HHS Public Access

Author manuscript

Trop Doct. Author manuscript; available in PMC 2016 July 01.

Published in final edited form as:

Trop Doct. 2015 July ; 45(3): 164–167. doi:10.1177/0049475515577024.

Altered mental status is an indicator of mortality and associated with both infectious and non-communicable disease in Lilongwe, Malawi

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Abstract

Little is known about diseases associated with *Altered Mental Status* in resource-poor settings. We studied adult medicine patients presenting with AMS in Lilongwe, Malawi and found that AMS and HIV infection were each significantly associated with mortality. It is therefore critical that evaluation and management in this patient population is improved.

Keywords

Altered mental status; HIV; non-communicable diseases; infectious diseases; resource-poor settings

INTRODUCTION

Altered mental status (AMS) is a common chief finding among patients presenting to acute healthcare settings[1]. There is a broad spectrum of aetiologies associated with AMS, including infectious, metabolic, structural or traumatic causes, all of which may contribute significantly to morbidity and mortality[2,3]. Prompt diagnosis and treatment of the underlying problem is crucial to any improvement in patient outcomes. However, little is known about the aetiology of AMS in resource-poor settings (RPS) with high HIV prevalence. In recent studies, AMS has been described as a risk factor for mortality[3,4]. A 2009 study from Uganda reported 44% mortality among patients presenting with AMS, with infectious aetiologies predominating[4].

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Conflicts of interest: none of the authors has any financial or non-financial conflicts of interest to report.

OBJECTIVES

We conducted a study to assess the prevalence of AMS and HIV among adult patients admitted to the central hospital in Lilongwe, Malawi over a 6-week period.

METHODS

Study setting

The Kamuzu Central Hospital, Lilongwe, Malawi is the Lilongwe district's largest healthcare facility and a referral centre for the country's Central Region. Over 6,000 patients per year are evaluated in the "short stay" unit, which functions as an urgent care or emergency department. Patients are triaged by clinicians and either treated and discharged, or admitted for further evaluation and management.

Study population

We conducted a retrospective cohort study of adult patients admitted to Kamuzu Central Hospital medical wards from 15 April to 31 May 2013. We included patients who met at least one of three criteria: (1) Glasgow Coma Score<15, (2) documented 'AMS key terms': confused, drowsy, delirious, disoriented, convulsing, unconscious, or comatose, or (3) were recommended to undergo lumbar puncture (LP) with cell count and culture for suspected central nervous system infection. The inclusion criteria were intentionally broad so as to maximize the number of cases identified during the retrospective review.

Procedures and Statistical Analysis

Paper charts were reviewed and demographic, clinical and laboratory data were extracted from patient files using a case report form and stored in a de-identified Microsoft® Access 2007 database. Diagnostic data included vital signs, random blood sugar, malaria smear/malaria rapid diagnostic test, rapid HIV test (Determine®/Unigold®) and cerebrospinal fluid cell count/culture for routine work-up for AMS. Patients were categorized as having an infectious diagnosis, a non-communicable diagnosis, or both if a diagnosis of each type was identified in the same patient. All statistical analyses were conducted using SAS™ version 9.4 (SAS Institute Inc., Cary, NC, USA). We used Fisher's exact tests and unpaired t-tests to identify patient characteristics associated with AMS or mortality.

Ethics review

The study was approved by the Malawi National Health Science Research Committee and the University of North Carolina, Chapel Hill Institutional Review Board.

RESULTS

Of the 643 adult admissions documented during the study period, 546 charts were located, of which 170 (31%) met at least one of three study inclusion criteria (49% female, median age 38, 48% HIV positive). Ninety-two of the 170 (54%) had a Glasgow Coma Score recorded, of which 62 (67%) were <15. A total of 117 of 546 (21%) were described with 'AMS key terms.' LP was clinically indicated in 114 of 546 (21%) patients, but this analysis

focuses on the 83 of these 114 patients who had actual AMS symptoms. A final group of 139 of the 546 (26%) patients qualified as having AMS symptoms and are analyzed here. Older age was significantly associated with AMS presentation (median age 41.8 SD 16.7 vs. non-AMS median age 34.9 SD 12.2; p=0.03). Fifty-nine patients with AMS (42%) were HIV positive; In 39 (26%) of the included patients, HIV status was not known. Forty-six percent of these patients with unknown HIV status died before discharge.

Among the 139 with AMS, the most common diagnoses were infectious (N=92; 66%), including malaria (22%), bacterial meningitis (16%), cryptococcal meningitis (6%), TB meningitis (4%) and sepsis of unknown source (15%). Fifty percent (N=70) of AMS patients had a non-communicable disease diagnosis, which included stroke (11%), severe anaemia (haemoglobin < 8g/dl; 5%), seizures (8%), kidney injury (4%), and diabetic ketoacidosis (4%). A total of 23 patients (17%) with AMS were diagnosed with both infectious and non-communicable disease (NCD).

The overall mortality of our 546 patient cohort was 23%. For infectious aetiologies with more than one patient presenting, bacterial meningitis and pneumonia had the highest mortality (77%). Among non-communicable aetiologies, anaemia and kidney injury had the highest mortality (86% and 83%, respectively) (Table 1). Mortality rates were higher in patients with AMS (46% vs 16% non-AMS, p<0.002) and those infected with HIV (46% vs 26% HIV−, p=0.03). Fifty-nine patients had both HIV and AMS and 33 of these patients (56%) died. HIV positive patients were more likely to have an infectious versus a non-communicable aetiology of AMS (61% v. 17%).

DISCUSSION

We demonstrated that AMS was a common presenting symptom of adult Malawian medical patients (26%) and an indicator of mortality (46%). Infectious aetiologies predominated (66%), but non-communicable diseases (NCDs) were also prevalent (50%), as previously indicated[4,5]. Improving our understanding of the relationship between AMS and high mortality disease aetiologies can positively impact patient care.

HIV infection was frequent in our cohort (48%) and significantly associated with mortality (42%, p=0.03). HIV has been shown to impact negatively on mental status through immune dysfunction with associated opportunistic infections, multi-organ dysfunction, interactions between medical therapies, immune reconstitution, psychosocial contributors, as well as HIV infection itself[6].

Importantly, HIV status was not known in 23% of patients. Forty-six percent of these patients died, the same proportion as in HIV positive patients. This highlights the limitations of our current HIV screening strategies and stresses the importance of universal screening to facilitate risk-stratification and appropriate therapeutic management[5,7]. Despite marked increase in HIV testing uptake at Kamuzu Central Hospital in recent years, the proportion of HIV testing remains sub-optimal. Some possible reasons for non-testing include short length of stay, early mortality, and weekend or holiday admission when laboratory services are diminished[8].

To date, most research has been appropriately directed towards infectious diseases in RPS. However, it is estimated that over 60% of all deaths world-wide are caused by NCDs and 80% of these occurred in low and middle-income countries[9]. Cumulative data from the WHO Africa Region in 2004 attributes about a quarter of all deaths to NCDs, with cardiovascular disease, malignancy, respiratory diseases, and diabetes being the most prevalent[10]. Little country-specific data is available describing the burden of NCDs in RPS. Recent studies of HIV prevalence and disease outcomes in Lilongwe, Malawi confirm that both infectious disease and NCD have a significant impact on mortality[5,7]. In particular, kidney injury and anaemia were found to be associated with high mortality, although lack of diagnostic testing limited our determination of a precise aetiology. We postulate that these conditions are secondary to severe underlying acute or chronic illness and an indicator of poor prognosis, rather than the primary pathology. While these cases of kidney injury and anaemia were categorized as NCD, their underlying aetiology may well have been infectious.

Access to blood transfusions is extremely restricted in Malawi and may have contributed to morbidity and mortality in our cohort, particularly in patients with severe anaemia. Expanding access to blood transfusions as well as diagnostic and treatment options for kidney injury may improve patient outcomes. Undiagnosed or untreated chronic diseases in Malawi need further investigation.

Our study had the following limitations. Data were obtained from retrospective paper-chart review and was limited by documentation availability. Further, diagnostic evaluation was restricted to clinical history, physical examination, malaria smear/malaria rapid diagnostic test, rapid HIV test (Determine®/Unigold®) and lumbar puncture for routine work-up for AMS. Standard-of-care evaluations in developed settings such as complete blood count, electrolytes, chest radiography and computed tomography scan were infrequently available, which may have affected the accuracy of diagnoses. Finally, aetiologies underlying AMS may have been multi-factorial in certain cases, but our analysis focused on the primary admission diagnoses listed in the chart as the aetiology most likely precipitating AMS.

Despite basic diagnostic testing being available at our centre, there was still high mortality in patients presenting with AMS. This highlights the need for a customized algorithm outlining a site-specific diagnostic and treatment plan. One recent multi-center study attempts to evaluate and test a meningitis check-list in Southern and East Africa with some efficacy[11]. This diagnostic concept can be applied to a broader range of diagnoses associated with altered consciousness.

In conclusion, AMS was a common finding in our acute care setting in Lilongwe and was a significant indicator of mortality, particularly in HIV positive patients. Our study highlights the importance of routinely screening for AMS and maintaining a broad differential when evaluating patients with AMS. At a minimum, malaria smear/malaria rapid diagnostic test, rapid HIV test (Determine®/Unigold®), and lumbar puncture with cell count, gram stain and culture should be applied consistently in such patients. Rapid diagnostic evaluation can tailor treatment and may improve patient outcomes.

Acknowledgments

Funding: provided by the University of North Carolina- Chapel Hill. The funding that supported the research in Malawi was through the University of North Carolina, Chapel Hill Department of Internal Medicine, UNC Office of International Activities, and the UNC Med Foundation. These were all small grants issued to the authors Charles Vorkas and Bryna Harrington, and did not have official grant numbers. The University of North Carolina Center for AIDS Research (CFAR) funded the regular HIV counselling, testing, and data management activities on the Kamuzu Central Hospital Medicine Ward.

REFERENCES

1. Douglas VC, Josephson A. Altered Mental Status. Continuum Lifelong Learning Neurol. 2011; 17(5):967–983.
2. Chang CJ, Tam HP, Ko WJ, et al. Predicting hospital mortality in adult patients with prolonged stay (>14 days) in surgical intensive care unit. Minerva Anestesiol. 2013; 79:843–852. [PubMed: 23698544]
3. Jarvis JN, Bicanic T, Loyse A, et al. Determinants of Mortality in a Combined Cohort of 501 Patients with HIV associated Cryptococcal Meningitis: Implications for Improving Outcomes. Clin Infect Dis. 2013; 58:736–745. [PubMed: 24319084]
4. Rwebembera J, Wilson T. Altered consciousness in Ugandan hospital admission. Trop Doct. 2009; 39:240–241. [PubMed: 19762582]
5. Kendig CE, McCulloch DJ, Rosenberg NE, et al. Prevalence of HIV and Disease Outcomes on the Medical and Surgical at Kamuzu Central Hospital, Lilongwe, Malawi. Trop Med Int Health. 2013; 41:163–170.
6. Ho EL, Jay H. Altered mental status in HIV patients. Emerg Med Clin N Am. 2010; 28:311–323.
7. Akinkuotu A, Roemer E, Richardson A, et al. In-hospital mortality rates and HIV: a medical ward review, Lilongwe, Malawi. Int J STD & AIDS. 2011; 22:465–470. [PubMed: 21795420]
8. LaCourse SM, Chester FM, Matoga M, Munthali C, Nsona D, Haac B, Hoffman IF, Hosseinipour MC. Implementation of routine counselor-initiated opt-out HIV testing on the adult medical ward at Kamuzu Central Hospital, Lilongwe, Malawi. J Acquir Immune Defic Syndr. 2015 Jan 23. [Epub ahead of print].
9. World Health Organization. Geneva: World Health Organization; 2012. Assessing national capacity for the prevention and control of non-communicable disease: Report from the 2010 Global Health Survey.
10. World Health Organization. [accessed on 2 March 2015] Global Info Database: Estimated Proportional Mortality, WHO Africa Region 2004. Available at: https://apps.who.int/infobase/Mortality.aspx?l=&Group1=RBTCntyByRg&DDLCntyByRg=AFR&DDLCntyName=1001&DDLYear=2004&TextBoxImgName=go
11. Durski KN, Kuntz KM, Yasukawa K, et al. Cost-effective diagnostic checklists for meningitis in resource-limited Settings. J Acquir Immune Defic Syndr. 2013; 63:101–108. [PubMed: 23392463]

Table 1

Diagnoses associated with Altered Mental Status and Mortality, stratified by HIV status

Diagnosis	Total AMS patients N=139*	% of AMS patients	HIV+ N=59	% HIV+ per diagnosis	HIV− N=35	HIV unknown N=45	Deaths N=64	Mortality % per diagnosis
Infectious	N=110	79	59	54	32	19	N=59	54
Gastroenteritis	3	2	3	100	0	0	2	67
Immunosuppression	2	1	2	100	0	0	2	100
Malaria	30	22	11	37	14	5	9	30
Meningitis- bacterial	22	16	12	55	6	4	17	77
Meningitis- TB	5	4	2	40	2	1	3	60
Meningitis- cryptococcal	8	6	8	100	0	0	4	50
Pneumonia	9	6	5	56	2	2	7	78
Sepsis	21	15	9	43	7	5	8	38
TB-- pulmonary	4	3	3	75	1	0	3	75
Other—infectious**	6	4	4	-	0	2	4	-
Noncommunicable	N=79	57	22	28	26	31	N=35	44
Anemia, severe	7	5	4	57	2	1	6	86
Congestive heart failure	6	4	2	33	2	2	5	83
Cerebrovascular accident	15	11	1	7	5	9	10	67
Diabetic ketoacidosis	6	4	1	17	4	1	0	0
Epilepsy, seizures	11	8	3	27	3	5	1	9
Hypertension	4	3	0	0	3	1	0	0
Hypoglycemia	5	4	4	80	0	1	3	60
Kidney injury	6	4	1	17	1	4	5	83
Poisoning/drug overdose	3	2	0	0	2	1	0	0
Psychosis	7	5	3	43	2	2	0	0
Other—noncommunicable**	9	6	3	-	2	4	5	-

* 139 of the 546 charts reviewed met criteria for AMS. 23 (17%) patients had both an infectious and non-communicable diagnosis; 10 (7%) patients had two non-communicable diagnoses; 17 (12%) patients had two infectious diagnoses.

** Infectious and non-communicable diagnoses with N=1 were combined into "other—infectious" or "other—non-communicable".

"Other – infectious:" gastritis/peptic ulcer disease, hepatitis, HIV encephalopathy, Pneumocystis jirovecii pneumonia, extrapulmonary TB, and urinary tract infections.

"Other—non-communicable:" acute lymphocytic leukemia, deep vein thrombosis/pulmonary embolism, electrolyte imbalance, hepatic encephalopathy, malignant hypertension, non-Hodgkin's lymphoma, peripheral neuropathy, psychosomatic disorder, and uremia.