

Kimaya TPN User Guide

Version 1.0

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Preface and Motivation

What is Total Parenteral Nutrition (TPN)?

Total Parenteral nutrition (TPN) is pharmacological therapies where nutrients, vitamins, electrolytes and medications are delivered via the venous route to those patients whose gastrointestinal tract is not functioning and are unable to tolerate enteral nutrition. TPN is an effective means of sustaining life and promoting recovery in critically ill patients incapable of ingesting, absorbing or assimilating nutrients.

Infants in the neonatal intensive care unit (NICU) often require nutrition support. Total Parenteral nutrition (TPN), the delivery of nutrients into the circulatory system, is often used in the first days of life to maximize caloric intake while oral feedings or enteral feedings (e.g. nasogastric), or a combination of the two methods, are established.

Why do we need special software?

TPN calculations present a difficult situation to most doctors. Even neonatologists, trained nutritionists and professionals experienced in TPN sometimes find it difficult and time consuming to do TPN calculation. So, sometimes TPN is simply avoided. However as mentioned earlier, TPN is vital to the survival of neonates.

Kimaya TPN is a software for TPN calculation. It works as an aid to help neonatologists in calculating the nutrient requirement for neonates quickly and accurately. TPN calculations are also safe for future reference. Errors are avoided by validations that are built into the software. Kimaya TPN can also prevent reports for hospital records and labels which can be stuck on TPN bottles.

WARNING: Kimaya TPN should be used only by neonatologists, trained nutritionists and experts in TPN.

Though this software is used primarily in the Neonatal Intensive Care Unit (NICU), it can also be used in the Pediatric Intensive Care Unit (PICU).

Starting / Stopping Kimaya TPN

Launching Kimaya TPN

Kimaya TPN can be started in various ways:

- There is a desktop icon called 'Kimaya-TPN' which is created during the installation. Double click this to launch the application.
- The quick launch bar also contains the 'Kimaya-TPN' shortcut.
- Start → All Programs → Josh → Kimaya-TPN

Exiting Kimaya TPN

Kimaya TPN can be terminated in the following ways:

- From the menu Administration → Exit
- Close the Main window using the X sign at the top right corner of the window.

Using Kimaya TPN

Kimaya TPN once started shows a main Parent Window with various menu options. All sub-windows can be started from this window. The following functions can be performed using Kimaya. Each of them is explained in detail in the subsequent sections.

- Creating and Modifying Doctor Data
- Enrolling Patients
- Viewing and Editing Patient Data
- Calculating TPN for a patient.
- Context Sensitive Help and Help on Errors.
- Selecting the correct marketing additive.
- Printing reports and labels.
- Saving to database and referencing the information later

Administration default password

To create doctors, modify marketing additives etc the administration password is required. The default password is **tpn123**. This can be changed from the 'Help' → 'Change Password'.

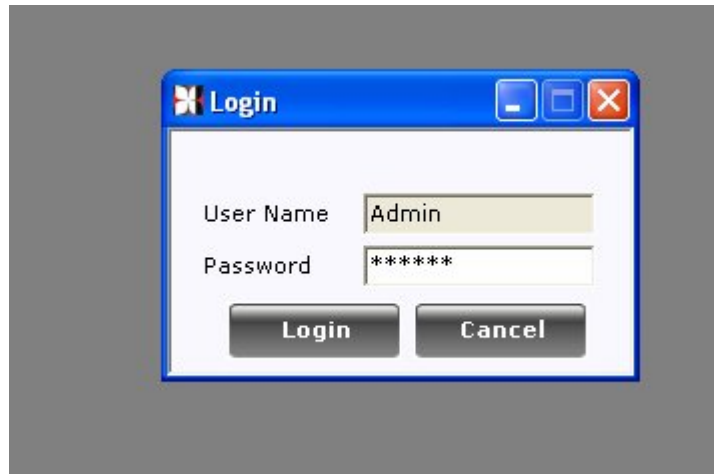


Figure 1

Creating and Modifying Doctor Data

This is an Administrative task and will not be done frequently. However, this is important so that every patient can be associated with a doctor. To create a doctor, you will be prompted for a password.

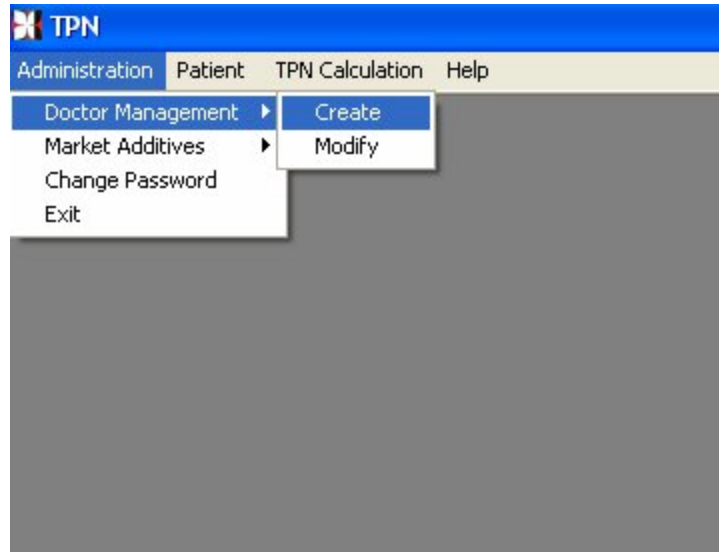


Figure 2

To create a doctor the mandatory fields are:

- Name
- City
- Telephone Number
- Mobile Number

Enrolling and Editing Patient Information

Once doctors' details are created, we can enroll patients associated with the doctors. Patients may sometimes have the same name. In case, a patient with the same name already exists, the software will prompt a warning 'A patient with the same name already exists'. You can re-enroll the patient or create a new patient entry in case the two patients do really have the same name!

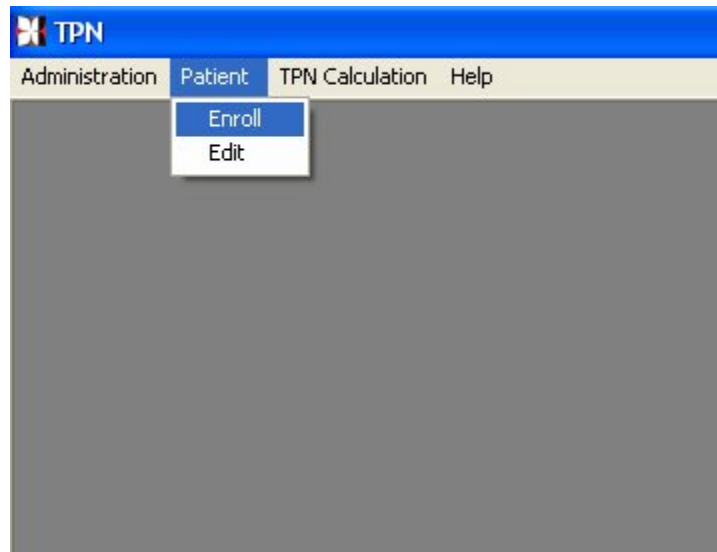


Figure 3

Mandatory fields are:

- Registration Number. This should be unique for every patient.
- Doctor
- First Name
- Address
- City
- Weight. It should be noted that the unit is in kg and not grams.

Calculating TPN for a Patient

This is the most important screen in the software. This is the main screen which calculates the TPN for a patient. The following screen shows an example of the TPN Calculations screen.

If the patient is being administered TPN for the first time, the 'Previous TPN Date' will be shown as 'Not Applicable' and all the corresponding boxes will be shown empty as shown in Figure 4.

The Hospital Name that was entered during installation will appear on all screens. For e.g. If 'NICU, Pune' was entered as the hospital during installation, it will appear on all screens, reports and labels. Please see Trouble shooting section on how to change the hospital name.

TPN Calculations

NICU Pune

TPN Information

Day of TPN Doctor Name

Daily Fluid Volume Intake

Previous TPN Date

Current Weight (kg)

Dextrose Concentration (%)

Fluid Intake (ml/kg/day)

Surgical Losses (ml/day)

Fat Required (gm/kg/day)

Lipid Concentration (%)

Overfill Factor

Additive Nutrients

Amino Acid (gm/kg) (%)

Sodium Chloride (meq/kg) (meq/ml)

Potassium Chloride (meq/kg) (meq/ml)

Calcium (meq/kg) (meq/ml)

Magnesium (meq/kg) (meq/ml)

Administration Peripheral Line Central Line

Help

The dose should be decided based on daily requirements, serum electrolyte values and clinical discretion. Click on the button to the right to select one of the available Magnesium solutions. Magnesium must be between 0 -2

Figure 4

Every input has context sensitive help associated with it. To see what the input should be, please look at the Help section at the bottom right of the screen.

Daily Fluid Volume Intake is the information about the daily intake and losses of the neonate. See ‘Context Sensitive Help’ section for details about each editable input.

NOTE: If the weight of the neonate is less than the birth weight, then the birth weight is taken for TPN calculation.

Additive Nutrients is the section where the dextrose solution is infused with TPN components necessary for the neonate’s growth. Please see the ‘Selecting Marketing Additives’ section for more details.

In case the previous results of TPN have been saved in the database (See section ‘Saving to Database’), the most recent TPN calculations are shown in the non-editable grey text box next to the white editable text box as shown in Figure 5.

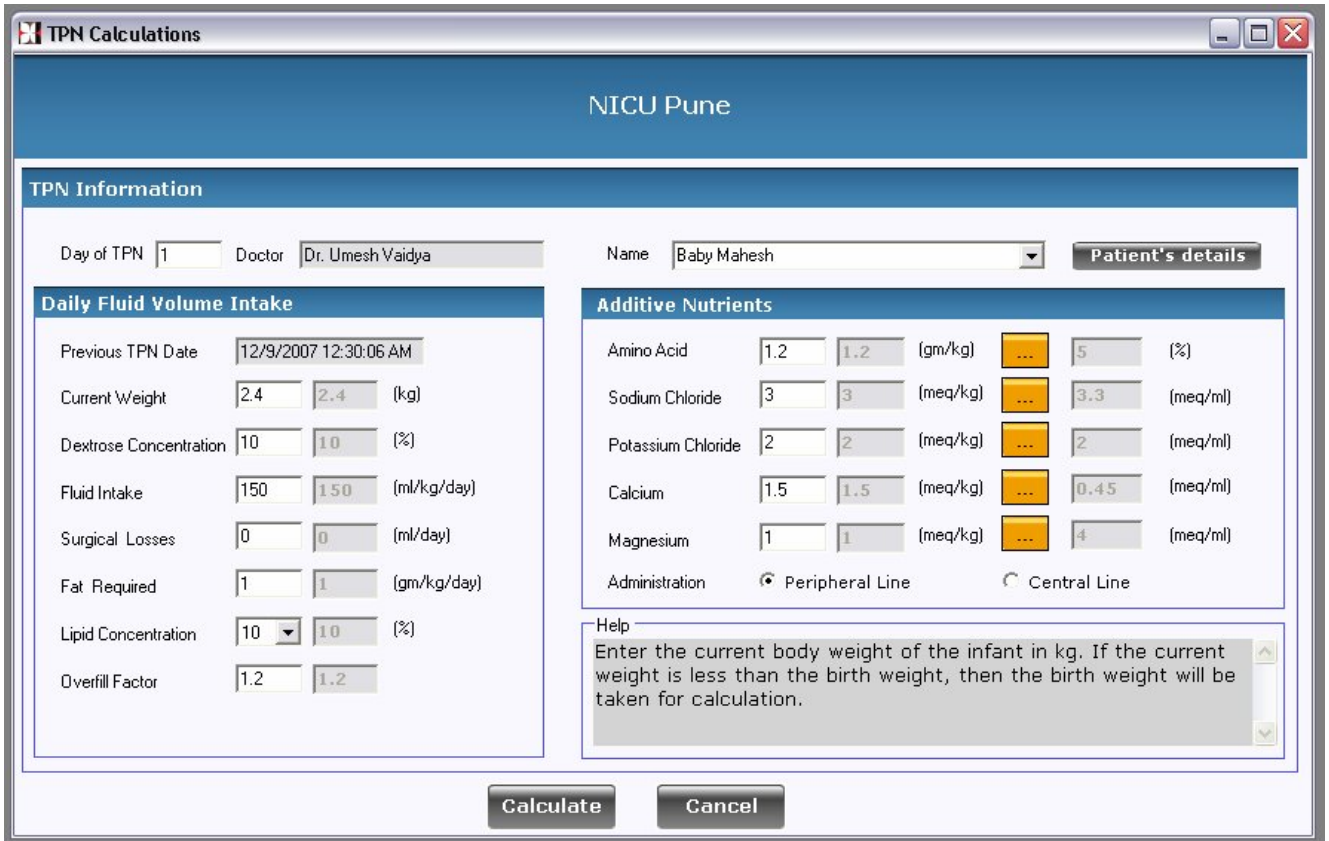


Figure 5

Context Sensitive Help

Each value is explained in the Help which is displayed in the bottom right of the TPN calculation window. Simply click in the white text box to see what sort of data should be entered.

Help on Errors

In case the software catches violations or warning, it flashes the error screen. Each error screen has a 'Help' button associated with it. On clicking the Help button, it expands and explains the reason for the error or warning. In case of warning, the user still has the option to continue or not.

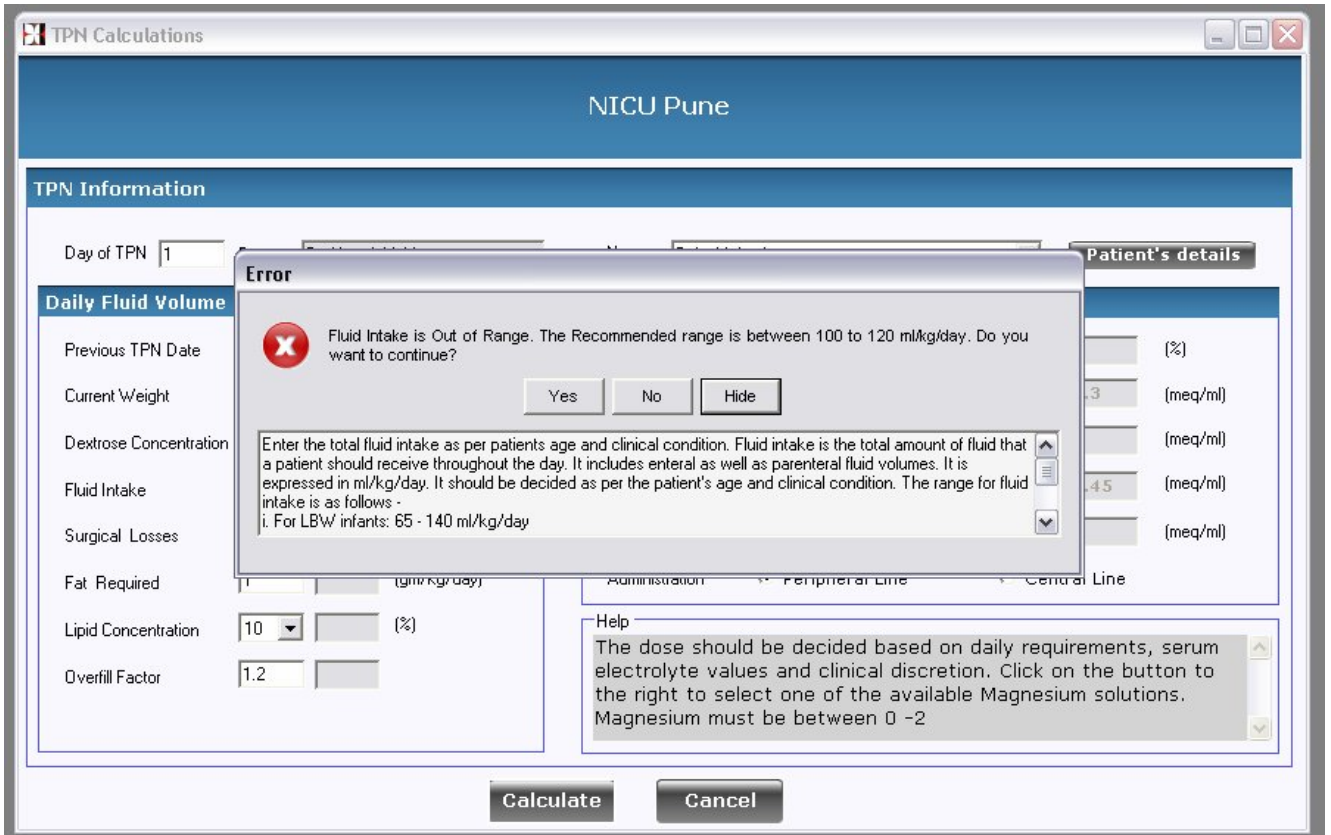


Figure 6

Selecting Marketing Additives


Amino Acids, Sodium Chloride, Potassium Chloride, Calcium, Magnesium, Multi-vitamins and Heparin form the Additives. Since there are various solutions available in the market with varying concentrations, the  button can be clicked to select among the various available marketing additives as shown in Figure 7.



Figure 7

Suppose the marketing additives are NOT available among the list of Marketing Additives, the administrator can add these additives. See 'Adding Marketing Additives' section.

NOTE: Heparin is added automatically **only** if the Central Administration is selected. Heparin is added as 1000 IU / ml.

NOTE: Multivitamins are added automatically depending on the weight.

Saving to Database

If all the inputs are within the correct range, the results are generated and displayed on the screen as shown in Figure 8.

Nutri Summary Sheet					
Fluid Volumes		Nutrient Volumes		Nutrient Intakes	
Total Fluid:	150 ml/kg/day	Dextrose:	316.5 ml	Dextrose 10 %:	294.5 ml
Surgical Losses:	0 ml	Conc. %:	9.9 %	Dextrose 50 %:	22 ml
TPN Volume:	360 ml	Fat:	24 ml	Fat:	1 gm/kg
Hyperalimentation Volume:	336 ml	CNR:	295.1	Amino Acid:	1.2 gm/kg
		DIR:	9.7 mg/kg/min	Sodium:	3 meq/kg
				Potassium:	2 meq/kg
				Calcium:	1.5 meq/kg
				Magnesium:	1 meq/kg
				Multivitamins:	1.5 ml/kg

Print Report Print Label Save Cancel

Figure 8

These results can be reviewed by the experts and evaluated if needed. This Output is divided into 3 parts:

Fluid Volumes is the column where all the fluid volumes calculated are shown like the Hyperalimentation Volume (HAV) and the Surgical losses.

Nutrient Volumes shows how much dextrose and fat will be contained in the HAV. The Carbon Nitrogen Ratio (CNR) and the Dextrose Infusion Rate (DIR) shows the ratios and the administration rate.

Nutrient Intakes is the column which shows the additive concentration. Dextrose 10% and Dextrose 50% are calculated based on an interpolation algorithm. This ensures that there is optimal use of both solutions as well as it ensures that the additives can be accommodated in the HAV.

After reviewing the results, you can print the report, print the label, save the data to database or cancel the results if they are not found satisfactory. If you save this to database, you can review the results at a later date.

NOTE: Only if you save the data, will you be able to review the inputs for reference later. It should also be noted that **only** the latest TPN calculation inputs will be available for review.

Printing reports and labels

Reports can be printed after clicking on the 'Print Report' or 'Print Label' buttons in the TPN Output results. Refer "Figure 8".

Administration Activities

Changing the password

It is advisable to change the administration password when the software is installed. This can be done from Administration → Change Password.

NOTE: The default password is tpn123

A dialog box titled "Change Password" with a close button (X) in the top right corner. It contains three text input fields: "Current Password", "New Password", and "Confirm Password". Below the fields are two buttons: "OK" and "Cancel".

Figure 9

Adding a new marketing additive

Marketing additives are nutrients available in the market which can be used to administer additives like Amino Acids, Calcium etc. Since new additives may be available as time goes by, you can add new marketing additives from Administration → Marketing Additives → Create


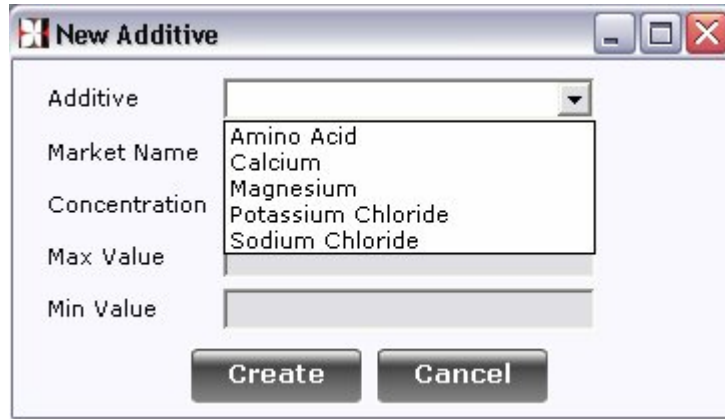
A dialog box titled "New Additive" with standard window controls (minimize, maximize, close) in the top right corner. It contains five text input fields: "Additive" (with a dropdown arrow), "Market Name", "Concentration", "Max Value", and "Min Value". Below the fields are two buttons: "Create" and "Cancel".

Figure 10

You cannot add any new additive. You need to select from the existing additives base name as to which Marketing Additive is available as shown in Figure 11.



The 'New Additive' dialog box contains the following elements:

- Additive:** A dropdown menu with a list of options: Amino Acid, Calcium, Magnesium, Potassium Chloride, and Sodium Chloride.
- Market Name:** An empty text input field.
- Concentration:** An empty text input field.
- Max Value:** An empty text input field.
- Min Value:** An empty text input field.
- Buttons:** 'Create' and 'Cancel' buttons at the bottom.

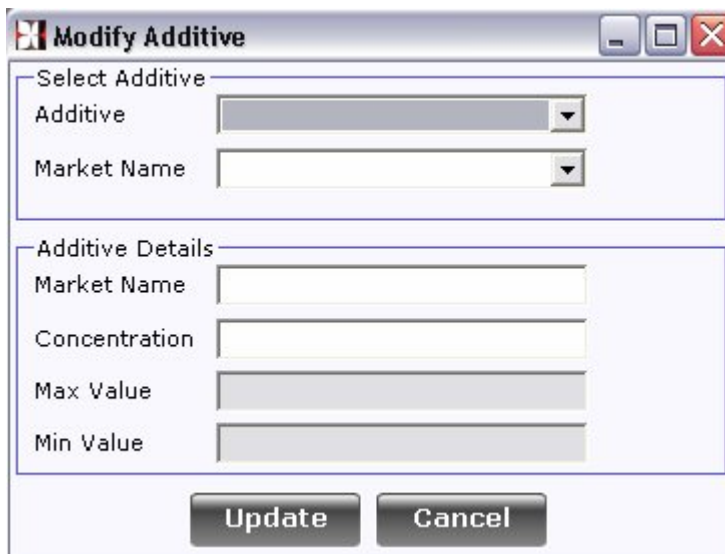
Figure 11

NOTE: Please note that different additives can have different Concentration. It is the onus of the doctor to ensure that the right concentration is entered as the Concentration value. These values can affect the calculation and hence it should be entered with a lot of precaution.

The Max Value and Min Value are the maximum and minimum allowed solution levels (in ml). These cannot be changed and have been certified by trained professionals.

Modifying a marketing additive

NOTE: Please proceed with extreme caution when modifying a marketing additive as the concentration value affects the calculation.



The 'Modify Additive' dialog box contains the following elements:

- Select Additive:** A section containing two dropdown menus: 'Additive' and 'Market Name'.
- Additive Details:** A section containing four text input fields: 'Market Name', 'Concentration', 'Max Value', and 'Min Value'.
- Buttons:** 'Update' and 'Cancel' buttons at the bottom.

Figure 12

Once you select which Additive and which Market Name needs to be modified, you can modify the name or the concentration as shown in Figure 13.

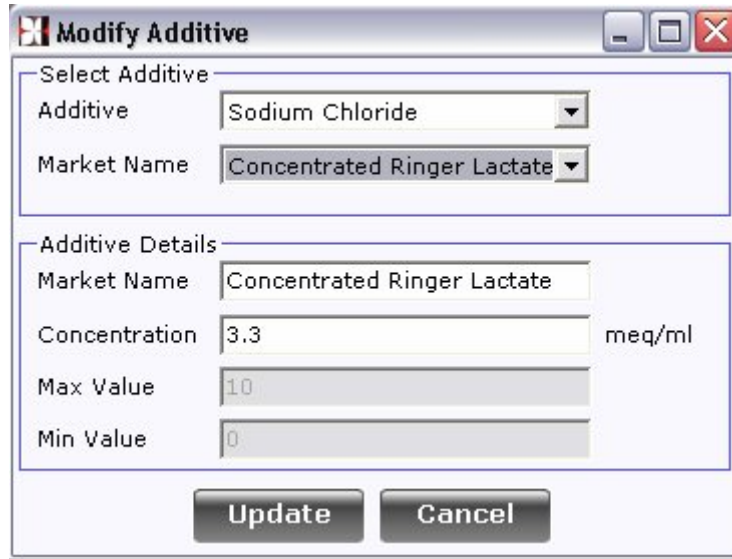


Figure 13

Seeing Help and Support information

To see the Help and Support information, click Help → About. In the About Screen, you can click on the ‘Support’ button to see the support information

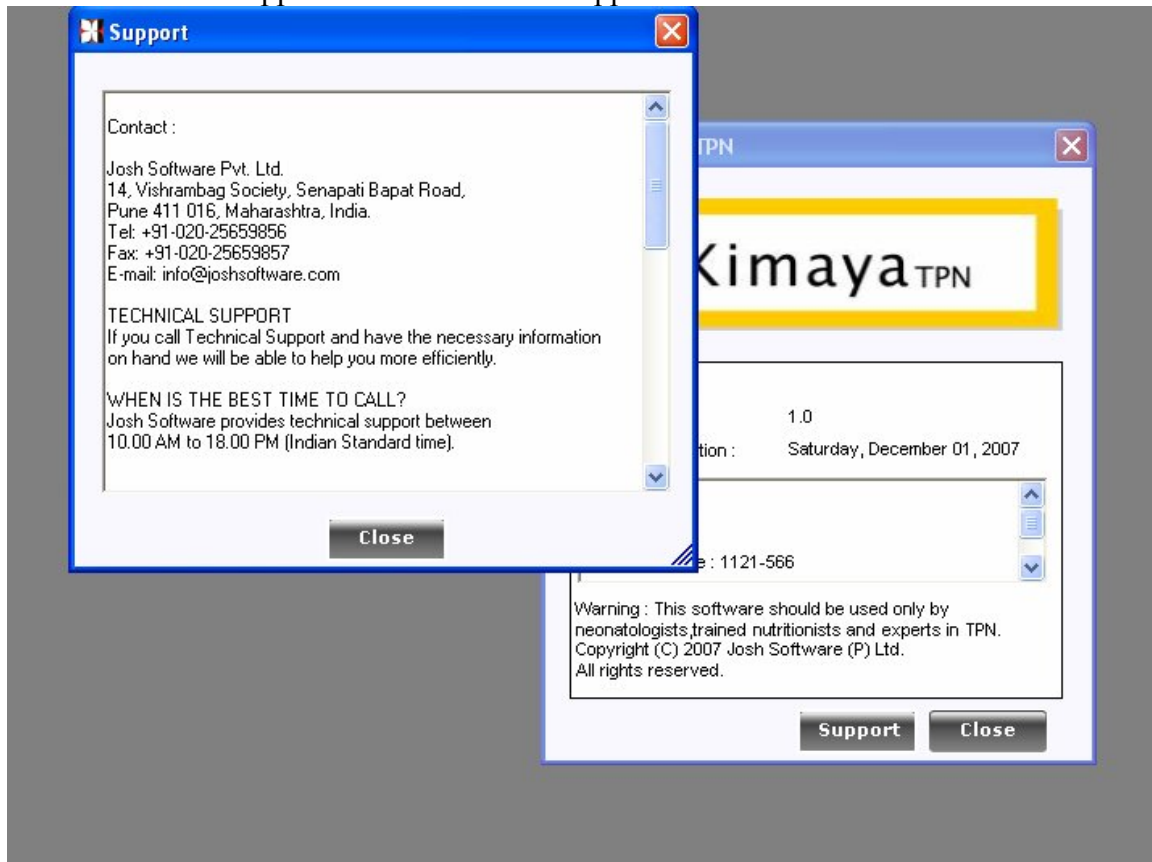


Figure 14

Licensing

Checking License Term

Depending on the term of your license, your product key will prompt you a month and a week before term expiry. Once the term expires, Kimaya TPN will not be functional. To see how many days are remaining for your license to expire, you can click on Help → Upgrade License.



Figure 15

Renewing the license term

If you want to renew your license, please do the following:

- Contact Josh Software Pvt. Ltd. using the given contact details.
- Please provide your current customer code and license key to customer support. These are available in the Help → About Window.
- Please enquire with support for the latest license term rates
- Please dispatch a Cheque in favor of 'Josh Software Pvt. Ltd.' for the preferred term.
- After the Cheque has cleared, we will dispatch the new product key to you via courier or email or any other preferred medium.

Once you have received the new key, please click on the 'Renew' button in Help → Upgrade License. Please enter the new key (in CAPITALS) in the License Window and click 'Upgrade'. The next time when the application is started, the new terms will be reflected.

NOTE: If you upgrade the product license before it has expired, the license term is extended beyond your current expiry date. For e.g., if you have taken a 1 year license,

and you upgrade after 6 months usage to another 1 year license, the license validity will be for 1 year and 6 months.

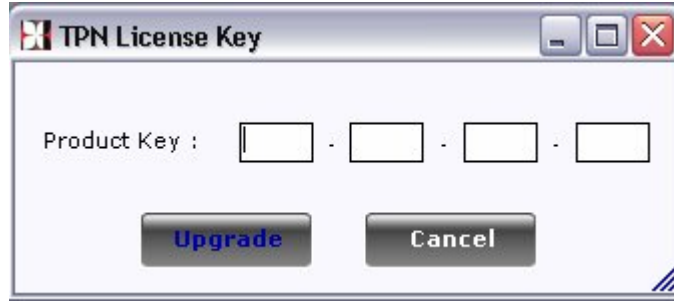


Figure 16

Trouble shooting

Cannot connect to Database. Please contact Administrator. Application will now terminate.

This error occurs when the database has not been configured correctly. This can happen if you already have MySQL database installed and it has a root password. Please see the Installation Guide 'Special Instructions if database is already installed'.

If the product still starts with the same error, please contact support.

A patient with the same name already exists. Do you want to Re-Enroll the patient? To Re-Enroll press 'YES' or To Enroll the patient press 'NO'.

Sometimes, patients may have the same name and sometimes the same patient may get enrolled twice! To ensure that these cases are catered to, the software checks if a patient of the same name already exists. In case, the patient record already exists, the doctor can RE-ENROLL the patient by clicking Yes.

If the patient is indeed a new patient, the doctor can click 'No' to create a new entry for this patient.

Changing Name of the Hospital

Suppose during installation, the Hospital Name was entered incorrectly or if the hospital name needs to be changed, this can be done. Please contact support for simple instructions on how to do this.

Forgotten administration password

If for some reason, the administration password is forgotten, it will not hamper the daily activities. Please contact support for instructions on how to reset the password.

NOTE: For all contact with the Support team, please keep the following information ready with you:

- Customer Code (from Help → About)
- Product Key (from Help → About)
- System Information like Operating System, Free disk space, etc.

Appendix

TPN Medical data

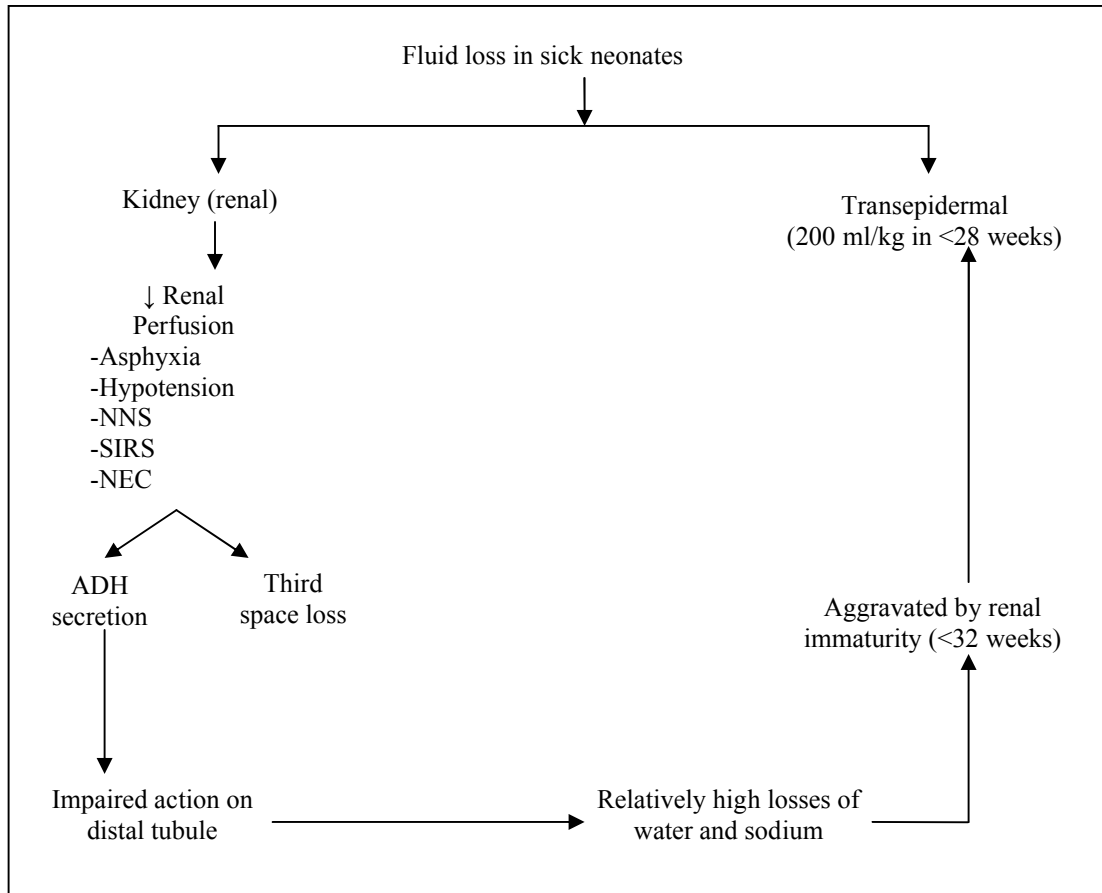
Indications for TPN

- Preterm and Very low birth weight neonates (Gestation <30 weeks and / or birth weight <1000g)
- Severe Intra Uterine Growth Retardation (IUGR)
- Critically ill neonates who cannot be fed orally or enterally
- Neonates with gastrointestinal malformation (like omphalecele, gastroschisis, intestinal atresia, volvulus, and Hirschsprung's Disease)
- Neonates at risk for Necrotising enterocolitis (NEC)
- Neonates on with respiratory distress syndrome and on ventilation
- Neonates who have undergone a surgery
- Other indications may include intractable, nonspecific diarrhea; extra corporeal membrane oxygenation (ECMO); congenital diaphragmatic hernia; and vasopressor support (e.g. dopamine, dobutamine). ECMO and vasopressor support may not be absolute

Components of TPN

Fluids:

Fluid management is important because most sick neonates require IV fluids. Appropriate fluid therapy ensures maintenance of homeostasis and assist recovery. After birth there is an increase in renal perfusion and glomerular filtration followed by diuresis. This results in loss of extracellular water and weight. The two main areas of fluid loss are the kidneys and transepidermal water loss. Thus preterm sick neonates are more prone to lose water and weight. In sick neonates fluid losses can be multi-factorial as shown in figure below.



Fluid therapy in special situations

Situation	Total fluid (ml/kg/day)	Watch for signs of
Patent ductus arteriosus	120	Heart failure
Bronchopulmonary dysplasia	120 – 140	Worsening oxygenation
Necrotizing enterocolitis	200	Hypotension, shock
Acute renal failure	400 + urine output	Fluid overload

(Gupte, 2006)

Energy:

Energy needs of a neonate are dependent on age, weight, rate of growth thermal environment, activity, hormonal activity, nature of feedings and organ size and maturation. A multitude of other factors can significantly increase the energy requirement including exposure to a cold environment, fever, sepsis, burns, trauma, cardiac or pulmonary diseases. Measurement of a true basal metabolic rate requires a prolonged fast and can not ethically be determined in VLBW infants; therefore, resting metabolic rate (RMR) is used to estimate energy needs, dietary induced thermogenesis, minimum energy expended in activity and the metabolic cost of growth. (Gupte, 2006 & Klaus, 2001)

With few exceptions ex. some cases of respiratory insufficiency, at least 60% of energy are provided by glucose. Up to 40% of calories may be provided by intravenous fat emulsions. During the acute phase of the disease, aim is to avoid catabolism and not growth. This is difficult in VLBW neonates due to higher requirements, poor stores and reduced intake.

Estimated energy expenditure in a growing preterm infant:

Factors	Kcal/kg/day
Energy expenditure	60
Resting metabolic rate	5
Activity	5
Thermoregulation	15
Synthesis	30
Energy stored	15
Energy excreted	13

(Gupte, 2003)

Carbohydrates:

Tolerance to glucose infusion varies, especially in VLBW infants. Infants with birth weight less than 1.0 kg should be started with glucose at 6 mg/kg/min and infants weighing 1.0 to 1.5 kg may initially receive glucose at 8 mg/kg/min. Once initial glucose infusions are tolerated, stepwise increase in glucose intake can be made. The maximum concentration of dextrose should not exceed 12.5% in a peripheral vein. It is the rate of glucose and not the dextrose concentration in the solution that determines the amount of dextrose provided to the infant. Insulin may be used to prevent hyperglycemia. (Klaus, 2001)

Practical considerations:

- Start glucose infusion on day 1. Begin with 6 mg/kg/min. For infants < 1000 g begin with 4 mg/kg/min
- Monitor dextrostix and uristix 6 – 8 hourly. Levels above 150 mg/dl should be correlated with laboratory values
- Increase glucose infusion by 12 mg/kg/min daily and assess tolerance
- Maximum dose reached by late second or early third week of therapy may be as high as 18 mg/kg/min
- Hyperglycemia and hyperosmolarity should be avoided
- Use isolyte P (Dextrose 5%) and build glucose concentration by adding 10 to 25% to it

(Guha, 2005s)

Proteins:

Protein needs to vary depending on gestational age, disease state, and method of nutrient delivery. Amino acid concentration in parenteral nutrition can influence nitrogen utilization as well as the metabolic response in a preterm, sick neonate. Histidine is necessary for protein synthesis and growth. Due to low or absent hepatic activity of cystathionase, cysteine is considered essential amino acid during fetal and infant growth. (cysteine is synthesized in vivo from methionine by enzyme cystathionase) Taurine is also considered an essential amino acid in neonates and its supplementation in preterm infant formula has shown to improve fat absorption, especially saturated fats, in LBW infants. Early introduction of amino acids results in positive nitrogen balance and greater nitrogen retention. (Klaus, 2001)

Practical considerations:

- Start early in critically ill small infants. Start with 0.5 g/kg/min on day 1
- Increase daily by 0.5 g/kg/day
- Watch for metabolic acidosis and azotemia while daily increments are being done
- Maximum dose that can be reached is 3.0 – 3.5 g/kg/day
- A calorie : nitrogen ration of 200 to 300: 1 should be maintained

(Guha, 2005)

Lipids:

Although use of intravenous lipid emulsions is currently accepted as an important component of TPN for LBE infant, controversy related to dosage, timing of first use and effect in lung function still exists. Essential fatty acid deficiency is a known complication in infants on fat free TPN. Manifestations of deficiency may be presented within first week of life and as early as day 2 or 3 in VLBW infants. Lipid emulsions are supplied as either 10% or 20% solutions providing 10 or 20g of triglyceride/dL respectively. Both contain same amount of egg yolk phospholipids emulsifier and glycerol.

Adverse side effects of intravenous lipid emulsions include: displacement of direct bilirubin from albumin binding sites, increasing risk of kernicterus, suppression of the immune system, coagulase-negative staphylococcal and fungal infection, thrombocytopenia, and accumulation of lipid in the alveolar macrophages and capillaries, subsequently altering pulmonary gas exchange. Careful monitoring of plasma triglyceride levels are therefore advised for babies administered fat emulsions.

(Klaus, 2001)

Practical considerations:

- Start with 0.5 g/kg/day. Infuse over 24 hours using a 20 percent solution
- Increase daily by 0.5 g/kg/day in the absence of lipemia
- Limit maximum to 3 g/kg/day
- Monitor serum triglyceride with each increment of lipid dose

- Continue weekly monitoring as long as the infant is on IV lipids
- Maintain triglyceride levels below 150 mg/dl
- Try and maintain a non-protein caloric balance between carbohydrate and lipid as approximately 60:40

(Guha, 2005)

Vitamins and minerals:

Various multivitamin and multi-mineral supplements may be added to the TPN solution for neonates to provide complete nutrition. The recommendations for the same are given below.

Recommended parenteral intake of vitamins for term and preterm infants

Vitamin	Unit	Term (daily dose)		Preterm (dose/kg/day)		
		ASCN (1988)	MVI Pediatric 1 vial = 5 ml	Consensus recommendation (1993)	ASCN (1988)	MVI Pediatric (40% of vial 2 ml/kg/day)
Fat soluble vitamins						
Vitamin A	IU	2300	2300	700 – 1500	1640	920
Vitamin D	IU	400	400	40 – 160	160	160
Vitamin E	IU	7	7	3.5 (max 7)	2.8	2.8
Vitamin K	mcg	200	200	8 – 10 (300 at birth)	80	80
Water soluble vitamin						
Pyridoxine	mcg	1000	1000	150 – 200	180	400
Vitamin B ₁₂	mcg	1	1	0.3	0.3	0.4
Vitamin C	mg	80	80	15 – 25	25	32
Biotin	mcg	20	20	5 – 8	6	8
Folic acid	mcg	140	140	56	56	56
Niacin	mg	17	17	4 – 6.8	6.8	6.8
Pantothenic acid	mg	5	5	1 – 2	2	2
Riboflavin	mcg	1400	1400	150 – 200	150	560
Thiamin	mcg	1200	1200	250 – 300	350	480

(Guha, 2005)

Recommended electrolyte and mineral parenteral intake in neonates

Nutrient	Preterm infant	Term infant
Sodium	50 mg/kg/day	2 mmol/kg/day
Potassium	80 mg/kg/day	2 mmol/kg/day
Chloride	70 mg/kg/day	2 mmol/kg/day
Calcium	180 mg/day	400 mg/day
Phosphorus	150 mg/day	300 mg/day
Iron	2 mg/day (after first 1 -2 months)	1 mg/kg/day (after 2 months)
Magnesium	15 mg/day	40 mg/day

(Gupte, 2006)

Recommended parenteral intake of trace elements for term and preterm infants

Trace element	Consensus recommendation (1993)		ASCN 1988	
	Preterm (mcg/kg/day) Transitional	Preterm (mcg/kg/day) Stable	Term (mcg/kg/day)	Preterm (mcg/kg/day)
Chromium	0 – 0.5	0.05 – 0.2	0.20	0.20
Copper	0 – 20	20	20	20
Iron	0 – 0.2	0.1 – 0.2	-	-
Fluoride	-	-	-	-
Iodide	1	1	1	1
Manganese	0 – 0.75	1	1	1
Molybdenum	0	0.25	0.25	0.25
Selenium	0 – 1.3	1.5 – 2.0	2	2
Zinc	150	400	250	400

(Guha, 2005)

Carnitine:

It is an essential co-factor for fat metabolism by B-oxidation. As preterm infant is born with limited stored for Carnitine, and may develop deficiency, it is recommended for LBW infants who may require TPN support over 2 or 3 weeks to increase tolerance to lipid emulsions. Dosage: 50 mg/kg/day for prolonged use and higher dose for short period.

Heparin:

Heparin may be added to TPN solution to avoid blockage of the intravenous line. (Klaus, 2001)

Administration

Peripheral parenteral nutrition (PPN) is the method to deliver all the required nutrients through peripheral veins whereas central parenteral nutrition (CPN) is the method to deliver nutrients by central venous catheter. Osmolarity of formulas for PPN should be less than 900 mOsm/L. Formulas of PPN contain low concentrated dextrose and amino acid along with concentrated calorie dense lipids. Lipids are an essential part of PPN. It has low osmolarity (260 mOsm/L) and therefore reduces the risk of thrombophlebitis in PPN. Peripheral route is used when PN has to be given for less than 7 to 10 days. If PN has to be administered for a long time, then central route is preferred. Hypertonic solutions (1000 – 1900 mOsm/L) can be given through CPN. For safe and adequate delivery of CPN, it is important to establish central vascular access with proper selection of type of catheter and site of insertion.

For neonates, Multiple bottle System of delivering nutrients is used. i.e. in this system separate bags infuse various required nutrients. For reducing number of connections and to avoid transfusion of multiple bottles simultaneously, mixture of amino acids and dextrose is infused by one bag and lipid is infused separately.

Kimaya TPN formulae

Total Fluid (ml)	Fluid Intake (ml/kg/day) * Current Weight (kg)
TPN Volume (ml)	Total Fluid (ml) - Feed Volume (ml) + Surgical losses(ml)
Fat Volume (ml)	FatVolumeIntake (gm/kg) * CurrentWeight (kg) / LipidConcentration (%)
Hyperalimentionation Volume (ml)	TPNVolume (ml) – FATVolume (ml)
PreparedOverFill (ml)	Hyperalimentionation Volume (ml) * OverfillFactor
AminoAcid (gm)	AminoAcidIntake(gm/kg) * CurrentWeight(kg) * OverfillFactor / AminoAcidConcentration (%)
Sodium Cholride (ml)	SodiumChlorideIntake (meq/kg) * CurrentWeight (kg) * OverfillFactor / SodiumChlorideConcentration (meq/ml)
Potassium Choloride (ml)	PotassiumChlorideIntake (meq/kg) * CurrentWeight (kg)* OverfillFactor / PotassiumChlorideConcentration (meq/ml)
Calcium (ml)	CalciumIntake (meq/kg) * CurrentWeight (kg) * OverfillFactor / CalciumConcentration (meq/ml)
Magnesium (ml)	MagnesiumIntake (meq/kg) * CurrentWeight (kg) * OverfillFactor / MagnesiumConcentration (meq/ml)
MVI	mviIntake * overfillFactor
Heparin (1000 IU /ml) (Only Central Line)	PreparedOverfill (ml) / 1000
Dextrose Volume (ml)	PreparedOverfill (ml) – Sum of Additives (ml)

Multi-Vitamins Lookup table

CurrentWeight < 1	0.75
CurrentWeight >= 1 & CurrentWeight < 3	1.5
CurrentWeight >= 3 & CurrentWeight < 10	2.5
Default	5

Administration

Dextrose Infusion Rate (DIR)	Hyperalimentionation Volume (ml) * PercentDextroseConcentration (%) / (24 * 60 * currentWeight (kg)) * 1000
FAT Calories	FATVolume * LipidConcentration * 9.0
CHO Calories	Hyperalimentionation Volume (ml) * DextroseConcentration * 3.4
CNR	(FATCalories + CHOCalories) / ((AminoAcid * AminoAcidConcentration) / 6.25)

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Feedback is valued and will help make better enhancements to the software. Please contribute with your suggestions and comments. Write to us at info@joshsoftware.com.

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