A Quality Improvement Project

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A Quality Improvement Project on Fluid balance chart accuracy in medical ward of Ayub Teaching Hospital Abbottabad

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ABSTRACT

Background: Fluid balance monitoring is fundamental to patients' health. A healthy body is in a state of fluid balance, but hospitalized patients are at risk of fluid balance disorders. Thus, fluid balance monitoring has clinical significance to treating the patient correctly and helps determine the appropriate recommending of fluids and diuretics necessary to achieve or maintain homeostasis and healing Therefore, the aim of the study is to improve the accuracy of the fluid balance chart in the medical ward of Ayub Teaching Hospital, Abbottabad.

Methods: This project (n=100) was conducted from May 2024 to August 2024 in an adult general medical ward at Ayub Teaching Hospital, Abbottabad. Data for the project were obtained from two sources: patients' clinical records and responses from nursing staff. The fluid balance charts were evaluated for value using two areas: 'accuracy' and 'completeness,' rationalizing and familiarizing with procedures of previous, similar quality improvement projects stated previously in this report. In evaluating for accuracy, we checked if all measurements in the chart were accurate, if the accesses had been summed up properly, and if the daily totals and balances were correct.

Results: The current project shows that 70% of fluid balance patients' records were accurate, while the remaining 30% of fluid monitoring records were found to be inaccurate in medical wards. In the inaccurate fluid monitoring records, 16% were found positive with a mean and standard deviation of 450.50 $\pm$ 155.70 ml, and 14% of fluid balance monitoring records were found negative with a mean and standard deviation of 325.67 $\pm$ 148.33 ml, with a P-value of 0.0024. It was shown that the nurses' knowledge regarding fluid balance records in the medical ward was moderately adequate, 68%. Regarding the importance of fluid monitoring in the medical ward, it was about 65%, and information about responsible persons was 70%. Regarding the fluid balance sheet, more than 80% were satisfied. While about fluid balance calculation, more than half were satisfied that the 24-hour fluid balance was correctly calculated all the time in the medical ward of Ayub Teaching Hospital Abbottabad.

Conclusion: This project concluded that applying standardized documentation and calculation approaches can decrease errors. Proper training and education for nursing staff on fluid balance charting can advance accuracy. Relating patients in fluid balance monitoring and education can also improve accuracy. The electronic health records with automatic controls can minimize errors and increase charting quality.

Keywords: Fluid, Documentation, Accurate, Knowledge, Perception

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INTRODUCTION

Fluid balance assessment on busy ward rounds or during general patient review requires clear documentation of fluid input and output. This allows accurate assessment of a patient's fluid balance status, which is pertinent when reviewing intravenous fluid prescriptions or assessing for early clinical decline [1]. Subjective indication from junior doctors in a district general hospital (DGH) in England painted improper fluid balance monitoring, mainly due to poor documentation on fluid balance charts. Patients not requiring monitoring had charts at their bedside, increasing the workload for nurses. This consequently impacted the overall quality of fluid balance charts for patients in need of accurate fluid balance monitoring. The charts were A3-sized and cumbersome, with little guidance on correct chart completion. They were fluid input and output. Fluid balance charting is considered a fundamental nursing task and has been an essential tool in hospital practice for over 50 years [8]. Fluid balance is the difference between the amount of fluid taken into the body and the amount excreted or lost. The AustralianNurses Dictionary defines it as 'a state in which the volume of body water and its solutes (electrolytes and non- electrolytes) is within normal limits, and there is a normal distribution of fluids within the intracellular and extracellular compartments [9].' In hospitalized patients, fluid complaints are among the most common difficulties encountered in clinical practice across medical and surgical wards, and fluid balance complaints such as overhydration and dehydration can seriously affect patients' health. Overhydration is related to problems such as peripheral edema and dyspnea [7].commonly under filled with either fluid input or output missing.

AIMS AND OBJECTIVES

To assess the knowledge of nurses concerning fluid balance monitoring in the medical ward Accurate fluid balance monitoring is a fundamental component of safe and effective patient care, particularly in medical wards where patients are frequently at risk of fluid disturbances due to acute illnesses, comorbidities, and therapeutic interventions. Fluid imbalances may arise from dehydration, renal dysfunction, sepsis, cardiac failure, over hydration, or the administration of diuretics and intravenous fluids. When not identified promptly, these imbalances can lead to serious complications such as acute kidney injury, electrolyte disturbances, delayed recovery, prolonged hospitalization, or even mortality. Therefore, maintaining a reliable and accurate fluid balance monitoring system is essential for optimizing clinical decision-making and ensuring safe medical management. Despite its importance, several studies have highlighted persistent challenges in the documentation and interpretation of fluid balance charts. These challenges often stem from heavy workload pressures, time constraints, unclear responsibilities among staff, and inadequate training on the relevance and proper use of fluid monitoring tools. Nurses, who shoulder the primary responsibility for recording intake and output measurements, frequently report barriers such as poorly designed charts, inconsistent instructions, lack of feedback, and limited appreciation of the importance of accurate documentation. Similarly, junior doctors may misunderstand or underestimate the significance of fluid balance records when making prescribing decisions. These systemic issues collectively contribute to incomplete, inaccurate, or inconsistent fluid balance documentation, ultimately compromising patient safety.Our preliminary assessment of the existing fluid balance monitoring system within the medical ward revealed several areas of concern. A baseline review found that nurses rated the ease of completing the existing fluid balance chart at an average score of 7.4 out of 10, with scores ranging from as low as 3 to as high as 10. While a higher score reflects improved familiarity with the chart among experienced staff, the lower scores highlight the difficulties faced by newly inducted nurses, student nurses, and agency staff who interact with the chart for the first time. A well-designed, user-friendly chart should be intuitive enough to be completed consistently and correctly by all categories of staff regardless of experience level. Complexity or unclear formatting may discourage accurate completion and lead to omissions or incorrect entries.Additionally, our initial audit identified significant discrepancies between nursing and medical staff in recognizing which patients required fluid monitoring. Only 52% agreement was observed between doctors and nurses regarding indications for initiating fluid balance documentation. This discordance undermines effective multidisciplinary teamwork and can result in either unnecessary charting—placing additional burden on nursing staff—or missed opportunities for monitoring in high-risk patients, thereby increasing the

likelihood of adverse clinical outcomes. Such gaps in interdisciplinary communication indicate the need for clear clinical criteria, standardized reminders, and improved handover processes to ensure that all members of the healthcare team work towards the same goals.Fluid balance monitoring is clinically meaningful because it provides essential information for the prescribing of intravenous fluids, titration of diuretics, and overall assessment of a patient's hydration status. A reliable fluid balance chart helps clinicians detect early signs of deterioration, adjust treatment plans promptly, and prevent avoidable complications. Therefore, identifying the current deficiencies in practice and implementing strategies to improve fluid balance documentation are critical steps in enhancing patient safety and quality of care.

Specific Objectives of the Study:

To evaluate the accuracy and reliability of the current fluid monitoring system used in the medical ward.

MATERIALS AND METHODS

Study Design

This study was conducted as a prospective quality improvement audit using the Plan–Do–Study–Act (PDSA) model to assess and enhance the accuracy and reliability of fluid balance monitoring practices in the medical ward. The study involved a baseline assessment phase, implementation of an intervention, and a post-intervention re-evaluation to determine improvement in documentation quality and staff awareness.

Setting and Duration

The audit was carried out in the Medical Ward of a tertiary care hospital over a three-month period from January to March 2024. The setting included all male and female medical units where fluid monitoring charts were routinely used for patients requiring intake and output documentation.

Study Population

The study population consisted of nursing staff assigned to the medical ward, including registered nurses, student nurses, and trainee staff. Patient records of individuals placed on fluid balance monitoring during the study period were also included. Exclusion criteria included critically ill patients transferred to the ICU and charts with incomplete hospital stays that could not be assessed reliably.

Data Collection Tool

A structured audit proforma was developed based on international standards and guidelines for fluid balance documentation, including AHRQ and RCP recommendations. The proforma evaluated:

- Indication for initiating fluid monitoring
- Completeness of intake and output entries
- Accuracy of calculations (24-hour totals, cumulative balance)
- Recording of intravenous fluids, oral intake, urine output, drains, and insensible losses
- Documentation of patient weight and comorbidities
- Chart legibility, clarity, and user-friendliness
- Correlation between nursing documentation and physician orders

Additionally, a questionnaire assessing nursing staff knowledge, confidence, and perceived barriers to fluid monitoring was administered anonymously.

Baseline Assessment:

A retrospective review of 50 fluid balance charts completed over one month was conducted. Each chart was scored against the audit criteria, and discrepancies between documented intake/output and actual clinical records were recorded. Inter-observer reliability was assessed by having two auditors independently review the same charts.

Intervention:

Following baseline analysis, deficiencies were addressed by introducing a standardized fluid balance chart, conducting staff training sessions, reinforcing guidelines during handovers, and placing visual reminders near nursing stations.

Post-Intervention Assessment:

A subsequent audit of 50 newly completed charts was performed using the same criteria. Improvements in accuracy, completeness, and reliability were compared with baseline findings using chi-square tests and paired t-tests, with $p < 0.05$ considered statistically significant.

Study Setting and Methodological Design of Reserch

Design: A prospective, single - centered research design was utilized in this study.

Setting: Ayub Teaching Hospital Abbottabad. May 2024 to August 2024.

Subject: A purposive sample of 100 adult conscious patients undergoing both sexes and age range between 20 years to 60 Years.

Tools: Three tools were used; a structured interview questionnaire, modified fluid balance chart, and a fluid volume disturbance monitoring sheet.

Data collection: Data were collected from May 2024 to August 2024.

Baseline Measurement: Data for the project were obtained from two sources: patients' clinical notes and feedback from nursing staff.

Statistical design: Data collected and analyzed by computer program SPSS" Origin.8 and MS Word 2010.

This study was carried out in Ayub Teaching Hospital, Abbottabad. Patients were admitted to the Medical ward directly from the emergency department. Patients had a variety of disorders. Subjects: the study combined two parts: "Fluid balance monitoring audit"

Subjects: the study combined two parts: "Fluid balance monitoring audit"(Part 1) and "Fluid balance monitoring questionnaire" (part 2). The subjects for the audit were all critical care fluid balance-related records for 100 patients with the following inclusion criteria: nursing records of admissions to critical care from May to August 2024, and nursing records of the first 48 hours of a patient's stay in the Medical ward, when available. Patients on dialysis were excluded, as they need special monitoring. Subjects were selected and divided specifically among the Medical ward under the guidance of the statistician [2]Part 2: "Fluid balance monitoring questionnaire". A convenient sample of 100 critical care nurses was drawn from the previously mentioned Medical ward. Nurses with less than a year of medical ward experience and intern nurses were included in the study. Nurses have the ultimate responsibility and accountability for the patients allocated to their care in the Medical ward.

DATA COLLECTION INSTRUMENT

The tool of this study was "Fluid balance monitoring accuracy in Medical ward," which was used to collect data regarding the accuracy of monitoring fluid balance in the Medical ward, and it was developed by the researcher after reviewing the relevant literature (1,3,9,10-15). This tool combined two parts:Part 1: "Fluid balance monitoring audit." This part of the tool was used to assess the current practices implemented in fluid balance monitoring. The audit included all critical care patient fluid balance- related records, which were the daily chart, medication prescription form, non-medication prescription form, fluid balance-related forms, other doctor order forms, and the laboratory result. The audit examined the main parts of fluid balance monitoring:

Vital signs such as pulse, blood pressure, and respiratory rate, and monitoring of patients' electrolyte values. Capillary refill time, skin elasticity. Recording of prescription and administration in the form of intravenous infusions, enteral nourishment, total nutrition, and blood products.Recording of output in the form of urine, vomiting, diarrhea, and drainage

OBSERVATIONS AND PATIENTS‟ FOLDERS.

The audit also includes an observation part in which the researcher observes nurses' current fluid balance practices to identify the actual fluid balance. The observation contains the basic items that nurses should perform such as check the amount, type of intake (intravenous fluids, feeding, blood products, others) against prescription, check the amount, type of output (urine, vomiting, drainage and others), adjust the intravenous infusions flow rate accurately, document the time started/ended for intravenous infusions, document the prescribed intake on chart, monitor the exact amount of intake/output. The researcher calculated the actual fluid balance from observation/prescription and compared it with the one recorded in the patient's file. If both the researcher's calculation and the recorded fluid balance matched, the calculated fluid balance was accepted as accurate, and if it did not match, the fluid balance recorded was considered not accurate. Part 2: "Fluid balance monitoring questionnaire". Section 2-c was developed to collect data regarding factors affecting fluid balance monitoring in the Medical ward. It includes items regarding workload, time management, and inaccuracy of the measuring equipment, lack of knowledge / skills / training, and communication with other healthcare workers. Scoring system: If the factor is affecting fluid balance monitoring, the response is yes and no is the response when the factor is not affecting fluid balance monitoring. In addition, this part includes an open question regarding nurses' recommendations for accurate fluid balance monitoring. Critical care nurses'

characteristics, namely, age, gender, qualification, years of experience, current position, level of education, and patients-to-nurse ratio, were collected. Tool validity and reliability. Validity. The study tools were developed after reviewing the related literature. To determine content and face validity, ten critical care-nursing experts evaluated the tool. Six experts were academic experts in critical care nursing education and critical care medicine. Four experts were drawn from the hospital and ICUs: clinical practice, quality assurance, and education. Each of the experts was an active participant in their particular environment, and together they offered a complete assessment of the content and face validity of the instruments. The following recommendations were made based on experts' opinions: the questions that were not appropriate to ask nurses were taken out, and some questions needed clarification and modifications to be easier for nurses to understand. Reliability. To ensure consistency, the researcher and two research assistants collected all the data themselves.

BASELINE MEASUREMENT

This project was conducted in an adult general medical ward at Ayub Teaching Hospital, Abbottabad from May to August 2025. Data for the project were obtained from two sources: patients' clinical notes and feedback from nursing staff. The fluid balance charts were assessed for quality using two domains: 'accuracy' and 'completeness', rationalizing and adapting from methodologies of previous, similar quality improvement projects mentioned earlier in this report. In assessing for accuracy, we checked if all measurements in the chart were accurate, if the entries had been summed up correctly, and if the daily totals and balances were correct. In assessing for completeness, we checked. if fluid monitoring was requested in each patient's clinical notes, if all fluid intakes and losses had been documented, if the times of intake/loss had been recorded, and if the entries were legible. A simple proforma was used to record the data, which were analysed afterwards on a Microsoft Excel spreadsheet using simple mathematical calculations. Baseline measurements were collected in August 2019 in a 40-bed general medical ward. In a snap audit on a chosen date, we went through all 40 inpatients' clinical notes. Thirty-five of these notes were found to have fluid balance charts. To ensure uniformity and objectivity, the fluid balance chart from the previous day in each of the 35 notes with fluid balance charts was assessed, and the data showed that:

- Measurements were accurate in 50% of the charts.
- Summations were correct in 32% of the charts.
- The daily totals and balances were accurate in 43% of the charts.
- Fluid monitoring was prescribed in 39% of the charts.
- The entry times were indicated all the time (100%).
- Records of all intakes and losses were complete in 28% of the charts.
- Entries were legible in 78% of the charts.

Statistical Analysis

Statistical analysis was performed by Origin.8, SPSS 16, and MS Word 2010.

RESULTS

Figures 1 and 2 show the accuracy and inaccuracy of fluid balance monitoring in Medical wards. It was identified that 70% of fluid balance patients' records were accurate, while the remaining 30% fluid monitoring records were found to be inaccurate in medical wards. In the inaccurate fluid monitoring records, 16% were found positive with a mean and standard deviation of 450.50 $\pm$ 155.70 ml, and 14% fluid balance monitoring records were found negative with a mean and standard deviation of 325.67 $\pm$ 148.33 ml (Figures 1 and 2).

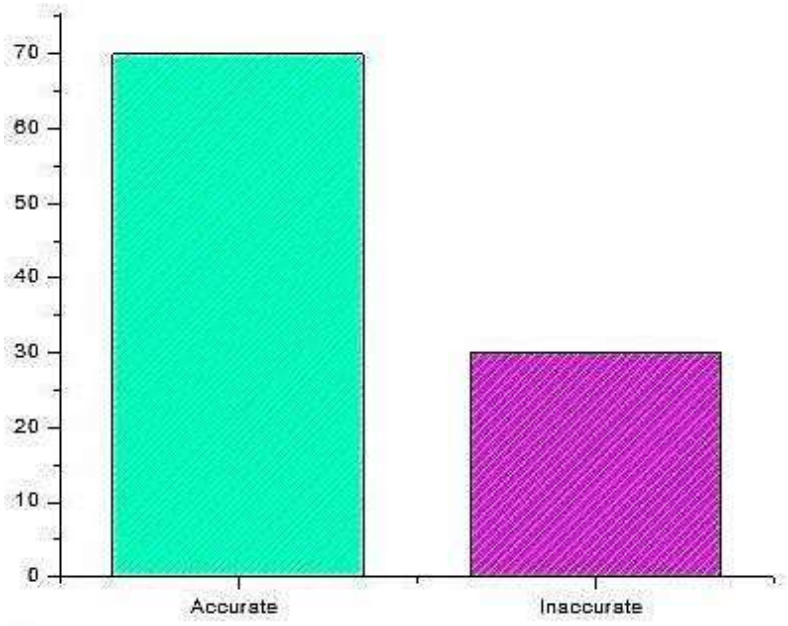

Figure. 1 The accuracy of fluid balance records in medical ward.

Table.1 shows that the nurses' knowledge regarding fluid balance monitoring in the medical ward in Ayub Teaching Hospital, Abbottabad. It was shown that the nurses' knowledge regarding fluid balance records in the medical ward was moderately adequate, 68%. Nurses' knowledge regarding some items of fluid balance monitoring in the medical ward was about the average amount of urine output 55%, the required amount of patients per day 60%, signs of fluid assessment 70%, signs associated with hypovolemia 80%, Nurses' action to hypovolemia 74%, Fluids infused continuously 78% and blood products 58% respectively.

Table.1 Nurses knowledge regarding fluid balance monitoring in medical ward

Knowledge Items	Responses (n=100)			
	Correct		Incorrect	
	N	%	N	%
Urine output	55	55%	45	%
Fluid intake	60	60%	40	40%
Vital signs	70	70%	30	30%

Clinical signs	80	20%	20	20%
Nurses action	74	74%	26	26%
Blood products	58	58%	42	42%
Fluids	78	78%	22	22%
Factors that affect urine	40	40%	60	60%

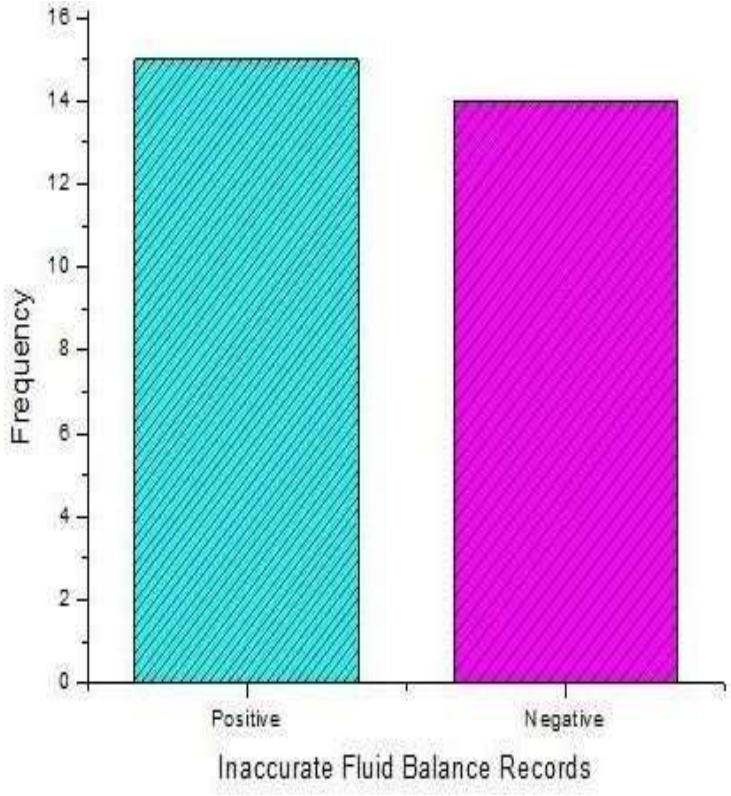

Figure. 2 Distribution of inaccurate fluid balance records

Table.2 shows that about nurses' perception regarding fluid balance monitoring in the medical ward. Regarding the importance of fluid monitoring in the medical ward, it was about 65%, and information about responsible persons was 70%. Regarding the fluid balance sheet, more than 80% were satisfied. While about Fluid balance calculation, more than half were satisfied that the 24-hour fluid balance was correctly calculated all the time in the medical ward of Ayoub Medical Complex, Abbottabad. The P-value of the knowledge and perception was 0.0024.

Table.2 Nurses perception regarding fluid balance in medical ward

Nurses perception	**Strongly Disagree**		**Disagree**		**Uncertain**		**Agree**		**Strongly Agree**	
	N	%	N	%	N	%	N	%	N	%
Importance of fluid balance monitoring										
Intake and output recording	12	12%	19	19%	9	9%	37	37%	23	23%
Fluid balance assessment	18	18%	12	12%	10	10%	25	25%	35	35%
Inaccurate fluid balance calculation	0	0%	0	0%	24	24%	33	33%	43	43%
Fluid balance monitoring										
Correct fluid balance calculation	7	7%	18	18%	20	20%	15	15%	40	40%
People fill fluid balance chart	18	18%	45	45%	22	22%	6	6%	9	9%
Fluid balance monitoring sheet										
Fluid balance chart design by nurses	5	5%	7	7%	12	12%	34	34%	42	42%
Adequate fluid numbers on the chart	20	20%	13	13%	27	27%	21	21%	19	19%
Observation and patients records	40	40%	10	10%	16	16%	14	14%	20	20%
Fluid balance calculation										
Nurse responsible for more than one patients	10	10%	17	17%	23	23%	24	24%	26	26%
The 24 hours correct records all the time	0	0%	0	0%	18	18%	32	32%	50	50%

Table.3 Shows the comparison between nurses' knowledge and perception regarding fluid balance monitoring records, in which nurses' knowledge was slightly adequate, 69% similarly, the perception was also favorable 64% and statistically significant, P value 0.0024

Table.3 Comparison between nurse's knowledge and perception regarding fluid balance in medical ward

Items		**Total N= 100**		**P Value**
		N	%	
Knowledge	Adequate	69	69%	0.0024*
	Inadequate	31	31%	
Perception	Favorable	64	64%	
	Unfavorable	36	36%	

Inaccuracy of the time management of intravenous infusions of measuring equipment was 80%, Inaccuracy due to equipment was 88% while inaccuracy due to workload was 60%, lack of skills was 35% led by lack of knowledge and communication skills, which were 28% and 26% A record of fluid balance monitoring in a medical ward has been shown in the Table. 4

Table. 4 Factors effecting fluid balance monitoring in medical ward

Factors associated with fluid balance chart	**N=100**	
	N	%
Time	80	80%
Inaccuracy of due to equipment	88	88%
Work load	60	60%
Lack of skills	35	35%
Lack of knowledge	28	28%
Communication	26	26%

Baseline demographic information of the patients revealed that the age of more than 60 years showed poor consistency, ranging from 40 to 60 years, while good consistency was shown by the age of less than 40 years. The gender wise information shows that the males had adequate information compared to females, which may be due to their education status. The clinical baseline data highlight that the prevalence of Diabetes mellitus was 32%, Hypertension 29%, Chronic disease of the kidney 16%, and Asthma 9% while the major morbidity records were 14% shown in the Table. 5

Table.5 Baseline Demographic information of the patients of Medical ward

Variable	Frequency	Percentage
Age	N	%
21-40	22	22%
41-60	37	37%
60≥	41	41%
Gender		
Male	42	42%
Female	58	58%
Clinical		
Diabetes mellitus	32	32%
Hypertension	29	29%
Chronic disease of kidney	16	16%
Asthma	9	9%
No major morbidity	14	14%

DISCUSSION

Based on the current result, the comparison between nurses' knowledge and perception regarding fluid balance monitoring records, in which nurses' knowledge was slightly adequate, 69% similarly, the perception was also favorable 64% and statistically significant P value 0.0024. These findings were in agreement with [10], [11], and [14], who were on the same line as they reported that" the comparison between nurses' knowledge and perception regarding fluid balance monitoring records, in which nurses' knowledge were slightly adequate 60% similarly the perception were also favorable 40% and statistically was significant P value= 0.0001. The nurses' knowledge regarding fluid balance monitoring in the medical ward in Ayub Medical Complex, Abbottabad. It was shown that the nurses' knowledge regarding fluid balance records in the medical ward was moderately adequate, 68%. Nurses' knowledge regarding some items of fluid balance monitoring in the medical ward was about the average amount of urine output 55%, the required amount of patients per day 60%, signs of fluid assessment 70%, signs associated with hypovolemia 80%, Nurses' action to hypovolemia 74%, Fluids infused continuously 78% and blood products 58% respectively. Similar studies were also [12], [14], and [15]. The study results revealed that "more than half of Nurses' knowledge was adequate. The current study illustrated that the mean fluid balance of the routine chart was identified, and that 70% of fluid balance patient records were accurate, while the remaining 30% fluid monitoring records were found to be inaccurate in medical wards. In the inaccurate fluid monitoring records, 16% were found positive with a mean and standard deviation of 450.50 ± 155.70 ml, and 14% fluid balance monitoring records were found negative with a mean and standard deviation of 325.67 ± 148.33 ml. While a study also conducted by [18] and [15] illustrated that the mean fluid balance of the routine chart was 8333. 63 ± 388 ml, while the mean fluid balance of the modified chart was 10750.00± 409 ml, with nearly two liters difference between the two charts. From the researchers' point of view, this result isexpected as the nurses didn't accurately calculate the amount of fluid intake and output as (fluids used in flushing the intravenous catheter and the insensible fluid loss) in the routine fluid chart, it may be because their workload or nurses shortage in the unit but it was calculated on the modified fluid chart, adding to that the nurses' mistakes in calculating and recording the daily balance[17] were agreeing with our explanation as they found that a shortage of nursing staff, a deficit in knowledge and a heavy workload are factors affecting fluid balance monitoring in medical; ward. These findings agreed with[16] who reported that "the majority of recoded fluid balance by critical care nurses was deviated by more than fifty ml from the required balance [9] found that "fluid balance was inaccurate in more than a third of critically ill patients with errors ranging from (-3606 mL to +2020 mL)[21]The comparison between nurses' knowledge and perception regarding fluid balance monitoring records, in which nurses' knowledge was slightly adequate, 69% similarly, the perception was also favorable 64% and statistically

significant P value 0.0024. Inaccuracy of the time management of intravenous infusions of measuring equipment was 80%, Inaccuracy due to equipment was 88% while inaccuracy due to work load was 60%, lack skills was 35% leading by lack of knowledge and communication skills were 28% and 26% record of fluid balance monitoring in medical ward [19] who performed a study to assess the accuracy of fluid balance monitoring in critical care units was not agreeing with the previous findings as he reported that "It was observed that more than half of fluid balance recorded in patients" folders were accurate and more than a quarter were inaccurate". Regarding the modified chart, the current study showed that there was a difference between patients' weight in the pre-transplant period and the post-transplant period by approximately six kg. According to the researchers' opinion, weight loss that occurred during HSCT is because of refusing oral intake by patients, and the majority of them had oral mucositis that prevents them from eating, adding to that fluid loss from vomiting and diarrhea that occurredduring the transplantation period. This result was not similar to The nurses' knowledge regarding fluid balance monitoring in the medical ward in Ayub Teaching Hospital, Abbottabad. It was shown that the nurses' knowledge regarding fluid balance records in the medical ward was moderately adequate,, 68%. Nurses knowledge regarding some items of fluid balance monitoring in medical ward were about average amount of urine output 55%, required amount of patients per day 60%, signs of fluid assesment 70%, signs associated with hypovolumia 80%, Nurses action to hypovolumia 74%, Fluids infused continuously 78% and blood products 58% respectivily and the Baseline demographic information of the patients revealed that the aged of more than 60 years were poor consistency leading by 40 to 60 years while good consistency were showed by the aged low than 40 years. The gender wise information shows that males had adequate information compared to females, which may be due to their education status. The clinical baseline data highlights that the Diabetes mellitus was 32%, Hypertension 29%, Chronic disease of the kidney 16%, Asthma 9% while the major morbidity records were 14%. Another study was also performed by [15] and [16]. The study revealed that very serious complications, such as diarrhea, delayed skin turgor, hypervolemia, hypovolemia, and vomiting, were detected by a modified chart rather than the routine chart, with statistically significant differences for each item. These results were similar to [17].reported that" Diarrhea is a common complication of HSCT, with an average incidence of approximately fifty percent of patients, with a higher occurrence within the first several weeks post- transplant[18]. Also a study who performed a retrospective study on adult HCT patients was agreeing with the study findings and found that more than one-half of study patients suffered from hypervolemia had a significant increase in weight from their baseline within the first week after transplant and also, agree with who reported that "more than half of patients who performed HSCT complained from post-transplant fluid overload (hypervolemia) were agreeing with the current study regarding vomiting, diarrhea as they revealed that "oral ulcers, abdominal pains, and diarrhea are symptoms that reflect damage to the entire GI tract together with a disruption of the intestinal barrier function approximately two weeks after the start of the conditioning therapy[22]. Some patients experience nausea and vomiting for up to two months after the transplantation (prolonged post- chemotherapy nausea and vomiting). Finally, accurate monitoring of fluid intake and output is a crucial part of the management of patients undergoing HSCT, rapid discovery of very serious complications that decrease the patients' morbidity and mortality, and improve those patients' outcomes.

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Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

CONCLUSION

This project concluded that applying standardized documentation and calculation approaches can decrease errors. Proper training and education for nursing staff on fluid balance charting can advance accuracy. Relating patients in fluid balance monitoring and education can also improve accuracy. The electronic health records with automatic controls can minimize errors and increase charting quality.

Disclaimer: Nil

Conflict of Interest: Nil

Funding Disclosure: Nil

Authors' Contribution:

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Drafting: , Hamza Ali khan, Kashif Nawaz

Data Analysis: Mujtaba Hussain, Yousaf khan

Critical Review: Mujtaba Hussain, Yousaf khan

Final Approval of Version: All mentioned authors reviewed and approved the final version of the manuscript.

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