

Preoperative delirium in patients with fragility fractures: Preliminary results of the detect (delirium in elderly patients admitted to trauma) study protocol

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Abstract

Objectives: Creation of a common background that may allow different health care professionals to effectively share clinical information and, at the same time, measuring the relevance of delirium in daily practice.

Methods: We proposed a perspective observational study, with the involvement of all the professionals participating to the process of care, i.e. physicians, nurses, and physiotherapists. Patients were evaluated on admission and at 24 and 48 hours with the Confusion Assessment Method (CAM) and the 4AT for detection of Delirium. Risk factors, predisposing conditions, functional status, and cognitive function are also taken into account, in this paper we report the incidence and factors related to preoperative delirium in trauma elderly patients admitted to our department.

Results: 115 out of 478 patients developed an acute episode of confusion before surgery (24,1%), 70 within the first 24 hours after hospital admission. Hyperkinetic delirium was more frequent; however, the diagnosis of hypokinetic form may be underestimated. Age, cognitive and functional impairment, sensory deficits are related to development of preoperative delirium.

Implications: Occurrence of delirium during hospitalization is a frequent complication and can be considered an adverse health care sequel. Furthermore, it is associated to negative outcomes on mortality, morbidity, functional level and cognitive performance, longer hospital stays and increased risk for institutionalization. Health care costs are also increased for those patients that develop delirium in several hospital settings. A prompt and accurate diagnosis with the introduction of all those preventive and non-pharmacological measures may reduce the incidence, severity and/or duration of delirium and improve patient's functional recovery.

Introduction

The aging of population as well as the increased life expectancy make progressively urgent demands about the adequacy of the level of care provided in a hospital environment to ensure clinical pathways tailored on the needs of each individual patient. On the other hand, the gradual evolution of Health-care systems to care for the acute, with increasing levels of specialization often technologically driven, cannot and must not neglect these aspects of personalization of care protecting the elderly "frail" patient, because of its intrinsic characteristics [1]. In such a context, evaluation of frailty undertakes not only the meaning of prevention and promotion of quality of life, but it takes in account important issues for patient's safety and the economic weight it entails. Delirium (acute confusion state) is a complex syndrome which frequently occurs in the elderly hospitalized population [2]. Development of Delirium is associated with negative outcomes such as a longer hospital stay, a higher rate of complications, cognitive and functional decline, loss of independence, institutionalization, and, ultimately, death [3]. For skilled healthcare professionals, it represents a challenging condition because a prompt and accurate diagnosis with the introduction of all those preventive and non-pharmacological measures may reduce the incidence, severity and/or duration of Delirium and improve functional recovery [4].

One of the crucial points in addressing delirium's detection and assessment during hospitalization is that the clinical team must be trained for this purpose and all team's members must act and interact uniformly by effectively working in a multidisciplinary fashion to achieve collaboration within and between disciplines [5]. Since September 2011, at the Trauma and Orthopedics Centre of the Azienda Ospedaliero-Universitaria Careggi in Florence, a multidisciplinary division for a care pathway based on comprehensive preoperative assessment, including a detailed medical history and a careful physical examination with the identification and stabilization of concomitant clinical problems, as well as a functional, nutritional, and cognitive status evaluation, and postsurgical management was created. Different specialist figures, i.e. geriatricians, internal medicine physician, cardiologist's nurses and physiotherapists concur at the clinical activity in order to reduce the time to theatre, postsurgical complications and hospital length of stay.

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Key words: delirium management, delirium prevention, education, frail elderly, patient's safety

Received: June 08, 2018; **Accepted:** June 20, 2018; **Published:** June 25, 2018

Integration of medical information and interaction with the orthopedic surgeon and the anesthesiologists are required in order to create a safer environment for each patient. Therefore, it is important to develop a teamwork approach in regard to Delirium, creating competence able to jointly produce knowledge rather than reproduce information. Nurses are key figures in management of delirium, in the phases of prevention/treatment related to non-pharmacological treatment. In this paper we report preliminary results. "The DETeCt Study - Delirium in Elderly patients" (ClinicalTrials.gov identifier: NCT02086981).

Design and methods

A prospective observational study has been designed. All consecutive patients aging >65 years without distinction of gender, admitted in the traumatology ward of the Department of Orthopedics and Traumatology of Careggi Hospital in Florence, were considered eligible. Exclusion criteria are: the impossibility to give an informed consent or refusal to participate to the study. Main objectives were to determine preoperative incidence and prevalence of Delirium and its association with risk factors and their prognostic value. On admission demographic characteristics (age, sex, family composition and presence of a care-giver) were collected. Cognitive status is assessed through the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) compiled by a care-giver, while functional independence with the Katz Index of Independence in Activities of Daily Living (ADL) and the Lawton Instrumental Activities of Daily Living (IADL) Scale [6-9]. Mobility is evaluated with the Modified Barthel Index for the walking domain. The presence of common chronic disease conditions, including coronary artery disease, congestive heart failure, atrial fibrillation, hypertension, diabetes mellitus and respiratory failure is collected [10]. Number of medications and modifiable and non-modifiable risk factors for delirium are recorded [11]. On hospital admission and every 24 hours for the next two days or in case of a variation of the clinical condition, patients are administered by trained personnel the Confusion Assessment Method (CAM) and the 4 AT Scale for the identification of Delirium [12,13]. Medical data also include ASA score for surgical risk, the type of fracture, time to surgery as well as peri and post-operative complications, including pressure ulcer rate and nosocomial infection, use of blood transfusions and hospital length of stay [14]. Discharge destination was also reported. The study protocol has been approved by the local ethics committee and informed consent was obtained by each patient enrolled.

Statistical analysis

Values for continuous variables were reported as the mean and standard deviation (SD). Categorical variables were compared using the χ^2 test or the Fisher exact test (two-tailed). Continuous variables were compared between the groups using the Student *t* test (two-tailed). The relation between continuous variables was examined using Pearson's linear method. Statistical analysis was performed using SPSS 18.0 (Chicago, IL, USA) statistical software. A probability value of < 0.05 was statistically significant.

Results

Between April 31st and July 31st, 2014 553 patients were admitted to the Department of Orthopedics and Traumatology of Careggi Hospital in Florence: According to inclusion criteria reported in method section 478 were enrolled in the study. Female gender was significantly more represented (346 vs 142). One third of patients were aged > 85 years (Table 1). 115 patients developed an acute episode of confusion before surgery (24,1%), 70 within the first 24 hours after hospital admission.

Hyperkinetic delirium was more frequent; however, the diagnosis of hypokinetic form may be underestimated (Table 2).

Development of delirium was significantly more frequent in patients with hip fracture (66.1%) in comparison to other sites of fracture (Tables 3 and 4). Incidence of delirium increased with the age, being less than 1 % in patients < 70 years and more than 30 % in those aged > 85 years ($p < 0.0001$). Cognitive and functional impairment, previous falls and multiple pharmacotherapy were significantly more frequent in patients with delirium (Table 5). The relation with modifiable risk factors and development of delirium is reported in Table 6. Hearing loss and impaired vision were significantly related to the occurrence of delirium. An history of dementia, previous episodes of delirium, gait disturbances, an history of falls and finally Parkinson disease were also related with preoperative delirium.

Table 1. Age distribution of enrolled patients

Mean age	81.4±8.4 years	
Age classes (years)	N	%
65-69	53	11.1
70-74	58	12.1
75-79	81	16.9
80-84	88	18.4
85-89	116	24.3
>=90	82	17.2

Table 2. Incidence and clinical characteristics of preoperative delirium

Delirium	Total
	115 (24.1)
<i>Hiperkintec (%)</i>	70 (60.9)
<i>Mixed (%)</i>	30 (26.1)
<i>Hypokinetic (%)</i>	15 (13.0)

Table 3. Site of fracture

	N	%
Upper limb	83	17.4
Lower limb	47	9.8
Column	19	4.0
Hip fracture	275	57.5
Pelvis	12	2.5
Head trauma	19	4.0
Other	23	4.8
Total+	478	100.0

Table 4. Relation between incidence of delirium and site of fracture

	Upper limb	Lower limb	Column	Hip fracture	Pelvis	Head trauma	Other	Total
No (%)	67 (18.5)	38(10.5)	17 (4.7)	199 (54.8)	7 (1.9)	15 (4.1)	20 (5.5)	363
Yes (%)	16 (13,9)	9(7.8)	2 (1.7)	76 (66.1)	5 (4.3)	4 (3.5)	3 (2.6)	115
Total	83	47	19	275	12	19	23	478

Table 5. Relation between preoperative delirium and mobility, history of falls, ADL and IADL and respectively number of drugs

	Delirium no	Delirium yes	p
Functional capacity (Barthel >=2)	70/293 (19.3)	60/55 (52.2)	.000
History of falls >=2	20/343 (5.5)	20/95 (17.4)	.000
ADL (<=3)	54/309 (14.9)	69/46 (60.0)	.000
IADL (<=4)	109/254 (30.0)	80/35 (69.6)	.001
Number of drugs (>=3)	158/205 (43.5)	68/47 (59.1)	.003

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Table 6. Relation between preoperative delirium and modifiable factors

Modifiable		Delirium no	Delirium yes	P
Sensorial impairment	Hearing loss	94/269 (25.9)	66/49 (57.4)	0
	Visual impairment	61/302 (16.8)	41/74 (35.7)	0
	Malnutrition	48/315 (13.2)	31/84 (24.0)	0.001
Not modifiable		Delirium no	Delirium yes	P
Dementia		23/340 (6.3)	48/67 (41.7)	0.001
History of	Delirium	6/357 (1.7)	19/96 (16.5)	0
	Falls	55/308 (15.2)	34/81 (29.6)	0.001
	Gait abnormalities	57/306 (15.7)	37/78 (32.2)	0
Comorbidity	Parkinson disease	4/359 (1.1)	6/109 (5.2)	0.007

Discussion

Occurrence of delirium during hospitalization leads to both poor clinical and functional outcomes and frequent adverse events. There is also growing evidence that health care costs are increased for those patients that develop delirium in several hospital settings. In a prospective cohort study in 275 consecutive mechanically ventilated patients was found a 39% increase of intensive care unit costs (95 confidence interval, (CI) 12-72%) and 31% greater hospital costs (95% CI, 1-70%) if compared to a non-delirious control group, after adjusting for confounding variables including age, co-morbidities and severity of illness, degree of organ dysfunction, nosocomial infection, and hospital mortality [15]. A 1-year health care costs observation associated with delirium in an elderly population showed that total costs per day survived were more than 2.5 times higher for patients with delirium than for patients without delirium [16]. The overall financial impact of delirium on the health care system ranged from \$38 to \$152 billion annually. It is therefore evident that the economic burden of delirium is substantial, and it is a serious condition with long-term clinical and economic implications. In elderly patient's candidate for surgery a substantial number of patients develops delirium before surgery and this may lead to surgery delay and higher post-operative complication rate. Preliminary data from our survey suggest that one fourth of patients aged > 645 years develop delirium before surgery, most within 24 years from admission. Although not modifiable factors (age, comorbidities, functional impairment) are significantly related to the development of preoperative delirium, however it must be stressed that impaired vision and hearing are also significantly related to behavioral abnormalities. Help to these patients by careful nursing may prevent the occurrence of delirium. These data support the results from Inouye, *et al* [12]. Finally, as indicated by the Institute of Medicine, drawing upon data gathered directly from the patient's care environment has enormous potential for accelerating the rate at which useful knowledge is produced, including information about quality of care, efficiency, safety, and cost-effectiveness [17]. Patient's outcome can be improved by putting into practice preventive strategies and particularly multicomponent approaches and optimization of risk

factors lead to reduced incidence. Appropriate treatment of delirium requires thorough investigation, management of the underlying illness, avoidance of complications and simplification of the care environment.

Declarations

ClinicalTrials.gov identifier: NCT02086981. "The DETECT Study - Delirium in Elderly patients Admitted to Trauma" - <http://clinicaltrials.gov/ct2/show/NCT02086981>

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