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ASSESSMENT OF PRESCRIBING RATIONALITY IN PAEDIATRICS PATIENTS USING POPI CRITERIA IN A TERTIARY CARE HOSPITAL

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ABSTRACT
Objectives: To evaluate prescribing efficiency in paediatric inpatients using POPI. To identify drug related issues and contributing factors. To assess the utility of POPI criteria for paediatric prescribing efficiency and rationality. To assess the role of pharmacists in the deliverance of pharmaceutical care using POPI. **Methodology:** Selection of diseases was based on POPI propositions; the relevant data was extracted and documented on a specific designed data collection form. In-patients with inappropriate prescription and omission were identified through Medication Chart review using POPI propositions. Rationality was divided into rational, part-rational and irrational based on the number of inappropriateness and omissions in a prescription. Validated information was retrieved from standard references to utilize for improving prescribing rationality in pediatrics. **Result:** Out of 135 patients, male (58.51%) were dominant over female and most of the patients (32.59%) were infants. Study analyzed inappropriate and omission of prescription using POPI criteria. Out of 135 prescriptions, 30 had one inappropriateness, 14 had one omission and 1 had two omissions individually. The most common DRP was choice of drugs (31.11%) in Pain & Fever. Hence, numbers of rational prescriptions were 97 having neither inappropriateness nor omission followed by 26 part-rational prescriptions having either 1 inappropriateness or omission and 12 irrational prescription having both inappropriateness and omission. **Conclusion:** The study concludes that the prescribing efficiency was found to be adequate for majority of the cases, but the POPI tool is limited to selected disease. This can contribute to promote appropriate prescribing among the paediatric population.

KEYWORDS: Inappropriate, Omission, Pediatrics.

INTRODUCTION
Rational prescribing in paediatrics was inadequately studied and was an issue for all countries. WHO estimated that >50% of all the medication are prescribed and dispensed or sold inappropriately and that 50% of all patients failed to take them as directed by the professionals.[1] Paediatric patients are a clinically vulnerable target for drug delivery due to changes in absorption, distribution, metabolism and excretion; and the potential for PK related toxicological events to occur throughout development. These changes in absorption, distribution, metabolism, excretion and toxicity can have profound effects on drug delivery, and may even lead to toxic or sub-therapeutic outcomes.[2] Safety and efficacy data on medicines that are being used in children are surprisingly scarce, which results in children being given ineffective medicines or medicines with unknown harmful side effects. Clinical trials in Paediatrics are more challenging to conduct than trials in adults due to

the scarcity of funding, uniqueness of children and particular ethical concerns.[1] Prescription of medications that have a high chance to interact with other drugs, or with the disease can be categorised as inappropriate, and prescription of medication for excessively long durations and the failure to prescribe recommended medications are also be categorised as inappropriate.[1] Tools to identify rational prescribing in paediatrics are few, while there are tools available for geriatrics such as STOPP/START criteria (Screening Tool of Older Person's Prescriptions/Screening Tool to Alert doctors to Right Treatment) and BEERS criteria (Beers Criteria for Potentially Inappropriate Medication Use in Older Adults) to identify inappropriate prescription, this system is useful because it clearly classifies drugs according to different medical conditions that are commonly found in the elderly.[4,5] POPI(Paediatrics omission of prescriptions and Inappropriate Prescriptions) a tool recently developed by Robert-Debre´ University

Hospital, AP-HP (Assistance Publique-Hoˆpitaux de Paris) in Paris, France aims to identify any inappropriate prescription that may occur during prescribing drug to paediatrics.

POPI (Paediatric Omission of Prescription and Inappropriate prescription) consist of a list of common and frequently occurring disease and their inappropriate prescription and omission. Most diseases listed down on the tools have high prevalence rate as compared to other diseases found in paediatrics, although some diseases may have high prevalence rate in other geographical area. Our study narrowed down the list to 8 diseases such as Pain and Fever, Diarrhoea, Cough, Nausea and vomiting / GERD, Urinary tract infection, Bronchiolitis, Epilepsy and Asthma.[6,7] as the prevalence of these diseases were higher than the other diseases in the study area, omitted diseases were mainly due to lack of patients and low occurrence of the diseases in the study area. The study based completely on the tool and its listed criteria. As mentioned earlier POPI is a rather new tool and have not been widely known and used, it is an attempt to reduce errors in medication and prevent any omission of prescription that may occur. POPI tool may not contain the complete list of inappropriate prescription and omission as the tool have not been highly recognised and used in day to day prescribing. All the diseases mentioned have their individual inappropriate prescription and omission which were listed down and a separate checklist was developed which was made from the tool itself so as to easily cross checked with the collected inpatient cases upon which inappropriate and omission of prescription were identified. The whole process was monitored by a qualified paediatrician and any inappropriate and omission of prescription was notified to him.

Our objective was to assess prescribing rationality using POPI (Paediatric Omission of Prescription and Inappropriate prescription) tool in Indian geographical region.

MATERIALS AND METHODOLOGY
The study was a prospective observational study which was conducted in the general paediatric wards of Shri. B. M. Patil medical College Hospital and Research Center, Vijayapura, Karnataka, for 6 months. A sample size of 135 subjects was obtained with 95% of confidence level and 10% relative error and 74% proportion of inappropriate prescription [POPI (Pediatrics: Omission of Prescriptions and Inappropriate prescriptions): development of a tool to identify inappropriate prescribing] by using the formula $n = z^2 p(1-p)/d^2$, where z is statistics at 5% level of significance, d is margin of error, p is anticipated proportion of inappropriate prescription. Pediatric inpatients of either gender age range between 0-18 years were included in the study. POPI consist of a list of common and frequently occurring disease and their inappropriate prescription and omission. Most diseases listed down on the tools

have high prevalence rate as compared to other diseases found in pediatrics, although some diseases may have high prevalence rate in other geographical area. Our study narrowed down the list to 10 diseases such as Pain and Fever, Diarrhea, Cough, Nausea and vomiting / GERD, Urinary tract infection, Bronchiolitis, Epilepsy, ENT infections, Ringworm and Asthma as the prevalence of these diseases were higher than the other diseases in the study area, omitted diseases were mainly due to lack of patients and low occurrence of the diseases in the study area. A data on the prevalence rate of past 2 years of the above mentioned diseases were obtained from the Medical record Department (MRD). Pediatric out-patient were excluded and inpatients in pediatric admitted other than the disease mentioned above were excluded. Patients admitted in the pediatric critical care, PICU, non-cooperative and non-consenting were excluded. An exclusive data collection form was created containing the patient's demographic, Diagnosis, Medication chart and POPI propositions and other contributing factors. The initial treatment of each patient was considered for the analysis of the prescriptions; the prescriptions/data were strictly analyzed according to the validated propositions of POPI. A pediatrician as an expert and as an external advisor was consulted for cross examination of the prescriptions. The main source of the data was the patient profile and POPI prescribing guidelines. The secondary sources of the data were truven Micromedex solutions, articles and journals. After the collection of the data the prescriptions were analyzed and the inappropriateness and omission if any, was recorded and reported to the consulting pediatrician and based on the number of Inappropriateness and Omissions the prescriptions were classified as Rational, Part-rational and Irrational.

RESULTS
During the period, a total of 135 cases was collected and assessed according to the POPI tool. Age group was divided according to the WHO classification of paediatric population, male (58.51%) were dominant over female and most of the patients (32.59%) were infants (Table 1). Of all the cases assessed in the study population the disease selected was based on POPI propositions and the prevalence of the disease in the study area with or without comorbidities and most of the cases were of Pain & Fever with or without comorbidities (Figure 1 & Table 2). POPI contains a list of various diseases with their propositions that include inappropriate prescriptions and omission of prescriptions, The reasons of Inappropriateness and Omissions identified during the course of the study and are also considered as Drug related Problems i.e. POPI propositions (Table 3) whereas, the lack of updated knowledge of POPI tool is the only contributing factor (23.7%) due to which the prescriptions were identified as either Part-rational or Irrational. (Figure 2) shows the number of Inappropriateness and Omissions of prescriptions identified in the study. There were more

rational prescriptions than Part-rational and Irrational as
per POPI tool and is depicted in (Figure 3).

Table 1: Division of Age group according to WHO classification.

AGE	M	F	N	N%
0 - 0.1	7	5	12	8.88
0.1 - 2.0	25	19	44	32.59
2.0 – 6.0	25	12	37	27.4
6.0 – 12.0	16	15	31	22.96
12.0 – 18.0	6	5	11	8.14
TOTAL	79	56	135	100%

Table 1 shows WHO classification of the age i.e. Neonate (0-0.1), Infant (0.1-2.0), Child (2.0-6.0), Young child (6.0-12.0), Adolescent (12.0-18.0); Where, M is Male; F is Female and N is total number of patients.

Table 2: Disease selected based on POPI propositions and the prevalence of the disease in the study area with comorbidities.

Distribution of diagnosis or patient complaints	N	%
Pain & Fever	25	18.51
Pain & Fever & Cough	18	13.33
N&V/GERD &Diarrhea	14	10.37
Pain & Fever &Diarrhea	14	10.37
Pain & Fever & UTI	13	9.62
Cough	12	8.88
UTI	12	8.88
Pain & Fever & N&V/GERD	8	5.92
Diarrhea	5	3.7
Pain & Fever & N&V/GERD &Diarrhea	4	2.96
Pain & Fever & N&V/GERD & Cough	2	1.48
Bronchiolitis	1	0.74
Cough & Bronchiolitis	1	0.74
N&V/GERD	1	0.74
Pain & Fever & Bronchiolitis	1	0.74
Pain & Fever & Epilepsy	1	0.74
Pain & Fever & N&V/GERD Diarrhoea& Epilepsy	1	0.74
Pain & Fever & UTI & Cough	1	0.74
Pain & Fever & UTI & Diarrhoea	1	0.74

Nausea and Vomiting (N&V), Gastroesophageal Reflux Disease (GERD), Urinary Tract Infection (UTI).

Nausea and Vomiting (N&V), Gastroesophageal reflux disease (GERD), Urinary Tract Infection (UTI), Non-Steroidal Anti Inflammatory Drugs (NSAIDS), Oral Rehydration Solution (ORS).

Table 3: POPI propositions to identify Inappropriateness and Omissions in the prescriptions.

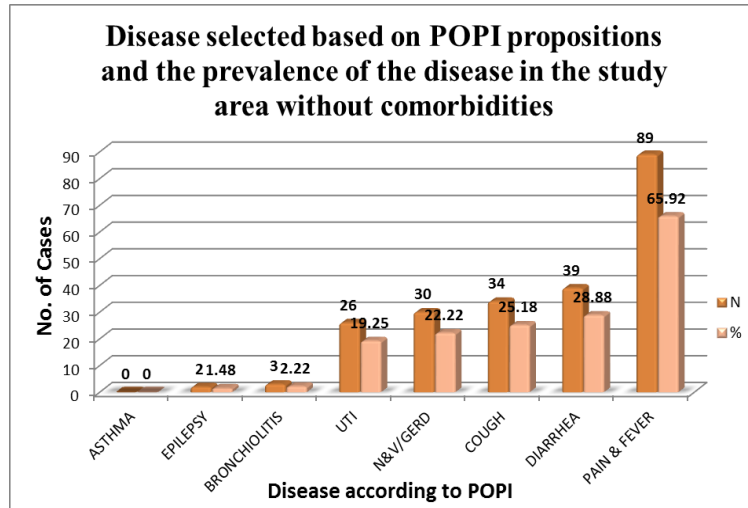| Disease	PROPOSITION	N	%
Pain & Fever	Medication other than paracetamol was used as first line agent	14	15.73
	Combined used of two NSAID	1	1.12
	Two alternating antipyretics were used	3	3.37
	Failure to provide analgesic/NSAID for Pain & Fever	2	2.24
N&V/GERD	Omission of ORS	5	16.66
Diarrhea	Omission of ORS	9	23.07
Cough	Mucolytics prescribed to pts. Less than two yrs.	9	26.47
Bronchiolitis	Mucolytics were prescribed	2	66.66

Figure 1: Disease selected based on POPI propositions and the prevalence of the disease in the study area without comorbidities.

X-axis indicates disease selected based on POPI propositions and the prevalence of the disease in the study area without comorbidities out of the total sample size, Y-axis indicates N i.e. number of cases collected without comorbidities out of the sample size & its %, UTI – Urinary Tract Infection, N&V/GERD – Nausea & Vomiting/ Gastroesophageal reflux disease.
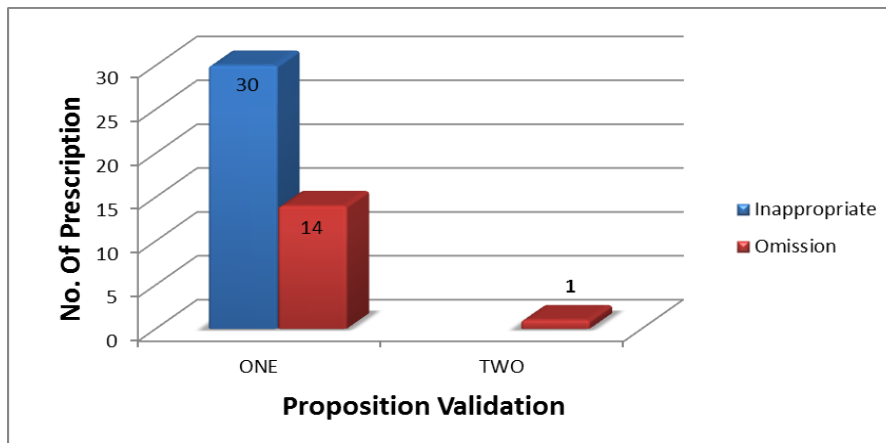

Figure 2: Proposition validation of the prescriptions according to POPI.

X–axis indicates the number of inappropriateness and/or omissions in a prescription; Y-axis indicates the number of prescriptions having inappropriateness or omission, blue column shows the no. of inappropriate prescription and red column shows the no. of omission in a prescription.
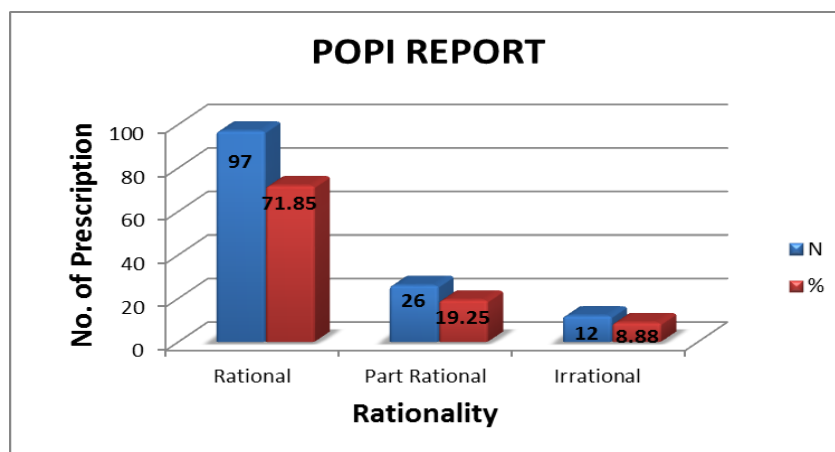

Figure 3: Rationality of the prescriptions according to POPI tool.

X-axis indicates the rationality of the prescription; Y-axis indicates N i.e. number of rational, part-rational, irrational prescription and its % respectively.

DISCUSSION

Throughout the study, the inappropriateness and omission of prescription were analyzed using POPI criteria. Out of 135 cases, 105 (77.77%) had zero inappropriateness and the remaining 30 (22.22%) cases had one inappropriateness and out of 135 cases, 120 (88.88%) had zero omission, 14 cases (10.37%) had one omission and 1 case (0.74%) had two omissions.

Diseases were selected and analyzed according to POPI criteria, although POPI criteria listed out server diseases out of which 8 disease were selectively chosen as their chance of prevailing was high in the study area. The distribution of diseases were Pain & Fever which accounts for 89(65.92%) of the total cases out of which 69(77.52%) cases were appropriate and 20 cases were Inappropriate. The reasons for the Inappropriate cases were: The use of Medication other than paracetamol for first line agent which accounts for 14(15.73%) of the total inappropriate cases. As per the study carried out by M Maurizio et al it is not recommended to use alternative NSAID to paracetamol because NSAID's are contraindicated in patients with chickenpox and in those with dehydration and pneumonia, paracetamol can be used from birth and in patients with dehydration.

Combined use of two NSAID was on 1(1.12%) case which is inappropriate as per the study conducted by G Madlen et al NSAID combinations should be avoided because toxicity is likely to be increased without a proven increased benefit.

Two Alternating antipyretics prescribed accounts for 3(3.37%) cases and failure to provide analgesic for pain and fever was found on 2(2.24%) cases. From the total cases analysed, Disease on UTI account for 26(19.25%) of the total cases, where all the cases were appropriate according to POPI criteria. Nausea, Vomiting & GERD account for 30 (22.22%) of the total case, where 25(83.33%) of them were appropriate and the rest of the 5 (16.66%) case were inappropriate, which was due to Omission of ORS.

Diarrhoea cases account for 37(28.88%) of the total case, where 28(71.79%) cases were appropriate and 9(23.07%) were inappropriate. According to WHO's Division of Diarrhoeal and Acute respiratory disease control, drugs have no proven value for acute diarrhea. They do not decrease the fluid loss responsible for death and may even have serious side effects, such as central nerve depression and gastrointestinal toxicity. So it is appropriate to prescribe Oral rehydration solution for diarrhea in pediatrics.

A case on Cough accounts for 34(25.18%) of the total cases, where 25(72.52%) were appropriate and

9(26.47%) were inappropriate, the inappropriateness was due to the prescription of mucolytics for patients less than 2 years. Bronchiolitis accounts for 3(2.22%) of the total cases, where (33.33%) case was appropriate and the other 2(66.66%) cases were inappropriate, the reason for inappropriateness was due to the prescription of mucolytics which were not to be prescribed in paediatric patients as per the study conducted by Ioan Magyar et al, use of mucolytic agents for cough in pediatrics may worsen the symptoms which causes appearance of reflex vomiting or any life threatening symptoms.

Upon the analysis of 135 cases, the study divided the rationality of prescription into three parts i.e. rational, part rational and irrational and analysed the rationality of prescription using POPI criteria. Hence, number of rational prescription were 97 (71.85%) followed by part rational prescription of 26 (19.25%) and irrational prescription of 12(8.88%).(ref table no.2.4) and the inappropriate and omission of prescription in paediatric inpatients using POPI criteria. 30 (22.22%) cases had one inappropriateness and 14 cases (10.37%) had one omission in the prescription and 1 case (0.74%) had two omissions.

Of all the cases collected in the study, diseases were selected according to POPI criteria and were assessed according to the propositions in the criteria. Number of rational prescription according to POPI was 97, part rational was 26 and irrational prescriptions were 12. Hence POPI was used to identify a limited number of diseases and was found to be adequate to be used for the assessment of rationality for the mentioned disease in the criteria.

CONCLUSION/SUMMARY

The study reveals that the prescribing efficiency was found to be adequate for majority of the cases and reported inappropriateness with POPI (22.22%) and reported omissions with POPI (11.11%).The most common DRP identified in POPI tool was the choice of drugs. The study reveals that the POPI checklist showed some limitations as it can be assessed only for selected diseases. Clinical pharmacist can play a crucial role in promoting appropriate prescribing among the paediatric population by performing regular medication chart review and providing information regarding POPI for prescribing rationality.

REFRENCES

1. Prot-Labarthe S, Weil T, Angoulvant F, Boulkedid R, Alberti C, Bourdon O: POPI (Pediatrics: Omission of Prescriptions and Inappropriate Prescriptions): Development of a Tool to Identify

Inappropriate Prescribing. Plos One, 2014; 9(6): e101171.

2. Copp HL and Schmidt B: Work up of Paediatric Urinary Tract Infection. Journal HHS Author Manuscripts, 2015; 42(4): 519–526.

3. Raffaeli G, Orenti A, Gambino M, Rios WS, Bosis S, Bianchini S et al: Fever and Pain Management in Childhood: Healthcare Providers and Parents Adherence to Current Recommendations. International Journal Environ Research Public Health, 2016; 13(5): 499.

4. Consolini DM: Fever in Infants and Children, 2018.

5. Doern CD, Richardson SE: Diagnosis of Urinary Tract Infections in Children.Journal Clinic Microbiology, 2016; 54(9): 2233–2242.

6. Larcombe J: Urinary tract infection in children. BMJ Publishing Group, 2010; 2: 306.

7. Robinson J L, Finlay J C, Lang M E, Bortolussi R: Urinary tract infections in infants and children: Diagnosis and management. Journal Canadian Pediatric Society, 2014; 19(6): 315-319.

8. Samprathi M, Jayashree M: Child with Vomiting. Indian Journal Pediatrics, 2017; 84(10): 787-791.

9. Rybak A, Pesce M, Thapar N, and Borrelli O: Gastro-Esophageal Reflux in Children. International Journal Molecular Science, 2017; 8(8): 1671.

10. *Kay MH:* Diarrhea in Children. *The American Journal of Gastroenterology,* 2004.

11. Lakshminarayanan S and Jayalakshmy R: Diarrheal diseases among children india. Journal National Science Biology Med, 2015; 6(1): 24–28.

12. Radlovic N, Lekovic Z, Vuletic B, Radlovic V, Simic D: Acute Diarrhea in Children. Journal Srp Arh Celok Lek, 2015; 143(11-12): 755-62.

13. Worrall G: Acute cough in children.Journal Can Fam Physician, 2011; 57(3): 315–318.

14. Erickson EN, Mendez MD: Pediatric Bronchiolitis. Journal StatPearls Publishing LLC, 2019.

15. VanAalderen WM: Childhood Asthma: Diagnosis and Treatment. Journal Scientifica (Cairo), 2012; 2012: doi: 10.6064/2012/674204:674204.

16. Camfield P, Camfield C: What is new in paediatric epilepsy?. Journal Paediatric Child Health, 2003; 8(9): 557–560.

17. Bashiri FA: Childhood epilepsies.Journal Neurosciences (Riyadh), 2017; 22(1): 14–19.

18. Raffaeli G, Orenti A, Gambino M, PevesRios W, Bosis S, Bianchini S et al:Profile of urinary tract infections in paediatric patients . Int J Environ Res Public Health, 2016; 13(5): 499.

19. CaJacob NJ, Cohen MB: Diarrhea.Journal Pediatrics in Review, 2016; 37(8): 313-322.