

The Basic Practice of Total Parenteral Nutrition by Physicians in Saudi Arabia

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ABSTRACT

Objectives: To explore the essential practice of Total Parenteral Nutrition services (TPNs) by the physician in Saudi Arabia. **Materials and Methods:** The study is a cross-sectional survey highlighting the essential practice of Total Parenteral Nutrition services (TPNs) by a Saudi Arabian physician. The survey consisted of respondents' demographic information about the essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution, including the availabilities of Parenteral Nutrition services (TPNs) at the institution, physician prescribing TPN, the number of patients who need TPN, and the number of TPN orders. The 5-point Likert response scale system was used with closed-ended questions. The survey was validated through the revision of expert reviewers and pilot testing. Besides, various tests of the reliability of McDonald's α , Cronbach alpha, Gutmann's λ_2 , and Gutmann's λ_6 were done with the study. Furthermore, the physician's data analysis of the essential practice of Total Parenteral Nutrition services (TPNs) is done through the survey monkey system. Besides, the Statistical Package of Social Sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel sheet version 16. **Results:** A total number of 409 physicians responded to the questionnaire. Of them, almost one-half responded from the Northern region ($n=186$ (45.48%)), and around one-Quarter of the responded physician were from the central area ($n=106$ (25.92%)), with statistically significant differences between the provinces ($p=0.000$). Females responded more than males ($n=268$ (65.53%) versus ($n=141$) (34.47%)), with statistically significant differences between all levels ($p=0.001$). Most of the responders were in the age group of 36-45 years ($n=198$) (48.41%) and 46-55 years ($n=109$) (26.65%), with statistically significant differences between all age groups ($p=0.000$). Almost one-half of responders ($n=176$) (43.03%) worked at an organization that had parenteral nutrition services (TPNs) services. However, less than a quarter had been ever requested any parenteral nutrition services (TPNs) ($n=86$) (21.03%), with statistically significant differences between all answers ($p=0.000$). Most physicians do not ever request any parenteral nutrition services (TPNs) ($n=179$) (43.77%), or they do not have any answer ($n=144$) (35.21%). The estimated total number of TPN prescriptions was (21,344.50) daily, with an average of (16.25) TPN orders per responder working in hospital practice. Those prescriptions were needed; the total number of patients was (5,757); with an average of (60.3) patients per responder. The highest range number of patients was ($n=108$) (26.41%) in a range (81-100) patients and 103 (25.18%) in a field (1-20) patients daily. The average score of essential practice items for Total Parenteral Nutrition services (TPNs) at the institution was (3.31). The element "Mission of Total Parenteral Nutrition services (TPNs) system" obtained the highest score (3.61). The element "Nutrition Support Team services were (3.56). **Conclusion:** Physicians' essential practice of parenteral nutrition was inadequate despite the high number of patients and the number of TPN orders. Lack of parenteral nutrition education was the primary concern in the physician's parenteral nutrition practice in medical care.

Keyword: Basic, Practice, Total Parenteral Nutrition, Physicians, Saudi Arabia.

INTRODUCTION

Physicians, during their undergraduate education journey, make various clinical rotations. As included medical, surgical, obstetrics, gynecology, pediatric, and other disciplines in medical practice. There is a need for the physician to be familiar with nutrition support, either enteral or parental feeding, at specific rotations such as pediatrics and surgical rotations. To focus more, the physician should prescribe parenteral nutrition according to internal enteral and parental feeding guidelines. Besides, the job description and competency requirements for nutrition support. The American Society

of Parenteral and Enteral Nutrition released various guidelines about healthcare providers emphasizing physicians with competency in the nutrition support field.^[1-3] Those competencies recommendations to prevent enteral or parental nutrition support-related problems. Enteral and parental nutrition-related concerns had critical consequences that should be considered such as impact on patients, and economic burden on healthcare systems.^[4] Nevertheless, few studies have been conducted about physicians' essential practice of parental nutrition, including prescribing information-related issues.^[5-9] The authors were unaware of any publication about the current topic locally or in Gulf and Arabic

countries.^[10,11] The cross-sectional study aims to illustrate the primary practice of TPN by physicians in Saudi Arabia.

MATERIALS AND METHODS

An across-sectional survey that investigated the physician's basic knowledge about Total Parenteral Nutrition services (TPNs) in Saudi Arabia. The survey was a self-administered questionnaire that was designed electronically. The physician samples include all physicians, from interns to consultants, and physician specialties, in all regions of Saudi Arabia. The excluded criteria were all non-physician or students, non-completed, non-qualified surveys. The survey consisted of 3 parts that included respondents' demographic information and the essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution. Also, the availabilities of Parenteral Nutrition services (TPNs) at the institution, the physician was prescribing TPN, the number of patients who need TPN, and the number of TPN orders.^[5-9,12] The essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution consists of 13 items assessed by a 5-point Likert response scale system with closed-ended questions. According to the previous literature with an unlimited population size, the sample was calculated as a cross-sectional study, with a confidence level of 95% with a z score of 1.96 and a margin of error of 5%, a population percentage of 50%, and a drop-out rate 10%. As a result, the sample size will equal 380-420 participants with a power of study of 80%.^[13-15] The response rate required for the calculated sample size is at least 60-70% and above.^[15,16] The physician recruitment process by snowball sampling techniques was used by distributing the survey via social media of what's applications and telegram groups of a physician. The reminder message had been sent every 1-2 weeks. The survey was validated through the revision of expert reviewers and pilot testing. Besides, various tests of the reliability of McDonald's ω , Cronbach alpha, Gutmann's λ_2 , and Gutmann's λ_6 been done with the study. The data analysis of the physician practice of some items for Total Parenteral Nutrition services (TPNs) at the institution is done through the survey monkey system. Besides, the Statistical Package of Social Sciences (SPSS) version xx, Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel sheet version 16. It included a description and frequency analysis, good of fitness analysis, and correlation analysis. Besides, inferential analysis of factors affecting the essential practice of Total Parenteral Nutrition services (TPNs) by the

physician with linear regression. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of the current study.^[17,18]

RESULTS

A total number of 409 physicians responded to the questionnaire. Of them, almost one-half responded from the Northern region (186 (45.48%)), and one Quarter responded from the central region (106 (25.92%)), with statistically significant differences between the provinces ($p=0.000$). Most of the responders were from National Guard Hospitals (90 (22.00%)), Military hospitals (79 (19.32%)), Ministry of Health (MOH) hospitals (53 (12.96%)), and University Hospitals (51 (12.47%)), with a statistically significant difference between working sites ($p=0.000$). Females responded more than males (268 (65.53%)) versus 141 (34.47%), with statistically significant differences between all levels ($p=0.001$). Most of the responders were in the age group of 36-45 years (198

(48.41%)) and 46-55 years (109 (26.65%)), with statistically significant differences between all age groups ($p=0.000$). Most of the pharmacists were residents (133 (32.52%)) and General practitioners (110 (26.89%)), with statistically significant differences between all levels ($p=0.000$). Most of the responders worked as Assistant directors of the medical unit (228 (55.75%)) and Medical Directors (90 (22.00%)), with a statistically significant difference between positions ($p=0.000$). Most physicians had a work experience of 1-3 years (176 (43.03%)) and 4-6 years (137 (33.50%)), with a statistically significant difference between years of experience ($p=0.000$). Most of physician's specialties was emergency (86 ((20.05%)), Surgery (79 ((19.32%)), Psychiatry (78 ((19.07%)), and Obstetrics and Gynecology (74 ((18.09%)) with statistically significant differences between all specialties ($p=0.000$). Almost one-half of responders, 176 (43.03%), worked at an organization that had Parenteral Nutrition services (TPNs) services, with only 86 (21.03%) had been ever requested any Parenteral Nutrition services (TPNs) with statistically significant differences

Table 1: Demographic, social information.

Nationality	Response Count	Response Percent	p-value (X2)
Central area	106	25.92%	0.000
North area	186	45.48%	
South area	68	16.63%	
East area	36	8.80%	
West area	13	3.18%	
Answered question	409		
Skipped question	0		
Site of work	Response Count	Response Percent	p-value (X2)
MOH Hospitals	53	12.96%	0.000
Military hospitals	79	19.32%	
National Guard Hospital	90	22.00%	
Security forces hospitals	39	9.54%	
University Hospital	51	12.47%	
MOH primary care centers	12	2.93%	
Private hospitals	30	7.33%	
Private ambulatory care clinics	47	11.49%	
Private primary healthcare center	7	1.71%	
Community pharmacy	0	0.00%	
University (academia)	1	0.24%	
Answered question	409		
Skipped question	0		
Gender	Response Count	Response Percent	
Male	141	34.47%	0.000
Female	268	65.53%	
Answered question	409		
Skipped question	0		
Age	Response Count	Response Percent	p-value (X2)
24-35	63	15.40%	0.000
36-45	198	48.41%	
46-55	109	26.65%	
> 55	39	9.54%	
Answered question	409		
Skipped question	0		

Table 2: Demographic, social information.

Physician Qualifications	Response Count	Response Percent	p-value (X2)
Intern	34	8.31%	0.000
Resident	133	32.52%	
General practitioner	110	26.89%	
Specialist	73	17.85%	
Consultant	59	14.43%	
Answered question	409		
Skipped question	0		
Position Held	Response Count	Response Percent	
Director of the medical unit	54	13.20%	0.000
Assistant director of the medical unit	228	55.75%	
Medical Director	90	22.00%	
Supervisor	1	0.24%	
Physician staff	36	8.80%	
Answered question	409		
Skipped question	0		
Years of experience in the medical career	Response Count	Response Percent	
< 1	9	2.20%	0.000
1-3	176	43.03%	
4-6	137	33.50%	
7-9	47	11.49%	
10-12	26	6.36%	
>12	14	3.42%	
Answered question	409		
Skipped question	0		
Physician Specialties	Response Count	Response Percent	
Critical Care	3	0.73%	0.000
Emergency	82	20.05%	
Medical	33	8.07%	
Surgical	79	19.32%	
Pediatrics	23	5.62%	
Anesthesia	36	8.80%	
Psychiatry	78	19.07%	
Obstetrics and Gynecology	74	18.09%	
Family medicine	1	0.24%	
Answered question	409		
Skipped question	0		

between all answers ($p=0.000$). There are non-statistically significant correlations between all demographic variables ($p>0.05$) (Tables 1 and 2). The estimated total number of TPN prescriptions was (21,344.50) daily, with an average number (3,557.42) per hospital and

(16.25) TPN orders per responder working in hospital practice. The highest daily number of prescriptions in the range (6-10) and (26-30) were 158 ((38.63%) and 111 (27.14%), respectively. Those prescriptions were needed total number of patients was (5,757); with

an average (959.50) patients daily per each hospital and (60.3) patients per responder. The highest range number of patients was 108 ((26.41%) in a range (81-100) patients and 103 ((25.18%) in a field (1-20) patients daily (Table 3). The average score of practice items

Table 3: TPN prescribing information.

The availabilities of Parenteral Nutrition services (TPNs) at the institution	Response Count	Response Percent	p-value (X2)	
Yes	176	43.03%	0.000	
No	160	39.12%		
I do not know	73	17.85%		
Answered question	409			
Skipped question	0			
Have you ever requested any Parenteral Nutrition services (TPNs)?	Response Count	Response Percent		
Yes	86	21.03%	0.000	
No	179	43.77%		
I do not know	144	35.21%		
Answered question	409			
Skipped question	0			
The number of patients who need TPN daily	Response Count	Response Percent		
1-20	103	25.18%	0.000	
21-40	66	16.14%		
41-60	21	5.13%		
61-80	91	22.25%		
81-100	108	26.41%		
> 100	20	4.89%		
Answered question	409			
Skipped question	0			
The number of TPN orders prescribed daily	Response Count	Response Percent		
1-5	20	4.89%	0.000	
6-10	158	38.63%		
11-15	70	17.11%		
16-20	9	2.20%		
21-25	11	2.69%		
26-30	111	27.14%		
I do not know, and I can not specify	30	19.07%		
Answered question	409			
Skipped question	0			

Table 4: The essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution.														
		No activity had been implemented	It was formally discussed and considered, but it was not implemented	It is partially implemented in hospitals for some patients, drugs, staff	It is fully implemented in the hospital for some areas, patients, drugs, and staff	It is fully implemented throughout the hospital for all patients, drugs, and staff	Total	Weighted Average	p-value (X2)					
1.	The vision of reporting Total Parenteral Nutrition services (TPNs) system.	11.25%	46	48.41%	198	23.96%	98	2.93%	12	13.45%	55	409	2.59	0.000
2.	The mission of reporting Total Parenteral Nutrition services (TPNs) system.	0.50%	2	13.78%	55	39.35%	157	17.29%	69	29.07%	116	399	3.61	0.000
3.	The strategic plan of the Total Parenteral Nutrition services (TPNs) system.	0.49%	2	5.87%	24	42.05%	172	43.77%	179	7.82%	32	409	3.53	0.000
4.	The annual plan of Total Parenteral Nutrition services (TPNs).	0.25%	1	5.58%	22	53.81%	212	24.11%	95	16.24%	64	394	3.51	0.000
5.	Policy and procedure of Total Parenteral Nutrition services (TPNs).	0.49%	2	11.00%	45	41.81%	171	39.85%	163	6.85%	28	409	3.42	0.000
6.	Total Parenteral Nutrition services (TPNs) competency.	0.51%	2	9.97%	39	47.57%	186	31.20%	122	10.74%	42	391	3.42	0.000
7.	Total Parenteral Nutrition services (TPNs) quality management.	0.24%	1	20.29%	83	53.79%	220	15.40%	63	10.27%	42	409	3.15	0.000
8.	Home Total Parenteral Nutrition services (TPNs).	3.18%	13	23.72%	97	28.36%	116	30.81%	126	13.94%	57	409	3.29	0.000
9.	Nutrition Support Team services.	0.26%	1	12.60%	49	39.59%	154	25.71%	100	21.85%	85	389	3.56	0.000
10.	Total Parenteral Nutrition services (TPNs) and medication error system.	5.13%	21	15.40%	63	32.03%	131	35.94%	147	11.49%	47	409	3.33	0.000
11.	Total Parenteral Nutrition services (TPNs) and adverse drug reactions system.	0.49%	2	14.18%	58	44.01%	180	28.61%	117	12.71%	52	409	3.39	0.000
12.	Total Parenteral Nutrition services (TPNs) and education and training program.	4.89%	20	14.91%	61	54.03%	221	17.11%	70	9.05%	37	409	3.11	0.000
13.	Total Parenteral Nutrition services (TPNs) and patient satisfaction system.	6.85%	28	14.91%	61	41.81%	171	30.07%	123	6.36%	26	409	3.14	0.000
	Answered											409		
	Skipped											0		

for Total Parenteral Nutrition services (TPNs) at the institution was (3.31). The element "Mission of Total Parenteral Nutrition services (TPNs) system" obtained the highest score (3.61). The element "Nutrition Support Team services" was (3.56). In contrast, the lowest score was obtained for the element "The vision of reporting Total Parenteral Nutrition services (TPNs)" (2.59). The score for the element "education and training program of Total Parenteral Nutrition services (TPNs)" was (3.11), with a statistically significant difference between the responses ($p < 0.000$). All aspects of the practice of pharmacists about of practice items for Total Parenteral Nutrition services (TPNs) at the institution were statistically significant between responses ($p < 0.000$) (Table 4). The score for single-test reliability analysis of McDonald's ω was 0.685, Cronbach's α was 0.678, Gutmann's was λ_2 , 0.718, Gutmann's λ_6 was 0.885, and Greater Lower Bound was 0.957 with statistically significant ($p < 0.05$).

Factors affecting the essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution

Factors affecting physician practice were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. The essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution includes location, worksite, gender, Physician qualification, Physician specialties, years of experience, current position, presence of the Parenteral Nutrition services (TPNs) at the institution, requisitions of any Parenteral Nutrition services (TPNs) before, number of TPN orders, and number of patients needed for TPN. The result showed that the central region displayed the highest scores (3.3757) of TPN prescription, with statistically significant differences between regions ($p = 0.000$). Regarding the workplace site, the study revealed that ten worksites affected the essential practice of (TPNs) by the physician at the institution. Moreover, the lowest scores (3.1213) were obtained from MOH hospitals with statistically significant differences among all sites ($p = 0.004$). Regarding the physician gender and TPN practice, the result showed that females (3.4670) were more affected the essential practice of (TPNs) by the physician at the institution than males (3.3283) with a statistically significant difference ($p = 0.001$). Also, the age of the responders affected The essential practice of (TPNs) by the physician at the institution. Additionally, physicians aged more than 55 years old showed the lowest score (2.8681), with a statistically significant difference between all age groups ($p = 0.000$). Five levels of academic qualifications also

Table 5: Multiple regression of Factors with the physician's knowledge of Total Parenteral Nutrition services (TPNs) adjusted based on diseases.

Model	R	R Square	F	Sig.	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
					B	Std. Error	Beta				Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.661 ^b	.473	25.564	.000 ^b	3.549	.089			39.708	.000	3.373	3.725		
Location					-.057	.014	-.180		-4.193	.000	-.084	-.030	.776	1.288
Site of work					-.015	.006	-.111		-2.447	.015	-.028	-.003	.686	1.458
Age (years)					.075	.020	.195		3.745	.000	.036	.114	.526	1.902
Physician gender					.250	.030	.367		8.346	.000	.191	.309	.736	1.359
Physician qualification					-.015	.011	-.055		-1.338	.182	-.037	.007	.849	1.178
Physician specialties					-.027	.007	-.185		-4.097	.000	-.040	-.014	.699	1.430
Years of experience in the medical career					.044	.014	.148		3.170	.002	.017	.072	.649	1.542
Position Held					.011	.015	.034		.742	.458	-.018	.040	.665	1.504
The presence of Parenteral Nutrition services (TPNs) at the institution.					-.219	.022	-.498		-9.748	.000	-.263	-.175	.545	1.836
Requisitions of any Parenteral Nutrition services (TPNs) before					-.035	.019	-.080		-1.856	.064	-.072	.002	.773	1.293
Number of TPN orders					-.044	.007	-.263		-5.884	.000	-.058	-.029	.710	1.408
Number of patients needed for TPN					.001	.010	.006		.119	.906	-.018	.020	.556	1.799

a. Dependent Variable: the basic practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution, Predictors: (Constant), location, worksite, gender, Physician qualification, Physician specialties, years of experience, current position, Present of the Parenteral Nutrition services (TPNs) at the institution, Requisitions of any Parenteral Nutrition services (TPNs) before, Number of TPN orders, and Number of patients needed for TPN.

Model	Bootstrap for Coefficients									
	B		Bias		Std. Error	Sig. (2-tailed)	Bootstrap ^a			VIF
	B	Std. Error	Bias	Std. Error			95% Confidence Interval Lower	95% Confidence Interval Upper		
1 (Constant)	3.549	.089	.006	.006	.139	.001	.001	3.273	3.816	
Location	-.057	.014	.000	.000	.013	.001	.001	-.083	-.030	
Site of work	-.015	.006	.000	.000	.009	.077	.077	-.032	.002	
Age (years)	.075	.020	.000	.000	.032	.030	.030	.009	.138	
Physician gender	.250	.030	.000	.000	.049	.001	.001	.155	.347	
Physician qualification	-.015	.011	-.001	-.001	.012	.242	.242	-.039	.009	
Physician specialties	-.027	.007	-.001	-.001	.010	.007	.007	-.047	-.008	
Years of experience in the medical career	.044	.014	.002	.002	.026	.099	.099	-.005	.096	
Position Held	.011	.015	.002	.002	.032	.744	.744	-.051	.075	
The presence of Parenteral Nutrition services (TPNs) at the institution	-.219	.022	-.002	-.002	.041	.001	.001	-.299	-.141	
Requisitions of any Parenteral Nutrition services (TPNs) before	-.035	.019	.000	.000	.027	.228	.228	-.089	.017	
Number of TPN orders	-.044	.007	.001	.001	.014	.003	.003	-.073	-.017	
Number of patients needed for TPN	.001	.010	-.001	-.001	.014	.943	.943	-.025	.031	

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

affected the essential practice of (TPNs) by the physician at the institution. The lowest score (3.0654) was obtained for the consultants, with a statistically significant difference between all levels ($p=0.000$). Five levels of the physician specialties affected the essential practice of (TPNs) by the physician at the institution, with the lowest score (3.0124) obtained for the pediatrics with a statistically significant difference between all levels ($p=0.000$). The levels of work experience affected the essential practice of (TPNs) by the physician at the institution. The lowest score (3.0816) was obtained for those with work experience of >12 years, with a statistically significant difference between all levels ($p=0.008$). Five levels of the position affect the essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution, with the highest score (3.7619) of physician staff with a statistically significant difference between all levels ($p=0.000$). The presence of the Parenteral Nutrition services (TPNs) at the institution with the highest score (3.5244) affected The essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution, with a statistically significant difference between all answers ($p=0.000$). The physician did not request any (TPNs) before, with the highest score (3.5674) affected The essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution, with a statistically significant difference between all answers ($p=0.000$). The total number of patients needed for TPN orders (81-100) daily had the highest score (3.5608), which affected The essential practice of (TPNs) by the physician at the institution, with a statistically significant difference between all answers ($p=0.000$). The total number of TPN orders (16-20) and (6-10) daily had the highest score (3.8413) and (3.5868), respectively, affected The essential practice of Total Parenteral Nutrition services (TPNs) by the physician at the institution, with a statistically significant difference between all answers ($p=0.000$). (Table 5).

The relationship between the physician practice of some items for Total Parenteral Nutrition services (TPNs) at an institution and factors such as location, worksite, age (years), gender, qualifications, specialties, years of experience, position held, the availability of Parenteral Nutrition services (TPNs) at the institution, Requisitions of any Parenteral Nutrition services (TPNs) before, Number of TPN orders, and Number of patients needed for TPN. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an explanatory variable. There was a medium relationship ($R=0.661$ with $p=0.000$) between the physician practice of Total Parenteral Nutrition services

(TPNs) and its factors. Six factors (worksite, physician qualifications, experiences, position, requisitions of any Parenteral Nutrition services (TPNs) before, and the number of patients needing TPN) out of twelve were non-significant differences ($p>0.05$). However, multiple regression analysis confirmed that four factors (i.e., locations, physician specialties, presence of the Parenteral Nutrition services (TPNs) at the institution, and the number of TPN orders) explained 18.0%, 18.5%, 49.8.2%, and 26.3% respectively of the negative relationship to the variation in knowledge, with a statistically significant difference ($p=0.000$), ($p=0.000$), and ($p=0.000$). The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with a Variance Inflation Factor (VIF) of 1.288, 1.430, 1.836, and 1.408, respectively, less than three or five as a sufficient number of VIF. Besides, two factors (age and gender) explained 19.5%, and 36.7%, of the positive relationship to the variation in knowledge, with a statistically significant difference ($p=0.000$) and ($p=0.000$), respectively. The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with the two factors (worksite and gender) with a Variance Inflation Factor (VIF) of 1.902 and 1.359, respectively less than three or five as an adequate number of VIF.^[19-21] (Table 5).

DISCUSSION

The nutrition support program consisted of an oral diet, which is a dietitian's or nutritionist's responsibility.^[1] The second type of enteral feeding is a ready-made fluid diet given through a tube by nasal or oral route. Enteral feeding is most the responsibility of dietitians or nutritionists and sometimes by physicians or pharmacists.^[1] The third practice of nutrition is parental nutrition which is primarily the responsibility of pharmacists or physicians and sometimes by dietitians or nutritionists. All those previous types required various practice issues related to knowledge and skills. The current cross-sectional study will focus on parental nutrition. The electronic self-administered survey was distributed to multiple types of physicians with different age levels and specialties. It reflected physician's culture to demonstrate their practice of parental nutrition in Saudi Arabia. similar to previous studies.^[5-7]

The findings showed that less than half of respondent's organizations had parenteral nutrition services. However, most organizations were hospitals, indicating that intravenous administration services might not exist, as

shown in previous research. The findings showed few respondents had only requested TPN before, which might reflect the inadequate practice of parenteral nutrition. Generally, the results showed a considerable number of more than twenty thousand TPN prescriptions for more than nine hundred patients daily. The average TPN prescription was almost four days, which most patients might undergo for surgical purposes, which was not an appropriate TPN duration.^[8] The findings showed that physicians intermediate practice of TPN. The most practice element was the mission of TPN, and TPN teams existed in hospitals which was a good advantage. However, the lowest practice element was the vision of TPN services and the lack of education and training for TPN. That's expected because the majority of hospitals do not have TPN services. TPN Educational support will improve the practice of TPN by physicians.^[12] Furthermore, some practice elements are always non-available in the hospital, such as quality management of TPN services, ADR of TPN documentation, and Medication errors of TPN, which was very important to monitor all TPN-related problems. Besides, TPN competency, policy, and procedures are not fully implemented at hospitals which might lead to difficulties in physician's practice.

For more explanation, several factors affected the physician's essential practice of TPN in Saudi Arabia. Regarding the practice pattern, the highest practice of TPN was located among central region physicians. That's anticipated because most available the advanced hospital had TPN services. The study revealed that the MOH hospitals had the lowest physician's practice for the working sites because most did not have TPN services. Concerning gender, female physicians had more TPN practice than male physicians, who might be more involved in TPN prescribing.

Regarding the physician experience, the study concluded that the older physicians and consultants with high years of experience had the lowest TPN practice. They might be busy with administrative issues or leave TPN practice to younger staff physicians for education and to gain more practice and experience. According to the physician specialist, the study revealed that the pediatric physician had the lowest practice of TPN, which might be related to insufficient knowledge to prescribe TPN and no standardized system for TPN services. The presence of TPN services at healthcare facilities, a high number of TPN orders, and the high number of patients requiring TPN had much practice TPN. The most dependable factors that might affect TPN practice by physicians were positive, such as gender and age. To

emphasize more that more getting with age more practice until reach to consultants stage it decreases. In contrast, locations, physicians specifically, sites with TPN services, and the number of TPN might negatively affect TPN practice by physicians, as explained earlier. Those factors at medium number practice not at an early stage or very high load it decreases the practice of TNP by physicians. Thus, there is no previous investigation to compare with the current findings.

Limitations

The current study had several advantages, such as a calculated sample size and different demographic characteristics of physicians, which might represent the real future of physicians. However, the study found several limitations, such as non using non-randomized sampling methods, which had a wide range of variables, and not optimal results of reliable test results. Therefore, future research with randomized sampling techniques and high-reliability tests is highly recommended.

CONCLUSION

Overall, physicians' essential practice of total parenteral nutrition was insufficient in Saudi Arabia; less than half of the physicians did not practice TPN. Generally, the estimated total number of patients requiring complete parenteral nutrition was sixty per hospital per responder. Most physicians practice with the mission of TPN and through TPN teams. On the other hand, most deficit practice items were the vision of TPN services and education and training in parenteral nutrition. Numerous factors might affect primary practice physicians of parenteral nutrition, such as age and gender might affect positively physician's practice. In contrast, locations, physicians' specialties, TPN availability at healthcare facilities, and the number of TPN orders might negatively affect physician's practice. Therefore, all items of TPN practice by physicians should be reviewed to arrange to keep them updated or transferred to all TPN practice items to pharmaceutical care services at healthcare organizations.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Consent For Publications

Informed consent was obtained from all the participants

Ethical Approval

This research was exempted from research and ethical committee or an Institutional Review Board (IRB) approval.

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

ABBREVIATIONS

TPNs: Total Parenteral Nutrition services; **MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **SPSS:** Statistical Package of Social Sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology statement; **VIF:** Variance Inflation Factor.

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