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Original Research Article

A Comparative Study to Evaluate Diagnostic Agreement of IMNCI Algorithm in Young Infants

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Abstract

Aim: The aim of the present study was to evaluate diagnostic agreement of IMNCI algorithm in young infants.

Methods: The comparative study was conducted in the Department of Pediatrics, JLNMCH, Bhagalpur, Bihar, India for the period of 18 months. 200 young infants were taken from Emergency and Outpatient Department of Pediatrics.

Results: In this study out of 200 young infants, 120 were 0-7 days of age and rest 80 were 7 - 59 days of age. Out of 200 infants, 124 were males and 76 were females. There were 60% males and 40% females in age group 0-7 days of age group. There were 65% males and 35% females in infants 7 days to 2 months of age group. A total of 100 infants were recruited each from the OPD and Emergency. Out of which 110 infants were admitted, and 90 infants were sent home after initial management. There were total of 70 admissions, 4 from OPD and 66 form emergency and rest 48 were sent home in 0-7 days age group. There were 35 admission and rest 45 infants were sent home in 7days – 2 months of age. There was no mismatch in diagnosis in 47.5% infants while partial mismatch was present in 37.5% infants. Over diagnosis was present in 12.5% and under diagnosis was present in 5% of 0-2 months of age young infants. There was no mismatch in 43.34%, partial mismatch in 36.66%, over-diagnosis in 15% and under-diagnosis in 5% of infants in 0- 7 days of age respectively. There was no mismatch in 50%, partial mismatch in 40%, over-diagnosis in 7.5% and under-diagnosis in 2.5% of infants in 7 days- 2 months of age.

Conclusion: Therefore, in conclusion, it could be mentioned that IMNCI is a quite sensitive strategy and could identify the severe illnesses of the young infants requiring referral to higher facility. Presence of other diagnosis with similar symptoms might result in false positive errors and low specificity. The algorithm covered most of the conditions, except some uncommon and rare ones.

Keywords: IMCI, Diagnostic Agreement, Childhood Illness, Integrated Management of Childhood Illness

Introduction

Children brought for medical treatment are often found to be suffering from more than one morbid condition, making a single diagnosis impossible. The effective

management of those conditions is more dependent on adopting a holistic approach using cheap, universally available and accessible strategies rather than sophisticated and expensive technology. According to the World Bank Report 1993, for situations where laboratory support and clinical resources are limited, such an approach is more realistic and cost‑effective, and therefore, has the potential to make the greatest impact on the global burden of disease. [1]

During the year 1992, the World Health Organization (WHO), WHO, in collaboration with United Nations Integrated Children's Emergency Fund (UNICEF), and some other agencies, institutions and individuals, responded to the challenge by adopting a strategy known as integrated management of childhood illness (IMCI). [2] IMCI is an evidence‑based syndromic approach. In this approach, priority has not been given to diagnosis of individual disease, rather the classification of the diseases and assessment of severity according to the common signs and symptoms were approached. Along with curative care for common childhood illnesses like acute respiratory infection, diarrhea, measles, malaria and malnutrition, the strategy also addressed aspects of nutrition, immunization, and other important elements of disease prevention and health promotion. [2] IMCI addressed the age group between 2 weeks and 59 months, but in India it was found that neonatal mortality constitutes 64% of "under‑five mortality", all neonates are included in the strategy, starting from the day of birth and it is adapted in the Indian version as IMNCI. In the adapted version, the entire age group of 0 to 59 months (as against 2 weeks to 59 months in IMCI) was included to address the neonatal mortality challenge. [3]

Globally, close to 10 million children including 4 million neonates die each year. [4-8] In response to this challenge, WHO and UNICEF in the early 1990s developed Integrated Management of Childhood Illness (IMCI), a strategy designed to reduce child mortality and morbidity in developing countries. [9] This strategy combines improved management of childhood illness with aspects of nutrition, immunization and other important disease prevention and health promotion elements. [10,11] However, before widespread implementation, the IMCI algorithms require careful evaluation to reflect the epidemiological and cultural characteristics of the country and adaptations as per the regional morbidity patterns. [11-14]

Thus, a single diagnosis for a sick child is often inappropriate because it identifies only the most apparent problem and can lead to an associated and potentially life-threatening problem being overlooked. For effective management of these major childhood illnesses, WHO and UNICEFF have developed the "Integrated Management of Childhood Illness" (IMCI) Strategy. [15,16] IMNCI aims to reduce death, illness and disability, and to promote improved growth and development among children under 5 years of age. IMNCI includes both preventive and curative elements that implemented by families and communities as well as by health facilities. [17]

The aim of the present study was to evaluate diagnostic agreement of IMNCI algorithm in young infants.

Materials and Methods

The comparative study was conducted in the Department of Pediatrics, JLNMCH, Bhagalpur, Bihar, India for the period of 18 months. 200 young infants were taken from Emergency and Outpatient Department of Pediatrics.

Inclusion criteria

Any infant presented with a fresh episode of any illness in the Emergency or the Outpatient Department of the Pediatrics

Exclusion criteria

Infants attended the well-baby clinic or immunization clinic for routine visits.

Methodology

Detailed history and examination were done for all enrolled young infants and was recorded in proforma according to IMNCI and for enrolled infants' diagnosis and treatment was made in the Pediatric Department and was considered as Gold Standard. All the relevant investigations were sent and treated accordingly in the department of pediatrics.

Statistical analysis:

The data was evaluated in the predesigned proforma, data were entered into MS Excel and analyzed using SPSS 10.01 for window 7, chi square test and fisher's exact test, sensitivity, specificity, positive predictive value and negative predictive value. The broad treatment agreement was compared using descriptive statistics and using statistical tests of significance wherever possible.

Results

Table 1: Age distribution of study infants

Age	**N%**
0-7 days	120 (60%)
7 days- 2 months	80 (40%)
Gender (0-2 months) n=200	
Male	124 (62%)
Female	76 (38%)
Gender (0-7 days) n=120	
Male	72 (60%)
Female	48 (40%)
Gender (7 days- 2 months) n=80	
Male	52 (65%)
Female	28 (35%)

In this study out of 200 young infants, 120 were 0-7 days of age and rest 80 were 7 - 59 days of age. Out of 200 infants, 124 were males and 76 were females. There were 60% males and 40% females in age group 0-7 days of age group. There were 65% males and 35% females in infants 7 days to 2 months of age group.

Table 2: Relationship between recruitment and hospitalization

0-2 months (n=200)	**Admitted**	**Sent Home**	**Total**
OPD	20	80	100
Emergency	90	10	100
0-7 days (n=120)			
OPD	4	44	48
Emergency	66	6	72
7 days- 2 months (n=80)			
OPD	15	40	55
Emergency	20	5	25

A total of 100 infants were recruited each from the OPD and Emergency. Out of which 110 infants were admitted, and 90 infants were sent home after initial management. There were total of 70 admissions, 4 from OPD and 66 form emergency and rest 48 were sent home in 0-7 days age group. There were 35

admission and rest 45 infants were sent home in 7 days – 2 months of age.

Table 3: Diagnostic agreement between gold standard and IMNCI Algorithm

0-2 months (n=200)	**N%**
No mismatch	95 (47.5%)
Partial mismatch	75 (37.5%)
Over-diagnosis	25 (12.5%)
Under-diagnosis	5 (2.5%)
0-7 days (n=120)	
No mismatch	52 (43.34%)
Partial mismatch	44 (36.66%)
Over-diagnosis	18 (15%)
Under-diagnosis	6 (5%)
7 days-2 months	
No mismatch	40 (50%)
Partial mismatch	32 (40%)
Over-diagnosis	6 (7.5%)
Under-diagnosis	2 (2.5%)

There was no mismatch in diagnosis in 47.5% infants while partial mismatch was present in 37.5% infants. Over diagnosis was present in 12.5% and under diagnosis was present in 5% of 0-2 months of age young infants. There was no mismatch in 43.34%, partial mismatch in 36.66%, over-diagnosis in 15% and under-diagnosis in 5% of infants in 0- 7 days of age respectively. There was no mismatch in 50%, partial mismatch in 40%, over-diagnosis in 7.5% and under-diagnosis in 2.5% of infants in 7 days- 2 months of age.

Discussion

Annually, over 10 million children in low and middle income countries including India die before they reach their fifth birthday and 7 out of 10 of these deaths are due to some common treatable or preventable conditions such as diarrheal dehydration, acute respiratory infections, measles, malaria, and malnutrition.2 Delay in seeking treatment and lack of quality care in health facilities are important cause of death in such conditions. [18] Integrated management of neonatal and childhood illness (IMNCI) is already operational at the field level in India, but there is paucity of published study testing its validity and reliability.

A total of 200 infants between 0-2 months who fulfilled the study criteria were investigated. Of these 120 (60%) were 0-7 days of age and rest 80 (40%) were 7 to 59 days of age. Similar study conducted by Kaur et al [19] showed that 42% infants were 0-7 days and 58% infants were 7 days to 2 months of age which is almost similar to the present study.

In the current study, 62% infants were male and 38% infants were female. In this study total of 55% infants were admitted and rest 45% infants were sent home. Admitted babies were significantly higher in Emergency group as compared to the OPD in 0-7 days as 91.6% and 8.4% and 7 days-2 months was 80% and 29.3% respectively. In similar study conducted by Kaur et al [19] admission from emergency and OPD in 0-7 days was 96.3% and 85.4% and 7-59 days were 97.5% and 38.6% respectively. Higher percentage of admission in this study may be due to difference in study settings but a greater number of admissions from emergency are comparable.

Similar study conducted by Goswami et al [20] showed that 66% of infants in early neonatal period (0-7 days) were admitted as compared to 52% in 7 days-2 months

age groups that was corresponding to the present study. Other study conducted by Gupta et al [21] showed that 65.7% of infants were admitted and rest 34.3% were sent back home in 7 days -2 months age groups.

In this study no mismatch or complete diagnostic agreement was present in nearly half (47.5%) of infants, partial mismatch was there in 37.5% infants, over-diagnosis was present in 12.5% and under-diagnosis was present in 2.5% infants. Subdividing the data to 0-7 days age group, complete agreement, partial mismatch, over diagnosis and under diagnosis was 43.34%,36.66%, 15%, 5%- and 7 days- 2 months age group was 50%, 40%, 7.5%, 2.5% respectively. Kaur et al19 had complete diagnostic agreement, partial mismatch, over-diagnosis, under-diagnosis in 0-7 days as 40.3%, 31.3%, 15.9%, 12.5% and 7- 59 days as 55.9%,10.3%, 20.6%, 13.2% respectively. The diagnostic agreement percentage in this study was comparable to the present study. Another study conducted by Goswami et al20 showed that no mismatch, partial mismatch, over-diagnosis under-diagnosis was 57%, 42%, 16%, 87% in 0-7 days age group and 68%, 32%,72%, 29% in 7-59 days age group respectively which is comparable. Gupta et al21 conducted study in 7-59 days age group and showed that complete agreement was present in 60% young infants. Partial mismatch, over-diagnosis, under-diagnosis was 40%, 21%, and 22.5% respectively which is comparable to the present study. Another study conducted by Bhattacharya et al [22] showed that IMNCI algorithm decisions were compared with the pediatrician's decisions and it was revealed that the overall diagnostic agreement was 55.56%, and among the disagreements, 33.33% was due to over diagnosis, and 11.11% was due to under diagnosis. [23]

Conclusion

Therefore, in conclusion, it could be mentioned that IMNCI is a quite sensitive strategy and could identify the severe illnesses of the young infants requiring referral to higher facility. Presence of other diagnosis with similar symptoms might result in false positive errors and low specificity. The algorithm covered most of the conditions, except some uncommon and rare ones. However, as this study was done in a tertiary care setting, further study particularly in primary health care setting is required.

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