

Implementation of Research for Quality of Care Project! Measuring and Improving Physician Compliance with WHO Clinical Practice Guidelines for ‘Iron Deficiency Anemia in Children’

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Abstract: Iron deficiency anemia (IDA) is the most prevalent anemia globally. As per WHO, 600 million children worldwide have IDA. Additionally, National Nutrition Survey 2011, Pakistan revealed 61.9% children are anaemic. In our project we measure and improve physicians compliance with WHO Clinical practice guidelines for ‘Iron deficiency anemia in children’. Juran’s Problem Solving Methodology was applied. Pre-survey results suggest 81.1% children are anemic. Only 11.4% and 10.6% are on regular Iron supplementation and deworming agents respectively. Though (93.4%) physicians surveyed have comprehensive knowledge. Moreover, merely 13.7% parents have some knowledge about IDA. We choose Ishikawa Fish Bone Diagram for cause and effect analysis and ‘Gant Chart’ to allocate timelines. We implement certain strategies like Physician’s questionnaire form, refresher courses, information material for parents, and sustain supply of medicines. Post survey analysis concluded significant increased prescription rate of Iron supplementation and deworming agents as well as parents knowledge for IDA. For long-term sustainability, we established Policy, Quality indicators, Posters/Brochures and regular refresher courses. We also ensure adequate and sustain supply of iron supplementations and deworming agents at subsidized rates in hospital pharmacy. In responses to our project, we found under-practice of WHO recommendations despite comprehensive physician’s knowledge.

Key words: Iron deficiency anemia, WHO recommendations, physicians compliance.

1. Introduction

Iron deficiency anemia (IDA) is one of the most common micronutrient deficiencies in the world. As per WHO report around 600 million children worldwide are anemic, at least half of this solely caused by iron deficiency [1]. According to National Nutrition Survey of Pakistan 2011, IDA present in 61.9% of children (severe 5.0% and moderate 56.9%) [2]. Pakistan is one of the three countries which account for half of global malnourished women and children [2]. Children are particularly liable to iron deficiency anemia specifically in the first five years of life because

of inadequate dietary intake or absorption, rapid growth, or blood loss due to parasitic infections such as malaria or worm infestations. IDA produces many systemic abnormalities both acute and chronic. IDA causes impaired exercise tolerance, early fatigability and poor school performance [3-7] with increased susceptibility to infections and allergies as IDA depletes lymphocyte count [8]. Epidemiological and experimental data also suggest long term, irreversible consequences of Iron deficiency Anemia even after repletion of iron stores, thus reinforcing the importance of preventing this condition from the beginning [9]. More than 30 years of efforts document differences in IQ, social/emotional and neurophysiologic functioning, abnormal developmental performance and poor growth

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in infants with IDA [10, 11]. Iron needs of the brain depend on different Phases of the life and the cell types/site in brain. Iron is one of the crucial components of the many enzymes that involve in bio-processing and production neurotransmitters and myelin respectively [10, 11]. In the last two decades, the importance of iron deficiency anemia as a 'Public health problem' has been increasingly recognized by health authorities and policy makers. Where iron deficiency anemia is prevalent, effective control programs recommended by WHO, emphasizing regular Iron supplementation and deworming.

Considering the above mentioned background we picked up these recommendations as Guidelines for our Pediatric quality projects. Though IDA is most common in Pediatric population, but there is no such study or previous benchmark which specifically reveals data on iron prescription rate and physician's effort to treat/prevent IDA besides treating acute health related issues. Reflecting the fact that IDA under estimated by health care providers. In our project we checked how compliant our Physicians are with WHO recommendations to treat Iron Deficiency Anemia by Regular Iron Supplementation and Regular Deworming, besides treating acute or chronic illnesses in outpatient department (OPD). Also, we aimed at reducing observed non-compliance 30% from the base line. We proceed from evidence to policy and policy to implementation.

2. Methodology

2.1 Continuous Quality Implementation

Juran's Problem Solving Methodology (JPSM) was applied for this quality project due to its effectiveness and authentication. JPSM composed of three basic pillars include Diagnostic Journey, Remedial Journey and Holding the Gains.

2.2 Diagnostic Journey

Pre survey: We developed a pre-survey Questionnaire to analyze the gravity of problem. Physicians (total 7),

children from 6 months to 10 years of age visiting clinics were surveyed (total 700). Physicians were enquired for recommendations by WHO for IDA, its prevention and treatment options in children. Children were assessed for IDA by Presence of Pallor on general physical examination as per Integrated Management of Neonatal and Childhood Illnesses (IMNCI) protocol [12]. This was further confirmed by standard reference levels of Haemoglobin (Hb) and Haematocrit (Hct) set by WHO (Table 1). Hb and Hct were noted from Complete Blood Count (CBC), done as part of management of their acute illness for which visited OPD. Though Hb was the only measure reflecting iron status, as iron deficiency was prevalent and anemia was assumed to be secondary to iron deficiency [2]. Anemia is defined as insufficient hemoglobin (Hb), cutoff levels for insufficient Hb have been proposed by WHO in the below mentioned table we exclude all those who had past history of blood transfusions, or family history of blood diseases, with chronic diseases or taken Deworming agents at least 6 months before. In addition to Regular iron supplementation we also conduct census for regular deworming as worm infestation is a prevalent cause of Anemia in children in developing countries [1]. Pre-survey results suggest that 81.1% of Pediatric population visiting OPD's are anemic and only 11.4% and 10.6% of them are on regular Iron supplementation and deworming respectively, prescribed by their physician. Though majority of the physician's surveyed (93.4%) answered the questions about IDA, its treatment and prevention in accordance with guideline by WHO. But when parents were asked regarding IDA, its consequences and prevention, only 13.7% were able to answer appropriately.

2.3 Cause & Effect Analysis

We choose Ishikawa Fish Bone Figure for cause and effect analysis. The given figure (Fig. 1) elaborate underlying causes of 5M's (include Methods, Material, Man-power, Machine and Management) lead to final

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Table 1 Hemoglobin and Hematocrit cutoffs used to define Anemia in people living at Sea level.

Age/Sex Group	Hemoglobin (g/dL) below:	Hematocrit (%) below:
Children 6 months-5 years	11.0	33
Children 5-11 years	11.5	34
Children 12-13 years	12.0	36
Non-Pregnant Women	12.0	36
Pregnant Women	11.0	33
Men	13.0	39

*From WHO/UNICEF/UNU, 1997.

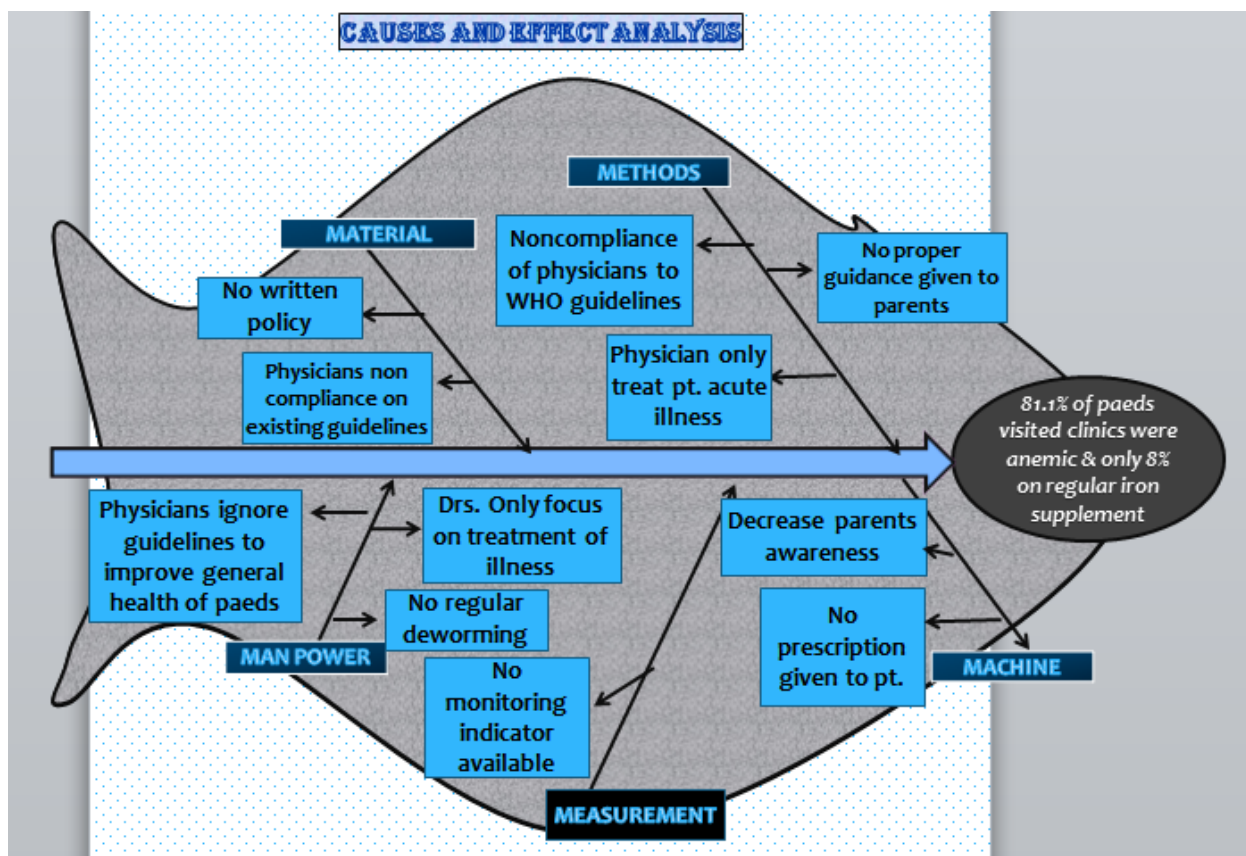


Fig. 1 Ishikawa Fish Bone Figure for cause and effect analysis.

Table 2 Demographic features checked for Anemia and physician's compliance.

RISK FACTORS	Yes	No
*Pallor present on examination as per IMNCI protocol	93.7%	6.3%
**Anemia present	81.1%	18.9%
Past history for Iron prescription by physician	11.4%	88.6%
Past history worm infestations	12.5%	87.5%
Past history of Deworming agents prescribed by physician	10.6%	89.4%
Physician's knowledge for WHO recommendations for IDA in children	93.4%	6.6%
Drug allergy (Iron supplements or deworming agents)	1.9%	98.1%
Parents knowledge for IDA	13.7%	86.3%

*Identified on General Physical Examination as per IMNCI protocol.

**Anemia positive if below the reference levels given in Table 1.

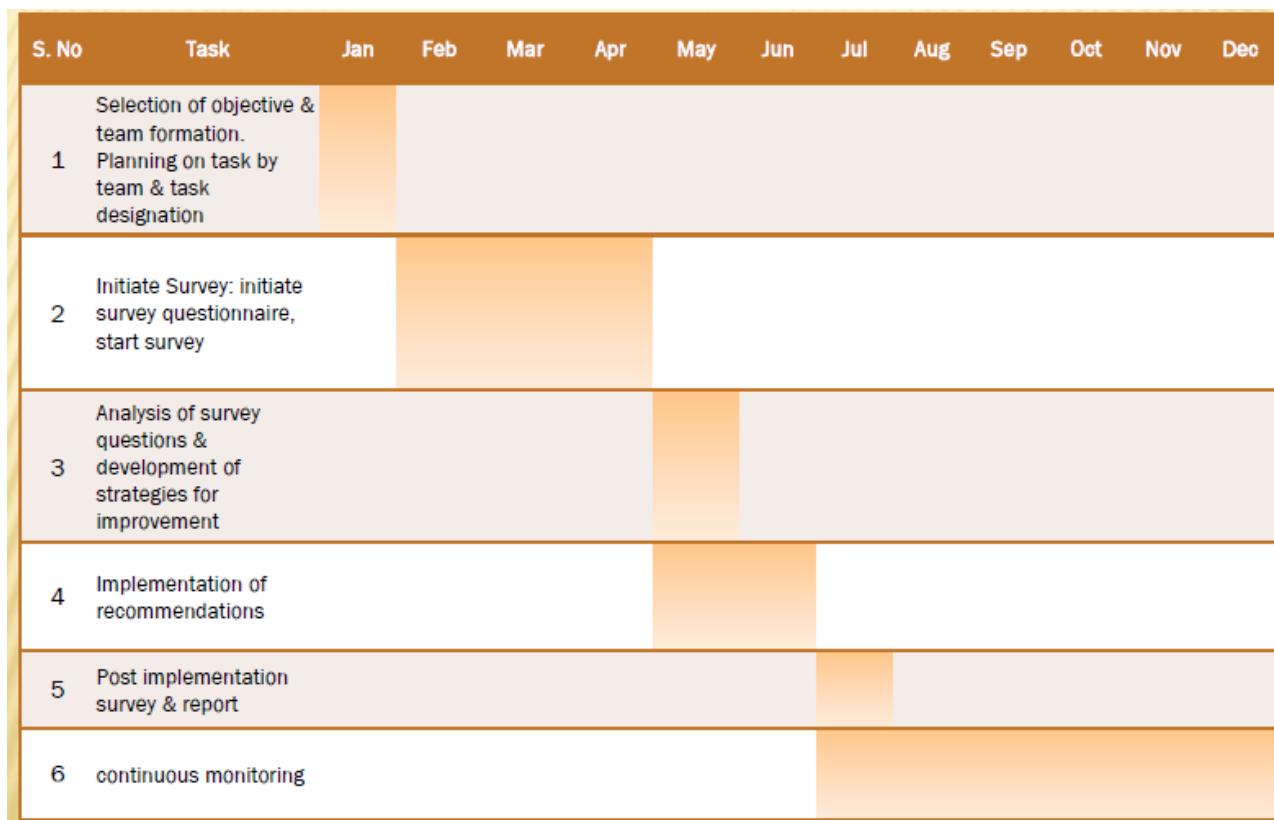


Fig. 2 Gantt chart.

outcome that is 81.1% pediatric population with anemia neither on iron supplementation nor on regular deworming medications, although they have regular visits in OPD for acute health issues. Strategic brain storming was done for solutions with long term sustainability.

Timelines for the project: We utilize ‘Gantt Chart’ to allocate timelines for the different phases of the project (Fig. 2).

3. Remedial Journey

3.1 Implementation of Strategies

We developed a questionnaire form referring status of pallor, iron supplementation, regular deworming and EPI vaccination status along with appropriate actions/advice. We make it part of Medical record file. At first visit attending physician had to filled it initially and later reviewed it with subsequent visits along with addressing acute illnesses. We also developed parent’s information materials like Posters and Brochure in

layman’s language entitled ‘Iron deficiency Anemia: causes, long term and short term side effects (particularly on growth, development and cognition) and how to prevent it. These are displayed in OPD for maximum parental awareness. We also make sure that all forms of Iron supplementation (tablets, syrups or drops) and Deworming agents available in pharmacy around the clock and at subsidized rates to ensure better compliance.

3.2 Post Implementation Survey and Outcomes

Iron supplementation and deworming agents’ prescription rate increased from 11.4% to 66.3% and from 10.6% to 57% respectively by the same physicians surveyed initially. Parent’s knowledge improved remarkably from 13.7% to 67.3%, particularly thru parent’s information material (Poster/Brochures). Our intervention had a large impact on improving compliance of physicians for WHO guidelines to treat and prevent IDA in pediatric population and thereby improving

Table 3 Post Implementation Outcomes.

Features	Pre-Implementation	Post-Implementation
Iron prescription by physicians	11.4%	66.3%
Deworming agents prescription by physicians	10.6%	57%
Parents knowledge for IDA	13.7%	67.3%

the overall general health of the pediatric patients besides treating their acute health related issues.

3.3 Holding the Gains

We scheduled Periodic continuing medical education (CME's) programs and refresher courses that will reinforce doctors for practicing WHO guidelines linked with IDA in children. We draft policy as 'Clinical Practice Guidelines (CPG)' to keep physician updated and compliant. We set quality indicators to prevent IDA and quarterly reporting to Quality officer was ensured. For parents awareness we displayed Parents information material like Posters and Brochures in pediatric clinics permanently. Further, Iron supplements and anthelmintic medications are provided in Hospital Pharmacy at subsidized prices which would ensure better compliance. To make sure the sustainability of the supply our Hospital Pharmacy fixed PAR (stock) level to meet spikes in demand and smooth supply, Fixed Picking Location and re-Order quantity as per daily demand and consumption.

4. Discussion

Iron deficiency anemia (IDA), is the most prevalent anemia globally [13]. Children particularly between the ages of 6-24 months are more liable to develop IDA [7]. This period is also regarded as 'maximum brain growth period' [10, 14] with key features of myelinogenesis, dendritogenesis, and synaptogenesis [9]. Throughout the brain, white matter contains iron as a major constituent, largest in basal ganglia and hippocampus [10]. More than 30 years of research revealed the negative impact of IDA on Intelligence, behavior, psychomotor, Social, cognitive performance, neurophysiologic and metabolic functions of brain [11]. Studies proved IDA negatively influence scores on

tests of intelligence (6-15 points lower) [9] reduced motor activity [14-16] developmental delay [16] with disturbed socio-emotional behavior like irritability, decreased attention span and emotional responsiveness [10]. It is hypothesized that during infancy particularly, rapid development leads to peak metabolic activity of brain making it more liable to deficiencies of substrates required for metabolism [9, 13, 17, 18]. Iron is one of them [13, 17, 18]. Neuro-pathological and biochemical researches concluded that iron deficiency causes posttranslational block ie reduced iron incorporation into protein structures (cytochromes, iron-sulfur proteins, and myelination) produce fragile proteins [9]. Long-term follow-up studies of IDA demonstrate strong association between Iron deficiencies with altered myelination resulting evident by slow conduction in the auditory and visual systems [19, 20] and learning delay [21].

Now, IDA as a 'Public health problem' is well recognized by Community health experts and policy makers. Though, as a result of past 30 years of research, overarching policies and effective interventions with programmatic guidance for policy makers are well documented, still IDA proven to be very resistant to preventive Public health measures unlike Vitamin A and Iodine deficiencies preventive programs. Besides challenges of compliance, delivery of services, lingering program support and public health systems, Physician's motivation is equally important. In our project we observed that besides parental lack of information, physicians though possess comprehensive knowledge, put little efforts in addressing IDA, they focused more on acute health issues. They need to be persistently motivated for implementation of policies regarding prevention and treatment of IDA. Physicians should consider IDA at almost every interaction with

their pediatric patients. Same findings were also observed another study in which besides other factors physician's lack of interest was also a contributing factor towards non-compliance Iron supplementation [22]. Parental awareness and understanding is also a strong predictor for better compliance. As awareness is a key element of behavior change [23]. This could be enhanced by informative material like Posters/brochures and it should be well displayed and easily available at the most visited sites of the hospital like waiting areas or OPD's. Same practice was also suggested in another study [22] in an attempt to enhance Iron supplementation compliance.

Considering the deleterious effects of IDA in children particularly the early years of life, innovative approaches are required to involve the active participation of both physicians and patients for implementation of already existing comprehensive policies/recommendation for IDA generated by WHO.

5. Conclusions

Physician's compliance with WHO recommendations for prevention of IDA in children is an important tool for the quality of medical care. In responses to our project, we found under-practice of these recommendations despite comprehensive physician's knowledge.

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