CLINICAL PREDICTORS OF SEVERITY AND OUTCOME OF PNEUMONIA IN HOSPITALISED ADULTS IN BLANTYRE, MALAWI.

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Introduction

Pneumonia is the commonest cause of infectious disease-related death globally and the commonest cause of adult hospitalisation in Malawi.

Optimal management of pneumonia is guided by the use of severity-scoring tools (e.g. CURB65 and Pneumonia Severity Index) which predict the risk of death or clinical deterioration.

Tools developed in well-resourced settings - where most patients with pneumonia are elderly and have chronic comorbid illness - may perform less well in settings like Malawi.

Objectives

- To determine the frequency of treatment failure* and 30-day mortality amongst adults hospitalised with clinically-diagnosed pneumonia in Blantyre, Malawi.
- To identify the clinical and basic diagnostic laboratory characteristics associated with treatment failure and 30-day mortality.

Methods

A prospective observational study of adults with clinically-diagnosed pneumonia admitted to Queen Elizabeth Central Hospital, Blantyre.

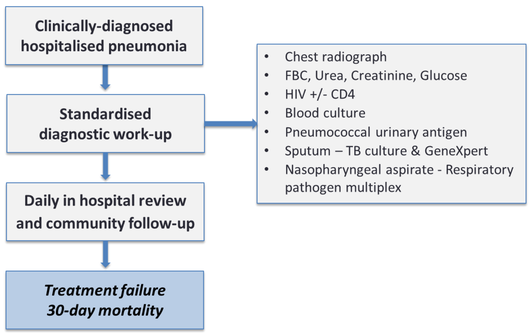

Figure 1. Overview of study procedures and follow-up

Recruitment started on 15th May 2013. The results of the interim analysis performed after the first 100 patients followed to 30-day time-point are summarised.

* *Treatment failure* - Clinical deterioration with death, oxygen saturations <90% without supplemental oxygen, systolic blood pressure <90mmHg or fall by ≥40mmHg from baseline, or persistence/reappearance of fever at 72 hours after the start of antibiotics.

Results

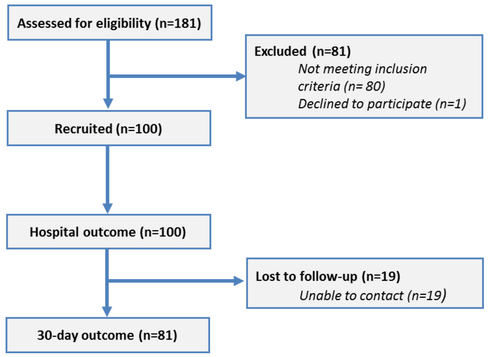

Figure 2. Summary of patient recruitment and follow-up to date.

Characteristic	No. (%) of episodes**
Male sex	56 (56)
Age	
≥50	20 (20)
Comorbid conditions	
HIV positive	65 (66)
Chronic lung disease	4 (4)
Chronic heart condition	2 (2)
Stroke	3 (3)
Current smoker	7 (7)
Previous tuberculosis	10 (10)
Previous pneumonia	15 (15)
Physical examination features	
Systolic BP <90 or diastolic ≤60 mmHg	26 (26)
Heart rate ≥125 beats/min	33 (33)
Respiratory rate ≥30 breaths/min	42 (42)
Pulse oximetry ≤90%	16 (17)
Body mass index <18.5	30 (33)
Laboratory results	
White blood cell count <4 or >15 x10^9cells/L	33 (33)
Urea >7 mmol/L	23 (24)
CD4 ≤200 cells/μL	35 (65)†
Severity assessment	
CURB65‡ = 0 or 1	73 (78)
CURB65 = 2	16 (17)
CURB65 ≥ 3	4 (4)

Table 1. Summary of patient baseline characteristics.

† HIV-positive patients. ‡ Validated pneumonia severity assessment tool based on confusion, urea level, respiratory rate, blood pressure and age. **Denominator 98-100 unless otherwise specified: pulse oximetry, 96; body mass index, 92; urea, 95.

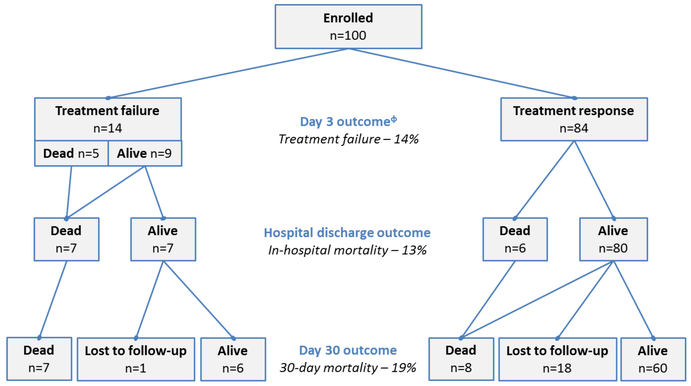

Figure 3. In-hospital and day 30 patient outcomes.

Φ Day 3 data missing in 2 patients; included in treatment response limb for later time-points.

Risk factor	Treatment failure		30-day mortality	
	OR (95% CI)	P-value	OR (95%CI)	P-value
Age ≥50 years	0.66 (0.13-3.22)	0.60	0.57 (0.12-2.8)	0.49
Male	1.49 (0.46-4.81)	0.51	1 (1.13-25.9)	0.03
HIV positive	-§	0.002¶	9.94 (1.23-80.25)	0.03
CD4 ≤200	1.19 (0.31-4.57)	0.81	3.89 (0.73-20.7)	0.11
Systolic BP <90 mmHg	1.37 (0.26-7.13)	0.71	1.85 (0.32-10.58)	0.49
Diastolic BP ≤60 mmHg	3.4 (1.03-11.26)	0.045	2.45 (0.70-8.60)	0.16
Respiratory rate ≥30 breaths/min	0.73 (0.22-2.35)	0.59	0.94 (0.30-2.94)	0.91
Pulse oximetry ≤90%	5.15 (1.54-17.18)	0.008	5.61 (1.68-18.69)	0.005
Body mass index <18.5	0.63 (0.16-2.52)	0.51	1.69 (0.52-5.57)	0.38
Urea >7 mmol/L	3.43 (1.02-11.61)	0.048	3.57 (1.07-11.9)	0.038
CURB65 ≥3	0.57 (0.07-4.83)	0.606	1.53 (0.79-2.96)	0.20

Table 2. Univariate analysis of risk factors associated with treatment failure (n=98) and 30-day mortality (n=81).

§ No treatment failure observed in HIV-negative patients. ¶ Fisher's exact test.

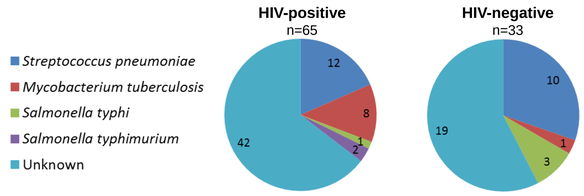

Figure 4. Microbial aetiology classified by HIV status. Aetiology determined using BinaxNOW *S.pneumoniae* urinary antigen assay, mycobacterial smear and culture, GeneXpert MTB/RIF assay, and aerobic blood culture.

Chest x-rays were obtained in 88 patients. Radiographic features compatible with infection were present in 70 (80%). Microbial aetiology varied with chest x-ray status; all patients with invasive salmonella infection lacked radiographic change.

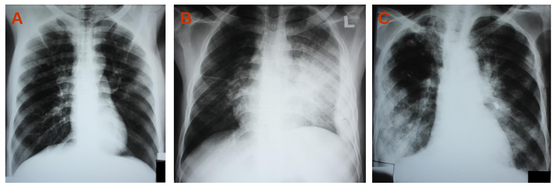

Figure 5. Selected chest x-ray images: **(A)** HIV-negative male with positive sputum GeneXpert MTB/RIF survived to day 30; **(B)** HIV-positive male with positive pneumococcal urinary antigen died in hospital; **(C)** HIV-positive male with positive pneumococcal urinary antigen survived to day 30.

Current work

- Continued recruitment of large prospective cohort to allow multivariate analysis of clinical predictors.
- Enhanced aetiological characterisation by molecular diagnostics on stored nasopharyngeal aspirates.

Conclusions

- The burden of hospitalised pneumonia in Malawi is mainly in young adults with HIV infection, rather than elderly patients with chronic vascular and pulmonary comorbidity.
- Severity-scoring tools developed in pneumonia populations in well-resourced settings may not accurately identify patients at risk of early treatment failure or death.
- There is a need for locally-derived and validated tools that incorporate relevant clinical predictors to guide triage and early pneumonia management in Malawi.

Acknowledgements

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