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National Survey of Total Parenteral Nutrition Practice in Saudi Arabia: Prescribing and Transcribing at MOH Hospitals

Yousef Ahmed Alomi[1]*, Sumaiah Mohammed Aljudaibi[2] and Saeed Jamaan Alghamdi[2]

[1]Head, National Clinical pharmacy and pharmacy practice, Head, Pharmacy R & D Administration, Ministry of Health, Saudi Arabia
[2]General Administration of Pharmaceutical Care, Ministry of Health, Saudi Arabia

***Coresponding Author:** Yousef Ahmed Alomi, Head, National Clinical pharmacy and pharmacy practice, Head, Pharmacy R & D Administration, Ministry of Health, Saudi Arabia.

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Abstract

A national survey of Total Parenteral Nutrition practices with emphasis on preventing and transcribing at MOH hospital conducted in Saudi Arabia. To explore the TPN current practice with focusing on TPN prescribing and transcribing. Twenty-four hospitals received the survey with twenty hospitals responded 80.33% as response rate. Of that 65 % large hospitals, 20% medium hospitals, and 15% medical cities. The number of hospitals had TPN units contains Laminar Air Flow Hood (LAFH) in some 13 (65%) with 14 (70%) had TPN automated compounding machines. TPN applied Standard Formulation and TPN protocol in a range 40-55 % of hospitals. TPN hospital units prepare Eleven neonates prescriptions, ten pediatrics prescriptions, and ten adults TPN orders daily over all the hospitals. The number of pharmacist 1-2 pharmacists works at 65 % of hospitals while 1-2 pharmacy technician works at 40% of the hospitals. The Pharmacist writes Adults TPN order at 20% of the hospitals while 10% write neonates TPN order. The pharmacy prepares home TPN in 35% of the hospitals, and more than 70% of the hospitals the pharmacist review and follow up TPN order. Besides, the pharmacist only ultimately participates in 20% of MOH, regional, and hospital nutrition support committees. The survey explored the real TPN practice of prescribing and transcribing. Targeting of implementing international standard TPN practice lead to expanding TPN services with excellent patient outcome, prevent TPN-related problems 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; KKUH: King Khalid University Hospital; GAPC: General Administration of Pharmaceutical care; MOH: Ministry of Health; ASHP: American Society of heath system pharmacist

Introduction

Total Parenteral Nutrition (TPN) services stated in Saudi Arabia at King Faisal Special Hospital and Research Center in the mid-1970s [1-2], followed by King Khalid University Hospital in early 1980s through applying for pharmacy practice programs [3-4]. Nutrition Support education included as part of Clinical Pharmacy curriculum as elective in the mid-1980s and being of Pharm D curriculum at the college of pharmacy at King Saud University in early 2010s [5-6]. TPN services started increasing after that as part of hospital pharmacy practice. General Administration of Pharmaceutical Care at Ministry of Health (GAPC-MOH) at Ministry of Health updated Pharmaceutical Care Strategic Plan in 2012 [7] and included one of the major project is to develop pharmacy services including IV Admixtures with TPN services and Chemotherapy Preparations [8].

Exploring all services of TPN starting from basic facilities of TPN procurement, preparation, prescribing, dispensing, administration, and follow-up is not exist. Old two studies from Switzerland found 83% TPN preparation were commercially available not prepared by

the pharmacist with 52 % present Nutrition support teams, in the USA found more 70% compliance with TPN guidelines with pharmacist made TPN under sterile aseptic area by using a computer and automated compounding machines [9-10]. Recent surveys of Pharmacy practice in the USA found 46-55% of the hospital had TPN consultations with 43% the pharmacist-managed TPN [11-13]. In Saudi; there were ancient studies conducted as clinical auditing of TPN and useful in critically ill patients not exploring of all TPN services. A recent survey of hospital pharmacy practices. It was with TPN as part of providing services to patients. It was 28 governmental and the private hospital in Riyadh City, the TPN preparation was 13 (46.3%) among the hospitals, Large-volume base compounder 9 (36.0%), and Additive compounder 9 (36.0%) [14]. Also, the other study showed that is Nutrition support was 8 (36.4 %) Consultation provided by hospitals, more than 80% Adoption Rate of pharmacist recommendation 3 (16.7%) [15]. However; both surveys had a limited number of hospitals with one region in Kingdom of Saudi Arabia. Moreover; both studies did not show such details of TPN services.

The American Society of Health-system Pharmacists make the national survey of pharmacy at hospital practice based six stages; each year conducted two steps, prescribing, transcribing, dispensing, administration, monitoring, and patient education [11-13]. Saudi Pharmaceutical Society and King Saud University with collaboration with ASHP conducted survey in Saudi Arabia [14-16]. The authors explored the National Survey of Total Parenteral Nutrition practice at MOH hospitals in Saudi Arabia based on that as the goal of this study. Each two stages present separately, in this issue the first step: Prescribing and transcribing discussed.

Methods

It is a national survey of Total Parenteral Nutrition at MOH hospitals only with three segments; prescribing and transcribing, preparation and administration, the third one is TPN monitoring and patient education. Others hospitals Non-MOH governmental hospitals (Royal, Military, National Guard, Security Forces, Universities) and private hospitals excluded from the study. It consisted of 50 questions designed by the authors. It based on ASHP minimum standard of hospital pharmacy and ASPEN standard. It was including but not limited 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 [17].

This survey distributed to twenty-four hospital pharmacies who run IV admixture and Total parenteral nutrition services (TPNS). The information of hospital phases from extensive records of General Administration of pharmaceutical care. The survey conducted in the year 2014. The survey distributed to hospitals by email to the supervisor of IV admixture or TPNS. The authors contacted by telephone and emails after two weeks. The surveys collected after four weeks. The data entered into Microsoft Excel version 10 for analysis. In this study, the first segment is prescribing and transcribing explored and analyzed.

Results

The number of hospitals responded to the survey were twenty hospitals, the response rate was 20 (80%). Of that 65 % large hospitals, 20% medium size hospitals, 15% medical cities as showed in Table 1. The size location of TPN unit 11-20 meter square (MS) (57.9%) followed by 4 (21%) 21-30 MS. The number of hospitals had TPN units contains Laminar Air Flow Hoos (LAFH) in some 13 (65%) with 14 (70%) had TPN automated compounding machines as showed in Table 2. The number of hospitals had TPN adults form, TPN Pediatrics forms, and TPN neonates forms 12 (60%), 12 (60%), and 13 (65%) respectively, TPN Standard Formulation and TPN protocol in a range 40-55 % of hospitals as showed in Table 3. Most of the TPN units at hospitals (75%) works seven days per a week and cover all hospital wards in 85% of TPN units as showed in Table 4. The TPN hospital units prepare Eleven neonates prescriptions, ten pediatrics prescriptions, and ten adults TPN orders daily over all the hospitals as showed in Table 5. The number of pharmacist 1-2 pharmacists works at 65 % of hospitals while 1-2 pharmacy technician works at 40% of the hospitals as showed in Table 6. The Pharmacist write Adults TPN order at 20% of the hospitals while 10% write neonates TPN order and only % five discontinued TPN orders as showed in Table 7. The pharmacy prepares home TPN in 35% of the hospitals, and more than 70% of the hospitals the pharmacist review and follow up TPN order. Besides, The pharmacist only ultimately participates in 20% of MOH, regional, and Hospital Nutrition Support committees as showed in Table 8.

Discussions

The authors pretend that is National Survey of Total Parenteral Nutrition practice in Saudi Arabia with emphasis on prescribing and transcribing, preparation and administration, and TPN monitoring and patient education the first report in Saudi Arabia and Gulf region Countries, and may be in detail such report in the world.

In this report explored in depth about TPN services at MOH hospitals, starting from environment building to TPN monitoring and follow up the patients. The study showed the size distance of the TPN rooms at all hospital based on bed capacity; it not fit with MOH pharmacy standard, and all of them lower size than hospital standards. Hospitals 50-100 beds the room size should be (6.35 x 15.35 M2), 200-30 beds (8.6 x 15.35 M2), and 400-500 beds (10 x 16.2 M2) [18]. All of the IV room built before the standard implemented in 2013. TPN unit's physical design recommended by American Society of Parenteral and Enteral Nutrition (A.S.P.E.N.) Parenteral Nutrition Safety Consensus [19].

In the utilization of TPN automated compounding machines, the authors found that is the MOH hospital higher usage than another Saudi study Alsutan *et al*. [15], and American study Pedersen CA *et al*. [11]. MOH hospitals provide Heath care 60% of the population in the Kingdom of Saudi Arabia. It justifiable to find that is due to the high workload of the most hospitals. Also, some hospitals in the USA increased using TPN commercially bag or outsourced, it less cost and more stable especially uses in home TPN, and used in less than 100 beds capacity while not so in Saudi Arabia.

In TPN prescribing guidelines, the author found the number of a hospital had TPN guidelines less than Alsutan *et al*. study [15], and Pedersen CA *et al*. [12]. In both studies mentioned general guidelines during our guidelines more specific towards TPN services. Also, the particular disease of services guidelines less than what found with Neal BC *et al*. study [10]. Those guidelines are necessary to raise the percentages of adherence leads to preventing of prescribing errors [20]. In TPN working hours, the authors found the rates the same as Alsutan *et al*. [15]. Moreover, better than average results of Pedersen CA *et al*. [12] study, while it is the same results of medium or large hospitals. In the USA survey small size hospitals not provided 24/7 pharmacy services lead to average dilution results of the total hospitals. In TPN workload, the authors found a very high workload with an average of 15-20 TPN order per day per 8 hrs morning duties. It is with 1-2 pharmacist and technicians. At MOH, the number of pharmacist per bed is 0.04 while at USA 0.18 pharmacist per bed [11]. Recently MOH approved new manpower guidelines 0.2 pharmacists per bed. Those guidelines help improving pharmaceutical services including TPN services provide to patients [21].

In pharmacist prescribe TPN, the author found the number of hospitals had pharmacist prescribe TPN less than the study by Pedersen CA et al. [12] while it not mentioned in any Saudi study. Our Nutrition support clinical pharmacy program just recently started since 2013 while in the USA started since several years ago[22].

Home health care is a new service had begun at MOH since 2009 [23]. General Administration of Pharmaceutical Care started pharmacy home care program in 2013. It is normal for the authors to find pharmacy hospital prepares home TPN in only 35% of the hospitals. The author thought the percentages increases in coming years especially chronic patient adults or neonates with short bowel syndrome, new ASPEN Guidelines and Saudi Managed Care Pharmacy [11,24-24]. There was more than 70% of the hospitals founded the pharmacist review and followed up TPN order. Besides, The pharmacist only ultimately participates in 20% of MOH, regional, and Hospital Nutrition Support committees as showed in Table 8. It is new program founded by MOH General Administration of Pharmaceutical care, peripheral local administration of pharmaceutical care, and even hospital pharmacies, still we need sometimes to expand the TPN services overall King of Saudi Arabia.

Limitations

Despite the survey is the first one in Saudi Arabia and Gulf countries and maybe around the world. As a national study of TPN practice with emphasis on Prescribing and transcribing, it carried out several useful with practical information, and that is the best available re-

sources. 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. Also, to there is no information about TPN transcription stage of drug distribution process.

Conclusion

This survey explored the gap analysis between the real practice and our strategic goals and objectives in distance size of TPN services units, the number of staff as TPN pharmacist, the role of the pharmacist in prescribed TPN, and Committed involved in TPN services. Targeting to change the discrepancies with regular survey every other year to every year with follow up; it improve TPN services to patients, raise patient satisfaction, and patients improve outcome.

Region	Number of hospitals	Percentages %
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 Cities n (%)	Total n (%)
Size Meter Sequre of TPN units (hospitals n=19)						
>30	0 (0)	1 (5.26)	0 (0)	1 (5.26)	0 (0)	2 (10.52)
21-30	0 (0)	0 (0)	0 (0)	3 (15.78)	1 (5.26)	4 (21)
11-20	0 (0)	3 (15.78)	3 (15.78)	4 (21)	1 (5.26)	11 (57.9)
1-10	0 (0)	0 (0)	1 (5.26)	1 (5.26)	0 (0)	2 (10.52)

No of Laminart Air Flow Hood (LAFH) (hospitals n=20)						
>6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5-6	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
3-4	0 (0)	1 (5)	0 (0)	2 (10)	2 (10)	5 (25)
1-2	0 (0)	3 (15)	4 (20)	6 (30)	0 (0)	13 (65)
0	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
No of Automated compounding equipments (hospitals n=20)						
>6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5-6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3-4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1-2	0 (0)	3 (15)	2 (10)	6 (30)	3 (15)	14 (70)
0	0 (0)	1 (5)	2 (10)	3 (15)	0 (0)	6 (30)

Table 2: *TPN units size and equipments.*

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
(hospitals n=20, may contains more than one answers)						
Type of TPN Prescritions Avaliable						
Adults TPN Forms	0 (0)	1 (5)	2 (10)	6 (30)	3 (15)	12 (60)
Pediatrics TPN Forms	0 (0)	3 (15)	1 (5)	7 (35)	1 (5)	12 (60)
Neonates TPN Forms	0 (0)	4 (20)	1 (5)	8 (40)	0 (0)	13 (65)
Type of TPN Standard Formulation Available						
Adults Formulation	0 (0)	1 (5)	0 (0)	5 (25)	3 (15)	9 (45)
Pediatrics Formulation	0 (0)	3 (15)	0 (0)	4 (20)	1 (5)	8 (40)
Neonates Formulation	0 (0)	4 (20)	1 (5)	5 (25)	0 (0)	10 (50)
TPN Protocol Avaliable						
Adults	0 (0)	1 (5)	1 (5)	4 (20)	3(15)	9 (45)
Pediatrics	0 (0)	3 (15)	1 (5)	5 (25)	1(5)	10 (50)
Neonates	0 (0)	4 (20)	1 (5)	6 (30)	0 (0)	11 (55)

Table 3: *TPN prescribing guidelines.*

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
TPN units working hours (hospitals n=20)						
Works 7 days per a week	0 (0)	3 (15)	2 (10)	8 (40)	3 (15)	15 (75)
Works 5 days per a week	0 (0)	1 (5)	2 (10)	1 (5)	0 (0)	5 (25)
Works 4 days per a week	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Works 3 days per a week	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Works 2 days per a week	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Works 1 days per a week	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
TPN Prescriptions (hospitals n=20)						
Cover 100 % of all hospital wards	0 (0)	3 (15)	4 (20)	8 (40)	2 (10)	17 (85)
Cover 75 % of all hospital wards	0 (0)	1 (5)	0 (0)	1 (5)	0 (0)	2 (10)
Cover 50 % of all hospital wards	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Cover 25 % of all hospital wards	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
Not Cover hospital wards	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Table 4: *TPN services working hours and coverage hospital ward.*

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
(hospitals n=20, TPN Precsriptions varities from hospital to another)						
Number of TPN Adults prescription per day						
>10	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)
5-9	0 (0)	0 (0)	0 (0)	0 (0)	2 (10)	2 (10)
1-4	0 (0)	1 (5)	1 (5)	4 (20)	1 (5)	7 (35)
Number of TPN pediatrics precsription per day						
>10	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5-9	0 (0)	0 (0)	1 (5)	1 (5)	1 (5)	3 (15)
1-4	0 (0)	3 (15)	2 (10)	3 (15)	0 (0)	8 (40)
Number of TPN neonates prescription per day						
>10	0 (0)	3 (15)	2 (10)	6 (30)	0 (0)	11 (55)
5-9	0 (0)	0 (0)	1(5)	0 (0)	0 (0)	0 (0)
1-4	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)	0 (0)

Table 5: *TPN services workload.*

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
No of pharmacist in the TPN units (hospitals n=20)						
>6	0 (0)	1 (5)	0 (0)	0 (0)	0 (0)	1 (5)
5-6	0 (0)	0 (0)	0 (0)	2 (10)	1 (5)	3 (15)
3-4	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)	2 (10)
1-2	0 (0)	2 (10)	4 (20)	6 (30)	1 (5)	13 (65)
0	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
No of pharmacy technician in the TPN units (hospitals n=20)						
>6	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
5-6	0 (0)	0 (0)	0 (0)	2 (10)	0 (0)	2 (10)

3-4	0 (0)	1 (5)	0 (0)	2 (10)	0 (0)	3 (15)
1-2	0 (0)	1 (5)	1 (5)	5 (25)	1 (5)	8 (40)
0	0 (0)	2 (10)	3 (15)	1 (5)	1 (5)	7 (35)

Table 6: *TPN pharmacy staff.*

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
The Pharmacist write Adults TPN order (hospitals n=20)						
Pharmacist write 100 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	2 (10)	2 (10)
Pharmacist write 75 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	2 (5)
Pharmacist write 50 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Pharmacist write 25 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
Pharmacist write 0 % of TPN precsriptions	0 (0)	4 (20)	3 (15)	9 (45)	0 (0)	16 (80)
The Pharmacist write Neonates TPN order (hospitals n=20)						
Pharmacist write 100 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Pharmacist write 75 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Pharmacist write 50 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
Pharmacist write 25 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
Pharmacist write 0 % of TPN precsriptions	0 (0)	4 (20)	2 (15)	6 (30)	0 (0)	12 (60)
Discontinue (DC) TPN order (hospitals n=20)						
Physicians and Clinical Pharmacist DC 100 % of TPN precsriptions	0 (0)	1 (5)	0 (0)	1 (5)	1 (5)	3 (15)
Physicians DC 100 % of TPN precsriptions	0 (0)	3 (15)	4 (20)	7 (35)	1 (5)	15 (75)
Physicians DC 75 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
Physicians DC 50 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Clinical Pharmacist DC 100 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (5)
Trainee TPN Pharmacist DC 100 % of TPN precsriptions	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Table 7: *Pharmacist prescribes TPN order.*

Region	Small <100 n (%)	Medium 100–299 n (%)	Large 300–399 n (%)	Large 400- > or = 600 n (%)	Medical Cities n (%)	Total n (%)
Type of Home TPN Prescriptions (hospitals n=20)						
Adults	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)	2 (10)
Pediatrics	0 (0)	0 (0)	1 (5)	1 (5)	1 (5)	3 (15)
Neonates	0 (0)	0 (0)	0 (0)	2 (10)	0 (0)	2 (10)
Not existed	0 (0)	4 (20)	3 (15)	5 (25)	1 (5)	13 (65)
Reviewing Patient TPN Therapy and follow-up (hospitals n=20)						
100% of TPN patients	0 (0)	2 (10)	3 (15)	3 (15)	3 (15)	11 (55)
75% of TPN patients	0 (0)	0 (0)	0 (0)	2 (10)	0 (0)	2 (10)

50% of TPN patients	0 (0)	1 (5)	0 (0)	1 (5)	0 (0)	2 (10)
25% of TPN patients	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
0% of TPN patients	0 (0)	1 (5)	1 (5)	3 (15)	0 (0)	5 (25)
The pharmacist participates in MOH, regions, and hopsital Nutrition Support committees						
100% of Nutrition Support committees	0 (0)	0 (0)	0 (0)	3 (15)	1 (5)	4 (20)
75% of Nutrition Support committees	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)
50% of Nutrition Support committees	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	1 (5)
25% of Nutrition Support committees	0 (0)	1 (5)	0 (0)	2 (10)	0 (0)	3 (15)
0% of Nutrition Support committees	0 (0)	3 (15)	3 (15)	4 (20)	1 (5)	11 (55)

Table 8: *Home TPN and Reviews TPN orders.*

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