

# IMCI Approach in Tertiary Hospitals, India

Ritu Jain, Shally Awasthi and Avivar Awasthi<sup>1</sup>

Department of Pediatrics Chhatrapati Shahuji Maharaj Medical University, Lucknow and La Martiniere College, Lucknow (UP) India

## ABSTRACT

**Objective.** This study was conducted to compare physicians' diagnosis with Integrated Management of Childhood Illness (IMCI) algorithm generated diagnosis in hospitalized children aged 2 – 59 months. **Methods.** Recruited were patients aged 2-59 months admitted with one or more IMCI danger signs. IMCI and physician's diagnosis were noted and compared. **Results.** In 222 included subjects, mean duration of illness was 9.4 (SD: 16.5) days. Among those with cough or difficult breathing, 44 (19.8%) and 66 (29.7%) were diagnosed as either severe pneumonia or mild to moderate pneumonia by physicians and IMCI algorithm, respectively ( $p= 0.015$ ). Among 146 presenting as fever, 140 (95.9%) were diagnosed as very severe febrile disease by the IMCI algorithm, whereas physicians diagnosed these as either malaria in 10/146 (6.7%), pyogenic meningitis in 47/146 (32.2%), sepsis in 31/146 (21.3%), tuberculous meningitis in 17/146 (11.6%), encephalitis in 5/146 (3.4%), measles in 3/146 (2.1%) or others in 24/146 (16.4%). **Conclusion.** As there was a low concordance between physician and IMCI algorithmic diagnosis of pneumonia (Kappa value= 0.74, 95% CI: (0.64 – 0.84)) and since very severe febrile disease is not a diagnosis made by the physicians, the IMCI algorithms have to be refined for appropriate management of these conditions. [Indian J Pediatr 2009; 76 (7) : 725-727] E-mail: sawasthi@sancharnet.in

**Key words:** IMCI; Danger signs; Pneumonia; Very severe febrile disease; Tertiary care; India

World Health Organization and the UNICEF launched the global initiative of "Integrated Management of Childhood Illness" (IMCI) in 1992 with the aim of improving management of childhood illnesses and also combined it with assessment and management of nutritional and immunization status of the child and maternal health care.<sup>1</sup> The IMCI integrates management of five most important causes of childhood deaths, namely acute respiratory infections (ARIs), diarrhoeal diseases, measles, malaria and malnutrition. IMCI approach is based on clinical assessment and classification of illness that is independent of laboratory assistance. It has identified four general danger signs of inability to drink / breastfeed, vomiting, convulsions and lethargy/unconsciousness that require referral for hospitalization.<sup>2</sup> Data from the African subcontinent has validated the feasibility and utility of adopting the IMCI integrated approach.<sup>3</sup> There is a paucity of published experience with the IMCI approach from the Indian subcontinent.<sup>4</sup> The present study was therefore designed to compare physicians' diagnosis with IMCI diagnosis in children between 2 – 59 mth of age, hospitalized in a

tertiary care center in northern India with at least one IMCI general danger sign.

## MATERIAL AND METHODS

This study was conducted in the Department of Pediatrics, Chhatrapati Shahuji Maharaj Medical University (erstwhile King George's Medical College, then University), Lucknow, India, over a period of seven months, from October 2003 to April 2004. There is a 125 bedded pediatric hospital providing tertiary care. The scientific merit as well as ethical aspects of the study was approved by the Departmental Review Committee as well as the Academic Council of the university. All patients between the age of 2-59 mth admitted with one or more IMCI general danger sign (namely inability to drink / breastfeed, vomiting, convulsions, lethargy / unconsciousness) at the time when the recruiting officer was on duty, which on an average was once a week, were included in the study. Information was collected on patient's date of admission, age, sex, weight, axillary temperature at admission and address. A single Pediatric resident (RJ) doctor examined the children for the presence of general danger signs. Patients were also assessed for the presence of malnutrition (by weight for age, visible severe wasting, edema of both feet) and

**Correspondence and Reprint requests :** Dr Shally Awasthi Professor, Dept. of Paediatrics Chhatrapati Shahuji Maharaj Medical University, Lucknow- 226003 (UP) India.

[DOI-10.1007/s12098-009-0121-2]

[Received May 24, 2008; Accepted August 20, 2008]

anemia (by palmar pallor). Every child was classified according to the WHO/UNICEF algorithms for IMCI. These were termed as "IMCI diagnoses".

The authors have assumed that there will be 50% co-positivity between physicians' and IMCI diagnosis. Then to detect this with a precision of 7% and alpha level of 0.05 about 196 patients were to be recruited. This is the largest sample size required and would be sufficient to detect co-positivity greater or lesser than 50%. The hospital diagnoses at the time of discharge were considered as the "Physician's diagnoses", as it is based on investigations and close observation of the patient and is as close to "Gold Standard" as possible in a given setting. The diagnostic agreements between the Physician's diagnosis and the IMCI diagnosis were computed. Complete agreement was when all the diagnoses made by IMCI algorithms matched the Physician's diagnosis, partial agreement when at least one of the diagnoses made by IMCI algorithms matched the Physician's diagnosis and complete disagreement when no diagnosis made by the algorithms matched the Physician's diagnosis.

Data was computerized and SPSS 11 software was used for statistical analysis. We reported distribution of characteristics of patients at recruitment alongwith 95% confidence interval. Kappa statistics with 95% confidence interval was calculated to compare the physician's and IMCI diagnosis and the agreement between the two alongwith standard error has been reported. Univariate comparison was done using Chi Square test for categorical variables. The diagnostic agreements between the Physician's diagnosis and the IMCI diagnosis were also computed.

## RESULTS

From October 2003-April 2004, a total of 911 patients between the ages of 2-59 mth were admitted, of which 222 fulfilled the study criteria and were included. Of these 115 (51.8%) were between 2 to 12 mth and 107 (48.2%) were between 13 to 59 mth. There were 158 (71.2%) males. Mean weight was 7.5 (SD: 3.3) kg. Mean duration of illness was 9.4 (SD:16.5) days. Most (n=170, 76.6%) of the patients had two or more co-existent danger signs as per the IMCI algorithm. The mean number of morbidities according to IMCI algorithm and physicians' diagnoses were similar and were 2.43(SD: 1.1) and 2.36 (SD: 1.1), respectively. Of the 4 general danger signs, inability to drink/ breastfeed was present in 177 (79.7%), convulsions in 89 (40.1%), vomiting in 93 (41.9%) and lethargy and loss of consciousness in 115 (51.8%).

We have compared physicians' and IMCI diagnosis of respiratory and diarrheal diseases, malnutrition,

anemia and fever in Table 1. Among those with cough or difficult breathing, 44 (19.8%) and 66 (29.7%) were diagnosed as either severe pneumonia or mild to moderate pneumonia by physicians and IMCI algorithm, respectively (p= 0.015). The diagnosis of 22 cases not diagnosed as pneumonia by physicians were bronchial asthma in 4/22 (18.2%), bronchiolitis in 9/22 (40.9%), tuberculosis in 6/22 (27.3%), empyema in 1/22 (4.5%) and laryngotracheobronchitis in 2/22 (9.1%). Likewise, among 146 patients presenting as fever, 140/146 (95.9%) were diagnosed as very severe febrile disease by the IMCI algorithm, while none of the physicians made this diagnosis. Among 146 patients presenting with fever, physicians diagnosed these as either malaria in 10/146 (6.7%), pyogenic meningitis in 47/146 (32.2%), sepsis in 31/146 (21.3%), tuberculous meningitis in 17/146 (11.6%), encephalitis in 5/146 (3.4%), measles in 3/146 (2.1%) and others in 24/146 (16.4%). The others category included cardiovascular diseases, electrolyte imbalances, metabolic encephalopathies, seizure disorders, hemolytic uraemic syndrome, febrile seizure.

Diagnostic agreement computed between the Physician's Diagnosis and the IMCI diagnosis showed complete agreement on all diagnoses in a single patient

TABLE 1. Comparison "Physician's Diagnosis" and "IMCI" Diagnosis for Various Morbidity (n=222)

CONDITION	IMCI DIAGNOSIS SAME AS PHYSICIAN DIAGNOSIS		KAPPA (95% CI)	AGREEMENT ,SE
	No (%)	Yes (%)		
PHYSICIAN DIAGNOSIS				
Pneumonia				
No (%)	156(100%),	0(0%)	0.74	0.901, 0.051
Yes (%)	22(33.3%),	44(66.7%)	(0.64 – 0.84)	
Acute Ear Infection				
No (%)	220 (100%),	0 (0%)	1	1, NA
Yes (%)	0 (0%),	2 (100%)	(NA)	
Chronic Ear Infection				
No (%)	217 (100%),	0 (0%)	0.89	0.995, 0.112
Yes (%)	1 (20%),	4 (80%)	(0.67 – 1)	
Acute diarrhea				
No (%)	174 (97.8%),	4 (2.2%)	0.95	0.982, 0.027
Yes (%)	0 (0%),	44(100%)	(0.89 – 0.99)	
Dysentery				
No (%)	207 (100%),	0(0%)	0.84	0.983, 0.08
Yes (%)	4 (26.7%),	11 (73.3%)	(0.68 – 0.99)	
Persistent Diarrhea				
No (%)	209 (100%),	0(0%)	1	1, NA
Yes (%)	0 (0%),	11 (100%)	(NA)	
Malnutrition				
No (%)	117 (100%),	0(0%)	1	1, NA
Yes (%)	0(0%),	103(100%)	(NA)	
Anemia				
No (%)	140 (100%),	0 (0%)	0.98	0.991, 0.014
Yes (%)	2 (2.4%),	80 (97.6%)	(0.95 – 1)	
Fever				
No (%)	76 (89.4%),	9 (10.6%)	0.912	0.959, 0.028
Yes (%)	0 (0%),	137(100%)	(0.86 – 0.97)	
VSFD				
No (%)	82(36.9%),	140(63.1%)	NA	NA
Yes (%)				

Abbreviations: CI: Confidence Interval, SE: Standard Error, NA: Not applicable, VSFD: very severe febrile disease

## IMCI approach in Tertiary Hospitals, India

in 41 (18.5%), partial agreement in 132 (59.5%) and total disagreement in 49 (22%) patients.

### DISCUSSION

IMCI approach has been developed for field and primary care facilities to systematically evaluate and treat patients or identify those requiring higher level of health care and refer them accordingly.<sup>1-4</sup> Since IMCI is being taught to medical undergraduates in most colleges in India<sup>4</sup>, it is essential to scientifically demonstrate its utility and practicability. Hence the current study has been conducted

In the present study there is a low concordance between physician and IMCI algorithmic diagnosis of pneumonia (Kappa value = 0.74, 95% CI: (0.64 – 0.84)). The discordance for 'cough/difficult breathing' category was due to under-diagnosis of bronchial asthma, bronchiolitis, tuberculosis, empyema and laryngotracheobronchitis and over-diagnosis of pneumonia /severe pneumonia by IMCI algorithms. For the diagnosis of fever, we observed a good concordance between physician and IMCI diagnosis (kappa value = 0.912, 95% CI: (0.86 – 0.97)). However, IMCI categorized majority of cases as very severe febrile disease, that can assist referral at the community level but can also delay initiation of specific treatment since there was under-diagnosis of specific infections like malaria, measles, infections of nervous system and sepsis by IMCI algorithms.

In Kenya it has been found that on comparing IMCI algorithms applied by minimally trained health care staff at first level facility with trained physicians<sup>5</sup>, the algorithm had variable sensitivity and specificity for diagnosing specific diseases like pneumonia (97% sensitivity, 49% specificity), dehydration with diarrhoea (51% sensitivity, 98% specificity), ear problem (98% sensitivity, 2% specificity) and nutritional status (96% sensitivity, 66% specificity). Like the study from Kenya<sup>5</sup>, in the current study also, the IMCI algorithms had poor performance.

The present study shows that using IMCI algorithmic approach results in misclassification of cases with respiratory and febrile illnesses, taking

physician's diagnosis as the gold standard. Hence initiating appropriate treatment (including specific antibiotics) in such cases by relying solely on IMCI algorithms would be delayed. Therefore, these algorithms need to be supported by relevant investigations to arrive at a specific diagnosis for institution of appropriate therapy at least in tertiary care level.

### CONCLUSION

We conclude that as there is a low concordance between physician and IMCI algorithmic diagnosis of pneumonia (Kappa value= 0.74, 95% CI: (0.64 – 0.84) and since very severe febrile disease is not a diagnosis made by the physicians, the IMCI algorithms have to be refined for appropriate management of these conditions.

**Contributions:** RJ was responsible for study design recruitment analysis and paper writing. SA was responsible for design and analysis and paper writing and AA responsible for analysis and paper writing.

**Conflict of Interest:** None

**Role of Funding Source:** None

### REFERENCES

- 1 Nicoll A. Integrated management of childhood illness in resource-poor countries an initiative from the World Health Organization. *Trans R Soc Trop Med Hyg* 2000;94:9-11.
- 2 Robinson D. The integrated management of childhood illness. *Afr Health* 1996; 18:20-21.
- 3 Weber MW, Mulholand EK, Jaffar S, Troedsson H, Gove S, Greenwood BM. Evaluation of an algorithm for the integrated management of childhood illness in an area with seasonal malaria in the Gambia. *Bull WHO* 1997;75: 25-32.
- 4 Shah D, Sachdev H.P.S. Evaluation of the WHO/UNICEF algorithm for integrated management of childhood illness between the age of two months to five years. *Indian Pediatr* 1999; 36: 767-777.
- 5 Perkins BA, Zucker JR, Otieno J, Jafari HS, Paxton L, Redd SC, Nahlen BL, Schwartz B, Oloo AJ, Olango C, Gove S, Campbell CC. Evaluation of an algorithm for integrated management of childhood illness in an area of Kenya with high malaria transmission. *Bull World Health Organ* 1997;75 Suppl 1:33-42.