

Practical challenges in Nutritional Support of Pre & Post Liver Transplant

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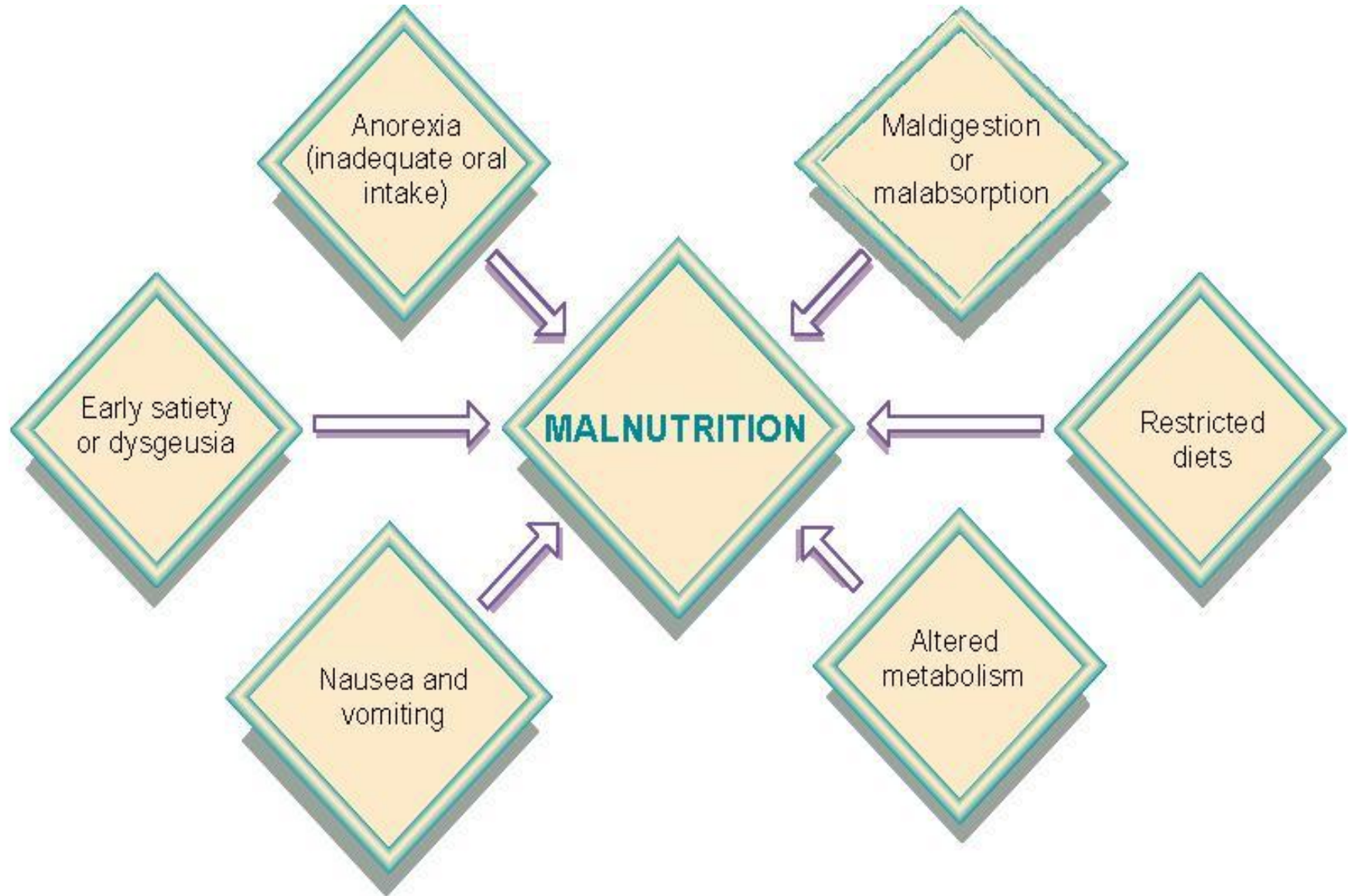
Apollo Hospitals, Chennai

Prevalence of Malnutrition

- 20% - Compensated liver disease
- >80% - Decompensated liver disease
- 100% - Await Liver Transplant

Antonio J. Sanchez; Mayo Clinic Foundation, 2006

Malnutrition in CLD - Cause

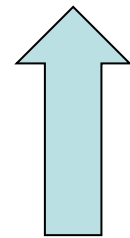


Algorithm content developed by John Anderson, PhD, and Sanford C. Garner, PhD, 2000. Updated by Jeanette M. Hasse and Laura E. Matarese, 2002.

Abnormalities of
metabolism

Poor nutrient
intake

MALNUTRITION



Morbidity

Mortality

Malnutrition in CLD - Cause, Etiology

Causes	Etiology	
Reduced nutrient intake	Decreased Intake and anorexia	<ul style="list-style-type: none">• Unpalatable Diets (Na & H₂O restriction)• Disgeusia due to micronutrient deficiencies (Zn or Mg)• Anorexia effect caused by increased levels of proinflammatory cytokines and leptin

Malnutrition in CLD – Cause, Etiology

Causes	Etiology	
Reduced nutrient intake	<ul style="list-style-type: none"> •Nausea & early satiety 	<ul style="list-style-type: none"> •Tense Ascites •Gastroparesis •Small bowel dysmotility •Bacterial over growth
	<ul style="list-style-type: none"> •Starvation 	<ul style="list-style-type: none"> •Hospitalization •Invasive diagnostic procedure requiring fasting •Gastrointestinal bleeding and endoscopic therapies
Reduced Intestinal absorption	<ul style="list-style-type: none"> •Maldigestion •Bacterial over growth •Diarrhea 	<ul style="list-style-type: none"> •Pancreatic insufficiency in Alcohol abuse and /or Cholestasis) •Drugs (i.e., nonabsorbable disaccharides, antibiotics and cholestyramine)

Malnutrition in CLD – Cause, Etiology

Causes	Etiology	
Altered Metabolism/ Expenditure	<ul style="list-style-type: none">•Protein Catabolism •Increased energy expenditure •Insulin resistance•Increase fat turnover	<ul style="list-style-type: none">• Reduced hepatic protein synthesis and increased protein breakdown•During ascites and bacterial infections•Hepatocellular carcinoma•Hyperinsulinemia and reduced nonoxidative glucose metabolism•Increased lipolysis due to more rapid transition to starvation•Fats are utilized as alternative energy source

Altered metabolism

CHO

- Increased
 - ✓ Catabolic hormones (as not degraded by liver)
 - ✓ Gluconeogenesis
- Decreased
 - ✓ Post prandial glucose storage
 - ✓ Glycogen stores (accelerated starvation)

Accelerated Starvation

Fat – major substrate for energy

72hrs of Starvation
(Normal adult)

Vs

Overnight fast
(Cirrhotic pt)

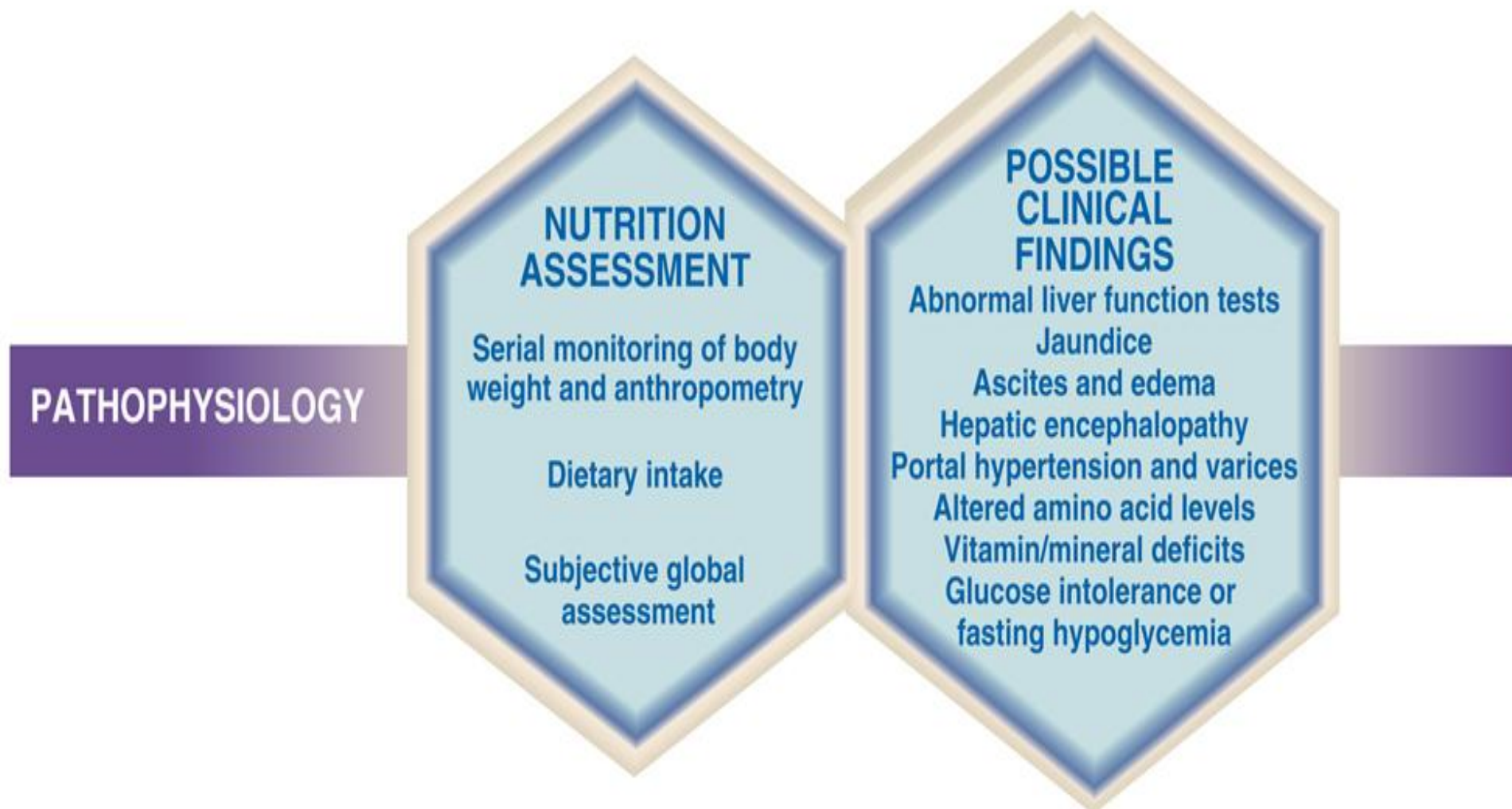
Fat & Muscle
Breakdown

Increases Gluconeogenesis → Muscle Wasting

Altered metabolism

Protein	<ul style="list-style-type: none">• Imbalance in BCAA and aromatic amino acids✓ Expected Ratio – 3.5:1✓ Decreased to 1:1<ul style="list-style-type: none">- increased cerebral uptake of aromatic amino acids- promoting the synthesis of false neurotransmitters• Muscle wasting
Fat (preferred fuel)	<ul style="list-style-type: none">• Nocturnal fat metabolism - impaired synthesis PUFA from EFA• Decreased PUFA associated with severity of malnutrition

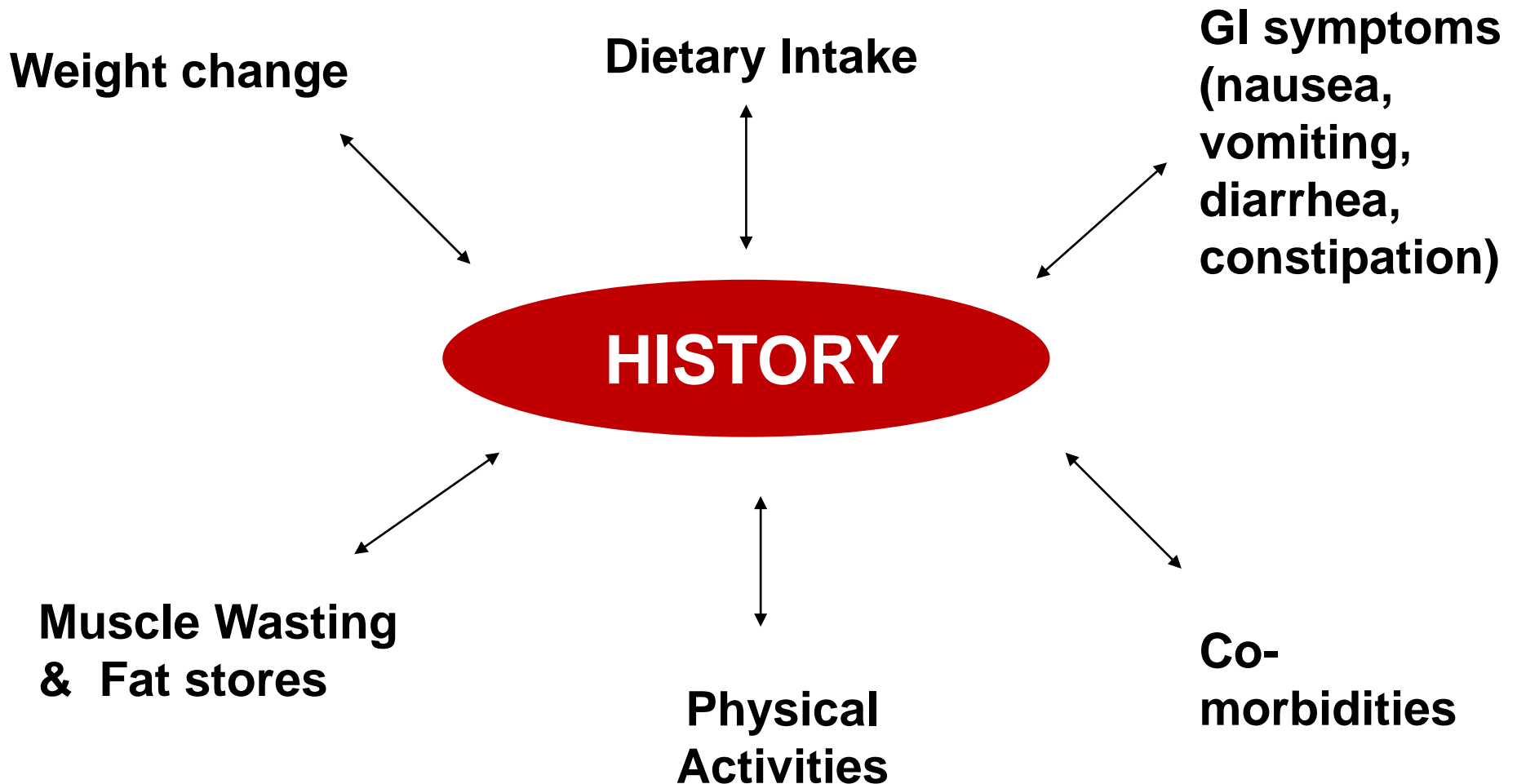
Malnutrition in CLD - Pathophysiology



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Nutrition Assessment

Subjective Global Assessment (SGA)



cont...

Patients Label

SUBJECTIVE GLOBAL ASSESSMENT (ADULTS)

(A) Patient 's related medical history							
1. Weight change (overall change in past 6 months)							
1		2		3		4	5
No weight change or gain		Minor weight loss <5%		weight loss 5-10%		weight loss 10-15%	weight loss >15%
2. Dietary Intake (Duration)							
1		2		3		4	5
No Change		Sub-optimal solid diet		Full liquid diet or moderate overall decrease		Hypo-Caloric liquid	Starvation
3. Gastrointestinal Symptoms (Duration)							
1		2		3		4	5
No symptoms		Nausea		Vomiting or moderate GI symptoms		Diarrhoea	Sever anorexia
4. Functional Capacity (Nutrition related functional impairment)							
1		2		3		4	5
None / improved		Difficulty with ambulation		Difficulty with normal activity		Light activity	Bed/chair-ridden with no or little activity
5. Co-morbidity(Disease and its relationship to nutritional requirements)							
1		2		3		4	5
Healthy		Mild co-morbidity		Moderate co-morbidity or age > 75 years		Severe co--morbidity	Very severe multiple co-morbidity
(B) Physical Examination							
1. Decreased fat stores or loss of subcutaneous fat							
1		2		3		4	5
Normal (no change)				Moderate			Severe
2. Signs of muscle wasting							
1		2		3		4	5
Normal (no change)				Moderate			Severe

Total Score = Sum of above 7 components	
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Nutritional Status: Based on this score patient is :

- Well nourished**
- Moderately malnourished**
- Severely malnourished**

- 7-14 - Well nourished
- 15-28 - Moderately malnourished
- 29-35 - Severely malnourished

Height _____ cms

Current weight _____ kg.

Dietitian

Date

Guidelines for estimating fluid weight (kg)

Category	Ascites	Odema
Minimal	2.2	1.0
Moderate	6.0	5.0
Severe	14.0	10.0

- Grade 1 (mild). Ascites is only detectable by ultrasound examination.
- Grade 2 (moderate). Ascites causing moderate symmetrical distension of the abdomen
- Grade 3 (large). Ascites causing marked abdominal distension.

Fluid retention in ESLD & relevance to nutrition

- Impairs food intake
- Energy expenditure increases
- Negative nitrogen balance

Factors influencing the accuracy of common indices used for nutritional assessment

Body weight	<ul style="list-style-type: none">•Water restriction and fluid accumulation•Changes in body composition
Visceral proteins	<ul style="list-style-type: none">•Decreased liver synthesis•Increased volume of distribution
Anthropometry	<ul style="list-style-type: none">•Fluid retention
Immunological status	<ul style="list-style-type: none">•Hypersplenism•Abnormal immunological reactivity
Creatinine excretion	<ul style="list-style-type: none">•Renal insufficiency
Bioelectrical impedance analysis	<ul style="list-style-type: none">•Presence of ascites

Nutritional Goals

- Correct malnutrition
- Prevent metabolic complications
- Improve quality of life
- Reduce Perioperative complications
- Nutrition education – Individual care plan

Nutritional Management - CLD

- Energy: 35 to 40 kcal/kg dry weight
BEE x 1.2 to 1.3, depending on degree of malnutrition
CHO: 60 – 70 % of cals as complex & simple CHO
- Protein: 1.2 to 1.5 g/kg dry wt depending on degree of malnutrition, malabsorption, metabolic stress
 - To maintain
 - Muscle mass
 - Protein levels in the blood

ESPEN Guidelines on Enteral Nutrition: Liver disease 2006

Nutritional Management - CLD

- Hepatic Encephalopathy
 - BCAA formula
- Fat: 25% to 40% of kcal
- Electrolytes: restrict sodium with edema or ascites (2 - 4 g/day)
- Fluid: restrict fluid if hyponatremia is present
- ***Individualized***

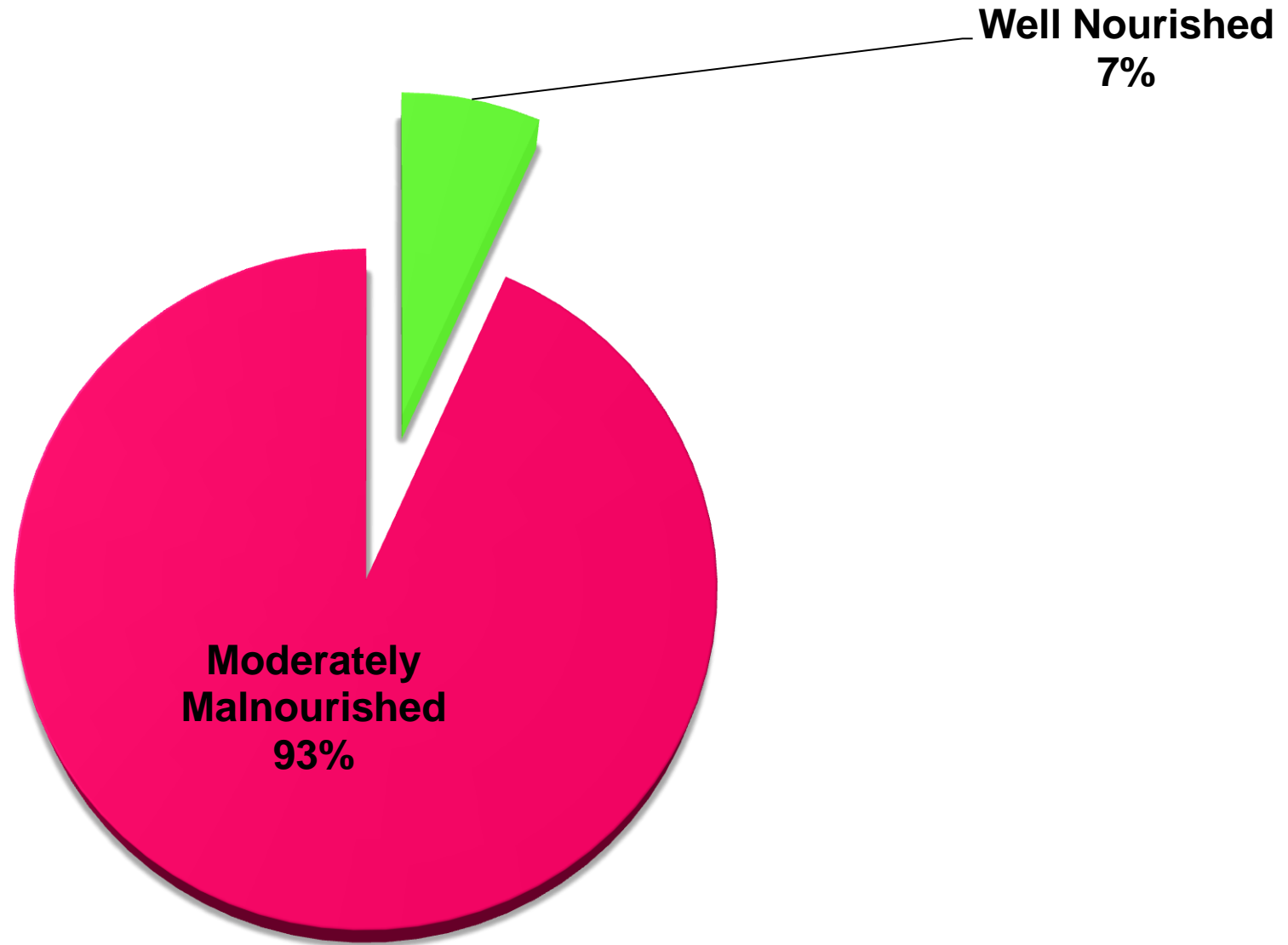
Practical Difficulties in meeting Nutrition Prescription

- Study Design** : Single Center,
Prospective study
- Study Duration** : May to August 2013
- Setting** : Liver ICU, Tertiary care
hospital, Chennai
- Study Population** : **ESLD**
- Data Collected** : Baseline demographics
Nutritional status
- Subjective Global Assessment (SGA)
 - Nutrition Data

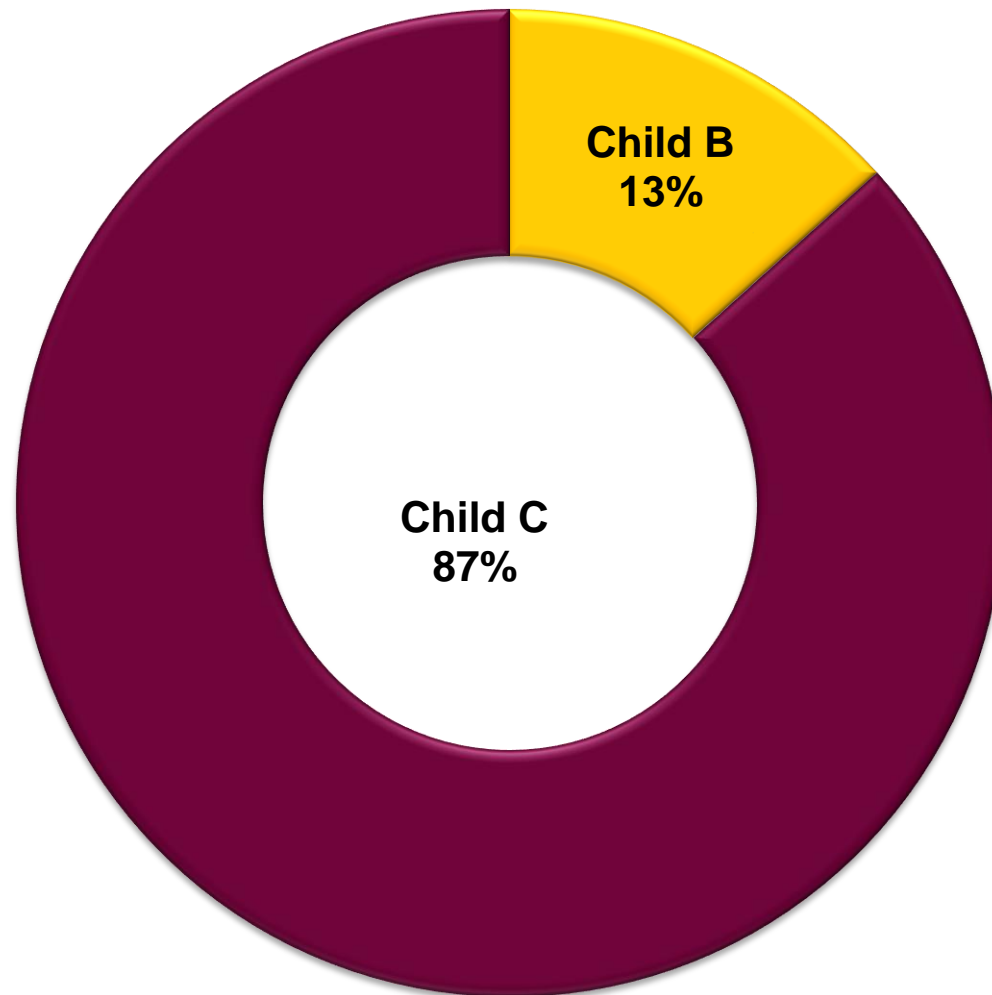
Baseline Demographics

	Mean \pm Std	Range
Age (yrs)	45.4 \pm 9.32	30 - 58
Height (cms)	168.5 \pm 10.6	157 - 180
Weight (kg)	75.3 \pm 17.01	36 - 94
BMI (kg/m ²)	26.45 \pm 5.08	14.61 - 32.86
MAC (cms)	26.08 \pm 4.25	18 - 32
MELD	19.6 \pm 4.46	11 - 23

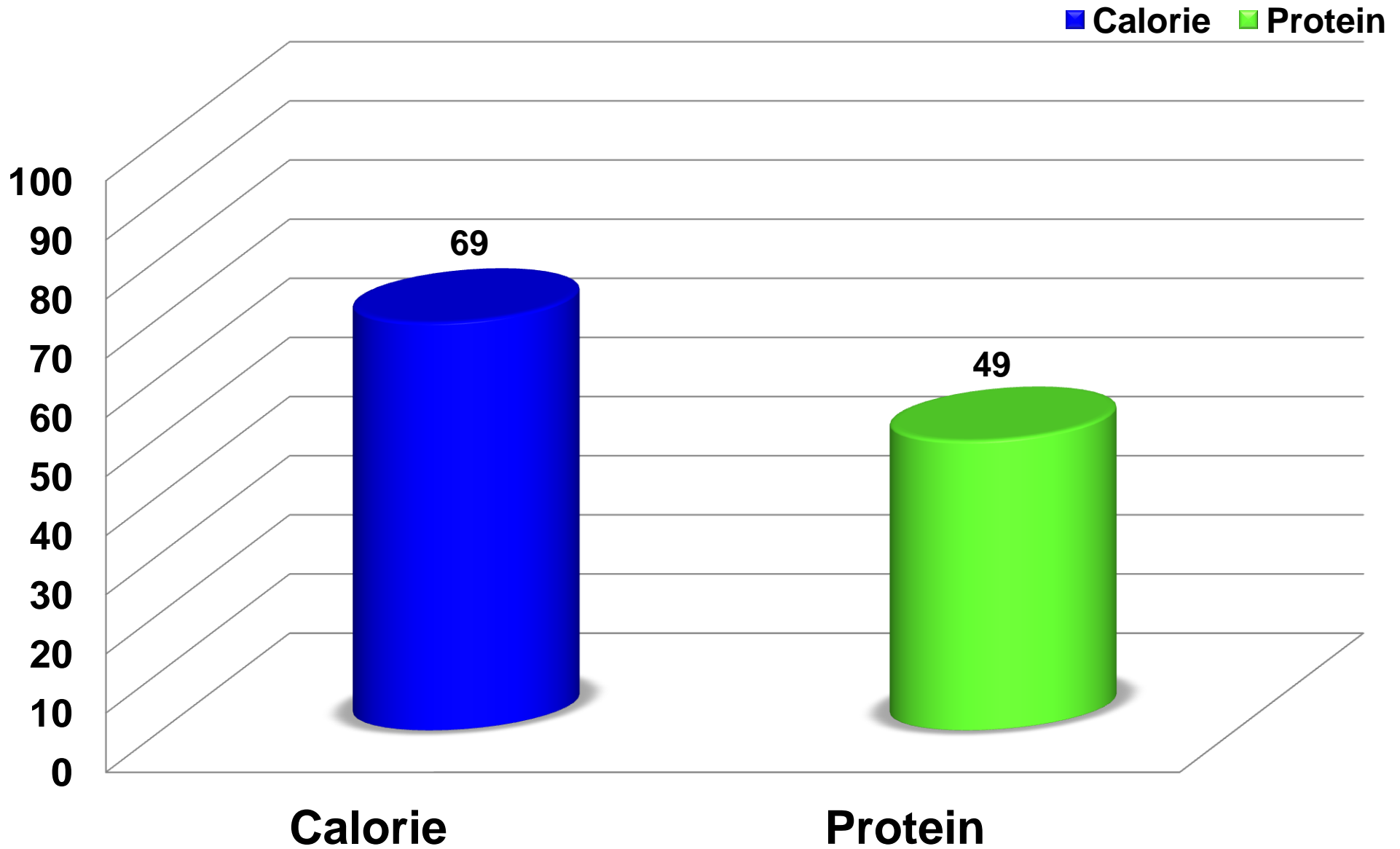
Baseline Nutritional Status



Classification - Child Pugh Score



% Nutritional Target Achieved



How did we achieve Nutrition Goals?

- **Nutrition Monitoring**
 - Oral intake was monitored using a food and fluid chart by the Nurses
 - Calorie Count – done by the Dietitian
 - Labs : Hb, Serum Albumin, Lymphocytes, Na, K etc.,

Nutrition Monitoring – Oral diet

Name:
 UHID No:
 Room No.:
 Doctor:
 Diet Prescribed:

AH-QF-DT-48
APOLLO HOSPITALS
 DEPARTMENT OF DIETETICS
FOOD & FLUID CHART

DATE		AMOUNT EATEN					DATE		AMOUNT EATEN				
FOOD & DRINK ITEMS		NIL	1/4	1/2	3/4	ALL	FOOD & DRINK ITEMS		NIL	1/4	1/2	3/4	ALL
Bed Coffee							Bed Coffee						
Breakfast							Breakfast						
Mid-Morning							Mid-Morning						
Lunch							Lunch						
Tea Time							Tea Time						
Dinner							Dinner						
Bed Time							Bed Time						

Total Calorie Intake(approx):
 Protein Intake(approx):
 Remarks (If any):
 Signature of the Nurse:
 Signature of the Dietitian:

Total Calorie Intake(approx):
 Protein Intake(approx):
 Remarks (If any):
 Signature of the Nurse:
 Signature of the Dietitian:

How did we achieve Nutrition Goals?

- **Nutrition Education**
 - Educated on the salt and fluid restrictions
 - Emphasized on
 - Increased caloric and protein intake
 - Oral Nutrition Supplement (ONS)
 - Nocturnal tube feed suggested if oral intake is not adequate

Reasons for Deviation

- Salt & fluid restriction
- Fever, Infection & Abdominal Pain
- Hepatic encephalopathy
- Nausea
- Procedures

General recommendations

- Small frequent meals
- Monitor calorie count
- TPN - GI dysfunction is present
- Aggressive nutrition support
 - Highly Individualized
 - Minimize catabolism
 - Slow the deterioration of nutritional status

Post -operative state

Immediate Post - operative state

Nutrition Status is affected by

- Graft function
- Pre - existing malnutrition
- The stress response to surgery
- Catabolic effects of high dose steroids

Nutrition Care Plan

- **Post OP Nutrient recommendations**

- Energy – 1.2 – 1.3 times BEE**

- BEE using Harris Benedict equation
 - AEE : $1.3 \times \text{BEE}$

- Protein - 1.3 – 2g / kg / day**

- **American Association for the Study of Liver Disease**

Effect of Nutrition Support in the post liver transplant Indian Adult Patients

- Study design : Single centre, Prospective
- Study period : Jan - Sep'13
- Sampling technique: Random
- Sample size : 27 subjects
- Setting : Liver unit, Tertiary care hospital
- Inclusion criteria : All Indian adults who underwent transplant for the first time
- Exclusion criteria : All paediatric and international pts

On admission, the demographic, biochemical, nutritional, and anthropometric details were noted

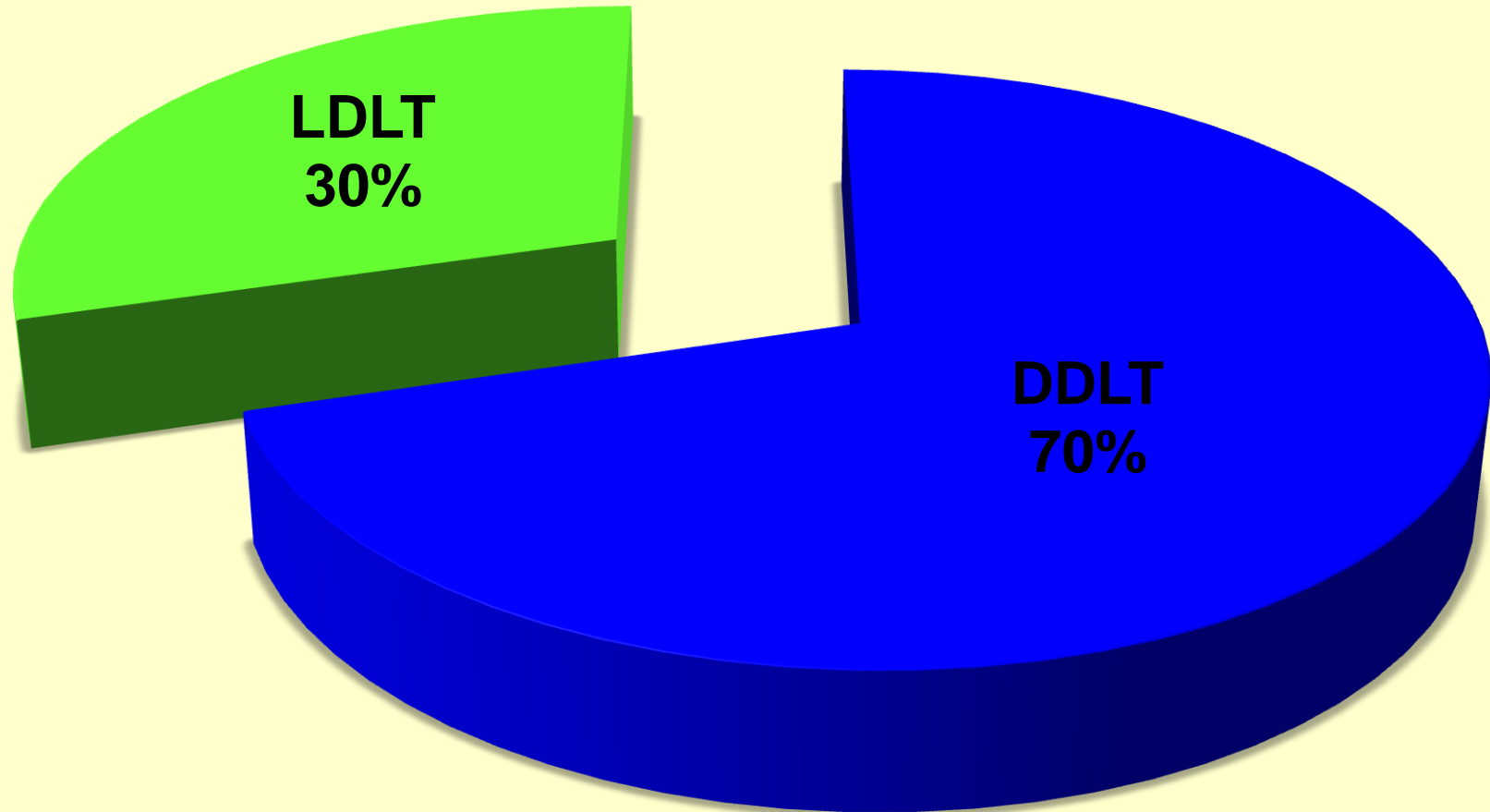
Baseline Characteristics

Characteristics of Patients	Mean±Std	Range
Age(yrs)	47.5±9.59	25-60
Height(cms)	163.6±10.05	143-182
Weight(Kg)	69.5±13.56	36-95.5
BMI(Kg/m ²)	26.01±5.14	14.79-38.94
MAC(cms)	25.8±4.13	18-35
MELD	18.1±3.78	11 - 23
A/G Ratio	0.9±0.36	0.3 - 1.8

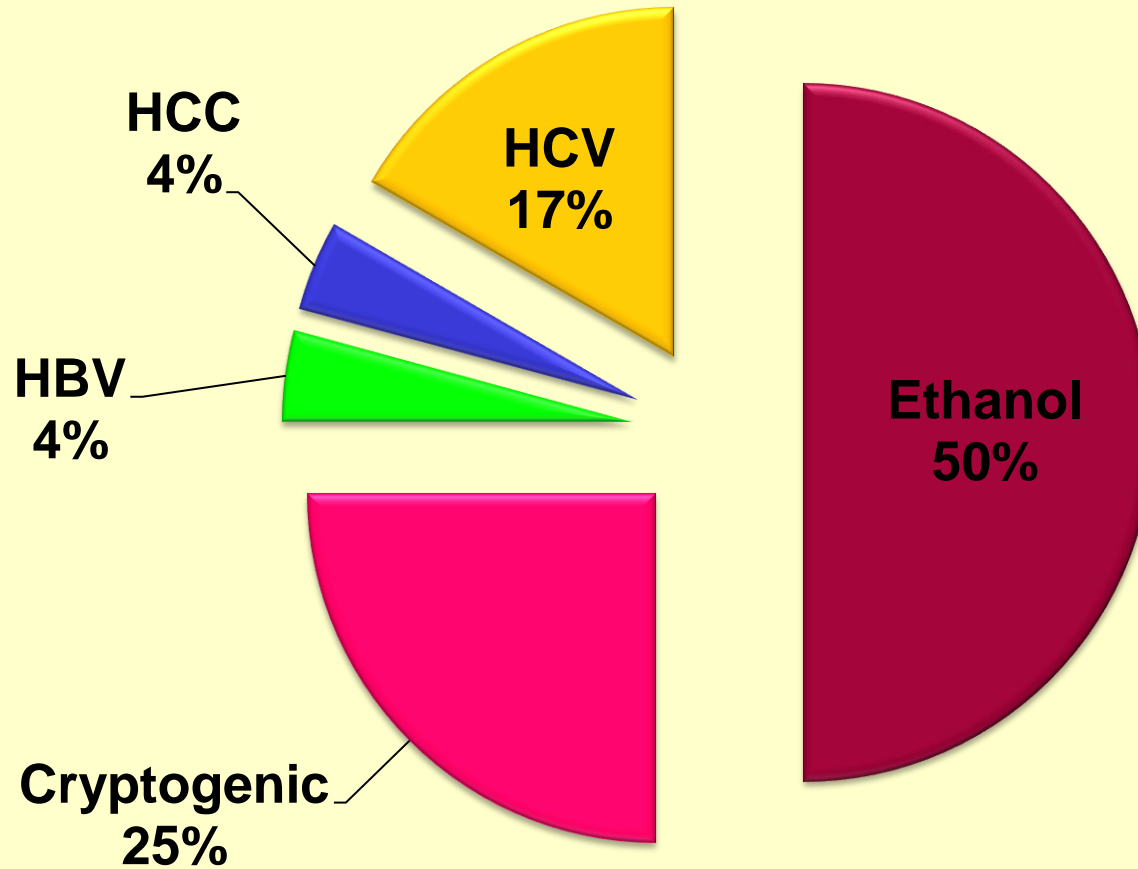
Objectives

- To study the effect of
 - disease severity on nutritional status and outcomes
 - nutritional intervention in A/G ratio, LOS in ICU and hospital and nutritional status of the patients
 - ethanol and non-ethanol related ESLD and type of transplant (DDLT and LDLT) in nutritional status and outcome

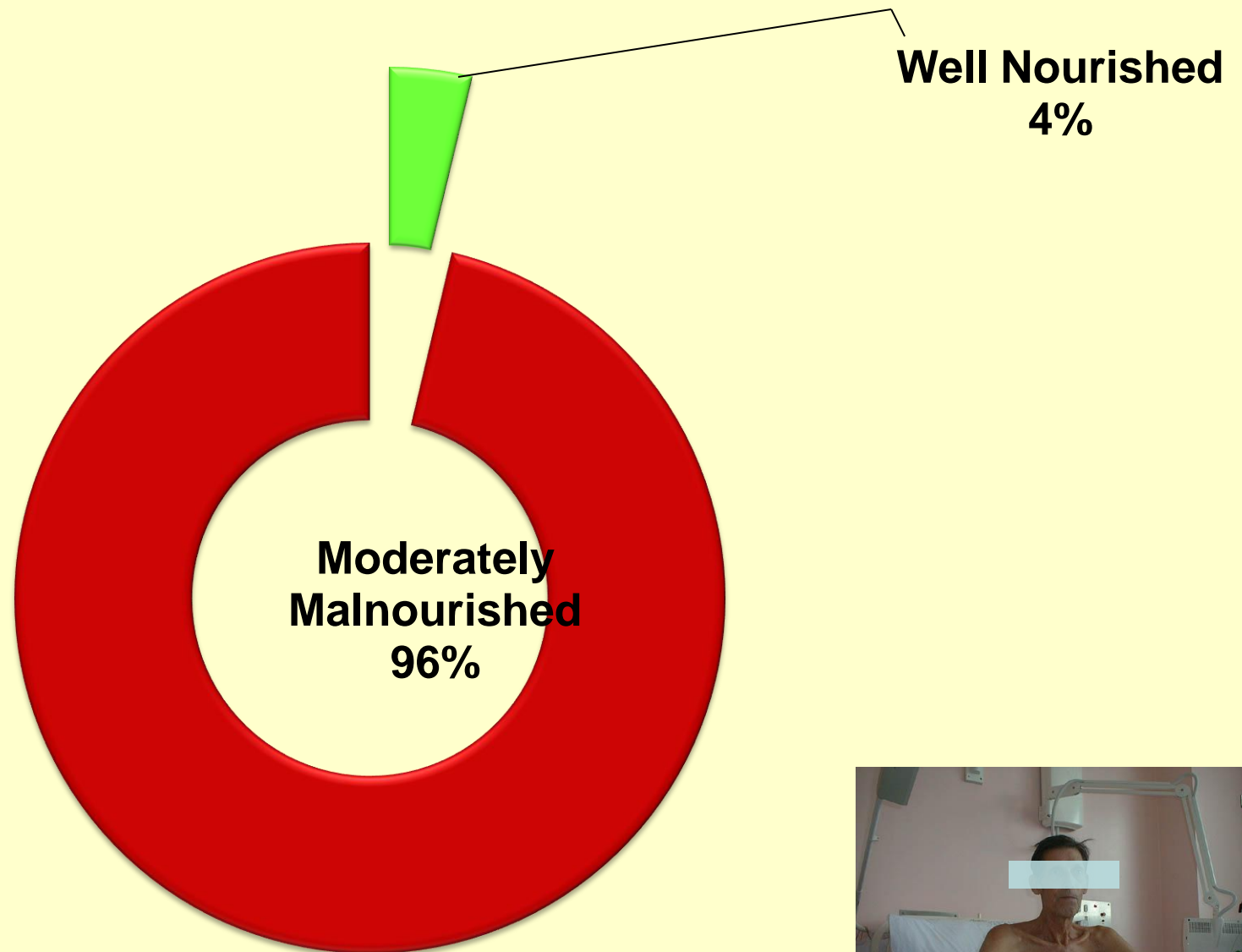
Type of Liver Transplant



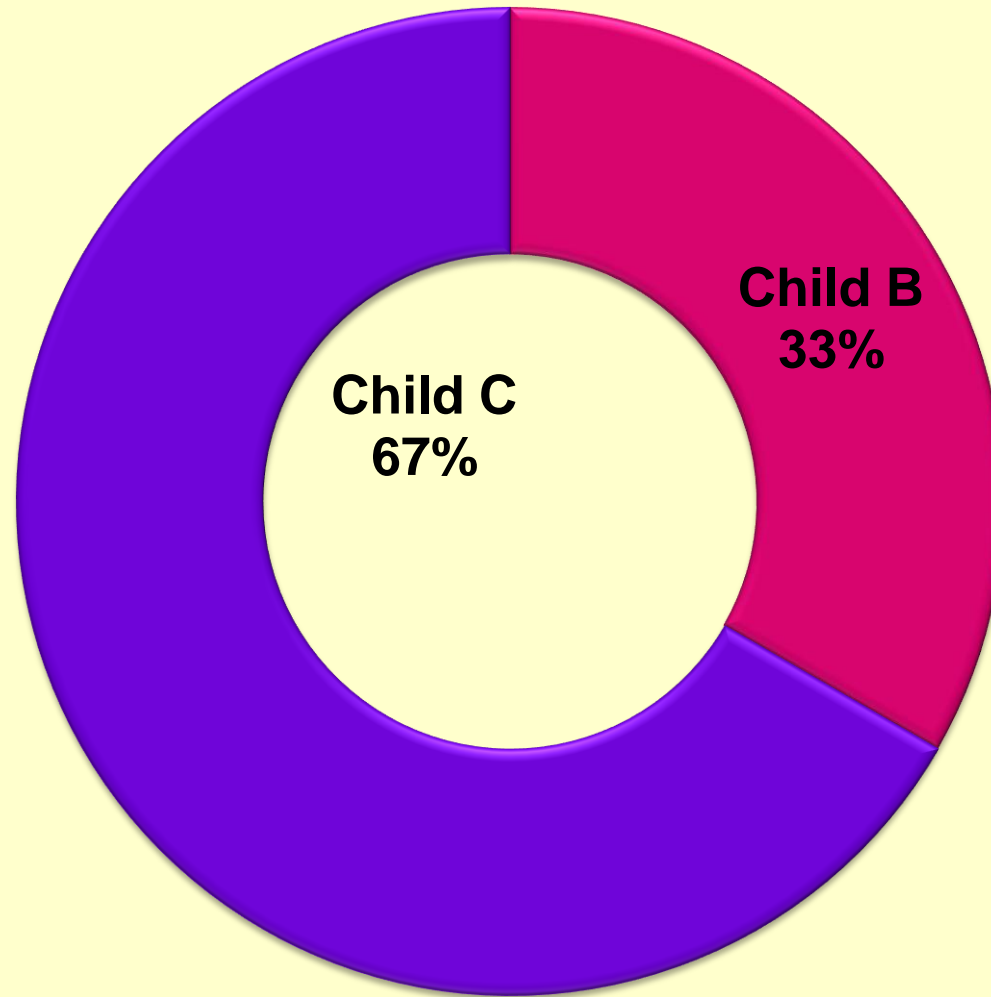
Type of Diagnosis



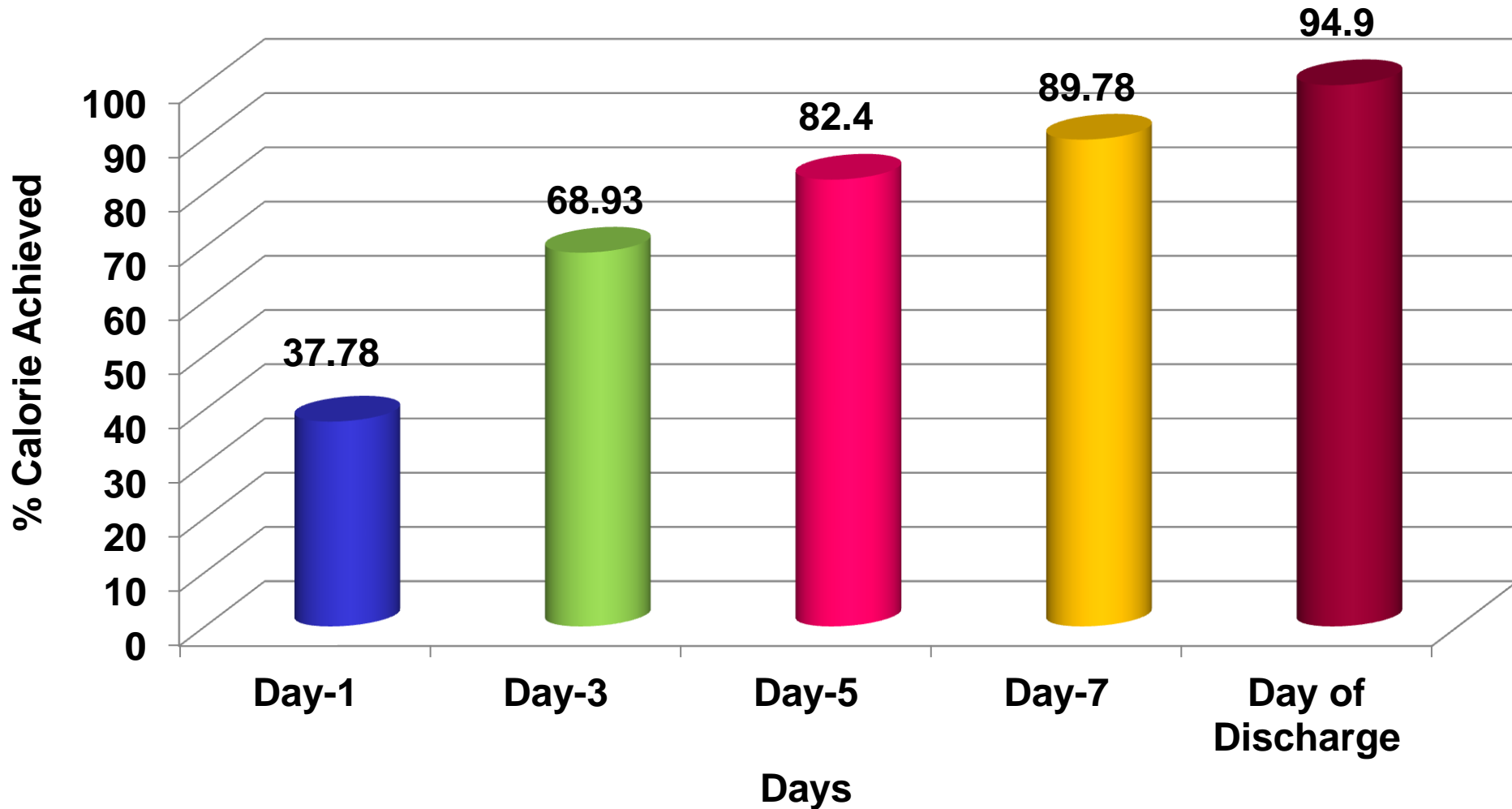
Baseline Nutritional Status



Classification - Child Pugh Score

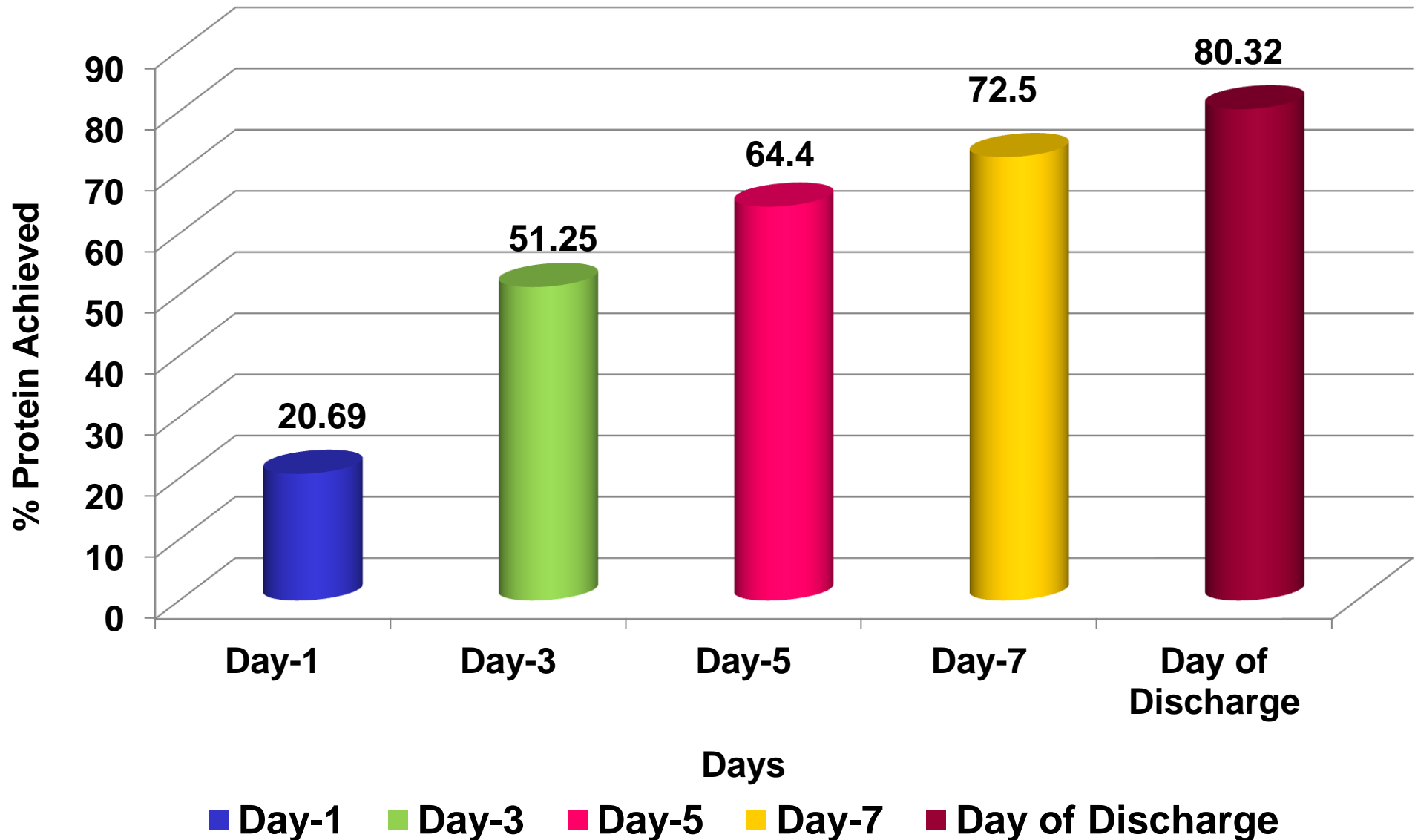


% Calorie Achieved



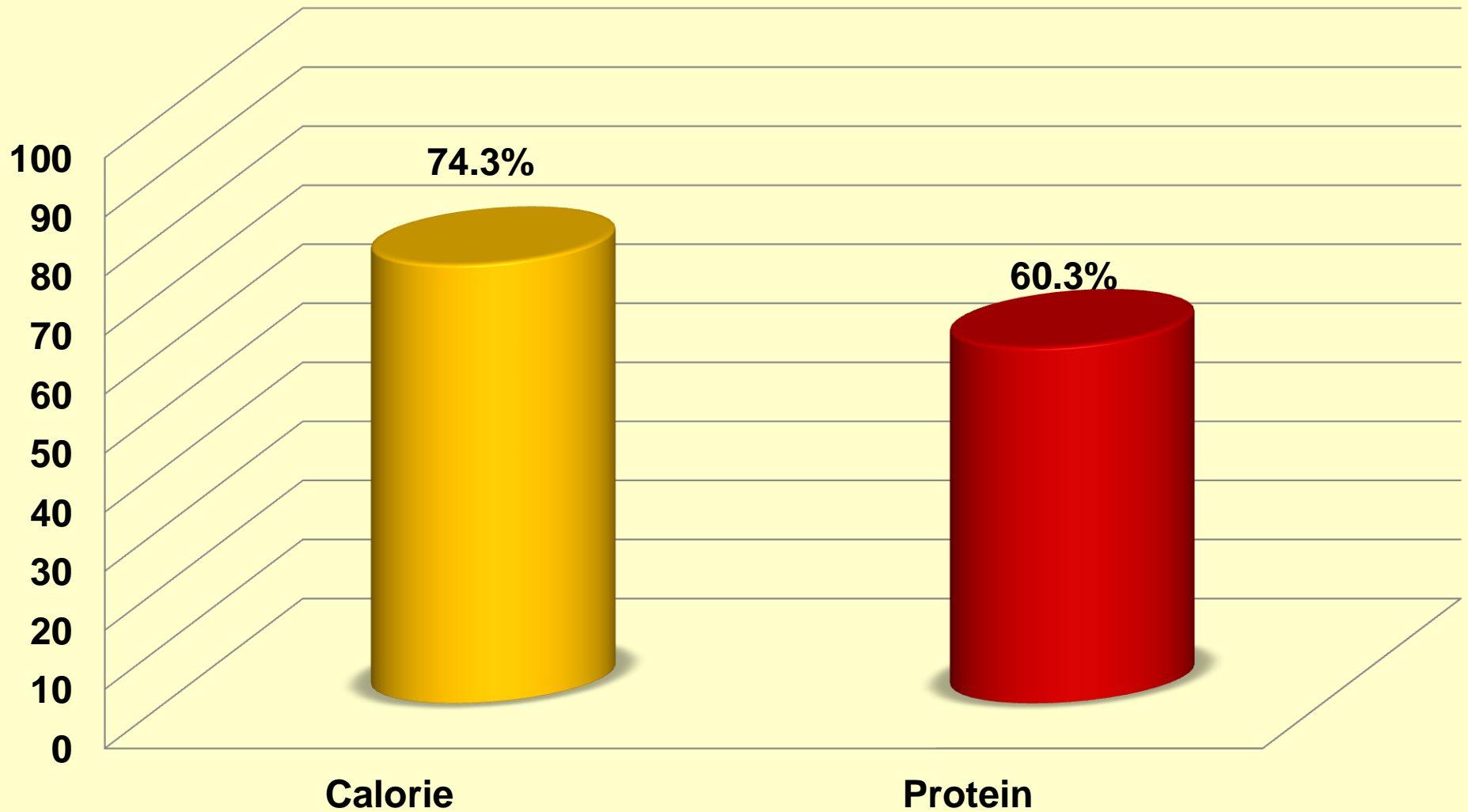
■ Day-1 ■ Day-3 ■ Day-5 ■ Day-7 ■ Day of Discharge

% Protein Achieved



Target Vs Achieved

■ Calorie ■ Protein



Results

- Strong correlation between the disease severity score (child) and the nutritional status (SGA) of the patients
- There was an improvement in weight and A/G ratio of the patients after nutritional intervention and was significant ($p < 0.001$)
- Length of stay in ICU and Hospital were 9.9 ± 6.9 and 16.07 ± 10.78 respectively
- LOS of child - C class in the hospital (17.5 days) was comparatively higher than the child - B class (13.1 days)
- There is a strong correlation between the ethanol intake and the nutritional status (SGA) of the patients ($p < 0.014$)

Conclusion

- A protocolized nutritional support and close monitoring reduced the risk of adverse outcomes in our study population

How did we achieve Nutrition Goals?

- **Nutrition Monitoring**
 - Oral intake was monitored using a food and fluid chart by the Nurses
 - Calorie Count – done by the Dietitian
 - Labs : Hb, Serum Albumin, Lymphocytes, Na, K etc.,
 - Protocolized treatment plan

How did we achieve Nutrition Goals?

- **Nutrition Education**
 - Post transplant diet education
 - Emphasized on
 - Increased caloric and protein intake
 - Oral Nutrition Supplement (ONS)
 - Food hygiene and safety

Reasons for Deviation

- Surgical stress
- Fever, Infection & Abdominal Pain
- Nausea & Vomiting
- Procedures

THANK YOU