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Screening for delirium and dementia in older hospitalised adults in Zambia☆

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ABSTRACT

Delirium prevalence and aetiology in older people in hospital or community settings in sub-Saharan Africa (SSA) is largely unknown. Cognitive screening tools designed for high-income countries (HICs) may be inappropriate due to cultural and educational differences, and delirium-specific measures lack validation in this context. The 'Identification and Intervention for Dementia in Elderly Africans' (IDEA) screen is a low-literacy tool developed and validated for dementia and delirium screening in Tanzania and Nigeria.

This study aims to determine the prevalence and aetiology of delirium and dementia in older hospitalised patients in Zambia and to assess the utility of the IDEA screen for identification of major cognitive impairment in this setting.

This was a blinded 4-month validation study which took place February–June 2015. Consecutive inpatient admissions of a rural mission hospital aged ≥60 years were administered the IDEA screen onadmission. Individuals were evaluated for dementia or delirium based on clinical examination, notes review and the Confusion Assessment Method. Delirium aetiological factors were recorded and classified (infectious/non-infectious).

Of 136 patients recruited, dementia, delirium and major cognitive impairment were identified in 37 (27.2%), 45 (33.1%) and 62 (45.6%) respectively. Diagnostic accuracy of the IDEA screen for dementia and delirium was 0.661–0.795 (AUROC). Of those with delirium, 18 (40%) were classified infectious and 26 (57.8%) were classified non-infectious aetiologies.

Dementia and delirium prevalence in older Zambian inpatients is comparable tohigh-income countries. The IDEA screen ispotentially clinically useful in this setting though diagnostic accuracy was lower than in initial validation studies. Non-infectious diseases are more highly represented amongst delirium precipitants than anticipated.

1. Introduction

Demographic shift, and a globally ageing population, are contributing to the rapidly increasing prevalence of dementia worldwide. This increase is greatest in low- and middle-income countries (LMICs), with the number of older people forecast to increase by 185% from 2015 to 2050 [1]. By 2050, it is estimated that 68% of all individuals living with dementia will live in LMICs [1].

Delirium is a very common neuropsychiatric condition, increasingly recognised in high-income countries (HICs) [2–4]. Older adults and

☆ We certify that this work is novel and evaluates the use of IDEA screen for identification of major cognitive impairment in older hospitalised inpatients in Zambia. Data on prevalence and precipitants of delirium in older hospital populations in sub-Saharan Africa are currently extremely limited. This study also estimates delirium prevalence amongst older inpatients in Zambia and explores associated infectious and non-infectious aetiologies and precipitants.

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those with pre-existing cognitive impairment or dementia, are disproportionately affected [5]. Up to 50% of older hospital inpatients meet criteria for delirium [2], and new cognitive impairment or delirium predicts morbidity and mortality amongst this group [4]. Delirium is a well-recognised risk factor for dementia [6]. Cognitive impairment is increasingly considered a marker of poor prognosis in Intensive Care settings [7]. Early recognition and treatment of delirium can reduce the associated poor outcomes [8].

In sub-Saharan Africa (SSA), data on delirium and dementia in older hospital patients are limited, despite having an ageing population likely to be vulnerable to both dementia and delirium. Estimated community dementia prevalence is 2–6.4% and hospital prevalence 3–5% [9–11]. One Zambian delirium study reported a hospital prevalence of 48.5% and that delirium duration independently predicted mortality and disability at 6 months in all age groups [12]. Studies in older populations are even more limited. A study of Nigerian older medical inpatients reported 21.3% delirium prevalence, most commonly secondary to neurological diseases [13].

Population demographic factors, comorbidity burden and exposure to pathogens are likely to differ significantly in SSA compared to HIC settings where the majority of studies and data on delirium in older persons originate [14]. For example, infectious causes of delirium including HIV seropositivity, malaria and tuberculosis, are substantially higher in SSA [15]. Existing, albeit limited, data suggest that inflammation and infection are the most consistent aetiological factors for delirium in SSA [16]. The prevalence and aetiology of delirium may therefore differ from HICs. Given the similar community dementia prevalence, and increasing non-communicable comorbidities, delirium may be as prevalent in older adults in SSA as in HICs. The limited current data may be in part due to lack of appropriate screening tools validated in SSA, alongside a lack of specialist clinicians in neurology, psychiatry and geriatric medicine, particularly outside specialist centres. Existing data suggest a substantial diagnostic gap for delirium in SSA. A large multi-site study of inpatients aged ≥60 years based on case note review reported prevalence of only 1.5% [14]. This group with undiagnosed delirium may be at higher risk of poor outcomes, including increased mortality rates, and because underlying medical problems precipitating delirium may remain untreated if delirium is unrecognised. Accurate non-specialist screening methods suitable for routine practice are required and may reduce this diagnostic gap [16]. Accurate prevalence and aetiological data are necessary to aid development of SSA-specific guidelines for screening, diagnosis, prevention and management [16].

Making a diagnosis of dementia for a patient allows family members, and the wider community, to understand symptoms and allows future care planning and referral for dementia-specific interventions [17,18]. Dementia interventions are increasingly available worldwide, including Cognitive Stimulation Therapy (CST) [19,20]. Despite this, validated dementia screening and case finding tools appropriate for LMIC settings are currently lacking [21,22]. Our team have previously validated the Identification and Intervention for Dementia in Elderly Africans (IDEA) screen, a culturally appropriate low-literacy cognitive screen in community and inpatient settings in Tanzania and Nigeria, however, external validation in other settings is needed [23–25].

Our aim in this study was to evaluate the IDEA cognitive screening tool for identification of major cognitive impairment (dementia and/or delirium) in older hospitalised inpatients in Zambia. We also aimed to estimate prevalence of delirium in older inpatients in this setting and explore associated infectious and non-infectious aetiologies and precipitants, given the limited current data for SSA.

2. Methods

2.1. Study setting

This study was conducted at St Francis Hospital, a 350-bed rural teaching hospital in Katete, Eastern Province, Zambia. Treatment is provided free of charge. Medical staff include medical licentiates, clinical officers, Zambian doctors in speciality training and overseas volunteer doctors. No specialists in neurology or psychiatry were employed at the hospital at the time of the study, and neuroimaging was not available.

2.2. Ethics and consent

Ethical approval was granted by the University of Zambia Biomedical Research Ethics Committee (Reference: 008–04-15). Participants were given written and verbal information about the study by the research nurse (DM) and invited to ask questions in the local language (Chichewa) Consent was indicated by signature or thumbprint, depending on literacy status. Where the participant lacked mental capacity to give consent, but was not objecting, assent was sought from a close relative accompanying the patient to hospital.

2.3. Study design

This was a cross-sectional, two-stage, blinded validation study. Consecutive admissions to the hospital over a 4-month period (9th February – 29th June 2015) were approached to participate. Inclusion criteria were inpatient admissions of medical and surgical departments aged ≥60 years. Patients considered too unwell or distressed for screening were excluded from the study based on the judgment of the responsible doctor (OT). Patients undergoing emergency investigations away from the clinical area were also excluded.

2.4. Stage 1 -cognitive screening

In stage one; all individuals who met the inclusion criteria and consented to participate were screened using the IDEA cognitive screen. The research nurse (DM) recruited participants within 24 h of admission, obtained informed consent, and administered the IDEA screen. Baseline demographic data including age, sex, occupation, highest educational level, and self-reported literacy status were collected. Literacy was defined as currently or previously being able to read and write a short note. DM provided the study doctor (OT) a list of bed numbers for eligible, consented individuals who had completed the IDEA screen. IDEA screening results were filed separately and not shared with the study doctor to ensure that stage two assessment was conducted blinded to IDEA screen outcome.

The IDEA cognitive screen has been previously validated in Tanzania and Nigeria for identification of neurodegenerative dementia and delirium [24–26]. Diagnostic accuracy appears to be independent of literacy level [24]. The IDEA screen includes items intended to screen abstraction, orientation, long term memory, categorical verbal fluency, verbal learning and recall, but no delirium specific item such as sustained attention. The IDEA is scored from 0 to 15, and higher scores signify better cognitive function. Previous validation work in rural Tanzania (low literacy setting) has outlined the following categorisation; score 0–7, low performance (consider dementia), 8–9 intermediate/borderline performance (consider mild cognitive impairment, possible dementia) and 10–15 good cognitive performance level (dementia unlikely) [24].

2.5. Stage 2 clinical assessment

In stage two, participants were assessed for dementia (Diagnostic and Statistical Manual for Mental Disorders- Version IV (DSM-IV criteria)) and delirium (DSM-IV criteria, or International Classifications of Diseases Version 10 (ICD-10) where necessary, see below). Clinical assessments were completed by a physician undergoing higher specialist training in geriatric medicine and experienced in dementia and delirium diagnosis (OT) with translation assistance from nursing staff. Assessments included bedside clinical neurocognitive assessments, case note

review and informant history where available. Where a family member was present and able to assist with collateral history, the IDEA-Instrumental Activities of Daily Living (IDEA-IADL) questionnaire (previously validated in Tanzania) was administered as part of the stage 2 assessment [27]. Subsequent attempts to identify informants to complete the IDEA-IADL were dependent on clinical work commitments. Due to the uncertainty of dementia subtype diagnosis in an acute setting, dementia subtypes were recorded only where diagnoses were previously established in medical records.

The ascertainment of delirium used the internationally-validated Confusion Assessment Method (CAM), based on DSM-IV criteria. Where there was uncertainty (*e.g.* CAM criteria were not fully met, but further information suggested delirium) the case was assessed according ICD-10 criteria ([28]. Assessment followed a structured protocol based on DSM-IV(Appendix) previously used in other SSA studies [29]. The rater (OT) had completed comprehensive training in delirium through the Hospital Elder Life Program as part of a research study immediately prior to this reported work (including inter-rater reliability of the CAM assessment) [30]. Clinical assessment also included bedside cognitive examination of attention, concentration, orientation and delayed recall, and focussed neurological examination for dysphasia, abnormal movements, gait and posture, visual acuity, hearing impairment and motor weakness. Individuals who were CAM positive (Appendix), underwent further investigations, including a more detailed clinical examination of cardiovascular, respiratory and gastrointestinal systems to determine likely aetiologies. Clinical records were reviewed for common delirium precipitants as described in the NICE Delirium Guideline 2010 [31]. Where available, results of urine dipstick, full blood count and biochemistry, HIV status, malaria rapid antigen test and any other recent investigations undertaken during each patient's care (including electrocardiogram, chest radiograph and abdominal ultrasound) were recorded. Delirium subtype diagnosis was made by clinical assessment based on Delirium Motor Subtype Scale [32] as a guide, but not as a formal score.

All participants had physical observations including pulse, temperature, respiratory rate, systolic and diastolic blood pressure (BP) recorded. Potential predisposing factors for delirium including HIV status, alcohol history and regular medications, including traditional or herbal remedies, were recorded. Potential precipitating factors for delirium including constipation and evidence of infection were also recorded, based on clinical examination (OT).

The 15-item Geriatric Depression Scale (GDS) [33] was used as a guide for further clinical assessment where severe depression was a differential diagnosis. This scale has previously been used in SSA [25,34].

2.6. Statistical analysis

Statistical analyses were undertaken using IBM SPSS for Windows version 21 (IBM Corp, Armonk, NY, USA) and SAS (SAS Institute Inc., Cary, NC, USA). Descriptive statistical analysis used standard summary measures. Each parameter was checked for normal or non-normal distribution using histograms to determine whether parametric or non-parametric summary measures should be applied. Sensitivity, specificity and likelihood ratios (LR) were calculated comparing clinician diagnosis to IDEA screen outcome. Diagnostic accuracy of the IDEA screen score to identify cognitive impairment compared to blinded independent clinical assessment was measured using the C-statistic or Area under the Receiver Operating Characteristic (AUROC) curve statistic.

3. Results

3.1. Study cohort

A total of 240 patients aged ≥60 were admitted to St Francis Hospital medical and surgical departments during the study period, of whom 136 consented and were included in analysis (Fig. 1).

Of those recruited and screened, 89 (65.4%) had an informant available to assist with collateral history. All 136 individuals were seen for stage 2 clinical assessment, however only 89 (those with available informants) completed IDEA-IADL. Baseline demographic and clinical data of participants and non-participants are outlined and compared in Table 1. Participants and non-participants were demographically similar at baseline, although females were significantly more likely to participate.

3.2. Cognitive screening

Dementia was diagnosed in 37 (27.2%) individuals. Of those with a pre-existing clinical subtype diagnosis, 4 (2.9%) had Alzheimer's disease, 14 (10.3%) vascular dementia, 4 (2.9%) alcohol related dementia and 14 (10.3%) were classified as unspecified dementia. Delirium was identified by OT in 45 (33.1%) individuals recruited of whom 7 (5.1%) were classified hypoactive delirium, 2 (1.5%) classified hyperactive delirium, 1 (0.7%) was classified as mixed delirium, and in 30 (22.1%) delirium subtype were unspecified. Resolving delirium was identified in 5 (3.7%) individuals.

Major cognitive impairment (dementia and/or delirium) was identified in 62 (45.6%) individuals of whom 20 (14.7%) met criteria for both likely dementia and delirium.

Table 2 summarises the prevalence of dementia and delirium subdivided by age, sex and literacy. Both delirium and dementia were significantly associated with older age but there was no association with sex or literacy status.

3.3. Cause of delirium

Of the 45 individuals meeting criteria for delirium, 18 (40%) were classified as infectious aetiologies and 26 (57.8%) were classified as non-infectious or predisposing disease aetiology. For one individual, the cause of delirium was unknown. Likely delirium aetiologies are outlined in Table 3.

Precipitating causes of delirium were identified in 20 (44.4%) individuals and predisposing causes in 24 (53.3%).

3.4. Diagnostic accuracy

Summary statistics for the diagnostic accuracy of the IDEA screen at previously validated cut-offs are presented in Table 4. For dementia, the most accurate cut-off was 9 (sensitivity 0.757, specificity 0.616, PPV of 0.424 and NPV of 0.871). Likelihood ratio estimates for a positive screen were 1.966 and a negative screen, 0.398. Based on these data, the *a priori* probability of dementia was 0.272 and the *a posteriori* probability was 0.424.

For delirium, the most accurate cut off was also 9 (sensitivity 0.889, specificity 0.714, PPV of 0.606 and NPV of 0.929). The likelihood ratio estimates for a positive delirium screen was 3.108 and for a negative screen, 0.155. Based on these data, the *a priori* probability of delirium was 0.331 and the *a posteriori* probability was 0.606.

In total, 7 people were subsequently found to have delirium with a normal cognitive screening score (IDEA >9/15). Conversely, 32 individuals were screen-positive on IDEA at admission, but not subsequently diagnosed with dementia or delirium.

4. Discussion

This study was the first external validation of the IDEA cognitive screen in SSA older adults in a non-specialist setting. Dementia was diagnosed in 37 (27.2%) patients in this study, high in comparison to previous hospital-based studies of older adults in SSA, identified in a recent meta-analysis [35]. This meta-analysis included 41 studies

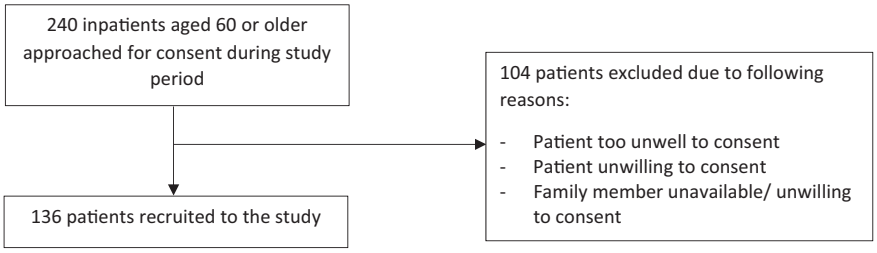

Fig. 1. Study recruitment and assessment flowchart.

Table 1
Characteristics of Participants and Non-participants.

Variable	Missing data (#, %)	Participants *n* = 136	Non-participants *n* = 104	Statistical test for difference
Age (median, IQR)	6 (_ %)	71 (65, 76) Data missing *n* = 6) (	72 (65, 78)	Mann-Whitney U = 6537.500 *p* = .665
Sex (% Female)	0 (_ %)	69.9%	53.8%	Chi Square = 6.472 *p* = .011*
Literacy (% Literate)	8 (_ %)	32.8%	44.2%	Chi Square = 3.178 *p* = .075
Employment (% Working)	4 (_ %)	40.9%	37.5%	Chi square = 0.283 *p* = .595
Occupation (% Farmers)	0 (_ %)	80.6%	77.7%	Chi square = 0.304 *p* = .581

IQR = Interquartile Range.

(published 1992–2013) of which 14 were hospital-based and used varying methods of dementia diagnosis, including clinical assessment and autopsy results. Overall the meta-analysis described increasing dementia prevalence in more recent studies [36], (up to 21.6%, compared to 27.2% in our study). Our results are in keeping with this upward temporal trend. Additionally, our dementia prevalence estimates are comparable to those reported in ≥65 year old inpatients in HICs such as the UK [37] and Germany [38].

In our study, delirium was identified in 45 (33.1%) individuals, a higher figure than in previous SSA studies in the same age group [13,39]. Our reported delirium prevalence is comparable to a meta-analysis of 42 studies in older medical inpatients in HICs, where reported prevalence rates were 10–31% [4]. Within our cohort, 18 (40%) were considered to have an infectious aetiology and 26 (57.8%) non-infectious aetiologies with 17.8% of delirium caused by stroke. These findings are comparable with previous studies which found infectious causes in 32–43% of delirium cases and stroke causing delirium in 15–22% of cases [4,40].

Our patient cohort was similar age to a previous delirium study conducted in SSA by our research group [29], which found only 19.6% were CAM positive for delirium on admission, but recruited from a demographically-different majority-male inpatient sample, and did not focus on aetiologies. However, a 2014 study of acute hospital admissions aged 60 and older in Nigeria, Sudan and Tanzania found that non-infectious diseases accounted for 81% of hospital admissions [14]. Cerebrovascular accident was the most common reason for admission (25.6%), followed by cardiac or circulatory dysfunction (17.2%). These are similar findings to those reported in our study, though methodologies differ. Both studies reflect the predicted increase in non-infectious disease burden on health services in the older population in Africa.

The IDEA screen was developed using data collected from 1198 older adults screened for dementia in rural Tanzania [25]. Subsequent validations were completed in high prevalence inpatient and outpatient hospital settings in Nigeria and Tanzania [24]. Sensitivity in Tanzanian outpatients was relatively low, attributed to lower prevalence of dementia, and because individuals with dementia able to attend outpatient appointments might be at earlier stages of the dementia disease process and perform relatively well on initial screening.

In our cohort, the most accurate cut-off was 9 for both dementia and delirium, higher than in the original community studies in Tanzania. For dementia our reported NPV was high (0.871). For delirium, diagnostic accuracy was higher but again NPV was high indicating good 'rule-out'

Table 3
Aetiology of delirium where cause known.

Infectious aetiology (*n* = 18)	Frequency	Non-infectious aetiology (*n* = 26)	Frequency
Urinary Tract Infection	5 (27.8%)	Congestive cardiac failure	7 (26.9%)
Gastroenteritis	5 (27.8%)	Stroke and complications	8 (30.8%)
Pneumonia	3 (37.5%)	Diabetes and complications	2 (7.7%)
Cellulitis	1 (5.6%)	Malignancy	2 (7.7%)
Toxic epidermal necrosis	1 (5.6%)	Alcohol misuse	3 (11.5%)
HIV	1 (5.6%)	Malnutrition	2 (7.7%)
Hepatitis	1 (5.6%)	Chronic Kidney Disease	1 (3.9%)
Sepsis of unknown source	1 (5.6%)	Anaemia	1 (3.9%)

HIV – Human immunodeficiency virus.

Table 2
- Prevalence of dementia and delirium by subgroup.

		n	Dementia		Delirium	
			Prevalence % (95% CI)	Statistical test for Association	Prevalence % (95% CI)	Statistical test for Association
Total sample		136	27.2 (19.7, 34.7)		33.1 (25.2, 41.0)	
Age	60–69	56	19.6 (9.2, 30.0)	Pearson's correlation coefficient = 0.228	23.2 (12.2, 34.3)	Pearson's correlation coefficient = 0.20
	70–79	49	28.6 (15.9, 41.2)	*p* = .009	32.7 (19.5, 45.8)	*p* = .022
	80 <	25	44.0 (24.5, 63.5)		56.0 (36.5, 75.5)	
Sex	Female	95	29.5 (20.3, 38.6)	$\chi^2 = 0.818$	32.6 (23.2, 42.1)	X2 = 0.047
	Male	41	22.0 (9.3, 34.6)	*p* = .366	34.1 (19.6, 48.7)	*P* = .828
Literacy	Literate	42	28.6 (14.9, 42.2)	$\chi^2 = 0.047$	40.5 (25.6, 55.3)	X2 = 1.665
	Illiterate	86	26.7 (17.4, 36.1)	P = .828	29.1 (19.5, 38.7)	*P* = .197

CI = confidence interval.

Table 4
The diagnostic accuracy of the IDEA screen using previously identified intermediate and high probability cut-off scores.

	n	Total Sample prevalence %	AUROC	Sensitivity	Specificity	PPV	NPV
Intermediate performance cut-off (≤7)							
Dementia cases	37	27.2	0.661	0.595	0.727	0.449	0.828
Delirium cases	45	33.1	0.795	0.756	0.835	0.694	0.874
Delirium and/or dementia (major cognitive impairment) cases	62	45.6	0.747	0.629	0.865	0.796	0.736
High performance cut-off (≤9)							
Dementia cases	37	27.2	0.686	0.757	0.616	0.424	0.871
Delirium cases	45	33.1	0.802	0.889	0.714	0.606	0.929
Delirium and/or dementia (major cognitive impairment) cases	62	45.6	0.780	0.790	0.770	0.742	0.814

AUROC – Area Under the Receiver Operating Characteristic; IDEA – Identification and Intervention for Dementia in Elderly Africans cognitive screen; NPV – Negative Predictive Value; PPV – Positive Predictive Value.

value (sensitivity 0.889, specificity 0.714, PPV 0.606 and NPV 0.929). Similarly the likelihood ratio for a negative test was higher (moderate to large decrease in post-test probability) than for a positive test (slight to moderate increase in post-test probability). The AUROC statistic was highest when the cut-off was 9 for delirium (0.801) (Fig. 2). The IDEA screen performed moderately well in this setting, though arguably demonstrated greatest potential as a measure to rule out delirium. The AUROC data indicates performance was highest for delirium screening, although lower than in the original validation studies.

When compared to other screening tools for major cognitive impairment used in African populations, the IDEA screen performs well. The 'Test of Senegal' used on elderly patients aged ≥55 years has a reported AUROC for dementia in an outpatient setting of 0.967, with high sensitivity (0.931) and specificity (0.896). However, the 39 question screening tool is arguably too long for a busy hospital inpatient setting [41]. The IDEA screen takes a reported mean of 10 min to complete and is more likely to be useful in clinical settings [24]. Another relatively brief tool (Montreal Cognitive Assessment (MOCA) had lower sensitivity (0.6) and specificity (0.72) in Tanzania and scores were influenced by age and education [42].

The low number of delirium cases missed is encouraging (7 individuals with IDEA screen >9 on admission), indicating that the IDEA would identify the majority of inpatient cases in this setting. The relatively high proportion of false positives (32 with IDEA ≤9 on admission) indicates that further assessment in these cases would be needed. In low-resource settings, a decision has to be made whether to prioritise sensitivity (more likelihood of identifying cases, but risk of giving a false diagnosis) or specificity (likely to identify cases later, but with more

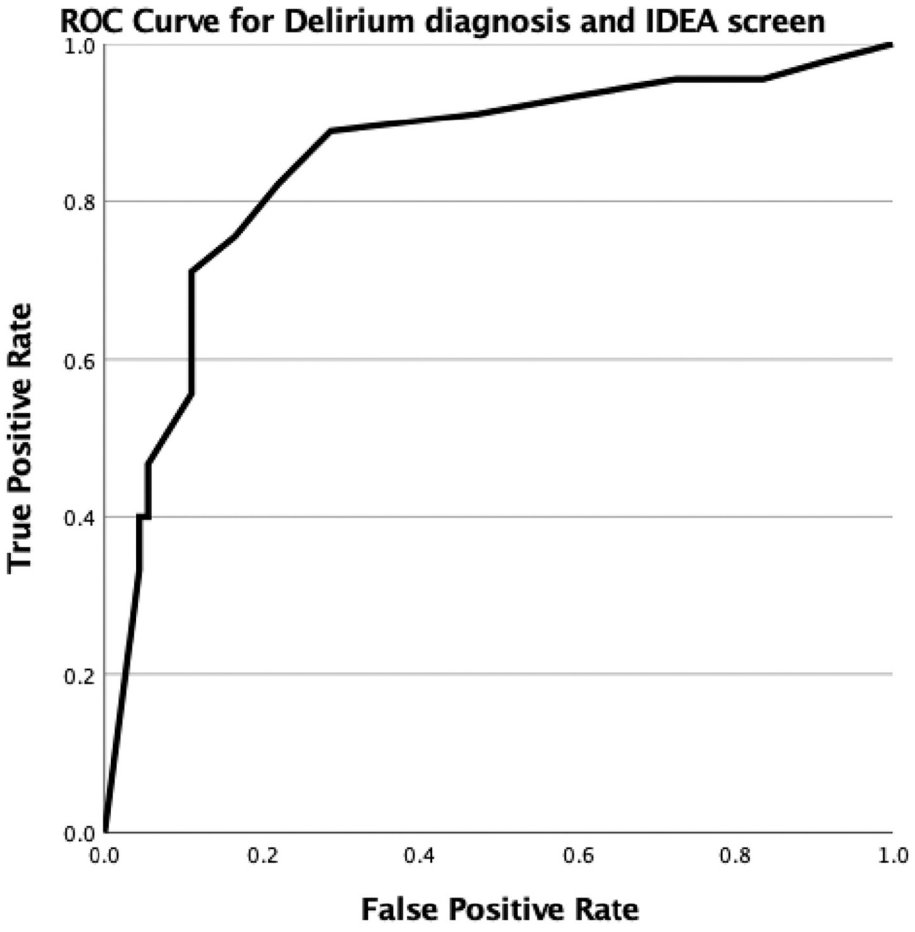

Fig. 2. Area under the Receiver Operating Characteristic (ROC) for Delirium diagnosis against IDEA screen (IDEA >9/15).

certainty). The value of carrying out inpatient screening using this method would be to alert clinicians to cognitive impairment so that delirium can be promptly recognised and treated. In the case of dementia, the tool would be optimally used to identify cases to assist with hospital discharge planning, but it is clear that diagnostic accuracy was a little more challenging than that reported for delirium, a well-recognised challenge in dementia diagnosis in inpatient settings. It is also important to note that the IDEA does not include any delirium-specific measure, such as sustained attention, and therefore low IDEA screen score in delirium may be due to the impact of attentional deficit on other cognitive functions. It would be important to assess for delirium in those with a low IDEA score in this setting to differentiate those with delirium from those with dementia to offer prompt investigation and management of delirium.

Although early dementia diagnosis is valued in HICs, in LMIC settings this may vary depending on availability of interventions. Acetylcholinesterase inhibitors remain difficult to access, prohibitively expensive for many, and do not currently appear in Zambian national treatment guidelines or essential medicines list [43]. Lack of routine brain imaging, or access to clinicians trained in dementia sub-type diagnosis, may also limit usefulness of medications at present.

Non-pharmacological dementia interventions are becoming available in SSA. Cognitive Stimulation Therapy (CST) is a psychosocial group-based treatment evaluated in Tanzania and Nigeria, and appears feasible and beneficial in SSA [19,20]. Similarly, carer interventions are also being evaluated. Increased diagnostic rates, dementia awareness and access to interventions may start to address stigma and lack of awareness of dementia amongst healthcare workers, people with dementia and their carers [44]. We would argue therefore that an early diagnosis is also to be recommended in SSA, as in HICs.

4.1. Limitations

There is a significant sex difference between non-participants and participants, with non-participants more likely to be male, reflecting potential recruitment bias.

Diagnosis of dementia within a hospital setting is challenging, particularly in those with evidence of delirium. In relation to the IDEA screen, although the study nurses were trained in its use, we did not conduct a formal inter-rater reliability in this setting to identify any potential areas of doubt in use of the tool. The dementia prevalence estimates reported in this study may be inaccurate for a number of reasons. Dementia diagnosis relied upon in-hospital assessment and collateral history which were not universally available (only 89/136 participants had an informant-rated functional assessment for example). It would have been ideal to have been able to offer follow-up at 4–6 months to determine whether or not delirium had resolved, but this was not feasible due to resource constraints and was not routine practice at the hospital. Some of the individuals with delirium may therefore have had underlying dementia which was not diagnosed. We attempted to reduce some of these limitations by having a doctor experienced in dementia diagnosis who had some specialist training conducting the assessments, but due to lack of specialist personnel, a second opinion from an expert was not available.

Furthermore, not all individuals screened for delirium underwent a detailed clinical assessment, which also may have introduced selection bias, although that both groups were demographically similar is reassuring. Those undergoing investigations and not at their bedside were not assessed and these groups may have been more likely to be unwell and at potential higher risk of delirium. Individuals were also assessed only once, meaning that individuals with fluctuating cognition may have been missed. Similarly, some cases of delirium identified in stage 2 had a normal IDEA screen score in stage 1. Delirium may therefore have developed in the interval between cognitive screening and clinical assessment.

Clinical assessment was as comprehensive as was feasible in the setting of a busy rural hospital. Documented aetiologies of delirium were likely to be those identified in routine practice, but more uncommon aetiologies may have been missed, especially since diagnosis relied upon a limited number of diagnostic tests and investigations available in this setting. Furthermore, multiple aetiologies could have contributed to the identified delirium and our attempts to classify aetiology may be simplistic. Nevertheless we felt that the completed assessments were typical of those realistically possible alongside a busy clinical workload in a general hospital in a resource poor setting and may therefore have some generalisability.

5. Conclusion

Cognitive screening of older people admitted to hospital for delirium and major cognitive impairment using the IDEA cognitive screen appears to have clinical utility in this rural Zambian setting. Sensitivity appears lower than in other validation studies, but negative predictive value was high, indicating its potential as a test to rule out delirium.

The prevalence of dementia and delirium appear high in this setting, and similar to HIC settings. Non-communicable aetiologies of delirium were most prevalent, though infectious aetiologies were still identified in a high proportion of patients. The focus of screening should be on high sensitivity tools for the early identification of those at greatest risk, and it is reassuring that few cases of delirium were missed.

Data availability statement

Study data are held at Newcastle University and may be shared upon appropriate request with the approval of the University of Zambia Biomedical Research Ethics Committee.

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The authors have no conflicts. Grace George prepared the literature review, and wrote the paper. Monty Fricker helped write the paper; Oliver Todd completed the ethics application with Dennis Makowa undertook all data collection. Chimozi Tembo contributed to the protocol. Catherine Dotchin, Richard Walker, William Gray and Stella Maria Paddick led on the study design and protocol and supervised the write up of the study. We affirm that we have listed all significant contributors as authors. This work had no specific funding.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jns.2022.120186.

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