Hi! We're Cuddles Foundation.

Beating childhood cancer starts with eating well, because #FoodHeals

www.cuddlesfoundation.org

Malnutrition - the villain in India's childhood cancer story.

Childhood cancer can be cured. But for children in India, it's a very different story. Lack of access to timely treatment and a ~40% malnutrition rate among those seeking care is making survival difficult for our children.*

Malnutrition has serious impact on cancer treatment.

→ Slows treatment response

→ Increases cost of care

→ Leads to compromised immunity

→ Greater risk of infections & treatment complications

The good news?

Up to 94% of children are more likely to stick with the treatment plan when nutrition is a part of it.*

4

Our journey starts at a hospital and ends at a playground.

37

Hospitals*

13

States*

52

Nutritionists*

As of May 2021

FoodHeals® App

We made The FoodHeals® App to help our nutritionists every day. It's a first-of-its-kind platform that helps automate clinical functions — like calculating the grade of malnourishment, BMI, calorie deficiency, etc.

The app also aids in counselling, diet planning and mapping progress of the child through the course of the treatment.

6
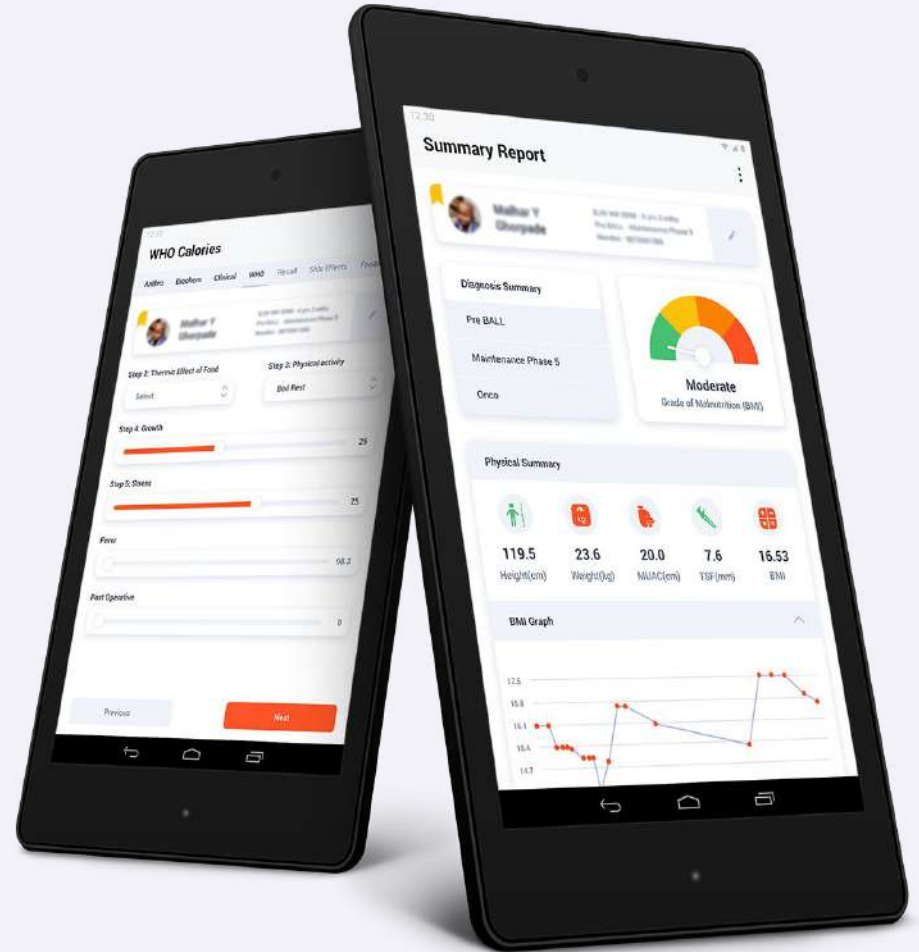
Our awards

National Award for Child Welfare (2015-16)

UNGC and Akshaya Patra Foundation's Nourisher Award (2018)

Outlook India Poshan Award *(Special Jury)* (2019)

Panna Dhai Award from Mewar Foundation (2020)

Disclaimer (1 of 2)

The contents of this session are purely for guidance and not approved by any regulatory body or medical practitioner. This session will provide the participant with only an introduction to Nutrition in Pediatric Oncology. Attending this session is by no means an approval or certification for implementing the guidelines discussed in this session. Further practical and certified training beyond this session is required for implementing the guidelines discussed in this session.

Further, the information provided in this session is general and may not apply in a specific situation. Medical advice should always be sought before taking any action based on the information provided during this session. Cuddles Foundation accepts no responsibility for any loss, harm, or damage, arising to any person acting or refraining from acting on the material contained in this session. While we have made all efforts to verify the accuracy of the information, please be advised that this is a developing area and Cuddles Foundation is not liable for inaccuracies, if any.

Disclaimer (2 of 2)

Cuddles Foundation does not endorse any commercial product, if shown herein and spoken about during this session. These products, if referenced during the session, were chosen randomly without consideration of the manufacturer and are used to only illustrate the information disseminated in this session.

About the Speakers

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Paediatric Onco Nutritionist
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Learning Objectives

✓ **Understand the importance of nutrition in pediatric oncology**

✓ **The Nutrition Care Team: The role of the nurse**

✓ **Assessment of nutritional status in children with cancer**

✓ Nutrition Intervention

Importance of Nutrition in Pediatric Cancer

Common Childhood Cancers in India

In order of prevalence in children between 0-14 years of age

Leukaemia (Lymphoid, Myeloid, Unspecified)

Lymphoma (Non-Hodgkins, Hodgkins)

CNS tumours

Genitourinary tumours

Bone tumours

Eye tumours (retinoblastoma)

Gastrointestinal tumours

Liver tumours

Das S *et al. Indian Pediatr.* 2017 15;54(12):1033–1036

Paediatric Cancer Cure Rates

Most Childhood Cancers are Curable
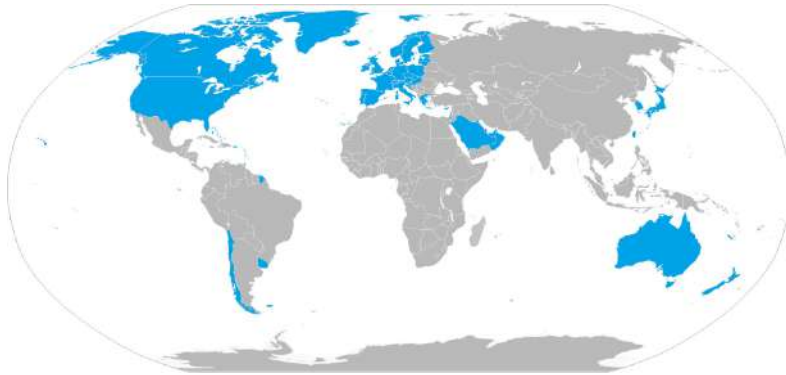
High income countries
80%

India
10–30%

Yadav SP *et al.* Pediatr Hematol Oncol. 2014 Apr;31(3):217–24

Barriers to cure for pediatric cancers in India

Indian Pediatric Hematology Oncology Group

Delayed Diagnosis and referral

Treatment abandonment

Sepsis and Treatment related toxicity

Lack of Cooperative groups and multispeciality care

Relapse

Yadav SP *et al.* Pediatr Hematol Oncol. 2014 Apr;31(3):217-24

How Nutritional status ties into the barriers of cure

Indian Pediatric Hematology Oncology Group

Delayed Diagnosis and referral

Rates higher in the event of malnutrition

Treatment abandonment

Sepsis and Treatment related toxicity

Malnutrition is probable underlying cause

Lack of Cooperative groups and multispeciality care

Relapse

1.Yadav SP *et al.* Pediatr Hematol Oncol. 2014 Apr;31(3):217–24
2.Ganguly S *et al.* Cancer Epidemiol. 2020 Feb 6;101679
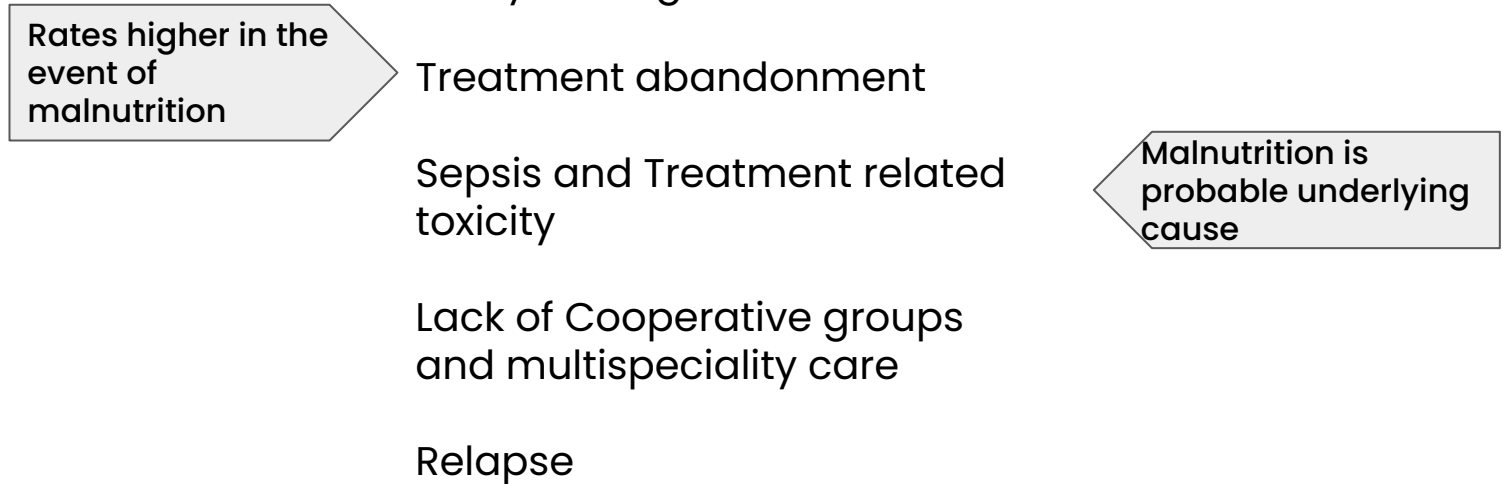
Malnutrition: A Common Complication in Children with Cancer

Reported malnourishment prevalence range of 8% – 60%[1]
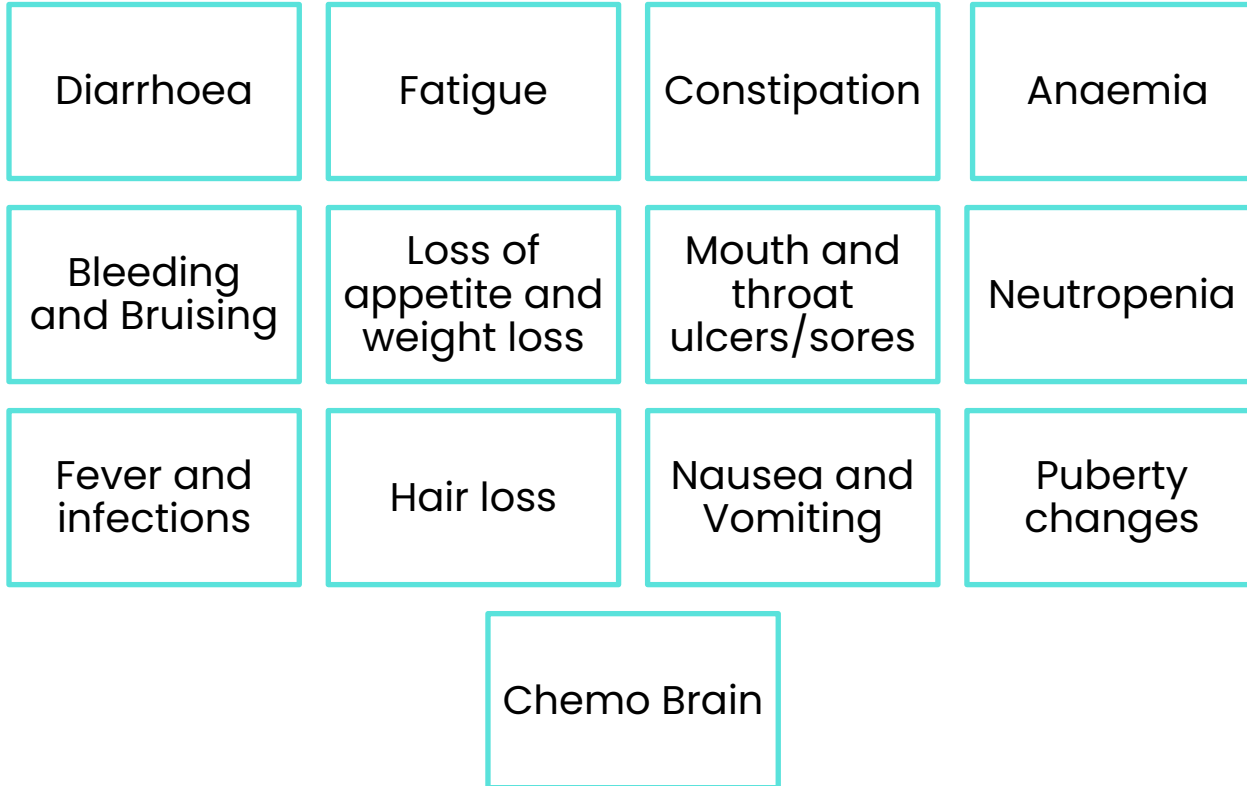
Increased nutrient needs[2] ➕ **Decreased intake of nutrients[2]** ➖ **Malnutrition[2]**

- Increased metabolic rate
- Increased catabolic breakdown
- Accelerated breakdown on energy stores and whole body protein

- Chemotherapy induced toxicity (vomiting, diarrhea, mucosal damage, malabsorption)
- Emesis with no desire to eat
- Taste and smell changes

Side-effects of Cancer Treatment

Diarrhoea	Fatigue	Constipation	Anaemia
Bleeding and Bruising	Loss of appetite and weight loss	Mouth and throat ulcers/sores	Neutropenia
Fever and infections	Hair loss	Nausea and Vomiting	Puberty changes
	Chemo Brain		

Tumour Lysis Syndrome

Potassium, phosphorous and nucleic acids get released into the blood

https://together.stjude.org/en-us/diagnosis-treatment/side-effects.html

Risk of Malnutrition: A Constant in the Cancer Cure Journey

Underweight　　Overweight　Underweight　　Overweight　Underweight　　Overweight

| Diagnosis | Active treatment | Maintenance | Survivorship |

Causes

Diagnosis
- Late diagnosis
- Symptoms of the disease

Active treatment
- Hypercatbolic
- Side-effects of treatment
- Medications
- Nutrition myths

Maintenance
- Side-effects of treatment
- Medications
- Over-protective caregiver

Survivorship
- "Late effects"
- Caregiver attitude on nutrition
- Lack of physical activity

Importance of Nutrition Intervention in a Child with Cancer

Short Term Complications

- Wasting of muscle and fat mass
- Change in body composition
- **Delayed wound healing**
- **Decreased tolerance to chemotherapy**
- Unfavorable response to treatment
- Treatment delays
- Fatigue
- Biochemical disturbances (anemia and hypoalbuminemia)
- Delayed recovery of normal marrow function
- **Drug dose alteration**
- Decreased QOL and productivity
- **Higher susceptibility to infections**
- Greater levels of psychological stress

Long Term Complications

- **Growth impairment, reduced final height**
- Decreased long-term survival in several tumor types
- Motor, cognitive, and neurodevelopmental impairment
- Risk for metabolic syndrome
- Risk for secondary cancers
- Increased mortality rate
- Skeletal maturation retardation
- Abnormal bone mineral density
- Decreased QOL

1. Triarico *et al* Eur Rev Med Pharmacol Sci. 2019;23(3):1165-1175
2. Bauer et al . Adv Nutr. 2011; 2(2): 67–77

Clinicoepidemiological profiles, clinical practices, and the impact of holistic care interventions on outcomes of pediatric hematolymphoid malignancies - A 7-year audit of the pediatric hematolymphoid disease management group at Tata Memorial Hospital

Gaurav Narula [1], Maya Prasad [1], Shalini Jatia [2], Papagudi G Subramanian [3], Nikhil Patkar [3], Prashant Tembhare [3], Dhanlaxmi Shetty [4], Nehal Khanna [5], Siddharth Laskar [5], Tanuja Shet [3], Sridhar Epari [3], Seema Kembhavi [6], Sneha Shah [7], Sajid Qureshi [8], Sumeet Gujral [3], Shripad D Banavali [1]

Affiliations — collapse

Affiliations

1 Department of Medical Oncology, Tata Memorial Hospital, Mumbai, Maharashtra, India.
2 ImPaCCT Foundation of Pediatric Oncology Division, Mumbai, Maharashtra, India.
3 Department of Pathology, Tata Memorial Hospital, Mumbai, Maharashtra, India.
4 Department of Cytogenetics, Tata Memorial Hospital, Mumbai, Maharashtra, India.
5 Department of Radiation Oncology, Tata Memorial Hospital, Mumbai, Maharashtra, India.
6 Department of Radiodiagnosis, Tata Memorial Hospital, Mumbai, Maharashtra, India.
7 Department of Nuclear Medicine, Tata Memorial Hospital, Mumbai, Maharashtra, India.
8 Department of Surgical Oncology, Tata Memorial Hospital, Mumbai, Maharashtra, India.

Free article

Impact of Holistic support for newly diagnosed pediatric cancer patients

Pediatric Hematolymphoid Disease Management Group at Tata Memorial Hospital (A 7 year audit report)

Infection control

Nutrition

Social support (accommodation, picnics, education)

Counselling

Palliative support

Ration for a week

Nutritional supplements

High protein snacks

Hot meals

RTF

Micronutrient supplements

Treatment refusal and abandonment rates decreased 32% to 3.4%

Early mortality in AML cases reduced 32% to 3.4%

5 y OS 69.5%

The Nutrition Care Team

Roles of the Nutrition Support Team

Doctor

- Central line placement and catheter site care
- Management of complications
- Liaison with the nursing staff
- Overall incharge of team

Nutritionist

- Nutrition assessment and calculation of requirements
- Designing and implementing EN and PN feeds
- Facilitates transitional feeding
- Staff and patient education

Pharmacist

- Provides expertise on parenteral solution incompatibilities and septic solution preparation
- Resource for identifying drug nutrient interaction and drug induced feeding intolerance

Nurse

- Assisting during central line placement
- Monitoring of EN and PN feeds
- Catheter care
- Appropriate collection of blood specimens
- Monitoring food intake and escalating if nutrition status deteriorates

1. *ASPEN.* Nutrition support dietetics core curriculum. 2nd edition. 1993.
2. Philip J. Schneider. Nutrition Support Teams: An Evidence-Based Practice. Nutr Clin Pract, February 2006; 21(1): 62-67.

Take home messages

Risk of undernutrition and overnutrition is a constant during a child's cancer journey

Poor nutritional status of a child is a probable cause for treatment abandonment

The nutritional status of a child can impact treatment outcome and overall survival

The nurse and the nutritionist are very important part of the nutrition care team

Feedback on food intake and severity of side-effects resulting in reduced food intake by the nurse is crucial.

Learning Objectives

✓ Assessment of nutritional status in children with cancer

✓ Nutrition Intervention

Assessment of Nutritional Status in Pediatric Oncology

Risk of Malnutrition: Patient Profile

	High risk of malnutrition	High risk of adiposity

Tumor type	Presentation with and/or undergoing treatment for
	  Solid tumor in advance stages
	    Neuroblastoma
	    Wilms tumor
	    Rhabdomyosarcoma
	Undergoing treatment for
	  Advanced stage Ewing sarcoma
	  Multiple relapsed and some high-risk leukemia
	  Head and neck tumors
	  Diencephalic tumors
	  Poststem cell transplantation (graft vs. host disease)
		Presentation with and/or undergoing treatment for
		  Central nervous system tumors
		    Craniopharyngioma
		    Medulloblastoma
		    Astrocytoma
		Undergoing treatment for
		  ALL
		  Ependymoma
		  Nasopharynx carcinoma
		  Sarcoma
		  Lymphoma
		  Disseminated testicular cancer

Treatment modality	Irradiation to the GIT Major abdominal surgery Bone marrow transplant Intense frequent intervals of chemotherapy (<3 weeks) in the absence of corticosteroids	Extensive brain surgery High dose cranial/cranial spinal radiotherapy Total body or abdominal radiotherapy Prolonged corticosteroid therapy with large doses or other drugs that can increase body fat stores

Patient demographics	Infancy
	Low social-economic status
	Lack of family or health supports system
		Brain tumors
		  Female
		  Greater than %BMI at diagnosis
		ALL <10 years at diagnosis
		  Hispanic
		  Male

GIT=Gastrointestinal tumor; ALL=Acute lymphoblastic leukemia; BMI=Body mass index

Schoeman J *Indian J Cancer*. 2015;52(2):186-90

Nutrition Screening Tool for Childhood Cancer (SCAN)

- Developed by an interdisciplinary team at the Children's Nutrition Research Center Queensland Children's Medical Research Institute University of Queensland Brisbane Australia in 2014.

- Developed to identify children with a diagnosis of cancer for risk of malnutrition.

- The tool consists of 6 questions with scoring determined by clinical evaluation of each criteria's contribution to nutrition risk.

- Each response is allocated a 1 or 2.

Murphy AJ, et al. Evaluation of the nutrition screening tool for childhood cancer (SCAN). Clin Nutr. 2016 Feb;35(1):219-224.

Nutrition Screening: SCAN questions

Does the patient have a high risk cancer? **1**

Is the patient currently undergoing intensive treatment? **1**

Does the patient have any symptoms relating to the GI tract? **2**

Has the patient had poor intake over the past week? **2**

Has the patient had any weight loss over the past month? **2**

Does the patient show signs of undernutrition? **2**

Total: If ≥3 (indicates high nutrition risk and nutritionist is consulted)

Murphy AJ, et al. Evaluation of the nutrition screening tool for childhood cancer (SCAN). Clin Nutr. 2016 Feb;35(1):219–224.

Anthropometry

Measures

- Weight

- Height

- Mid Upper Arm Circumference (MUAC)

- Triceps Skin-Fold Thickness (TSF)

- Head Circumference
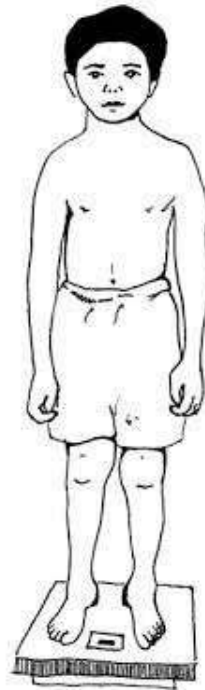
Growth Indices

- Body Mass Index (BMI)

- Weight for Age Z- score (WAZ)

- Height for Age Z- score (HAZ)

- Weight for Height/Length Z- score (WHZ/WLZ)

- BMI for Age Z- score

Measuring Weight

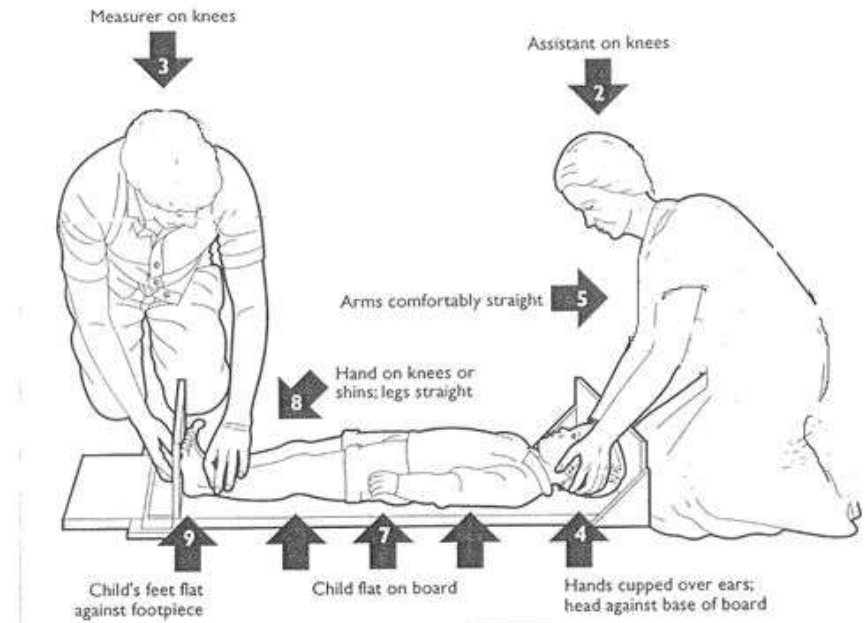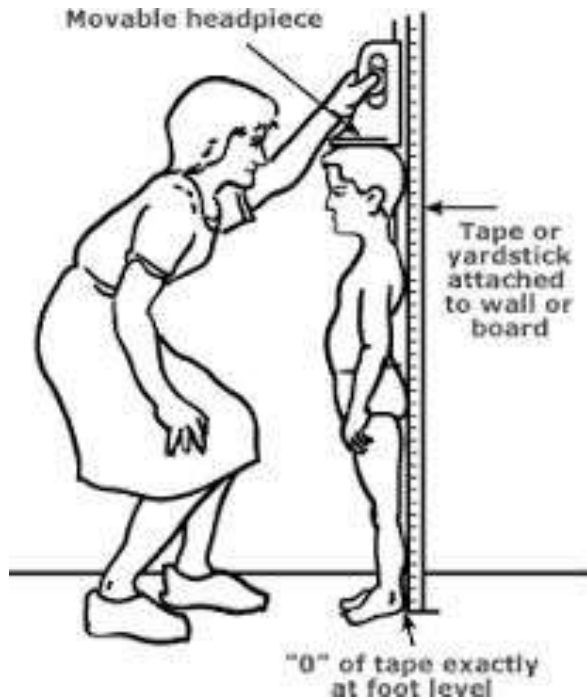1. Electronic weighing scale   2.Calibrate the scale everyday   3.Light clothing

Tared Weighing for children under 2 years

Measuring Height/Length

- Remove shoes, socks, hair accessories and undo pony tails

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Interpreting Nutritional Status using Z scores

Simplified field tables

Weight-for-height BOYS 2 to 5 years (z-scores) — World Health Organization

cm	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
65.0	5.9	6.3	6.9	7.4	8.1	8.8	9.6
65.5	6.0	6.4	7.0	7.6	8.2	8.9	9.8
66.0	6.1	6.5	7.1	7.7	8.3	9.1	9.9
66.5	6.1	6.6	7.2	7.8	8.5	9.2	10.1
67.0	6.2	6.7	7.3	7.9	8.6	9.4	10.2
67.5	6.3	6.8	7.4	8.0	8.7	9.5	10.4
68.0	6.4	6.9	7.5	8.1	8.8	9.6	10.5
68.5	6.5	7.0	7.6	8.2	9.0	9.8	10.7
69.0	6.6	7.1	7.7	8.4	9.1	9.9	10.8
69.5	6.7	7.2	7.8	8.5	9.2	10.0	11.0
70.0	6.8	7.3	7.9	8.6	9.3	10.2	11.1
70.5	6.9	7.4	8.0	8.7	9.5	10.3	11.3
71.0	6.9	7.5	8.1	8.8	9.6	10.4	11.4
71.5	7.0	7.6	8.2	8.9	9.7	10.6	11.6
72.0	7.1	7.7	8.3	9.0	9.8	10.7	11.7
72.5	7.2	7.8	8.4	9.1	9.9	10.8	11.8
73.0	7.3	7.9	8.5	9.2	10.0	11.0	12.0
73.5	7.4	7.9	8.6	9.3	10.2	11.1	12.1
74.0	7.4	8.0	8.7	9.4	10.3	11.2	12.2

Interpreting Z scores

Cut off values	Terms of status
Weight for Age Z-Score	
< −3.00 WAZ	Severe underweight
−3.00 to -2.01 WAZ	Moderate underweight
−2.00 to 1.01 WAZ	Mild underweight
± 1.00 WAZ	Normal
Height for Age Z-Score	
< −3.00 HAZ	Severe stunting
−3.00 to −2.01 HAZ	Moderate stunting
−2.00 to 1.01 HAZ	Mild stunting
Weight for height Z-Score	
± 1.00 HAZ	Normal
< −3.00 WHZ	Severe wasting
−3.00 to −2.01 WHZ	Moderate wasting
−2.00 to 1.01 WHZ	Mild wasting
± 1.00 WHZ	Normal
+2.01 to +3.00 WHZ	Over-weight
≥3.00 WHZ	Obesity

Source: Reference WHO child growth standards, 2006.

MUAC measurement

https://www.youtube.com/watch?v=uQb8fge-BWs

Anthropometry in Children with Cancer

Estimation of Nutritional Status based on height and weight has drawbacks due to:[1]

Large tumour weight

Hydration status

Organomegaly

Mid Upper Arm Circumference (MUAC)[2]

- Cheap, rapid and easy
- Minimal training required
- Sensitive for measuring musculature and available protein stores
- Measures lean body mass
- In children with cancer
  - Independent of abdominal tumour mass
  - Temporary gain in body water
  - Ethnicity

1. Viani K et al. Pediatric Blood & Cancer [Internet]. 2020 [cited 2022 Jan 17];67(S3):e28211. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/pbc.28211
2. UNICEF. Mid-upper arm circumference (MUAC) measuring tapes. [Internet]. 2022 p. 1–2. Available from: https://www.unicef.org/supply/media/1421/file/mid-upper-arm-circumference-measuring-tapes-technical-bulletin.pdf

MUAC Nutritional Status Cutoffs

Age group	Acute malnutrition	Severe Acute Malnutrition
6 months to five years	MUAC < 12.5 cm (125 mm)	MUAC < 11.0 cm (110 mm)
> 5 years without tumour mass	W/H < -2 Z-score	W/H < -3 Z-score
> 5 years with a tumour mass	MUAC < 13.5 cm (135 mm)	MUAC < 11.5 cm (115 mm)

MUAC, mid-upper arm circumference; W/H, weight for height; SAM, severe acute malnutrition.

1. Viani K et al. Pediatric Blood & Cancer [Internet]. 2020 [cited 2022 Jan 17];67(S3):e28211. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/pbc.28211
2. Israels T, et al. Pediatric Blood & Cancer. 2013;60(6):899–904

Nutrition Intervention

Indications for Nutritional Support

✓ **Insufficient Oral Intake**

- Inability to meet >60% to 80% of individual requirements for >10 days
- Children older than 1 y, NS initiated within 5 days of anticipated lack of oral feed
- Children younger than 1 y within 3 days of anticipated lack of oral feed
- Total feeding time in a disabled child >4 to 6 h/day

✓ **Clinical signs of undernutrition**

ESPGHAN Committee on Nutrition. Practical Approach to Paediatric Enteral Nutrition: A Comment by the ESPGHAN Committee on Nutrition. J. Pediatr Gastroenterol Nutr. 2010;51(1):110-22.

Routes of Feeding

Oral Feeds +

Modification of texture, nutritional supplements, RTF, most physiological route

Enteral Tube Feeds +

Anticipating or in the event of complications of treatment like stomatitis, mucositis, excessive vomiting and/or diarrhoea

Parenteral Feeds +

In the event of severe complications where the gut is not accessible. Eg necrotizing enterocolitis

Types of Oral/ Enteral Feeds

Age appropriate Feeds +

Monomeric/ Elemental feeds +

Disease specific feeds +

Semi-elemental feeds +

Polymeric/ Intact feeds +

Lactose free formulations +

Calculation of Nutritional Requirements (Oral and Enteral)

Table 4.23. Energy requirements of Indians at different ages

Age Group	Category	Body weights	Requirement (kcal/d)[a]	Requirement (kcal/kg/day)
Men	Sedentary work	65.0	2110	32
	Moderate work	65.0	2710	42
	Heavy work	65.0	3470	53
Women	Sedentary work	55.0	1660	30
	Moderate work	55.0	2130	39
	Heavy work	55.0	2720	49
	Pregnant	55.0 + GWG[b]	+ 350	
	Lactating	55.0+[c]	+600 +520	
Infants	0-6 m	5.8	530	90
	6-12m	8.5	660	80
Children[d]	1-3y	12.9	1110	83
	4-6y	18.3	1360	74
	7-9 y	25.3	1700	67
Boys	10-12y	34.9	2220	64
Girls	10-12y	36.4	2060	57
Boys	13-15y	50.5	2860	57
Girls	13-15y	49.6	2400	49
Boys	16-18y	64.4	3320	52
Girls	16-18y	55.7	2500	45

[a] Rounded off to the nearest 10 kcal/d

[b] GWG – Gestational Weight Gain. Energy need in pregnancy should be adjusted for actual bodyweight, observed weight gain and activity pattern for the population.

Protein requirements

1. As per the DGI chart **OR**
2. Max upto 1.5 g/Kg/BW

NIN 2020 Dietary Guidelines of India

Special Tips to Keep in Mind (1/2)

General

- Accurate anthropometry is crucial in oncology
- Calibrate, Measure and Monitor

RT Feeds

- To prevent aspiration, patient should be propped up by 30-45° and fed. Continue to be in this position for at least half an hour after feed administration
- Discard and call for fresh feeds if patient has missed a feed due to procedures or investigations
- In the event of a vomiting episode during feeds, the nutritionist and/or doctor should be informed immediately
- NO medication should be given through the NG tube.
- Tube should be closely monitored for blockage or clogging.

Special Tips to Keep in Mind (2/2)

Parenteral Feeds

- Drawing of blood from the same port that is being used to administer feeds can lead to erroneous readings
- Mixing of 2 or 3 chamber bags has to be carefully done under aseptic conditions
- Parenteral bags that are being administered should be covered by a dark cloth to prevent photodegradation
- The infusion rate should not be changed without informing the nutritionist planning the parenteral feed
- Mandatory monitoring
  - 6 hourly blood sugar levels
  - Input/Output

It's Quiz Time!!

Go to the Comments window and click on the post-assessment link

Effective Nurses-Nutritionists Collaboration

✓ **Collaborate on nutritional assessments**

✓ Respect each other's expertise

✓ Communicate clearly

✓ Foster a team approach to patient care

Together, we can!!

Take home messages

Accurate anthropometry measurements are crucial for estimating nutritional status of children with cancer.

MUAC is a better indicator of nutritional status in children with solid tumours

The collaborative team of nurses and nutritionists should administer, monitor and manage the nutritional aspect of the patient together

Thank you for your attention!

Content created by:

Dr. Sripriya Venkiteswaran (Ph.D)

Created: March 2023

Beating childhood cancer starts with eating well.

www.cuddlesfoundation.org

Open for questions