it can be targeted specifically to these high-risk groups. However, technical and practical barriers exist: limited information on the effectiveness of supplementation interventions, side effects that affect compliance, and supply/distribution constraints. An innovative approach to addressing these constraints is the use of sprinkles of powdered, microencapsulated ferrous fumarate that can be added directly to any semi-liquid food without changing their taste or consistency. This technique has been tested in initial trials in Ghana and found to be as effective as iron drops. Another approach to improve the effectiveness of iron interventions is through information, education and communication (IEC) programs. These interventions can help modify consumer behavior in some cases, but in some countries, geographic location, variations in language and population size can make the cost of IEC programs very high. IEC strategies in Indonesia aimed at increasing demand for iron supplements by systematic dissemination of specific messages, improving the quality and variety of tablets, increasing the availability and access to supplements by engaging the commercial sector, enrolling traditional birth attendants and other community volunteers in selling supplements. Key issues to be addressed include clarifying optimal starting points and duration of supplementation interventions—based on individual status or population prevalence, defining hemoglobin and ferritin cutoffs at which treatment should be instigated and evaluating the effectiveness of intermittent supplementation with multiple micronutrients. J. Nutr. 132: 853S–855S, 2002.

KEY WORDS: • iron supplementation • ferrous fumarate • technical barriers

Effective strategies to address iron deficiency (ID)5 and iron deficiency anemia (IDA) usually have three main objectives: to increase intake of absorbable iron; to enhance absorption of ingested iron; and to reduce iron losses, particularly those associated with infections and parasites. Iron supplementation and fortification are practical approaches to achieve the first two objectives, while other public health measures are expected to help achieve the third one. Iron supplementation is seen as an effective means of increasing intake of iron and, eventually, other anemia-related nutrients. Iron supplementation is probably the best available option to effectively address ID/IDA in pregnant women and young children (1). However, some technical and practical barriers have precluded the full realization of the potential impact of iron supplementation on ID/IDA. Barriers that have been found to play a major role in program implementation include: insufficient data on the relative contribution of ID to anemia; limited knowledge of the efficacy of various treatment regimens and delivery systems; incomplete understanding of side effects and other factors affecting compliance; and supply/distribution constraints in public health delivery systems (2).

Development and implementation of effective programs

The presenters in this session examined technical and practical barriers to program implementations as well as discussed innovative approaches to solve the problem.

Dr. Stanley H. Zlotkin described his experience in using a novel, low-cost and effective delivery system that has been shown to enhance intake of absorbable iron by infants and young children to prevent and control ID/IDA. Children from 6 to 24 mo old are by far the group at highest risk of ID and IDA in developing countries, with anemia prevalence usually exceeding that of pregnant women. Because of the well-known implications of anemia in infancy for mental development, learning capacity and school performance, controlling anemia in young children should have a high priority in health/
nutrition programs. Children who have IDA in infancy are at risk for long-lasting developmental disadvantage compared with their peers with better iron status. Primary prevention is the key goal for children. Because children are not small adults, strategies that work for adults, including commodity fortification and food diversification, are not likely to be beneficial, especially for infants and young children.

Iron supplementation of children

The frequent lack of effectiveness of large-scale programs has triggered the search for innovative approaches for treatment and prevention of IDA in children. From the three common programmatic choices (supplementation, fortification and increased food consumption), supplementation is likely to have the greatest potential for young children. Indeed, changing feeding practices to increase consumption of more expensive sources of bioavailable iron has been shown to be difficult. The diet of young children tends to comprise few foods (<5) consumed in small amounts, and, thus, food quality becomes critical. In contrast, fortification of food staples has been shown to be less effective in young children because their consumption of the fortified foods may not be large enough to significantly increase their intake of key micronutrients. As with other intervention programs, sustainability is key to supplementation, and it is more likely to be achieved if the supplement has a low production cost, is simple to distribute, easy to administer/ingest (ideally once a day), produces few side effects and can be used regularly to treat or prevent deficiency. From the possible choices for supplements, capsules and tablets are not suitable for ingestion on a daily basis because they are difficult to swallow, while drops and syrups are efficacious in the treatment of anemia but have some potentially serious shortcomings: frequent unpleasant taste, teeth staining, poor compliance, difficult monitoring, potential for overdose and packing in potentially harmful glass bottles. Nevertheless, drops under controlled conditions are efficacious in the treatment of anemia. Dissolvable tablets (fizzy tablets that dissolve in liquids) are a new approach currently being developed by the World Health Organization Office of Child and Adolescent Health. A practical and potentially effective option would be to supplement the child's diet by adding key micronutrients directly to food preparations, which may be seen as a form of targeted home fortification. Dr. Slotkins' group has recently developed and tested a new form of iron, powdered microencapsulated ferrous fumarate, and a new delivery system: a single-dose sachet. The powdered iron can be added directly to any semi-liquid food. Other micronutrients, such as ascorbic acid, zinc and vitamin A, can be included in the sachet. Advantages of the coated sprinkles are that they can be added directly to food preparations without changing their taste or consistency; they are easy to use (no literacy needed); the lightweight sachets are easy to store and transport; simple and inexpensive technology is used to manufacture them; inadvertent poisoning is unlikely; and virtually any micronutrient can be added. Through randomized controlled trials in Ghana and a pilot study in India, it has been demonstrated that the iron sprinkles are as efficacious as iron drops for the treatment of anemia. Effectiveness in non-study settings is still to be tested. Although sprinkles may be one effective way to overcome technical barriers, more than one approach is needed to successfully eliminate micronutrient deficiencies.

Obstacles affecting iron supplementation programs

Dr. Endang Achadi reviewed the experiences of health services in addressing both supply and demand constraints affecting iron supplementation programs. The role of training and communications in improving delivery, counseling and compliance with iron supplements and the use of non-conventional delivery mechanisms were also examined. Iron supplementation programs have not proven to be an easy approach for combating IDA. One of the key obstacles is the low level of compliance with iron tablet consumption. Results from different studies show that consumer knowledge about anemia is low; however, when consumers are informed, the compliance rate for taking iron tablets increases. Unfortunately, consumer ignorance is caused in part by health providers' limitations, including lack of knowledge about anemia and iron tablets and insufficient communication and counseling skills. Improving health provider's knowledge and communication skills has been effective in improving program content and counseling strategies. Information, education and communication (IEC) programs using multimedia have had a positive effect on modifying consumer behavior in some cases. Developing an effective IEC strategy requires a certain level of knowledge and skills, which may not be fully available at many institutions in developing countries. Furthermore, in some countries, geographic location, variations in language, and population size can make the cost of IEC programs very high. Significant experience has been gained in Indonesia, a country with anemia prevalence of 51 and 40% in pregnant and non-pregnant women, respectively. Population groups targeted for iron supplementation have been pregnant/lactating women who are provided free tablets in health facilities, as well as adult female workers, adolescent girls and women to be married. However, supplementation was recommended but not mandatory, and demand was very low. To address the demand problem, a carefully designed IEC strategy was implemented successfully. Some of the approaches to remove existing barriers were: securing regular availability of IEC materials; making the cost of the IEC intervention affordable; developing health providers skills in using the IEC materials; enhancing the impact of counseling by making it more systematic and effective; improving quality (taste and physical appearance) of iron tablets while improving their availability (tablets were delivered free to pregnant and lactating women but not to other women) and reducing their cost; addressing supply and distribution barriers at health facilities; improving the overall quality of services; and enhancing health care providers knowledge and skills.

Attention has to be given to promote increased demand for iron supplements by systematic dissemination of specific messages to the population, including community leaders; improved quality and variety of tablets; and increased availability and access to supplements by engaging the commercial sector; enrolling traditional birth attendants and other community volunteers in selling supplements. Strategies used to improve the general quality of health services included intensive training of health care providers, with emphasis on development of interpersonal communication skills, distribution and regular use of IEC materials, establishment of clear policy guidelines and improved supplement quality. Experience from other countries shows that systematic counseling of methods to prevent or ameliorate side effects enhances compliance. School girls can be used successfully to distribute tablets (India) and traditional birth attendants (Indonesia) and other community health volunteers (India) can be instructed to become effective supplement distributors.
A second key obstacle is the limited availability and accessibility of low-cost iron tablets, as well as poor quality (e.g., taste and physical appearance). Usually, iron tablets are provided by health facilities, so those not seeking health/medical services at these facilities will not have access to them. Furthermore, logistical problems (storage capacity and timely supplies) do not guarantee availability of iron tablets in these facilities. These logistic issues can be addressed by a clear and simple supply and distribution strategy. To ensure the availability and accessibility of low-cost, good quality, iron tablets beyond government-sponsored health facilities, the government needs to collaborate with the pharmaceutical industry to ensure production of low-cost iron tablets. Iron tablets with improved quality would then be available from the companies directly or through other private channels, including drug stores and traditional birth attendants. Expansion of the target groups to include female workers, women to be married and school girls requires interprogrammatic and intersectoral commitment and coordination. Further work is needed to involve private companies in combating IDA among female workers.

Treatment and prevention of IDA throughout lifespan

Dr. Lindsay Allen engaged in a provocative discussion on the need, constraints and options to address treatment and prevention of IDA throughout the lifespan. The programmatic overlap usually found between prevention and treatment of anemia was highlighted, as well as the need for a lifespan approach. Because existing resources in developing countries may never be enough to cover everyone at risk with supplementation, the question of who should be supplemented (e.g., prioritization) has important policy implications. Based on risk and vulnerability criteria, the following priorities may be considered: low-birth-weight babies, infants 6 to 12 mo old, preschoolers up to 18 to 24 mo old when prevalence steadily increases, pregnant women (infant stores may also improve through supplementing their mothers during pregnancy), school-aged children to treat anemia and eventually prevent it through intermittent supplementation, and women of reproductive age, including lactating women, a currently neglected group.

One of the issues still to be resolved is sustainability of improved iron status, as a period of negative iron balance tends to occur because absorption is down-regulated, thus, benefits of supplementation are likely to be temporary if diets are low in available iron. Iron balance in pregnancy depends on adequate intake more than on stores at conception. Still pending is a clear definition of the role of supplementation as a treatment of existing anemia or as a preventive measure to reduce the risk of acquiring it. There is, however, some consensus in that daily supplementation would be the fastest way to treat IDA. There is some evidence that intermittent supplementation might also work, although certainly not during pregnancy. There are still some issues in need of clarification through well-conducted research:

- When/how supplements are to be used for treatment or prevention.
- Hemoglobin and ferritin cutoffs at which treatment should be instigated.
- Optimal starting points and duration of intervention—based on individual status or population prevalence.
- Effectiveness of intermittent supplementation with multiple micronutrients. (Related issues to be addressed include the levels of other micronutrients to be recommended and whether the inclusion of other micronutrients makes supplementation more attractive to local planners and recipients).

CONCLUSION

The following conclusions emerged from the presentations, discussions and contributions from participants in the concurrent and plenary sessions:

1. Iron supplementation is a key strategy to reach target groups that have increased iron needs. However, for large-scale programs to be effective, both supply and demand constraints should be addressed in an integrated way.
2. Supplementation options for infants and children include drops, fizzy tablets to dissolve in liquids and coated sprinkles to be added to foods.
3. Critical issues to be addressed in iron supplementation programs for women of childbearing age include identifying ways to increase demand of and access to good quality iron tablets, as part of improved quality of services, particularly antenatal care; to secure a continued supply of iron tablets at distribution points by developing effective supplement management and monitoring systems; and to enhance compliance through IEC, systematic counseling and follow-up.
4. Prenatal iron supplementation is key to reduction of anemia during pregnancy as well as to improve infant stores, thus, reducing the risk of IDA. Postpartum supplementation will also be beneficial to women and their children.

LITERATURE CITED