

THE ROLE OF CLINICAL PHARMACISTS IN PRESCRIBING IV FLUIDS IN IRAQI HOSPITALS**Haidar Kadhim Al-Jawadi*¹ and Noor Najim Alwiswasi²**

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INTRODUCTION

Intravenous fluids are given through an IV administration set directly to the blood stream via veins. The IV administration set is a tube made of different substances. IV fluids are administered for various indications, and hence the volume given should be accurately calculated. If the type and volume of fluids are not accurate adverse events can occur affecting the safety of the patients. The flow of the fluid is regulated manually or by a special pump.

Indications for giving different IV fluids depends on the assessment of the patient: either for fluid resuscitation, or routine maintenance, or replacement and redistribution^[1] or to deliver medications and to manage hemodynamic instability.^[2] Medications can be given with IV fluids either as a continuous infusion, or an intermittent infusion, or as a direct push into the injection site of an existing IV line.^[3] The type of fluid used varies according to clinical requirements, availability, clinician preference, cost, and local guidelines.^[4] The targeted end points should be hemodynamic parameters, like blood pressure, central venous pressure, maintenance of euvolemic state, balancing urinary and insensible losses.^[5] Overhydration and underhydration is a multifactorial problem which is difficult to quantify however it is associated with morbidity and mortality.^[6] IV fluids are also given in surgery to avoid hypovolemia due to blood loss as well as evaporation from open wounds.^[7] They are also administered in about 3-5ml/kg/hr during surgery to alleviate the problem of nausea.^[8]

Types of fluids given to patients depends on the indications for conditions. These types are mostly electrolytes or dextrose in different concentrations. Prescribing IV fluids depends on understanding the physiology and pathophysiology of disease processes to enhance patient's recovery and avoiding complications.^[9] Complications can result from receiving inaccurate quantities in inaccurate rates as the integrity of organisms is a factor of the delicate balance of water and electrolytes. Other complications may include infection at the injection site, collapsed vein. If infused over a short time IV fluids cause transient sensations of swollenness in the trunk and face, and even dyspnea.^[10]

Adverse effects of crystalloids are related to the distribution inside the vital organs (subcutis, the gastrointestinal tract and the lungs). These could range from headache, high blood pressure, poor wound healing reaching to fatal pulmonary edema or even heart dysfunction due to fluid overload.^[11] Other adverse effects may include anaphylactic reactions, kidney injury, coagulation due to haemodilution, as well as hypothermia and thrombophlebitis.^[12] High volumes of IV fluids in colon surgery may increase the risk of infection and bleeding^[13] and even fatal pulmonary edema after days of the surgery.^[14] The age of the patient is an essential factor in adverse effects appearance.^[15] Metabolic acidosis and renal impairment are specific adverse effects of normal saline.^[16] Subacute hyponatremia presenting neurologic disturbances may be induced by glucose solutions due to impairment of body's capacity to handle glucose infusions during surgery.^[17,18] Brain swelling, intracranial pressure and neurological dysfunction may be aggravated by IV fluids leading to higher neurological morbidity.^[19]

Monitoring of patients on IV fluids is essential and depends on the fluid balance method, the outcome-guided method and the goal-directed fluid therapy.^[20] Parameters such as arterial pressure, central venous pressure, and urinary excretion can help although they are considered as vague signals about inappropriate fluid therapy.^[21]

AIM

There is no data about patterns of prescribing IV fluids in Iraqi hospitals and the role of clinical pharmacists in this area. Studying this problem leads to identifying types of errors, as well as factors contributing to them and the role of clinical pharmacists in it and hence more effective

implementation by identifying the roles of the medical team.

METHODS

A descriptive study was used to analyze trends in IV fluid consumption, prescribing procedures and describing various types of errors accompanying the giving process. Data was collected for one year-(12 months) which was during 2018- 2019 by clinical pharmacy program trainees according to a standard form prepared by the authors. The hospitals involved were 17, distributed in 10 governorates all over Iraq.

Quantities and volumes of IV fluid prescribed were checked by clinical pharmacists according to the special calculations for IV fluids from NICE.

Data was then analyzed using the excel program to calculate simple proportions and percentages then get the relations between measured parameters.

RESULTS

The total number of patients studied was 2105, the sex distribution was 879 males (41.76%) and 1226 females (58.24%).

The indications for using the IV fluids were:

For delivering medications	326 cases (13.18% of cases)
For maintenance	201 cases (8.12% of cases)
For replacement	1506 cases (60.89% of cases)
For resuscitation	331 cases 13.4% of cases)
No indication mentioned	109 cases (4.4% of cases)

The results of IV fluid prescribing in the 4 main wards in hospitals were analyzed and the results are shown in the following table:

Ward	Volume dispensed equal to equation	Volume dispensed more than equation	Volume dispensed less than equation
General surgery	18 (1.8%)	357 (36.2%)	611 (62%)
Gynecology & obstetrics	6 (1.87%)	12 (3.73%)	303 (94.4%)
Internal medicine	16 (1.6%)	265 (27.2%)	693 (71.2%)
pediatrics	2 (2.4%)	80 (95.2%)	2 (2.4%)

From the whole number of IV fluid indications, there were 325 cases of clinical pharmacist interventions which shows about 13.14% of the prescribing process.

The mean public price for one pint of IV fluid is 1.25\$. So the interventions of clinical pharmacists in the area of this study gave an average of 17.3\$ saving for each patient.

The sum of these indications were 2473 which is higher than the number of patients which means that there are patients receiving IV fluids for more than one indication and more than one type at the same time.

The number of IV fluid types prescribed for these patients were as follows:

Number of IV fluid types / patient	Number of patients and percentage
1	2105 (100%)
2	321 (15.3%)
3	34 (1.6%)
4	10 (0.5%)
5	3 (0.14%)

The availability of IV fluids was also studied and the following data was recorded: in 1995 cases the IV fluids were available which represents 80.67% of the total cases, in 388 cases the IV fluids were not available in the hospital at the time of dispensing which represents 15.68% of the studied cases, while in 90 cases which represent 3.63% of the cases the availability was not mentioned in the data collected.

The total amount of different IV fluids dispensed during the study period for all indications was 31533 pints. The unavailability of IV fluids was 4593 pints, and 332 pints of them were changed according to clinical pharmacist suggestions according to indications and available alternatives. This was done for 24 patients from the total 2105 patients.

The use of 500ml IV fluid bottles instead of 100ml bottles for medication delivery was also studied. The total number of IV fluid pints given for medication delivery in this study was 6310 pints for 264 patients for their total days of hospitalization. The mean for this would be 23.9 pints per patient. The mean public price for a 100 ml bottle IV fluid used for medication delivery is less than that for a 500 ml bottle by 0.25\$, and this would have saved about 5.97\$ for each patient during the

average days of hospitalization in this current study in case of being used. Other factors also have drawbacks in this context; waste in the extra volume from the 500ml

bottle, time spent for spilling the extra volume, the probability of human errors in volume, as well as contamination.

Types of IV fluids used in the different wards during the period of study were as follows:

Ward	G/S	G/W	N/S	Ringer	Mannitol
General surgery	482 (48.9%)	218 (22.1%)	173 (17.5%)	113 (11.5%)	
Gynecology & obstetrics	124 (30.3%)	174 (42.6%)	94 (23%)	17 (4.1%)	
Internal medicine	388 (40%)	117 (12%)	385 (40%)	67 (7%)	11 (1%)
pediatrics	91 (87.5%)	5 (4.8%)	4 (3.85%)	4 (3.85%)	

DISCUSSION

IV fluid use has a number of problems that were studied by many researchers. In the cases analyzed in this study, the highest indication for using IV fluids in Iraqi hospitals was for replacement followed by resuscitation and medicine delivery, the latter being mandatory for certain medications that should be compatible with the IV fluids. This indication was the main field for choosing alternatives by clinical pharmacists according to the known chemical compatibility of medications. By this function, the significantly high percent of clinical pharmacist intervention (13.14%) had a high saving rate in IV fluids.

Using IV fluids for more than one indication shows a high burden on the consumption of these items. The differences in type of IV fluids' use between wards shows that there is an unexplained high interspeciality variation. The unexplained variations in IV fluids consumption needs more in-depth studies to show the evidence-based considerations for the variations, as it is a problem in more than one country around the world such as New Zealand and Australia.^[22,23,24]

Clinical pharmacist suggestions for alternative IV fluids in cases of unavailability showed that 332 pints were changed out of 4593, which is about 7.2%.

The volume of IV fluid dispensed for patients was another field in which clinical pharmacists had a role. It was found that the highest problem was in the surgical wards in which the volumes of fluids dispensed was higher than other wards. Volumes of fluids more than indicated lead to problems of overdose as well as its economic burden. This study showed the high effect of clinical pharmacist interventions on the economic part of the problem.

The unavailability of IV fluids and the suggestions of the most appropriate alternatives by clinical pharmacists had the following effects: economic effect both on the hospital and the patient, shortening the hospitalization period, saving the available IV fluids from being expired.

The problems of dealing with IV fluids are nearly common with other countries,^[25] and so the concentration of the clinical pharmacy training program in Iraq on the IV fluid problem has the aim to reach the ideal use and reduce many of the problems associated with their widely extended use.

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