

Age- and gender-related peculiarities of patients with delirium in the cardiac intensive care unit

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Abstract

Background: The overall evidence base regarding delirium has been growing steadily over the past few decades. There has been considerable analysis of delirium concerning, for example, mechanically ventilated patients, patients in the general intensive care unit (ICU) setting, and patients with exclusively postoperative delirium. Nevertheless, there are few studies regarding delirium in a cardiovascular ICU (ICCU) setting and especially scarce literature about the particular features of delirium relating to patient age and gender.

Aim: We aimed to determine particular features of delirium not induced by alcohol or other psychoactive substances, relating to patient age and gender in an ICCU setting.

Methods: An observational cross-sectional study was conducted to evaluate patients with delirium in a Lithuanian ICCU. From a sample of 19,007 ICCU admissions, 337 (1.8%) had documented delirium diagnosed through liaison and consultation with a psychiatrist and were included in the final analysis. The obtained data was then evaluated and analysed according to patients' gender and four categorised age groups: < 65 years, 65–74 years, 75–84 years, and ≥ 85 years.

Results: Female patients who experienced delirium demonstrated a higher prevalence of hypertension, hyponatraemia, heart failure, cardiac rhythm and conduction disorders, myocardial infarction (MI), and dementia. The men, who were on average seven years younger than the women, significantly more often had hypokalaemia, double- or triple-vessel coronary artery disease, and sepsis. Furthermore, MI, ST-segment elevated MI, and Killip class 4 were most frequent amongst patients less than 65 years of age. Moreover, the youngest patient group demonstrated the highest mortality.

Conclusions: Our investigation presented a number of associated peculiarities related to gender and age. It was shown that delirium is a severe complication that more often affects men amongst patients < 65 years old and more frequently affects women in the age group of ≥ 85 years. Male patients < 65 years old, who develop delirium should be treated with more caution because they tend to have more serious forms of disorder and a poorer prognosis.

Key words: delirium, cardiovascular intensive care unit (ICCU), cardiac care, gender, age

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INTRODUCTION

Delirium is an aetiologically nonspecific syndrome characterised by disturbances in cognition, attention, and awareness, which can develop over a short period of time [1, 2]. It ought to be acknowledged that delirium is quite often incorrectly thought to be of little consequence [3], even though it is proven to be an independent predictor of prolonged length of stay, reintubation, and higher rates of morbidity and mor-

tality [4–9]. While delirium may occur at any age, it is most common after the age of 65 years [10]; consequently, there is little research concerning younger patients. Generally, delirium is a common condition that develops in up to 80% of mechanically ventilated patients in the intensive care unit (ICU) [5, 8, 11, 12]. However, delirium is very frequently underdiagnosed [4, 12]. This delirium “epidemic” in an ICU setting is rather well described and the main objective of in-

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investigation has recently focussed on researching and approving targeted intervention strategies designed to alleviate or prevent delirium itself or the conditions associated with this disease process [5, 8, 13]. Although there is considerable analysis of, for example, postoperative delirium highlighting the growing burden of this condition in cardiovascular intensive care units (ICCU) [14–16], there is little literature about the particular features of delirium relating to patient gender and specific age-groups. In this study, we aimed to evaluate whether there are gender- or age-related differences and similarities in patients with delirium, who were admitted to the ICCU, and determine how this finding could be implemented into clinical practice.

METHODS

Study population

The retrospective analysis incorporated all patients who had developed delirium (ICD-10, F05 — delirium, not induced by alcohol or other psychoactive substances) in the ICCU of Vilnius University Hospital Santariskiu Clinics, Lithuania, from 1st January 2011 to 31st December 2015. The facilities, capacity, and catchment area for admission to the hospital were equal for men and women. All the patients had been evaluated and diagnosed through liaison and consultation with a psychiatrist according to ICD-10 [1] guidelines and were included in the local electronic patient card database. From a sample of 19,007 ICCU admissions, 337 (1.8%) had documented delirium and were included in the final analysis. The underlying causes of hospitalisation for those who developed delirium was: myocardial infarction (MI) (121, 59.6% of cases); atrial fibrillation and flutter (148, 7.4% of cases); complete atrioventricular block (144.2, 6.5% of cases); angina pectoris (120, 6.2% of cases); pulmonary embolism (126, 5.9% of cases); heart failure (3.3% of cases); sick sinus syndrome (149.5, 1.8% of cases); and other causes (9.3%).

Study design

This research was carried out as a part of the “Delirium Peculiarities in an ICCU Setting” project. All data were processed anonymously. An observational cross-sectional study was conducted to evaluate patients with delirium in the ICCU. Given the design of the observational study, the need for patient consent was waived. Data on patient demographics, comorbidities, blood test results, percutaneous coronary intervention findings, and admission and discharge diagnoses were retrospectively compiled from the electronic patient card local database. The records of each patient were analysed separately, and the collected information was then evaluated considering patients’ gender and age. Patient age ranged from 21 to 93 years, and they were categorised into the following four age groups: < 65 years, 65–74 years, 75–84 years, and ≥ 85 years, hereafter termed groups G1, G2, G3, and G4, respectively.

Analysis of data

The analysis was conducted using SPSS (IBM Corp. Released 2011. IBM SPSS Statistics for Windows. Version 21.0. Armonk, NY: IBM Corp) software. Discrete variables were compared using the χ^2 test of significance, unless frequencies were small, in which case the Fisher’s exact test was used. Continuous variables if normally distributed were compared using the Student’s t-test; if the distribution was non-normal, the non-parametric Mann-Whitney-Wilcoxon rank sum test was used. $p \leq 0.05$ was considered statistically significant.

RESULTS

Out of 19,007 admissions to the ICCU, 337 (1.6% of males and 2.1% of females) patients had documented delirium (Table 1). Amongst patients with F05, 188 (55.8%) were male and 149 (44.2%) were female. It was seen that women who developed delirium were significantly older than men (80.7 ± 0.806 vs. 73.7 ± 0.803 , $p < 0.001$) and had a higher chance than men of developing F05 during admission (risk ratio [RR]: 1.29, 95% confidence interval [CI]: 1.05–1.6, $p = 0.018$). The age-group-related analysis showed that the largest number of patients was in G3 (38.9%) and the smallest in G1 (13.6%). Analysis of the time of onset of delirium showed that delirium developed on average after four days of hospitalisation and did not statistically significantly differ between genders.

Hypertension was the most common comorbidity in both genders and all age groups that overlapped with F05; nevertheless, it was more prevalent amongst women (86.6% vs. 73.4%, RR: 1.18, 95% CI: 1.06–1.31, $p = 0.003$) and in the G3 group (84%, $p = 0.048$) (Figs. 1, 2). Cardiac rhythm and conduction disorders were also particularly highly prevalent between both genders (men: 65.4% and women: 71.1%) and demonstrated a tendency to become more frequent with age and was most prevalent in G4 (86.5%, $p < 0.001$).

As was expected, the smallest percentage of patients with coronary heart disease (CHD) was diagnosed in the youngest group, i.e. G1 (78.3%) and the highest percentage of patients (93.1%) in G3 ($p = 0.005$). Likewise, acute MI was mostly (69.6%) diagnosed amongst the youngest patients (G1) and more rarely (56.2%) amongst the eldest (G4) ($p = 0.131$). In addition, it should be noted that in both men ($p = 0.043$) and women ($p = 0.012$), acute MI was mostly diagnosed in G1 (Tables 2, 3). Interestingly, Killip class 4 was diagnosed most frequently in G1, with 21.7% ($p = 0.041$) of patients in this age group classified accordingly. Additionally, it should be highlighted that male patients, when compared separately, exhibited a significantly higher Killip class 4 rate ($p = 0.015$). Unsurprisingly, single-vessel coronary artery disease (1CAD) was mostly found in G1 (19.6%) and most sparsely in G4 (13.5%, $p = 0.355$). Double-vessel CAD (2CAD) was most frequent in G3 (14.5%) and least common in G4 (4.5%, $p = 0.017$). Triple-vessel CAD (3CAD) was mostly found in G2 (35.2%)

Table 1. Gender-related characteristics of included cardiovascular intensive care unit (ICCU) patients (Lithuania, VUHSC, ICCU, 2011–2015)

Variable	Total	Males	Females	p
Age [years], mean ± SE	76.8 ± 0.603	73.7 ± 0.803	80.7 ± 0.806	< 0.001
All ICCU patients	19,007 (100%)	11,806 (62.1%)	7201 (37.9%)	0.018
Patients with delirium	337 (100%)	188 (55.8%)	149 (44.2%)	
Hypertension	267 (79.3%)	138 (73.4%)	129 (86.6%)	0.003
Cardiac rhythm and conduction disorders*	229 (68%)	123 (65.4%)	106 (71.1%)	0.264
Heart failure	139 (41.3%)	65 (34.6%)	74 (49.7%)	0.005
Diabetes mellitus	75 (22.3%)	36 (19.2%)	39 (26.2%)	0.124
Renal insufficiency	50 (14.8%)	30 (16%)	20 (13.4%)	0.516
Sepsis	37 (11%)	27 (14.4%)	10 (6.7%)	0.026
Coronary heart disease	301 (89.3%)	167 (88.8%)	134 (89.9%)	0.745
MI	211 (62.6%)	120 (63.8%)	91 (61.1%)	0.604
STEMI	138 (40.9%)	81 (43.1%)	57 (38.3%)	0.371
NSTEMI	47 (13.9%)	31 (16.5%)	16 (10.7%)	0.13
Killip class I	58 (17.2%)	34 (18.1%)	24 (16.1%)	0.633
Killip class II	72 (21.4%)	42 (22.3%)	30 (20.1%)	0.624
Killip class III	19 (5.6%)	12 (6.4%)	7 (4.7%)	0.505
Killip class IV	40 (11.9%)	26 (13.8%)	14 (9.4%)	0.211
Single-vessel CAD	57 (16.9%)	30 (16%)	27 (18.1%)	0.6
Double-vessel CAD	36 (10.7%)	26 (13.8%)	10 (6.7%)	0.04
Triple-vessel CAD	86 (25.5%)	58 (30.9%)	28 (18.8%)	0.012
Previous MI	67 (19.9%)	44 (23.4%)	23 (15.4%)	0.069
Previous stroke	40 (11.9%)	21 (11.2%)	19 (12.8%)	0.66
Dementia	26 (7.7%)	8 (4.3%)	18 (12.1%)	0.008
Mortality	29 (8.6%)	17 (9%)	12 (8.1%)	0.748
Most frequent imbalances of electrolytes and biochemical indices				
Creatinine (> 100 μmol/L)	209 (62%)	120 (63.8%)	89 (59.7%)	0.441
Glucose (> 7.78 mmol/L)	142 (42.1%)	74 (39.4%)	68 (45.6%)	0.247
Potassium (> 5.1 mmol/L)	38 (11.3%)	19 (10.1%)	19 (12.8%)	0.446
Sodium (> 145 mmol/L)	55 (16.3%)	35 (18.6%)	20 (13.4%)	0.2
Potassium (< 3.5 mmol/L)	61 (18.1%)	34 (18.1%)	17 (11.4%)	0.089
Sodium (< 135 mmol/L)	45 (13.4%)	28 (14.9%)	35 (23.5%)	0.044

Numbers in bold represent statistical significance ($p \leq 0.05$). Blood test results were selected, which were associated with the confirmed delirium diagnosis date. *Cardiac rhythm and conduction disorders — I44-49 according to International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification; CAD — coronary artery disease; MI — myocardial infarction; STEMI — ST segment elevation myocardial infarction; NSTEMI — non-ST segment elevation myocardial infarction; SE — standard error

and significantly infrequently in G3 (20.6%, $p = 0.023$). The highest rate of heart failure was in G4 (Fig. 2), and it was also significantly more common among women (49.7% vs. 34.6%, $p = 0.005$).

Diabetes was identified in as many as 22.3% of all patients with F05, and it was significantly more prevalent in G2 for men and in G3 for women. It is important to mention that hypercreatininaemia and hyperglycaemia were detected in approximately every second patient and were equally prevalent between both genders (Table 1). The most significant

gender-related differences resulting from laboratory tests involved abnormally low sodium and potassium levels in the blood: hyponatraemia presented significantly more frequently in women ($p = 0.044$) and hypokalaemia more commonly in men ($p = 0.089$). Further analysis revealed that men with delirium had sepsis more than twice as often as women (14.4% vs. 6.7%, RR: 2.14, 95% CI: 1.07–4.28, $p = 0.026$).

Dementia (F00) was not diagnosed among those under the age of 75 years, and in most cases was observed in the oldest group ($p < 0.001$) (Table 4). Women exhibited an

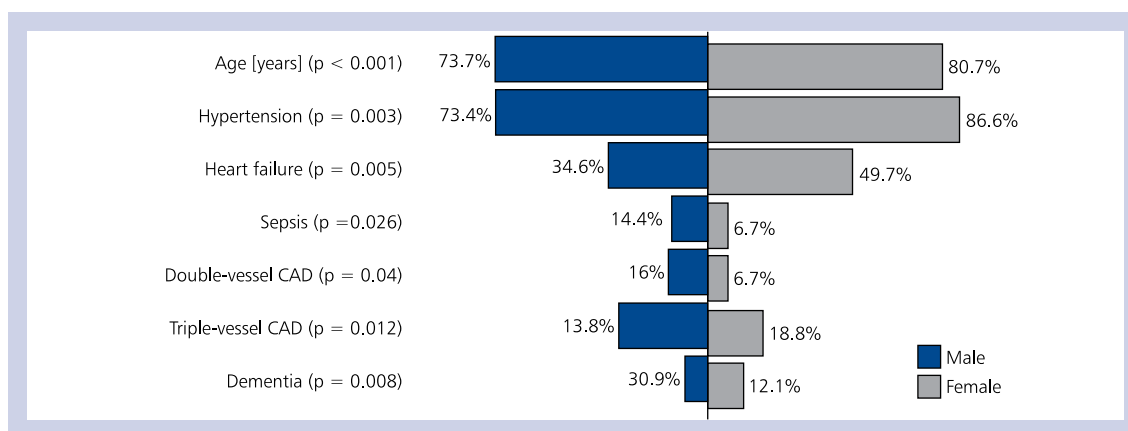


Figure 1. Significant differences between genders; CAD — coronary artery disease

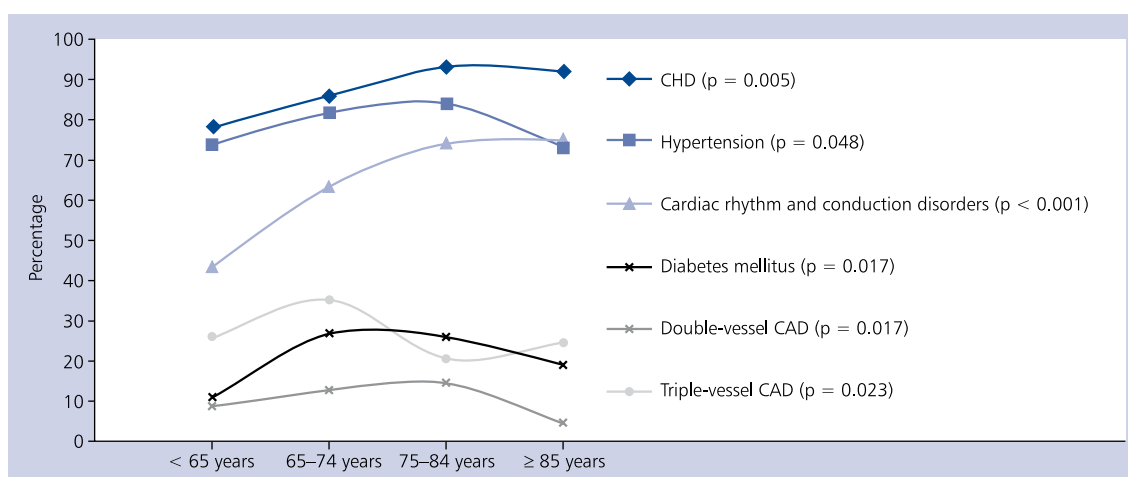


Figure 2. Comorbidity differences among the four age groups; CAD — coronary artery disease; CHD — coronary heart disease

almost three-times higher probability of having dementia than men (12.1% vs. 4.3%, RR: 3.04, 95% CI: 1.36–6.8, $p = 0.008$) (Fig. 1).

There were 29 lethal outcomes in patients with delirium (accounting for 8.6% of the 337-patient sample), and there was no significant difference in mortality between the genders when collectively analysing the accumulated data. However, the youngest patient group with F05, unexpectedly, demonstrated the highest mortality (Table 4). It is also important to stress that all deaths associated with delirium in G1 were amongst men (Tables 2, 3).

DISCUSSION

Our investigation presented a number of associated peculiarities related to gender and age and, unsurprisingly, the accumulated data showed that numerous comorbidities in patients with delirium were highly prevalent and quite similar to previous studies [6, 8]. Nonetheless, some reportable differ-

ences were identified. For example, in the general population, some articles indicate that MI with ST-segment elevation MI (STEMI) is almost twice as frequently diagnosed as non-STEMI (NSTEMI) [17]; whereas in our study, STEMI amongst patients with delirium was diagnosed nearly three times as frequently as NSTEMI. Moreover, in one of the most robust delirium studies to date, performed by Pauley et al. [6], STEMI and NSTEMI prevalence differed markedly from our results. Amongst the 120 patients with delirium they assessed, 6% had STEMI and 10% had NSTEMI as the primary admission diagnosis. In our study, however, STEMI was diagnosed nearly three times as frequently as NSTEMI. Furthermore, STEMI was over six times more frequently diagnosed than in Pauley et al.'s [6] study, whilst the NSTEMI rate was similar. Another point worth noting is that, for example, Ferrara et al. [18] and Puymirat et al. [19] demonstrated that a greater proportion of STEMI was found in women whilst our analysis showed a greater proportion in men. Not just the study of 210 patients with acute coronary syndrome [18],

Table 2. Age-related characteristics of included cardiovascular intensive care unit (ICCU) male patients with delirium (Lithuania, VUHSC, ICCU, 2011–2015)

Variable	Age group				p
	< 65 years	65–74 years	75–84 years	≥ 85 years	
Patients with delirium	36 (100%)	57 (100%)	62 (100%)	33 (100%)	N/A
Hypertension	27 (75%)	44 (77.2%)	47 (75.8%)	20 (60.6%)	0.094
Cardiac rhythm and conduction disorders*	18 (50%)	36 (63.2%)	44 (71%)	25 (75.8%)	0.027
Heart failure	10 (27.8%)	20 (35.1%)	20 (32.3%)	15 (45.5%)	0.127
Diabetes mellitus	3 (8.3%)	15 (26.3%)	10 (16.1%)	8 (24.2%)	0.033
Renal insufficiency	4 (11.1%)	8 (14%)	14 (22.6%)	4 (12.1%)	0.157
Sepsis	4 (11.1%)	10 (17.5%)	9 (14.5%)	4 (12.1%)	0.398
Coronary heart disease	30 (83.3%)	49 (86%)	59 (95.2%)	29 (87.9%)	0.051
MI	27 (75%)	37 (64.9%)	46 (74.2%)	17 (51.5%)	0.043
STEMI	19 (52.8%)	21 (36.8%)	29 (46.8%)	12 (36.4%)	0.171
NSTEMI	5 (13.9%)	9 (15.8%)	14 (22.6%)	3 (9.1%)	0.073
Killip class I	8 (22.2%)	5 (8.8%)	18 (29%)	3 (9.1%)	0.005
Killip class II	7 (19.4%)	16 (28.1%)	12 (19.4%)	7 (21.2%)	0.263
Killip class III	1 (2.8%)	3 (5.3%)	6 (9.7%)	2 (6.1%)	0.201
Killip class IV	9 (25%)	4 (7%)	9 (14.5%)	4 (12.1%)	0.015
Single-vessel CAD	7 (19.4%)	12 (21.1%)	9 (14.5%)	2 (6.1%)	0.059
Double-vessel CAD	4 (11.1%)	6 (10.5%)	14 (22.6%)	2 (6.1%)	0.041
Triple-vessel CAD	12 (33.3%)	19 (33.3%)	17 (27.4%)	10 (30.3%)	0.483
Previous MI	7 (19.4%)	15 (26.3%)	13 (21%)	9 (27.3%)	0.441
Previous stroke	4 (11.1%)	6 (10.5)	8 (12.9%)	3 (9.1%)	0.580
Dementia	0 (0%)	0 (0%)	4 (6.5%)	4 (12.1%)	< 0.001
Mortality	5 (13.9%)	4 (7%)	6 (9.7%)	2 (6.1%)	0.282
Most frequent imbalances of electrolytes and biochemical indices					
Creatinine (> 100 μmol/L)	20 (55.5%)	22 (38.6%)	38 (61.3%)	24 (72.7%)	0.002
Glucose (> 7.78 mmol/L)	18 (50%)	17 (29.8%)	24 (38.7%)	10 (30.3%)	0.05
Potassium (> 5.1 mmol/L)	4 (11.1%)	8 (14%)	5 (8.1%)	2 (6.1%)	0.246
Sodium (> 145 mmol/L)	6 (16.7%)	9 (15.8%)	13 (21%)	7 (21.2%)	0.512
Potassium (< 3.5 mmol/L)	8 (22.2%)	9 (15.8%)	12 (19.4%)	5 (15.2%)	0.453
Sodium (< 135 mmol/L)	7 (19.4%)	9 (15.8%)	5 (8.1%)	7 (21.2%)	0.066

Numbers in bold represent statistical significance ($p \leq 0.05$). Blood test results were selected, which were associated with the confirmed delirium diagnosis date. *Cardiac rhythm and conduction disorders — I44-49 according to International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification; CAD — coronary artery disease; MI — myocardial infarction; STEMI — ST segment elevation myocardial infarction; NSTEMI — non-ST segment elevation myocardial infarction; N/A — not applicable

but other recent studies [20] also strongly suggest that the number of diseased coronary vessels was greater in NSTEMI than in STEMI. In our study, however, gender-related differences associated with the STEMI and NSTEMI proportion were not identified and, though 3CAD was the most common, NSTEMI was less frequently observed. Interestingly, our investigation revealed a higher than anticipated CHD prevalence than that described in detail by Mozaffarian et al. [21]. Although there was no significant difference between genders and CHD, there were adverse results concerning different age groups. It would

seem that CHD was statistically more common in younger patients. Therefore, it leads to speculation that even though younger patients have more myocardium at stake, because they have less cardiac and non-cardiac concomitant diseases than older patients who have more prior cardiac damage and also non-cardiac diseases, the acute cardiac damage to young patients might manifest more dramatically and delirium may be more probable.

Another markedly relevant difference was found when considering risk factors of delirium. Even though the greater

Table 3. Age-related characteristics of included cardiovascular intensive care unit (ICCU) female patients with delirium (Lithuania, VUHSC, ICCU, 2011-2015)

Variable	Age group				p
	< 65 years	65–74 years	75–84 years	≥ 85 years	
Patients with delirium	10 (100%)	14 (100%)	69 (100%)	56 (100%)	N/A
Hypertension	7 (70%)	14 (100%)	63 (91.3%)	45 (80.4%)	0.275
Cardiac rhythm and conduction disorders*	2 (20%)	9 (64.3%)	53 (76.8%)	42 (75%)	< 0.001
Heart failure	7 (70%)	6 (42.9%)	33 (47.8%)	28 (50%)	0.188
Diabetes mellitus	2 (20%)	4 (28.6%)	24 (34.8%)	9 (16.1%)	0.018
Renal insufficiency	0 (0%)	1 (7.1%)	12 (17.3%)	7 (12.5%)	0.152
Sepsis	1 (10%)	0 (0%)	3 (4.3%)	5 (8.9%)	0.227
Coronary heart disease	6 (60%)	12 (85.7%)	63 (91.3%)	53 (94.6%)	0.001
MI	5 (50%)	12 (85.7%)	34 (49.3%)	33 (58.9%)	0.012
STEMI	5 (50%)	7 (50%)	21 (30.4%)	24 (42.9%)	0.158
NSTEMI	0 (0%)	3 (21.4%)	7 (10.1%)	6 (10.7%)	0.118
Killip class I	2 (20%)	3 (21.4%)	7 (10.1%)	12 (21.4%)	0.081
Killip class II	1 (10%)	2 (14.3%)	15 (21.7%)	12 (21.4%)	0.388
Killip class III	0 (0%)	3 (21.4%)	2 (2.9%)	2 (3.6%)	0.118
Killip class IV	1 (10%)	2 (14.3%)	5 (7.2%)	6 (10.7%)	0.387
Single-vessel CAD	2 (20%)	1 (7.1%)	14 (20.3%)	10 (17.9%)	0.244
Double-vessel CAD	0 (0%)	3 (21.4%)	5 (7.2%)	2 (3.6%)	0.118
Triple-vessel CAD	0 (0%)	6 (42.9%)	10 (14.5%)	12 (21.4%)	0.017
Previous MI	1 (10%)	2 (14.3%)	10 (14.5%)	10 (17.9%)	0.539
Previous stroke	0 (0%)	4 (28.6%)	8 (11.6%)	7 (12.5%)	0.064
Dementia	0 (0%)	0 (0%)	11 (15.9%)	7 (12.5%)	0.037
Mortality	0 (0%)	1 (7.1%)	7 (10.1%)	4 (7.1%)	0.291
Most frequent imbalances of electrolytes and biochemical indices					
Creatinine (> 100 μmol/L)	4 (40%)	8 (57.1%)	43 (62.3%)	35 (62.5%)	0.182
Glucose (> 7.78 mmol/L)	2 (20%)	13 (92.9%)	33 (47.8%)	25 (44.6%)	< 0.001
Potassium (> 5.1 mmol/L)	1 (10%)	3 (21.4%)	5 (7.2%)	10 (17.9%)	0.101
Sodium (> 145 mmol/L)	2 (20%)	1 (7.1%)	12 (17.4%)	5 (8.9%)	0.348
Potassium (< 3.5 mmol/L)	0 (0%)	3 (21.4%)	15 (21.7%)	9 (16.1%)	0.101
Sodium (< 135 mmol/L)	0 (0%)	1 (7.1%)	11 (15.9%)	5 (8.9%)	0.174

Numbers in bold represent statistical significance ($p \leq 0.05$). Blood test results were selected, which were associated with the confirmed delirium diagnosis date. *Cardiac rhythm and conduction disorders — I44-49 according to International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification; CAD — coronary artery disease; MI — myocardial infarction; STEMI — ST segment elevation myocardial infarction; NSTEMI — non-ST segment elevation myocardial infarction; N/A — not applicable

percentage of patients were men, evidence suggests that proportionally women have a significantly higher chance of developing delirium. By contrast, in a systematic review of studies published from 2000 to 2013 of risk factors for delirium, Zaai et al. [22] concluded that gender was not associated with delirium in critically ill adults not undergoing cardiac surgery.

Additionally, we found other gender- and age-related distinctions: men, who were on average seven years younger than women, significantly more often had hypokalaemia,

as well as 2CAD and 3CAD and sepsis. Those women who experienced delirium showed a higher prevalence of hypertension, hyponatraemia, heart failure, cardiac rhythm and conduction disorders, MI, and dementia. It should be also noted that women accounted for a significantly ($p < 0.001$) larger proportion of the oldest group of patients with delirium. Concerning MI, STEMI and Killip class 4 was most frequent amongst patients aged < 65 years. In addition, it is necessary to stress that males accounted for a significantly ($p < 0.001$) greater proportion of the youngest group. Moreover, all deaths

Table 4. Age-related characteristics of included cardiovascular intensive care unit (ICCU) patients with delirium (Lithuania, VUHSC, ICCU, 2011–2015)

Variable	Age group				p
	< 65 years	65–74 years	75–84 years	≥ 85 years	
Patients with delirium	46 (100%)	71 (100%)	131 (100%)	89 (100%)	N/A
Hypertension	34 (73.9%)	58 (81.7%)	110 (84%)	65 (73%)	0.048
Cardiac rhythm and conduction disorders*	20 (43.5%)	45 (63.4%)	97 (74.1%)	67 (75%)	< 0.001
Heart failure	17 (37%)	26 (36.6%)	53 (40.5%)	43 (48.3%)	0.138
Diabetes mellitus	5 (10.9%)	19 (26.8%)	34 (26%)	17 (19.1%)	0.038
Renal insufficiency	4 (8.7%)	9 (12.7%)	26 (19.9%)	11 (12.4%)	0.083
Sepsis	6 (13%)	5 (7%)	12 (9.2%)	9 (9%)	0.277
Coronary heart disease	36 (78.3%)	61 (85.9%)	122 (93.1%)	82 (92.1%)	0.005
MI	32 (69.6%)	49 (69%)	80 (61.1%)	50 (56.2%)	0.131
STEMI	24 (52.2%)	28 (39.4%)	50 (38.2%)	36 (40.5%)	0.098
NSTEMI	5 (10.9%)	12 (16.9%)	21 (16%)	9 (10.1%)	0.206
Killip class I	10 (21.7%)	8 (11.3%)	25 (19.1%)	15 (16.9%)	0.125
Killip class II	8 (17.4%)	18 (25.4%)	27 (20.6%)	19 (21.4%)	0.312
Killip class III	1 (2.2%)	6 (8.5%)	8 (6.1%)	4 (4.5%)	0.162
Killip class IV	10 (21.7%)	6 (8.5%)	14 (10.7%)	10 (11.2%)	0.041
Single-vessel CAD	9 (19.6%)	13 (18.3%)	23 (17.6%)	12 (13.5%)	0.355
Double-vessel CAD	4 (8.7%)	9 (12.7%)	19 (14.5%)	4 (4.5%)	0.017
Triple-vessel CAD	12 (26.1%)	25 (35.2%)	27 (20.6%)	22 (24.7%)	0.023
Previous MI	8 (17.4%)	17 (23.9%)	23 (17.6%)	19 (21.4%)	0.398
Previous stroke	4 (8.7%)	10 (14.1%)	16 (12.2%)	10 (11.2%)	0.38
Dementia	0 (0%)	0 (0%)	15 (11.5%)	11 (12.4%)	< 0.001
Mortality	5 (10.9%)	5 (7%)	13 (9.9%)	6 (6.7%)	0.509
Most frequent imbalances of electrolytes and biochemical indices					
Creatinine (> 100 μmol/L)	24 (52.2%)	45 (63.4%)	81 (61.8%)	59 (66.3%)	0.11
Glucose (> 7.78 mmol/L)	20 (43.5%)	30 (42.3%)	57 (43.5%)	35 (39.3%)	0.537
Potassium (> 5.1 mmol/L)	5 (10.9%)	11 (15.5%)	10 (7.6%)	12 (13.5%)	0.08
Sodium (> 145 mmol/L)	8 (17.4%)	10 (14.1%)	25 (19.1%)	12 (13.5%)	0.276
Potassium (< 3.5 mmol/L)	8 (17.4%)	12 (16.9%)	27 (20.6%)	14 (15.7%)	0.362
Sodium (< 135 mmol/L)	7 (15.2%)	10 (14.1%)	16 (12.2%)	12 (13.5%)	0.602

Numbers in bold represent statistical significance ($p \leq 0.05$). Blood test results were selected, which were associated with the confirmed delirium diagnosis date. *Cardiac rhythm and conduction disorders – I44-49 according to International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification; CAD — coronary artery disease; MI — myocardial infarction; STEMI — ST segment elevation myocardial infarction; NSTEMI — non-ST segment elevation myocardial infarction; N/A — not applicable

amongst G1 patients with F05 were amongst males. Therefore, special attention should be paid to male patients younger than 65 years, who develop delirium, because these patients tend to have more serious forms of disorders and poorer prognosis. Furthermore, it should also be noted that age over 65 years is a well-recognised delirium risk factor [7] and some clinical trials [23] included only those patients who are ≥ 65 years old. Because our study has shown a rather significant tendency of younger patients to develop delirium, it is important not to ignore the possibility of delirium at a younger age. For

example, the youngest patient in our study was a 21-year-old female who, after developing sick sinus syndrome and thus New York Heart Association (NYHA) class III heart failure, acquired delirium. Another example that shows a typical course of delirium development was observed in a 44-year-old male whose primary admission diagnoses was STEMI (3CAD). As a result, he developed ventricular fibrillation and cardiogenic shock, which were followed by delirium. Our investigation showed a lesser increase in mortality rates associated with delirium compared to some existing studies. For example, in

a study performed in a similar ICCU population [6] mortality rates were nine-times higher in those patients who developed delirium and even reached a 27% death rate. By contrast, in the present investigation, we identified that the mortality rate among delirium patients was 8.6% and an average of 72% higher than in patients without delirium.

We would also like to clarify that, aside from non-psychopharmacologic approaches for initial delirium treatment, all patients were additionally administered haloperidol (0.25 to 0.5 mg intramuscular injection or *per os*) and/or quetiapine (12.5 to 25 mg *per os* twice a day) and/or lorazepam (*per os*).

Our investigation has several strengths. Firstly, the relatively large sample of patients with delirium. We believe 337 analysed cases with delirium presents a robust amount of overall data that compensates for some limitations. Secondly, the wide range of co-occurring diseases included in the analysis provided the required materials for a better comprehension of the broad comorbid disease background of critically ill patients with delirium.

Limitations of the study

Limitations of this study include its retrospective nature, which introduces the possibility of confounding variables that may have influenced our assessment. This risk was mitigated by including the most objective and well-validated ICU markers. Moreover, only those patients who had delirium confirmed through liaison and consultation with a psychiatrist were included in the final analysis. Secondly, contrary to the high levels of delirium found by McPherson et al. [8] (26% in a mixed cardiology and cardiac surgery ICU) and Salluh et al. [5] (31.8% in a meta-analysis of 42 studies), the 1.8% prevalence of delirium in our study is misleadingly low. This could be partially explained by differences in the inclusion criteria because our study included in the final analysis only those patients who had delirium confirmed through liaison and consultation with a psychiatrist. Other similar studies most frequently included diagnostic tools that were more easily applied to daily bedside practice, such as the Delirium Rating Scale, Confusion Assessment Method (CAM), Nursing Delirium Screening Scale, and the Intensive Care Delirium Screening Checklist. Thirdly, it was a single-centre study from a tertiary care academic institution, where a considerable portion of patients had a higher severity of illness. Furthermore, although our study included a relatively large sample of patients, which should alleviate this concern, our results might not be fully applicable to secondary health care institutions. Finally, we collected little data about patients who did not develop delirium in the ICCU. As mentioned, we chose not to assess data regarding particular sedation agents used or doses and to focus instead on age- and gender-related differences, although in other studies [7, 9, 22, 24, 25] the significance of medication on development of delirium has

been addressed. We are further investigating this subject and hope to publish our findings in the near future.

CONCLUSIONS

Firstly, our study found that comorbidities were highly prevalent in patients with delirium; these findings were quite similar to those in previously conducted studies in other ICCUs. Secondly, it was shown that delirium is a severe complication that more often affects men amongst patients < 65 years old and more frequently affects women who are ≥ 85 years old. Thirdly, compared to other studies, our study showed that STEMI was diagnosed more frequently than NSTEMI. Last but not least, it should be also noted that although age > 65 years is a well-recognised delirium risk factor, our study has shown a rather significant tendency of younger patients to develop delirium. Thus, it is important not to ignore the possibility of delirium at younger ages, and it is even recommended that male patients < 65 years old, who develop delirium should be treated with more caution because they tend to have more serious forms of the disorder and a poorer prognosis. Although the evidence base regarding delirium is growing, prospective multicentre studies are required to better understand the exact causes of ICCU delirium, and for the development and implementation of effective strategies for disease treatment and prevention.

Conflict of interest: none declared

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Swoiste, związane z wiekiem i płcią, cechy u pacjentów ze stanem majaczeniowym na oddziale intensywnej opieki kardiologicznej

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Streszczenie

Wstęp: W ostatnich latach wzrosła liczba danych naukowych odnoszących się do stanu majaczeniowego (delirium). Przeprowadzono znaczące analizy delirium obejmujące na przykład pacjentów poddawanych mechanicznej wentylacji, przebywających na ogólnym oddziale intensywnej opieki medycznej (OIOM) i chorych, u których stan majaczeniowy występował wyłącznie w okresie pooperacyjnym. Niemniej niewiele jest badań dotyczących stanu majaczeniowego u pacjentów oddziału intensywnej opieki kardiologicznej (OIOK), a zwłaszcza brakuje prac na temat szczególnych cech stanu majaczeniowego w odniesieniu do wieku i płci chorych.

Cel: Badanie przeprowadzono w celu ustalenia szczególnych właściwości substancji niealkoholowych i innych substancji o działaniu psychoaktywnym wywołujących delirium w odniesieniu do wieku i płci pacjentów przebywających na OIOK.

Metody: Obserwacyjne badanie przekrojowe przeprowadzono w celu oceny pacjentów w stanie majaczeniowym hospitalizowanych na OIOK na Litwie. W próbie liczącej 19 007 przyjęć na OIOK było 337 (1,8%) chorych z udokumentowanym rozpoznaniem stanu majaczeniowego (poprzez współpracę i konsultacje z psychiatrami), których włączono do końcowej analizy. Uzyskane dane oceniano i analizowano w odniesieniu do płci chorych oraz czterech grup wiekowych: < 65 lat, 65–74 lat, 75–84 lat i ≥ 85 lat.

Wyniki: U kobiet, u których występował stan majaczeniowy, częściej stwierdzano nadciśnienie tętnicze, hiponatremię, niewydolność serca, zaburzenia rytmu serca i przewodzenia, zawał serca (MI) oraz demencję. Natomiast u mężczyzn, których średnia wieku była o 7 lat wyższa niż u kobiet, istotnie częściej występowały hipokaliemia, dwu- lub trójnaczyniowa choroba wieńcowa oraz posocznica. Dodatkowo MI, MI z uniesieniem odcinka ST oraz IV klasa wg klasyfikacji Killipa występowały dużo częściej u chorych w wieku poniżej 65 lat. Ponadto w najmłodszej grupie pacjentów śmiertelność była najwyższa.

Wnioski: W niniejszym badaniu zaobserwowano wiele szczególnych cech związanych z płcią i wiekiem. Wykazano, że stan majaczeniowy jest ciężkim powikłaniem, które dotyczy częściej mężczyzn niż kobiet w grupie chorych w wieku poniżej 65 lat, natomiast w grupie osób w wieku 85 lat i starszych częściej występuje u kobiet. Mężczyzn poniżej 65 lat, u których rozwinął się stan majaczeniowy, należy traktować ze szczególną uwagą, ponieważ ta grupa charakteryzuje się większym ryzykiem ciężkiego przebiegu choroby i gorszym rokowaniem.

Słowa kluczowe: delirium, oddział intensywnej opieki kardiologicznej (OIOK), opieka kardiologiczna, płeć, wiek

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