Factors Affecting Mortality in Malawian Adults with Bacterial Meningitis

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Aims

To investigate potentially reversible factors that may be contributing to the high mortality of bacterial meningitis (BM), with a view to future targeted interventional trials

Introduction

Mortality of BM in Malawi is 57% compared to 10-25% in the UK. Recent trials of adjunctive glycerol and steroid therapy have failed to show benefit in Malawian adults. Local clinical experience suggests that the observed excess mortality is likely to be multi-factorial. We investigated a range of contributing factors focusing on those potentially reversible

Methods

Prospective cross-sectional observational study; December 2008 to May 2009

Site – medical wards, Queen Elizabeth Central Hospital, Blantyre

Inclusion criteria – Any patient with clinically suspected BM

Exclusion criteria – Age <16yrs; nosocomial or partially treated BM

Primary endpoint – death or discharge

Secondary endpoints – neurological deficit at discharge; prolonged stay

Definition: 'Proven BM' – neutrophilic CSF, wcc >100 cells/ml *plus* positive CSF Gram stain, culture or Streptococcus *pneumoniae* PCR

Results

161 patients enrolled
63 abnormal CSF
27 bacterial meningitis
1 absconded

Total BM (n=26): overall mortality 65%

- 22/26 (85%) had pneumococcal meningitis (PM)
- Mortality was 36% in PM vs 75% in non-PM
- Median time to death was 3 days (IQR 1-6)
- 7/17 (41%) died within 24 hrs
- 5/9 (56%) discharged patients stayed longer than 10 days; median 12 days (IQR 10-13d)

Host factors

Table 1: host factors	Total BM (n=26) Median (IQR)	Died (n=17) Median (IQR)	Disch'd (n=9) Median (IQR)	p
Median age (years)	29 (26-41)	33 (26-46)	26 (25-28)	0.089
Male	38%	**53%**	**11%**	**0.045**
HIV positive	81%	88%	66%	-
Symptom dur^{n} (days)	6.3 (4.4-8.7)	6.3 (4.3-8.8)	6.4 (4.5-8.3)	-
CD4 (cells/ml)	143 (75-266)	125 (84-165)	232 (85-306)	-
MUAC (cm)	26.1 (24.4-28)	25.5 (21.5-34.2)	27 (23.5-33.4)	-
Pneumonia at adm'n	12%	12%	11%	-

Clinical factors

Table 2: observations at admission	Died (n=17) Median (IQR)	Discharged (n=9) Median (IQR)	P
Glasgow coma score (GCS)	**9 (4-15)**	**14 (13-15)**	**0.07**
O2 saturation (%)	**94** (87-98)	**98** (98-98)	-
Resp rate (cpm)	28 (24-32)	30 (28-36)	-
Pulse rate (bpm)	**115** (92-124)	**90** (84-104)	**0.039**
Systolic BP (mmHg)	110 (100-120)	120 (110-130)	-

- Baseline renal function, lactate and haemoglobin were similar in each group
- A **greater drop in serum lactate after 24hr** admission was seen in survivors than non-survivors (median 1.8 vs. 0.4 mmol/L; not significant)
- **No improvement in blood pressure, pulse rate** (table 3) or renal function was noted for patients in either group after the first 24 hours of admission

Therapeutic factors

Fluid resuscitation - inadequate

- Median volume of IV fluid given was 1 litre (range 0-3L)

Seizure management – suboptimal

- **Mortality 100%** for BM patients with seizures (n=5)
- Only 6/17 episodes were treated with specific therapy (IM phenobarbitone or IV diazepam)
- 1 patient received oxygen therapy (HDU)

Operational factors

Door-to-needle (intravenous Ceftriaxone 2G) times were longer in those who died. Delay appeared to occur whilst awaiting medical consult (* ‡ p=0.20 for both).

Part of patient journey	Died	Discharged
Travel to hospital	0.5	1.5
‡Ward to medical consult	**2.5**	**1.0**
Med ward to IVAB	4.7	2.2
***Total door-to-needle**	**5.3**	**2.7**

able 3: Subdivisions of median door-to-needle times (hours)

- 10/17 non-survivors arrived ing hours (0800 to 1600)
- All survivors arrived on the and 1430

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Conclusions

In this pilot study we have identified that certain characteristics of patients and the timing of their presentation to hospital, as well as various operational, therapeutic and clinical management aspects of the patient journey all offer potential for intervention and reduction of mortality in adult bacterial meningitis in Blantyre, Malawi.

Care packages are being developed for investigation, and expansion of the role of specifically trained nurses is being considered to address the in-hospital mortality.

A community-based study is planned to identify barriers to health-care seeking and access.

Funding sources

Meningitis Research Foundation 20 years of progress

wellcome trust