Delirium in elderly inpatients admitted to clinical wards
Prevalence and investigation of clinical conditions in a Brazilian sample

Fernando de Bortoli Pereira1, Marcos Antonio Lopes1

ABSTRACT. In Brazil there is scarce data about the occurrence of delirium among hospitalized elderly patients. Objective: This study aimed to evaluate the prevalence of delirium among elderly patients hospitalized in clinical wards. Methods: This cross-sectional study examined a sample of elderly inpatients admitted to three clinical wards of a general hospital between July 2011 and May 2012. The presence of delirium was detected by applying the Confusion Assessment Method (CAM). Dementia diagnosis was conducted in two steps: screening and diagnosis (Cambridge Examination, CAMDEX, was applied during hospitalization at a second timepoint). Other medical diagnoses and medications in use were extracted from medical records. Results: A sample of 173 elderly inpatients was examined; mean age 71.2 years (SD: 7.8; 60-92 years); 64.2% male. Thirty-one patients were diagnosed with delirium; prevalence of 17.9% (95% CI: 12.2-23.6). Delirium was directly associated with Urinary Tract Infection, Renal Failure and Dementia (p<0.05). Conclusion: The principal findings of this study were a high prevalence of delirium and the identification of associated factors, helping to guide preventive approaches and clinical management for at-risk patients in a Brazilian sample.

Key words: delirium, aged, hospitalization, consultation, epidemiology.

According to a well-established definition, delirium is a neurobehavioral syndrome caused by the acute and transient impairment of brain activity. The clinical context usually

This study was conducted at Internal Medicine Department Federal University of Santa Catarina, Florianópolis, SC, Brazil.

1Health Science Center, Internal Medicine Department, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

Marcos Antonio Lopes. Departamento de Clínica Médica – Hospital Universitário Universidade Federal de Santa Catarina – Rua Maria Flora Paussewang, Campus Universitário – 88040-970 Florianópolis SC – Brazil. E-mail: lopes.marcos.ant@gmail.com

Disclosure: The authors report no conflicts of interest.

Received March 05, 2018. Accepted in final form March 20, 2018.
involves a vulnerable patient, susceptible to predisposing factors, such as clinical illness, cognitive and sensory deficits, with precipitating factors occurring during the period of hospitalization. It is highly prevalent in clinical wards, being considered the most common complication of hospital admission in elderly people. Although this medical emergency is cited as one of the oldest diseases described in medicine, its pathophysiological mechanisms are not well defined.

Studies estimate failure to recognize delirium by physicians in up to 70% of cases, a cause of concern since failure to detect the disease in clinical emergencies is associated with a 7-fold increase in mortality. This disease is directly associated with a worse prognosis, being related, among other factors, to a 2-fold increase in mortality, an average of eight additional days of hospital stay, worsening of physical and cognitive recovery after 1 year of hospitalization and longer institutionalization time after discharge. A systematic review analyzing the occurrence of delirium and its consequences in hospitalized patients evaluated 42 studies and found rates ranging from 11% to 42%. Regarding Brazilian data, an article analyzing the prevalence and incidence of delirium among elderly hospitalized with hip fractures revealed rates of 16.5% and 12.6%, respectively.

Although widely explored in international studies, there is little knowledge about the occurrence of delirium among hospitalized patients in Brazil, especially among elderly patients, the population most affected by this clinical condition. The importance of the present article, therefore, lies in filling this gap in the national literature, focusing on a condition of extreme relevance in the clinical context of general hospitals in Brazil. The objectives of this article were to evaluate the prevalence of delirium among elderly patients hospitalized in the clinical wards of the University Hospital of the Federal University of Santa Catarina (HU-UFSC) and its distribution in relation to sociodemographic characteristics, clinical conditions and medications.

METHODS

Study design and sample

This cross-sectional study was conducted at the HU-UFSC in Florianópolis (approximately 400,000 population, of which 10.8% were aged 60 years and older, according to the 2010 census). In the study period, 55% of the 77 clinical ward beds at the HU-UFSC were occupied by elderly people. All elderly patients (60 years of age or older) admitted to the Medical Clinic Units of the HU-UFSC between July 2011 and May 2012 for a hospital stay of up to 30 days were included in the sample. The macro-region of Florianópolis had five general hospitals. The principal causes of admission of elderly people to general hospitals in this region were related to cardio-circulatory (30.1%), oncologic (16.9%), respiratory (14.1%), and digestive (10.0%) diseases.

Instruments

The Confusion Assessment Method (CAM) instrument was used for detecting delirium. The CAM is an instrument created for the diagnostic evaluation of delirium, with sensitivity of 94.1%, specificity of 96.3% and inter-rater reliability of 0.70. The diagnosis of delirium requires the presence of items 1 and 2 of the CAM (acute onset and attention disorder) and/or items 3 and 4 (disorganized thinking and altered level of consciousness). This instrument is associated with satisfactory validity and reliability, and is greater when involving multiple clinical observations.

A questionnaire collecting socioeconomic and medical data was applied to the informant/relative, obtaining data regarding age, sex, marital status, education, cognitive and affective symptoms, as well as the patient’s medical history. The medical diagnoses and medications in use by patients during the hospital stay were extracted from medical records.

An investigation for the diagnosis of dementia was also performed, in two steps: screening and diagnosis. In the screening phase, the Mini-Mental State Examination (MMSE) and the Bayer-Activities of Daily Living scale (B-ADL) for the six months prior period were used. Similarly to a study that investigated dementia in patients with delirium using a scale for informants, the present study applied the B-ADL scale to the informant/relative to screen dementia. The B-ADL scale has been previously tested for differentiating between mild-to-moderate dementia and normal aging, with sensitivity and specificity of 87.9% and 96.6%, respectively. At a second timepoint during hospitalization, in the diagnostic phase, the Cambridge Examination (CAMDEX) was partially applied to the positively screened cases and informant/relative. Subsequently, a clinical discussion with a geriatric psychiatrist was conducted and the diagnosis established based on the criteria established by the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV). The findings of the dementia investigation have been published elsewhere.

Statistical analysis

The data were analyzed using SPSS version 18.0 for Windows. Proportions, means and standard deviations (SD) were calculated. Bivariate analysis was used to

Pereira and Lopes Delirium in elderly inpatients 153
compare the frequency of controls and cases of delirium (dependent variable) in relation to several independent variables (sociodemographic factors, clinical conditions and use of medications), employing the Chi-square test. Odds Ratios (OR) and a 95% Confidence Interval (95% CI) were calculated; a P-value <0.05 was considered statistically significant. The multivariate analysis, employing the logistic regression method, was conducted to examine the interference of the independent variables in the association with the dependent variable.

Ethics statement
The project was approved by the local research ethics committee (CEPSH-UFSC). All participants (elderly or relatives) were required to sign a consent form.

RESULTS
During the study period, 296 elderly persons were admitted, of which 123 (41.5%) were subject to attrition, leading to a final sample of 173 subjects. The principal reasons for attrition included medical discharge before the interview (64.6%), death (16.1%), long hospital stay (7.6%) and voluntary drop-out from the study by relatives (7.4%). The sample comprised predominantly subjects who were male (64.2%), had a low level of education (≤4 years, 73.5%) and were married (60.1%); with a mean age of 71.2 years (SD: 7.8; 60-92 years) (Table 1). A total of 31 patients (17.9%; 95% CI: 12.2-23.6) were diagnosed with delirium. The association of delirium with sociodemographic factors, several clinical conditions and use of medications was determined. The bivariate analysis revealed no association with the sociodemographic variables. Regarding clinical variables, presence of delirium was directly associated with urinary tract infection (UTI), renal failure, cardiac failure and dementia. With respect to medications, use of morphine was directly associated with presence of delirium (Table 2). Age, gender, education, marital status, chronic obstructive pulmonary disease, pne-

| Table 1. Sociodemographic distribution of sample. |
|-----------------------------------------------|
| N  |  |
|---|---|
| Age (range) | N | % |
| 60-69 | 81 | 46.8 |
| 70-79 | 61 | 35.3 |
| ≥80 | 31 | 17.9 |
| Gender | | |
| Male | 111 | 64.2 |
| Female | 62 | 35.8 |
| Education (years) | N | % |
| 0 (illiterate) | 24 | 14.1 |
| 1-4 | 101 | 59.4 |
| 5-8 | 24 | 14.1 |
| ≥9 | 21 | 12.4 |
| Marital status | N | % |
| Single | 7 | 4.0 |
| Married | 104 | 60.1 |
| Divorced | 11 | 6.4 |
| Widower/widow | 51 | 29.5 |
| Day of evaluation mean (SD; minimum-maximum) | 8.7 (5.9; 1–28) |

| Table 2. Comparison of participants with and without delirium for sociodemographic variables, clinical conditions and medications. |
|-----------------------------------------------|
| Without delirium | With delirium | p** | OR | 95%CI |
|---|---|---|---|---|
| Age (range) | | | | |
| 60-69 | 70 | 86.4 | 11 | 13.6 | 0.162 |
| 70-79 | 50 | 82 | 11 | 18 | |
| ≥80 | 22 | 71 | 9 | 29 | |
| UTI* | | | | |
| No | 130 | 85 | 23 | 15 | 0.018 | 3.29 | 1.17-9.25 |
| Yes | 12 | 63.2 | 7 | 36.8 | |
| Renal failure | | | | |
| No | 129 | 86 | 21 | 14 | 0.002 | 4.25 | 1.61-11.18 |
| Yes | 13 | 59.1 | 9 | 40.9 | |
| Cardiac failure | | | | |
| No | 135 | 84.4 | 25 | 15.6 | 0.022 | 3.85 | 1.13-13.12 |
| Yes | 7 | 58.3 | 5 | 41.7 | |
| Dementia | | | | |
| No | 97 | 91.5 | 9 | 8.5 | <0.001 | 6.46 | 2.21-18.89 |
| Yes | 15 | 62.5 | 9 | 37.5 | |
| Morphine | | | | |
| No | 137 | 84 | 26 | 16 | 0.006 | 5.26 | 1.42-19.50 |
| Yes | 5 | 50 | 5 | 50 | |

*UTI: urinary tract infection; **Chi-square test.
Delirium in elderly inpatients

Quality of the hospital service, lending greater statistical importance to this data.

The association of delirium with certain clinical conditions also corroborated previous studies which observed a strong association with dementia and identified infectious conditions and metabolic disorder among the main causes of delirium in elderly inpatients. Between 25% and 75% of patients with delirium have dementia, and the presence of dementia increases the risk of developing delirium by five. A study evaluating the clinical profile of elderly inpatients admitted with UTI found that delirium was the most common clinical manifestation, occurring in 56.3% of these patients.

In relation to the present findings involving morphine on the bivariate analysis, it is important to note that, among the precipitating factors of delirium, medications are implicated in up to 40% of cases and represent an isolated factor in 12%-39%. Moreover, the incidence of delirium increases in direct proportion to the number of medications used. The medications most commonly associated with delirium are psychoactive medications (such as benzodiazepines), analgesics (such as morphine) and drugs with an anticholinergic effect.

The main limitations of the present study were the attrition rate (41.5% of initial sample) and the small sample size, which may have led to inaccuracy in the findings (e.g. wide confidence interval on bivariate and multivariate analyses). In addition, although a globally accepted and recognized scale was used for the identification of delirium, another limitation was the non-inclusion of a medical evaluation to confirm the diagnosis of delirium.

In conclusion, the findings of this study have significant implications for clinical practice in identifying the principal factors associated with delirium among hospitalized elderly in a Brazilian sample. The major contribution of this study is to provide useful information to help guide a preventive approach and clinical management for at-risk patients, allowing a reduction in delirium incidence, rapid identification and improvement in prognosis.

Author contributions. All authors have contributed to the work and approved the manuscript.

Acknowledgements: The study was supported by the FAPESC, grant no. 2451/2011-1.
REFERENCES

1. Inouye SK, Charpentier PA. Precipitating risk factors for delirium in hospitalised elderly persons: predictive model and inter-relationship with baseline vulnerability. JAMA 1996;275:852-7.

2. Inouye SK, Schlesinger MJ, Lydon TJ. Delirium: a symptom of how hospital care is failing older persons and a window to improve quality of hospital care. Am J Med 1999;106:555-73.

3. Levkoff SE, Evans DA, Liptzin B, Cleary PD, Lipsitz LA, Wettle TT, et al. Delirium: the occurrence and persistence of symptoms among elderly hospitalized patients. Arch Intern Med.1992;152:334-40.

4. O’Keefe ST, Lavan JN. Clinical significance of delirium subtypes in older people. Age Ageing 1999;28:115-9.

5. McCusker J, Cole M, Dendukuri N, Han L, Bedzile E. The course of delirium in older medical inpatients: a prospective study. J Gen Intern Med 2003;18:696-704.

6. Siddiqi N, House AO, Holmes JD. Occurrence and outcome of delirium in medical inpatients: a systematic literature review. Age Ageing 2006;35:350-64.

7. Furlaneto ME, Garcez-Leme LE. Delirium in elderly individuals with hip fracture: causes, incidence, prevalence, and risk factors. Clinics 2006;61(1):35-40.

8. Furlaneto ME, Garcez-Leme LE. Delirium in elderly individuals with hip fracture: a new method for detection of delirium. J Am Geriatr Soc 2005;54:1245-50.

9. Bucht G, Gustafson Y, Sandberg O. Epidemiology of delirium. Dement Geriatr Cogn Disord 1999;10:315-8.

10. Elie LM, Cole MG, Primeau FJ, Bellavance F. Delirium in elderly hospitalized patients. J Gen Intern Med 2003;18:696-704.

11. Folbri RM, Moreira MA, Garrido R, Almeida OP. Validity and reliability of the Bayer Activities of Daily Living Scale (B-ADL) in the differentiation between mild to moderate dementia and normal aging. Rev Bras Psiquiatr. 2007;29(4):350-3.

12. Roth M, Tyrer P, Mountjoy CG, Huppert FA, Hendrie H, Verma S, Goodard R. CAMDEX. A standardized instrument for the diagnosis of mental disorders in the elderly with special reference to the early detection of dementia. Br J Psychiatry 1986;149:698-709.

13. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. Washington, DC: American Psychiatric Association, 1994.

14. Mapi Research Institute. Cultural Adaptation of the Bayer Activities of Daily Living Scale (B-ADL) into Brazilian Portuguese. Rev Bras Psiquiatr. 2007;29(4):350-3.

15. Roth M, Tyrer P, Mountjoy CG, Huppert FA, Hendrie H, Verma S, Goodard R. CAMDEX. A standardized instrument for the diagnosis of mental disorders in the elderly with special reference to the early detection of dementia. Br J Psychiatry 1986;149:698-709.

16. Inouye SK. Delirium in older persons. N Engl J Med 2006;354(11):1157-65.

17. Dallacorte RR, Schneider RH, Benjamin WW. Urinary tract infections profile of the hospitalized elderly in Geriatric Ward. Scientia Med 2007;4:197-204.

18. Aalagiriswan K, Wiens CA. An approach to drug induced delirium in the elderly. Postgrad Med J 2004;80:388-93.

19. Inouye SK, Bogardus ST Jr, Charpentier PA, Leo-Summers L, Acampora D, Holford TR, Cooney LM Jr. A multi-component intervention to prevent delirium in hospitalized older patients. N Engl J Med 1999;340:669-720.