

A photograph of the Tata Medical Center building at night. The building is a modern, multi-story structure with a prominent brick facade on the left and a glass facade on the right. The interior lights are on, and the building is illuminated against a dark blue sky. The text "NUTRITION SUPPORT FOR CANCER PATIENTS" is overlaid in large, bold, yellow letters across the center of the image.

# **NUTRITION SUPPORT FOR CANCER PATIENTS**

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# Learning Objectives

- Understand India's growing cancer problem
- Understand nutritional problems of cancer patients
- Highlight issues that are related to providing nutrition support
- Share some of our experience and data

## The growing burden of cancer in India: epidemiology and social context.

Mallath MK<sup>1</sup>, Taylor DG<sup>2</sup>, Badwe RA<sup>3</sup>, Rath GK<sup>4</sup>, Shanta V<sup>5</sup>, Pramesh CS<sup>3</sup>, Digumarti R<sup>6</sup>, Sebastian P<sup>7</sup>, Borthakur BB<sup>8</sup>, Kalwar A<sup>9</sup>, Kapoor S<sup>10</sup>, Kumar S<sup>11</sup>, Gill JL<sup>2</sup>, Kuriakose MA<sup>12</sup>, Malhotra H<sup>13</sup>, Sharma SC<sup>14</sup>, Shukla S<sup>15</sup>, Viswanath L<sup>16</sup>, Chacko RT<sup>17</sup>, Pautu JL<sup>18</sup>, Reddy KS<sup>19</sup>, Sharma KS<sup>3</sup>, Purushotham AD<sup>20</sup>, Sullivan R<sup>21</sup>.

### Author information

### Abstract

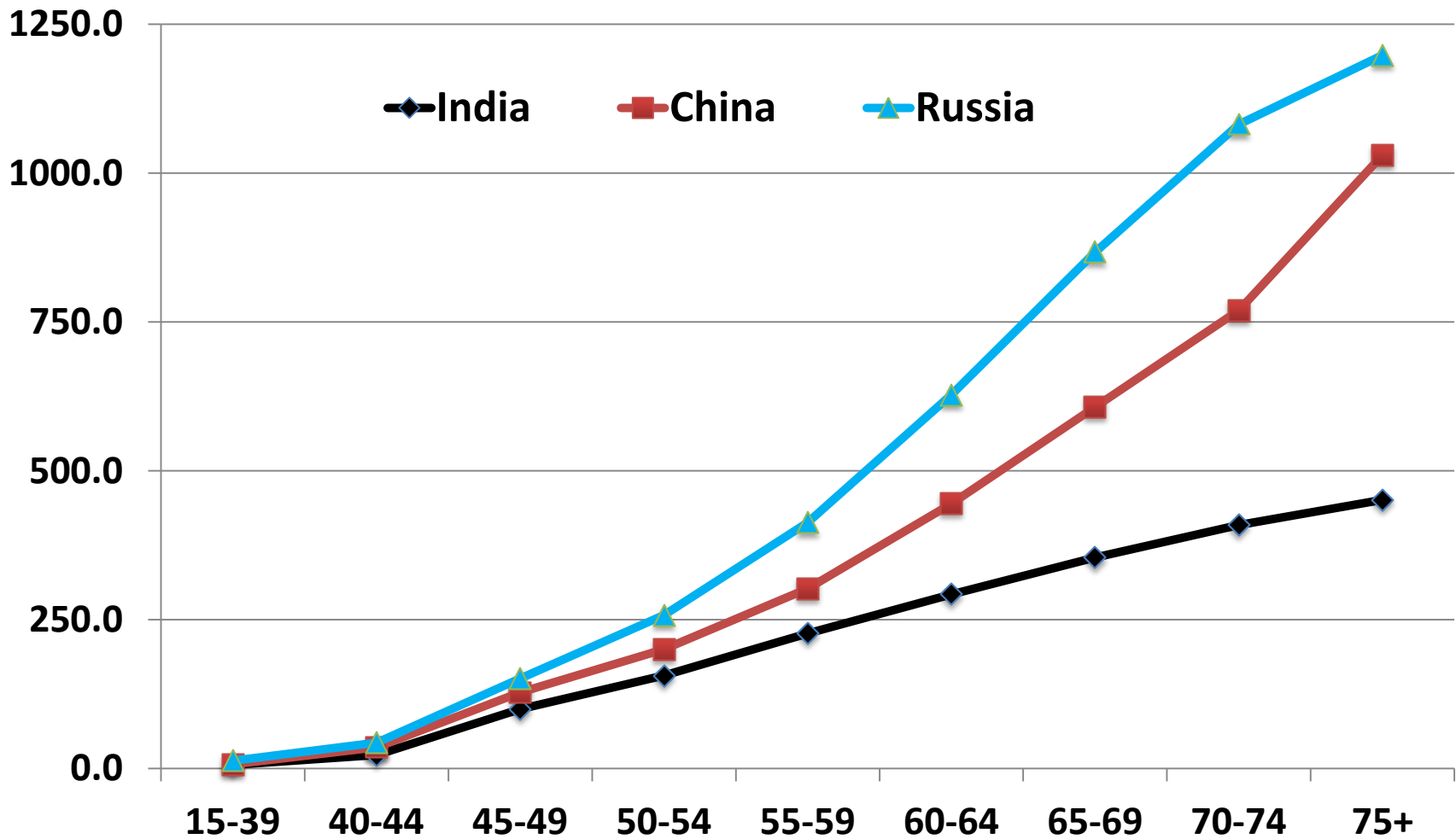
Cancer can have profound social and economic consequences for people in India, often leading to family impoverishment and societal inequity. Reported age-adjusted incidence rates for cancer

Region or Country	Incident cases	Mortality cases	Incidence ASR	Mortality ASR	Mortality to Incidence ratio
VHDI	5780821	2606104	279.2	105.3	37.7
HDI	2126439	1244496	180.2	102.3	56.8
MHDI	5232474	3656562	144.2	102.8	70.9
LHDI	943102	690141	112.8	86.7	76.9
India	1014934	682830	94.0	64.5	68.6

HHDI= High Human Development Index, LHDI= Low Human Development Index

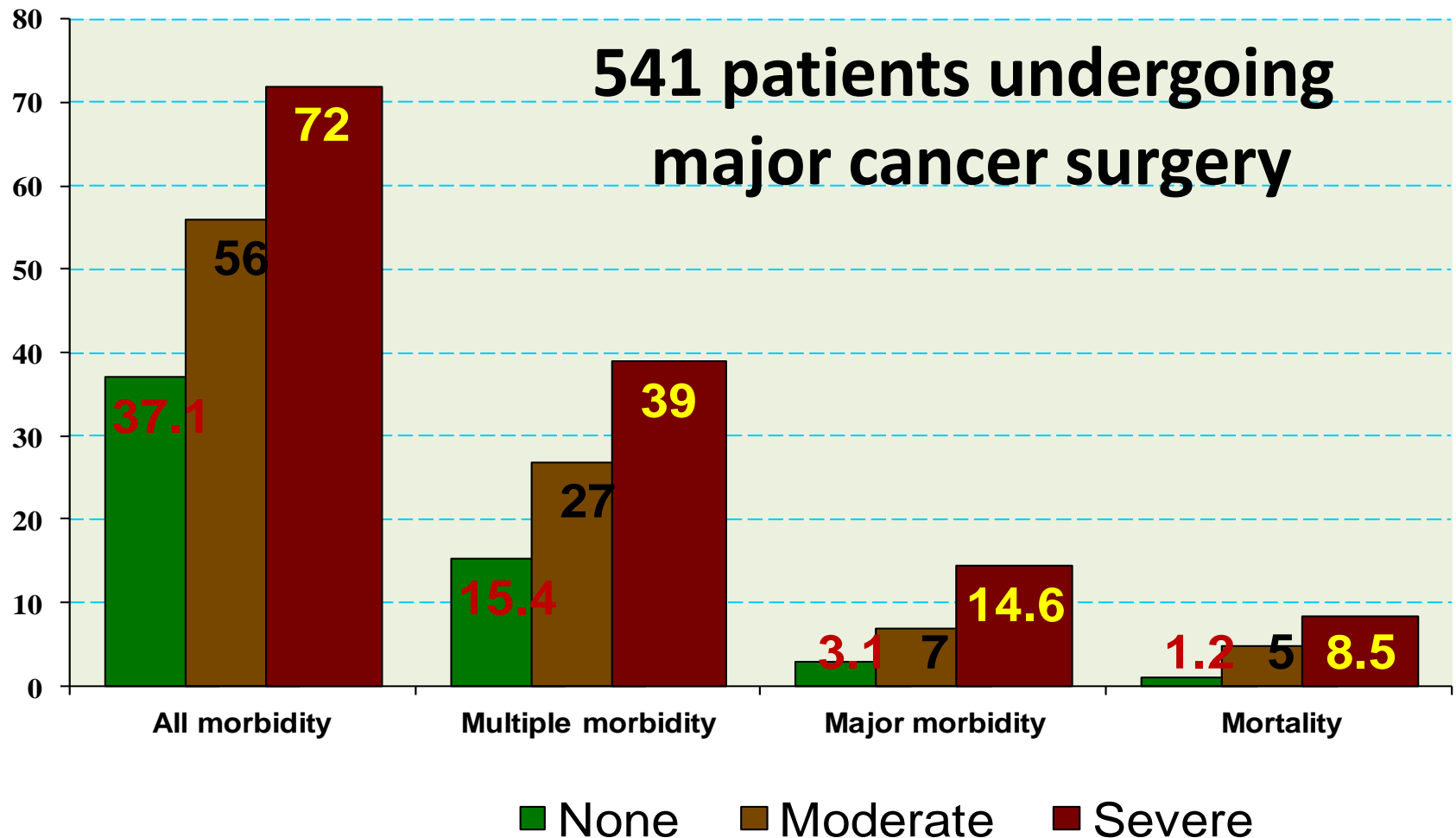
# Cancer is a disease of elderly

## Age specific incidence rates of all cancers





# Malnutrition significantly increases the post-op morbidity, mortality & costs





# KILL BILLS

**A**s a cancer specialist, Dr Mohandas K. Mallath has seen it all. But he still remembers how helpless he felt a couple of years ago, when he met Dr Kumar (name changed). Her husband, a middle-aged doctor like her, had a rare form of cancer. The Kumars had spent Rs 6 lakh in just one year on the treatment. They had to slowly sell most of their assets to meet the high cost of cancer treatment.

“Her ornaments disappeared during each follow-up visit for review. Arms barren, there was only a *mangalsutra* hanging on a thread around her neck during one visit,” recalls Dr Mallath, who has been working at the Tata Medical Centre (TMC), Calcutta, since 2012. For 24 years he had been at the Tata Memorial Hospital (TMH) in Mumbai and had witnessed the struggles of countless such patients.

These cases inspired the oncologist to explore the socio-economic context of cancer in India as part of a commission of global cancer experts. Their series of papers published last month in the journal *Lancet Oncology* focused on the escalating cost of cancer treatment and its impact in the country.

Ironically, as treatment for cancer gets better and better, most Indians are finding it more and more difficult to fight the disease, thanks to exorbitant drug prices and multiple diagnostic tests.

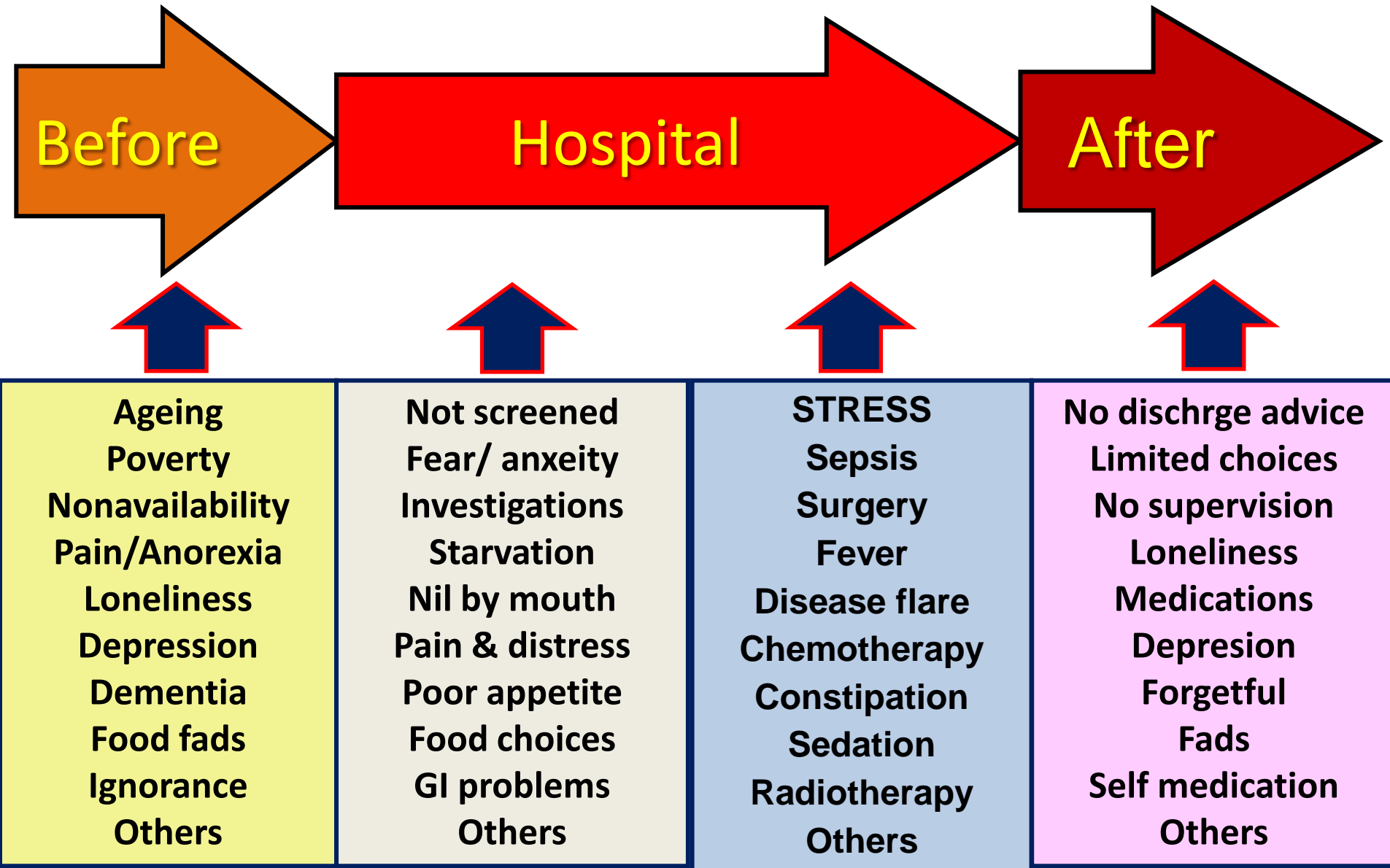
Take the case of Rubeena (not her real name). She was 29 when she discovered she had breast cancer. Within months, the malignancy had spread to the whole of her right breast. The breast was removed, but she is still undergoing treatment a year after the tumour was detected.

Her life can be saved. A drug called herceptin, marketed by Swiss pharmaceutical company Roche, is extremely effective in battling this type of cancer. But each injection costs Rs 80,000 — 10 times the sum her husband earns from his Unani medicine store in Burdwan’s Raniganj every month. And Rubeena needs 12 such shots.

IF YOU GET CANCER, THE CHANCES ARE HIGH THAT YOU’LL BECOME A PAUPER, WARN **T.V. JAYAN** AND **PRASUN CHAUDHURI**, THANKS TO THE SOARING COSTS OF CANCER DRUGS AND TREATMENT



# Factors Abetting Cancer Malnutrition





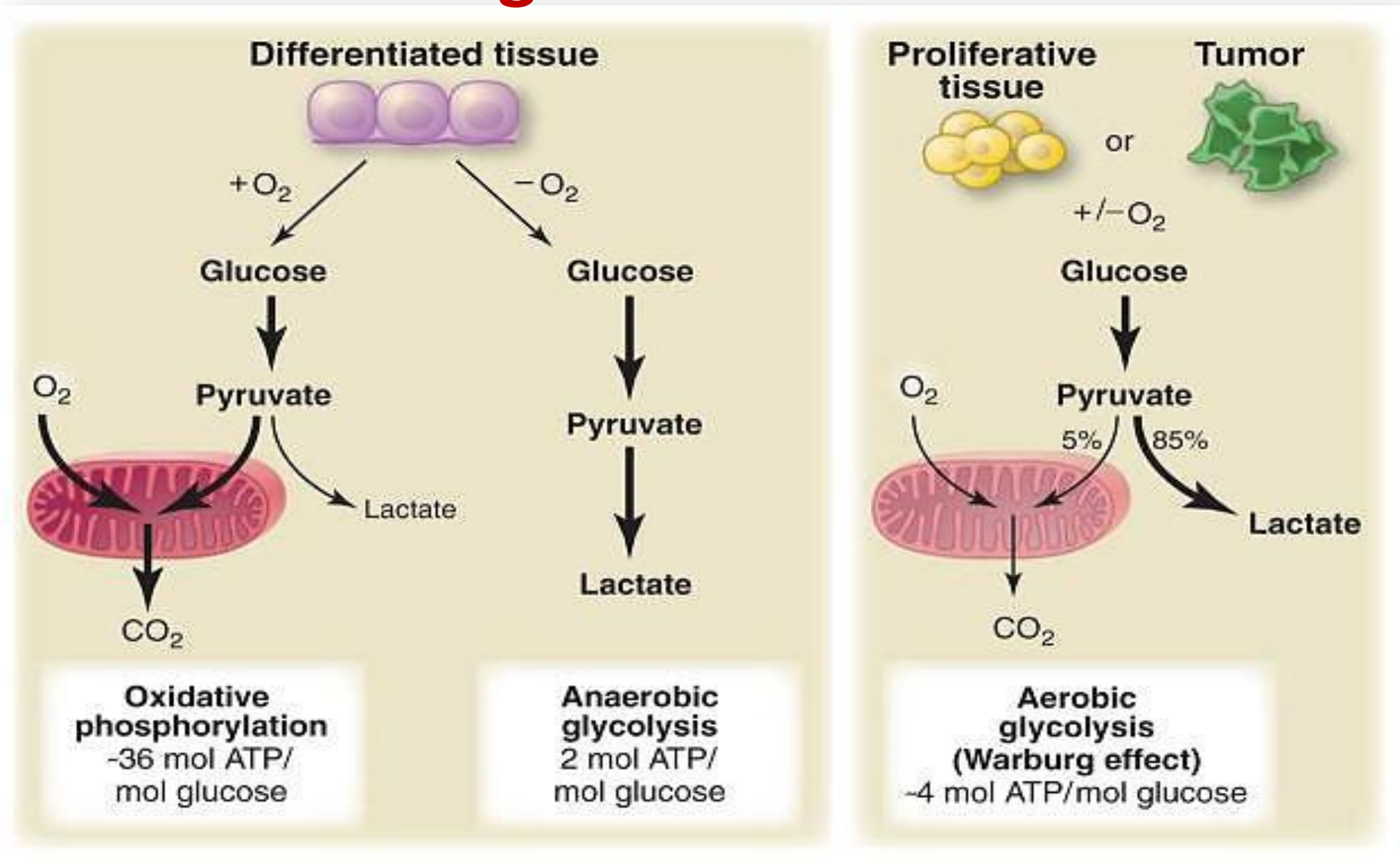
# **Nutritional Goals in Oncology**

- **Improve tolerance and completion of treatment on time with out any protocol deviation**
  - **Preserve lean body mass**
  - **Improve strength and energy.**
  - **Protect immune function**
  - **Decrease the risk of infection.**
  - **Enhance healing and recovery**
  - **Maximize quality of life.**

# Non-nutritional risk factors in cancer

- Severe immune suppression
- Mucosal lining is often disrupted
- Gut motility is altered- Satiety, vomiting, etc.
- Energy and protein requirements are higher
- Treatments lasts for several months
- Need money for many things

# Warburg Effect: Metabolic Inefficiency During Cell Proliferation



# Variable REE in Indian Cancer Patients

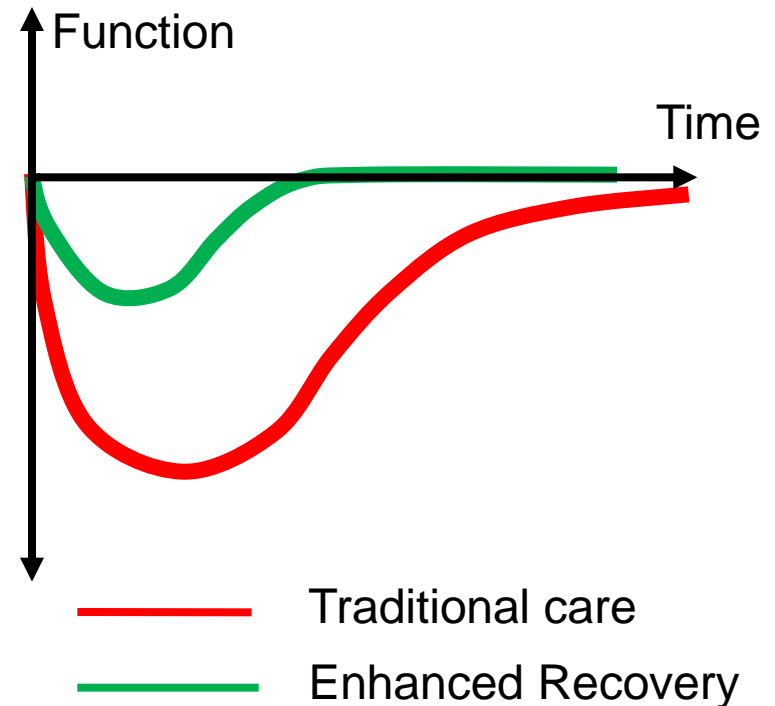
- REE estimated using the metabolic cart-  
**(Vista MX-VacuMed, USA).**
- O<sub>2</sub> consumed & CO<sub>2</sub> produced by the patient was determined.
- REE was estimated using the Weir equation
- **REE= [3.9 (VO<sub>2</sub>)+1.1(VCO<sub>2</sub>)] 1.44 RQ: VCO<sub>2</sub>/VO<sub>2</sub>**

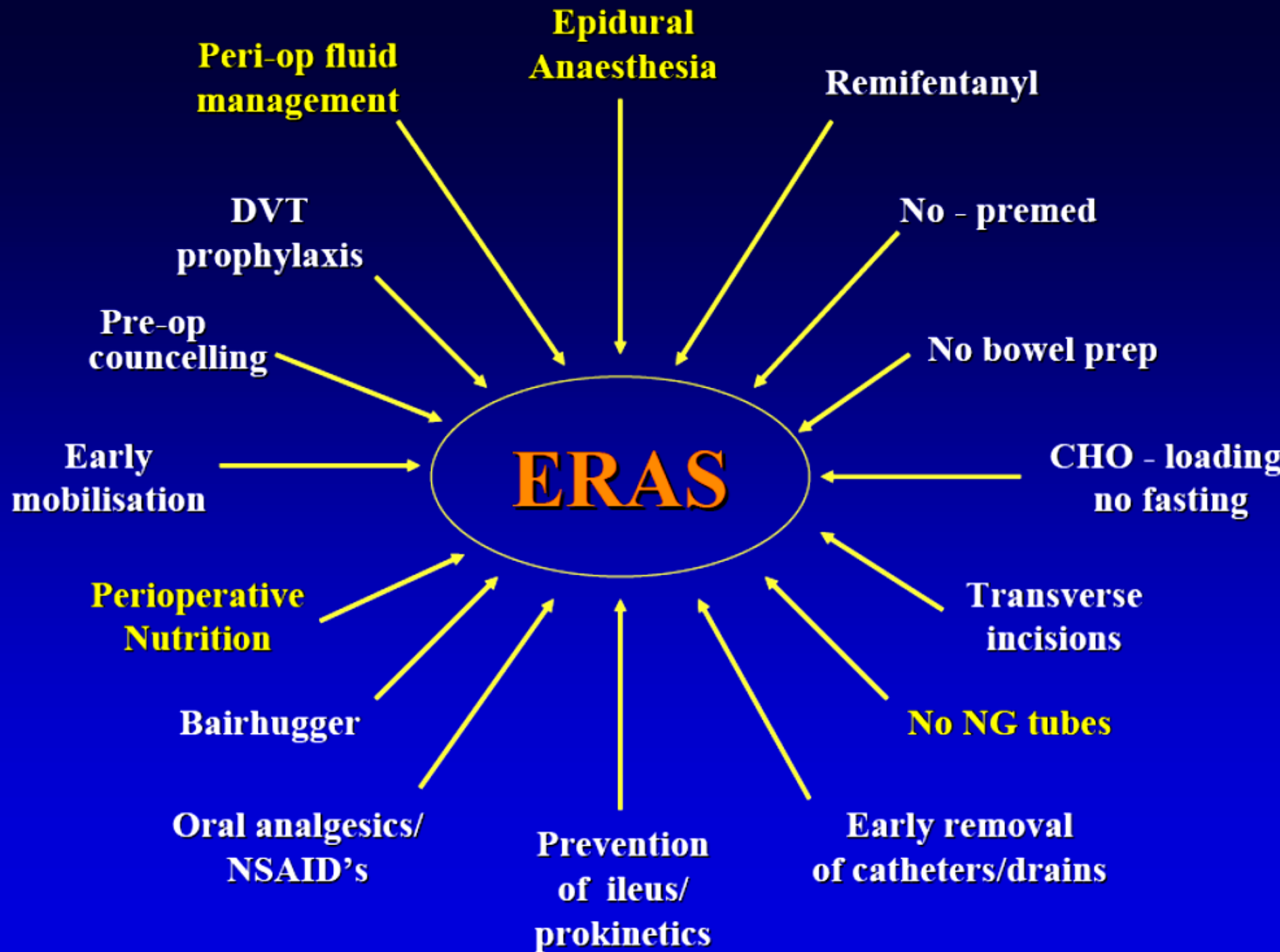


REE Equation	r <sup>2</sup>	95% CI of r <sup>2</sup>
Harris Benedict	0.21	-0.07 – 0.46
Fleisch	0.28	-0.04 – 0.48
WHO	0.24	0.01- 0.52

# Enhanced Recovery After Surgery: ERAS?

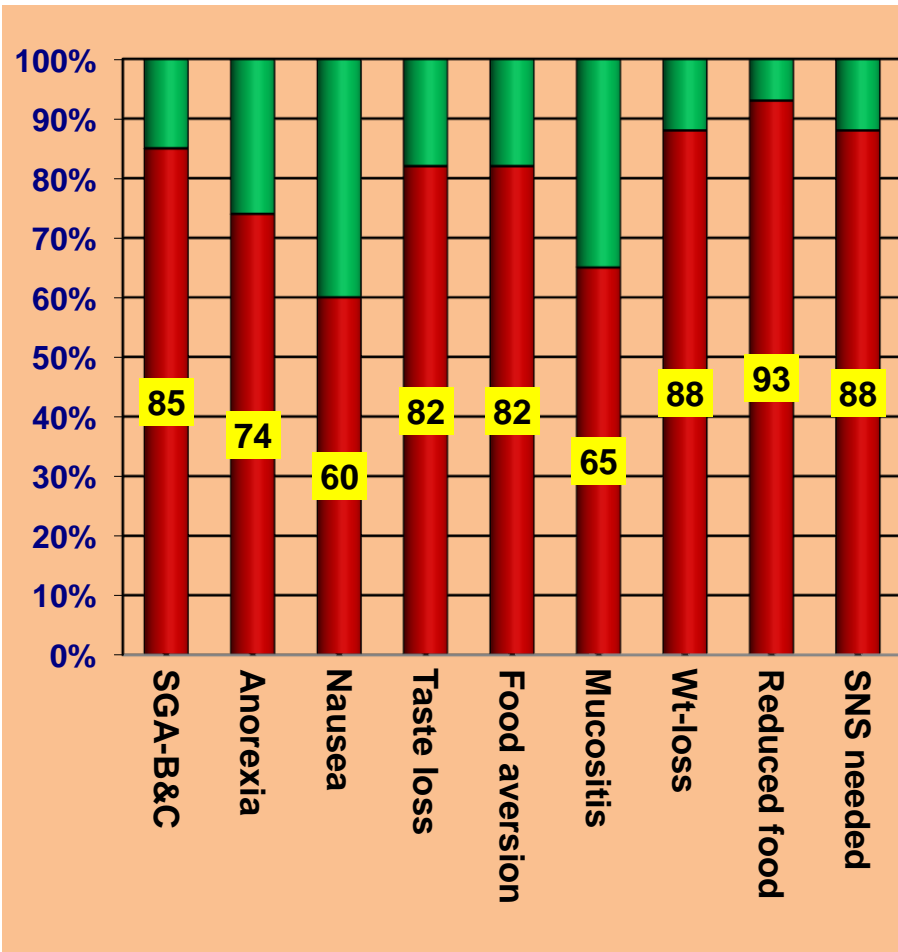
- **Minimise Perioperative stress response**
  - Optimise pre-op conditions
  - Optimise peri-operative care
  - Optimise post-op rehabilitation
- **Start postop treatments early**



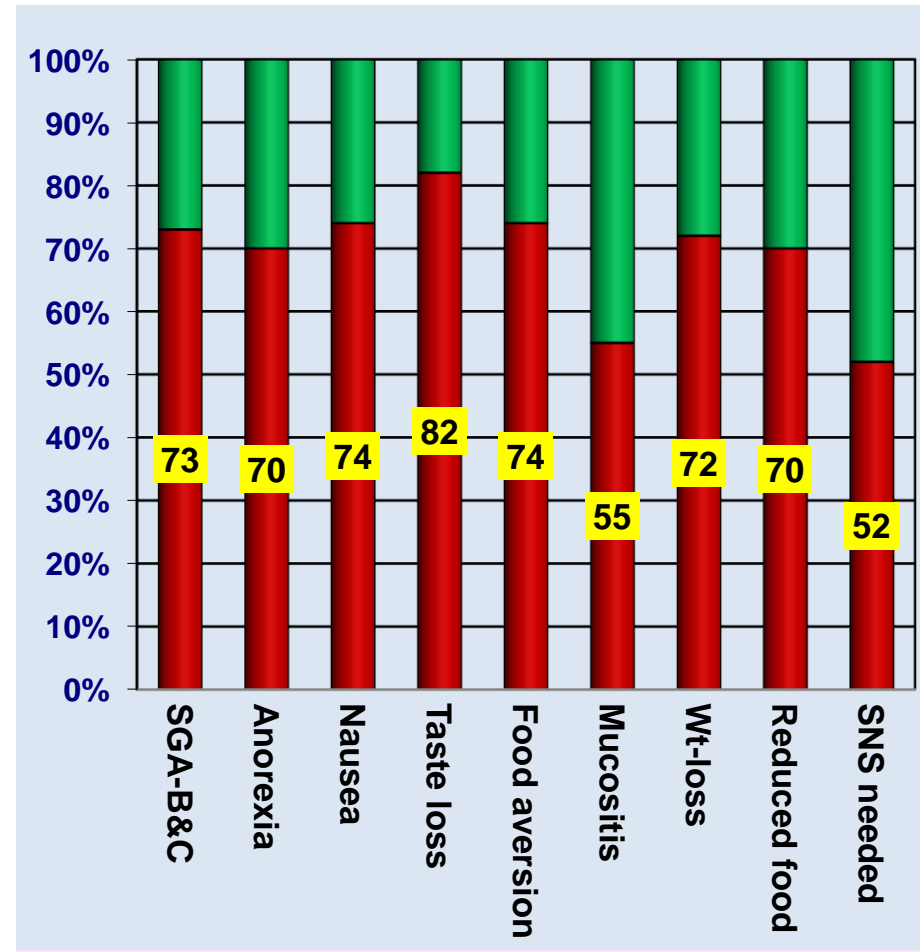




# Nutritional problems of patients undergoing radiotherapy (125) and chemotherapy (125)

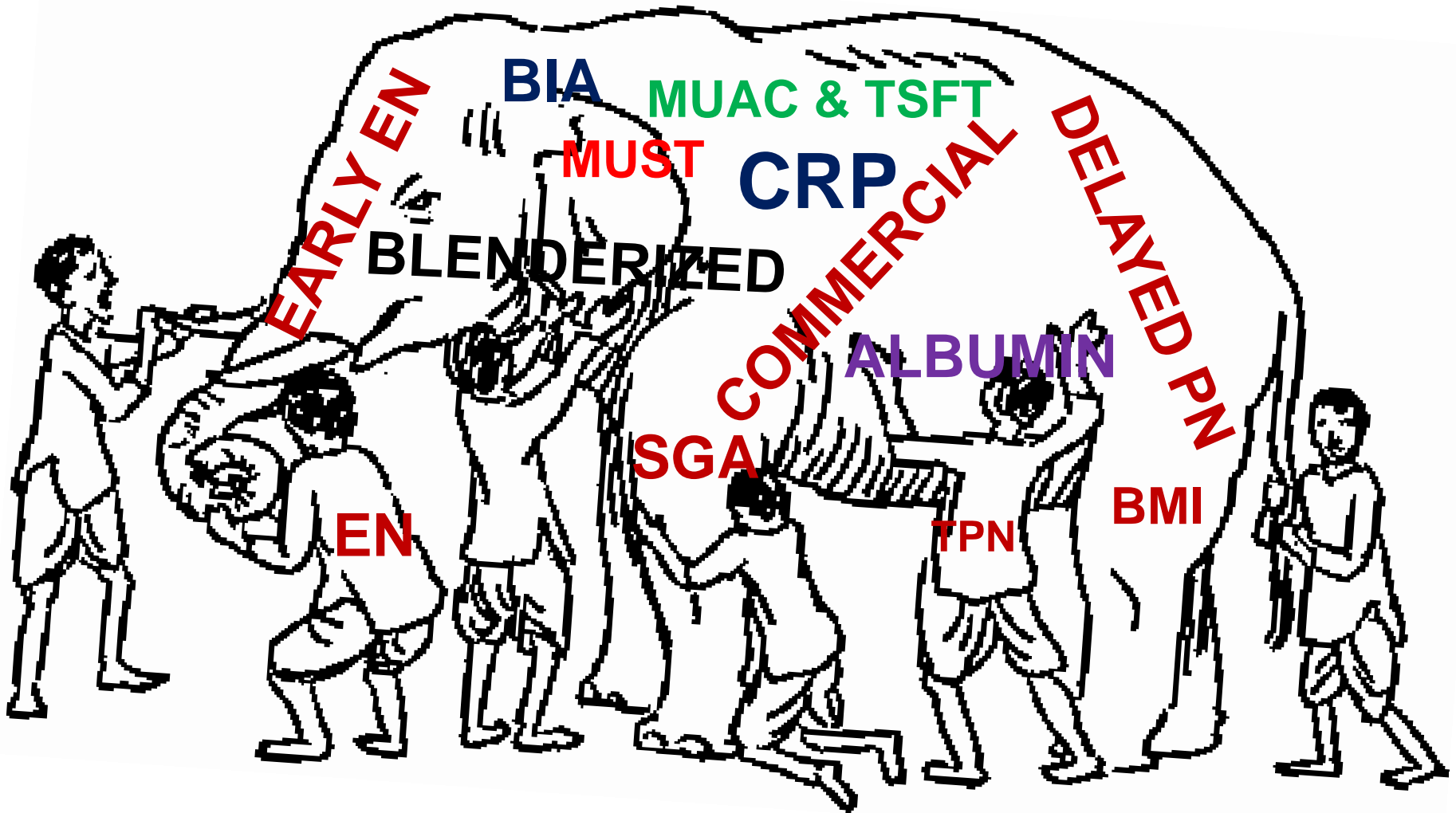


**RADIOTHERAPY**



**CHEMOTHERAPY**

# Clinical Nutrition Support means different things to different staff





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online at:  
[pharmacyeurope.net/](http://pharmacyeurope.net/)

# Malnutrition: one size won't fit all

Providing a clear and substantial improvement to the clinical outcome of malnutrition patients can only be achieved if clinicians begin to identify and overcome the current problems associated with nutrition support

## Professor Mohandas Mallath

MD

Head

Department of digestive  
diseases and

clinical nutrition

Dean-Academic

Tata Memorial Centre

Mumbai, India

**M**alnutrition is the commonest co-morbid disease found in patients at hospitals and in the communities where people dwell.

The prevalence of malnutrition among hospitalised patients is known to vary widely between 20% and 80% depending on the criteria used and the nature of the healthcare setting (eg, Intensive Care Unit).<sup>1,2</sup>

Nutrition therapy was the most important component of medical treatment before the discovery of antibiotics. Sadly, malnutrition has continued to remain a major problem in communities and hospitals in all parts of the world, in spite of all the scientific evidence

of nutrition screening and intervention have come in small increments. The results of most all randomised clinical trials using intensive and expensive nutrition support during the treatment of different disease states has not been spectacular in terms of reducing the overall mortality that we have aimed for. Furthermore, the end results of nutritional care varied considerably among different disease and their treatment settings. Some of the better results were seen in patients undergoing surgery for upper digestive cancer. On the other hand the use of routine nutrition support by total parenteral nutrition during cytotoxic

In clinical Nutrition Practice  
one size won't fit all

# Clinical Nutrition Mantra (4R)

**RIGHT feeds in RIGHT amounts  
at RIGHT time to RIGHT Patients**

**RIGHT feeds in RIGHT amounts  
at RIGHT time to RIGHT Patients**

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at RIGHT time to RIGHT Patients**

# Good nutrition support needs multidisciplinary teams



# 5-Fold Path of Clinical Nutrition

- 1 • Screen, assess and grade malnutrition
- 2 • Establish appropriate route for feeding
- 3 • Calculate the macro and micro needs
- 4 • Deliver the nutrients with out losses
- 5 • Monitor & Audit the above process

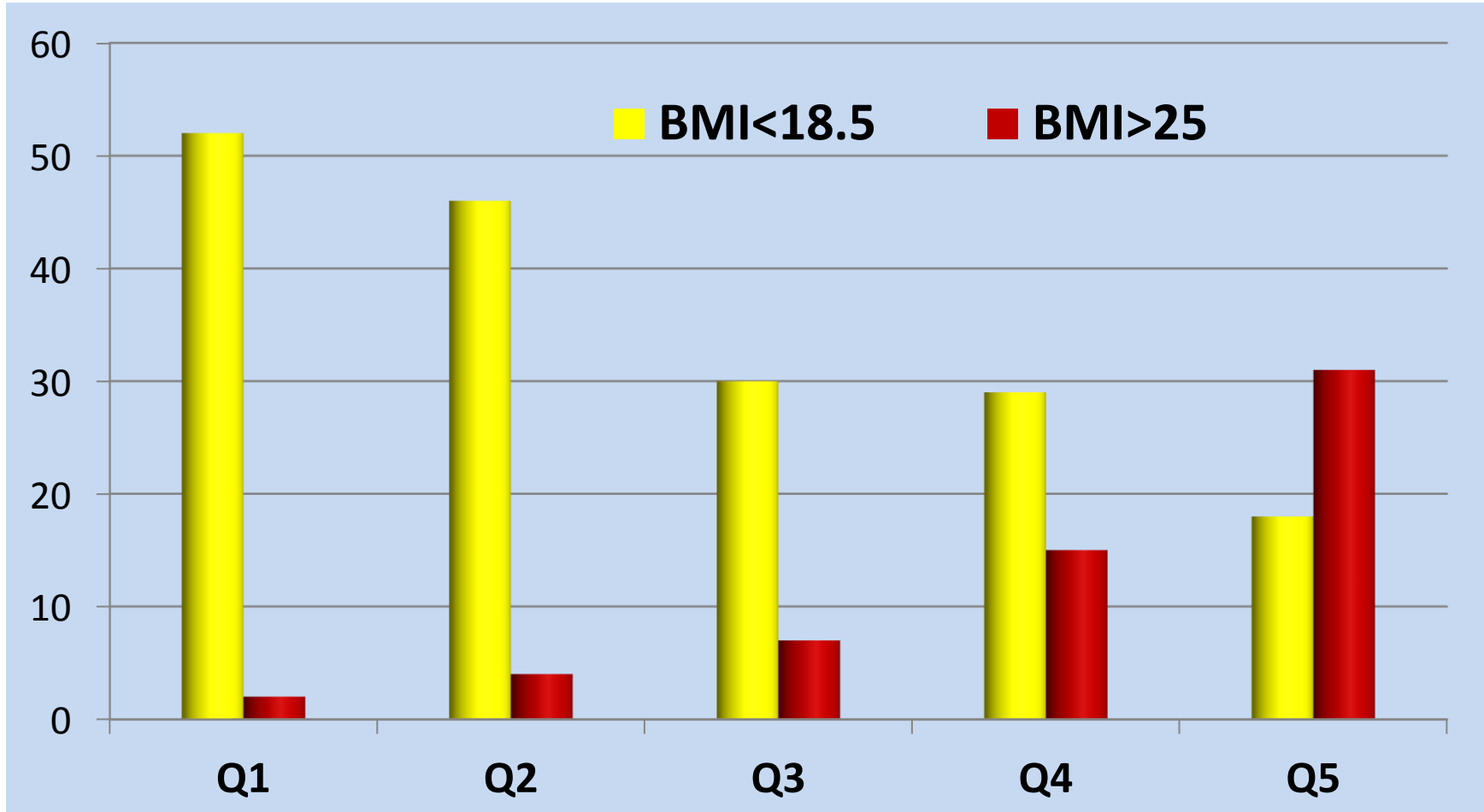




**By 2010 our group had, 3 coordinators, 5 dietitians, 2 nurses treating ~ 2500 patients a year.**

# Screening and Assessment

# Co-existing Double Burden. Underweight and overweight in women



National Family Health Survey – 2005-06

# Subjective Global Assessment (SGA)



Detsky, et al., JPEN 1987; 11: 8-13

## History

- Weight loss
- Nutritional intake
- GI symptoms
- Functional capacity
- Severity of disease

## Physical

- Subcutaneous fat
- Muscle mass
- Edema
- Ascites

## Subjective Assessment:

A = well nourished

B = suspect of or moderately malnourished

C = severely malnourished

# Subjective global assessment: a simple and reliable screening tool for malnutrition among Indians

M Shirodkar, K M Mohandas

Department of Digestive Diseases and Clinical Nutrition, Tata Memorial Hospital, Mumbai 400 012

**Background and Aims:** Subjective global assessment (SGA) is a simple and reliable malnutrition-screening tool. The SGA has not been evaluated in India or in populations where chronic energy deficiency (CED) is rampant. We evaluated the value of preoperative nutrition, determined using the SGA, in predicting postoperative adverse outcomes in cancer patients. **Methods:** Two hundred and ninety-

Chronic energy deficiency (CED) and malnutrition are common in India.<sup>1,2</sup> Malnutrition increases morbidity, mortality, and cost of medical care.<sup>3,4</sup> Failure to diagnose malnutrition leads to neglect of nutritional support during illness. Active nutritional support has been shown to improve outcomes and reduce cost of treatment in severely malnourished patients.<sup>3-7</sup>

## Conclusion:

SGA is a simple and inexpensive way to identify clinically relevant malnutrition in Indian patients undergoing cancer surgery. Low BMI was not associated with postoperative adverse outcomes, and its use for nutritional screening is likely to overestimate severe malnutrition in Indian patients.

[*Indian J Gastroenterol* 2005;24:246-250]

# Malnutrition & postop outcome-SGA vs. MUST

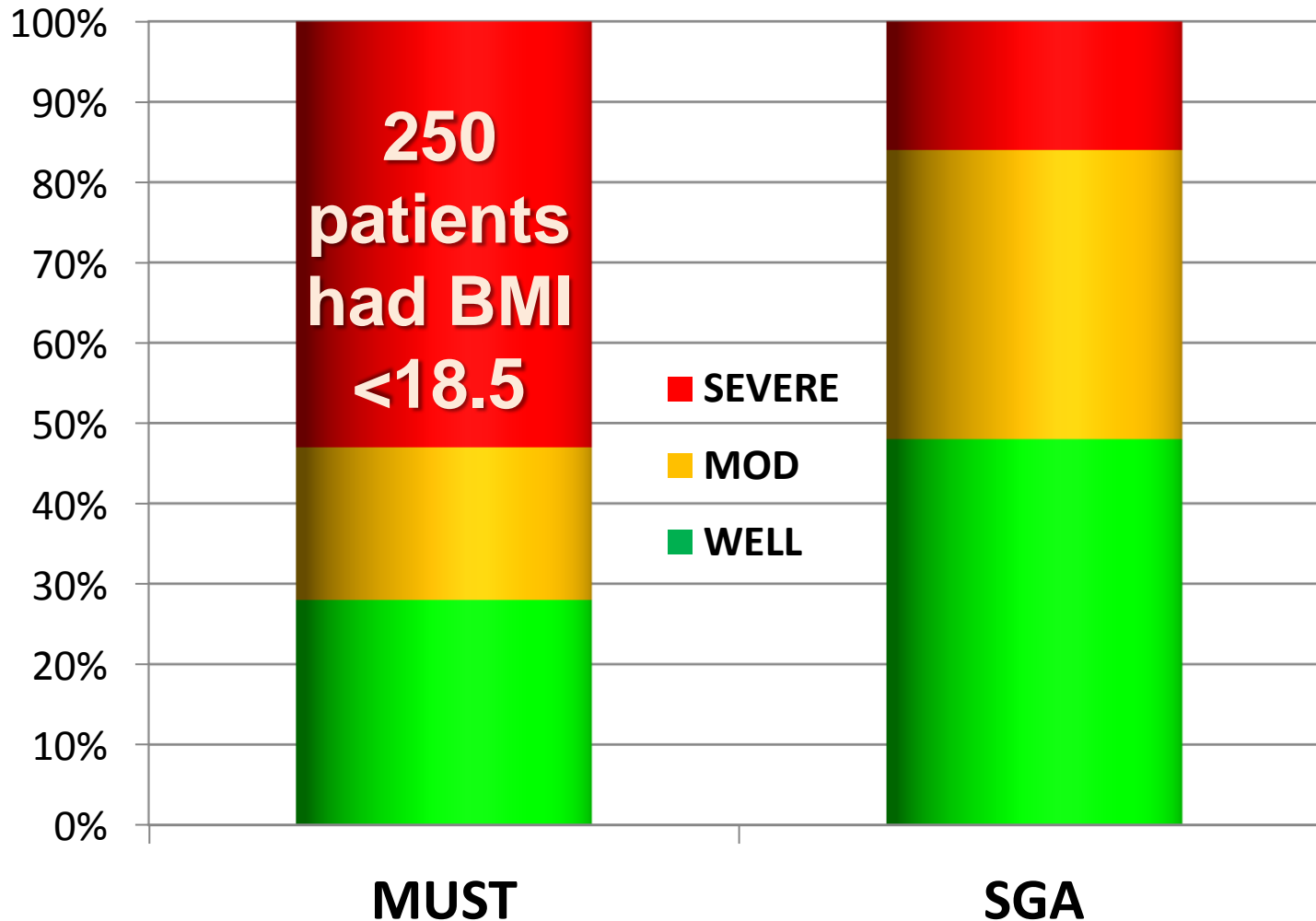
Outcome Variable	Nil-Mild	Moderate	Severe	P value
<b><u>MUST Tool</u></b>	<b>A(149)</b>	<b>B(106)</b>	<b>C(286)</b>	<b>541</b>
<b>Any adverse events</b>	<b>121</b>	<b>37</b>	<b>39</b>	<b>0.003</b>
<b>Major event</b>	<b>32</b>	<b>14</b>	<b>13</b>	<b>0.5</b>
<b>30-day Mortality</b>	<b>12</b>	<b>5</b>	<b>3</b>	<b>0.4</b>
<b>Post Op days(median)</b>	<b>10.0</b>	<b>11.0</b>	<b>10.7</b>	<b>0.32</b>



# Malnutrition & postop outcome-SGA vs. MUST

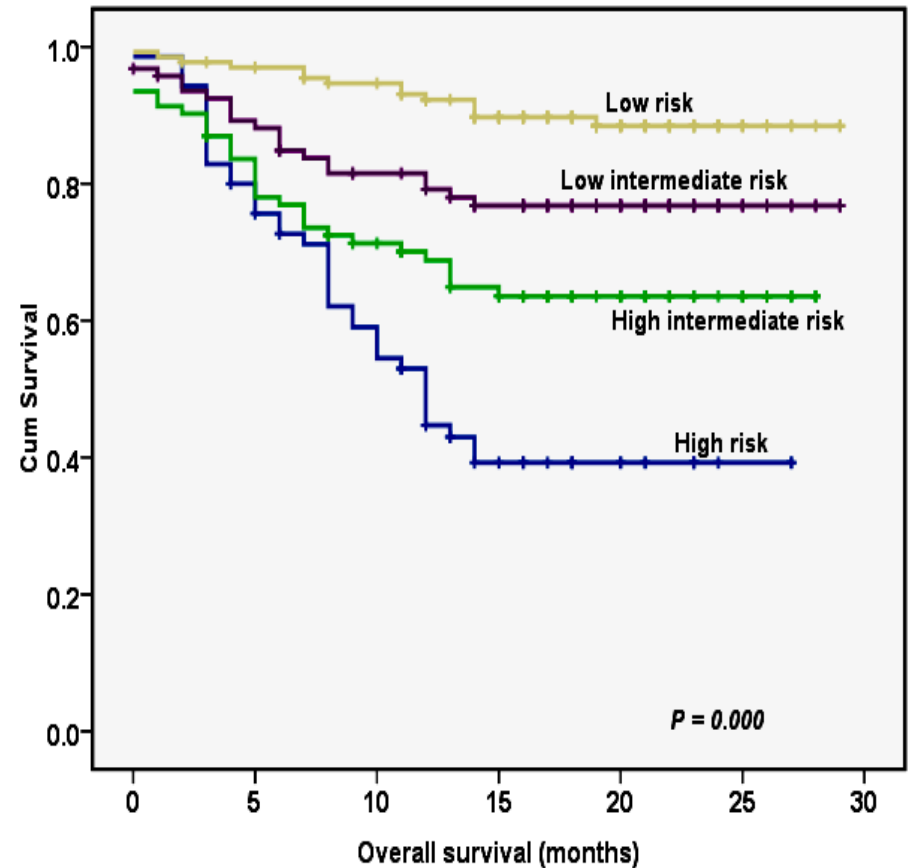
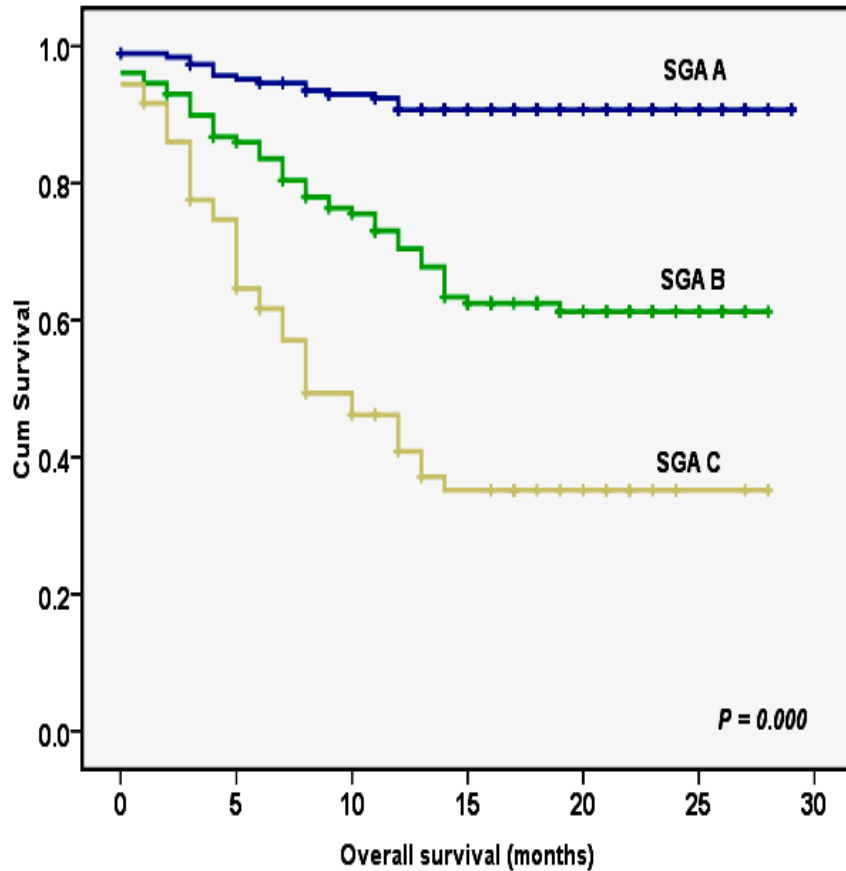
Outcome Variable	Nil-Mild	Moderate	Severe	P value
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<b>Post Op days(median)</b>	<b>10.0</b>	<b>11.0</b>	<b>10.7</b>	<b>0.32</b>
<b><u>SGA Tool</u></b>	<b>A(259)</b>	<b>B(199)</b>	<b>C(84)</b>	<b>541</b>
<b>Any adverse events</b>	<b>62</b>	<b>85</b>	<b>50</b>	<b>0.0000</b>
<b>Major event</b>	<b>16</b>	<b>27</b>	<b>16</b>	<b>0.001</b>
<b>30-day Mortality</b>	<b>3</b>	<b>10</b>	<b>7</b>	<b>0.004</b>
<b>Post Op days(median)</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>0.002</b>

# Using a BMI based tool will over-diagnose severe malnutrition in Indians



# One year overall survival by SGA groups and IPI groups using Kaplan Meir survival analysis

All NHL patients (401) screened for malnutrition



This study received Travel Award for ESMO 2011

# Subjective Global Assessment (SGA)



Detsky, et al., JPEN 1987; 11: 8-13

SCREEN

## History

- Weight loss
- Nutritional intake
- GI symptoms
- Functional capacity
- Severity of disease

## Physical

- Subcutaneous fat
- Muscle mass
- Edema
- Ascites

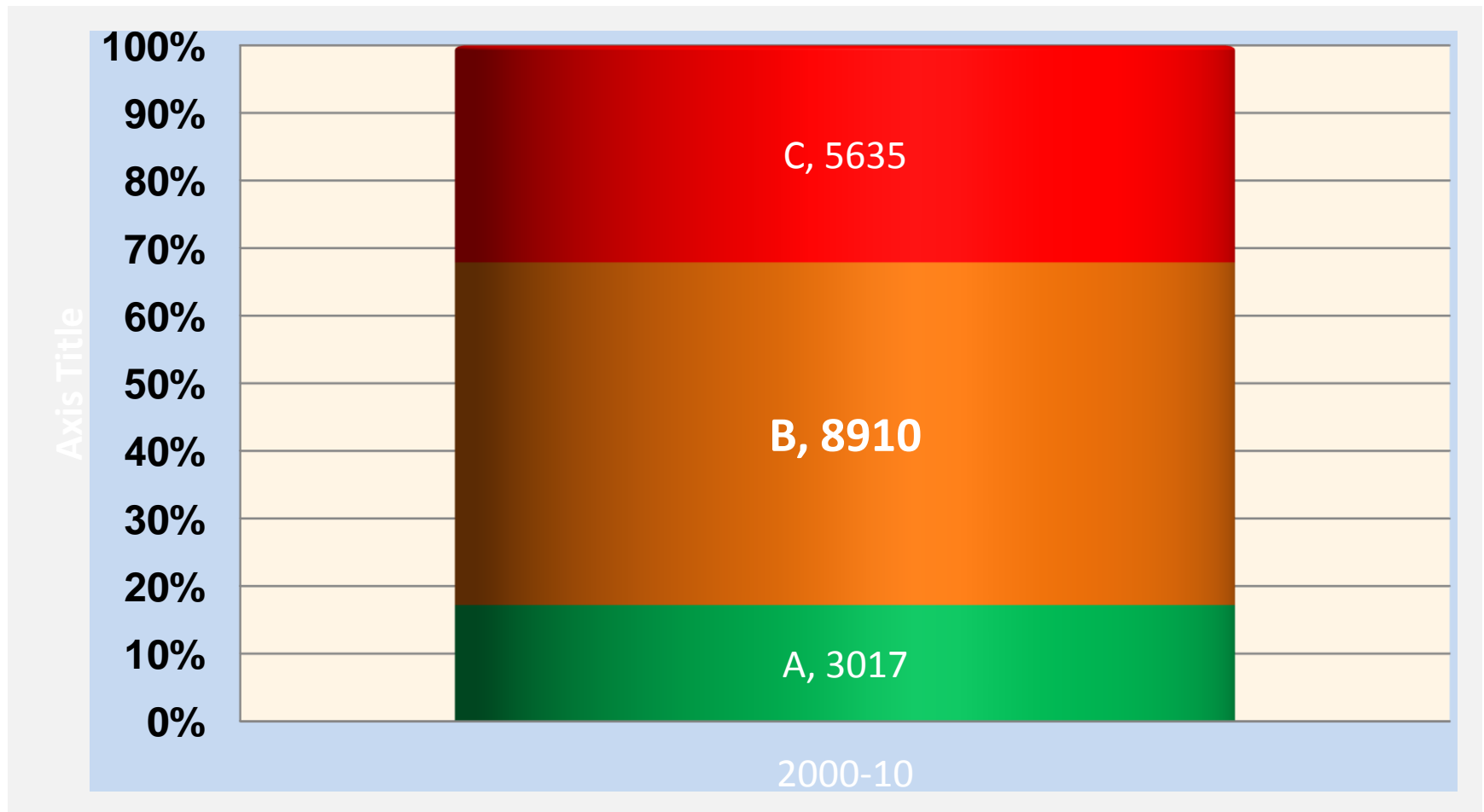
## Subjective Assessment:

A = well nourished

B = suspect of or moderately malnourished

C = severely malnourished

# Malnutrition status of 17562 cases in one decade at TMH- 2000-2009



# Approach to active nutrition support

Grade malnutrition	Risk from cancer treatment	Usual nutrition intervention
SGA-A	Low risk therapy	Eating hints, reassessment
	High risk therapy	Eating hints, Supplements, Tube feedings, SPN
SGA-B	Low risk therapy	INTENSIVE NS, Tube feedings, TPN Monitor intake, N2 balance
	High risk therapy	
SGA-C	Low risk therapy	INTENSIVE NS, Tube feedings, TPN Monitor intake, N2 balance
	High risk therapy	

# Routes for feeding

- Oral feeds/ Supplements
- Tube feedings
  - NJT, NJT, NET
  - PEG, REG, SG, PEJ, SJ
- Parenteral feeding
  - PPN or TPN
- Combination/ Supplemental



# Eating Well During and After Your Cancer Treatment

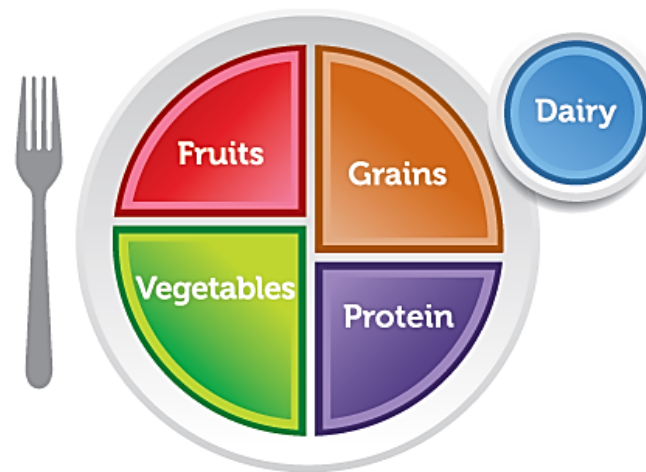
This information will help you maintain your nutrition during and after your cancer treatment.

Good nutrition is very important for patients with cancer. There may be some nutritional changes you can make now that will help you during treatment. Start by eating a healthy diet. This can increase your strength, help you maintain your weight, and help you fight infection. It may even help with the side effects of treatment.

## My Plate

My Plate is a picture of a place setting that shows what a healthy meal should look like. It includes the 5 food groups that are the building blocks of a healthy diet. These groups include whole grains, fruits, vegetables, lean proteins, and low-fat dairy products. Foods that are high in fat and sugar should be limited or avoided. For more information about the My Plate guidelines, visit [www.myplate.gov](http://www.myplate.gov).

The side effects of cancer and treatment can make it hard to eat. When this happens, it may be difficult for you to follow the My Plate guidelines. You may need to change your eating plan if you can't eat certain foods.



# Food and beverage safety

- **It is very important to make sure that the F&B are safe to reduce the risk for foodborne illnesses & other infections.**
  - ✓ **While preparing food, wash your hands well with soap and warm water. Clean your cutting boards and counters thoroughly.**
  - ✓ **Avoid eating any foods that have raw or undercooked eggs, meat, poultry, fish, or shellfish. Make sure that these raw foods or their juices never come in contact with other foods.**
  - ✓ **Eat only pasteurized milk and cheeses. Drink only processed or pasteurized juices and ciders.**
  - ✓ **Wash all raw fruits and vegetables well before eating, even if you are going to peel the skin off.**
  - ✓ **Thaw frozen foods in the refrigerator. Do not leave them out to thaw at room temperature.**
  - ✓ **After cooking, cool foods in the refrigerator. Do not let them cool at room temperature.**
- **If the immune system gets weaker (e.g. BMT), ask to follow stricter guidelines.**

# Contamination of blenderized formulas

- Locally prepared and manipulated diets had more coliforms than pasteurized milk.
  - Anderson et al JPEN 1984
- The use of “natural” food in blenderized formulas causes a major variance in nutrients and bacterial contamination as compared to reconstituted commercial formulas.
  - Mitne C et al. Brazilian journal of Clin Nutr
- Hospital prepared blenderized enteral tube feedings provide unpredictable micro and macronutrients and deliver less than the desired amounts of nutrients.
  - APJCN 2004

# Handling and re-use

- Risk of bacterial contamination if feeding systems are not carefully handled. Observe the Following:
  - Connections should be minimized
  - Same bag/tube should never be used on more than one patient
  - Giving sets should be changed at least every 24 h.
  - Reservoirs should only be used for 24 h after which they should be thoroughly cleaned/sterilized before re-use
  - Feeds should not be hung for longer than the recommended period
  - Scrupulous hand washing before handling feeds is mandatory
  - Feeding tubes should be flushed adequately after each feed

# What formulas to use in oncology

- **In general cancer patients needs:**
  - More calories and proteins
  - Formulations should be free of contamination
  - Easy to swallow or use with easily acceptable taste
  - EPA supplementation helps take care of the inflammatory component of cancer cachexia and improve many secondary endpoints
- **Specific nutritional is offered depending on the comorbidity or treatments being carried out:**
  - Diabetic, Renal
  - Perioperative immune nutrition
  - Bone marrow transplant

## **A disease-specific enteral nutrition formula improves nutritional status and functional performance in patients with head and neck and esophageal cancer undergoing chemoradiotherapy: results of a randomized, controlled, multicenter trial.**

Fietkau R<sup>1</sup>, Lewitzki V, Kuhnt T, Hölscher T, Hess CF, Berger B, Wiegel T, Rödel C, Niewald M, Hermann RM, Lubgan D.

### **Author information**

### **Abstract**

**BACKGROUND:** In patients with head and neck and esophageal tumors, nutritional status may deteriorate during concurrent chemoradiotherapy (CRT). The aim of this study was to investigate the influence of enteral nutrition enriched with eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) on body composition and nutritional and functional status.

**METHODS:** In a controlled, randomized, prospective, double-blind, multicenter study, 111 patients with head and neck and esophageal cancer undergoing concurrent CRT received either an enteral standard nutrition (control group) or **disease-specific** enteral nutrition Supportan®-containing EPA+DHA (experimental group) via percutaneous endoscopic gastrostomy. The

**CONCLUSION:** Enteral nutrition with EPA and DHA may be advantageous in patients with head and neck or esophageal cancer by improving parameters of nutritional and functional status during CRT.

# Probiotics

- In general avoid probiotics in patients with immunosuppression
- Probiotics are useful in patients receiving pelvic radiotherapy



# **Specialized Feeding in Oncology**

# Cost alone favors EN

**NET x 7  
days**

- Endoscopy (5000)
- Tube (1000)
- Consult (2000)
- Formula feeds (2000)
- Hospitalization (2000)

**Rs. 12000**

**TPN x 7  
days**

- Consult (2000)
- PICC line (6000)
- Labs (2000)
- TiO formula (14000)
- Hospitalization (14000)

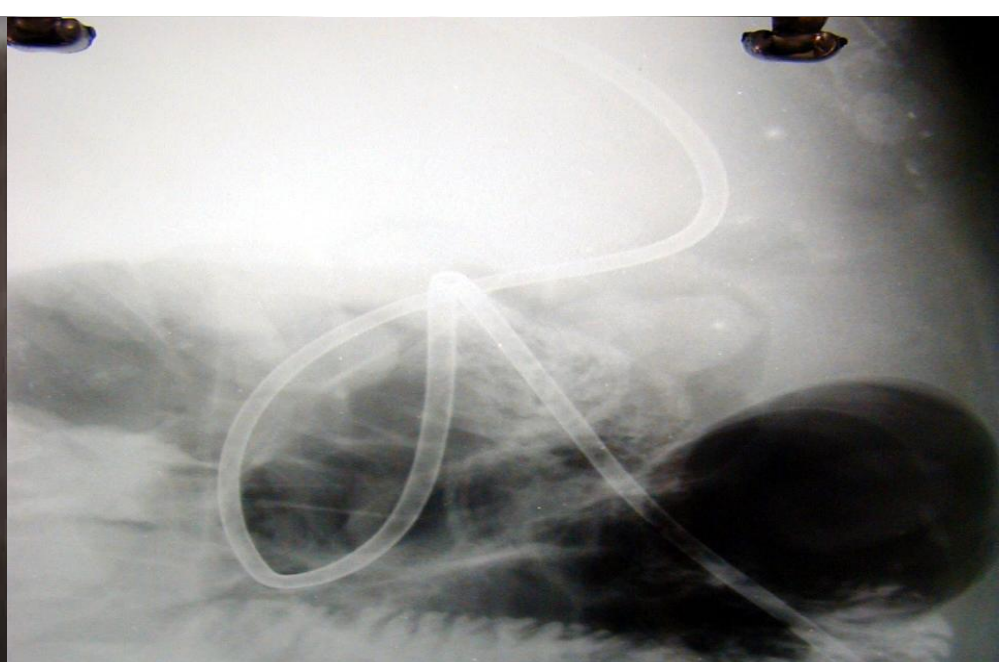
**Rs. 38000**

**EN= Rs250 - TPN= Rs2500/day**

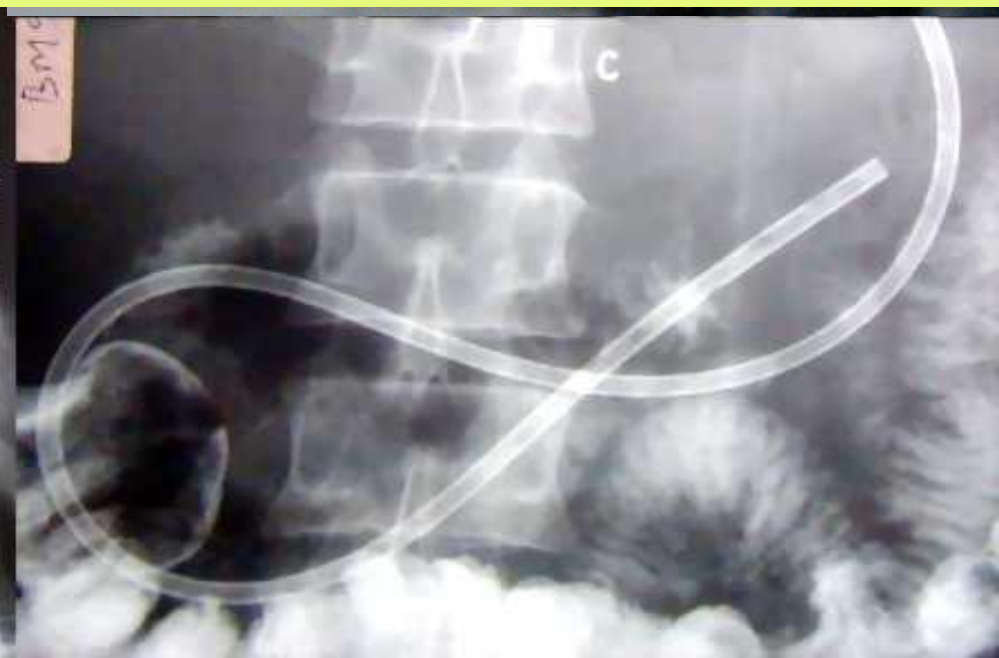
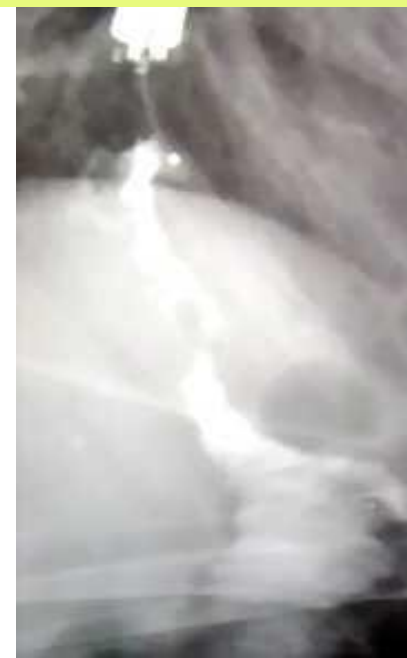
# Audit of our NST services[n=30811]

<b>ROUTE</b>	<b>1999-03</b>	<b>2004-08</b>	<b>2009-13</b>	<b>TOTAL</b>
<b>ORAL</b>	<b>2824</b>	<b>7583</b>	<b>9927</b>	<b>20334</b>
<b>EN (All)</b>	<b>2450</b>	<b>3632</b>	<b>3454</b>	<b>9536</b>
<b>NGT</b>	<b>1726</b>	<b>1986</b>	<b>2335</b>	<b>6047</b>
<b>PEG</b>	<b>162</b>	<b>997</b>	<b>220</b>	<b>1379</b>
<b>SGT</b>	<b>16</b>	<b>6</b>	<b>6</b>	<b>28</b>
<b>NET</b>	<b>111</b>	<b>197</b>	<b>429</b>	<b>737</b>
<b>SJT</b>	<b>251</b>	<b>111</b>	<b>42</b>	<b>404</b>
<b>PN (All)</b>	<b>184</b>	<b>335</b>	<b>422</b>	<b>941</b>





**“If the gut works, we shall reach it and use it”**





## Endoscopic feeding tube placement in patients with cancer: a prospective clinical audit of 2055 procedures in 1866 patients

Y. M. SHASTRI\*,†, M. SHIRODKAR\* & M. K. MALLATH\*

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### Conclusions

Enteral feeding tubes can be placed in almost all patients with cancer using endoscopic techniques. Adequate training of the endoscopy fellows and sufficient care by nutrition support team help achieve high success with few complications.

*Aliment Pharmacol Ther* 27, 649–658

**98% Success, Minimal morbidity, No mortality**

**If you don't reach it you wont use it**

# One tube won't suit all



C  
E



D  
F

G  
H



# Comparison of various enteral access

<b>ROUTE</b>	<b>ADVANTAGE</b>	<b>DISADVANTAGE</b>
<b>Oral</b>	<b>Natural, no cost</b>	<b>Patient dependant intake</b>
<b>NGT</b>	<b>Easy to pass, cheap, wide availability</b>	<b>Disfigurement, GER Discomfort, Migration</b>
<b>NET</b>	<b>Reduced GER Overcomes gastroparesis</b>	<b>Disfigurement, Expertise Special tube &amp; formula, Migration</b>
<b>PEG PEJ</b>	<b>Cosmetic, large lumen, long life</b>	<b>Cost, Expertise, Pain, Complications, GER</b>
<b>SG/SJ</b>	<b>Done during surgery</b>	<b>Surgery, More morbidity, Cost</b>

# Choosing the feeding route

<b>DURATION</b>	<b>Low risk of aspiration</b>	<b>High risk of aspiration</b>
<b>Less than 4 weeks</b>	<b>NGT</b>	<b>NET</b>
<b>More than 4 weeks</b>	<b>PEG</b>	<b>PEJ, JET-PEG</b>

*Note: Post pyloric feeding doesn't guarantee the prevention of GER*

# TPN AUDIT(n=941)

	No	Percent
<b>Referred for TPN</b>	<b>941</b>	<b>100</b>
<b>TPN Not Indicated</b>	<b>182</b>	<b>19</b>
<b>No TPN/ Functioning gut</b>	<b>54</b>	<b>6/30</b>
<b>TPN Done</b>	<b>759</b>	<b>81</b>

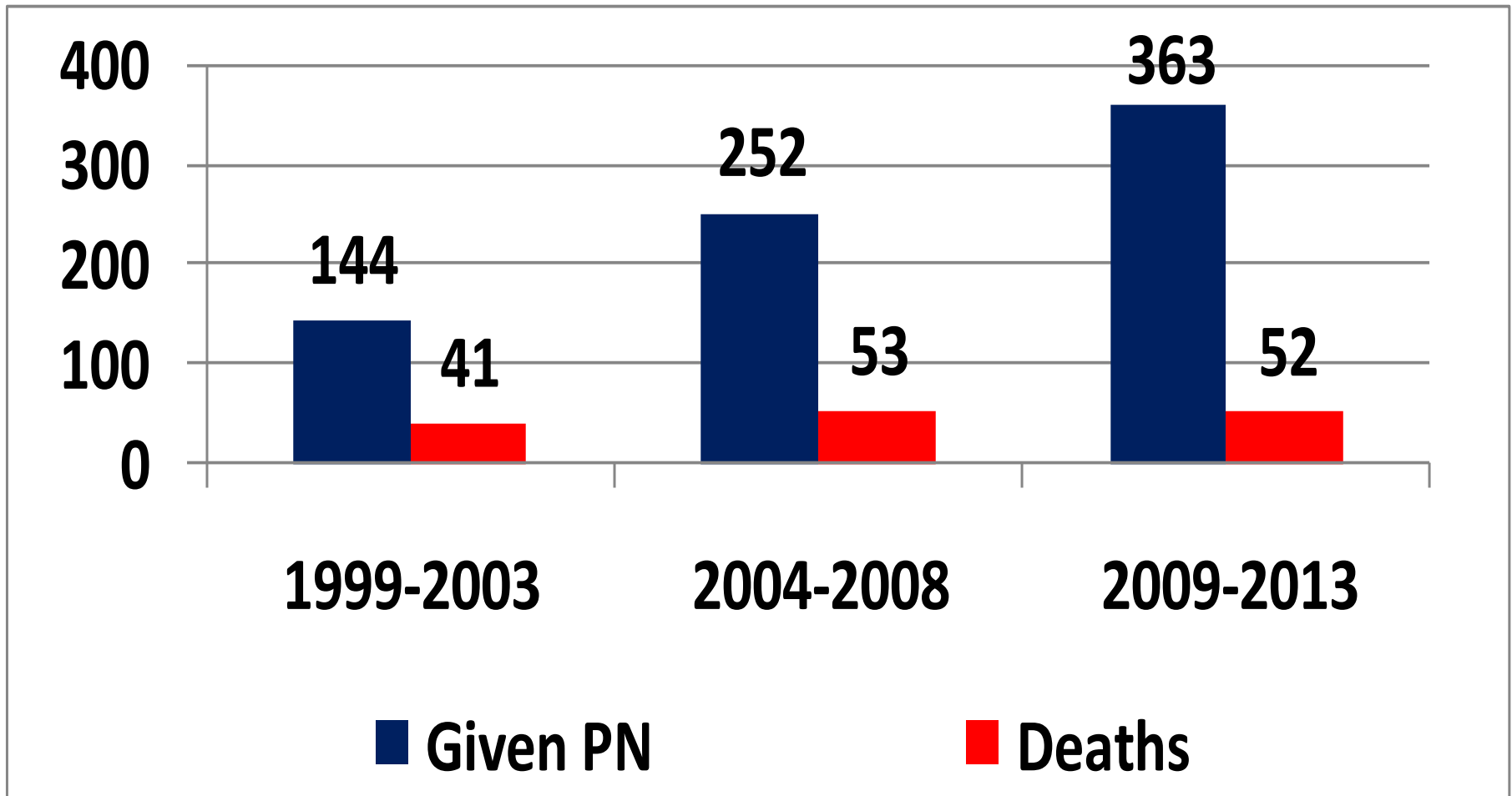
# Site of primary cancer

Type of cancer	Frequency	Percent
Gastrointestinal- Luminal	349	46.0
Hematolymphoid	122	16.1
Genitourinary	108	14.2
Hepato-Pancreatico-Biliary	104	13.7
Gynecological	20	2.6
Bone and Soft tissue	20	2.6
Head and Neck	16	2.1
Others	14	1.7
Noncancerous	6	0.8
<b>Total</b>	<b>759</b>	<b>100.0</b>

# Indication for TPN

<b>Indication</b>	<b>Frequency</b>	<b>Percent</b>
<b>Intestinal obstruction</b>	184	24.2
<b>Postoperative support</b>	114	15.0
<b>Post op leaks</b>	97	12.8
<b>Hypoalbuminemia</b>	73	9.6
<b>Fistula</b>	59	7.8
<b>Enterocolitis</b>	41	5.4
<b>Poor oral intake</b>	35	4.6
<b>Preoperative buildup</b>	27	3.6
<b>Intestinal perforation</b>	22	2.9
<b>Mucositis</b>	19	2.5
<b>Pancreatitis</b>	15	2.0
<b>Paralytic ileus</b>	13	1.7
<b>Burst abdomen</b>	11	1.4
<b>Poor nutritional status</b>	8	1.1
<b>Others</b>	41	5.2

# Early mortality in three periods

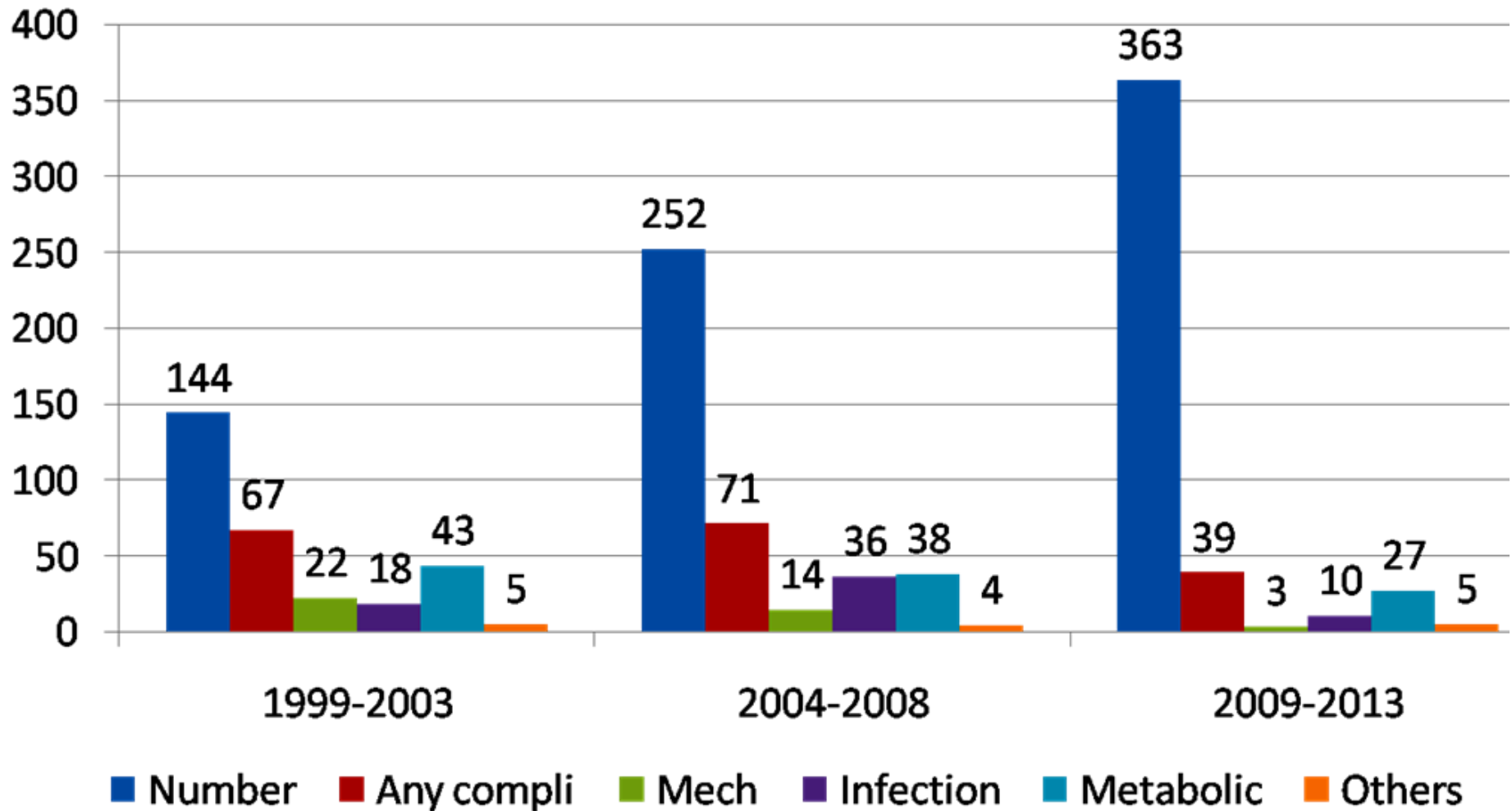


# Complications overview

<b>Type of complications</b>	<b>Frequency</b>	<b>Percent</b>
<b>Any complication</b>	177	23.3%
<b>Metabolic complications</b>	108	14.2%
<b>Infective complications</b>	64	8.4%
<b>Mechanical complications</b>	39	5.1%



# Complications over three periods



~~**NO SCREENING**~~



**DELAYED DIAGNOSIS**



**LATE/NO TREATMENTS**



**POOR OUTCOMES**



**INCREASED COSTS**



**THANK YOU**

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