Pediatrics' Total Parenteral Nutrition: Initiative and implementation of standardized formulation in Saudi Arabia

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Abstract

The national total parental nutrition program with an emphasis on pediatrics started before several ago at Ministry of health hospitals In Kingdom of Saudi Arabia. The program covered several regions and consisted from the foundation of Intravenous Admixture and preparation of pediatric parenteral nutrition to administration and follow up of patients outcomes. In addition to the prior system, the new initiative project with the standardized formulation of pediatric's parenteral nutrition is the complementary project of the parental nutrition for pediatrics. The project initiated to prevent drug-related problems of parental nutrition, improve patient clinical outcome and reduce the unnecessary economic burden on the healthcare system. It is the new system in the Middle East and Gulf counties in additional to Saudi Arabia. The initiatives are the systemic implementation of standardized pediatrics formulation using management project tools of starting new idea until finding in the ground.

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

INTRODUCTION

The general administration of pharmaceutical care established several pharmacy practice program for pediatrics for high alert medications [1]. It included national total parental nutrition and Intravenous national therapy [2-3]. The administration established a strategic plan for the national Total parental nutrition (TPN) program included the standardized concentration of TPN. Three hospitals in Riyadh city started to formulate specific physician order form as first initiatives program in the Kingdom of Saudi Arabia. Several publications showed the application of the standardized concentration of TPN around the world to improve outcome and reduce the cost related issues [4-7]. Half of the hospital only had standardized concentration formulation in the TPN for pediatrics in Saudi Arabia [8]. Also, the formulation will prevent dosing errors, and any drug therapy omission prevents by the pharmacist. The formulation of standardized concentration prevented nutrition-related problems in pediatrics and reduced the cost related to nutrition in the Kingdom of Saudi Arabia. The author is not familiar with any investigations published in Saudi Arabia, and Gulf countries or the Middle East described the standardized formulation of Pediatrics' Total Parenteral nutrition.

PEDIATRICS TOTAL PARENTERAL NUTRITION STANDARDIZED FORMULATION IN SAUDI ARABIA

It is the standardized formulation of total parental nutrition for pediatrics. The formulation drove from current literature and American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines for pediatrics' population with an average of fifteen-kilogram body weight [9]. The formulation consisted of several parts demographic 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

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TPN through central line administration. Each day contained one-third of the quantities of the total fluid requirements, total calories, carbohydrates, protein, electrolyte, trace elements and multivitamins as explored in appendix 1, 2 and 3.

SWOT ANALYSIS

The analysis of benefits and risk done by SWOT (Strength, Weakness, Opportunities, and Threats) analysis method. The strength of the pediatrics formulations including all information of starting total parental nutrition is available, dosing of TPN component is available, prevent mistakes in writing TPN pediatrics orders are available. The weak points are including the formulation is not individualized for all patients, It is not contained the TPN administration instruction. Also, it cannot apply to several disease renal or hepatic failure. The opportunity that is including it is straightforward to form to convert them into computerized, and physician order entry; it can calculate all TPN statistical information. The threat point is including the physician or pharmacist not used the formulation.

Implementations Steps of Pediatrics' 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 pediatrics total parenteral nutrition. The head of the committee will contact the 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 the Pharmacy and Therapeutic committee for review and approval. The head of the committee will arrange with Computer department to make an electronic order form. The pharmacy education coordinator arranges 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 set up 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 nursing, and surgical departments started 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 the committee. The head of the committee will expand to all hospital departments including pediatrics' critical care, Review and adjust the formulation accordingly. The pharmacy quality management coordinator 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 the pharmacy will submit the final report to the Pharmacy and the 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 for the next year.

CONCLUSION

The pediatrics' standardized formulation of the total parental nutrition is new initiative of pharmacy quality and medications safety project. It assists for the high alert product in preventing medical errors and related issues at Hospitals in Kingdom of 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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Appendix 1 Appendix 1 MINISRTY OF HEALTH PHARMACEUTICAL SERVIECES IV ADMIXTURE AND TPN DEBARTMENT						Name:Hospital No:Nationality:							
	TOTAL	PARE	NTE	ERAL NUT	RITION								
PEDIATRICS FORM							(TPN	s 15 kg Non-					
PRESC	CRIBER TO	COM	PLE	ΓΕ NOs. 1 UI	P TO 8			diabetic	norm	al kidn	ey & live	er function)	
NO. 1				Day(B	Begin with 1) Peripheral)		Ward			Age		
NO.2								Wt.		5 kg	Height	cm	
NO.3								Diagnosis					
NO.4							t	indication					
NO.5	Total volu							NO. 8 Daily Calories intake					
	Total volu Total volu			mL/day (Type of IVF:) mL/day				Dextrose (g	= 510 Kcal/day				
	Total volu							Fat $(gm/day) \times 10 = (10) \times 10 = 1$				100 Kcal/day	
NO.6 TPN rate: mL/hr				mL/day			-	Total =	al /day				
FAT rate: mL/hr over				ver hrs (max. rate: 0.11 gm/kg/hr)			Total/Wt = 40.6 Kcal /kg/day						
NO. 7							Non Protein Calories/ Nitrogen: 381.25 / 1 (Recommended ratio = 150 / 1)						
Additi	Prescri amt/da		Maintenance Range Notes							FOR PHA	FOR PHARMACY ONLY		
Sodiun	n	30		2-4 Mmol/kg/da	ıy						• Bas	<u>e</u> ution:	
Potassi	um	10		2-4 Mmol/kg/da						400_ml Dextrose _50%			
Calciu	m	2.3		0.25-0.5 Mmol/	Give as Calcium PHARMACY: c	Give as Calcium Gluconate PHARMACY: check Ca/PO4 compatibility				100_ml	Amino A _10%		
Magne	sium	3		0.25-0.5 Mmol/						ml	Sterile Water		
Phosphate 3							ol PO4 & 4 Mmc PO4 & 4.4 Mmc			• Additives:			
Chloride 30			2-4 Mmol/kg/da	ıy					Sodium				
Acetate			As needed		Acetate and CI s	Acetate and CI should be in 1:1, unless it is indicated			ated	mL Potassium			
Fat soluble vit. 2.5			Children, >2.5kg: 10 mL/day (1n (Vitalipid N Infant®)* - U		(1mL contains 2) - Use this brand	-Max dose=10 mL/day (1mL contains 20 mcg Vit K1) - Use this brand for age of ≤ 11 years. Contains: Vit. B1, B2, nicotinamide, B6, pantothenic acid.			mL Calcium				
Water soluble vit. 0.5			>10kg: 10 mL/day Contains: N <10kg:1mL/kg (Soluvit ™N)* C, biotin, for		Contains: Vit. B C, biotin, folic ac	1, B2, cid &	, nicotinamide, B B12		200 00 100 110 00 00 00 00 00 00 00 00 00	mL Magnesium So4			
Trace Elements 0.5			0.1 mL/kg of Multitrace TM - 4 P	-Contains: zinc, cooper, manganese & chromium -Caution: in renal dysf., biliary tract obstruction -Use this brand for pts ≤ 15 kg, for ≥15kg give adult form					mL Potassium				
Insulin, regular			As needed							mL			
Heparin			0.5-1 unit/ each	USED FOR PERIPHERAL TPN, Check PT/PTT, avoid in case of HIT or thrombocytpenia			, avoid in	mL					
Hydro	cortisone					USED FOR PER thrombophlebitis	IPHI ;	ERAL TPN and t	o prevent		• <u>Fat</u>	<u>:</u> %	
											Volume_		
	ber name & s				Bleep of pr	escriber			R	Ph name		I	
Prescriber ID				Nurse name				Technician			-		

Appendix 2 Kingdom of Saudi Arabia Appendix 2 Minisrty of Health Pharmaceutical Services IV admixture and tpn debartment						Name:P								
TOTAL PARENTERAL NUTRITION PEDIATRICS FORM							Nationality: Treating physician: (TPN Formula for Pediatrics 15 kg Non-							
PRESC	CRIBER TO	COMPLE	TE NOs. 1 UI	P TO 8						er function)				
NO.			nd Day(I □ I	Begin with 1 Peripheral)	Ward			Age					
NO.2								kg	Height	cm				
NO.3	(6-16mg/kg/min=8.64-23 gm/kg/day) NO.3 Amino Acids: 20 gm/day (start with 0.5gm/kg/day, increment by 0.5gm/kg/day, up to 3 gm/kg/day)-monitor BUN													
NO.4	Fat 20%:	20 gm/	day (start with			TPN indication	ı(s)							
NO.5			2.5-3gm/kg/d 750 mL/da		r TGs	NO. 8	D	aily Calo	Calories intake					
110.5	Total volum	ne of FAT:	100 mL/da	ay	TVE.	Dextrose (g	Dextrose (gm/day) \times 3.4 = (200) \times 3.4 = 680 Kcal/day							
	Total volui Total volui		mL/da	ay	[VF:		y) × 10	= (20)	× 10 =	200 Kcal/day				
NO.6	Total fluid	l intake: mL/hr	mL/d	ay		Total =		880		al /day				
1,010	FAT rate:	mL/hr o	over hrs (ma	ax. rate: 0.1	1 gm/kg/hr)	Total/Wt =		58.6	Kc	al /kg/day				
		NO. 7				Non Protein (Recommen								
Additives		Prescribed amt/day	Maintenance R	Range	Notes				FOR PHA	ARMACY ONLY				
Sodium	ı	60	2-4 Mmol/kg/da	ay					• Bas	se ution:				
Sodium Potassi	**	60	2-4 Mmol/kg/da						Solu					
100	um	11112		ay	Give as Calcium (iluconate eck Ca/PO4 compatil	bility		Solu	ution:				
Potassi	um n	20	2-4 Mmol/kg/da	ay kg/day			bility		ml I	tion: extrose _50%_% Amino A _10% deterile Water				
Potassi	um n sium	20	2-4 Mmol/kg/da 0.25-0.5 Mmol/l	kg/day kg/day	PHARMACY: ch		ol Na)		ml I	Dextrose _50%_%				
Potassii Calciur Magnes	um n sium ate	20 4.6 8	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/l	kg/day kg/day g/day	PHARMACY: ch	eck Ca/PO4 compatil	ol Na)		Soluml Imlmlml	ution: Dextrose _50%_% Amino A _10% Sterile Water				
Potassi Calciur Magnes Phosph	um n sium ate	20 4.6 8 6	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed	ay kg/day kg/day g/day	PHARMACY: ch Na PO4(1mL= 3 I KPO4(1 mL= 3 M	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.4 mmonol PO4 & 1.1, unless	ol Na) ol Na)	cated	Soli	Amino A _10_% Sterile Water				
Potassir Calciur Magnes Phosph Chlorid	um n sium ate	20 4.6 8 6	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/l 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg:	ay kg/day kg/day g/day : 4 mL/kg : 10 mL/day	PHARMACY: ch Na PO4(1mL= 3 I KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO4	ol Na) ol Na)	rated	ml ImlmlmlmImL	Amino A _10_ % Sterile Water ditives:				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu	um n sium ate	20 4.6 8 6	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/k 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg	kg/day kg/day g/day ay 4 mL/kg 10 mL/day by	PHARMACY: ch Na PO4(1mL= 3 I KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fe	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.5 Mmonol PO	ol Na) ol Na) it is indic	33/2/33/27/11	Soli	Amino A _10% Sterile Water L Sodium Potassium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s	um n sium ate le	20 4.6 8 6 60	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg (Vitalipid N Infant >10kg: 10 mL/d	ay kg/day kg/day g/day ay : 4 mL/kg :10 mL/day day (Soluvit TM N)*	PHARMACY: ch Na PO4(1mL= 3 1 KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fc Contains: Vit. B1, C, biotin, folic aci -Contains zine, cu -Coution: in renal	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.4 Mmonol PO4 & 4.5 Mmonol PO	ol Na) ol Na) it is indice 6, pantothe	nenic acid,	Soli	Amino A _10_% Sterile Water ditives: Sodium Potassium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s Trace E	um sium ate de suble vit.	20 4.6 8 6 60 5 0.75	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg (Vitalipid N Infant >10kg: 10 mL/c <10kg: 1mL/kg 0.1 mL/kg of	ay kg/day kg/day g/day ay : 4 mL/kg :10 mL/day day (Soluvit TM N)*	PHARMACY: ch Na PO4(1mL= 3 1 KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fc Contains: Vit. B1, C, biotin, folic aci -Contains zine, cu -Coution: in renal	Amol PO4 & 4.4 Mmol PO4 & 4.5 Mmol P	ol Na) ol Na) it is indice 6, pantothe	nenic acid,	Soli	Amino A _10_% Sterile Water ditives: Sodium Potassium Magnesium So4 Potassium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s Trace E	um n sium ate le suble vit. soluble vit.	20 4.6 8 6 60 5 0.75	2-4 Mmol/kg/da 0.25-0.5 Mmol// 0.25-0.5 Mmol// 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg: (Vitalipid N Infant >10kg: 10 mL/c <10kg: 1mL/kg 0.1 mL/kg of Multitrace TM , 4 P	ay kg/day kg/day g/day ay : 4 mL/kg :10 mL/day **)* lay (Soluvit ***N)*	PHARMACY: ch Na PO4(1mL= 3 M KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fo Contains: Vit. B1. C, biotin, folic aci -Coution: in renal -Use this brand fo	Amol PO4 & 4 Mmol PO4 & 4.4 Mmol PO	ol Na) ol Na) it is indice for pantothechromium control particular and the	nenic acid,	Soli	Amino A _10_% Sterile Water ditives: Sodium Potassium Magnesium So4 Potassium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s Trace E Insulin,	um n sium ate le suble vit. soluble vit.	20 4.6 8 6 60 5 0.75	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg Children, >2.5kg Children, >2.5kg Children Minfant >10kg: 10 mL/c <10kg: 1mL/kg 0.1 mL/kg of Multitrace TM . 4 P As needed	ay kg/day kg/day g/day ay : 4 mL/kg :10 mL/day **)* lay (Soluvit ***N)*	PHARMACY: ch Na PO4(1mL= 3 1 KPO4(1 mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fc Contains: Vit. B1. C, biotin, folic aci -Contains: vine, or -Caution: in renal -Use this brand fo USED FOR PERI case of HIT or thr	Amol PO4 & 4 Mmol PO4 & 4.4 Mmol PO	ol Na) it is indice 6, pantothe chromium struction in in in it is indice chromium in it is in	dult form Γ, avoid in	Soli	Amino A _10_% Amino A _10_% Sterile Water ditives: _ Sodium Potassium _ Calcium _ Magnesium So4 _ Potassium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s Trace E Insulin,	um n sium ate le buble vit. soluble vit. Elements regular	20 4.6 8 6 60 5 0.75	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg Children, >2.5kg Children, >2.5kg Children Minfant >10kg: 10 mL/c <10kg: 1mL/kg 0.1 mL/kg of Multitrace TM . 4 P As needed	ay kg/day kg/day g/day ay : 4 mL/kg :10 mL/day **)* lay (Soluvit ***N)*	PHARMACY: ch Na PO4(1mL= 3 1 KPO4(1mL= 3 M Acetate and CI sh -Max dose=10 mI (1mL contains 20 - Use this brand fo Contains: Vit. B1, C, biotin, folic aci -Contains: zinc, ce -Caution: in renal -Use this brand fo	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO	ol Na) it is indice 6, pantothe chromium struction in in in it is indice chromium in it is in	dult form Γ, avoid in	Soli	Amino A _10_% Amino A _10_% Sterile Water ditives: _ Sodium Potassium _ Calcium _ Magnesium So4 _ Potassium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s Trace E Insulin, Heparii Hydrod	um n sium ate le b le c soluble vit. Soluble vit. Elements regular n cortisone	20 4.6 8 6 60 5 0.75 1	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg Children, >2.5kg Children, >2.5kg Children Minfant >10kg: 10 mL/c <10kg: 1mL/kg 0.1 mL/kg of Multitrace TM . 4 P As needed	kg/day kg/day g/day ay : 4 mL/kg : 10 mL/day (*)* day (Soluvit **/N)* ediatric**	PHARMACY: ch Na PO4(1mL= 3 M KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fc Contains: Vit. Bl. C, biotin, folic aci -Coution: in renal -Use this brand fo USED FOR PERI case of HIT or thr USED FOR PERI thrombophlebitis	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO	ol Na) ol Na) it is indice 6, pantoth chromium struction skg give a	nenic acid, n dult form Γ, avoid in	Soli	Amino A _10_% Amino A _10_% Sterile Water ditives: _ Sodium Potassium _ Magnesium So4 _ Potassium _ Magnesium				
Potassii Calciur Magnes Phosph Chlorid Acetate Fat solu Water s Trace E Insulin, Heparii Hydrod	um n sium ate de cuble vit. soluble vit. Elements regular n cortisone	20 4.6 8 6 60 5 0.75 1	2-4 Mmol/kg/da 0.25-0.5 Mmol/l 0.25-0.5 Mmol/kg/da 0.5-1.5 Mmol/kg/da As needed Neonates, <2.5kg Children, >2.5kg Children, >2.5kg Children, >2.5kg Children Minfant >10kg: 10 mL/c <10kg: 1mL/kg 0.1 mL/kg of Multitrace TM . 4 P As needed	ay kg/day kg/day g/day ay : 4 mL/kg :10 mL/day **)* lay (Soluvit ***N)*	PHARMACY: ch Na PO4(1mL= 3 M KPO4(1mL= 3 M Acetate and Cl sh -Max dose=10 ml (1mL contains 20 - Use this brand fc Contains: Vit. Bl. C, biotin, folic aci -Coution: in renal -Use this brand fo USED FOR PERI case of HIT or thr USED FOR PERI thrombophlebitis	Amol PO4 & 4 Mmonol PO4 & 4.4 Mmonol PO	ol Na) ol Na) it is indice 6, pantoth chromium struction skg give a	dult form Γ, avoid in	Soli	Amino A _10_% Amino A _10_% Sterile Water ditives: _ Sodium Potassium _ Magnesium So4 _ Potassium _ Magnesium				

Appendix 3 KINGDOM OF SAUDI ARABIA MINISRTY OF HEALTH PHARMACEUTICAL SERVIECES IV ADMIXTURE AND TPN DEBARTMENT							Name: Hospital No:							
TOTAL PARENTERAL NUTRITION PEDIATRICS FORM								Nationality: Treating physician: (TPN Formula for Pediatrics 15 kg Non-						
PRESC	CRIBER TO	COMPLE	TE NOs. 1 UF	P TO 8						ney & li	The second second			
NO.	Date: / Day(s) of T	Wa	Ward Age											
NO.2	Dextrose: 450 gm/day (6-16mg/kg/min=8.64-23 gm/kg/day)						t.	1	5 kg	Height		cm		
NO.3	Amino Ac (start with 3 gm/kg/d		agnosis											
NO.4	Fat 20%:	10,112	TPN indication(s)											
NO.5		me of TPN:	2.5-3gm/kg/d mL/da		1108	NO	NO. 8 Daily Calories intake							
	Total volu	me of FAT: me of IVF:	mL/da	y	IVF:	Des	Dextrose $(gm/day) \times 3.4 = ($) × 3.4 = Kcal/day			
	Total volu	me of PO:	mL/day				Fat $(gm/day) \times 10 = ($)				× 10 = Kcal/day			
NO.6	Total fluid		mL/day			Tot	Total =			Kcal /day				
FAT rate: mL/hr over hrs (max. rate: 0.11 gm/kg/hr)						Tot	Total/Wt = Kcal /kg/day					у		
		NO. 7					n Protein ecommen				1			
Additives Prescribed amt/day		Maintenance Range Notes								FOR PHARMACY ONLY				
Sodium		45	2-4 Mmol/kg/day							• <u>Ba</u> <u>So</u>	<u>se</u> lution:			
Potassi	um	30	2-4 Mmol/kg/day							n	l Dextrose	%		
Calcium 6.9		0.25-0.5 Mmol/l	kg/day		Give as Calcium Gluconate PHARMACY: check Ca/PO4 compatibility				ml Amino A%					
Magnesium 12		0.25-0.5 Mmol/l	kg/day						n	l Sterile W	ater			
Phosphate 9		0.5-1.5 Mmol/kg	g/day	Na PO4(1mL= 3 Mmol PO4 & 4 Mmol Na) KPO4(1mL= 3 Mmol PO4 & 4.4 Mmol Na) • Additives				ditives:						
Chloride 45		2-4 Mmol/kg/da	у				n	L Sodium						
Acetate		As needed		Acetate and CI should be in 1:1, unless it is indica			ted	mI	Potassium					
Fat soluble vit. 10		Neonates, <2.5kg: Children, >2.5kg: (Vitalipid N Infant	:10 mL/day	 Use this brand for age of ≤ 11 years. 				L Calcium						
Water soluble vit. 10		>10kg: 10 mL/d <10kg:1mL/kg	day Contains: Vit. B1, B2						mL Magnesium So4					
Trace Elements 1		0.1 mL/kg of Multitrace™- 4 Pe	ediatric*	-Contains: zinc, cooper, manganese & chromium -Caution: in renal dysf., biliary tract obstruction -Use this brand for pts ≤ 15 kg, for >15kg give adult form			ult form	m	L Potassiu	m				
Insulin, regular		As needed						mL						
Heparin			0.5-1 unit/ each	USED FOR PERIPHERAL TPN, Chec case of HIT or thrombocytpenia		penia			m	L				
Hydrocortisone					USED FOR PERI thrombophlebitis	PHERAL	TPN and to	prevent		• <u>Fa</u>	%			
* Check wit	th IV Room for brand	l changing								Volume_	1	nL		
Prescril	ber name & s	ign.		Bleep of pr	rescriber			RI	Ph name					
Prescril	ber ID		Nurse name					Te	chnician					