

Provincial Specialized Eating Disorder Program for Children and Adolescents

Correlating Mid Upper Arm Circumference (MUAC) with weight gain and physical recovery in female adolescents with eating disorders



Peiyong Lam FRACP, Jadine Cairns RD MSc,
Lily Farris BA MA, Sheila K Marshall PhD



BC Mental Health & Addiction Services
An agency of the Provincial Health Services Authority

Disclosure statement

This study was funded by a research grant from the BC Mental Health and Addiction Services, PHSA.

No other disclosures are applicable.



2



BC Mental Health & Addiction Services
An agency of the Provincial Health Services Authority

Learning Objectives

- Understand how Mid Upper Arm Circumference (MUAC) is measured.
- Identify how MUAC can be used to track nutritional status.

3



BC Mental Health & Addiction Services
An agency of the Provincial Health Services Authority

Introduction

- Eating disorders in children and adolescents are complex illnesses with physical and psychological components.
- A key component of recovery for children and adolescents diagnosed with Eating Disorders is a return to normal growth and pubertal development.
- Methods for tracking nutritional restoration should ideally be cost effective, non invasive and free from falsification.

4



BC Mental Health & Addiction Services
An agency of the Provincial Health Services Authority

Mid Upper Arm Circumference (MUAC)

- MUAC is used extensively throughout famine-affected areas of the world as a strong predictor of mortality in children and adults
- It is a simple, low cost, and objective method of assessing nutritional status

5



BC Mental Health & Addiction Services
An agency of the Provincial Health Services Authority

Mid Upper Arm Circumference (MUAC)

MUAC & adolescents with anorexia nervosa
(Martin et al 2009)

- MUAC correlates with body mass index (BMI).
- Adolescents with anorexia nervosa who have a MUAC ≥ 20 cm rarely require hospitalization for malnutrition.
- Lack of consistency between longitudinal measurements of BMI and MUAC in individuals with anorexia nervosa should prompt a more detailed nutritional assessment.

6



BC Mental Health & Addiction Services
An agency of the Provincial Health Services Authority

Objective

To prospectively study relationships between MUAC and weight gain among adolescents admitted to inpatient or day treatment settings in an eating disorders program.

7

Hypothesis

Changes in MUAC correlate with weight changes when measured weekly.



Methods

Inclusion criteria:

- Admissions to inpatient or day treatment programs at BC Children's Hospital from 1st September 2011 to 30th September 2012
- Female
- 10-18 years
- Amenorrhea > 3 months
- Diagnosis of Anorexia Nervosa, Bulimia Nervosa or Eating Disorder Not Otherwise Specified where Suggested Body Weight (SBW) was $\leq 85\%$ at time of admission

8



Measures

- Weight (kg)
- %SBW
- MUAC (cm)

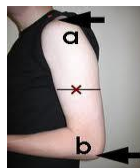
Data collected at admission and weekly for 6 weeks after admission.

9



MUAC measurement (WHO guidelines)

- Non dominant arm
- Patient stands with arm flexed 90 degrees at elbow.
- The measuring point is half way between the lateral aspect of the acromion process of the scapula and the tip of the olecranon process of the ulna.

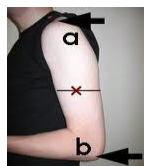


10



MUAC measurement (WHO guidelines)

- Arm hangs loosely down during measurement
- The mid-upper arm circumference is the circumference of the upper arm at that same midpoint, measured with a non-stretchable tape measure



11



Analyses

- Pearson's Product Moment correlations were performed to examine relationships between MUAC and weight within each week
- Repeated measures t-tests were used to assess whether the average rates of change in MUAC and weight gain across weeks were similar.

12



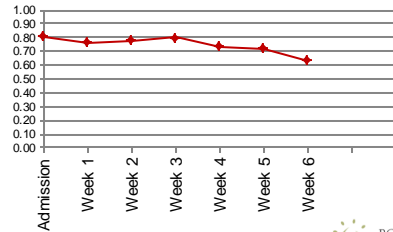
Results

- 40 adolescents consented to participate, 9 declined
- Data collection continuing to mid-October, 2012
- Data for N = 35 for 6 weeks reported here
- Mean Age on admission 15.7 years
- Mean Weight on admission 41.7 kg (SD=5.74)
- Mean %SBW on admission 75 % (SD=6.65)

13

Results

Correlations between MUAC & KG
(Weekly Measurements)



14

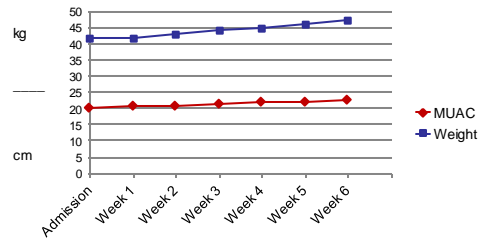
Results

- Assessments between adjacent weeks were regressed and residuals saved to create change scores
- Change scores were created for MUAC and weight (kg) across all intervals from admission to week 6
- MUAC and weight change scores were compared using paired samples t-tests
- These t tests were not statistically significant (t values ranged between .06 and .76)

15

Results

Mean levels of MUAC and KG



16

Conclusion

- MUAC and weight correlate significantly when measured weekly.
- Weekly changes in MUAC and weight do not differ (i.e. the rate of change is similar).

17

Implications for use

Advantages:

- MUAC is not as affected by water weight gains or constipation.
- Non-invasive, inexpensive, quick to perform.
- A consistent technique has been easy to teach.

Cautions:

- Less accurate when patient is over 90% SBW.
- Impact of height growth.
- Impact of exercises and physical activities involving upper arms.

18

Future directions for research

- Further data analysis required to clarify the relationship between MUAC and weight.
- In progress:
Acceptability of MUAC measurements compared to weighing and skin fold measurements

19

Future directions for research

- Studying the possible relationship between MUAC and percentage body fat
- Need to establish if the same statistical associations apply in male patients

20

References

- Fernandez MAL, Delchevalerie P, Van Herp M. Accuracy of MUAC in the detection of severe wasting with the new WHO Growth Standards. *Pediatrics* 2010, 126:e195-e201.
- Martin AC, Pascoe EM, Forbes DA. Monitoring nutritional status accurately and reliably in adolescents with anorexia nervosa. *Journal of Paediatrics and Child Health* 2009, 45:53-57.