

National Survey of Total Parenteral Nutrition Practice in Saudi Arabia: Dispensing and Administration at MOH Hospitals

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Abstract

The National Survey of Total Parenteral Nutrition practices with emphasis on TPN preparation and administration at MOH hospital conducted in Saudi Arabia. To explore the TPN current practice with focusing on TPN preparation and administration Twenty-four hospitals received the survey with twenty hospitals responded 80.33% response rate. Of those TPN medications completely available at 25% of the hospital, the 20% of TPN devices and 30% TPN filter available before preparation. The IV Admixture-TPN-Oncology Preparation system did not exist in 45% of the hospitals. The 95% of hospitals had full detail label, and alerting system founded in 75% of the hospitals, More than 80% of the hospitals administer TPN through the central line and three-quarters used an infusion pump. Application of TPN Quality Management found in 50% of hospitals, and in range, 60-65 had policy and procedures of TPN. The majority of TPN distributive pharmacists 95% had not had board certification of nutrition support pharmacy and 45% had not had any TPN training. The TPN references not completely available 45% of hospitals. While 25% of hospitals had pharmacists, do not attend the national or international TPN conference. Also, TPN education lectures to health care providers physicians, pharmacists, and nurses not existed in about 45% of hospitals. The survey explored the real TPN practice of preparation and administration Targeting of implementing international standard TPN practice in preparation and administration lead to preventing TPN misadventures, TPN-related complications, improve TPN services with excellent patient outcome, and avoid unnecessary cost of health care system .

Keywords: Parenteral Nutrition; Pharmaceutical Care; Ministry of Health; Saudi Arabia

Abbreviations

TPNS: Total parenteral nutrition services; KFSH & RC: King Faisal Specialist Hospital and Research Center; KKHU: King Khalid University Hospital; GAPC: General Administration of Pharmaceutical care; MOH: Ministry of Health; ASHP: American Society of health system pharmacist

Introduction

The international organizations; Joint Commission on Hospital Accreditation [1], American specify of health Pharmacist (ASHP) [2], and national institutions Saudi Central Board for Accreditation of Healthcare Institutions [3] required the minimum standards for hospital pharmacies. One of the vital essential required is Intravenous Administration department. This unit is necessary to prepare all parenteral medications including Total Parenteral Nutrition. The preparation should follow aseptic techniques and safe practice to prevent TPN-related infection and TPN complications [4]. In 2013, General Administration of Pharmaceutical Care established strategic planning of pharmaceutical care for more 270 hospital pharmacies. Intravenous administration and TPN services are of them [5-6]. Assessment of TPN services is required to determine the gap analysis, key performance indicators, and fore casting of the future. A national survey of TPN services of three sections including prescribing and transcribing, preparation and administration, then TPN monitoring and patient education. It is based on previous studies from ASHP and Saudi Pharmaceutical Society (SPS) [7-12].

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ASHP did a survey in the USA with emphasis on hospital pharmacy practice and as same as stages mentioned above. In the preparation and administration phase, they found 65% of hospitals had a clean room for IV preparations; commercially prepared TPN decreased from 36 to 43% of hospitals in years 2011-2014, most of the small and medium hospitals used them. TPN made by automated compounding devices dropped from 20.4% to 11.8% of hospitals at same years [7]. Another study showed the adherence of TPN guidelines reach to more 70% of the hospital with 33.4% in TPN order from, 78.8% pharmacist revised TPN formulation, and 86.9% used inline filter 2 in 1 TPN [13]. Also, Saudi Pharmaceutical Society with the collaboration of ASHP did like this study in Saudi Arabia; they found 60.7% of hospitals had an IV admixture with 65.5% of hospitals stated quality management program for IV services. Besides, 46.3% of hospitals had TPN services while 36% used automated compounding. There were several barriers prevents changing pharmacy practice including but not limited; lacking qualified technician, and lacking pharmacy resources and training [11].

This survey the First did in Saudi Arabia and Gulf countries, the author is not familiar with any literature discussed the national survey of TPN practice before the objective of this study to explore TPN practice preparation and administration stage in Saudi Arabia.

Methods

This survey is the second segment of the national survey of Total Parenteral Nutrition at MOH hospitals only; prescribing and transcribing. Others hospitals Non-MOH governmental hospitals (Royal, Military, National Guard, Security Forces, Universities) and private hospitals excluded from the study. It contains part of 50 questions designed by the authors. It based on American Parenteral and Enteral Nutrition standard and guidelines, and American Society of Health-System Pharmacists. It included the following; TPN Practice Management, Managing the TPN-Use Process, Total Parenteral Nutrition Patient Care, TPN Material Procurement and Inventory Management, Total Parenteral Nutrition (TPN) Delivery, Evaluating the Effectiveness the TPN-use System, Total Parenteral Nutrition (TPN) Research.

The survey distributed to twenty-four Total parenteral nutrition services (TPNS) of MOH hospital in different regions. In 2014; The study conducted. The survey circulated to hospitals by email to TPNS supervisor. The authors followed up by telephone and emails after two weeks. After four weeks the surveys final collected. The survey information entered into Microsoft Excel version 10 for analysis. In this study, the second segment is prescribing and transcribing explored and analyzed.

Results

The survey distributed to twenty-four hospitals, of those twenty hospitals responded, the response rate was 20 (80%). Of that 15 % medical cities, 20% medium size hospitals, and 65% large hospitals as showed in Table 1. The TPN medications available at 25% of the hospital completely, 20 % of TPN devices and 30% TPN filter available before preparation as showed in Table 2. In TPN preparation, the authors found that is IV Admixture-TPN-Oncology Preparation Program not existed in 45% of the hospitals, 95% of hospitals used TPN automated compounding with 95% had full detail label, and alerting system founded in 75% of the hospitals as showed in Table 3. In the TPN administration, more than 80% of the hospitals administer TPN through the central line and 75% used infusion pump during administration as showed in Table 4. In the TPN Quality Management, 50% of hospitals used quality management tools in TPNS, and in range 60-65 had policy and procedures of TPN as showed in Table 5. The majority of TPN distributive pharmacists 95% had not had board certification of nutrition support pharmacy and 45% had not had any TPN training as showed in Table 6. In the TPN Education and Training, the author found TPN references not completely available at TPN units lost 45% while 25% of pharmacist does not attend any TPN national or international conference. Also TPN education lectures to health care providers physicians, pharmacists and nurses not existed in about 45% of hospitals as showed in Table 7.

Region	Number of Hospitals	Percentage %
Hospital size (Number of staffed beds) Small		
< 50	0	0%
50-99	0	0%
Medium		
100-199	0	0%
200-299	4	20%
Large		
300-399	4	20%
400-599	9	45%
More that or equal 600	0	0%
Very Large		
Medical Cities	3	15 %
Missing No-Response	4	20 %
Ownership		
MOH-Hospitals	20	100%
Non-MOH Hospitals	0	0%
Privates	0	0%
Accreditation		
CIBAHI	20	100%
JCI	5	25%
Canada	0	0%

Table 1: Size ownership and accreditation of respondents.

Region	Small <100 n (%)	Medium 100-299 n (%)	Large 300 - 399 n (%)	Large 400- > or = 600 n (%)	Medical Cit-ies n (%)	Total n (%)
TPN Medications Availability (hospitals n=20)						
100 % medications available	0 (0)	0 (0)	1 (5)	1 (5)	3 (15)	5 (25)
75 % medications available	0 (0)	3 (15)	3 (15)	5 (25)	0 (0)	11 (55)
50 % medications available	0 (0)	1 (5)	0 (0)	1 (5)	0 (0)	2 (10)
25 % medications available	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
0 % medications available	0 (0)	0 (0)	0 (0)	1(5)	0 (0)	1 (5)
TPN devices (hospitals n=20)						
100 % devices available	0 (0)	0 (0)	0 (0)	1 (5)	3 (15)	4 (20)
75 % devices available	0 (0)	3 (15)	2 (10)	3 (15)	0 (0)	8 (40)
50 % devices available	0 (0)	1 (5)	1 (5)	4 (20)	0 (0)	6 (30)
25 % devices available	0 (0)	0 (0)	1 (5)	1 (5)	0 (0)	2 (10)
0 % devices available	0 (0)	0 (0)	0 (0)	0(0)	0 (0)	0 (0)
TPN Filter (hospitals n=20)						
100 % available	0 (0)	1 (5)	1 (5)	2 (10)	2 (10)	6 (30)

75 % available	0 (0)	1 (5)	0 (0)	2 (10)	1 (5)	4 (20)
50 % available	0 (0)	1 (5)	1 (5)	1 (5)	0 (0)	3 (15)
25 % available	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)
0 % available	0 (0)	1 (5)	1 (5)	4 (20)	0 (0)	6 (30)

Table 2: TPN medications and non-medications availabilities.

Region	Small < 100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
IV Adnixture-TPN-Oncolgy Preprartion Program available (hospitals n = 20)						
100 % applications	0 (0)	1 (5)	1 (5)	3 (15)	2 (10)	7 (35)
75 % applications	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)	2 (10)
50 % applications	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
25 % applications	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
0 % applications	0 (0)	3 (15)	3 (15)	3 (15)	0 (0)	9 (45)
TPN Preparations						
100 % of TPN orders prepare by pharmacists or pharmacy technicians	0 (0)	4 (20)	4 (20)	8 (40)	3 (15)	19 (95)
75 % of TPN orders prepare by pharmacists or pharmacy technicians	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % of TPN orders prepare by pharmacists or pharmacy technicians	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
25 % of TPN orders prepare by pharmacists or pharmacy technicians	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
0 % of TPN orders prepare by pharmacists or pharmacy technicians	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TPN Automated Preparations (hospitals n = 20)						
100 % of TPN Preparations by Automtic Compounding	0 (0)	4 (30)	4 (20)	9 (45)	2 (10)	19 (95)
75 % of TPN Preparations by Automtic Compounding	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % of TPN Preparations by Automtic Compounding	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	1 (5)
25 % of TPN Preparations by Automtic Compounding	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Not Cover hospital wards	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TPN preparation label contains all active ingredient (hospitals n = 20)						
100 % applications	0 (0)	4 (20)	4 (20)	8 (40)	3 (15)	19 (95)
75 % applications	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % applications	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
25 % applications	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

0 % applications	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
Use ca ph compatibility chart to prevent TPN precipitation (hospitals n = 20)						
100 % Prescriptions	0 (0)	2 (10)	3 (15)	7 (35)	3 (15)	15 (75)
75 % Prescriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % Prescriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
25 % Prescriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
0 % Prescriptions	0 (0)	2 (10)	1 (5)	2 (10)	0 (0)	5 (25)

Table 3: TPN preparation.

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
TPN Central line administration (hospitals n=20)						
100 % applications	0 (0)	3 (15)	2 (15)	5 (25)	2 (10)	12 (65)
75 % applications	0 (0)	1 (5)	1 (5)	2 (10)	1 (5)	5 (25)
50 % applications	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)
25 % applications	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	0 (5)
0 % applications	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	0 (5)
Using Infusion Pump during Administration of TPN (hospitals n = 20)						
100 % applications	0 (0)	4 (20)	3 (15)	5 (15)	3 (15)	15 (75)
75 % applications	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
50 % applications	0 (0)	0 (0)	0 (0)	2 (10)	0 (0)	2 (10)
25 % applications	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
0 % applications	0 (0)	0 (0)	1 (5)	1 (5)	0 (0)	2 (10)

Table 4: TPN administration.

Region	Small < 100 n (%)	Medium 100– 299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
TPN - TQM Applications (hospitals n = 20)						
100 % Prescriptions	0 (0)	2 (10)	1 (5)	4 (20)	2 (10)	9 (45)
75 % Prescriptions	0 (0)	2 (10)	0 (0)	0 (0)	0 (0)	2 (10)
50 % Prescriptions	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
25 % Prescriptions	0 (0)	0 (0)	1 (5)	2 (10)	0 (0)	3 (15)
0 % Prescriptions	0 (0)	0 (0)	2 (10)	2 (10)	1 (5)	5 (25)
TPN Policy and Procedures and Job descriptions (hospitals n = 20, may contain more than one answers)						
Adults	0 (0)	1 (5)	3 (15)	6 (30)	3 (15)	13 (65)
Pediatrics	0 (0)	3 (15)	2 (10)	7 (35)	1 (5)	13 (65)
Neonates	0 (0)	4 (20)	1 (5)	7 (35)	0 (0)	12 (60)

Table 5: TPN Quality Management.

Region	Small < 100 n (%)	Medium 100-299 n (%)	Large 300-399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
Pharmacists has BCNSP Available (hospitals n = 20)						
100 % Pharmacists	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
75 % Pharmacists	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % Pharmacists	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
25 % Pharmacists	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)	1 (5)
0 % Pharmacists	0 (0)	3 (0)	4 (20)	9 (45)	3 (15)	19 (95)
Pharmacist had accredited TPN Training Certificate (hospitals n = 20)						
100 % Pharmacists	0 (0)	1 (5)	0 (0)	3 (15)	0 (0)	4 (20)
75 % Pharmacists	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % Pharmacists	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
25 % Pharmacists	0 (0)	1 (5)	1 (5)	3 (15)	1 (5)	6 (30)
0 % Pharmacists	0 (0)	2 (10)	3 (15)	3 (15)	1 (5)	9 (45)

Table 6: TPN staff qualification.

Region	Small <100 n (%)	Medium 100-299 n (%)	Large 300-399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
TPN References (hospitals n=20)						
100 % of them available	0 (0)	0 (0)	1 (5)	1 (5)	1 (5)	3 (15)
75 % of them available	0 (0)	0 (0)	1 (5)	1 (5)	2 (10)	4 (20)
50 % of them available	0 (0)	3 (15)	1 (5)	5 (25)	0 (0)	9 (45)
25 % of them available	0 (0)	1 (5)	1 (5)	1 (5)	0 (0)	1 (5)
0 % of them available	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
Pharmacist attend national and international TPN Conference (hospitals n=20)						
100 % Pharmacists	0 (0)	1 (5)	0 (0)	2 (10)	2 (10)	5 (25)
75 % Pharmacists	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
50 % Pharmacists	0 (0)	1 (5)	1 (5)	4 (20)	1 (5)	7 (35)
25 % Pharmacists	0 (0)	1 (5)	1 (5)	1 (5)	0 (0)	3 (15)
0 % Pharmacists	0 (0)	1(5)	2 (10)	2 (10)	0 (0)	5 (25)
TPN Lectures given to Physicians and Nurses (hospitals n=20)						
100 % attended of Physi- cians and Nurses	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
75 % attended of Physicians and Nurses	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)	2 (10)
50 % attended of Physicians and Nurses	0 (0)	1 (5)	1 (5)	3 (15)	1 (5)	6 (30)
25 % attended of Physicians and Nurses	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
0 % attended of Physicians and Nurses	0 (0)	3 (15)	3 (15)	3 (15)	1 (5)	10 (50)

TPN Lectures given to Pharmacists and Pharmacy Technicians (hospitals n=20)						
100 % attened of Pharmacist and Pharmacy Technicians	0 (0)	0 (0)	0 (0)	3 (15)	1 (5)	4 (20)
75 % attened of Pharmacist and Pharmacy Technicians	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
50 % attened of Pharmacist and Pharmacy Technicians	0 (0)	0 (0)	1 (5)	4 (20)	1 (5)	6 (30)
25 % attened of Pharmacist and Pharmacy Technicians	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
0 % attened of Pharmacist and Pharmacy Technicians	0 (0)	4 (20)	3 (15)	2 (10)	0 (0)	9 (45)

Table 7: TPN Education and Training.

Discussions

In the first study in Saudi Arabia about TPN services at MOH hospitals, the second phase was dispensing, and administration explored below. TPN services found in thirteen regions overall King of Saudi Arabia, seven regions do not have TPN services at all. It is available 8.88% of all total hospitals. Most of the medium bed size hospitals, large, and medical cities had TPN services as showed in Table 9. In the hospital pharmacy that run IV admixture and TPN services, all medications and required material for preparation should be available in the ideal standard system. In the study, the author found some TPN components was not available for varieties percentages, in addition to there was demanding of TPN devices for preparation, material, and even TPN filter used during administration phase. The author did not find study mentioned that is to compare with it. It is hard to identify the reasons behind that are in this study. We need to validate the deficiency with another survey in the future. The shortages of TPN components may lead to nutritional errors and potentially death. For that, some reports mentioned the shortages of some nutritional elements, and strategies in how to deal with them [14].

In IV admixture is sitting, the authors found the percentage of hospitals had IV admixture program at MOH hospitals less than what found in Alsultan., *et al.* [11], and Pedersen CA [7]. In this study, the authors included all MOH hospitals while Alsutan study did not include them. Also none- MOH governmental hospitals are more developed than MOH hospitals. They started pharmacy application services since the 1980s and 1990s.

All TPN preparations done by the pharmacy, there is no nurse or physician prepares TPN at all. Also, the majority of the hospital had excellent preparations with standard labels, automated alarming system during the preparation of TPN to prevent any preparation errors. The study had a better result than what found in Hassig TB., *et al.* [14], this study ancient and TPN automated compounding was available most of the hospitals. Majority of the hospital used central administration of TPN this need for guidelines for infection control to prevent central line infection, and utilization of infusion pump for TPN lead to reduction of TPN administration errors.

In TPN quality, application TPN Quality management and TPN policy and procedures at MOH hospitals are the same results founded in Alsultan., *et al.* [11] and better than Hassig TB., *et al.* [14]. This system needs to improve more to prevent drug-related problems during preparation and administration of TPN and apply IV admixture outcome indicators, the authors highly recommended to use quality management for automated compounding according to ASHP guidelines [15]. In TPN education and treating section, the authors found the same percentages of Alsultan., *et al.* study [11]. It was one of the barriers to change pharmacy practice, the pharmacist need training; it was general without emphasis on TPN services. In TPN staff qualification, the author found the number of hospitals as the same as the percentage of Alsutan., *et al.* study [11], the lack pharmacist staff resources and lack of qualified pharmacy technician as one of the bar-

riers to change pharmacy practice. In TPN resources, the authors found our percentages almost the same results of Alsutan., *et al.* [11] study with availability a regular pharmacy electronic resource. However, the resources should be more specialized in TPN with increases number of resources.

Limitations

Despite the investigation is the unique in Saudi Arabia and Gulf countries and it maybe around the world, as a national survey of TPN practice with emphasis on Preparation and administration, it contained several useful practical information, and the best available resources currently. However, it had some limitations including but not limited to the following, the study with a small number of hospitals; it did not include non-MOH hospitals or privates sectors. In addition to there is no full or complete information TPN administration as one of stage of TPN distribution process.

Conclusion

This survey explored the gap analysis between the real practice and our strategic goals and objectives in IV admixture sitting, adherence to international guidelines (ASPEN, ASHP) for preparations, pharmacy staff qualifications, pharmacy education and training TPN practices. Approaching to correct the previous discrepancies with regular follow-up survey every year or every other year; it increase the TPN services adherence to Internal and National Guidelines, leads to prevent TPN-related problems, with avoiding the extra cost of TPN related problems in the pharmaceutical care system.

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