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Adult's Total Parenteral Nutrition: Initiative and Implementation of Standardized Formulation in Saudi Arabia

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Abstract

The general administration of pharmaceutical care started potential pharmacy practice program. The program is part of accreditation professional's process of national and international regulations. The adult's parenteral nutrition was one of the critical programs. The most healthcare professionals are not familiar with the new system. The new initiatives system adult's standardized concentration formulation of total parental nutrition as complementary to the previous one. The new formulation consisted of all parental nutrition requirements based on national and international standards. The new system can be converted as computerized physician orders. The new initiatives may implement as project management model over one year or less than that's. The new system prevents nutrition-related problems, and medication errors, and improve clinical outcomes of the adults' population in the Kingdom of Saudi Arabia.

Keywords: Adult total parenteral nutrition, formulation, Pharmacy, Ministry of Health, Saudi Arabia.

INTRODUCTION

The general administration of pharmaceutical care established the national total parental nutrition program at Ministry of Health institutions among part of pharmacy strategic plan in Saudi Arabia [1-2]. The plan of national total parental nutrition (TPN) consisted of several part over several years. The standardized concentration and formulation as part of it. The author and his team established the adult's, pediatrics and neonatal TPN formulation at three major hospitals. Several investigation around the world showed that benefit of the formulation improves clinical outcomes and reduced economic burden in healthcare system [3-6]. The standardized formulation of adult's TPN is existed not exceed more than 45 % base on the last survey done by the Alomi YA et al in Saudi Arabia [7]. Another study done by the same author and his colleagues showed that most pharmacist interventions in the TPN were dosing correction and drug therapy omission [8]. Therefore, the formulation of TPN founders to improve clinical outcomes and prevent drug related problem in the Total parental practice in Saudi Arabia. The author is not familiar with any publications in Saudi Arabia, and Gulf countries or the Middle East described the standardized formulation of Adult's Total Parenteral nutrition.

ADULTS TOTAL PARENTERAL NUTRITION STANDARDIZED FORMULATION IN SAUDI ARABIA

It is standardized formulation of total parental nutrition for adults. The formulation derived from current literature and American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines for adults population with average of seventy-kilogram body weight [4,9]. The formulation consisted of several parts democratic data of the patients, total macronutrients, total micronutrients, the calculated total calories and non-protein calories over nitrogen ratio, and pharmacy preparation part. The formulation consisted of first three consequence days of starting TPN through central line administration. Each day contained one third of the

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qualities of the total fluid requirements, total calories, carbohydrates, protein, electrolyte, traces elements and multivitamins as explored in appendix 1, 2 and 3.

SWOT ANALYSIS

The analysis of the project consisted of four directions. The strength of the project which included the adult formulations including all information of starting total parental nutrition is available, dosing of TPN component is available, prevent mistakes in writing TPN adults orders, The weakness points are including the formulation is not individualized for all patients, it cannot apply for several disease renal or hepatic failure. It does not contain the TPN administration instruction. The opportunity that is including it is very easy form to convert them as computerized and physician order enter, it can calculate all TPN statistical information. The threats points was including the physician or pharmacist is not used the formulation.

Implementations steps of Adults Total Parenteral Nutrition Standardized Formulation

The pharmacy department Organize Consultation Committee from expert pharmacist especially from Intravenous admixture and total parental nutrition services and clinical pharmacists inside the pharmacy department. The committee should extensively review then approve the standardized formulation of Adults Total Parenteral nutrition. The head of the committee will contact with surgical and medical department for final revisions of the drafting and approval. The head of pharmacy services will submit the final draft of the formulation to Pharmacy and Therapeutic committee for review and approval. The head of the committee will arrange with Computer department to make an electronic order forms. The pharmacy education coordinator arrange with all department including nursing, surgical and medical department to Educate and train the medical staff of using the formulation with additional to pharmacy staff. The pharmacy quality management will setup the key performance indicators (KPI) to measure the impact of the project. All pharmacy concern team including TPN Preparation, clinical pharmacist will Collect the KPI of the project retrospectively in the past three to six months. Then collect the data prospectively in the coming months. The head of the committee will contact with musing and surgical development to start with one surgical department as the pilot trial. The pharmacist will Review the pilot trial and correct the form according to the pharmacy consultation committee. The team will expand to all surgical department and medical department, review and alter the shape accordingly through committee. The head of the committee will Expand to all hospital department including adults critical care, Review and adjust the formulation accordingly. The pharmacy quality management coordinators will measure the impact of the project by comparing the KPI before and after starting the project. The head of the committee will analyze the results and review by the consultation committee. The head of pharmacy will submit the final report to Pharmacy and therapeutic committee for final touch and comments. The consultation team will Review the last comments on the project, update it accordingly, and continue the project with next year.

CONCLUSION

The Adults total parental nutrition standard formulation is new initiative system in Kingdom of Saudi Arabia, Gulf and Middle East counties. The new system has potential and easy to implement. The new formulation prevents nutrition related problems, improves patient outcomes, and reduced economic burden of healthcare system in Saudi Arabia.

Acknowledgment: None
Conflict of Interest: None

Abbreviation Used: TPN: Total parental nutrition, ASPEN: American Society for Parenteral and Enteral Nutrition, SWOT: Strength, Weakness, Opportunities, and Threats. KPI: Key Performance Indicators

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ndix 1 Kingdom of Saudi Arabia Minisriy of Health Pharmaceutical Servieces IV Admixture and typh debartment						Name:A1 Hospital No:					
	ТОТА	AL PARENTERA ADULT F		Nationality: Treating physician: (TPN Formula for Adult 70 kg Non-							
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	Total volum						/) × 10 =	=(20)	× 10 =	200 Kcal/day	
	Total fluids	s: mL	/kg/day	r		Total =	88		Kca	l /day	
NO.6		37.5 mL/hr -5.5 mL/hr over 18		nax. rate: 0.11 gr	n/kg/hr)	Total/Wt =		12.57		Kcal /kg/day	
	L	NO. 7	1			Non Proteir (Recommer				83 / 1	
Additiv	ves	Prescribed amt/day	y Maintenance Range Notes						FC	OR PHARMACY ONL	
Sodium	1	40	70-160) Mmol/day					•	Base Solution:	
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Calcium	n	2.3	4-6 Mı	mol/day		alcium Gluconate .CY: check Ca/PC		atibility	_2	00_ml Amino A _ <u>15</u> _%	
Magnes	sium	2	8-10 N	/mol/day					-	243_ml Sterile Water	
Phospha	ate	5	10-15	Mmol/day		PO4(1mL= 1Mn L= 3 Mmol PO4			Na)	Additives:	
Chloride		80	70-150) Mmol/day					_1:	2_mL Sodium 14.6 %	
Acetate			As nee						_20	0_mL Potassium <u>15%</u>	
Fat soluble vit.		5	10 mL Adult)	of (Vitalipid™ N *		ains 15 mcg of vi			_19	0_mL Calcium <u>10%</u>	
Water so	oluble vit.	5	10 mL	10 mL of (Soluvit™ N)*		Contains: Vit. B1, B2, nicotinamide, B6, pantothenic acid, C, biotin, folic acid & B12 -Contains: Cr, Cu, Fe, Mn, Mo, Se, Zn, F and I			_5	_mL Magnesium So4 1	
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NO.3	.3 Amino Acids: 60 gm/day (start with 0.5gm/kg/day, increment with 0.5 gm/kg/day, up to 1.5-2 gm/kg/day)-monitor BUN					TPN indication(s)					
NO.4 NO.5	NO.4 Fat 20%: 40 gm/day (start with 0.5gm/kg/day, increment with 0.5 gm/kg/day, up to 1.5 gm/kg/day)-Monitor TGs						NO. 8 Daily Calories intake				
Total volume of IVF: mL/day Total volume of IVF: mL/day Total volume of IVF: mL/day (Type of IVF:					,	Dextrose (gm/day) >	< 3.4 = (400)×3.	.4 = 1360) Kcal/day
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NO.3 A (NO.4 F NO.5 NO.5 Additives Sodium Potassium Calcium	Amino Acid (start with (1.5-2 gm/kş Fat 20%: with 0.5 gm Total volum Total volum Total volum Total fluids: Total fluids:	ds: 90 gm/day 0.5gm/kg/day, incre 2/day)-monitor BUN 60 gm/day (start 1/kg/day, up to 1.5 g e of TPN:2200 e of IVF: mI e of PO: I35.7 mI/k	ment w N with 0. gm/kg/d mL/d: mL/d:	rith 0.5 gm/kg/da/ .5gm/kg/day, inc day)-Monitor TC ay	rement	TPN indication						
NO.4 F v NO.5 T T T T T T T T T T T T T T T T T T T	(start with (1.5-2 gm/kg Fat 20%: with 0.5 gm Total volum Total volum Total volum Total fluids: Total fluids:	0.5gm/kg/day, incre 2/day)-monitor BUN 60 gm/day (start h/kg/day, up to 1.5 g e of TPN:200 e of FAT:300 e of IVF:	N with 0. gm/kg/d mL/d: mL/d: L/day (T	.5gm/kg/day, inc day)-Monitor TC ay	rement	indicatio	n(s)					
NO.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	with 0.5 gm Total volum Total volum Total volum Total volum Total fluids: Total fluids: TPN rate:	n/kg/day, up to 1.5 g e of TPN:2200 e of FAT:300 e of IVF: mL e of PO: mL/k	gm/kg/d mL/d: mL/d: L/day (T	lay)-Monitor TC								
NO.6 T F Additives Sodium Potassium Calcium	Total volum Total volum Total volum Total fluids: Total fluids: TPN rate: -	e of FAT:300 e of IVF: mI e of PO: mL/ 35.7 mL/k	mL/d: L/day (T			NO. 8	Do	ily Col	orios intole			
NO.6 The February Potassium Calcium	Total volum Total volum Total fluids: Total fluids: TPN rate:	e of IVF: mI e of PO: r 2500 mL/k	_/day (T		NO. 8 Daily Calories intake Dextrose (gm/day) × 3.4 = (600) × 3.4 = 2040 Kcal/day							
NO.6 1 F Additives Sodium Potassium Calcium	Total fluids: Total fluids: TPN rate:	2500 mL/k	mi //nav	me of IVF: mL/day (Type of IVF:)					0 0 0 0 0 0			
NO.6 T F Additives Sodium Potassium Calcium	TPN rate:		Total volume of PO: mL/day Total fluids:2500 mL/day					(60)>				
Additives Sodium Potassium Calcium		s:35.7 mL/kg/day 91.6 mL/hr					Total = 2640 Kcal /day					
Sodium Potassium Calcium	FAT rate: 16.7 mL/hr over 18 hrs (max. rate: 0.11 gm/kg/hr)						Non Protein Calories/ Nitrogen: 183 / 1					
Sodium Potassium Calcium		NO. 7]			(Recomme			5	, / 1		
Potassium Calcium	s	Prescribed amt/day	Maintenance Range Notes						FOR	PHARMACY ONL		
Calcium		120	70-160) Mmol/day					•	Base Solution:		
	n	120	70-160) Mmol/day					_1200	0_ml Dextrose _50_		
		4.6	4-6 Mmol/day			Give as Calcium Gluconate PHARMACY: check Ca/PO4 compatibility		600	0_ml Amino A _15_0			
Magnesium 6		6	8-10 M	/mol/day				_224	_ml Sterile Water			
Phosphate	e	15	10-15	Mmol/day		PO4(1mL= 1M L= 3 Mmol PO4			l Na)	Additives:		
Chloride		240	70-150) Mmol/day					_36_	_mL Sodium <u>14.6</u> °		
Acetate			As nee	eded					_60_1	mL Potassium _15%		
Fat soluble vit.		10	10 mL of (Vitalipid™ N Adult)*		1 mL conta	ins 15 mcg of v	itamin K1		_30_1	mL Calcium <u>10%</u> _		
Water soluble vit.		10	10 mL of (Soluvit™ N)*			Vit. B1, B2, nice			<u>15</u> _m	15_mL Magnesium So4 10		
Trace Elements		10	10 mL of (Addamel ™) Trace Elements		-Contains: C	ntains: Cr, Cu, Fe, Mn, Mo, Se, Zn, F and I recommended with obstructive jaundice or Renal ure.			1	15_mL Phosphate		
Insulin, regular			As needed						_10_	_10_mL Water soluble v		
Heparin			0.5-1 u TPN	unit/ each mL of		SED FOR PERIPHERAL TPN, Check PT/PTT, oid in case of HIT or thrombocytpenia			, <u>10</u>	<u>10</u> _mL Trace Elemen		
Hydrocort	tisone		5mg/ e			PERIPHERAL lebitis	TPN and to	•	• <u>Fat:</u>			
									Fat _ Volur	_ <u>20 %</u> me 300 mL		
		r brand changing		Plan of	ibou)Db	•	500 III.		
rrescriber	r name & si	gn.		Bleep of prescr	iber			RPh nan	iie			