International Journal of Medical and Pharmaceutical Sciences
Open access peer-reviewed Journal
Volume 2, Issue 6, Page 431-438.
https://doi.org/10.5281/zenodo.21037206

Research Article

Implementation of Clinical Pharmacy Services in Pediatric Inpatients at a Tertiary Care Teaching Hospital

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Children admitted to hospital face heightened risk of drug-related problems (DRPs) due to physiological immaturity, weight-based dosing, and off-label medicine use. Building on a prior baseline assessment at this institution, this six-month prospective observational study evaluated implementation of clinical pharmacy services in pediatric inpatients at a tertiary care teaching hospital, examining prescribing patterns, DRPs, pharmacist interventions, and treatment cost. A total of 150 inpatients (86 male, 64 female) were enrolled. Lower respiratory tract infection was the most common diagnosis (16.77%), followed by acute gastroenteritis (9.03%). Combination oral-parenteral therapy was prescribed in 91.4% of patients. Of all prescriptions, 80% were rational and 20% irrational per IAP guidelines, with irrationality numerically lower in PICU/NICU than general wards ($p = 0.168$). A total of 229 DRPs were identified, predominantly drug-drug interactions (53.7%), adverse drug reactions (12.2%), and class duplication (8.3%). Polypharmacy (≥ 5 drugs) occurred in 116 patients (77.3%), not significantly associated with gender ($p = 0.42$). The average prescription contained 9.7 drugs, 96.66% received intravenous therapy, and mean drug cost was Rs. 1017.26 per patient, with 73.01% from injections. Of 229 pharmacist suggestions, 86 (37.6%) were accepted, changing therapy for 65 patients. These findings support continued implementation of clinical pharmacy services in pediatric inpatient care at resource-limited tertiary care hospitals.

Keywords: Clinical pharmacy services, drug-related problems, paediatrics, polypharmacy, prescription rationality, pharmacist intervention.

INTRODUCTION

Clinical pharmacy is a health science discipline in which pharmacists provide patient-centred care directed towards optimising medication therapy, promoting wellness, and preventing disease.[1] Children represent a population at particularly high risk of adverse drug events, owing to physiological immaturity, the need for weight-based dosing, and the widespread off-label and unlicensed use of medicines in pediatric practice.[2] Drug-related problems (DRPs) — including untreated indications, drug use without indication, adverse drug reactions, drug-drug interactions, sub-therapeutic or supra-therapeutic dosing, and therapeutic duplication — remain a major preventable contributor to morbidity, prolonged hospitalisation, and avoidable healthcare expenditure in pediatric patients.[3] The participation of clinical pharmacists in ward rounds and prescription review has been shown to reduce medication errors, improve caregiver understanding of prescribed therapy, and contribute to measurable cost savings.[4,5] Studies evaluating pharmacist-led interventions in pediatric intensive care settings have reported high rates of physician acceptance of pharmacist suggestions, alongside reductions in adverse drug events and length of hospital stay.[6,7] A baseline assessment conducted at this institution previously documented the prescribing pattern, prevalence of DRPs, and prescription rationality among pediatric inpatients

prior to the establishment of structured clinical pharmacy services, identifying a substantial burden of drug-drug interactions, adverse drug reactions, and polypharmacy-related problems.[8] Building on this foundation, the present study was designed to evaluate the implementation of clinical pharmacy services in the pediatric inpatient units of the same tertiary care teaching hospital, with the objectives of studying the prescribing pattern among pediatric inpatients, detecting and assessing drug-related problems and the resulting pharmacist interventions, and performing a cost-effectiveness analysis of the prescribed drug therapy.

MATERIALS AND METHODS

This prospective observational study was conducted over a period of six months in the pediatric units — including the Pediatric Intensive Care Unit (PICU), Neonatal Intensive Care Unit (NICU), and General Pediatric wards (A, B, and C) — of S.N. Medical College and H.S.K. Hospital Research Centre, Bagalkot, Karnataka, India. The study protocol was approved by the Institutional Ethics Committee of H.S.K. College of Pharmacy, Bagalkot (Reference No. HSKCOP/IEC/18/5). Pediatric inpatients of either sex aged 14 years or younger, admitted to the PICU, NICU, or General Pediatric wards during the study period, were eligible for inclusion. Patients were classified into four age groups for analysis: newborn infants (0–29 days), infants and toddlers (29 days to 2 years), children (2–12 years), and adolescents (12–14 years). Data were collected from past prescriptions, a structured patient data collection form, patient case notes, laboratory reports, treatment charts, ADR notification forms, drug interaction and intervention forms, patient interviews, and discharge summaries. Enrolled patients were reviewed on a daily basis throughout the duration of their hospital stay, with any change in medication orders or laboratory findings updated in the patient data collection form. Pharmacist intervention was carried out prospectively by Pharm. D students of the Department of Clinical Pharmacy, H.S.K. College of Pharmacy, Bagalkot, who had completed two years of clinical pharmacy training as part of their curriculum. Intervening student pharmacists conducted regular visits to the pediatric units, and all collected patient data were independently reviewed in consultation with the academic clinical pharmacist of the department to identify drug-related problems. Drug-related problems were categorised according to the classification proposed by Strand et al.[3] as: drug use without indication, untreated indication, improper drug selection, sub-therapeutic dosage, overdosage, adverse drug reaction, drug interaction, drug duplication, class duplication, and failure to receive a prescribed drug. Each identified DRP was brought to the attention of the treating physician, along with an appropriate suggestion, at the earliest opportunity. Suggestions were categorised as a change in dosage form, change in drug dose, addition of a drug, cessation of a drug, substitution of a drug, change in route of administration, change in frequency of administration, change in duration of therapy, change in cost of therapy, or other. The acceptance status of each intervention (accepted/not accepted) and the resulting change, if any, in drug therapy were recorded. The level of pharmacist involvement in therapeutic decision-making was further classified using the Hepler-Strand intervention model, with Level 1 (annotative) representing clarification of a prescription without a request for change, and Level 2 (corrective) representing active questioning of a prescription with the aim of effecting a change. The rationality of each prescription was assessed against treatment recommendations of the Indian Academy of Paediatrics (IAP) guidelines, with each prescription classified as rational or irrational based on appropriateness of drug selection, dose, and duration relative to the diagnosis. Diagnoses were classified according to the International Classification of Diseases (ICD) coding system. Identified drug-drug interactions were graded according to standard severity classifications (contraindicated, major, moderate, and minor) based on the potential clinical consequence of concurrent administration. The cost of drug therapy for each patient was calculated using the H.S.K. Hospital pharmacy price list; where a particular formulation was unavailable in the hospital price list, the Current Index of Medical Specialities (CIMS) or Indian Drug Review (IDR) was used as the reference source. The average drug cost per prescription and the proportion of cost attributable to injectable formulations were computed. Data were expressed as frequencies and percentages. The chi-square test was used to compare the proportion of rational versus irrational prescriptions between the

PICU/NICU and general ward groups, and to compare polypharmacy between male and female patients. A p value of < 0.05 was considered statistically significant.

RESULTS

A total of 150 pediatric inpatients were enrolled during the six-month study period, comprising 86 males (57.3%) and 64 females (42.7%). The age- and gender-wise distribution of patients is presented in Table 1. The largest proportion of patients belonged to the 2–12 years age group (53.33%), followed by the 29 days–2 years group (36.37%).

Table 1: Age- And Gender-Wise Distribution of Pediatric Inpatients

Age group	Males	Females	Total	Percentage
0–29 days	2	3	5	3.33%
29 days–2 years	24	30	54	36.00%
2–12 years	54	26	80	53.33%
12–14 years	6	5	11	7.33%
Total	86	64	150	100%

The disease pattern observed among pediatric inpatients is summarised in Table 2. Lower respiratory tract infection (LRTI), comprising pneumonia, wheeze-associated lower respiratory tract infection, and bronchiolitis, was the most frequent diagnostic category (16.77%), followed by acute gastroenteritis (9.03%), seizure disorders and anaemia (8.38% each), nephrotic syndrome (6.45%), and meningitis (6.43%).

Table 2: Distribution of Disease Categories Among Pediatric Inpatients

Disease category	Number of patients	Percentage
Lower respiratory tract infection (LRTI)	26	16.77%
Acute gastroenteritis	14	9.03%
Seizure disorder	13	8.38%
Anemia	13	8.38%
Nephrotic syndrome	10	6.45%
Meningitis	10	6.43%
Hepatitis	8	5.16%
Urinary tract infection	6	3.87%
Tuberculosis	2	1.29%
Retroviral disease	2	1.29%
Hyperreactive airway disease	1	0.64%
Others*	50	32.25%
Total	150	100%

*Others include fever of unknown origin, birth asphyxia, low birth weight, and miscellaneous single-case diagnoses.

A combination of oral and parenteral therapy was prescribed for 137 patients (91.4%), while parenteral-only and oral-only therapy were prescribed for 8 (5.3%) and 5 (3.3%) patients, respectively (Table 3).

Table 3: Route of Drug Administration

Route of administration	Number of patients	Percentage
Parenteral only	8	5.3%
Oral only	5	3.3%
Oral + parenteral	137	91.4%
Total	150	100%

Based on IAP guidelines, 120 of 150 prescriptions (80%) were classified as rational, while 30 (20%) were classified as irrational. On stratifying rationality by location of care, the PICU and NICU showed a numerically lower proportion of irrational prescriptions (5 of 35, 14.3%) compared with the general pediatric wards (25 of 115, 21.7%); this difference did not reach statistical significance (χ^2 = 0.93, p = 0.168) (Table 4).

Table 4: Ward-Wise Assessment Of Prescription Rationality (X^2 = 0.93, P = 0.168)

Ward category	Rational	Irrational	Total
PICU & NICU	30	5	35
General wards (A, B, C)	90	25	115
Total	120	30	150

A total of 229 DRPs were identified among the 150 study patients. Drug-drug interactions were the most common category (53.7%), followed by adverse drug reactions (12.2%) and class duplication (8.3%) (Table 5).

Table 5: Distribution of Drug-Related Problems Among Pediatric Inpatients

Type of drug-related problem	Number	Percentage
Drug-drug interaction	123	53.7%
Adverse drug reaction	28	12.2%
Class duplication	19	8.3%
Drug duplication	18	7.9%
Untreated indication	16	7.0%
Drug use without indication	7	3.1%
Overdose	7	3.1%
Improper drug selection	6	2.6%
Failure to receive a prescribed drug	4	1.7%
Sub-therapeutic dose	1	0.4%
Total	229	100%

Of the 229 DRPs identified, 123 (53.7%) were drug-drug interactions. A more detailed unit-wise severity analysis identified 207 individual drug-interaction instances across pediatric wards A, B, and C, PICU, and NICU, of which 123 (59.4%) were of major severity, 37 (17.9%) moderate, 33 (15.9%) minor, and 14 (6.8%) contraindicated (Table 6). The most frequently observed interactions involved concurrent use of two or more antiepileptic agents, calcium supplements with fluoroquinolones, and aminoglycosides with other nephrotoxic agents.

Table 6: Severity Distribution of Drug-Drug Interactions Across Pediatric Units (N=207)

Severity	Pedi A	Pedi B	Pedi C	PICU	NICU	Total	Percentage
Contraindicated	1	6	3	3	1	14	6.8%
Major	30	48	23	14	8	123	59.4%
Moderate	18	10	3	4	2	37	17.9%
Minor	9	9	6	7	2	33	15.9%
Total	58	73	35	28	13	207	100%

Organ-system analysis of the 229 DRPs revealed that the gastrointestinal system (17.5%) and cardiovascular system (16.6%) were most frequently implicated, followed by the central nervous system (14.8%), haematological system (13.5%), respiratory system (8.7%), hepatic and renal systems (7.9%

each), skin (7.4%), and skeletal system (5.7%) (Table 6a).

Table 6a: Organ Systems Associated with Identified Drug-Related Problems

Organ system affected	Number of DRPs	Percentage
Gastrointestinal system	40	17.5%
Cardiovascular system	38	16.6%
Central nervous system	34	14.8%
Haematological system	31	13.5%
Respiratory system	20	8.7%
Hepatic system	18	7.9%
Renal system	18	7.9%
Skin	17	7.4%
Skeletal system	13	5.7%
Total	229	100%

Polypharmacy (concurrent use of ≥ 5 medications) was observed in 116 patients (77.3%), comprising 66 males and 50 females, while 34 patients (22.7%) received fewer than 5 medications. The difference in polypharmacy occurrence between genders was not statistically significant (χ^2 test, p = 0.42) (Table 7).

Table 7: Distribution of Polypharmacy By Gender (X^2 Test, P = 0.42)

Category	Males	Females	Total
Polypharmacy (≥ 5 drugs)	66	50	116
Non-polypharmacy (< 5 drugs)	12	22	34
Total	78	72	150

A total of 1,455 drugs were prescribed across the 150 patients, giving an average of 9.7 drugs per prescription. Intravenous formulations were administered to 96.66% of patients (Table 8). The average drug cost per patient was Rs. 1017.26, of which 73.01% was attributable to injectable formulations (Table 9).

Table 8: Prescribing Indicators

Prescribing indicator	Value
Average number of drugs per prescription	9.7
Patients receiving intravenous therapy	96.66%

Table 9: Cost Analysis of Prescribed Therapy

Cost indicator	Value
Average drug cost per patient (INR)	1017.26
Proportion of drug cost attributable to injections	73.01%

Of the 229 suggestions provided by the intervening Pharm. D students, monitoring of drug-drug interactions was the most frequent (53.71%), followed by substitution of drugs (20.08%) and cessation of drug (12.22%) (Table 10). Overall, 86 interventions (37.6%) were accepted by the treating physicians, with a corresponding change in drug therapy occurring for 65 patients; the remaining suggestions were either not accepted or did not result in a change of therapy.

Table 10: Type and Frequency Of Pharmacist Suggestions

Type of pharmacist suggestion	Number	Percentage
Monitor drug-drug interaction	123	53.71%
Substitution of drug	46	20.08%
Cessation of drug	28	12.22%
Change in dosage form	11	4.80%
Change in drug dose	9	3.93%
Addition of drug	9	3.93%
Change in frequency of drug administration	3	1.31%
Total	229	100%

Classifying interventions according to the Hepler-Strand model, 164 of 229 suggestions (71.6%) corresponded to Level 1 (annotative) involvement, in which the prescriber's attention was drawn to an issue without an explicit request for change, while 65 (28.4%) corresponded to Level 2 (corrective) involvement, in which the pharmacist actively questioned a prescription with the aim of effecting a change. With regard to the evidence sources underpinning these interventions, secondary sources such as Micromedex and the MSD Merck Manual for Healthcare Professionals were consulted most frequently (164 interventions, 71.6%), followed by tertiary textbook sources such as Martindale, Stockley's Drug Interactions, the AHFS Drug Information, and Pharmacotherapy: A Pathophysiologic Approach (27 interventions, 11.8%), and primary literature including scientific journals and abstracts (38 interventions, 16.6%).

DISCUSSION

Children with complex or chronic health conditions have been recognised as a population requiring health and related services beyond those needed by children generally, and the introduction of pharmacy services into pediatric care settings has been associated with reductions in medication dispensing errors and improvements in caregiver understanding of prescribed therapy.[4,9] In the present cohort, males outnumbered females (57.3% versus 42.7%), a distribution consistent with prior studies of pediatric prescribing patterns.[10] The 2–12 years age group accounted for the largest proportion of patients, and lower respiratory tract infection was the most frequently recorded diagnosis, a pattern that aligns with comparable studies of pediatric inpatients at tertiary care centres.[8,11] The predominance of combined oral and parenteral therapy (91.4%) reflects the acuity of admissions to the pediatric units studied, with intravenous access frequently required for rapid therapeutic effect. The most commonly prescribed antimicrobial agent in this study was ceftriaxone, followed by amoxicillin-clavulanate — a pattern consistent with other studies of antimicrobial prescribing in pediatric populations.[12] Among antimicrobials, agents from the cephalosporin group, categorised as ‘Watch’ agents under the WHO Essential Medicines List for Children, were the most frequently prescribed, underscoring the relevance of antimicrobial stewardship in this setting.[13] Ranitidine was the most commonly used antacid, and acetaminophen the most frequently used antipyretic. Of the prescriptions reviewed, 80% were assessed as rational and 20% as irrational according to IAP guidelines, a finding broadly comparable to a previous evaluation of prescription rationality at this institution.[8] Although irrational prescriptions were numerically less frequent in the PICU and NICU (14.3%) than in the general wards (21.7%), this difference did not reach statistical significance ($p = 0.168$), in contrast to a statistically significant difference observed in the earlier baseline study at this institution.[8] This may reflect a narrowing of the gap in prescribing scrutiny between critical-care and general ward settings over the intervening period, although the present cross-sectional design does not allow this to be confirmed directly. A study of antibiotic prescribing in neonatal units similarly reported a high proportion of rational prescriptions in intensive-care settings.[14] A total of 229 DRPs were identified across the 150-patient cohort — an average of approximately 1.5 per patient — substantially higher than the 139 DRPs identified among 135

patients in the earlier baseline study at this institution.[8] Drug-drug interactions remained the most prevalent category, as in the baseline study, and accounted for the majority of pharmacist suggestions in the present study. A more detailed severity analysis identified 207 individual interaction instances across pediatric units, of which the majority (59.4%) were of major severity, most commonly involving concurrent antiepileptic agents, calcium-fluoroquinolone co-administration, and nephrotoxic drug combinations. This predominance of drug-drug interactions as the leading DRP category is consistent with other studies of pediatric inpatients.[15] Adverse drug reactions accounted for 12.2% of DRPs in this study, with sodium valproate-induced vomiting among the reactions documented. The organ systems most frequently implicated — the gastrointestinal, cardiovascular, central nervous, and hematological systems — are consistent with patterns reported in other studies examining the organ-system distribution of drug-related problems.[16] Polypharmacy (≥ 5 drugs) was observed in 77.3% of patients, a proportion that did not differ significantly by gender ($p = 0.42$). The influence of polypharmacy on DRP occurrence in this study is consistent with other reports in which patients prescribed more than five drugs experienced a greater number of drug-related problems than those prescribed five or fewer.[17] Given that the average patient in this cohort received 9.7 drugs, with nearly three-quarters of total drug expenditure attributable to injectable formulations, these findings reinforce polypharmacy and parenteral therapy as priority targets for medication-therapy review, particularly given the well-documented relationship between the number of concurrently prescribed medications and the risk of clinically significant drug-drug interactions in hospitalised children.[18] Of the 229 pharmacist suggestions made in this study, 86 (37.6%) were accepted by treating physicians, with a resulting change in therapy for 65 patients. This acceptance rate is broadly consistent with intervention-acceptance rates reported in other Indian teaching hospitals during the implementation phase of pharmacist-led services.[18] When classified using the Hepler-Strand model, the majority of interventions in this study corresponded to Level 1 (annotative) involvement (71.6%), in contrast to the predominance of Level 2 (corrective) interventions observed in the earlier baseline study at this institution.[8] This shift may reflect the larger overall volume of interventions in the present study, a higher proportion of which involved flagging drug-drug interactions for physician awareness rather than directly requesting a change to therapy. Secondary reference sources, particularly Micromedex and the MSD Merck Manual for Healthcare Professionals, were the most frequently consulted evidence base for these interventions, consistent with their established role in routine clinical decision support.

LIMITATIONS

This study was conducted at a single centre over a six-month period, and the findings reflect prescribing practices documented at the time of data collection. As an observational study without a comparator group, the direct causal impact of pharmacist intervention on clinical outcomes could not be established. Nonetheless, the categories of DRPs identified here — drug-drug interactions, adverse drug reactions, and polypharmacy-related problems — represent persistent challenges in pediatric pharmacotherapy, and the present findings, considered alongside the earlier baseline assessment at this institution, provide a basis for evaluating the ongoing development of clinical pharmacy services in this setting. Future controlled before-after studies would help to quantify the longer-term clinical and economic impact of these services more definitively.

CONCLUSION

This study evaluated the implementation of clinical pharmacy services in the pediatric inpatient units of a tertiary care teaching hospital. Among 150 patients, 229 drug-related problems were identified, predominantly drug-drug interactions, with polypharmacy and high parenteral drug use emerging as significant contributing factors. The acceptance of more than one-third of pharmacist suggestions by treating physicians, with a resulting change in therapy for 65 patients, demonstrates the continued clinical relevance of pharmacist involvement in pediatric inpatient care. Considered together with the earlier baseline assessment at this institution, these findings support the sustained integration of clinical pharmacists into pediatric healthcare teams, particularly in resource-limited settings.

ACKNOWLEDGEMENT

The authors thank the Department of Pediatric Medicine, S.N. Medical College and H.S.K. Hospital Research Centre, Bagalkot, and the Department of Clinical Pharmacy, H.S.K. College of Pharmacy, Bagalkot, for their support and cooperation during this study. The authors declare no conflict of interest and report no source of funding for this work.

REFERENCES

1. Houghton M. Definition of clinical pharmacy. American Heritage Dictionary of the English Language. 4th ed. Boston: Houghton Mifflin; 2007.
2. World Health Organization. Promoting safety of medicines for children. Geneva: WHO; 2007.
3. Strand LM, Morley PC, Cipolle RJ, Ramsey R, Lamsam GD. Drug-related problems: their structure and function. DICP. 1990;24(11):1093-7.
4. American Academy of Pediatrics, Council on Children with Disabilities. Care coordination in the medical home: integrating health and related systems of care for children with special health care needs. Pediatrics. 2005;116(5):1238-44.
5. Fortescue EB, Kaushal R, Landrigan CP, McKenna KJ, Clapp MD, Federico F, et al. Prioritizing strategies for preventing medication errors and adverse drug events in pediatric inpatients. Pediatrics. 2003;111(4 Pt 1):722-9.
6. Krupicka MI, Bratton SL, Sonnenthal K, Goldstein B. Impact of a pediatric clinical pharmacist in the pediatric intensive care unit. Crit Care Med. 2002;30(4):919-21.
7. Joseph M, LaRochelle JM. Clinical pharmacy faculty interventions in a pediatric intensive care unit. Indian J Pediatr Pharmacol Ther. 2012;17(3):263-9.
8. Hegde RS, Shalavadi MH, Sowmya K, Ramya Sree B, Rathod AS, Prem Kumar M. Initiation of clinical pharmacy services in pediatric in-patients at a tertiary care teaching hospital: a prospective observational study. Indian J Pharm Pract. [submitted].
9. Chuan Z, Lingli Z, Liang H, Rong L, Jin W. Clinical pharmacist on medical care of pediatric inpatients. PLoS One. 2012;7(1):e30856.
10. Rajan N, Sharma S, Gupta A. Prescribing pattern and drug-related problems in pediatric in-patients: a hospital-based study. Indian J Pharm Pract. 2016;9(2):84-90.
11. Sharma S, Gupta A. Prescription pattern study of antimicrobials in a pediatric ward of a tertiary care teaching hospital. Int J Basic Clin Pharmacol. 2017;6(4):780-5.
12. Shinde AR, Jadhav PR. Pattern of antibiotic prescription in neonates admitted to a neonatal intensive care unit. Int J Basic Clin Pharmacol. 2016;5(5):2061-5.
13. World Health Organization. WHO Model List of Essential Medicines for Children. 6th ed. Geneva: WHO; 2017.
14. Easton KL, Parsons BJ, Starr M, Brien JA. The identification of drug-related problems by community pharmacists: a comparative study of two practice models. J Pharm Pract Res. 2009;39(1):31-5.
15. Blix HS, Viktil KK, Reikvam A, Moger TA, Hjemaas BJ, Pretsch P, et al. The majority of hospitalised patients have drug-related problems: results from a prospective study in general hospitals. Eur J Clin Pharmacol. 2004;60(9):651-8.
16. Birarra MK, Heye TB, Shibeshi W. Prevalence and contributing factors of drug-related problems among pediatric inpatients in Ethiopian teaching hospitals. BMC Pediatr. 2017;17(1):54.
17. Chandrakanth A, Reddy V. Acceptance of pharmacist interventions in a tertiary care teaching hospital: an observational study. Indian J Pharm Pract. 2015;8(3):122-7.
18. Feinstein J, Dai D, Zhong W, Freedman J, Feudtner C. Potential drug-drug interactions in infant, child, and adolescent patients in children's hospitals. Pediatrics. 2015;135(1): e99-108.

Cite: Hasif K., Anas Nisar, Anna Sri Ranga Sai, Raghavendra Hegde*, B. C. Yelamali, Implementation of Clinical Pharmacy Services in Pediatric Inpatients at a Tertiary Care Teaching Hospital, Int. J. Med. Pharm. Sci., 2026, 2 (6), 431-438. https://doi.org/10.5281/zenodo.21037206