Associated factors of mortality in children with malnutrition of Mt-Hagen General Hospital.

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AIM

Identify associated factors of mortality in children (less than 5 years old) with acute malnutrition admitted to the Mt-Hagen General Hospital between March and December 2019.

BACKGROUND

- Affects a tenth of the world's children under 5 years, esp. extreme poverty in developing countries. *(2)*

- Worldwide CFR - 5-60%. (2)

- Common in sub-Saharan Africa and south Asia. (2)

BACKGROUND - PNG

- PNG - high malnutrition rate - high mortality and morbidity. (3)

- SAM - present in 8% of admissions (2411 admissions) in 2019. *(4)*

- Contributed to 13% of all deaths & 20% of post-neonatal deaths. *(4)*

- CFR for SAM has improved;
- 18% - 2014. (3 & 4) to
- 12% - 2019 compared.

- Close to the World Health Organization target of under 10%. *(4)*

- Mt Hagen hospital recorded 150 admissions and 4 deaths in 2018 - CFR of 2.7%. (*4*)

METHODS

- Study Design: Prospective descriptive study

- Study Time: March – December 2019

- Malnutrition based on WHO criteria

- Socio demographic variables taken from questionnaire on admission

- Clinical and lab variables taken on admission, day 3 and day 5 of admission

METHODS

- Inclusion criteria
- Any child admitted with malnutrition
- Any child less than 5 years old

- Exclusion criteria
- Non consenting parents
- No lab or pending results
- Left at own risk (absconded)

- Data entered and analysed using Microsoft excel and SPSS 20

Factors analysed

- Socio-demographic parameters

- Clinical parameters

- Lab parameters

RESULTS

Total number of malnutrition children admitted: **150**

Total number of Children who died: **19**

Total number of children discharged home: **121**

Total number of children who left at own risk/Excluded: **10**

CFR: 12.6 %

Table 1: Nominal variables significantly associated with mortality. Case vs. Control

Variable Number (Total)	Cases (Died)	Controls (Survived)	Relative Risk (95% Confidence Interval)	P value
Cough	16 (19)	70 (121)	3 (1.02 – 10.96)	0.022
Apnoea	2 (19)	0 (121)	8 (5.2 – 12.67)	0.018
Fitting	3 (19)	3 (121)	4 (1.66 – 10.54)	0.033
Sepsis	11 (19)	3 (121)	12 (6.0 – 25.53)	0.00
Oral candidiasis	9 (19)	26 (121)	3 (1.2 – 6.1)	0.02
50% glucose 'IV' push	16 (19)	5 (121)	30 (9.6 – 94.7)	0.00

Variable – Capillary refill > 3 seconds (Number)	Cases (Died)	Control (Survived)	Relative Risk (95% Confidence Interval)	P value
Day 1	9 (19)	4 (121)	9 (4.38 – 17.65)	0.00
Day 3	2 (11)	0 (121)	14 (7.69 – 27.13)	0.01
Day 5	7 (10)	0 (118)	40 (13.19 – 123.3)	0.00

Table 2. Associated factors of mortality in children with severe malnutrition

Variable	No of observations	No with variable who died / survived	Odds ratio (95% CI)	Relative Risk (95% CI)	p-value
Respiratory distress (RR > 60) Day 1	140	4 / 5	6.19 (1.5 – 25.6)	3.88 (1.62-9.28)	< 0.01
Hypoxaemia (SpO_2 < 90%) Day 1	140	12 / 17	10.49 (3.62 - 30.39)	6.56 (2.84-15.17)	<0.001
Hypoxaemia (SpO2 < 90%) Day 3	132	8 / 10	29.6 (6.76 - 129.55)	16.89 (4.94-57.80)	<0.001
Hypoxaemia (SpO2 < 90%) Day 5	128	9 / 4	256.5 (25.87 - 2543.13)	79.62 (10.94-579.42)	<0.001

Variable	No of observations	No with variable who died / survived	Odds ratio (95% CI)	Relative Risk (95% CI)	p-value
GCS<13 Day 1	140	14 / 6	53.67 (14.48-198.92)	16.8 (6.80-41.52)	<0.001
GCS<13 Day 3	132	8 / 0	Infinity	41.33 (13.52-126.41)	<0.001
GCS<13Day 5	128	8 / 0	Infinity	60.00(15.18-237.15)	<0.001
High neutrophil (> 8) Day 3	65	3/6	6.5 (1.17-36.26)	4.67 (1.25-17.49)	<0.025
Low lymphocyte (<0.8) Day 1	114	1/0	Infinity	6.44 (4.22-9.85)	<0.025

Variable	No of observations	No with variable who died / survived	Odds ratio (95% CI)	Relative Risk (95% CI)	p-value
Low eosinophil (<0.02) Day 1	78	12/12	26 (5.13-131.81)	13.5 (3.27-55.72)	<0.001
Low eosinophil (<0.02) Day 3	66	5/10	8 (1.64-39.04)	5.67 (1.53-21.01)	<0.005
High platelet distribution width (>17) Day 3	97	1/0	Infinity	16 (7.37-34.72)	<0.001
Low calcitonin (< 2.82) Day 3	97	3/9	6.75 (1.3-35.07)	5.31 (1.35-20.90)	<0.025
Low calcitonin (< 2.82) Day 5	78	3/5	41.4 (3.61-474.26)	26.25 (3.08-223.50)	<0.001

Variable	No of observations	No with variable who died / survived	Odds ratio (95% CI)	Relative Risk (95% CI)	p-value
Low platelet (< 150) Day 1	117	6/13	4.06 (1.26-13.06)	3.10 (1.28-7.50)	<0.025
Low platelet (< 150) Day 5	79	4/7	Infinity	Infinity	<0.001
High urea (>6) Day 1	118	6/7	8.14 (2.29-29.00)	4.85 (2.11-11.14)	<0.001
High urea (>6) Day 5	72	3/1	201 (9.97-4051.39)	51 (6.7-386.82)	<0.001
Dysnatraemia (Na+<130 or >150 mmol/L) Day 1	92	5 / 23	4.42 (0.98 - 20.0)	3.81 (0.98-14.85)	<0.05

Variable	No of observations	No with variable who died / survived	Odds ratio (95% CI)	Relative Risk (95% CI)	p-value
High creatinine Day 1	119	3/3	7.69 (1.40-42.17)	4.35 (1.68-11.23)	<0.01
High creatinine Day 5	71	2/1	66.0 (4.09-1066.35)	22.67 (4.66-110.33)	<0.001
Abnormal ALT Day 1	105	9/21	4.93 (1.57-15.45)	3.75 (1.46-9.62)	<0.005
Abnormal ALT Day 5	71	2/8	7.38 (0.91-59.90)	6.10 (0.97-38.50)	<0.05
High AST (>59) Day 1	105	9/23	3.69 (1.23-11.04)	2.93 (1.20-7.19)	<0.025

Variable	No of observations	No with variable who died / survived	Odds ratio (95% CI)	Relative Risk (95% CI)	p-value
Low total protein (<60) Day 1	97	13/44	5.61 (1.19-26.47)	4.56 (1.09-19.11)	<0.025
High total bilirubin (> 22) Day 3	93	3/6	13.50 (2.23-81.87)	9.33 (2.2-39.60)	<0.001
High total bilirubin (> 22) Day 5	91	2/4	20.75 (2.30-187.62)	14.17 (2.40-83.72)	<0.001
Low calcium (< 2.6) Day 1	77	7/36	Infinity	Infinity	<0.025
Low calcium (< 2.6) Day 3	83	5/35	Infinity	Infinity	<0.025

Non significant factors

Factors which **DID NOT** predict death include:

- ✓ Socio demographic factors,

- ✓ Heart rate,

- ✓ Total white cell count, monocytes. Basophils, haemoglobin, mean cell volume, red cell distribution width,

- ✓ Alkaline phosphatase, serum albumin, magnesium, potassium, phosphorus, albumin, carbon di oxide, blood sugar level and

- ✓ being HIV positive.

RESULTS

This study found the factors associated with mortality to be

- Children who presented with
- Cough,
- Apnoea and
- Fitting.

- Children found on examination to have
- Capillary refill greater than 3 seconds,
- Tachypnoea,
- Hypoxaemia and
- Reduced conscious level

- Children diagnosed with
- Sepsis and
- Oral thrush

- Children administered 50% glucose intravenous push

Lab factors

- Neutrophilia,

- Lymphopenia,

- Eosinopenia,

- High platelet distribution width,

- Low calcitonin,

- Thrombocytopenia,

- Hyperuremia,

- Dysnatraemia ,

- Abnormal alanine aminotransferase,

- High aspartate aminotransferase,

- Low total protein,

- Hyperbilirubinemia and

- Hypocalcaemia.

DISCUSSION

- Malnutrition remains a major cause of global childhood morbidity and mortality.

- Uganda, published in 2017 - risk factors for mortality - presence of oral thrush, impaired consciousness, capillary refill time greater than two seconds, C-reactive protein concentration greater than 15mg/L and low plasma phosphate especially in oedematous children.

- Dhaka Hospital in 1997 - septicaemia, hypothermia and bronchopneumonia - death

- In this study, significant factors associated with mortality as per the results.

Recommendation

- In order to prevent or reduce mortality, acute malnutrition children presenting with and found to have any of the above symptoms and signs should be given special attention.

- The use of 50% glucose intravenous push as a form of treating hypoglycaemia should be reviewed and possibly stopped.

- Correct any of the above abnormal blood parameters when identified.

- Although timely treatment of children with malnutrition is essential, it is often poorly done in hospitals so prevention of malnutrition at the community level is the best way to avoid children dying from malnutrition. (3)

Limiting factors

- Inability to do blood gasses, C-reactive protein and culture at the Mt-Hagen hospital Lab.

- Some missing lab parameters were due to difficult venepuncture and/or insufficient blood samples.

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- Mt Hagen hospital paediatric nursing staff

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