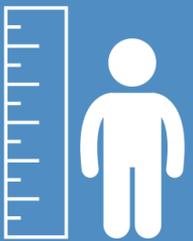


ASK ABOUT YOUR CHILD'S NUTRITION

It's Vital to Your Child's Health, Growth, and Development



DOES YOUR CHILD HAVE ANY OF THESE SIGNS?

<p>Weight Loss Slow Weight Gain Underweight</p>  <p>Overweight</p>	<p>Not Growing Longer or Taller</p>  <p>Not Outgrowing Clothes</p>	<p>Eating Less Than Usual</p>  <p>No Interest in Eating</p>	<p>Not Eating Well Due to Stomach Problems</p>  <p>Tube Feeding or Special Diet</p>	<p>Less Active Less Playful</p>  <p>Sleeping More Than Usual</p>
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Take the challenge:
Implement the “new definitions” of pediatric
malnutrition into your practice.

DANA BOCTOR MSC, MD

NICOLE GILBERT BSC, RD

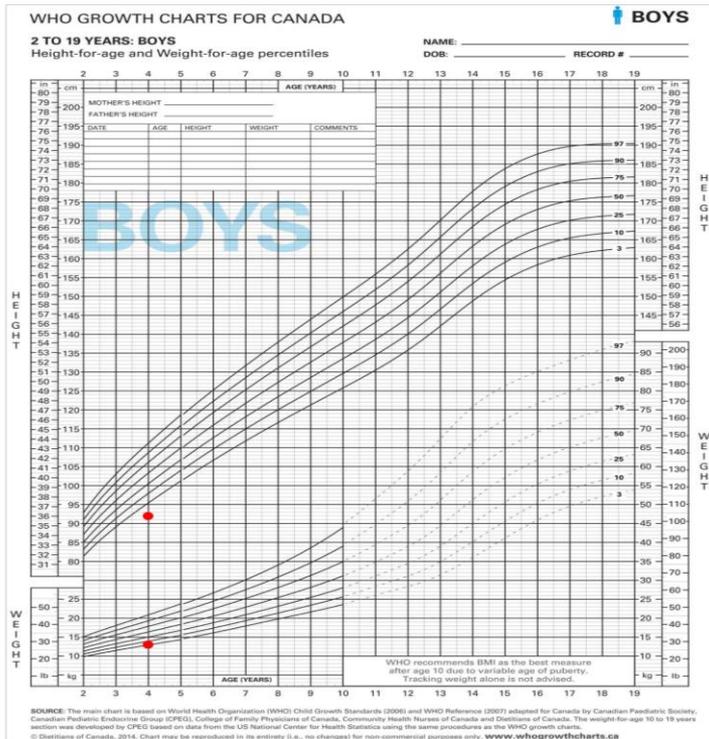
Disclosures

Relationships with commercial interests:

- Grants/Research Support: CMTF, Cdn Nutrition Society
- Speakers Bureau/Honoraria: None
- Consulting Fees: None
- Other: None

How would you
classify...

4 year old boy admit for asthma flare. Clerk notes FTT.



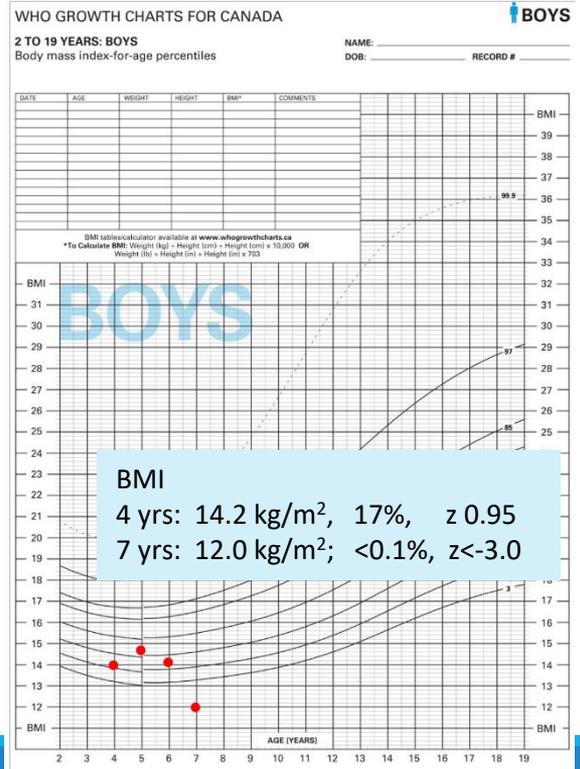
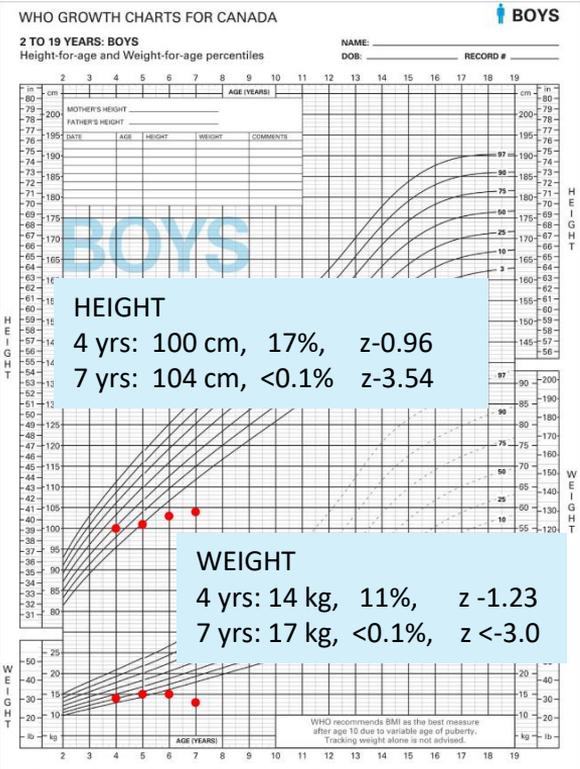
Weight 12.6 kg (1.9th percentile)
Height 94 cm (0.8th percentile)
BMI 14.5 kg/m² (24th percentile)

Does this child have malnutrition:

- Yes, weight and height are <3 percentile
- Yes, chronic malnutrition with height <1st percentile
- No, because BMI is 24th percentile
- Not possible to determine with 1 data point
- Honestly! I am not sure... consult GI?

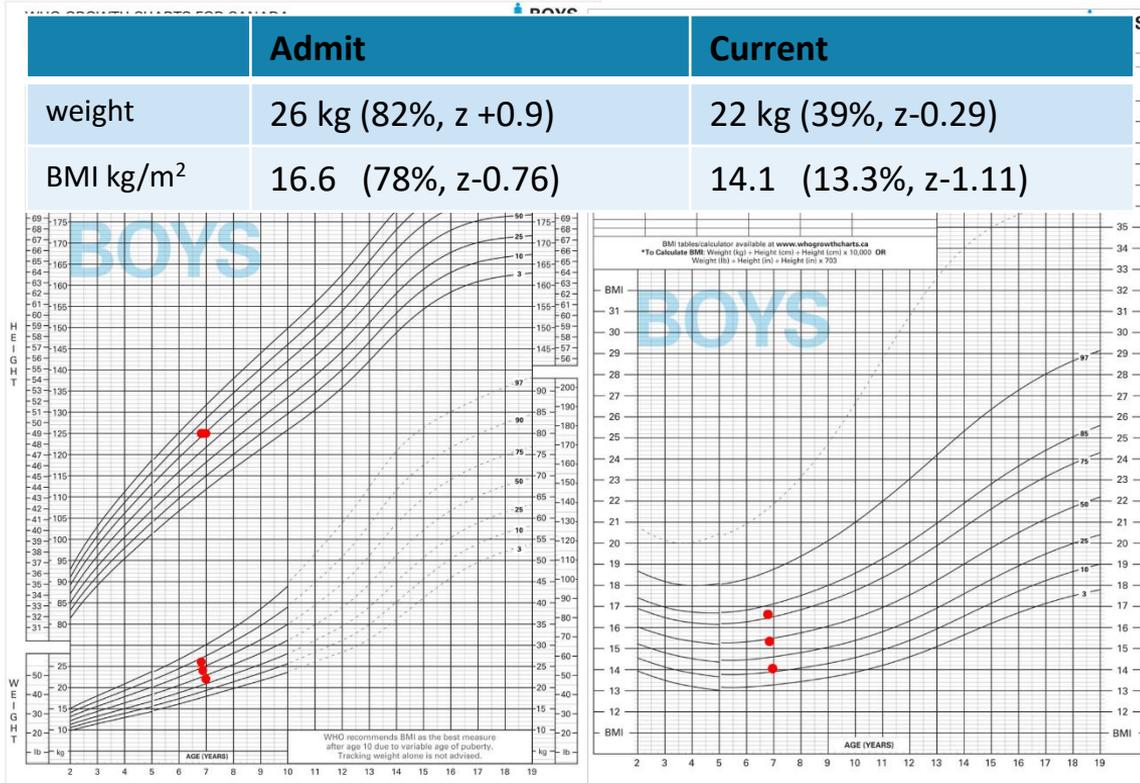
7 yo with untreated Crohn disease

Chronic diarrhea, ↓appetite, unable to participate in sports, ↓school performance, CRP 150



- How would you classify this child's malnutrition at 7 yrs?
- Chronic severe based on height
 - Severe based on current BMI
 - Severe based on BMI change
 - Severe based on weight for age z score
 - a, b, c only

7 year old with acute gastroenteritis, complicated by severe necrotizing pancreatitis. Admitted to ICU, spiking temperatures



What would best describe this nutritional state?

- FTT due to crossing of 2 major weight percentiles
- Severe acute malnutrition due to drop in weight by >10%
- Acute weight loss only, BMI is >3rd percentile
- a&b only
- None of the above

“A Call to Change”

Special Report



Defining Pediatric Malnutrition: A Paradigm Shift Toward Etiology-Related Definitions

Journal of Parenteral and Enteral Nutrition
Volume 37 Number 4
July 2013 460-481

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

FROM THE AMERICAN ACADEMY OF PEDIATRICS

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

Statement of Endorsement: Defining Pediatric Malnutrition

2015

FROM THE ACADEMY
Consensus Statement



Consensus Statement of the Academy of Nutrition and Dietetics/American Society for Parenteral and Enteral Nutrition: Indicators Recommended for the Identification and Documentation of Pediatric Malnutrition (Undernutrition)



Patricia J. Becker, MS, RD, CSP, LDN, CNSC; Liesje Nieman Carney, RD, CSP, LDN; Mark Richard Corlins, MD, CNSC, SPR, FAAP; Jessica Monczka, RD, LDN, CNSC; Elizabeth Smith, RD, LDN, CNSC; Susan Elizabeth Smith, RD, CSP, LD; Bonnie A. Spear, PhD, RDN, LD; Jane V. White, PhD, RD, LDN, FADA, FAND

Objectives

1. Review the etiology construct for pediatric malnutrition.
2. To review the definitions of pediatric malnutrition.
3. Implementation practice!
4. Introduce screening tool for malnutrition to be implemented at ACH.

What are the
definitions of
malnutrition?

Definitions Historically...

Marasmus & Kwashiorkor



WHO 2005

Marasmus

Emaciated

- Fat and muscle wasting
- “old person” face



Alert and irritable

Hair: normal

Skin: thin, flaccid

Kwashiorkor

Edema

- Extremities: Bilateral pitting
- Peri-orbital
- Ascites

Emaciated

- Possible
- subcutaneous fat may be present



Lethargic, apathetic, miserable

Dry, thin, pluckable hair, depigmented

Skin: atrophic, erythematous, hypo or hyperpigmented, desquamation, ulcerations

Hepatomegaly

FAILURE TO THRIVE

“An indicator of physical or psychosocial problems in early childhood and is associated with subsequent growth delay and cognitive deficiencies”

1. Chpt 21. In: *Nelson's Textbook of Pediatrics*. 20th ed. 2015; Philadelphia, PA: Saunders.
2. Olsen EM et al *Arch Dis Child* 2007;92: 109

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No consensus on specific definition

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FTT: various criteria

- Attained low weight or low height
 - Cut off: 3rd percentile or 5th percentile
- Weight <75% of median weight for chronologic age (Gomez)
- Weight <80% of median weight for length (Waterlow)
- BMI <5th percentile
- Length for age <5th percentile
- Weight deceleration
 - Crossing 2 or more major centile lines (5, 10, 25, 50, 75, 90, 95) from birth until current weight
 - Conditional weight gain \leq lowest 5%

FTT: various criteria

- Attained low weight or low height
 - Cut off: 3rd percentile or 5th percentile
- Weight <75% of median weight for chronologic age / length
- Weight <80% of median weight for length
- BMI <5 centile
- Length for age <5th percentile
- Weight <5th percentile
- Failure to cross weight lines (5, 10, 25, 50, 75, 90, 95) from birth until weight within given percentile
- Condition: weight gain \leq lowest 5%

LOW CONCURRENCE

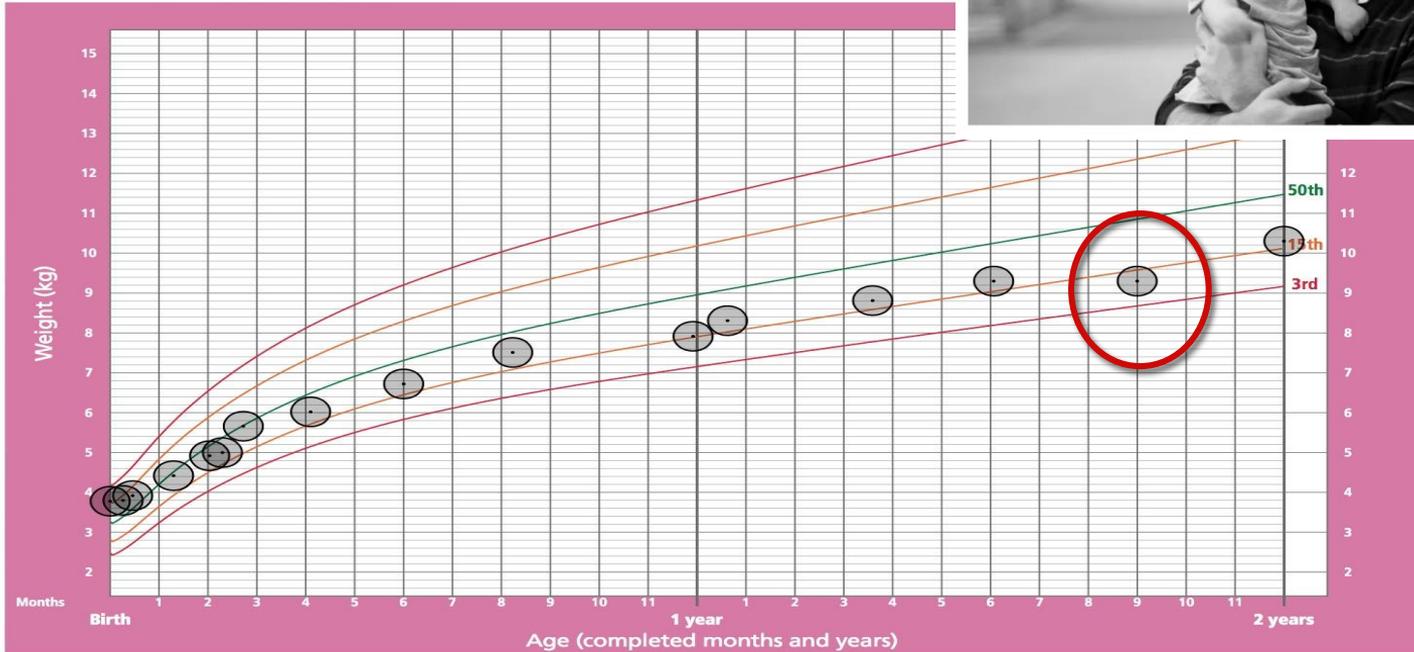
FTT Masquerader: “Catch-down growth”

Birth weight > intrinsic potential



Weight-for-age GIRLS

Birth to 2 years (percentiles)



Limitations

Parameter	Limitations
WFA	<ul style="list-style-type: none"><li data-bbox="531 380 1663 423">• Normal cross in percentiles in 1st 2 years: “catch down”<li data-bbox="531 440 1503 483">• WFA alone not associated with poor outcomes<li data-bbox="531 500 923 543">• Context of 1 plot

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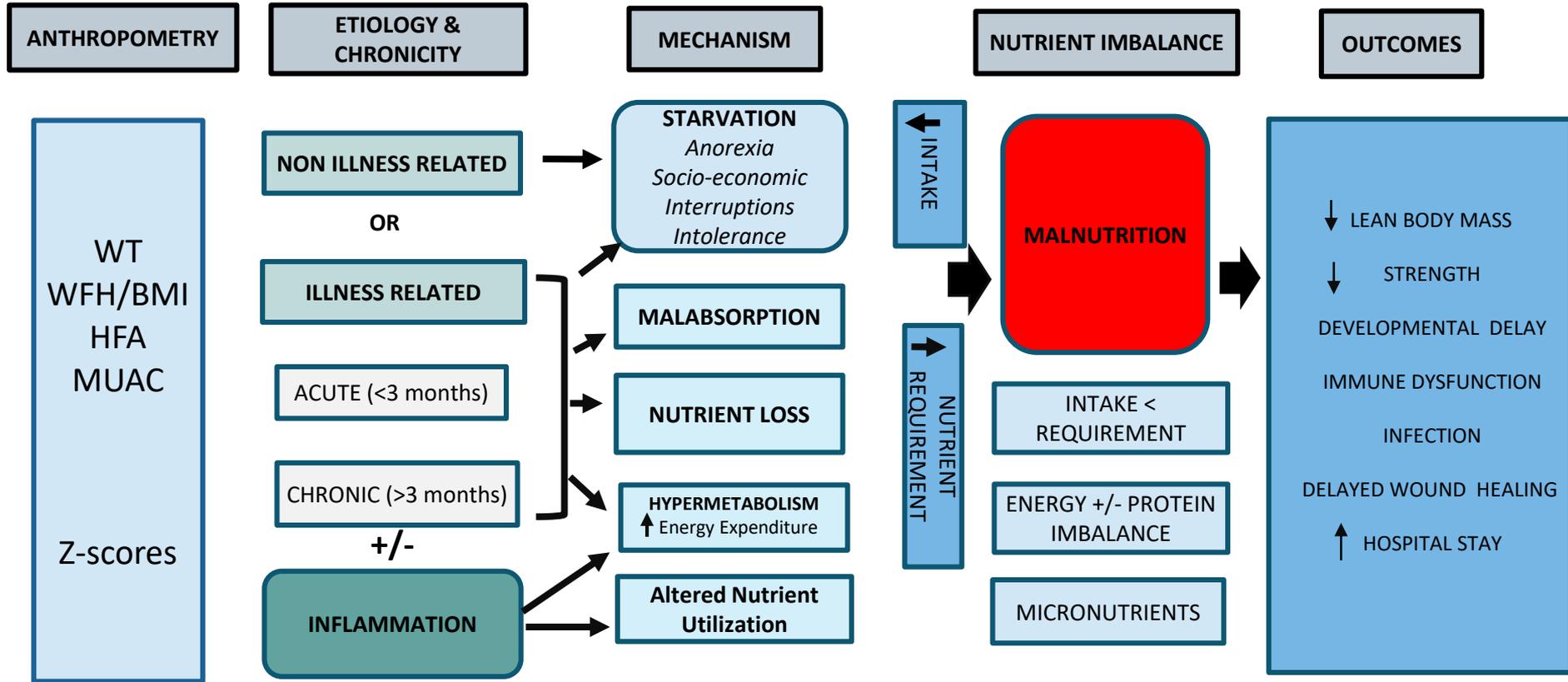


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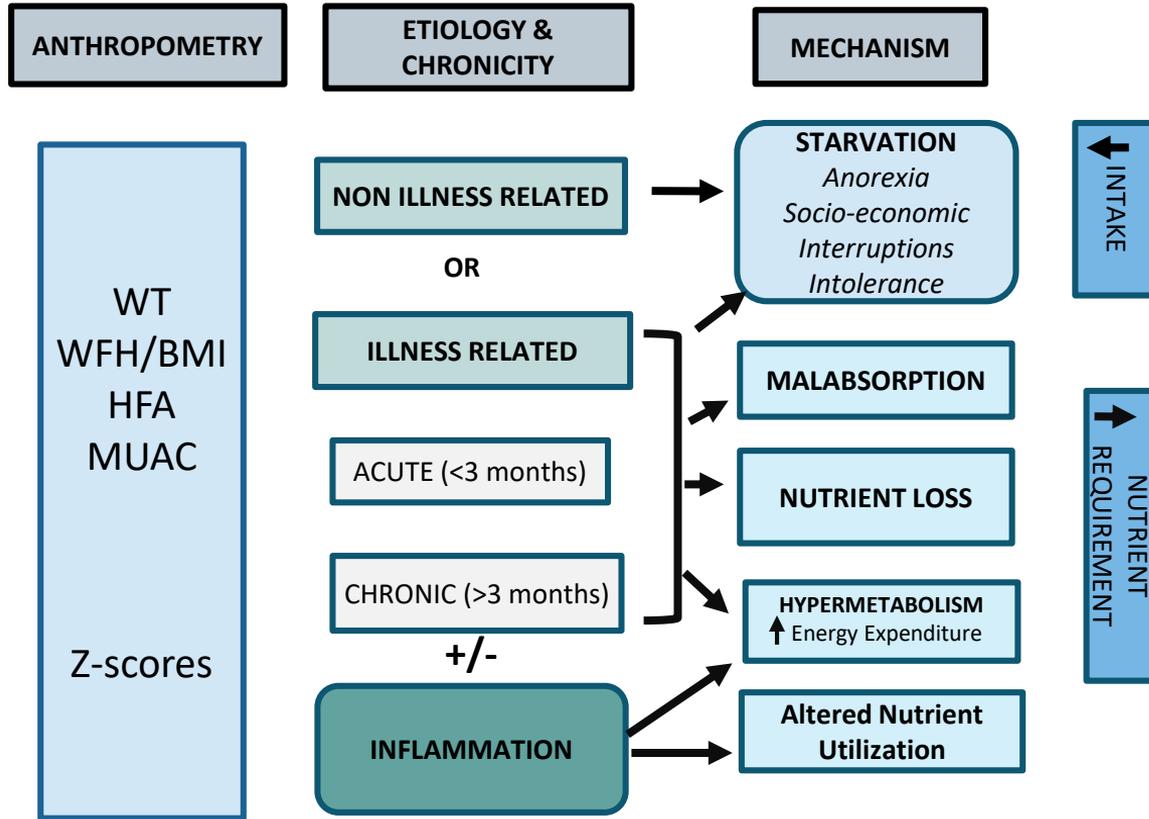


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Malnutrition Definition-Etiology Related

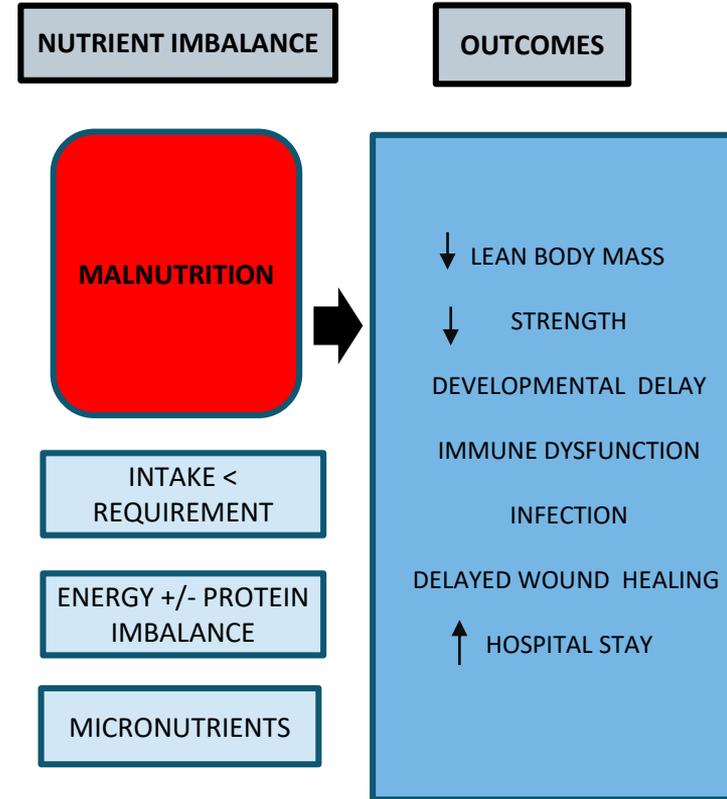


Malnutrition Definition-Etiology Related



Malnutrition Definition

“...an imbalance between nutrient requirements and intake that results in cumulative deficits of energy, protein or micronutrients that may negatively affect growth, development and other relevant outcomes”



Classification Scheme

Primary Indicators of Malnutrition: Single data point

Primary Indicator	At risk/Mild Malnutrition	Moderate Malnutrition	Severe Malnutrition
Wt For Ht z-score < 2 yrs	-1 to -1.9	-2 to -2.9	≤ -3
BMI z-score > 2 yrs	-1 to -1.9	-2 to -2.9	≤ -3
Ht For Age z-score			≤ -3
MUAC > 6 months	-1 to -1.9	-2 to -2.9	≤ -3

Primary Indicators of Malnutrition: Single data point

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Ht For Age z-score		≤ -3
MUAC <i>> 6 months</i>	-2 to -2.9	≤ -3

Primary Indicators of Malnutrition:

Two or more data points

Primary Indicator	At risk/Mild Malnutrition	Moderate Malnutrition	Severe Malnutrition
Weight gain velocity <i><2 yrs</i>	<75% of the norm	<50% of the norm	<25% of the norm
Weight loss <i>2-20 yrs</i>	5% BW	7.5% BW	>10% BW
Decline in Wt For Length z-score	↓ 1 z score	↓ 2 z score	↓ 3 z scores

Expected weight gain

(Median weight gain, WHO)

Age	grams/day (F/M)
0-3 months	28/33
3-6 months	16/17
6-9 months	10/11
9-12 months	8
1-3 years	6-7

Expected weight gain

(Median weight gain, WHO)

Age	grams/day (F/M)
0-3 months	30
3-6 months	15
6-9 months	10
9-12 months	8
1-3 years	7

What is the Moo-AK?



Eloise Brodeur, "Best Friends" 2017, Cathy comics

Mid Upper Arm Circumference

MUAC: Why use it?

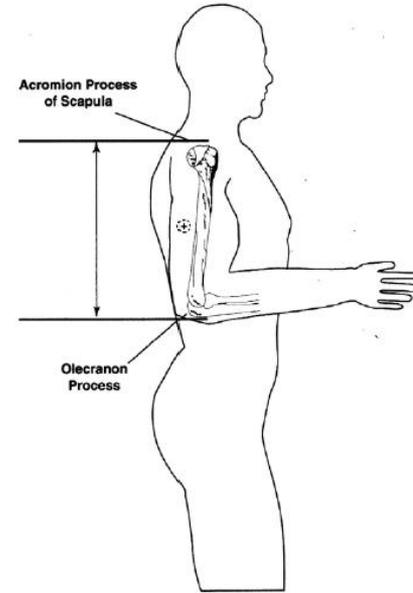
- Changes little during early years
- Standards available for >6 months
- Fluid shifts/edema: may be better than WFH for acute malnutrition
- Can MUAC be used adequately as a stand alone criteria?
 - Predicts malnutrition-related mortality with reasonable specificity and sensitivity
 - Asia, Kenya, Bangladesh: better than HFA or WFA
 - <11.5 cm (Z-score<-3 SD): as a diagnostic criteria increased risk of death

Myatt M 2006 Food Nutr Bulletin 27:S7; Briend A et al Lancet 1987 : 8561:725; Black R et al Lancet 2008; 370:243

Mid Upper Arm Circumference

MUAC: Why use it?

Simple



Is MUAC < 11.5 cm an adequate as a stand-alone measure?

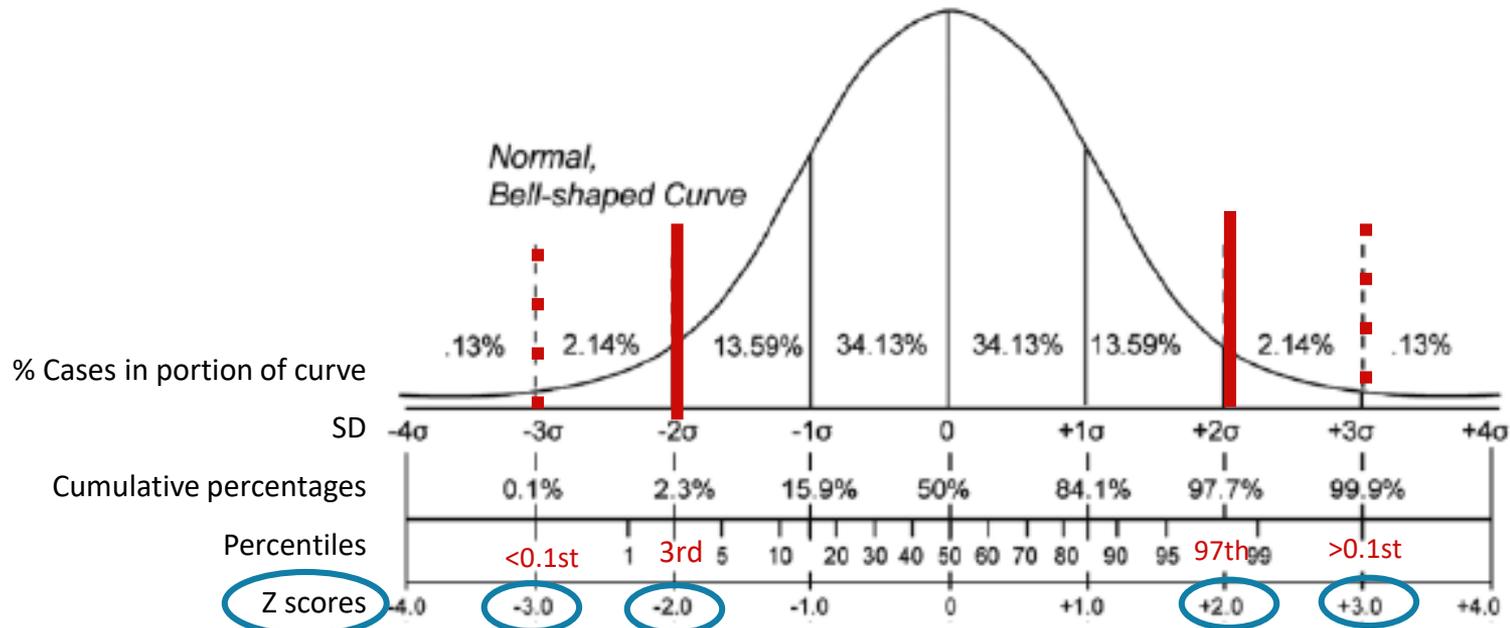
Age	Moderate Acute Malnutrition Z score -2 to -3	Severe Acute Malnutrition Z score <-3
6 mo –5 yr	11.5-12.5 cm	<11.5 cm
5 – 10 yr	12.5-13.5 cm	<13.5 cm
10 – 18 yr	16.0-18.0 cm	<16 cm

Limitations

MUAC

- Severe edematous states
- Standards for > 5 years less well established

Growth Charts: What is a z-score?



What are the advantages of using Z-scores vs. percentiles

- Comparable across age and sex
- Allow precision: Better define the severity of malnutrition
- Quantify smaller changes

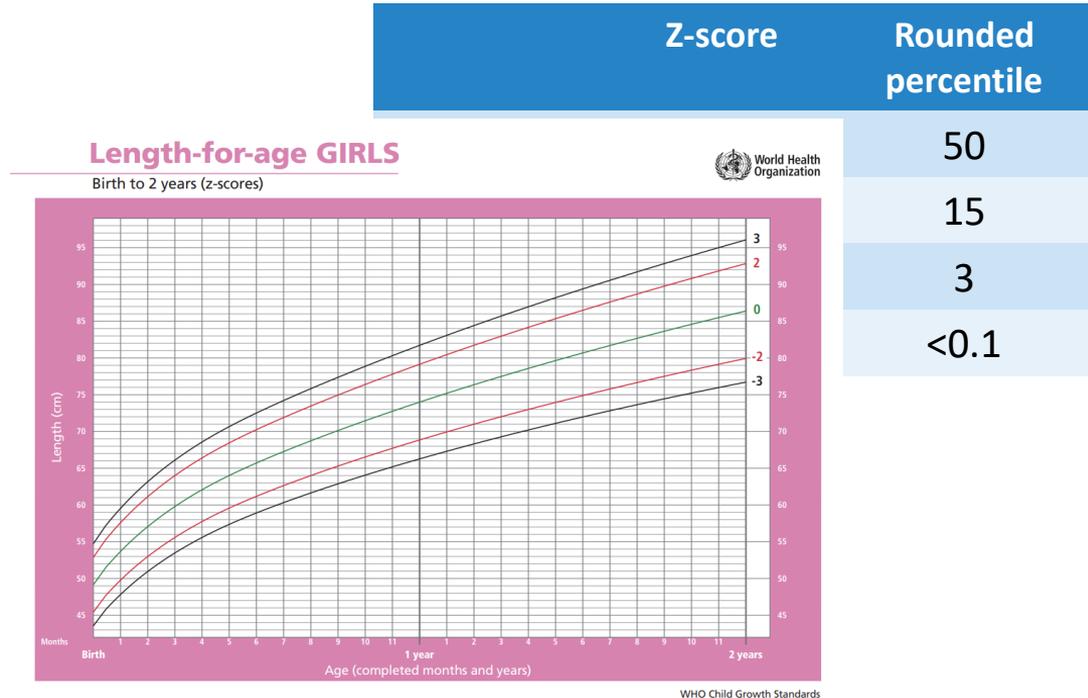
How to determine Z-score

1. Look at growth chart
2. Look at tables/charts
3. z-score calculators

	Z-score	Rounded percentile
	0	50
At-risk	-1	15
moderate	-2	3
severe	-3	<0.1

How to determine Z score

1. Look at growth chart
2. Look at tables/charts
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How to determine

1. Look at growth chart
2. Look at tables/charts
3. z-score calculators

Simplified field tables

Length-for-age GIRLS Birth to 2 years (z-scores)		 World Health Organization						
Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
0: 0	0	43.6	45.4	47.3	49.1	51.0	52.9	54.7
0: 1	1	47.8	49.8	51.7	53.7	55.6	57.6	59.5
0: 2	2	51.0	53.0	55.0	57.1	59.1	61.1	63.2
0: 3	3	53.5	55.6	57.7	59.8	61.9	64.0	66.1
0: 4	4	55.6	57.8	59.9	62.1	64.3	66.4	68.6
0: 5	5	57.4	59.6	61.8	64.0	66.2	68.5	70.7
0: 6	6	58.9	61.2	63.5	65.7	68.0	70.3	72.5
0: 7	7	60.3	62.7	65.0	67.3	69.6	71.9	74.2
0: 8	8	61.7	64.0	66.4	68.7	71.1	73.5	75.8
0: 9	9	62.9	65.3	67.7	70.1	72.6	75.0	77.4
0:10	10	64.1	66.5	69.0	71.5	73.9	76.4	78.9
0:11	11	65.2	67.7	70.3	72.8	75.3	77.8	80.3
1: 0	12	66.3	68.9	71.4	74.0	76.6	79.2	81.7
1: 1	13	67.3	70.0	72.6	75.2	77.8	80.5	83.1
1: 2	14	68.3	71.0	73.7	76.4	79.1	81.7	84.4
1: 3	15	69.3	72.0	74.8	77.5	80.2	83.0	85.7
1: 4	16	70.2	73.0	75.8	78.6	81.4	84.2	87.0
1: 5	17	71.1	74.0	76.8	79.7	82.5	85.4	88.2
1: 6	18	72.0	74.9	77.8	80.7	83.6	86.5	89.4
1: 7	19	72.8	75.8	78.8	81.7	84.7	87.6	90.6
1: 8	20	73.7	76.7	79.7	82.7	85.7	88.7	91.7
1: 9	21	74.5	77.5	80.6	83.7	86.7	89.8	92.9
1:10	22	75.2	78.4	81.5	84.6	87.7	90.8	94.0
1:11	23	76.0	79.2	82.3	85.5	88.7	91.9	95.0
2: 0	24	76.7	80.0	83.2	86.4	89.6	92.9	96.1

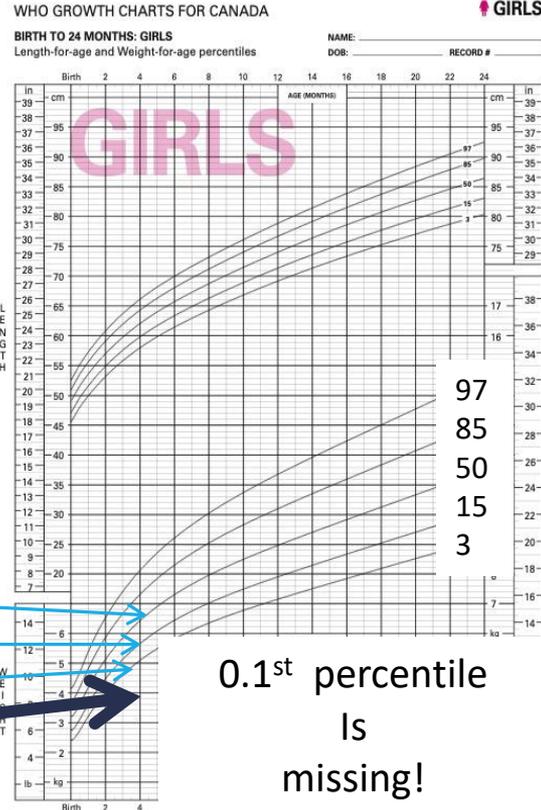
WHO Child Growth Standards

Resources: Z-scores using WHO

Technology	Tool	Comments
iphone/android	Anthrocal	Also has Fenton charts, syndromic charts, BP
	Peditools	Prem calculator (Fenton charts) adjust GA Calculator for ≤ 2 years exact zscores
Desktop	BCCH Anthro Calculator Peditools WHO	Excel spreadsheet: anthros, ht velocity, BP Web based app Software
CPEG Shiny Apps	Software for growth centile and z-score calculators	For use for research context

TERM	CRITERIA percentile
Underweight (weight-for-age)	< 3rd
Stunted (height-for-age)	< 3rd
Wasted (weight-for-length < 2yrs) (BMI-for-age > 2 yrs)	< 3rd

Z-score	Rounded percentile
0	50
At-risk moderate	15
severe	3
	0.1



SOURCE: Based on World Health Organization (WHO) Child Growth Standards (2006) and WHO Reference (2007) and adapted for Canada by Canadian Pediatric Society, Canadian Pediatric Endocrine Group, College of Family Physicians of Canada, Community Health Nurses of Canada and Dietitians of Canada.
© Dietitians of Canada, 2014. Chart may be reproduced in its entirety (i.e., no changes) for non-commercial purposes only. www.whogrowthcharts.ca

What is prevalence of malnutrition in high resource settings?

Prevalence Malnutrition in High Resource Settings: 2.4-51%

Geographical Location	Population Studied	Clinical Setting	Screening Tools	Anthropometric Parameters	Prevalence
Belgium	0.8–17 y N = 379	Tertiary & secondary care facilities	No specific	WFH < -2 SD BMI < -2 SD %WFH < 80% MUAC < -2 SD Any one variable	9.0% 9.8% 2.4% 3.8% 13.5%
Canada	Birth–18 y N = 173	General pediatric unit	PNRS	Scoring	20.2%
Canada	1 m–18 y N = 307	Tertiary Pediatric Care Facilities	STRONG _{kids}	Scoring WFA < -2 SD HFA < -2 SD WFH or BMI < -2 SD Any one variable	26.6% 10.4% 14.0% 9.1% 19.5%
Europe	1 m–18 y N = 1258	14 Hospital Centres General pediatric wards & pediatric surgery	PYMS STAMP STRONG _{kids}	Scoring	22% 22% 10%
France	1–>72 m N = 296	Tertiary care facility	PNRS	PIBW < 85%	26%
France	>6 m N = 52	Tertiary care facility	NRS	BMI < -2 SD Scoring	12% 26%
France	2 m–16 y N = 280	Tertiary care facility	No specific	WFH < -2 SD	11%
France	1 d–16 y N = 923	Primary & Tertiary Care Facilities	No specific	WFH < -2 SD	11.9%
Germany	7.9 ± 5 y N = 475	Tertiary care facility	Waterlow classification	Median WFH < 80% TST < 10% Perc.	6.1% 17.2%
Italy	1 m–20 y N = 1994	Tertiary care & General pediatric wards	No specific	BMI or WFH < -2 SD	13.2%
Turkey	1 m–23 y N = 528	General pediatric unit	No specific	WFA < -2 SDWFH < -2 SDBMI < -2 SD	36.6% 27.7% 7.4%
Turkey	1 m–18 y N = 1513	Nationwide hospitals	PYMS N = 919 STRONG _{kids}	Scoring BMI < -2 SD WFA < -2 SD HEA < -2 SD Scoring	39.7% 9.5% 14.8% 16.2% 3.6%
UK	0.6–16 y N = 226	Tertiary care facility	No specific	WFA < -2 SD or <5% Perc. HFA < -2 SD or <5% Perc. WFH: <80% of STD	8% 11% 16%
US	<2–18 y N = 268	Tertiary care facilities	Waterlow classification	Median WFH < 80%	7.1%
US	<24 m N = 121	Cardiac intensive tertiary care facility	Waterlow classification	Median WFH < 80%	17.4%
US	2–18 y N = 1747	Tertiary care facility	No specific	BMI ≤ 5% Perc.	24.5%
US	1 m–17 y N = 2.14 × 10 ⁶	Nationwide hospitals	No specific	% discharges	2.6%

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What is the prevalence of malnutrition at ACH?

ANALYSIS OF CANADIAN MALNUTRITION TASK
FORCE ACH COHORT

Study objectives

1. Primary objective: to assess the prevalence of malnutrition at the time of admission at the Alberta Children's Hospital.

Primary Indicator	Moderate Malnutrition	Severe Malnutrition
Weight For Ht/BMI z-score	-2 to -2.9	≤ -3
Height For Age z-score		≤ -3
Mid Upper Arm Circumference	-2 to -2.9	≤ -3

2. Secondary objective: to determine the diagnostic accuracy of individual indicators of nutritional status.

Study criteria

Eligibility:

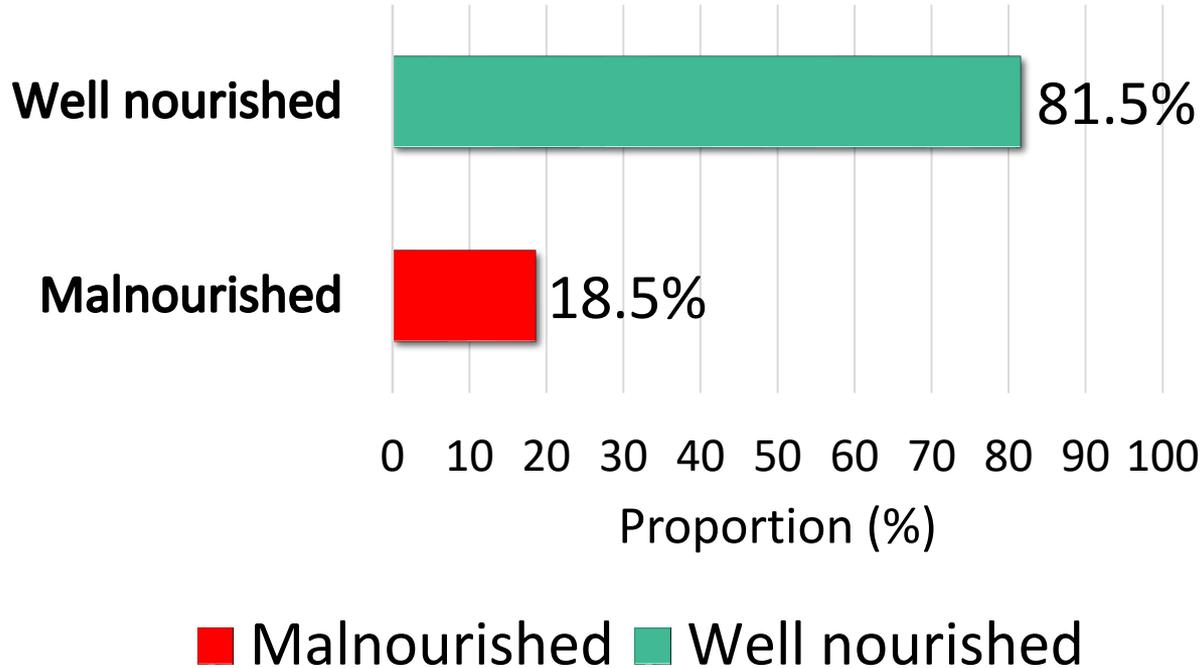
- Age – 1 month to 18 years
- Medical or surgical ward
- Planned hospital stay >48h

Exclusion:

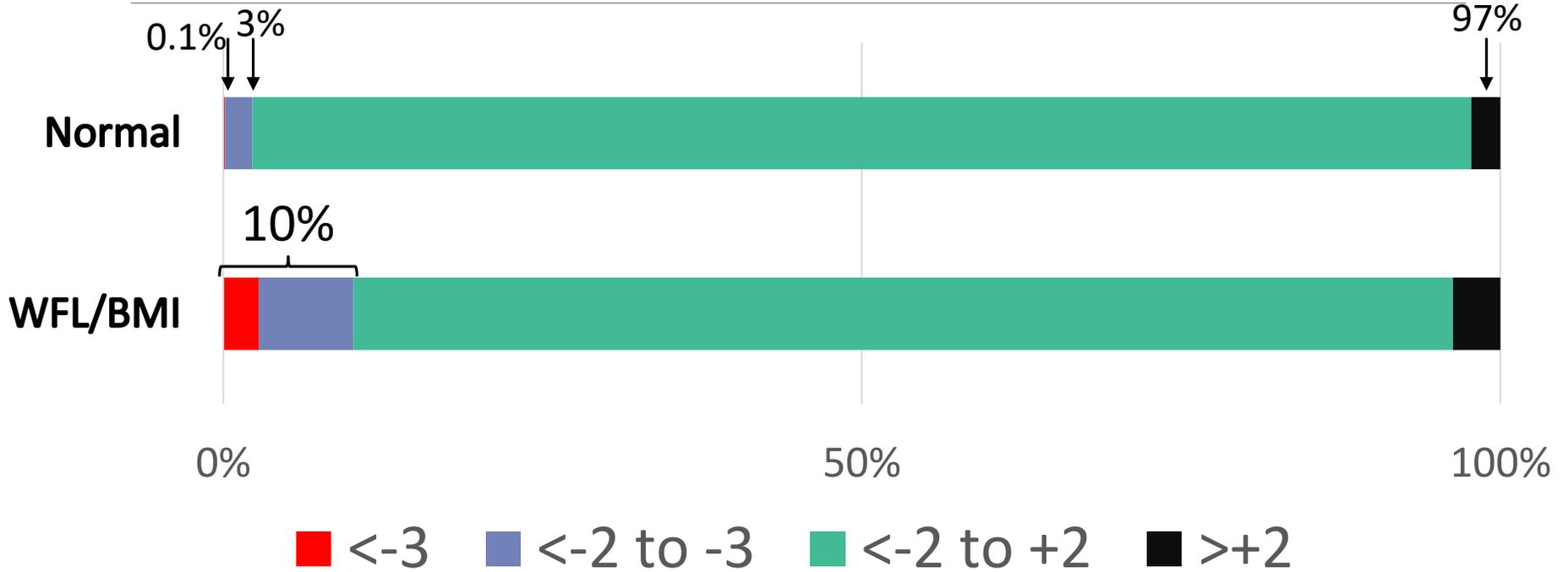
- PICU/NICU
- Palliative care
- Psychiatry
- Conditions leading to anasarca
- Documented eating disorders
- Re-hospitalization during study
- Prematurity (for infants who had not reached 1 month corrected age)

Results

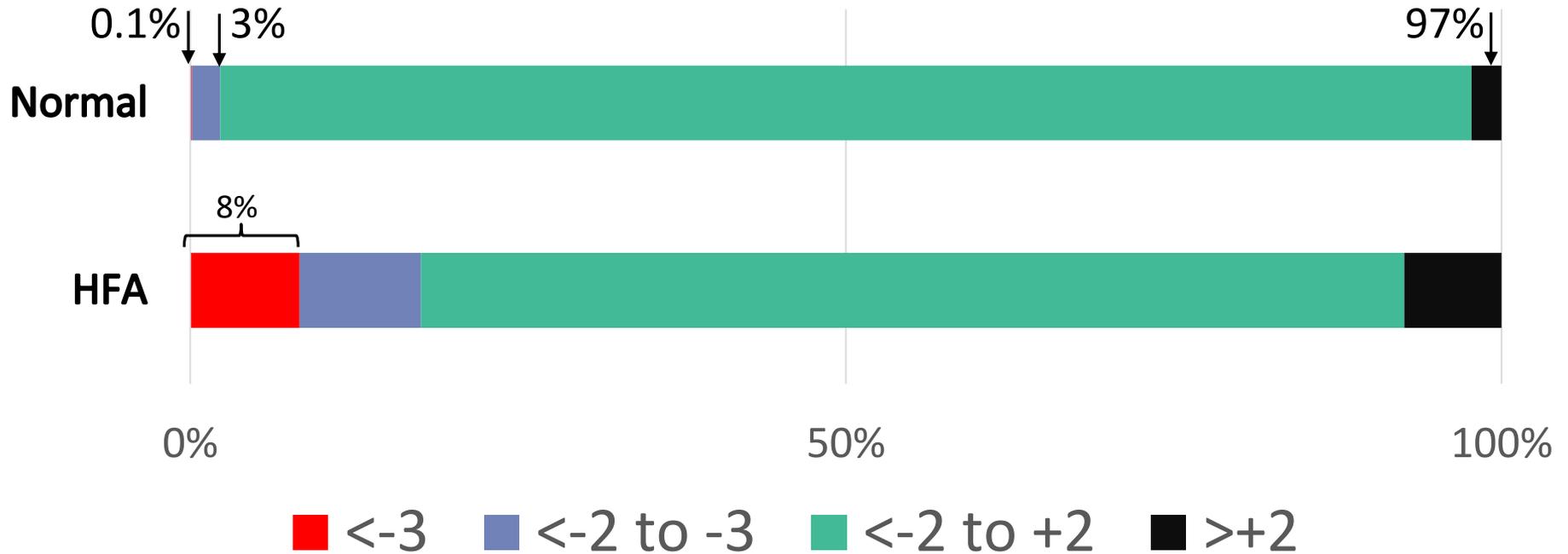
What was the prevalence of malnutrition at ACH?



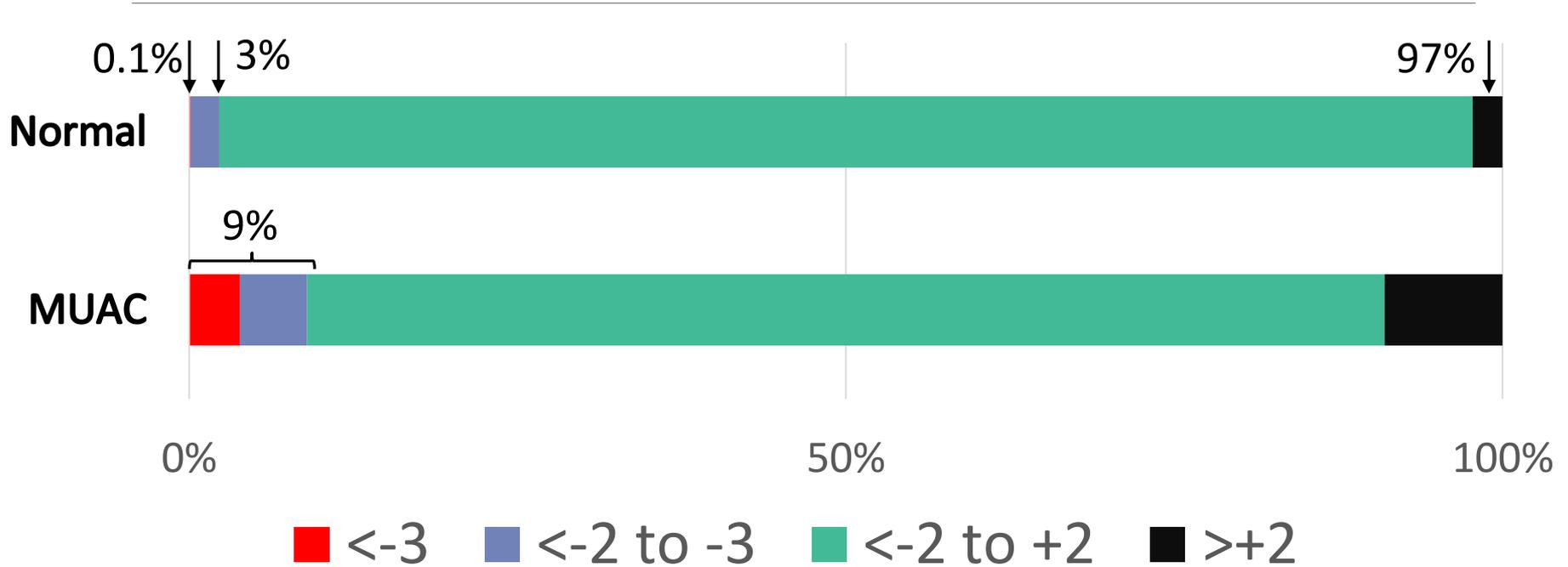
Weight for length/BMI (n = 108)



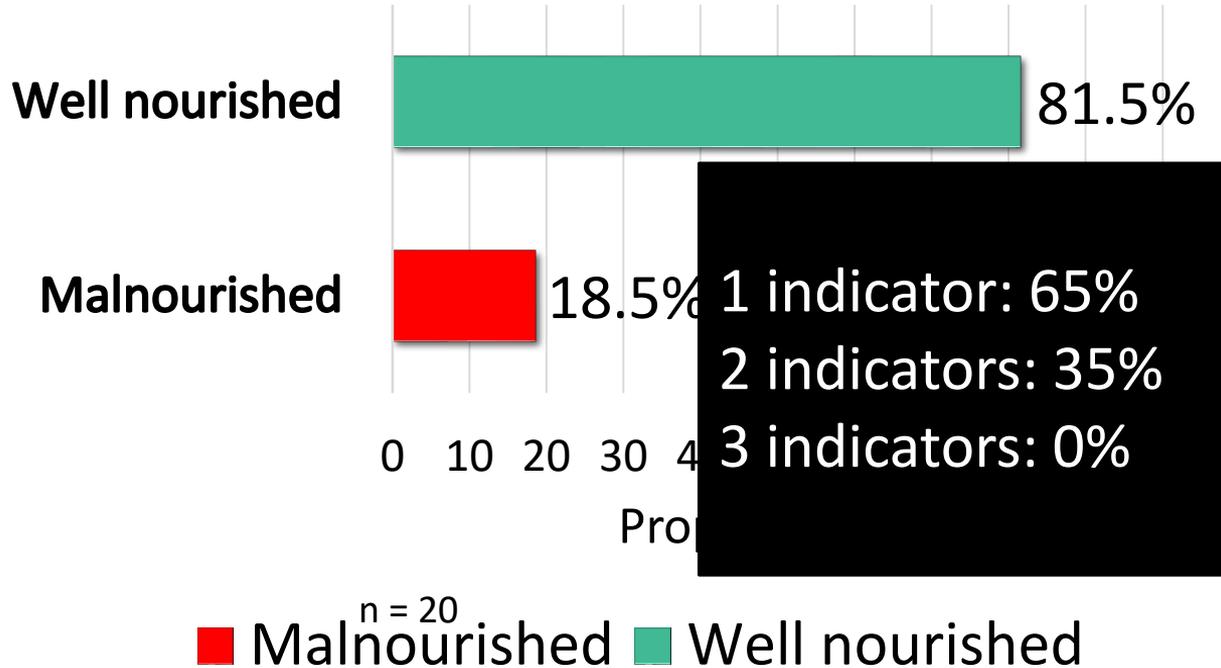
Height for age (n = 108)



Mid Upper Arm Circumference (n = 78)



More than 1 Primary Indicator



How does this translate at ACH?

Prevalence: 18.5%

How does this translate at ACH?

Prevalence: 18.5%

How does this translate at ACH?

Prevalence: 18.5%

Admissions: 5953

How does this translate at ACH?

Prevalence: 18.5%

Admissions: 5953

Malnourished/year: 1101

How does this translate at ACH?

Prevalence: 18.5%

Admissions: 5953

Malnourished/year: 1101

Malnourished/week: 21

Mean length of stay between groups



Diagnostic accuracy of individual indicators

Study Limitations

- Only single data point definitions
- Diagnosis rather than etiology

Primary Indicator	Moderate Malnutrition	Severe Malnutrition
Weight gain velocity (<2 yrs)	<50% of the norm	<25% of the norm
Weight loss (>2 yrs)	7.5% BW	10% BW
Decline in WFL z-score	↓ 2 z score	↓ 3 z scores

Limitations

Parameter	Limitations
Wt For Age	<ul style="list-style-type: none">• WFA alone not associated with poor outcomes• Normal cross in percentiles in 1st 2 years: “catch down”• Context of 1 plot
Ht For Age	<ul style="list-style-type: none">• Familial short stature, Constitutional Delay• Effect of steroids• Patient mobility

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Wt For Length /BMI	<ul style="list-style-type: none">• In chronic setting of stunting: under-estimate• High muscle mass

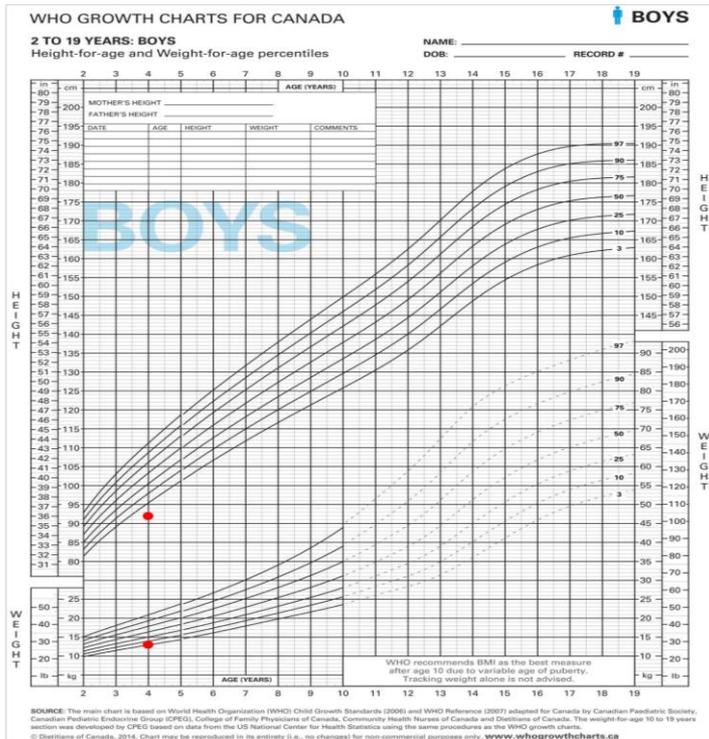
Limitations

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Wt For Age	<ul style="list-style-type: none">• WFA alone not associated with poor outcomes• Normal cross in percentiles in 1st 2 years: “catch down”• Context of 1 plot
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Wt For Length /BMI	<ul style="list-style-type: none">• In chronic setting of stunting: under-estimate• High muscle mass
MUAC	<ul style="list-style-type: none">• Severe edematous states• Standards for > 5 years less well established

Back to our cases....



4 year old boy admit for asthma flare. Clerk notes FTT.

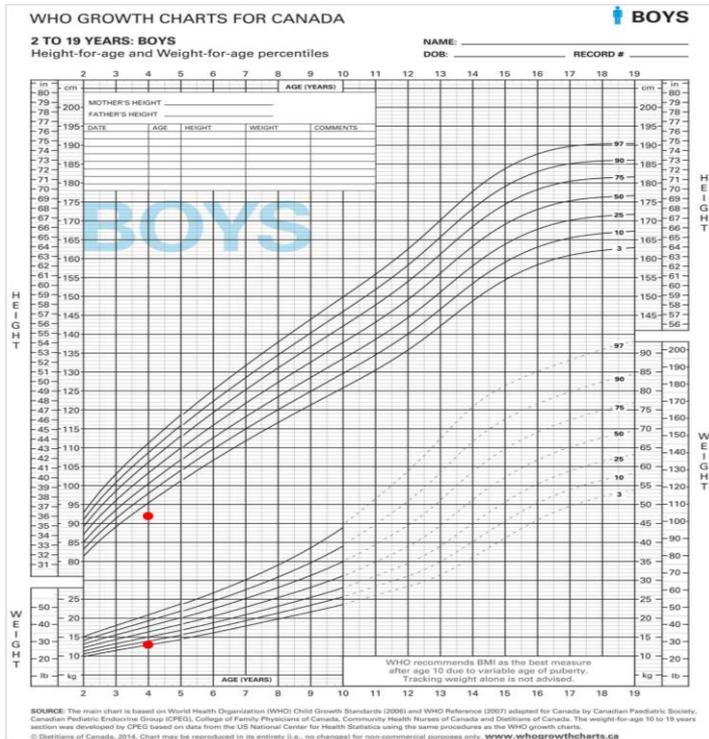


Weight 12.6 kg (1.9th percentile); z score ?
Height 94 cm (0.8th percentile); z score ?
BMI 14.5 kg/m² (24th percentile); z score ?

Does this child have malnutrition:

- Yes, weight and height are <3 percentile
- Yes, chronic malnutrition with height <1st percentile
- No, because BMI is 24th percentile
- Not possible to determine with 1 data point
- Honestly! I am not sure... consult GI?

4 year old boy admit for asthma flare. Clerk notes FTT.



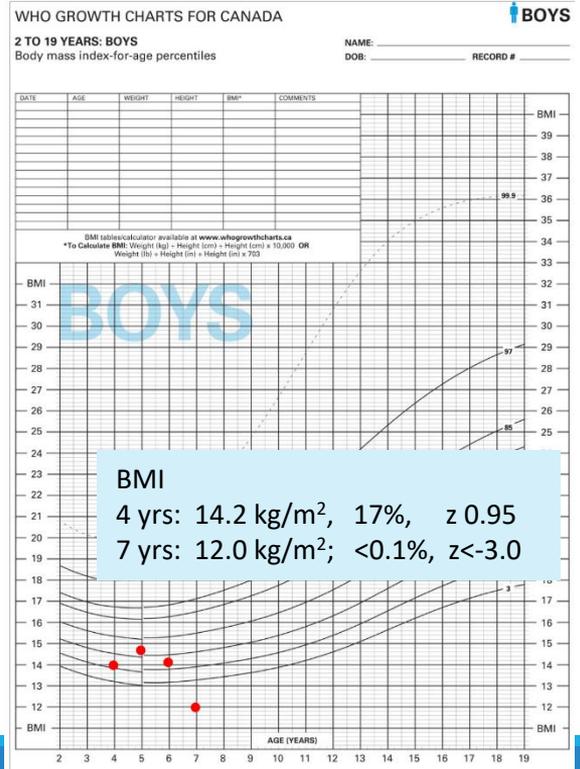
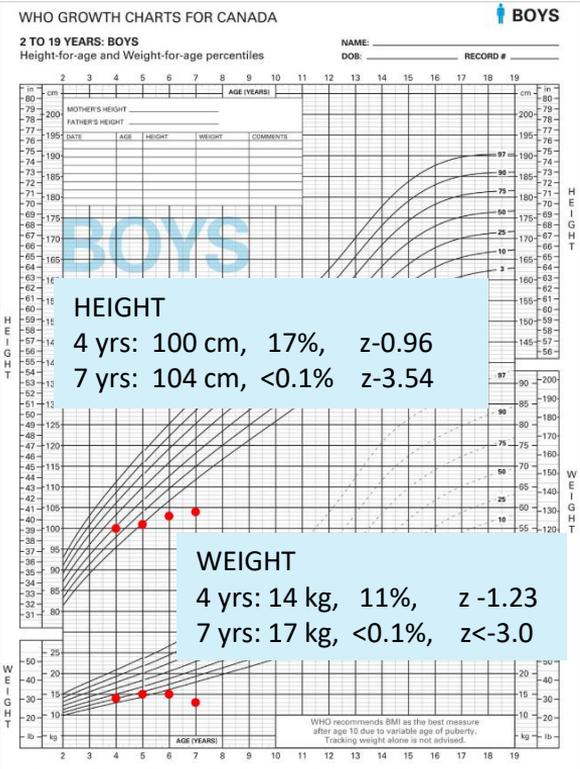
Weight 12.6 kg (1.9th percentile); z score -1.83
Height 94 cm (0.8th percentile); z score -2.03
BMI 14.5 kg/m² (24th percentile); z score -0.75

Does this child have malnutrition:

- Yes, weight and height are <3 percentile
- Yes, chronic malnutrition with height <1st percentile
- No, because BMI is 24th percentile
- Not possible to determine with 1 data point
- Honestly! I am not sure... consult GI?

7 yo with untreated Crohn disease

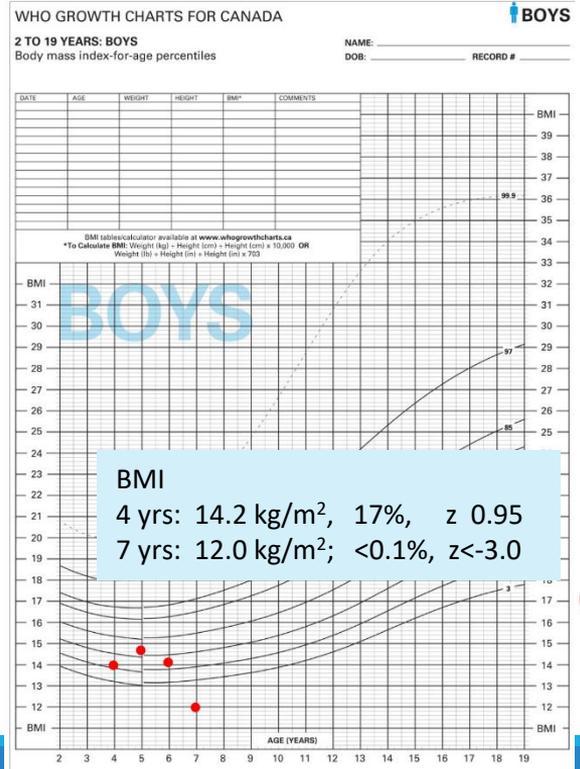
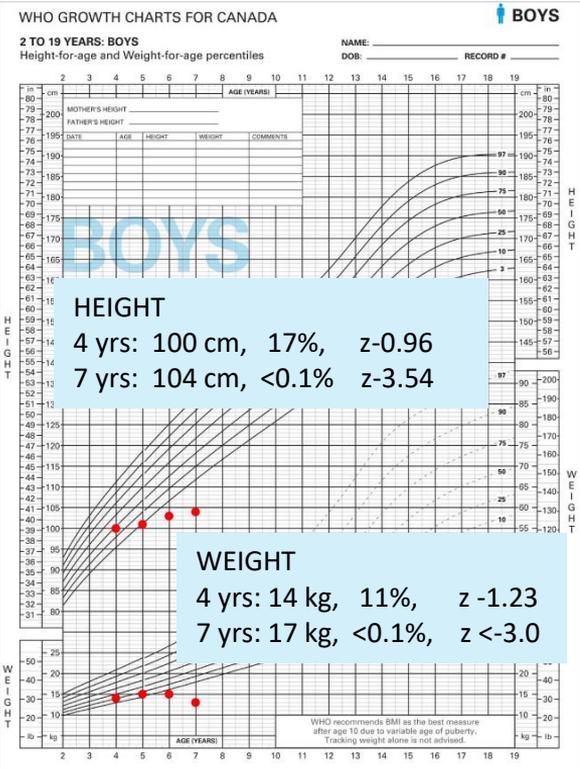
Chronic diarrhea, ↓appetite, unable to participate in sports, ↓school performance, CRP 150



- How would you classify this child's malnutrition at 7 yrs?
- a. Chronic severe based on height
 - b. Severe based on current BMI
 - c. Severe based on BMI change
 - d. Severe based on weight for age z score
 - e. a, b, c only

7 yo with untreated Crohn disease

Chronic diarrhea, ↓appetite, unable to participate in sports, ↓school performance, CRP 150

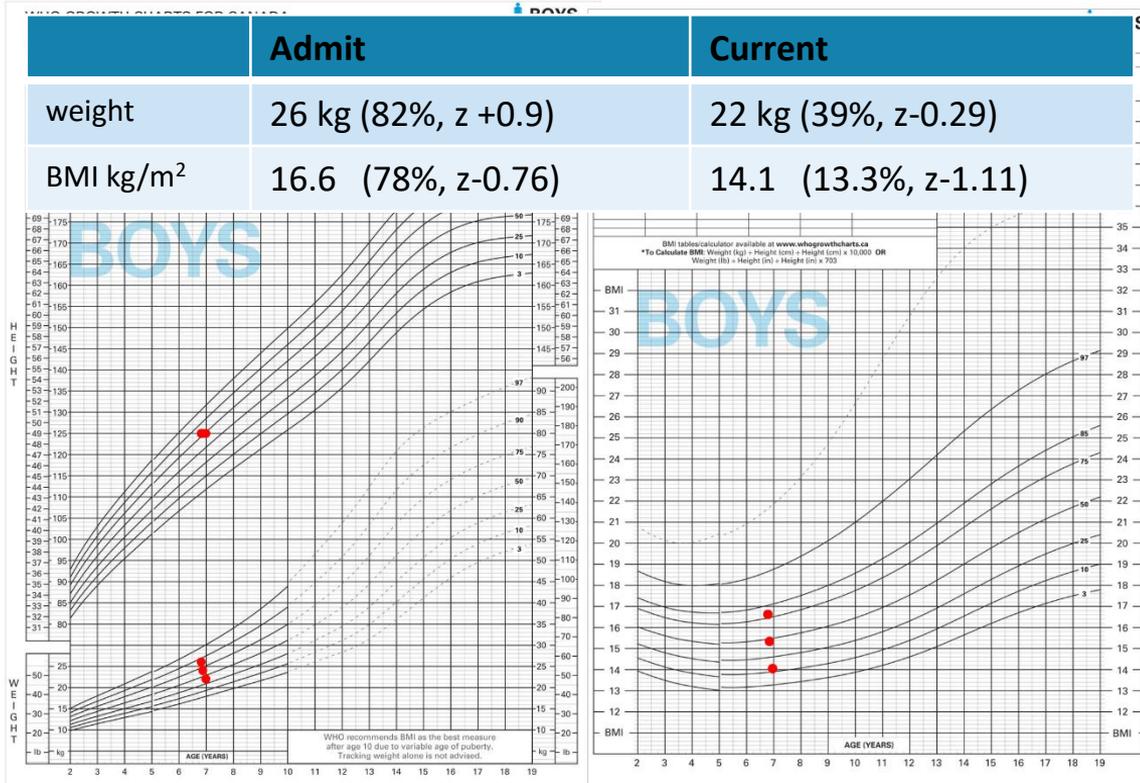


- How would you classify this child's malnutrition at 7 yrs?
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 - e. a, b, c only**

Practical Scheme for Malnutrition Definition

Chronicity	Degree	Etiology	Inflammatory State	Mechanism	Outcome
Acute Chronic	Mild/at Risk Moderate Severe	Illness related Non-illness related	Absent Mild Moderate Severe	Starvation Hypermetabolism Losses Altered assimilation	Lean body mass loss & weakness Cognitive Immune Infections Wound healing Ventilator dependence Hospital/ICU LOS

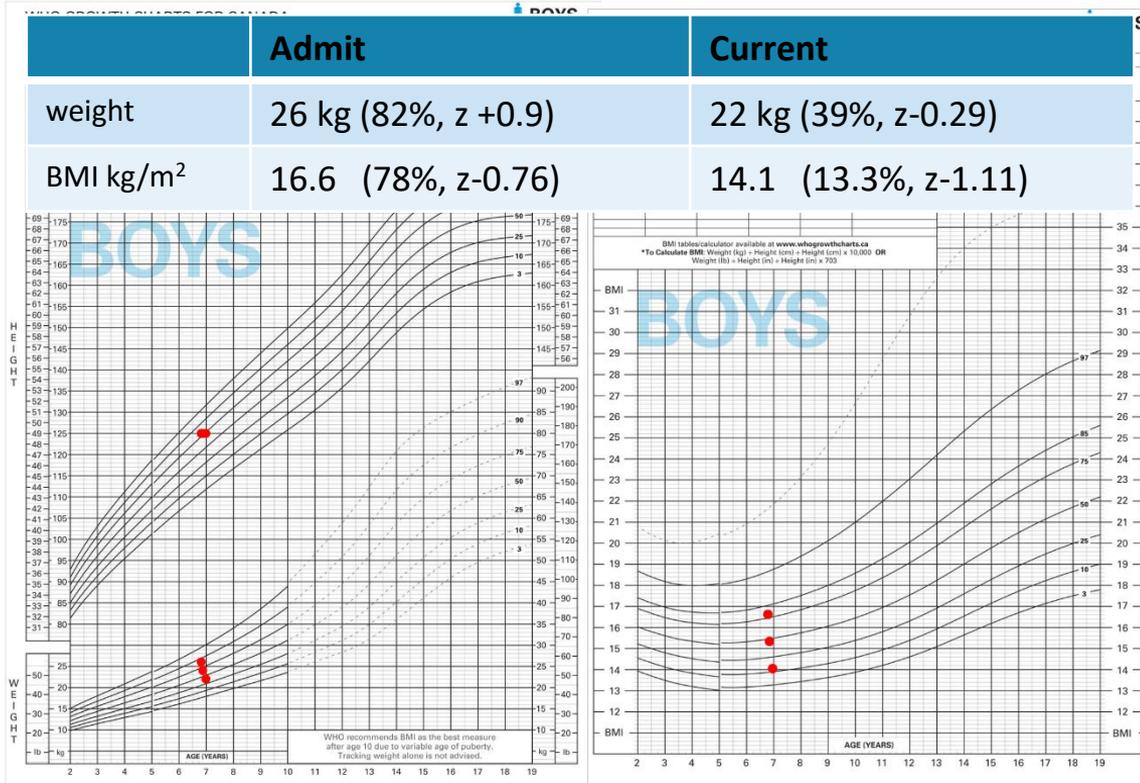
7 year old with acute gastroenteritis, complicated by severe necrotizing pancreatitis. Admitted to ICU, spiking temperatures



What would best describe this nutritional state?

- FTT due to crossing of 2 major weight percentiles
- Severe acute malnutrition due to drop in weight by >10%
- Acute weight loss only, BMI is >3rd percentile
- a&b only
- None of the above

7 year old with acute gastroenteritis, complicated by severe necrotizing pancreatitis. Admitted to ICU, spiking temperatures



What would best describe this nutritional state?

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- e. None of the above

Practical Scheme for Malnutrition Definition

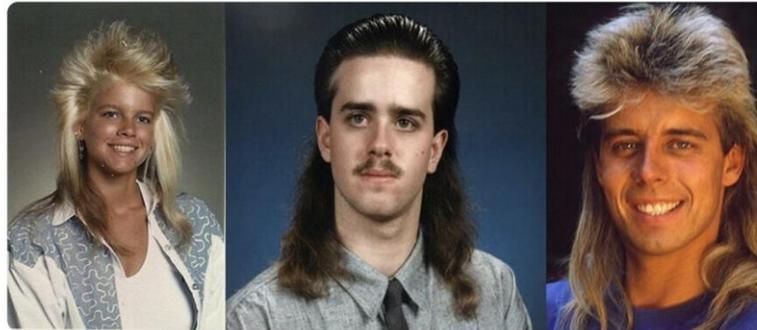
Chronicity	Degree	Etiology	Inflammatory State	Mechanism	Outcome
Acute	Mild/at Risk	Illness related	Absent	Starvation	Lean body mass loss & weakness
Chronic	Moderate	Non-illness related	Mild	Hypermetabolism	Cognitive
	Severe		Severe	Losses	Immune infections
				Altered assimilation	Wound healing
					Ventilator dependence
					Hospital (ICU LOS)

Summary

MOVING BEYOND FTT...

A solid blue horizontal bar at the bottom of the slide.

Passé Composé



Passé Composé

A blue square containing the white text 'FTT'.

FTT

Practical Scheme for Malnutrition Definition

Chronicity	Degree	Etiology	Inflammatory State	Mechanism	Outcome
Acute	Mild/at Risk	Illness related	Absent	Starvation	Lean body mass loss & weakness
Chronic	Moderate	Non-illness related	Mild	Hypermetabolism	Cognitive
	Severe		Moderate	Losses	Immune
			Severe	Altered assimilation	Infections
					Wound healing
					Ventilator dependence
					Hospital/ICU LOS

Single data point

Primary Indicator	Moderate Malnutrition	Severe Malnutrition
Wt For length/BMI z-score	-2 to -2.9	≤ -3
Ht For Age z-score		≤ -3
MUAC	-2 to -2.9	≤ -3

Multiple data points

Primary Indicator	Moderate Malnutrition	Severe Malnutrition
Weight gain velocity (<2 yrs)	<50% of the norm	<25% of the norm
Weight loss (>2 yrs)	7.5% BW	10% BW
Decline in Wt For Length z-score	↓ 2 z score	↓ 3 z scores

Take home points

- ◆ The “new” definitions of malnutrition emphasize etiology, and severity classification by z-scores
 - ◆ Weight for age is not an adequate criteria
- ◆ The use of any single parameter has limitations in malnutrition diagnosis
 - ◆ Use as many data points and parameters as possible
- ◆ The ease and value of the MUAC
- ◆ Local data suggests:
 - ◆ Notable prevalence of Moderate and Severe Malnutrition at admission
- ◆ Malnutrition detection – how are we doing at ACH?

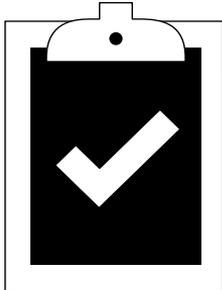
Update on Current ACH Nutrition Services Efforts

TERESA OOYEVAAR

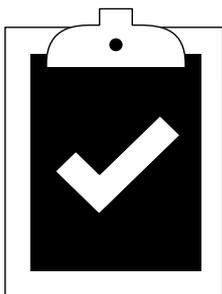


Malnutrition Detection at ACH

- How are we doing at detecting pediatric malnutrition at admission ?
- Opportunity for a collaborative approach on our process
- CMTF & recommended pINPAC for feedback
- HSO public review of malnutrition as a standard in Canada
- Canadian Malnutrition Awareness Week October 5 – 9, 2020

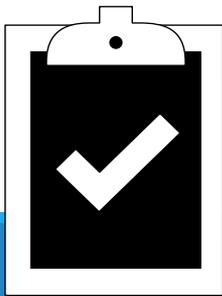


PATIENT ADMISSION:
RN/LPN completes the **Pediatric Nutrition Screening Tool** (PNST) on Patient Flowsheet in SCM



POSITIVE MALNUTRITION RISK SCREEN =
1 'YES' ANSWER

RN/LPN REFERS TO DIETITIAN
Order **Dietitian Referral – Peds** In SCM
Select from Drop Down Menu
Malnutrition Risk



PEDS DIETITIAN REFERRAL:

Dietitian completes a **Subjective Global Nutrition Assessment** (SGNA) to determine degree of malnutrition (none, moderate or severe) and next steps for nutrition care planning.

Pediatric Nutrition Screening Tool

PNST		
	Yes	No
1. Has the child unintentionally lost weight lately?		
2. Has the child had poor weight gain over the last few months?		
3. Has the child been eating/feeding less in the last few weeks?		
4. Is the child obviously underweight?		

≥1 yes answers:

Positive screen

- At nutrition risk

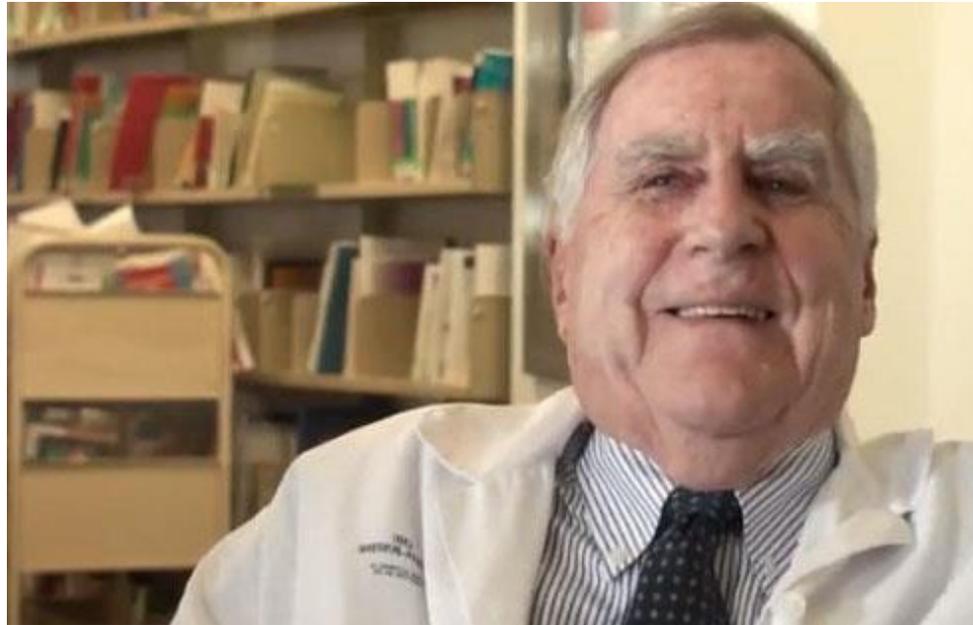
SGNA

NUTRITION FOCUSED MEDICAL HISTORY
Appropriateness of Current Height/Length for Age (Stunting) a) Height percentile: ____% <input type="checkbox"/> $\geq 3\%$ <input type="checkbox"/> Just below 3% <input type="checkbox"/> far below 3%
b) Appropriate considering mid-parental height? <input type="checkbox"/> Yes <input type="checkbox"/> No
c) Serial growth: <input type="checkbox"/> Following centiles <input type="checkbox"/> Moving upwards on centiles <input type="checkbox"/> Moving downwards on centiles (gradually or quickly)
Appropriateness of Current Weight for Height/Length Ideal Body weight = ____kg Percent ideal body weight: ____? <input type="checkbox"/> $>90\%$ <input type="checkbox"/> 75-90% <input type="checkbox"/> $<75\%$
Unintentional Changes in Body Weight a) Serial weight? <input type="checkbox"/> Following centiles <input type="checkbox"/> Crossed \geq centile upwards <input type="checkbox"/> Crossed \geq centile downwards
b) Weight loss <input type="checkbox"/> $<5\%$ of usual body weight <input type="checkbox"/> 5-10% of usual body weight <input type="checkbox"/> $>10\%$ of usual body weight
c) Changes in the past 2 weeks <input type="checkbox"/> No change <input type="checkbox"/> Increased <input type="checkbox"/> Decreased
Adequacy of Dietary Intake a) Intake is <input type="checkbox"/> adequate <input type="checkbox"/> inadequate – hypocaloric <input type="checkbox"/> inadequate – starvation (ie, taking little of anything)
b) Current intake versus usual <input type="checkbox"/> no change <input type="checkbox"/> increased <input type="checkbox"/> decreased
c) Duration of change <input type="checkbox"/> <2 weeks <input type="checkbox"/> ≥ 2 weeks
Gastrointestinal Symptoms a) <input type="checkbox"/> no symptoms <input type="checkbox"/> one or more symptoms; not daily <input type="checkbox"/> some or all symptoms; daily
b) Duration of symptoms <input type="checkbox"/> <2 weeks <input type="checkbox"/> ≥ 2 weeks
Functional Capacity (nutrition related) a) <input type="checkbox"/> no impairment, energetic, able to perform age-appropriate activities <input type="checkbox"/> restricted in physically strenuous activity, but able to perform play and/or school activities in a light or sedentary nature; less energy; tired more often <input type="checkbox"/> little or no play or activities, confined to bed or chair $> 50\%$ of waking time; no energy; sleeps often
Metabolic Stress of Disease <input type="checkbox"/> no stress <input type="checkbox"/> moderate stress <input type="checkbox"/> severe stress

PHYSICAL EXAM			
Loss of Subcutaneous Fat <input type="checkbox"/> no loss in most or all areas <input type="checkbox"/> loss in some but not all areas <input type="checkbox"/> severe loss in most or all areas			
Muscle Wasting <input type="checkbox"/> no wasting in most or all areas <input type="checkbox"/> wasting in some but not all areas <input type="checkbox"/> severe wasting in most or all areas			
Edema (nutrition-related) <input type="checkbox"/> no edema <input type="checkbox"/> moderate <input type="checkbox"/> severe			
	Normal	Moderate	Severe
OVERALL SGNA RATING			

Feedback

In Memory Dr. Claude Roy 1928 - 2015



Acknowledgments

Tanis Fenton RD PhD

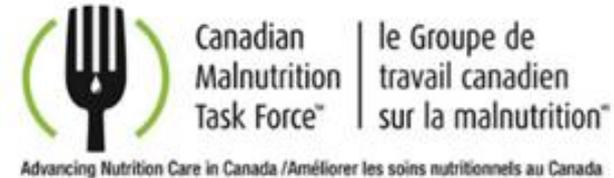
Nutrition & Food Services



Lorna Driedger RD
Teresa Ooyvaar RD
Gary Galante MD
Caitlin Zandstra RD



CIHR IRSC



Proud Visionary of the
Canadian Malnutrition Task Force
since 2010

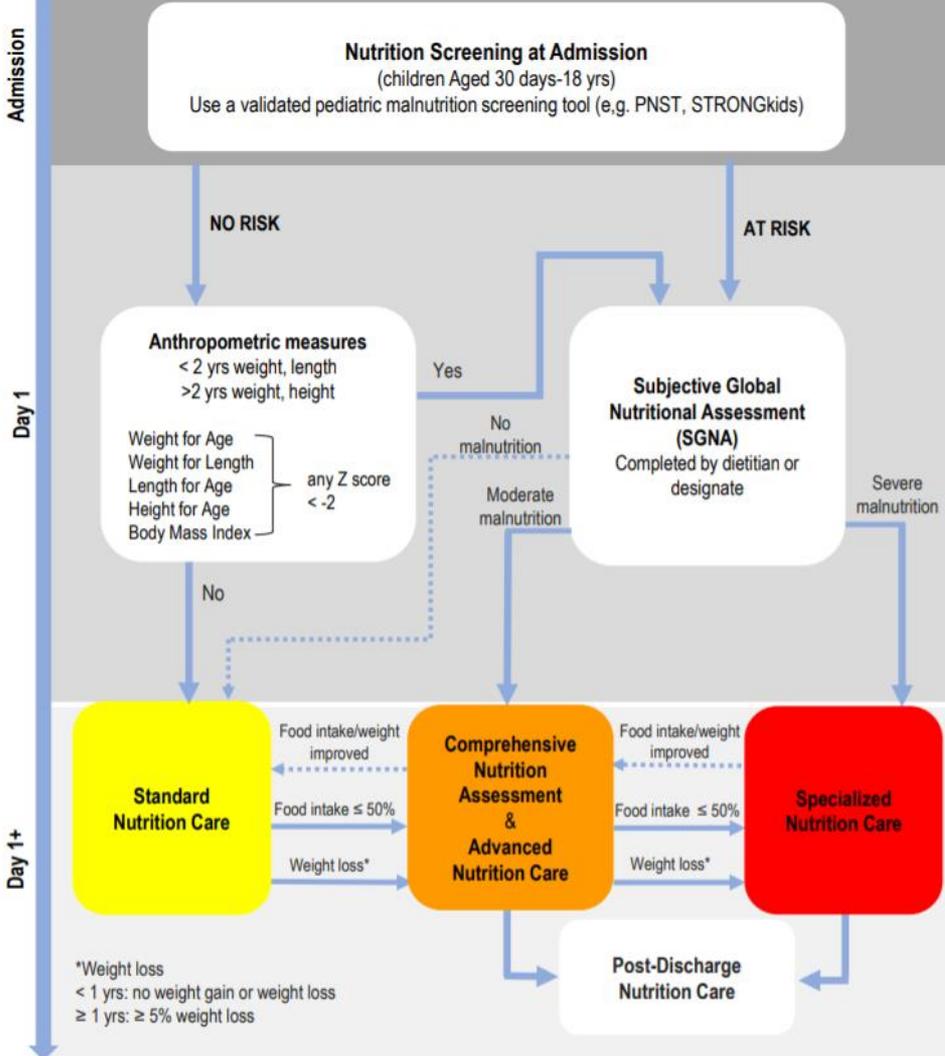
Extra Slides

Calculating z scores

Peditools - <https://peditools.org/index.html>

BC Children's - <http://www.bcchildrens.ca/health-professionals/clinical-resources/endocrinology-diabetes/tools-calculators#Anthro--calculators>

WHO app - <https://www.who.int/growthref/tools/en/>



P-INPAC

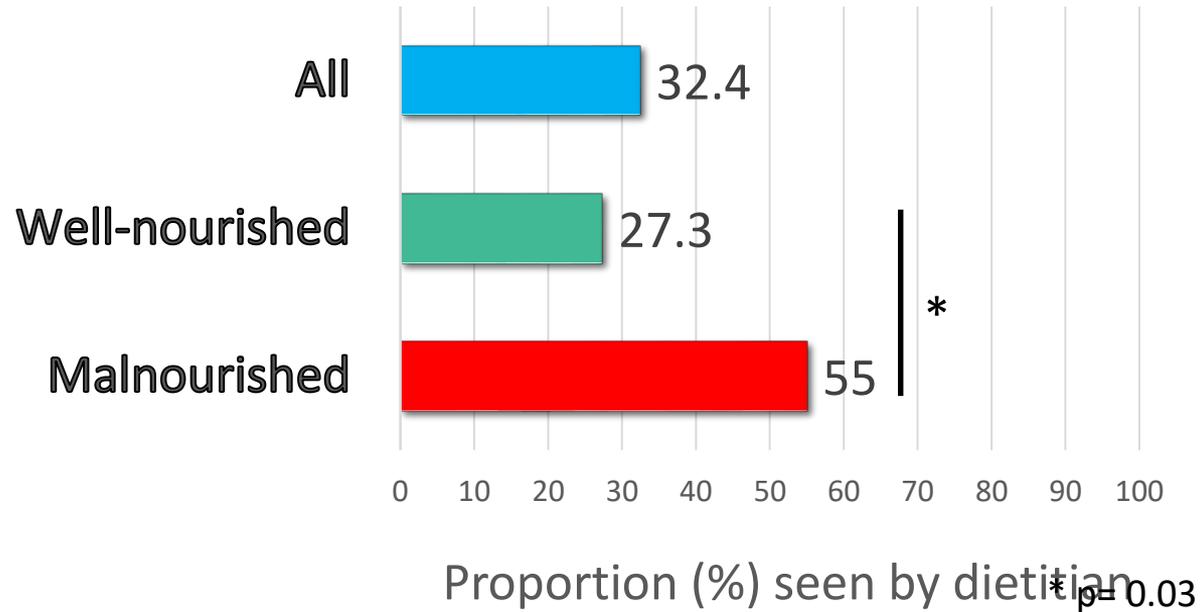
Canadian Malnutrition Taskforce (CMTF)

Diagnostic accuracy of individual indicators

	Specificity	Sensitivity	p value
WFL/BMI	100.0	52.0	<0.001
HFA	100.0	54.0	<0.001
MUAC	100.0	53.4	<0.001
WFA	98.3	68.0	<0.001
HC	96.9	52.4	<0.001

	Specificity	Sensitivity	p value
MUAC/WFLBMI	100.0	64.0	<0.001
MUAC/HFA	100.0	76.0	<0.001
MUAC/WFA	98.3	78.0	<0.001

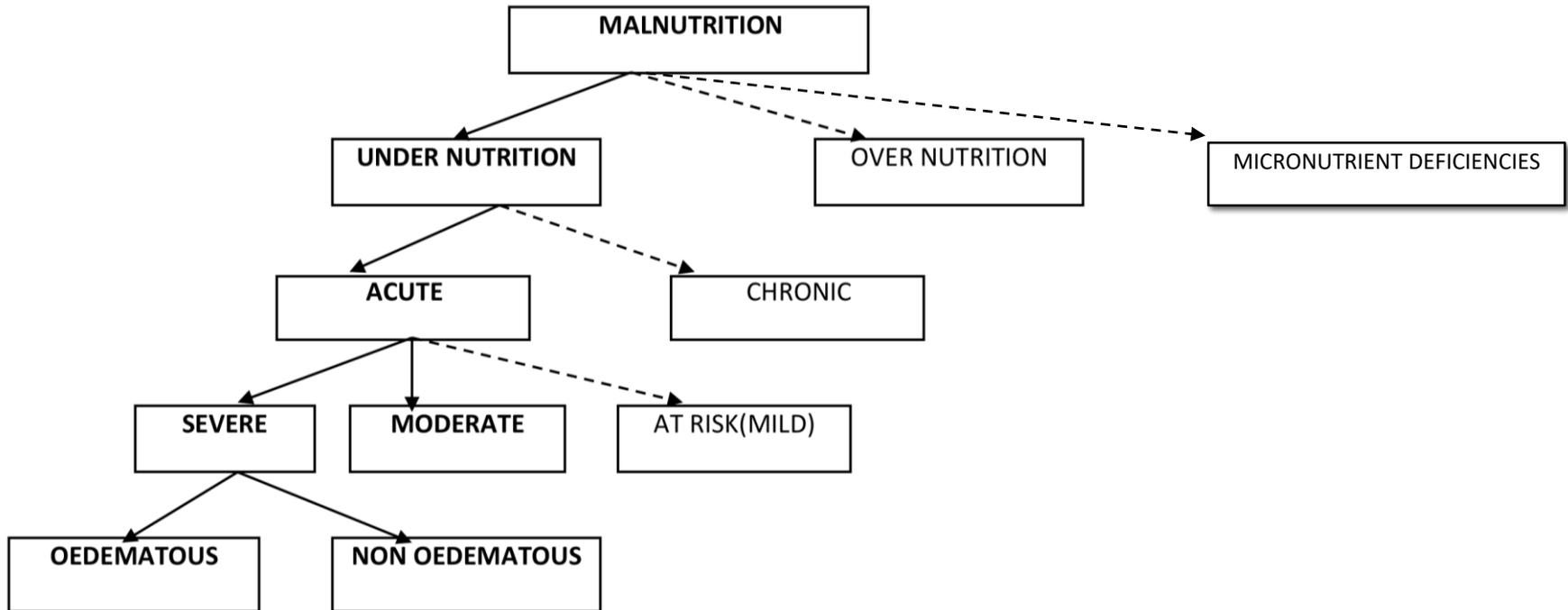
RD involvement?



Demographics – comparison between groups

Demographics	Well nourished n = 88	Malnourished n = 20	p value
Male sex n	57%	55%	1.00
Age, y, Median (IQR) (n = 108)	5.2 (0.2 to 17.5)	1.6 (0.2 to 16.9)	0.34
Parental education level			0.74
Severity of condition			0.5
Underlying medication condition			0.53
Admission diagnosis			0.43

Classifying Malnutrition



Nutrition Focused Physical Exam

Subcutaneous fat loss	Periorbital Upper Arm Thoracic/Lumbar Ribs
Muscle Loss	Temporal Clavicular –pectoralis, deltoid, trapezius Scapula- trapezius, supraspinatus, infraspinatus Dorsal Hand-interosseous
Edema	Ankles Scrotum/vulva
Head/Toe	Macro and micronutrients