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ORIGINAL ARTICLE

A Clinical Audit on Appropriateness of Intravenous Fluid Prescribing Practices in Hospitalized Adult Inpatients: Evaluating Compliance with National Guidelines

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ABSTRACT

Background: Intravenous (IV) fluid therapy is a routine yet critical aspect of inpatient care, essential for maintaining fluid and electrolyte balance. However, inappropriate prescribing can result in significant morbidity.
Aim: To assess appropriateness of IV fluid prescribing practices among adult inpatients at Lady Reading Hospital, Peshawar & evaluate compliance with NICE CG174 guidelines.
Methods: A retrospective audit was conducted over six months (January–June 2024). Data were collected from 200 randomly selected patient records across general medicine, surgery, and orthopedics departments. A structured tool based on NICE guidelines was used to evaluate key parameters such as initial fluid assessment, documentation, reassessment, and fluid type. Data were analyzed using SPSS version 25.
Results: Only 48% of IV fluid prescriptions were fully compliant with NICE guidelines; 35% were partially compliant, and 17% were non-compliant. Documentation of initial assessment occurred in 70% of cases, while ongoing reassessment was documented in just 49%. General Medicine showed the highest compliance (55%), and Orthopedics the lowest (38%). Normal Saline was the most frequently prescribed fluid (65%).
Conclusion: The audit reveals suboptimal adherence to national guidelines, with notable interdepartmental variation. Targeted interventions, including staff training and standardized protocols, are recommended to enhance safe and effective fluid prescribing practices.
Keywords: Intravenous fluid therapy, clinical audit, prescribing practices, guideline compliance

INTRODUCTION

Intravenous (IV) fluid therapy is a cornerstone of hospital-based medical and surgical care, serving a vital role in resuscitation, maintenance of fluid balance, and replacement of deficits in a wide range of clinical scenarios (Nasrullah, Azharuddin, Young, Kejas, &

Dumont, 2022; Chethan, De, Singh, Chander, Raja, Paul, & Prasad, 2023). Despite its ubiquity, the prescribing of IV fluids is often perceived as a routine task, which can lead to significant variations in practice, suboptimal care, and patient harm when done improperly(Rowberry & Mortimore, 2023;Bulloch et al., 2024). Inappropriate IV fluid prescribing has been associated with complications such as fluid overload, electrolyte disturbances, and kidney injury, all of which contribute to increased morbidity, prolonged hospital stays, and greater healthcare costs(Alsarimi et al., 2024;Wilkinson, Yates, Nasa, Malbrain, & Miller, 2023). Consequently, safe and rational prescribing of IV fluids must be grounded in evidence-based clinical guidelines, thorough assessment, and continuous monitoring(Lorente, Hahn, Jover, Del Cojo, Hervías, Jiménez, & Ripollés-Melchor, 2023;Sayed et al., 2022;Zhang et al., 2024).

In response to widespread variability and frequent errors in IV fluid prescribing, the National Institute for Health and Care Excellence (NICE) published guideline CG174 in 2013, outlining a systematic and patient-centered approach to IV fluid therapy in adults in hospital settings (Farouk, Smit Sibinga, & Abdella, 2024). The guideline emphasizes the importance of accurate fluid assessment, individualized prescribing based on clinical need, documentation of fluid type, rate, volume, and duration, and ongoing reassessment to ensure appropriateness over time (NICE, 2013). While these recommendations are widely endorsed, real-world adherence in clinical practice often falls short due to various factors including lack of awareness, inadequate training, and time pressures in busy hospital environments.

Audits, crucial tools for analyzing the current clinical practices as compared to set standards, point out gaps and provide direction to quality improvement initiatives (Dickerson, 2023; Willis et al., 2022) Fluid therapy prescribing audits are of particular value as an opportunity for clinical auditing due to the extremely high risk nature of fluid mismanagement and the ability to mitigate shortfall via targeted interventions (Pardo et al., 2024; McGinigle et al., 2022; Mengato et al., 2023). Overall, audits that have been conducted in high and low resource areas have consistently noted that adherence to national guidelines has been suboptimal with respect specifically to documentation of fluid plans, reassessment practices, and appropriate choice of fluid types (Therrell et al., 2024). In addition, junior doctors often are entrusted with the task of prescribing IV fluids, often with limited formal education on fluid prescribing or the incentives to rely on routine or out of date practice rather than current evidence.

Published literature in Pakistan evaluating prescribing of IV fluids in public sector tertiary care hospitals is very limited (Salman et al., 2022; Khursheed et al., 2023). A large and busy teaching hospital, Lady Reading Hospital in Peshawar provides a suitable representative setting for examining these practices. In the plural department comprising medical, surgical, and orthopedic patients, the case mix is diverse and volumes tallied so that IV fluid therapy appropriateness is fundamental provided in view of bettering patient outcomes and conscientious makes use of healthcare sources. There has been no structured audit of this institution to date, assessing compliance with NICE guidelines or local protocols for IV fluid prescribing.

To address this gap, this clinical audit systematically determines the appropriateness of IV fluid prescriptions given to adult inpatients at Lady Reading Hospital based on the reference standard provided by the NICE CG174 guideline. Underlying this audit are key aspects of safe fluid therapy such as prescribing clearly, recording correctly, monitoring and reassessing fluid therapy and correct fluid selection. In addition, it also attempts to detect departmental variations in compliance, derive patterns of nonadherence, and supply data driven suggestions to enhance practice.

We conducted this audit hoping to achieve a number of objectives: to quantify levels of compliance today, identify areas of good practice and areas of noncompliance needing attention, and educate the use of interventions such as standardized prescription charts, staff training, or routine audits. However, this work also supports wider objectives of patient safety, clinical governance and continuous improvement within the hospital. Additionally, it helps move towards safer systems for fluid therapy as stated by global patient safety campaigns (WHO, 2021).

Overall, this audit ultimately has potential to contribute toward developing a more standardized, evidence-based antecedence to prescribing of IV fluids in Lady Reading Hospital, and likely other similar facilities in Pakistan. Adherence to national and international guidelines can reduce risks, promote optimal patient outcomes, and build a truly accountable and excellent clinical environment. This will also serve as a benchmark result for future audits to serve as a point to continuously monitor and improve practice iteratively.

METHODOLOGY

This clinical audit was done at Lady Reading Hospital, Peshawar during the period of 3 months from January 2024 to June 2024. The first aim was to determine the level of appropriateness of prescribing of intravenous (IV)

fluid to hospitalized adult inpatients and evaluate whether it complies with national (National Institute for Health and Care Excellence (NICE), and relevant local hospital protocols) and local guidelines. This study was focused on adult inpatients (aged 18 years), who were given intravenous fluid in those patients admitted in selected wards (eg. general medicine, general surgery, orthopedics).

For data extraction, patient records were reviewed to collect data pertaining to IV fluid prescriptions, a retrospective audit design was used. Based on national guidelines, we developed a structured data collection form to capture relevant variables such as patient demographics, indication for fluid therapy, type and volume of prescribed fluids, documentation of fluid plans, fluid balance monitoring on a daily basis and reassessment of ongoing fluid need. A stratified sampling of 200 patient records from all the departments is then made to ensure representativeness.

We evaluated our collected data against standsed derived from the NICE guidelines (CG174), and recommend that IV fluid prescriptions should be individualized on clinical assessment, and include absolute documentation of type, volume, rate and duration. In terms of initial assessment, ongoing monitoring, and written fluid plans, compliance was defined as the extent to which prescribing practices met these standards.

Data analysis was performed using SPSS version 25. Descriptive statistics, including frequencies and percentages, were used to present compliance rates across various parameters. Areas of non-compliance were identified and analyzed by department to determine trends and potential gaps in practice. Ethical approval for this audit was obtained from the hospital's audit committee, and patient confidentiality was strictly maintained throughout the study by anonymizing patient records and limiting data access to authorized personnel only.

The findings from this audit aim to inform clinical practice improvements and support targeted interventions such as educational sessions, protocol reinforcement, and ongoing monitoring mechanisms to enhance safe and evidence-based fluid prescribing in the hospital.

RRESULT

A total of 200 patient records were reviewed across three departments: General Medicine (n=80), General Surgery (n=70), and Orthopedics (n=50). The mean age of the patients was 52.3 years (SD ±14.6), with 112 (56%) males and 88(44%) females. All patients had received intravenous fluid therapy during their hospital stay.

Overall Compliance with National Guidelines

Out of 200 IV fluid prescriptions, only 96 (48%) fully complied with the NICE CG174 guidelines. Partial compliance, where some but not all required components were documented and followed, was observed in 70 (35%) cases, while 34 (17%) prescriptions were deemed non-compliant (Table 1, Fig.1).

Department-Wise Compliance

Compliance varied across departments. General Medicine showed the highest full compliance (55%), while Orthopedics demonstrated the lowest (38%) (Table 2).

Assessment and Documentation Parameters

Initial fluid assessment was documented in 140 cases (70%), while ongoing reassessment was recorded in only 98 (49%). Fluid balance charts were properly maintained in 124 (62%) cases. Only 60% of prescriptions included the recommended components: type, volume, rate, and duration (Table 3, Fig.2).

Type of Fluids Prescribed

The most commonly prescribed fluid was Normal Saline (NS), used in 130(65%) of the cases, followed by Ringer's Lactate (RL) in 50(25%) cases and Dextrose-containing fluids in 20(10%) cases (Table 4, Fig. 3).

Table 1: Overall Compliance with IV Fluid Guidelines

Compliance Category	Frequency (n)	Percentage (%)
Fully Compliant	96	48%
Partially Compliant	70	35%
Non-Compliant	34	17%
Total	**200**	**100%**

Table 2: Department-Wise Compliance with Guidelines

Department	Fully Compliant	Partially Compliant	Non-Compliant	Total
General Medicine	44 (55%)	26 (32.5%)	10 (12.5%)	80
General Surgery	33 (47.1%)	24 (34.3%)	13 (18.6%)	70
Orthopedics	19 (38%)	20 (40%)	11 (22%)	50

Table 3: Documentation of Key Parameters

Parameter	Documented (n)	Percentage (%)
Initial Fluid Assessment	140	70%
Ongoing Reassessment	98	49%
Fluid Balance Chart Maintained	124	62%
Complete Prescription (All 4 parts)	120	60%

Table 4: Types of IV Fluids Prescribed

Type of IV Fluid	Frequency (n)	Percentage (%)
Normal Saline (NS)	130	65%
Ringer's Lactate (RL)	50	25%
Dextrose-based Fluids	20	10%
Total	**200**	**100%**

Figure 1:

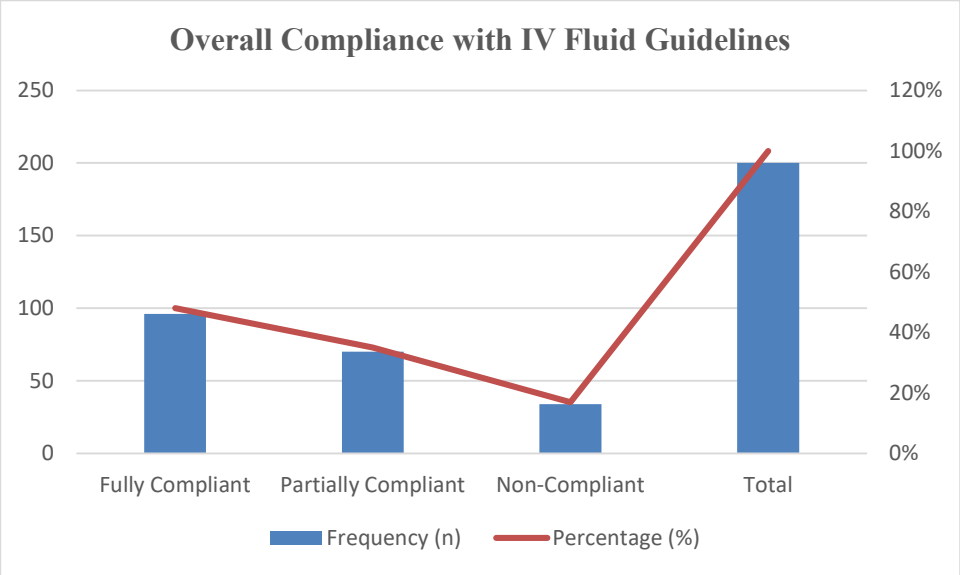


Figure 2:

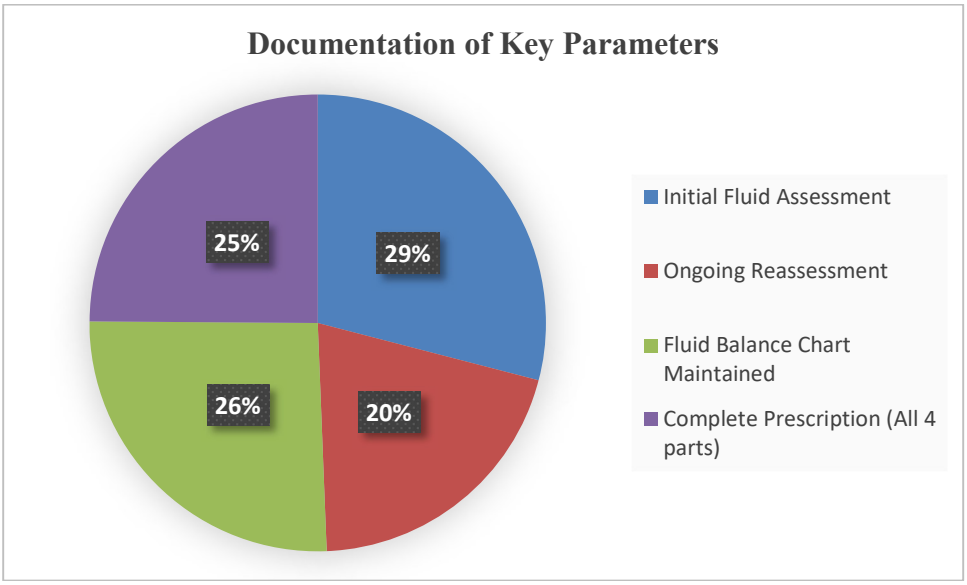
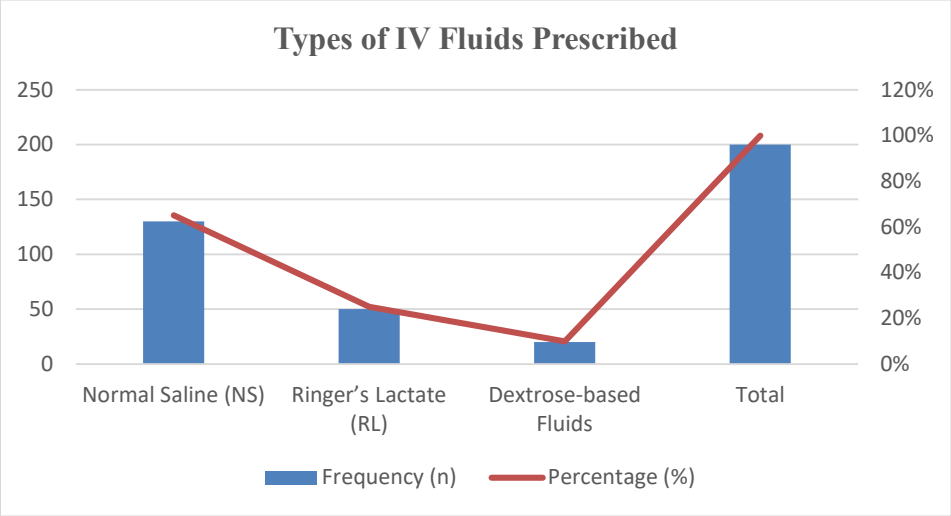


Figure 3: Types of IV Fluids Prescribed



DISCUSSION

This clinical audit evaluated the appropriateness of intravenous (IV) fluid prescribing practices in hospitalized adult inpatients at Lady Reading Hospital, Peshawar, with a focus on compliance with national guidelines, particularly those set forth by the National Institute for Health and Care Excellence (NICE CG174). The results revealed that while there was some adherence to recommended standards, significant gaps remained in both documentation and practice, highlighting areas in need of quality improvement.

Only 48% of prescriptions were fully compliant with national guidelines, meaning that fewer than half of the IV fluid therapies given were up to evidence based best practices. Partial compliance was observed in 35% and non compliance in 17% of the cases. These findings suggest that a large proportion of hospitalized patients receive or are even prescribed IV fluid therapy that is suboptimal or not suit to individual clinical needs, putting them at risk for fluid overload, electrolyte imbalance, or inadequate resuscitation.

The most noteworthy finding of the audit was how inconsistent departments were at complying. The highest rate of full compliance (55%) may be related to the more frequent use of fluid therapy in patients with complex medical conditions and increased need for accurate prescribing and monitoring of fluid therapy. In contrast, the Orthopedics department had the lowest compliance (38%) and this may point to low emphasis on training or perhaps lack of involvement with fluid prescribing protocols amongst orthopedic teams. This variation highlights the need for department specific education, as well as monitoring to tackle context specific challenges of fluid management.

In 70% of the cases, the initial fluid assessment was documented. This is encouraging, but falls short of ideal, with the assessment of fluid status still coming way behind the prescription, diametrically, although never as much as it should. In addition, although the rate of ongoing reassessment was rather low (49%), this is crucial to ensure that therapy continues to be appropriate as the patient's condition changes. If fluid needs are not reevaluated, fluids that are no longer necessary will be continued, or new imbalances will not be adequately treated.

Another integral part of monitoring that was properly undertaken was the maintenance of the fluid balance chart in 62% of the patients. Since this rate is moderately acceptable, there is a great deal of room for improvement. Tracking input and output correctly on fluid balance charts is important for detecting signs of dehydration or fluid overload early on, which is key to help clinicians. Poor data from the monitoring devices is not only ineffective in informing clinical decisions, but also predisposes to preventable complications, such as pulmonary edema or acute kidney injury.

A major finding of the audit was that only 60 percent of orders contain all four elements, including type of fluid, volume, rate and duration. Leaving any of these out can create ambiguity to administration and increase the risk for dosing errors. The incomplete prescribing pattern indicates a lack of awareness about standards and could increase the focus on the protocol driven practice.

The types of fluids used were also audited and Normal Saline was found to be most often prescribed (65%), followed by Ringer's Lactate (25%) and dextrose-based fluids (10%). This is in line with the findings from similar studies of other investigators who also discovered that Normal Saline is often the default resuscitative fluid

used in similar environments. Nevertheless, reliance on a single fluid type without appropriate individualization may not be applicable to all clinical situations. For example, the use of excessive Normal Saline is associated with hyperchloremic metabolic acidosis and renal deterioration. The NICE guidelines recommend that IV fluid choice is based on the patient's clinical status, electrolyte requirements and ongoing losses, which implies more attention should be paid.

This audit's findings were consistent with other studies done both nationally and internationally. Studies from tertiary hospitals in the UK and from India have also reported suboptimal compliance with fluid prescribing guidelines, noting the reasons to be lack of training, poor documentation, no standard protocols, etc. Often, junior doctors do the prime work of prescribing fluids with exceptionally little supervision or formal training in fluid management. This emphasizes the need for structured education sessions and fluid prescribing principles to be included in undergraduate and postgraduate medical curricula.

A number of interventions are recommended to address the observed gaps. The improvement in documentation could be achieved by first introducing standardized IV fluid prescription charts featuring prompts for all necessary parameters. Secondly, training workshops with fluid management in focus for junior staff would improve knowledge and practice. Third, continuous monitoring can be promoted by integrating fluid assessment and reassessment prompts into daily ward rounds and electronic medical records. Finally, audit periodicity is recommended to monitor improvements over time and sustain practice changes.

CONCLUSION

Finally, this audit indicated a lack of compliance with national IV fluid prescribing guidelines at Lady Reading Hospital, but also an opportunity for a great deal of improvement. Guideline dissemination is not enough for ensuring safe and effective use of IV fluids; they need to be accompanied with system level changes, training and continuous monitoring. These measures will improve patient safety, optimize clinical outcomes and facilitate the use of evidence based care in fluid management.

DECLARATION

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Authors contribution

Each author of this article fulfilled following Criteria of Authorship:

1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.

All authors agree to be responsible for all aspects of their research work.

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Ethical Review

Permission was granted by Institutional Ethical Review Committee.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or fnancial relationships that could be construed as a potential confict of interest.

Conflict of interest

The authors declared no conflict of interest.

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