Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii
Vol. 22, issue 3, 2012, pp. 359-365

THE NUTRITION OF CRITICALLY ILL PATIENT ADMITTED IN INTENSIVE CARE UNITS- NURSING ISSUES

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ABSTRACT. Nutrition is a critical issue because, while the patient is at rest he is not in basal conditions. Energy consumption of the critically ill patient is higher than the basal one, and energy requirements are calculated using the correction factors for situations where the patient can be found. Assessment of nutritional status is critical to patient, depending on clinical and biological criteria. The energy requirements of the critically ill patient are in the neighbourhood of 25 kcal / kg / day, representing total calories, including protein intake. This is considered to be the reference value. Nutritional support given to critical patients contributes to reduced mortality, by replacing energy and tissue loss due to hyper catabolism.

Keywords: critical patient, parenteral nutrition, enteral nutrition, monitoring of critically ill patient

INTRODUCTION

Critical patient is defined as those patients who have increased risk of actual or potential life-threatening health problems.

Critically ill patient has high vulnerability and instability, imposing an intensive and complex care.

Critically ill patient has several key features involving specific care measures, since it is unconscious and may have multiple organ dysfunctions.

The critically ill patient is not in basal conditions, although it is at rest. To establish the nutritional needs is needed to start from the basal energetic requirements. Energy consumption of the critically ill patient is higher than basal and is calculated using the correction coefficients (factors) .

In Table. 1 are specified the correction coefficients (factors) for situations where you can find the critical patient.

Table I

Clinical status	Coeficientii de corectie [%]
Fever	38^0C = 110%
	39^0C = 120%
	40^0C = 130%
Mmedium surgical procedure	100-110%
Politrauma	140-160%
Sepsis	120-180%
Burn < 20%	100-120%
Burn 20-40%	150-180%
Burn 40-90%	180-205%

After G. Litarczek 2002[1]

Assessment of nutritional status of the critical patient depends on the clinical and biological laboratory results .

In Table 2 are central criteria for assessing the nutritional status of critically ill patient.

Table 2

Criterii clinice	**Criterii biologice (valori de referinta)**
• Body mass index of the patient: $G/l^2 \left[kg/m^2\right]$; • Adipose tissue thickness; • Arm Circumfference .	• Total proteins: 5,6-8,4 g/dl; • Albumins: 42±2 g/l • Prealbumine (transtiretine TTR) 310±35 mg/l • Transferine concentration: 2,8±0,3 g/l • (retinol binding protein) RBP: 62±7 mg/l

Nutritional objectives of the critical patient:

• Maximal results in minimum amount of time

• Adjusting the nutritional requirements to the present metabolism of the patient;

• Correcting deficiencies of micro and macronutrients;

• Linking the patient status to his nutritional needs;

• Preventing complications of any kind due to the nutrition used to feed the critically ill patient.

Problem description:

Critical patient cannot feed himself, so it needs to be fed by other means:

• Parenteral Nutrition,

• Enteral Nutrition

• The mixed diet (partial parenteral and enteral nutrition)

• mixed nutrition (partial parenteral and minimum enteral nutrition).

In critical patients, delaying granting the necessary caloric support leads to the consumption of the body reserves and is associated with a worse outcome.

Parenteral nutrition is recommended:

• In case of dehydration or bleeding - to restore the intravascular volume;

•To correct fluid, electrolyte and acid-base imbalances;

• During anaesthesia or surgery - prophylaxis of fluid disturbances.

Parenteral nutrition is provided with:

• crystalloid solutions - they have small molecule and pass through semipermeable membranes, are distributed between the intravascular and extravascular space. Do not enter in the intracellular space. Crystalloid solutions do not give allergic reactions. 2

• colloidal solutions - containing high molecular weight molecules that cannot pass through semipermeable membranes. These solutions are used to restore volume expansion (1.5 g / kg corp/24 hours); because they have a higher colloid-osmotic pressure than plasma they remain longer in the vascular space, compared with crystalloid solutions. 2

Crystalloid solutions are:

- Molecular
- Ion containing

In Table. 3 are ion containing crystalloid solutions:

Table 3

Solutii cristaloide ionice[5]	
NaCl 9‰	3l can be given. Greater amounts of 3l, can induce hyperchloremic acidosis due to excess chlorine intake (154 mmol / l) compared with its serum concentration (103 mmol / l).
Ringer solution	Composition is more than physiological saline. It contains ions of Na, Cl, K, Ca.
Ringer lactat solution	Contains ions of Na, Cl, K, Ca and lactate in varying compositions. These alkalizing by transforming in bicarbonate.

In Table. 4 the molecular crystalloid solutions:

Table 4

Solutii cristaloide moleculare[5]	
Glucose solution 5%	Is isotonic (252 mosmol / l). Indicated for treatment of dehydration, hyperkalemia, hypersodemia. Contraindicated for restoring volume expansion.
Glucose solutions 10%-70%	Suitable for energy intake.
Administration: - 5% glucose solution and 10% will be given on peripheral vein. - glucose solution with concentration> 10% is given by a central catheter because irritate intimate vein. Administered iv if used for correcting hypoglycaemia. - Glucose solutions require a buffer with insulin 1U insulina/5g insulina/2g glucose for diabetics. Speed of administration 0.5 g / kg / hour.	
Saline hypertone solutions (3%, 5%, 7,5%, 10%)	Indicated in the treatment of hiposodemia, cerebral oedema, to reduce preoperative infusion of large volumes of fluid.
Na bicarbonate solutions (4,2% semimolar, 8,4% molar)	Indicated in metabolic acidosis, in order to alkalinize the urine.
KCl solution (4% , 7%)	Indicated to correct hypokalemia.
Manitol (10%, 15%, 20%)	Indicated in acute renal failure and cerebral oedema.

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In Table. 5 we present the colloidal solutions:

Table 5

Coloidal solutions[5]	
Dextran 6% **Dextran 10 %** The mode of action of dextran solutions is by drawing water from interstitium and cells (1 g dextran fixes 20 ml water).	• • turns on coagulation factor VIII; • • Reduces platelet aggregation • • The positive effects on the microcirculation improving it; • • Before administration is mandatory blood typing because dextrane interferes with the agglutination reaction; • • Can cause allergic reactions or anaphylaxis.
Gelatin derivatives. 1. oxipoligelatine (Gelofundiol 2. conjugated with urea (Haemocel) 3. succinilated (modified fluid gelatine) - Gelofusine.	• The fluid expansion is lower than dextrans and lasts 3-4 hours; • No toxicity • Not interfere with the agglutination reaction; • Can cause allergic reactions.
Hidroxietilamidone	• • The effect of volume expansion takes 4-6 hours and is 130-150% • • There is not metabolized in the body • • It's eliminated through kidney; • • Low molecular weight preparations (130000-200000 D) are commonly used; • • Preparation with high molecular weight (450000-480000 D) may cause adverse effects on coagulation.

Enteral nutrition is defined as any form of eating that uses the gastrointestinal tract.

An enteral diet is considered to be more physiological and having fewer complications for the patient than administration of parenteral nutritional support. Complications of enteral nutrition are fewer than those of parenteral nutrition.

The start of enteral or parenteral nutrition is when is anticipated within 3 days after admission that the patient is unable to resume oral feeding. Start of enteral or parenteral nutrition should be done early within the first 24 hours after admission to TI.

Enteral nutrition is the preferred route for administration in:

• critical patients, hemodynamically stable and with a functional digestive tract;

• preferably in patients who tolerate enteral nutrition in nearly the quantity required and when parenteral nutrition is not indicated

• associated with parenteral nutrition in patients who did not reach the caloric requirements after 2 days from starting the enteral nutrition;

• suitable for malnourished patients with chronic diseases or in combination with parenteral nutrition.

It is not indicated in recent interventions upon digestive tract, massive GI bleeding and in the absence of intestinal transit 4, 5,8,9,10

Nutritional requirement is calculated:

• depending on energy needs at rest;

• depending on the energy consumption related to associated affections;

• depending on the patient's nutritional status.

The ways of achieving enteral nutrition are:

• the nasogastric tube;

• the naso-duodenala tube;

•the nasojejunala tube - that are placed intraoperatively;

• by surgically done jejunostoma;

•by faringostoma, esofagostoma, surgical gastrostomy, percutaneous endoscopic gastrostomy.

If enteral nutrition is required the tube will always be placed under the place of obstruction.

Nutritional needs for the critically ill patient is presented in Table. 6.

Necesarul nutritionalrequirements [2,3,4,5,6,7]	
caloric nedds: 25 kcal/kg corp x correction factor	Caloric requirement consists of: • ENERGY SUBSTRATE: ¬ Carbohydrates; ¬ Fat: 30-50% - depending on the pathology.
proteinerequirements : 0,8-1,5 g/dl	Proteine needs are : ➢ Lower limit in renal or hepatic failure; ➢ Higher limit in proteinuria, plasmoragia, etc.

Nutrients are represented by macronutrients and micronutrients and are presented in Table. 7.

Table 7

Macronutrients		**Micronutrients**
Type	Dose	*vitamines si oligoelements – which are found in pharmaceutical nutritional products.*
Proteine	0,8-1,5 g/kg corp ideal weight /day	
Glucides	Max. 5g/kg ideal body weight/day	Caracteristics: • osmolarity approx 300 mosm/l, • contains 1 sau 1,5 kcal/ml, • 5-7-9 g N la 1000 ml.
Lipides	1-1,5 5g/kg ideal body weight/day	
water – vehicle for the foods used in enteral nutrition	30-40 ml/ kg kg ideal body weight/day Or a function of hidric balance	Pharmaceutical products contain all the required nutrients: proteins, carbohydrates, lipids, fibres, electrolits, vitamines, oligoelements. Examples: Fresubin®, Pulmocare®, Survimed®, Ensure®.
Minerale:	Na^+ 90-150 mEq/day	
	K^+ 60-90 mEq/day	
	Ca^{2+} 1000 mg/day	
	P^+ 1000 mg in nutritional intake	Mg, F, Mb, Se, Cu, Mn

A special class of products used in enteral nutrition of critically ill patient is the officinal products (kitchen). They are milled products, dissolved or suspended in water. They are administrated by the nutritional tube.

In table. 8 are summarized the components of kitchen products.

Table 8

Products are sodou and soup kitchen and they include:
• Protein: milk, egg whites, ground meat, peas.
• Fats: olive oil, sunflower, soybean, corn.
• Carbohydrates: starch, sucrose, lactose, fructose.
Standard for protein is white egg (100%).

Energy needs of critically ill patient are in the neighbourhood of 25 kcal / kg / day total representing total calories , including proteins.2 This value despite being widely discussed and analyzed, while remains a reference value.

Research advocates for the supplementation of the enteral nutrition with parenteral one for critically ill patient in order to achieve as early after admission to ICU the caloric needs.

It should be noted that overnutrition often have devastating effects on patient prognosis and is needs to be avoided.3

In critically ill patient, increased synthesis of stress hormones and inflammatory mediators inhibits the anabolic effect of insulin and amino acids, which inevitably leads, together with bed rest (physical inactivity), towards important loss of muscle mass in patients with severe trauma or sepsis despite aggressive nutritional support.

A protein intake above 1.3 to 1.5 g / kg ideal body weight / day did not further stimulate protein synthesis, but may increase the degree of nitrogen retention and even can cause renal failure.

Glutamine, albumin and cholesterol are considered biomarkeri.2 This is explained by the fact that in critical patients there is an imbalance between the synthesis capacity in the skeletal muscle of this product and the need for glutamine in the liver and immune cells.

Enteral nutrition can be achieved in 3 ways:

• Continuous nutrition - made with pharmaceutical products for enteral nutrition..4

• Nutrition in boluses Food - made with milled officinal products, dissolved or suspended in water which are administrated by feeding tubes.4

• Intermittent enteral nutrition (cyclic) - nutrient administrated continuously, 16 hours / day. Alimentation is done with a pause of 8 hours (night pause) 4

MATERIALS AND METHODS

The paper was taken to study the situation of patients admitted to ICU ward at Emergency County Hospital Arad, in the period 01.01.2012 - 31.03.2012.

We analyzed the following:

- the nutrition of patients admitted to ICU ward;
- distribution of patients in function of condition of critical patients;
- tolerance to mixed diet;
- evolution, weight and complications of parenteral, enteral and mixed nutrition,.

Admissions situation to ICU ward in the surveyed period is shown in Table 9.

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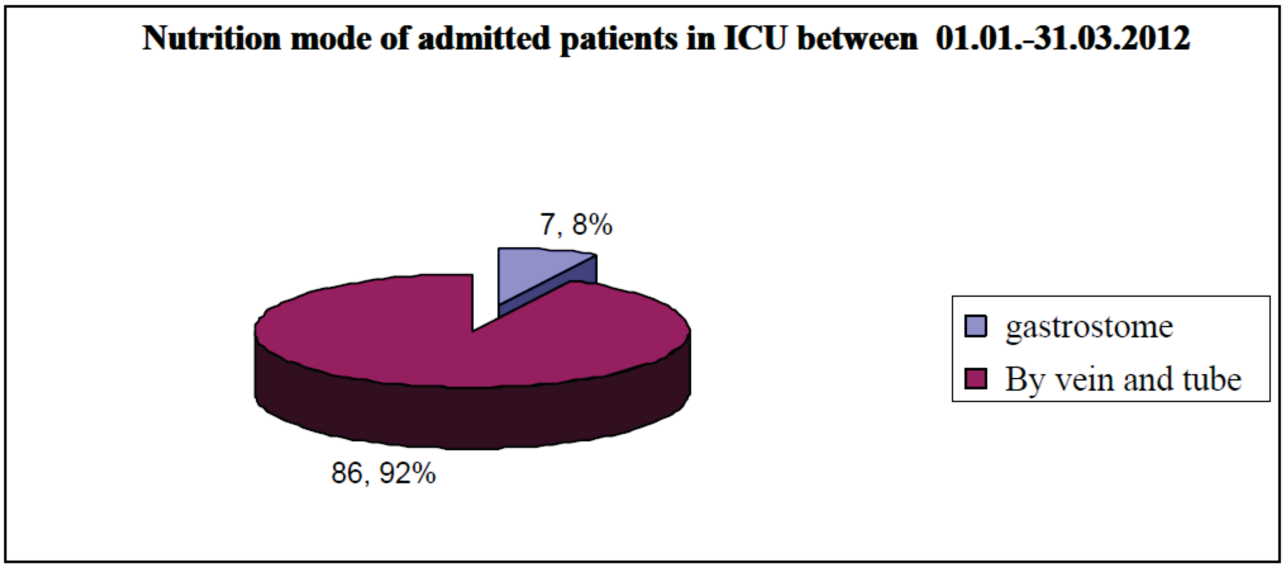
Table 9

Patients admitted to the ICU ward SCJU Arad during 01.01.2012 - 31.03.2012 period	370
Critical patients	93
Patients fed with mixed nutrition (partial enteral - nasogastric tube and parenteral - IV)	86
Patients fed enterally (through surgical gastrostome)	7

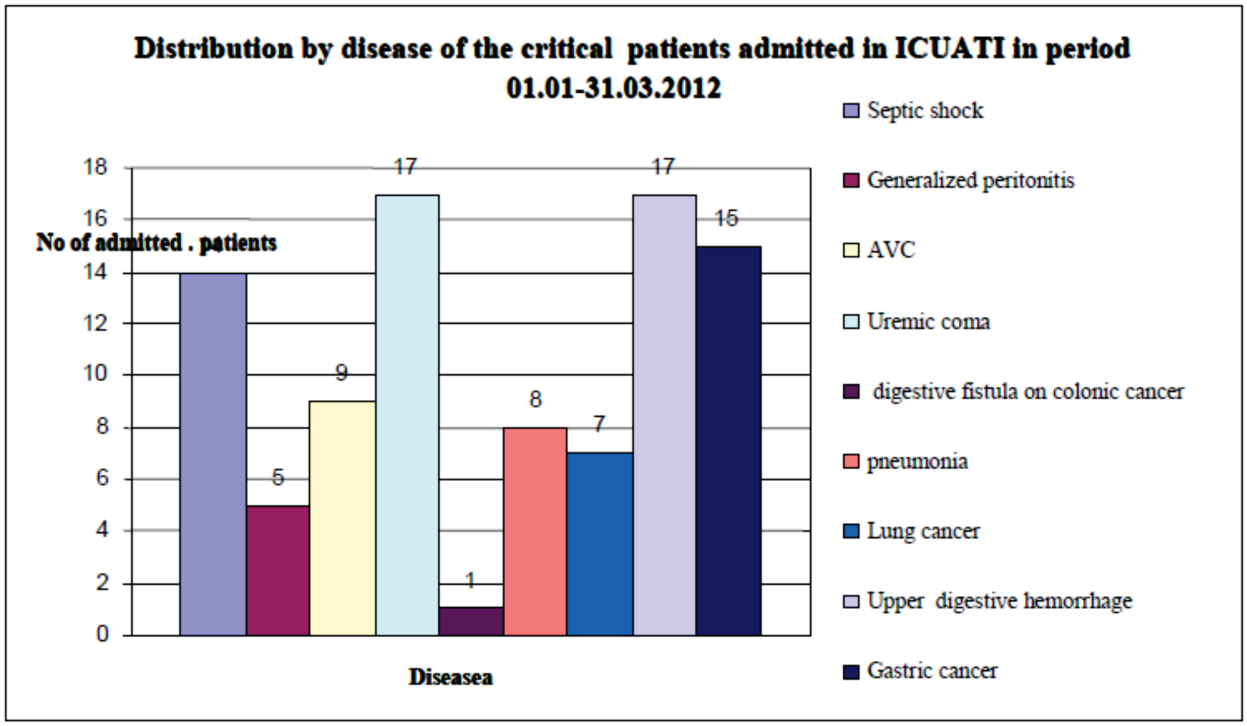


From the graphical representation can be seen that a relatively small number of patients (7 of 93 critically ill patients admitted, ie 8%) were fed enterally by gastrostomy, (86 of 93 hospitalized, ie 92%) were fed mixed - enteral and parenteral.

Distribution of the critical conditions of patients admitted to ICU between 01.01.-03.31.2012 is presented in Table. 10.

Table 10

Disease	**No. admissions**	**Percent per disease**
toxic-septic shock	14	15%
generalized peritonitis	5	5%
Stroke	9	10%
uremic coma	17	18%
Digestive fistula due to colonic cancer	1	1%
pneumonia	8	9%
pulmonary cancer	7	8%
Upper digestive haemorrhage	17	18%
gastric cancer	15	16%
TOTAL:	93	100%



The graphical representation is seen that most of the patients admitted to TI during the surveyed period had digestive fistula secondary to colonic cancer.

The following parameters were studied:

•Daily evolution;

• Weight;

•Nutritional complications.

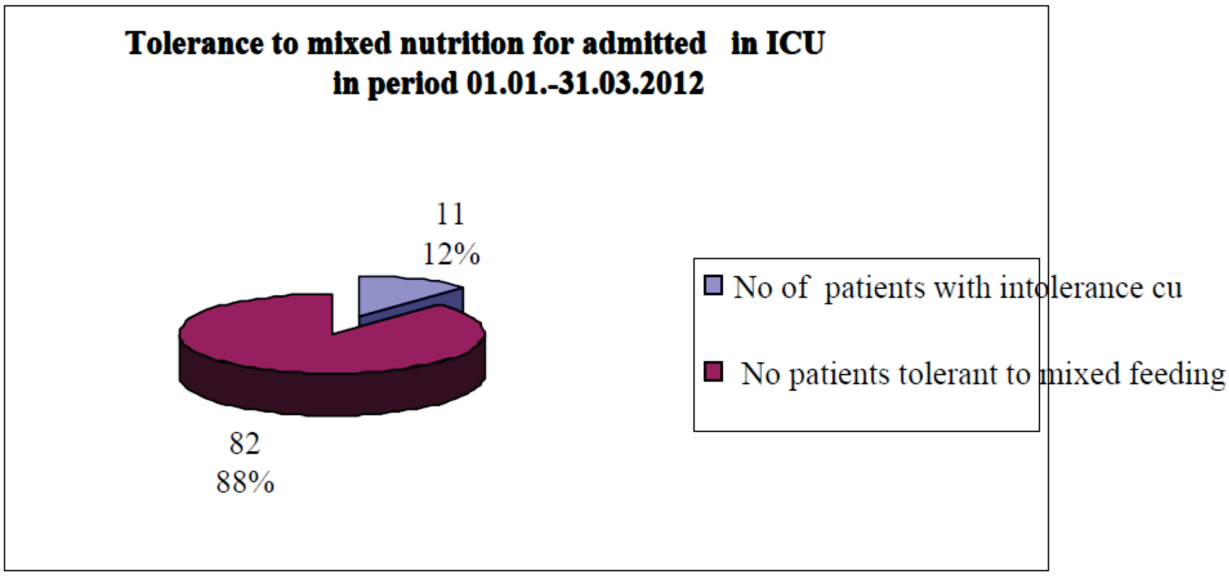
After studying these parameters we were able to draw the following conclusions:

- the weight of critical patients decreased on average by 10-13% for all 93 hospitalized patients , (100%)

- nutritional complications occurred by nausea and vomiting present in 11 -12%

- the remaining 82 patients had good tolerance to enteral or mixed nutrition (88%).

Graphically, these conclusions are presented in Fig. 3.



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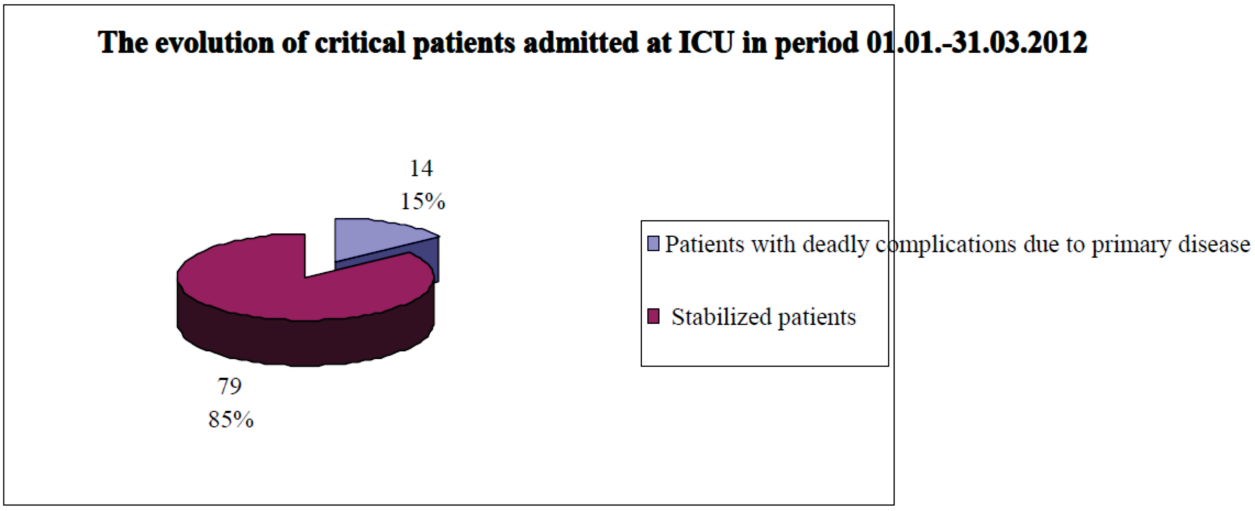
Despite all the efforts made by medical personnel 14 from 93 patients died from the complications of primary disease but not from complications due to nutrition.

Graphically, the situation is represented in Fig. 4.



From the graphical representation can be seen hat from 93 critical patients admitted, 79, (85%) had been evolving to cure or stabilize, and 14 patients, (15%) died.

The role of nurses in terms of nutrition in intensive care patients:

• Respects the process indicated by the physician and announces the complications that can occur during hospitalization;

• Respect and support the rights of patients;

• intervenes in the interest of the patient following the physicians' indications;

• Help patients to achieve the necessary care, does this with professionalism;

• Respect the values, beliefs and the rights of patients;

• Educates and support the person designated to make the decisions regarding the patient;

• Represents the patient according to his options;

• Facilitates for patients who cannot communicate the required emergency measures;

• Monitor and keep the quality of healthcare given;

• Acts as an link between family, patient and medical team.

CONCLUSIONS

1. Critically ill patient is at increased risk of problems that threaten his life. It's been noted that a small number of patients were fed enterally (1.89%) and 23.24% were fed mixed - enteral and parenteral.

2. Just one patient (1%) had a digestive fistula secondary to colon cancer.

3. Nursing measures that apply to ICU departments are in strict compliance with procedures, with speed and professionalism, respecting the physician indications.

4. Nutritional support which is given to critical patients leads to reduced mortality by replacing energy and tissue loss due to hypercatabolic states.

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