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RESEARCH PAPER

EFFECT OF NUTRITIONAL STATUS AT THE TIME OF INITIAL PRESENTATION ON OUTCOME IN CRITICALLY ILL PATIENTS ADMITTED TO ACUTE MEDICAL CARE UNIT: A PROSPECTIVE STUDY

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ABSTRACT **BACKGROUND:** Malnutrition is evident in40 to 80 % critically ill patients. As nutritional assessment is not routinely done malnutrition remains undiagnosed in nearly 70% ICU patients.

KEY WORDS : NUTRITIONAL, AMCU, CRITICALLY ill

AIMS AND OBJECTIVES:

1. To asses the NUTRITIONAL status of patients admitted to AMCU at time of INITIAL PRESENTATION at our TERTIARY care teaching hospital
2. To PROSPECTIVELY study the effect of NUTRITIONAL status at time of admission on in-hospital mortality in CRITICALLY ill patients admitted in AMCU

MATERIAL AND METHODS:

STUDY DESIGN: Prospective study

STUDY PERIOD: January 2017 to june2018

STUDY POPULATION: Consecutive patients admitted to AMCU at king George hospital, Visakhapatnam SOUTH India were screened for inclusion in the study.

NUTRITIONAL STATUS ASSESSMENT:

NUTRIC score

Table 1: NUTRIC Score variables

Variable	Range	Points
Age	<50	0
	50 - <75	1
	≥75	2
APACHE II	<15	0
	15 - <20	1
	20-28	2
	≥28	3
SOFA	<6	0
	6 - <10	1
	≥10	2
Number of Co-morbidities	0-1	0
	≥2	1
Days from hospital to ICU admission	0 - <1	0
	≥1	1
IL-6	0 - <400	0
	≥ 400	1

Table 2: NUTRIC Score scoring system: if IL-6 available

Sum of points	Category	Explanation
6-10	High Score	➢ Associated with worse clinical outcomes (mortality, ventilation). ➢ These patients are the most likely to benefit from aggressive nutrition therapy.
0-5	Low Score	➢ These patients have a low malnutrition risk.

Table 3. NUTRIC Score scoring system: If no IL-6 available*

Sum of points	Category	Explanation
5-9	High Score	➢ Associated with worse clinical outcomes (mortality, ventilation). ➢ These patients are the most likely to benefit from aggressive nutrition therapy.
0-4	Low Score	➢ These patients have a low malnutrition risk.

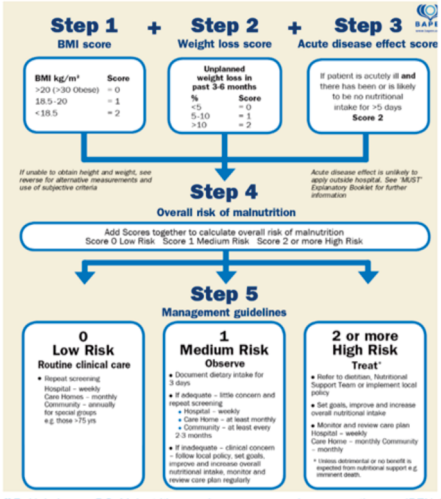
*It is acceptable to not include IL-6 data when it is not routinely available; it was shown to contribute very little to the overall prediction of the NUTRIC score.

haliwal R, Jiang X, Day AG. Identifying critically ill patients who benefit the most from nutrition therapy: the development and i

Anthropometric variables

- Weight was measured(in kg) to the nearest of 0.1 kg on a beam balance
- Height was calculated from ulnar length with the help of non elastic measuring tape to the nearest o.1cm
- BMI was calculated using height and weight
- NUTRITIONAL risk in CRITICALLY ill (NUTRIC) score malnutrition universal screening tool(MUST), NUTRITIONAL risk index (NRI) were calculated to identify patients who are at risk of malnutrition

MUST score



ı B, Roubenoff R, Heimburger DC. Malnutrition syndromes: a conundrum vs continuum. JPEN J Parenter Ente

INCLUSION CRITERIA:

- Patients aged 18 years or older admitted to AMCU

EXCLUSION CRITERIA:

- Patients under 18 years of age
- Patients whose in hospital stay is less than 24 hours
- Patients who are diagnosed to have malignancy
- Patients who test seropositive for human immunodeficiency virus (HIV)
- Pregnant women
- Patients unwilling to participate in the study.
- A written informed consent was taken from all the patients participating in the study
- In case the patient was unconscious, consent was obtained from next responsible attendant
- In all the patients studied, a detailed history was obtained and thorough clinical examination was done and laboratory investigations required for establishing diagnosis and management were done
- In all patients, severity of illness at admission to ICU was assessed by acute physiology and chronic health evaluation 2 (APACHE 2) score
- Assessment of organ failure at admission was done by sequential oragan failure assessment (SOFA) score.

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NUTRITIONAL RISK INDEX

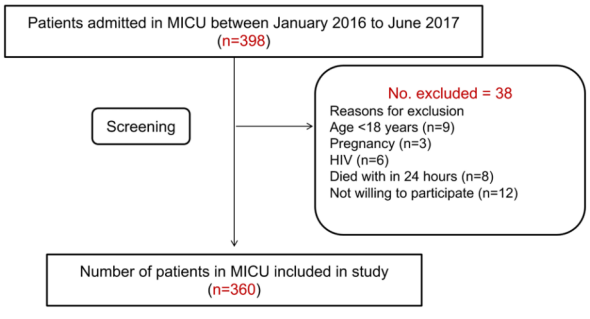
- 1.519 × albumin (g/l) + 41.7 × (present weight/usual weight)

STATISTICAL ANALYSIS

- Data entry was carried out using epidata version 3.1 data entry, data management and basic statistical analysis system (Odense, Denmark, apdata association)
- All the entries were double checked for any possible error
- Descriptive statistics are reported as mean+- standard deviation, median (interquartile range IQR)
- Categorically variables are reported as percentages
- Discharge from AMCU and AMCU mortality was considered as the end point for assessing the outcome
- In worst case scenario the patients who were discharged against medical advice (DAMA) patients were considered to have died
- Mortality in patients as per their nutritional status was compared using Chi square test.
- ROC analysis was carried out to derive optimal cut off values of BMI NRI MUST and NUTRIC score, at admission for predicting mortality and their performance was compared by comparing the AUCs.
- The statistical software IBM SPSS statistics version 20 (IBM Corp SomersNY,USA)Satata/IC 12 for Windows (SatataCorp LP, Texas USA) and MedCalc Version 11.3.0 for Windows 2000/XP/Vista/7(MedCalc software bvba,Belgium) was used for statistical analysis.

RESULTS

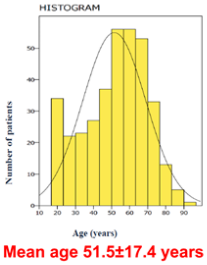
STUDY PLAN



MICU = Medical intensive care unit; HIV = human immunodeficiency virus

Demographic characteristics

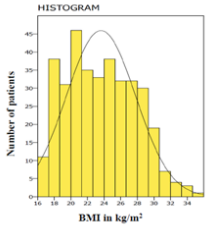
Age



Mean age 51.5±17.4 years

Male:female = 1.4:1

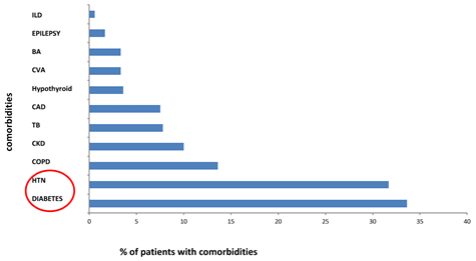
BMI



Mean BMI = 23.6±4.2kg/m²

Demographic characteristics

Co-morbidities



Nutritional status at admission

Nutritional status	Body mass index (kg/m²)	No. (%)
Underweight	< 18.5	43 (11.9)
Normal range	18.5 - 22.9	129 (35.8)
Overweight	≥ 23	188 (52.2)
At risk	23 - 24.9	47 (13)
Obese I	25 - 29.9	117 (32.5)
Obese II	≥ 30	24(6.7)

The International Association for the Study of Obesity and the International Obesity Task Force. The Asia-Pacific perspective: redefining obesity and its treatment. Australia: International Association for the Study of Obesity and International Obesity Task Force; 2000.

Nutritional status as per NUTRIC score

Nutritional status	No. (%)
0-4 (low risk of malnutrition)	295(82)
5-9 (high risk of malnutrition)	65(18)

Prospective Studies Collaboration, Whitlock G, Lewington S, Sherliker P, Clarke R, Emberson J, Halsey J, et al. Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. Lancet 2009;373:1083-96.

Aziz EF, Javed F, Pratap B, Musat D, Nader A, Pulimi S, et al. Malnutrition as assessed by nutritional risk index is associated with worse outcome in patients admitted with acute decompensated heart failure: an ACAP-HF data analysis. Heart Int 2011;6:e2.

Nutritional status as per MUST score

Nutriritonal status	No. (%)
0-1 (low risk of malnutrition)	238(66.1)
≥2 (high risk of malnutrition)	122(33.9)

Prospective Studies Collaboration, Whitlock G, Lewington S, Sherliker P, Clarke R, Emberson J, Halsey J, et al. Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. Lancet 2009;373:1083-96.

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Nutritional status as per NRI score

Nutritional status	No. (%)
Normal (>100)	111(32.5)
Mild malnourishment (97.5-100)	32(8.9)
Moderate malnourishment (83.5-97.5)	123(34.2)
Severe malnourishment (<83.5)	88(24.4)

Prospective Studies Collaboration, Whitlock G, Lewington S, Sherliker P, Clarke R, Emberson J, Halsey J, et al. Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. Lancet 2009;373:1083-96.

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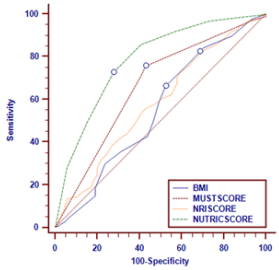
Mortality as per nutritional status

ICU outcome	Normal (n=131) No. (%)	Underweight (n=106) No. (%)	Overweight (n=123) No. (%)
Alive (n = 255)	101(77.1)	63(59.4)	91(74)
Dead (n =105)	30(22.9)	43(40.5)	32(26)

$\chi^2 = 9.29$; **p = 0.010**

Comparison of performance of ROC curves of BMI, MUST, NRI and NUTRIC scores in predicting mortality



ROC = receiver-operator characteristic curve; BMI = Body mass index; MUST = malnutrition university screening tool; NRI = nutrition risk index ; NUTRIC = nutrition in critically ill

Comparison of performance of sensitivity and specificity of BMI, MUST, NRI and NUTRIC scores

Nutritional assessment	Cut-off	Sensitivity	Specificity
BMI	>21	66.3	47.6
MUST	>1	75.7	57.1
NRI	>82	82.3	31.4
NUTRIC	>2	72.6	72.4

DISCUSSION

Comparision of studies on nutritional status in critically ill, India

Variable	Chakravarthy et al	Bandlish et al	Tripathy et al	Present study
Year of publication	2013	2014	2015	ND
Place	Lucknow	Kolkata	Bhubaneswar	Tirupati
Duration of study	2012	Dec 2011 – may 2013	2014	Jan 2016– Jun 2017
Sample size	500	50	111	360
Type of study	Prospective	Prospective	Prospective	Prospective
Study setting	Teaching hospital	Teaching hospital	Teaching hospital	Teaching hospital
Subjects studied	Adult, ICU	Adult, NICU	Age >65years, ICU	Adult, ICU

Comparision of studies on nutritional status in critically ill, India

Variable	Chakravarthy et al	Bandlish et al	Tripathy et al	Present study
Mean age (years)	54.6 ± 16.7	41.2±3.8	74.7 ± 8.4	51.5±17.4
Male: female	2.1 : 1	1.3:1	2.6 : 1	1.4:1
Methods of nutritional status assessment	SGA	SGA	MUST and NRI	BMI, NRI,MUST. NUTRIC
Prevalence of malnutrition	198(39.6%)	39(78%)	58 (52.3 %)	229(63.6%)

CONCLUSIONS

- Malnutrition was evident in more than half (63.6%) of patients admitted to the MICU.
- Among BMI, NRI, MUST,NUTRIC scores, NUTRIC score (cut-off >2, sensitivity 72.6 specificity 72.4) was found to be the best predictor of mortality in patients admitted to MICU ($p<0.0001$).
- This observation underscores the need for systematic nutritional assessment of patients so as to plan effective nutritional intervention strategies.

LIMITATIONS OF THE PRESENT STUDY

- The present study was a single centre study, carried over a limited period of time.
- Whether the observations can be extrapolated to other hospitals/institutions need to be further evaluated

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