e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(9); 581-590

Original Research Article

Clinico-Etiological Profile of the Elderly Population with Altered Mental Status (AMS) in a Teaching Hospital

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Received: 19-07-2022 / Revised: 21-08-2022 / Accepted: 06-09-2022
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Conflict of interest: Nil

Abstract

Introduction: This study is aimed at evaluating the clinico-etiological profile of AMS among elderly patients and to make recommendations regarding management based on etiologies, thereby to improve both morbidity and mortality outcome.

Methods: This retrospective observational study was conducted in a teaching cum tertiary care hospital. Two years' data (from July 2017 to June 2019) were extracted from the medical records section and 172 eligible subjects were analyzed using descriptive statistics for clinical outcomes, demographic profile, and various etiological factors.

Results: A total of 1,784 elderly inpatients (age >60 years) were screened from the records and 172 eligible elderly AMS patients were found eligible for the study. The male elderly population consisted of 110 (63.95%), and the female elderly was 62 (36.04%). The mean age of the study population was 67.82 years. The etiological factors of AMS in the study population were neurological- 47.09% (n = 81), infection- 30.23% (n = 52), metabolic/endocrine- 16.27% (n = 28), pulmonary- 2.32% (n = 4), fall- 1.74% (n = 3), toxic cause- 1.16% (n = 2), and psychiatric illness- 1.16% (n = 2). The total mortality rate was 9.30% (n = 16).

Conclusion: The main etiological factors of AMS in the elderly population were predominantly of neurological, septic, and metabolic causes. These factors were preventable and treatable by training physicians, staffs (as most of the physicians in the developing countries are not trained in managing this fragile group of population with multiple comorbidities), and by decentralizing Geriatrics healthcare setups.

Keywords: AMS (Altered Mental status), elderly, etiological profile

Introduction

The elderly population presenting with altered mental status (AMS) is very common consisting of up to 60% of inpatients [1]. The term altered mental sensorium (AMS) is a vague term which denotes varied clinical spectrum which can be simply defined as altered attention, awareness, and impaired cognition precipitated by underlying condition (s) with variable management modalities and clinical outcomes [2]. In some of the hospital settings, the elderly AMS population consist of 60% of inpatients and they need prolonged hospital stay

which not only have effects on morbidity and mortality outcome but also affects the economy of caregivers and require trained staffs too [2-4].

It's also one of the most common reasons for hospitalization, ICU admissions, and referrals to a tertiary care hospital from the peripheral hospitals/healthcare setups. The etiological factors of AMS in the elderly population are very variable and different from younger patients. As this group of patients often have multiple comorbidities with polypharmacy, it requires both time and resources to evaluate and manage them. In fact, many drugs have to be used cautiously with limitations and at the same time, they need early initiation of proper treatment for better morbidity and mortality outcome [5-8].

Hence, it is indeed challenging for the physicians to determine the etiological factors of AMS, thereby leading to difficulty in adopting early precise management plan. The current elderly populations are nearly 104 million (aged 60 years or above) in India and it's expected to grow exponentially to 173 million by 2026 as reported by United Nations Population Fund and Help Age India, 2017 [9].

It is also estimated that by 2050, India will have approximately one-fifth of its total population aged 60 years and above [10]. Not only in India, at present, is the most rapidly growing population worldwide also the elderly population [11].

In India, there's no adequate data and guidelines available to assess and manage these elderly populations who are admitted with AMS. Therefore, assessment of the etiological factors, demographic, and clinical outcomes of AMS in the elderly population is necessary.

Materials and Methods

This retrospective observational cohort study was conducted in a teaching hospital. The ethical clearance of the study was approved by the Ethical Committee of the Institute.

A total of 1,784 elderly populations above 60 years who were admitted with complaints of AMS were screened at the time of admission with the objectives to determine their clinical outcomes, demographic variables, and etiological factors.

Those elderly patients with a history of altered sensorium but recovered at the time of admission and those who had cardiac arrest within 8 h of admission were excluded from the study.

Out of 1,784 elderly patients, 172 AMS patients were found to be eligible and included in the study. Their detailed hospital records were collected as per the inclusion and exclusion criteria.

The duration of the study was from the 1st July 2017 to the 30th June, 2019. The AMS of the elderly population was assessed by Glasgow coma scale (GCS) at the time of presentation [11,12].

The diagnosis of AMS was based on GCS scale. GCS scale lesser than 15, who were aggressive in behaviour, disoriented to time; place, person, and reduced verbal response were considered as AMS in the study population [12-14].

The etiological factors of the AMS in the study population were broadly grouped into 5 (five) major categories based on the underlying causes. They were namely 1. neurologic; 2. infective; 3. metabolic; 4. pulmonary; 5. miscellaneous (toxin, psychiatrics, fall).

Statistical analysis of the collected data was done using IBM Statistics SPSS 25 version. Continuous variables were denoted in the form of mean, median (minimum–maximum) or standard deviation (SD) and number (percentage) for categorical variables. 95% confidence Interval (CI) and Odds ratio were applied to measure the strength of the association. Chi-square test or Fischer's test were used where applicable and P value less than 0.05 was considered as statically significance.

Results

In this retrospective study, a total of 172 AMS elderly patients were included after screening of 1,784 elderly inpatients hospital records. In the study population, 110 (63.95%) were male and 62 (36.04%) were female. The age of the elderly AMS in the study population ranged from 60–96 years. The average mean age was 67.82 years (67.82 Å} 7.71 SD). The average hospital stay was maximum (6.39 Å} 1.36 SD) in the elderly AMS populations of neurological cause. Elderly AMS patients caused by toxins and fall need lesser average hospital stay (4 days, 4.00 Å} 1.84 SD) [Table 1].

The level of altered sensorium was grouped according to GCS Score among the study population. The GCS score of 13 to <15 was seen in 70.34% (n = 121) elderly AMS subjects, and <3 GCS score was seen in 4% (n = 7) AMS cases. Out of these 7 AMS subjects, four cases were seen in metabolic cause, two cases in neurological, and one case in infective cause of AMS, respectively [Table 1].

Among the elderly AMS subjects, hypertension (n = 97, 56.39%) was the most commonly associated comorbidities and the second most common was diabetes mellitus (n = 47, 27.32%), which was found in 27.32% cases. Coexistence of diabetes, CVA, and HTN were the most commonly found among the cases of multiple comorbidities (n = 33, 19.18%). Only 9 (5.23%) elderly AMS were without any comorbidities among the studied population [Table 1].

The overall mortality rate was 9.30% (n = 16) in the study population. Most of the mortality (n = 7, 43.75%) was seen in AMS of neurological etiology. This includes four cases (57.14%) of CVA (3 hemorrhagic and 1 Ischemic CVA), two cases (28.57%) of meningitis, and one case (14.28%) of glioblastoma. Among the infective etiology (n = 5, 31.25%), mortality was seen in 3 cases of pneumonia (60%), one case each in urosepsis (20%), and mucormycosis (20%) of total mortality. The lowest mortality was seen in AMS of metabolic cause (n = 4, 25%). There was no mortality observed in the pulmonary and miscellaneous group [Table 1].

In our study, the most common etiological factor responsible for AMS in the elderly population was of neurological cause (47.09%, n = 81). Out of these, 70.37% was CVA (n = 57), becoming the most common cause of AMS in the study population of neurological etiology. AMS was seen more in hemorrhagic CVA (n = 32, 56.14%) than ischemic CVA (n = 25, 43.85%). The next common neurological cause of AMS was meningitis (16.04%, n = 13). Out of these, 30.76% (n = 4) patients were having tubercular meningitis. In rest of the patients (n = 9, 69.23), the definite cause of meningitis couldn't be ascertained [Table 2].

Chronic neurological disease like Parkinson's disease (n = 4) and malignancy (Glioblastoma, n = 2) comprised of 4.93% and 2.93% of AMS, respectively, in the study population.

Following neurological disorder, the second most common etiological factor of AMS in the elderly population was of Infective etiology (n = 52, 30.23%). In this group of AMS subjects with infective etiology, pneumonia (n = 21, 40.38%) predominated the etiology of AMS among the elderly population followed by urosepsis which was seen in 21.15% subjects (n = 11).

Community-acquired pneumonia was seen in 76.19% (n = 16) AMS cases. Rest 5 AMS (23.80%) patients were cases of hospital-acquired pneumonia which were referred from peripheral hospitals [Table 2].

The other etiologies of AMS of infective etiology include pulmonary TB (n = 8, 15.38%), viral hepatitis (n = 5, 9.61%), and GIT infections (n = 4, 7.69%). In GIT infections, one case of acute necrotizing

pancreatitis and three cases of acute diarrhea were seen respectively. Fungal infections (n = 2, 3.84%) consisted of a single case of both Mucormyscosis and Aspergillosis [Table 2]. AMS of metabolic etiology was seen in 16.27% (n = 28) of AMS subjects. Uremic encephalopathy topped among the metabolic etiology and was found in 39.28% (n = 11) subjects [Table 2].

The mortality rate correlated with the severity of the GCS score. The higher mortality rate was seen as GCS score lowers or tends toward more severity as described in the above table Table 3.

The overall mortality rate ranged from 6.73% to 50% in different age groups and found to be proportional to the age of the study population. Older the AMS population, higher the mortality rate. There was 50% mortality in the age group above > 90 years (n = 2).

The cause of mortality in > 90 years' age group was of infective etiology in both the cases. Least mortality was seen in 60 to 69 age groups (n = 103) in the studied AMS population (6.73%, n = 7) [Table 2].

Table 1: Demographic profile of the study population

Characteristics	Number	Percentage
Gender		
Male	110	63.95%
Female	62	36.04%
Age(yrs.)		
Mean	67.82	67.82±7.71SD
Altered Mental Status		
GCS score		
13≤15	121	70.34
9-12	33	19.18
3-8	11	6.39
3	7	4.0
Hospital Stays (Days)		
Neurological	6.39(mean)	6.39±1.36(SD)
Infection	6.37(Mean)	6.37 ±3.17(SD)
Metabolic	5.60(Mean)	5.60 ±1.98(SD)
Pulmonary	5.33(Mean)	5.33±1.41(SD)
Miscellaneous(Misc.)	4.00(Mean)	4.00±1.84(SD)
Comorbidities		
HTN	97	56.39
Diabetes	47	27.32
CKD	29	16.86
CAD	21	12.20
CLD	18	10.46
Hypothyroidism	7	4.69
Without any comorbidity	9	5.23
Mortality	16	9.30
Neurological	7	43.75
Infection	5	31.25
Metabolic	4	25

Table 2: Etiological factors of AMS in Elderly population

Etiological Factor	Number	Percentage
Neurological:	81	47.09
CVA	57	70.37
Meningitis	13	16.04
Seizure	5	6.17
Parkinson's disease	4	4.93
Malignancy	2	2.46
Infection:	52	30.23
Pneumonia	21	40.38
Urosepsis	11	21.15
Pulmonary TB	8	15.38
GIT infection	4	7.69
Fungal infection	2	3.84
Malaria	2	3.84
Viral Hepatitis	2	3.84
Metabolic:	28	16.27
Uremic Encephalopathy	11	39.28
Hepatic Encephalopathy	8	28.57
Hypoglycemia	4	14.28
Hyponatremia	3	10.71
Hypernatremia	1	3.57
Hypothyroidism	1	3.57
Pulmonary:	8	4.65
Bronchial Asthma	5	62.5
COPD	2	25
Malignancy	1	12.5
Misc.(n=7)	7	4.06
Traumatic	3	42.85
Toxic	2	28.57
Psychiatric	2	28.57

Table 3: Altered Mental Sensorium based on GCS score and Mortality association in the study group

GCS Score	Total(n)	Mortality (%)	Odd's ratio (95% CI)
13-15 (ref)	121	8 (6.61)	1
9-12	33	4 (12.12)	1.46 (0.44, 4.85)
3-8	11	2 (18.18)	2.33 (0.46, 11.88)
3	7	2 (28.57)	4.31 (0.77, 24.31)

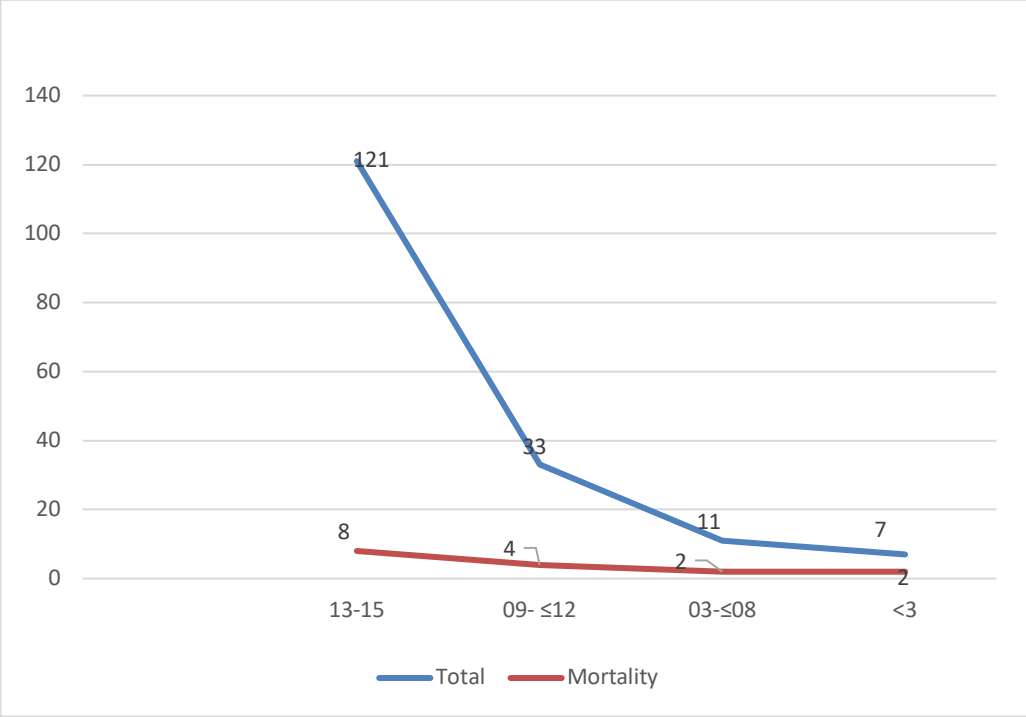

Figure 1

Table 4: Age group and Mortality association in elderly AMS population

Age group	Total (n)	Mortality (%)	Odd's ratio (95% CI)
60-69	103	7 (6.73)	1
70-79	52	5 (9.61)	1.05 (0.35, 3.2)
80-89	13	2 (15.38)	1.88 (0.38, 9.36)
>90	04	2 (50)	4.31 (0.77, 24.31)

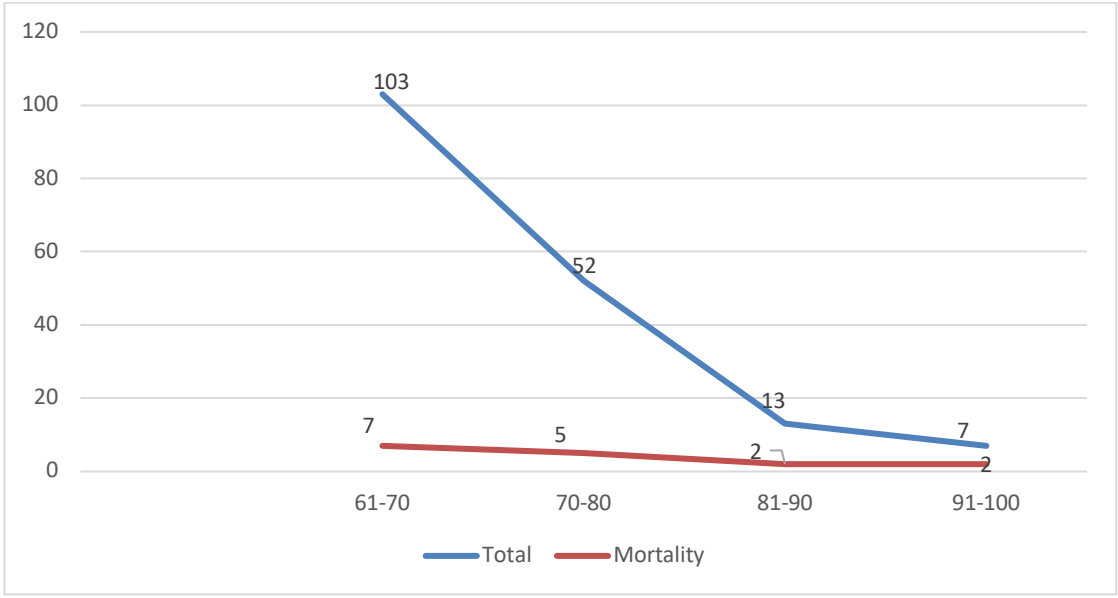

Figure 2

Discussion

This study was conducted in a multispecialty teaching hospital to assess the etiological profile of AMS in the elderly population. A total of 1,784 elderly were admitted during the study period. Out of 172 elderly AMS were found eligible and included in the study. Elderly patients who presented in ED with altered mental status require urgent attention and appropriate diagnosis for providing better management. To provide empirical treatment on these populations, determining local clinical and etiological factors play role for better clinical outcome [15-17]. This study had attempted to find the common etiologies of AMS in the elderly population and thereby initiating early treatment to reduce both morbidity and mortality.

Several worldwide studies on etiologic factors of AMS showed that elderly with AMS constitute around 4–10% of total hospital admission [18]. In Our study, elderly AMS comprised of 9.64% (n = 172) of total elderly inpatients (n = 1,784). This hospital admission rate of elderly AMS was similar to other studies done by Erkinjuntti T, *et al* [18] and Wofford J, *et al* [8]. It is found that AMS was more commonly seen in the age group of 60–70 years' age group subjects which consisted of 60% (n = 103) of total AMS cases. The gender-wise distribution of elderly AMS was almost similar in our study in comparison to the study by Xiao *et al*. and Kanich *et al*. [19] HTN (n = 97, 56.39%) was seen as the most common associated comorbidities among the AMS population followed by diabetes (n = 47, 27.32%).

In our study, the most common etiology of AMS was of neurological cause which comprised 47.09% (n = 81) of the total study population. Out of all neurological cases, CVA alone constituted 70.37% (n = 57) of all neurological causes (n = 81). Hemorrhagic CVA (n = 32, 56.14%) was more associated with AMS than ischemic CVA (n = 25, 43.85%). In a retrospective study, Kanich W, *et al* [19,20] found that neurological etiology (28%) was the most common followed by Toxic etiology (21%) whereas a study in China, by Xiao HY, *et al* [21]. showed that neurological causes (stroke, head trauma, or mass lesion) accounted for 35.0% (n = 641), and 65.0% (n = 1190) cases were of non-neurological factors. The higher percentage of CVA in our study might be due to exclusion of head trauma cases.

The top three AMS etiology in the elderly found by Xiao was cerebrovascular disease (36.2%), organ dysfunction (19.4%), and infection (10.4%) [2]. The second most common was infection induced AMS (n = 52, 32.23%) followed by metabolic etiology (n = 28, 16.27%). nfective etiology in the elderly population was lower in a study done by Xiao (9.1%), whereas a multicenter prospective study by Aslaner Ma *et al* [16]. showed 39.5% of elderly AMS were of infective etiology. In their study (Aslaner Ma *et al* [16]., among the infective etiology, pneumonia was found to be the most common cause of AMS.

In a study from north India, Rai D, *et al* [22] had found that bronchopneumonia (70%) was the most common cause of AMS among the infective etiology. In our study, community-acquired pneumonia (40.8%, n = 21) predominated among the infective etiology. The etiology AMS differs from regions to regions and population throughout the world. In Zambia and Ethiopia, the most common cause of non-traumatic AMS was infection. The cerebral malaria topped the infectious cause of AMS in those countries [19,20].

A study conducted by Tintinalli *et al*. found that around 4% of patients admitted in psychiatry ward with AMS were having infective etiology and needed to transfer back the patients to medicine ward [22]. The emergency department (ED) is a busy and hectic department; some patients with AMS might miss during evaluation in ED.

As our study found that infection induced AMS was the second most common cause, physicians may emphasize on clinical evaluation of occult septic focus in patients with AMS like osteomyelitis, Perineal abscess, Gluteal abscess, pyelonephritis, etc., as early as possible and start empirical treatment after rolling out any underlying neurological cause of AMS.

AMS of metabolic origin was seen in 16.27% (n = 28) cases in our study. Uremic Encephalopathy (39.28%, n = 11) predominated among the metabolic cases. A study conducted by Xiao HY, *et al* [21]. have found metabolic causes of AMS in elderly being 6.3% cases. Kanich W, *et al*. [19] found metabolic/endocrine causes constituted 5%, whereas a recent study by Rai D, *et al*. [22] had found metabolic causes comprised of 36% of elderly AMS.

In their study (Rai D, et al. [21], increase number of metabolic causes was contributed by increase number of dyselectrolytemia, which consisted mostly cases of hyponatremia. The mortality rate was highest in the age group >90 years (50%, n = 2) and lowest (6.73%, n = 7) in the age group between 60 and 69 yrs. age group. In relation to GCS score, mortality rate was maximum in AMS with GCS score <3 (28.57%, n = 2) and least (6.61%, n = 8) with GCS score between 13 and 15.

Xiao Hy *et al*. [21] found in their prospective cohort study that the mortality rate was higher in elderly AMS of >60 years than younger patients (10.8%). Elderly AMS is not only potentially life-threatening, so also the management of these patients as most of the time, eliciting a proper relevant history of these patients was not possible and have to rely on the attendants and caregivers [2]. In developing countries, blood laboratory and imaging reports used to get delayed because of the high number of patients, thereby compromising demand and supply ratio. Therefore, before starting early empirical therapy, physicians must emphasize on the clinical history and physical examinations before starting treatment of AMS and its underlying cause [8].

As the elderly population is growing rapidly both in developed and developing countries [10,11]. US medical schools have adopted to develop competencies in geriatrics for all medical students and also in residency training programmes. These were endorsed by the American Geriatrics Society (AGS) and American Medical Association (AMA) [23-25]. Similar programmes also could be adopted by Indian medical colleges and institutes to provide quality care to elderly AMS patients.

From the study findings, it is obvious that the etiology of AMS in the study population in this part of the world differs from others. The top three etiological factors of AMS in the elderly are treatable and preventable as well. They can be achieved by training the healthcare professionals, lifestyle modifications, antibiotic stewardship, public awareness, and decentralizing the Geriatric healthcare facilities.

Conclusion

AMS in elderly population has wide etiological factors and outcome. The outcome depends on initial diagnosis and management by trained physicians and staffs. This study reveals that the etiological factors for AMS in the elderly population in this part of the world are different from others. All of these three common etiological factors namely, neurological, infective, and metabolic causes of AMS in the elderly are preventable and treatable by adopting appropriate training policy to physicians and staffs by enhancing geriatric healthcare competences like that of USA.

At the same time, while giving early empirical therapy of AMS with infective etiology, rational use of drugs and antibiotic stewardship also to be considered. Formulation of local guideline/protocol will help physicians to

execute a timely and better management plan as these populations were mostly with multiple comorbidities.

Limitation

This is a hospital-based single centre study which may not represent the same etiology of AMS in the elderly population in other healthcare setups of the country. Therefore, further studies are needed (preferably multicentre) to determine the etiological factors and their clinical outcome of AMS in the elderly population.

Acknowledgments

We would like to thank to the ethical committee of the Institute for timely clearance and considering this study with due importance.

References

1. Horwitz RI. Clarifying confusion: The confusion assessment method. A new method for detection of delirium. Ann Intern Med 1990; 113:941-8.
2. Han JH, Wilber ST. Altered mental status in older patients in the emergency department, Clin Geriatr Med 2013;29:101-36.
3. American College of Emergency Physicians. Clinical policy for the initial approach to patients presenting with altered mental status. Ann Emerg Med 1999; 33:251-80.
4. Buist M, Bernard S, Nguyen TV, Moore G, Anderson J. Association between clinically abnormal observations and subsequent in hospital mortality: A prospective study. Resuscitation 2004; 62:137-41.
5. Kekec Z, Senol V, Koc F, Seydaoglu G. Analysis of altered mental status in Turkey. Int J Neurosci 2008; 118:609-17.
6. Sanello A, Gausche-Hill M, Mulkerin W, Sporer KA, Brown JF, Koenig KL, *et al*. Altered mental status: Current evidence-based recommendations for prehospital care. West J Emerg Med 2018; 19:527-41.
7. Douglas VC, Josephson SA. Altered mental status. Continuum (Minneap Minn) AAN 2011; 17:967-83.
8. Wofford J, Loehr L, Schwartz E. Acute cognitive impairment in elderly ED patients: Etiologies and outcomes. Am J Emerg Med 1996; 14:649-53.
9. HelpAge India, Senior Citizens Guide, 2017. Available from: www.helpageindia.org.
10. G. Giridhar, K.S. James, The Ageing Scenario: Population aging in the world, 2012-2050: India Ageing Report. UNFPA (United Nations Population Fund, 2017;3-4.
11. Khow KSF, Visvanathan R. Falls in the aging population. Clin Geriatr Med 2017; 33:357-68.
12. Wilber ST, Ondrejka JE. Altered mental status and delirium. Emerg Med Clin North Am 2016; 34:649-65.
13. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013.
14. Zadravecz FJ, Tien L, Robertson-Dick BJ, Yuen TC, Twu NM, Churpek MM, *et al*. Comparison of mental status scales for predicting mortality on the general wards. J Hosp Med 2015; 10:658-63.
15. Martel ML, Klein LR, Lichtenheld AJ, Kerandi AM, Driver BE, Cole JB. Etiologies of altered mental status in patients with presumed ethanol intoxication. Am J Emerg Med 2018; 36:1057-9.
16. Aslaner MA, Boz M, Çelik A, Ahmedali A, Eroğlu S, Metin Aksu N, *et al*. Etiologies and delirium rates of elderly ED patients with acutely altered mental status: A multicenter prospective study. Am J Emerg Med 2017; 35:71-6.
17. Odiari EA, Sekhon N, Han JY, David EH. Stabilizing and managing patients with altered mental status and delirium. Emerg Med Clin North Am 2015; 33:753-64.

18. Erkinjuntti T, Wikström J, Palo J, Autio L. Dementia among medical inpatients: Evaluation of 2000 consecutive admissions. Arch Intern Med 1986; 146:1923-6.
19. Kanich W, Brady WJ, Huff JS, Perron AD, Holstege C, Lindbeck G, *et al*. Altered mental status: Evaluation and etiology in the ED. Am J Emerg Med 2002;20:613-7.
20. Melka A, Tekie-Haimanot R, Assefa M. Aetiology and outcome of non-traumatic altered states of consciousness in North Western Ethiopia. E Afr Med J 1997; 74:49-53.
21. Xiao H-Y, Wang Y-X, Xu T-D, Zhu H-D, Guo S-B, Wang Z, *et al*. Evaluation and treatment of altered mental status patients in the emergency department: Life in the fast lane. World J Emerg Med 2012; 3:270-7.
22. Rai D, Garg RK, Malhotra HS, Verma R, Jain A, Tiwari SC, *et al*. Acute confusional state/delirium: An etiological and prognostic evaluation. Ann Indian Acad Neurol 25 2014; 17:30-4.
23. Tintinalli J, Peacock F, Wright M. Emergency medical evaluation of psychiatric patients. Ann Emerg Med 1994; 23:859-62.
24. Leipzig RM, Granville L, Simpson D, Anderson MB, Sauvigné K, Soriano RP. Keeping granny safe on July 1: A consensus on minimum geriatrics competencies for graduating medical students. Acad Med 2009; 84:604-10.
25. Accreditation Council for Graduate Medical Education. ACGME program requirements for graduate medical education in family medicine. Available from: http://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/120family_medicine_2017-07-01.pdf?ver=2017-06-30-083354-350. Updated 2017. [Last accessed on 2018 Feb 01].