Original Research Article

DRUG UTILIZATION STUDY BASED ON WHO CORE DRUG USE INDICATORS IN THE PAEDIATRIC DEPARTMENT OF TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Background: Irrational drug prescriptions frequently occur in clinical practice, primarily due to insufficient knowledge regarding medication prescribing. Developing nations possess constrained financial resources for healthcare and pharmaceuticals, making it imperative to prescribe medications judiciously. The data on WHO core drug use indicators (prescribing indicators, patient care indicators, and facility care indicators) was collected prospectively through prescriptions, registration books, patient interviews, and patient observations, all conducted with prior consent. This study aimed to evaluate drug utilisation patterns in paediatrics by assessing prescribing indicators, patient care indicators, facility indicators, and complementary indicators.

Materials and Methods: A total of 149 prescriptions for paediatric patients aged from newborn to 12 years were collected. This study aims to assess prescription patterns based on the key drug use indicators set by the World Health Organisation (WHO).

Results: The examination of prescribing indicators indicated an average of three medications per prescription encounter. The proportion of medications prescribed from the Essential Drug List reached a full 100%. The percentage of medications prescribed using their generic names was documented at 97.98%. Antibiotics comprised a notable category of prescribed medications, accounting for 19.46%, followed by vaccines at 16.77%.

Conclusion: The imperative to fortify logical prescribing practices and elevate awareness among physicians and medical students. This initiative should involve comprehensive training programmes that highlight the importance of evidence-based medicine and the potential risks of irrational prescribing. Additionally, continuous monitoring and evaluation of prescribing patterns will be essential to ensure compliance with the newly established standards and to promote a culture of responsible medication use.

Keywords: Drug Utilisation, World health organization, Prescription, Antibiotics.

INTRODUCTION

Pharmaceuticals play a crucial role in the realm of health care, facilitating the healing process and mitigating the impact of ailments, symptoms, and the distress experienced by patients. Nonetheless, a significant challenge faced by numerous healthcare systems globally is the illogical utilisation of pharmaceuticals.[1] The World Health Organisation (WHO) indicates that approximately half of all medications globally are improperly administered, distributed, or sold.[2] The irrational prescription of medications presents a significant issue in underdeveloped countries. The instruments

necessary for evaluating drug use across various healthcare facilities in these countries are either inadequately designed, only partially effective, or entirely lacking.[3] Promoting equitable medicinal practices necessitates the implementation of effective policies and the fostering of collaborative efforts among healthcare professionals, patients, and communities. It is imperative that all parties involved grasp the pertinent elements associated with the utilisation of pharmaceuticals in order to foster a collaborative endeavour aimed at addressing the challenge of indiscriminate medication use.[4,5] Confronting the issue of irrational drug usage is considered essential for enhancing health care, thereby safeguarding patient safety and optimising resource allocation.[6] Drug Utilisation Reviews (DUR), or Drug Utilisation Studies (DUS), are characterised as an ongoing, sanctioned, methodical, and continuous examination of the prescription practices, dispensing activities, and treatment protocols for patients within a healthcare facility by the providers.[7]

Globally, at least fifty percent of all medications are prescribed, dispensed, or sold inappropriately, and a significant number of patients do not manage their administration correctly. Approximately one third of the global population is deprived of access to vital pharmaceuticals.[8] This study endeavours to evaluate the patterns of prescription through the lens of the core drug use indicators established by the World Health Organisation (WHO). It will foster the advancement of standards for prescribing, formulating drug policies, and enhancing the rational utilisation of pharmaceuticals. The attainment of this objective will involve the assessment of various prescribing indicators, including the average quantity of medications prescribed, the proportion of generic medications, the use of antibiotics and injections, as well as the drugs selected from the essential drug list (EDL).[9] These indicators are broadly recognised and uphold international standards. Consequently, this research was structured to analyse the patterns of drug utilisation in paediatrics by examining prescribing indicators, patient care indicators, facility indicators, and complementary indicators.

MATERIALS AND METHODS

This cross-sectional study was carried out in the Department of Paediatrics at Government Medical College, Srikakulam, Andhra Pradesh. A comprehensive analysis was conducted on a total of 149 prescriptions for the study. Participants in the study comprised children of all genders, ranging from newborns to 12 years of age, who were receiving care in the paediatric outpatient, inpatient, and ICU units and expressed their willingness to take part in the research. The study excluded individuals over the age of 12 years, those with intellectual disabilities, those with neural tube anomalies, those who discontinued

the treatment and those who were unwilling to participate. Informed consent, duly documented, was secured from the parents or guardians. The institutional ethics committee granted approval for the study protocol.

We meticulously crafted a data collection sheet for each patient prescription to systematically gather information about the prescribed medications. This included the drug name, dosage, frequency of administration, route of delivery, and duration of the therapeutic regimen. Furthermore, we collected patients' age, gender, and various demographic information through the prescriptions. We used the stopwatch to measure the length of the patient's interaction with the healthcare provider in order to evaluate patient care indicators. We engaged pharmacy personnel in interviews to discuss facility indicators. The data collected on WHO core drug use indicators (prescribing indicators, patient care indicators and facility care indicators) using prescriptions, registration books, patient interview and observing the patients only after getting the consent

The data was meticulously analysed, utilising SPSS version 32.0. The categorical variables were expressed in terms of frequency and percentage, while the continuous variables were articulated as mean and standard deviation. The analysis of categorical variables was conducted using the chi-square test, with a p-value less than 0.05 deemed indicative of a statistically significant result.
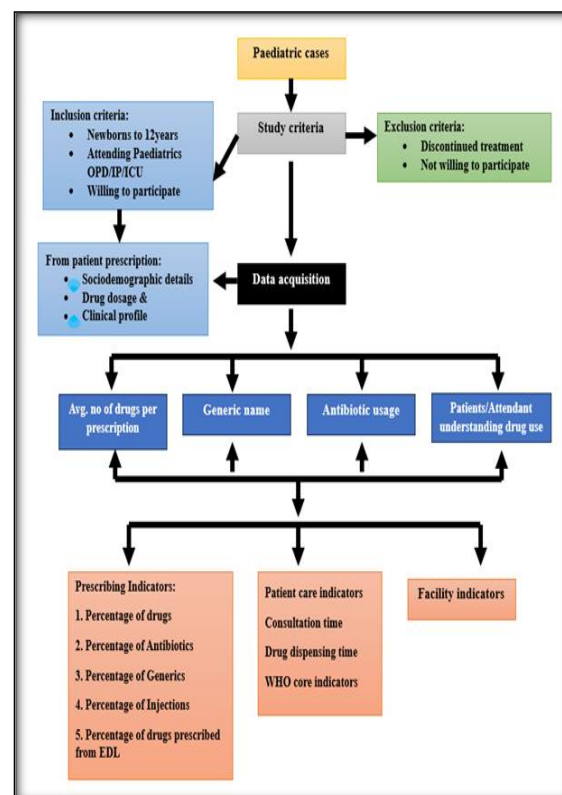
Figure 1: Schematic representation of study methodology.

RESULTS

**Table 1: Sociodemographic profile of study participants.**

Sociodemographic profile	Total Prescriptions (n=149)	
	Frequency	Percentage
Age		
0-3	47	31.54%
4-6	39	26.17%
7-9	33	22.14%
10-12	30	20.13%
Gender		
Male	84	56.37%
Female	65	43.62%
Duration of hospital stay (n=51)		
Up to 3 days	29	56.86%
4-6 days	15	29.41%
7 & above	07	13.72%

Table 2: Details of different indicators in prescribing patters in paediatrics patients.

Indicators	Frequency & percentage
Prescribing Indicators	
Average no. of medicines per encounter	3
Percentage of medicines prescribed from Essential Drug List	100%
Percentage of medicines prescribed by generic name	97.98%
Percentage of encounters with an antibiotic prescribed	20.13%
Percentage of encounters with an injection prescribed	42.28%
Patient care indicators	
Average consulting time	11 minutes
Average dispensing time	180 sec
Percentage of drugs actually dispensed	98%
Faculty indicators	
Availability of Essential Drug list	Available
Complementary Indicators	
Prescription without drugs	3 (2.01%)

Table 3: Profile of clinical diagnosis in study participants.

Diagnosis	O.P	I.P	I.C.U	Percentage (%)
Fever with Cough & Cold	39	5	2	30.87%
URTI and LRTI	20	-	-	13.42%
Abdominal Pain	14	-	-	9.39%
Malaria	-	4	7	7.38%
Seizures	2	-	7	6.04%
Acute gastritis	8	-	-	5.36%
Respiratory Distress	-	-	7	4.69%
Bronchiolitis	-	-	5	3.35%
Asthma	-	1	3	2.68%
Thalassemia	1	-	3	2.68%
Gastroenteritis	-	1	2	2.01%
Others	7	2	9	12.08%
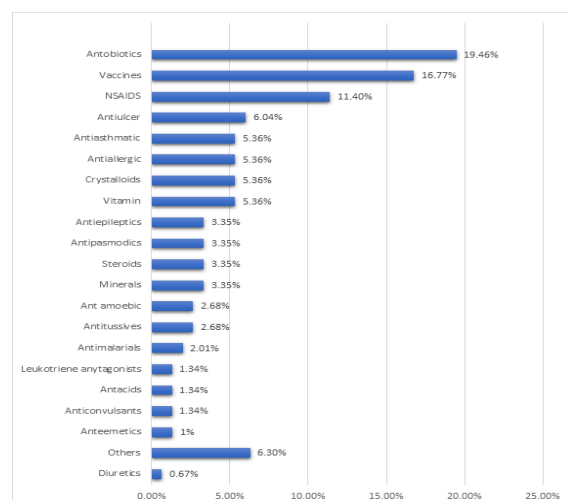
Figure 1: Drugs prescribed
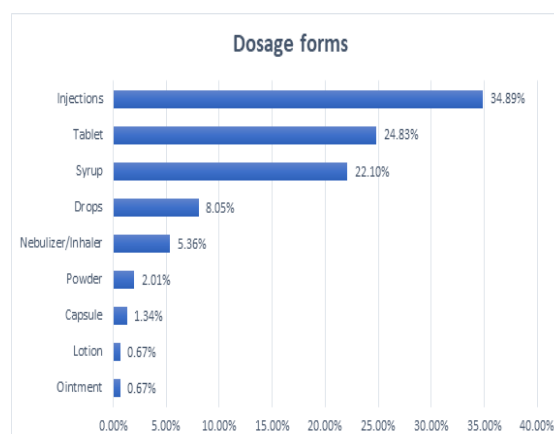
Figure 2: Details of various prescribed dosage forms

Table 4: WHO core prescribing indicators assessed for observed values in drug prescriptions

Indicators	Observed value	WHO standard	Std. Achievement
Prescribing indicators			
Average number of drugs prescribed per patient encounter	3	1.6-1.8	No
Generic name	97.98%	100%	No
Antibiotics	20.13%	20.0-26.8	Yes
Injections	42.28%	13.4-24.1	No
Drugs on EDL	100%	100	Yes
Patient care indicators			
Average consultation time	11 minutes	≥10	Yes
Average dispensing time	180 sec	≥90 sec	Yes
Drugs dispensed	98%	100	No
Facility indicators			
Availability of EDL	Yes	Yes	Yes

DISCUSSION

The predominant age group of participants was 0-3 years (31.54%), followed by 4-6 years (26.17%), 7-9 years (22.14%), and 10-12 years (20.13%), with a greater percentage of male participants (56.37%). The duration of hospital stay (n = 51) was recorded as follows: 56.86% of participants stayed up to 3 days, 29.41% stayed for 4–6 days, and 13.72% stayed for 7 days or longer [Table 1]. The analysis of prescribing indicators revealed a mean of three medications per prescription encounter. The percentage of medications prescribed from the Essential Drug List attained a complete 100%. The proportion of medications prescribed by their generic names was recorded at 97.98%. It was noted that 20.13% of interactions included the prescription of an antibiotic, while 42.28% involved the administration of an injection. The average consultation duration was 11 minutes, the dispensing time averaged 180 seconds, and the successful medication dispensing rate was 98%. The faculty indicator revealed a satisfactory presence of the essential drug list, with a rate of 2.01% for prescriptions devoid of pharmacological interventions [Table 2].

Antibiotics constituted a significant category of prescribed medications, representing 19.46%, followed by vaccines at 16.77%. Non-steroidal anti-inflammatory drugs (NSAIDs) constituted 11.40%, whereas antiulcer medications accounted for 6.04%. Antiasthmatic and antiallergic agents, crystalloids, and vitamins each represented 5.36%. Antiseizure medications, antispasmodics, steroids, and minerals each represented 3.35% (Graph 1). Fever associated with cough and cold occurred in 30.87% of cases, whereas upper respiratory tract infections (URTI) and lower respiratory tract infections (LRTI) comprised 13.42%. Abdominal pain occurred in 9.39% of cases, while malaria was noted in 7.38%. Seizures occurred in 6.04% of cases, acute gastritis in 5.36%, and respiratory distress in 4.69%. Bronchiolitis was noted in 3.35% of participants, whereas asthma and thalassaemia each represented 2.68%. Gastroenteritis occurred in 2.01%, while other conditions constituted 12.08% of the cohort. The outpatient department for paediatric patients indicated a higher prevalence of these clinical symptoms than those observed in inpatient and ICU settings [Table 3]. This finding suggests that paediatric patients receiving outpatient care may present with a broader range of symptoms compared to those admitted to inpatient wards or intensive care units. Further investigation is warranted to understand the underlying factors contributing to this disparity in clinical presentations across different care settings.

Injections represented the most commonly prescribed dosage forms at 34.89%, succeeded by tablets at 24.83%, syrups at 22.10%, drops at 8.05%, nebulisers/inhalers at 5.36%, powders at 2.01%, capsules at 1.34%, and both lotions and ointments at 0.67% each [Figure 2]. The current study's comparison of the WHO core indicators with observed values indicated that the mean number of medications prescribed per patient was 3. The proportion of generic names was 97.98%, whereas antibiotics comprised 20.13%. Furthermore, injections constituted 42.28%, while medications from the essential drugs list were prescribed at a rate of 100% according to the prescribing indicators. The average duration of consultations was 11 minutes, and the mean time for dispensing medications was 180 seconds. Moreover, the percentage of drugs effectively dispensed attained an impressive 98%. This high level of dispensing accuracy reflects a commitment to patient care and adherence to prescribing guidelines. Such efficiency enhances the quality of healthcare delivery and ensures that patients receive their medications in a timely manner, ultimately contributing to better health outcomes. The facility indicators demonstrated a complete availability of drugs listed as essential. The prescribing indicators, such as the average number of drugs prescribed per patient, the use of generic names, the percentage of injections, and the percentage of drugs dispensed in patient care, did not align with the standards set forth by the WHO [Table 4].

A cross-sectional study study conducted by Farid Habibyar A. et al. analysed 600 outpatient prescriptions and determined that the average number of medicines per prescription was 2.9. Significantly, 84% of prescriptions contained one or more antibiotics, exceeding the WHO benchmark of <30%. Furthermore, Afghanistan's national essential medicines list (EDL) included 67% of the dispensed

medications, falling short of the optimal level of 100%. Only 35.1% of the dispensed medications were in generic form, which is also below the advised 100% threshold. Furthermore, 5.7% of all prescriptions comprised injections, although the optimal proportion is below 20%. The most often prescribed drug categories were antimicrobials (25.7%), followed by non-steroidal anti-inflammatory medicines (NSAIDs) (21.4%), gastrointestinal medications (17.3%), and vitamins (7.8%).[11]

A cross-sectional study conducted by Prasad PS et al. analysed the prescriptions of 603 patients and determined that the average number of medications prescribed per prescription was 2.7. Antibiotics constituted around 9.6% (n = 159) of prescriptions, whereas injections represented roughly 1.6% (n = 27). The proportion of medications administered₁ as generics was 42i. (n = lob), while those from the essential sucking list (EDFC) constituted 95.6% (n = 1578). The mean consultation and dispensing durations were 3.7 minutes and 2.3 minutes, respectively, while the percentages of medications delivered and properly marked were 96.6% and 99.3%. 89.3% of patients have knowledge of the recommended dose. The EDL copy was accessible, and the availability of essential medications was 88%.[12]

A study conducted by Sharma A et al. examined 1008 prescriptions, revealing that a significant majority of the medications were prescribed by their generic names (60.2%), while 75.1% of the drugs were sourced from the WHO Model List of essential medicines for children. The proportion of encounters involving antibiotics and injections was 25.7% and 4.1%, respectively.[13] A study conducted by Jayaram KB and colleagues involving 400 neonates' prescriptions in the NICU revealed that the total number of drugs prescribed amounted to 1428, with an average of 3.57 drugs per neonate. Infants born preterm (before 37 weeks) and with low birth weight (under 2.5 kg) were subjected to a markedly greater number of pharmacological interventions. The predominant therapeutic class of drugs prescribed was anti-infectives, accounting for 60.36%, with drugs affecting the central nervous system following at 7.84%. In the realm of anti-infectives, Ampicillin emerged as the most frequently prescribed medication, accounting for 59% of prescriptions, closely followed by gentamycin at 42.5%. Antibiotics of a high calibre, such as carbapenems, colistin, and linezolid, were administered in fewer than 5% of instances.[14]

A comprehensive analysis conducted by Senthilselvi R et al. examined 859 pharmaceuticals across 200 cases. The most frequently prescribed class of medications is antibiotics, accounting for 304 instances or 35.39%. Furthermore, a significant proportion of these medications, totalling 412 or 47.94%, were delivered in injectable form. A comprehensive analysis revealed that a significant proportion of prescriptions, specifically 117 (58.5%),

were issued within the timeframe of 4 to 7 days. After the completion of treatment, 161 patients, representing 80.5%, were discharged. Upon examination of the core prescribing indicators established by the World Health Organisation (WHO), it was observed that the mean number of medications per prescription stood at 4.29, a figure that exceeds twice the average benchmark of 2. This suggests the practice of polypharmacy. 97.78% of prescribed medications were identified by their generic names, while the proportion of encounters resulting in antibiotic prescriptions reached 90.5%, a figure that is three times greater than the World Health Organization's standard of 30%. The administration of injections exceeds the recommended threshold set by the World Health Organisation, which is below 20%. The observed rate stands at a significant 97.5%, highlighting its critical importance for paediatric inpatients. The prescribing practices within the paediatric ward align fully with the national essential drug list (EDL) or formulary.[15]

A study conducted by Atif M et al. examined 2400 prescriptions, revealing an average of 2.8 drugs per prescription (SD = 1.3). It was found that 56.6% of the drugs were prescribed by their generic names, while 51.5% of encounters involved an antibiotic prescription. Notably, no injections were prescribed, and a remarkable 98.8% of the drugs were sourced from the Essential Drugs List (EDL). In the realm of patient-care metrics, the mean consultation duration was recorded at 1.2 minutes (SD = 0.8), while the average time taken for dispensing stood at 8.7 seconds (SD = 4.9). The proportion of medications dispensed reached an impressive 97.3%, with a complete 100% of drugs being adequately labelled. Furthermore, the patients' understanding of the correct dosage schedule was noted at 61.6%.[16]

A comprehensive analysis conducted by Thiruthopu NS et al. examined 209 cases and determined that the mean number of medications prescribed per patient was 4.56. The proportion of medications prescribed under their generic nomenclature was determined to be 19.16%. Out of a total of 209 prescriptions, 49.78% comprised essential medications. Of the antibiotics prescribed, 33.33% were from the cephalosporin group, which emerged as the most frequently utilised, followed by aminoglycosides and penicillins. Approximately 21.80% of the medications were administered intravenously, while prescriptions devoid of pharmaceuticals constituted 1.43%. A mere 75.6% of patients possess an understanding of their dosage schedule, while it is noteworthy that nearly all prescriptions were deemed appropriate.[17]

A study conducted by Aldabagh A et al. examined 1011 prescriptions and determined that the average number of drugs prescribed per encounter was 1.8 ± 1.3. Notably, within a particular clinic, the respiratory clinic, the average increased to 2.1 drugs prescribed per encounter. Every one of the prescribed medications was designated by its generic name, achieving a complete rate of 100%. A mere 47.7% of

the pharmaceuticals were sourced from the essential drug list of the JUH. In summary, antibiotics were administered in 19.5% of the encounters, with notably elevated rates observed in specific clinics, such as respiratory clinics, where the figure reached 50.8%. Injectables were administered in 9.5% of the 1011 encounters; nonetheless, their prescription rates were notably elevated in the fields of endocrinology and neurology, at 44.8% and 31.3% of encounters, respectively.[8]

A comprehensive analysis conducted by Hailesilase GG et al. examined 600 prescriptions, revealing that 91.5% of the medications were prescribed using their generic names, while an impressive 98.7% were sourced from the essential medicine list (EML). Furthermore, the proportions of encounters that included at least one antibiotic and one injection were 44.5% and 7.2%, respectively.[19]

Sharma S et al. conducted a review involving 811 patients, revealing that an average of 2.5 medications were prescribed per encounter, surpassing the WHO standard of 2.0. During 36.9% (n = 299) of all encounters, one or more antibiotics were prescribed, exceeding the WHO standard of 30%. 90.83% of antibiotics were dispensed from the essential drugs formulary, while 30% of the prescriptions featured the generic name of the medication. The mean length of antibiotic treatment was 5.73 days (s = 3.53 days). The predominant diagnoses included injuries (25.8%), asthma (20%), respiratory infections (19.5%), and gastrointestinal infections (12.1%).[20] This study has limitations in terms of short duration with limited sample size and single centre. Further multicentric approaches are required to review drug prescribing patterns across multiple specialities with more sample size.

CONCLUSION

Our study unveiled the most effective utilisation pattern of pharmaceuticals in accordance with the observed metrics. Particularly remarkable was the limited application of antimicrobials in this Government Tertiary Care Hospital. Essential medications were prescribed, predominantly using their generic designations. Medications were administered judiciously in our medical facility. It further emphasises the necessity of strengthening logical prescribing practices and enhancing awareness among physicians and medical students. The prevalent prescription of irrational fixed-dose combinations necessitates immediate intervention through the implementation of stringent regulations and the formulation of localised guidelines aimed at promoting rational prescribing practices.

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