

Design and implementation of TPN therapy

The contents of TPN are customized according to:

- patient's condition
- Patient's needs
- Venous route
- Relevant laboratory values
- Weight, age, sex

Orders for the contents may be changed daily.

Design and implementation of TPN therapy

steps

Calculate the daily fluid amount required:

1500 ml for the first 20 Kg + 20 ml/Kg of actual weight

For a patient whose body weight is 110 pounds (50 Kg)

$$\begin{aligned}\text{Daily fluid requirement (ml/day)} &= 1500 \text{ ml} + 20 \text{ ml} \times 30 \text{ kg} \\ &= \underline{\underline{2100 \text{ ml}}}\end{aligned}$$

Design and implementation of TPN therapy

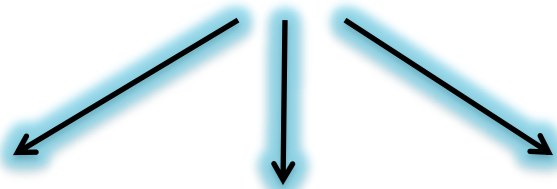
steps

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Fluid requirement

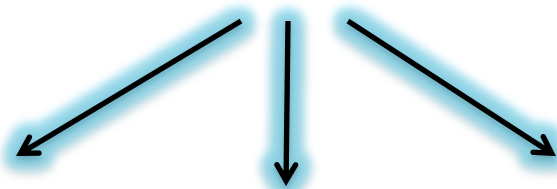
INcrease



fever fistulas diarrhea.

Fluid requirement

DEcrease



renal failure congestive heart failure pulmonary diseases.

Design and implementation of TPN therapy

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Calculate the daily calorie needs:

1. *Basal Energy Expenditure (BEE):* Harris-Benedict Equation

$$\text{BEE (male)} = 66.67 + 13.75 W + 5H - 6.7A$$

$$\text{BEE (female)} = 66.51 + 9.56W + 1.85H - 4.68A$$

H = height in centimeters

W = weight in kg

A = age in years

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Ahmed (65 years) is 5 feet and 6 inches and his weight is 110 pounds

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Ahmed (65 years) is 5 feet and 6 inches and his weight is 110 pounds

$$\begin{aligned}\text{BEE}_{\text{men}} &= 66.67 + 13.75 (\text{Weight}) + 5 (\text{Height}) - 6.76 (\text{Age}) \\ &= 66.67 + 13.75 (50\text{Kg}) + 5 (165\text{ Cm}) - 6.76 (65\text{Y}) \\ &= 66.67 + 687.5 + 825 - 440.2 = 1140 \text{ Calories.}\end{aligned}$$

1 inch = 2.54 centimeters

1 foot = 30.48 centimeters

1 pound = 0.45359237 kg

1 centimeter = 0.393700787 inches

1 centimeter = 0.032808399 feet

1 kilogram = 2.20462262 pounds

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Calculate the daily calorie needs:

1. *Basal Energy Expenditure (BEE)*: Harris-Benedict Equation

2. *Resting energy expenditure (REE)*: $REE = BEE \times \text{stress factor}$

Stress condition	Stress factor
Starvation	0.75-1.0
Normal, non-stressed, confined to bed	1.0-1.2
Post elective surgery with no complications (out of bed)	1.2-1.35
Moderate stress (chronic illness)	1.35-1.5
Severe stress (acute illness, severe infection, trauma or ventilation)	1.5-1.8 6
More than 20 % BSA burn	1.5 to 2.0

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Calculate the daily calorie needs:

1. *Basal Energy Expenditure (BEE)*: Harris-Benedict Equation
2. *Resting energy expenditure (REE)*: $REE = BEE \times \text{stress factor}$

If activity factor for this patient is 1.3.

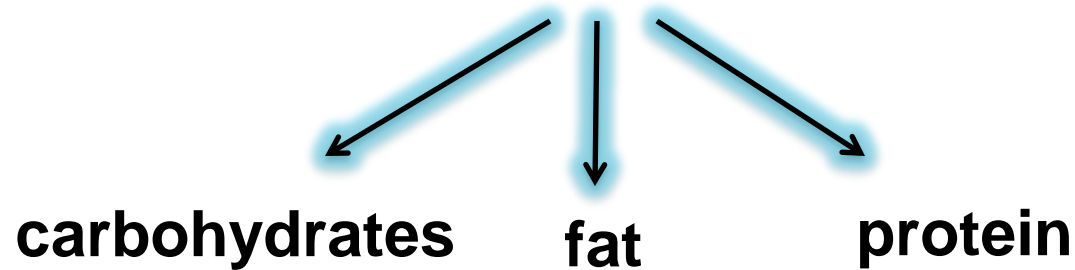
$$REE = 1140 \times 1.3 = 1480 \text{ Calories}$$

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Calculate the daily calorie needs:

Calories can be obtained from



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Calculate the daily calorie needs:

Calories can be obtained from

Non protein calories

Total calories

70% - 85%
from dextrose

15% - 30%
from lipids

total protein amounts
do not exceed 15%

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Calculate the daily calorie needs:

The use of fat in this patient is not recommended and the physician wants **a carbohydrate based** nutrient formula (Non protein calories).

1 gm dextrose = 4 Cal/gm

$$\frac{1 \text{ g}}{X} \times \frac{4 \text{ Cal}}{1480 \text{ Cal}} \quad X = 370 \text{ gm total dextrose}$$

Hospital Formulary includes **Dextrose 70% in water**

$$\text{Dextrose: } \frac{70 \text{ g}}{370 \text{ g}} \times \frac{100 \text{ ml}}{X} \quad X = 528 \text{ ml}$$

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Calculate the daily protein intake:

Patient is moderately stressed and based on his weight he needs 1-1.2 g/Kg/day

$$1.2 \text{ gm} \times 50 \text{ Kg} = 60 \text{ gm protein}$$

If hospital formulary includes 10% amino acid solution

$$\text{Amino acid: } \frac{10 \text{ g}}{60 \text{ g}} \times \frac{100 \text{ ml}}{X} \quad X = 600 \text{ ml}$$

$$\begin{aligned} \text{Water} &= 2100 \text{ ml} - (528 \text{ ml dextrose} + 600 \text{ ml AA}) \\ &= 785 \text{ ml} \end{aligned}$$