

## ALCOHOLIC AND POSTOPERATIVE DELIRIUM: A CASE-CONTROL STUDY

Milan Novaković<sup>1</sup>, Slavica Đukić Dejanović<sup>2</sup>, Joana Marić-Burmazević<sup>3</sup>,  
Zoran Dakić<sup>4</sup> & Ivan Dimitrijević<sup>5,6</sup>

<sup>1</sup>University of East Sarajevo, School of Medicine, Foča, Bosnia and Herzegovina

<sup>2</sup>University of Kragujevac, School of Medicine, Kragujevac, Serbia

<sup>3</sup>Clinical Hospital Center "dr Dragiša Mišović Dedinje", Belgrade, Serbia

<sup>4</sup>Health Center Bijeljina, Bijeljina, Bosna & Hercegovina

<sup>5</sup>University of Belgrade, School of Medicine, Belgrade, Serbia

<sup>6</sup>Clinic for Psychiatry, Clinical Centre of Serbia, Belgrade, Serbia

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### SUMMARY

**Background:** Delirium is an urgent condition in psychiatry and it occurs after long-lasting alcohol abuse, in surgical procedures and other organic mental syndromes with deprivation of interpersonal and social stimulations. The aim was to evaluate of socio-demographical and psychopathological differences in delirium patients with alcoholand surgical genesis, studied in period from January 1<sup>st</sup> 2003 to December 31<sup>st</sup> 2012 in Bosnia and Herzegovina (B&H).

**Subjects and methods:** Subjects were divided into two groups: alcoholics (N=75) and surgical patients (N=75) and multicentric, prospective study was performed in B&H. The following instruments have been used: list of general data (according to MCD-10 criteria), Eysenck Personality Questionnaire (EPQ), Becks test of anxiety (BAI), Hamilton Depressive Rating Scale (HDRS) and Mini Mental State Examination (MMSE). Descriptive and analytical statistical processing of patients has been performed (alpha level: 0.001).

**Results:** Patients from alcohol group showed, with statistical significance  $p=0.001$ , the following: unemployment (OR=0.657, CI 0.540-670), ruined marriage (OR=0.570, CI 0.650-710), alcohol abuse (OR=0.179, CI 0.860-0.990), on represented expressed psychoticism, (OR=0.635, CI 0.550-0.715) in EPQ test, HDRS total was more frequent (OR=0.925, CI 0.870-1.120) and on MMSE test, total score was more frequent (OR=0.560, CI 0.570-810). Postoperative patients were older  $p=0.001$  (OR= 1.120, CI 1.082-1.159) with acutestress: (OR=0.735, CI 0.650-0.910) and showed neuroticism (OR=-0.660, CI 0.575-0.715). Discriminative function confirms the differences between alcohol and surgical groups of delirium patients: Canonical  $F_{cr}$ :  $r=0.771$ ; Wilkin's lambda ( $\lambda_{cr}$ )=0.773 Student's test=57.551 and significance  $p=0.001$ ; OR=0.760, CI 0.550-0.870.

**Conclusion:** Delirium lasts longer in alcohol group with higher disalienation, depression of cognitive functions with organic lesions of cerebral functions. In surgical patients, delirium is the consequence of older age, acute stress, multi-morbidity, with neuroticism, vegetative disorders (HDRS) and temporary lesion on MMSE test. Delirium state in both groups requires intensive care and multidisciplinary work.

**Key words:** delirium – alcohol – postoperative - conditions

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### INTRODUCTION

Delirium is short, but life-threatening toxic, confusional state associated with symptomatic disorders and in case when delirium is the result of alcoholism in form of dementia (Regal 2013). Other delirious conditions may be the result of medical and surgical treatment (DSM-IV). Delirium caused by the prevailing influence of fatigue and age are found in both groups (Bott et al. 2005). State of defense mechanisms and the age impact on all forms of delirium (Dawson et al. 2007). Delirious states are not sufficiently established as an emergency in medicine (Hasin et al. 2006).

Genesis of alcoholic delirium is neglected, because it's about a biological disease, and the consequences are connate type, where the weakness of the person's will enters with alcoholism, and delirium is the part of alcoholism (Li et al. 2007). In alcoholic delirium diffi-

culties in the treatment are given by the loss of family and social support (McCusker et al. 2013). Form of delirium connected with surgical treatment is usually located in the postoperative period (Agnoletti et al. 2005).

Often it is presumptuous belief that surgical treatment is dominant, which some-times interpret delirium as a minor complication (Blondell et al. 2004). In surgery, the psychiatric care of delirium is often palliative (Lukan et al. 2002). The situation is very serious and it is understood only after the lethal outcome and then delirium is defined as "the direct cause of death or condition during surgery" (Csemy et al. 2007). Selection of causes of death can be bad when it is voluntarily determined by team of doctors who issued the most appropriate diagnose for that occasion. Delirium in old age with multimorbidity may be of alcoholic and surgical genesis (Gerke et al. 1997).

Delirium and the stress according to legal and ethical norms are lethal, which includes all the relevant factors (Cunradi et al. 2005). Delirium as an emergency in medicine is becoming essential when it is life-threatening for the surrounding people and it is often forgotten that the patient is already part of the moral breakdown, lack of legal norms (Cole 2013), anomie, and the transition in the presence of patients and therapeutic teams (Novaković et al. 2007a). Delirium is a diagnostic enigma of violence (manic) or suicide (depressive disalienation), but there post diction results with punitive outcome (Novaković et al. 2007b). Delirium of alcoholism is still lethal in up to about 15% (Vukovic et al. 2008) and a surgical intervention in delirium status of lethal outcome was mentioned in 32-67% (Skrobik & Chanques 2013).

The aim of the study is to assess socio-psychological differences of the patient in delirium of alcohol and operating genesis in the period from January 1<sup>st</sup> 2003 to December 31<sup>st</sup> 2012 in B&H. Hypothetically in clinical practice: alcoholic delirium is prolonged, with greater disalienation, depression, cognitive nature and organic lesions of cerebral functions. In surgical patients, delirium is the result of older age, acute stress and multimorbidity.

## SUBJECTS AND METHODS

The target of this survey is a civilian population in B&H. The only Including criterion is definitive diagnosis of delirium according to ICD-X. Persons who did not cooperate were excluded. Patients were divided into two groups. One group was consisted of patients with delirium of alcoholic genesis with dominant psychiatric treatment. The second group was consisted of patients with delirium of surgical genesis with dominant surgical treatment. The subjects involved in the study knew the aims and gave consent. The study was planned to include at least 150 patients in each group. Patients were contacted by achieved planned number and the groups of patients are cohort.

*Genesis of alcoholic delirium (Delirium AD)* tested in 212 persons, 55 did not meet the basic criteria in operation, and 82 individuals had data that were not usable, despite good cooperation. The final group consisted of 75 patients in a state of AD (64.10%).

*Genesis of surgical delirium (Delirium HD)* in the investigated 196 cases, of which 48 did not meet criteria and 73 persons had information that was not usable, despite good cooperation. The final group consisted of 75 patients in a state of high-definition (62.50%).

The survey was conducted by the research team in several institutions in B & H. The research team before testing had complete consistency in the criteria for inclusion of patients in labor and the exclusion from further research. Measuring instruments of the person who performed the test match with the unique set, and

individual work has been done on how to harmonize the evaluation of certain variables in the tests.

Questionnaires to determine the mental health variables are:

- List of Basic Data (LBD) is adapted (ICD-X, DSM-IV) and contains 20 questions such as: sex, age, treatment, marriage, education, employment, abuse of alcohol and/or nicotine, education of father/mother, father/mother job, mental illness heredity, migration, changing jobs, illness, hospital treatment, rehabilitation, acute stress and multimorbidity.
- Eysenck Personality Questionnaire (EPQ) has 102 questions (Eysenck 1976): extroversion (21 questions), neuroticism (30), psychoticism (23), Lie scale (28) and it was done individually.
- Beck Anxiety Inventory (BAI) has 21 questions related to general anxiety symptoms (Beck et al. 1988). Patients answer questions whose intensity is estimated to Likert scale from 1 (not present) to 3 (very strong). The sum of all 63 responses was the intensity of general anxiety. BAI items are: 1, numbness (numbness) or numbness to the touch; 2, feeling the heat; 3, uncertainty in the legs; 4, inability to relax; 5, fear that the worst will happen; 6, vertigo and dizziness; 7, pounding and a racing heart; 8, instability; 9, horrified; 10, anxiety; 11, feeling of suffocation; 12, trembling of hands; 13, feeling to shake; 14, fear of losing control; 15, difficulty in breathing; 16, fear of dying; 17, terrified; 18, indigestion or stomach disorders; 19, unconsciousness; 20, blushing persons; 21, sweating (not caused by heat).
- Hamilton Depression Rating Scale (HDRS) with 21 questions (Hamilton 1967). Score of the Hamilton depression scale determines degree of depression: 0-8, depression is not present, from 17 to 24, mild depression, more than 24 expressed depression. HDRS variables were analyzed in five groups: 1. depression, 2. anxiety/agitation, 3. cognitive disorders, 4. retardation and 5. vegetative disorders and the total score on the Hamilton scale.
- Mini Mental State Examination (MMSE) has 11 questions (Folstein et al. 1975), and the maximum score is 30. The first five questions given score 21, and the next 6 issues score 9. Score below 23 indicates cognitive impairment. Scale includes the following questions: 1. orientation/time, 2. orientation/space, 3. remembering, 4. attention and calculation, 5. reproduction, 6. language-naming, 7. recurrence, 8. coordination, 9. praxis, 10. gnosis and 11. cognition.

## Statistical analysis

After the distribution of the results, basic descriptive parameters were calculated (mean  $\pm$  standard deviation (SD)). To test the difference between groups chi-square

test ( $\chi^2$ ) was used for nominal variables (frequency). Analyses included discriminant function. The hypothesis was tested at the level of statistical significance of  $p < 0.001$  (alpha level): OR (odds ratio-95% significance) and CI (confidence interval). Statistics were used: "SPSS" Statistical Software 9.0: SPSS Inc., Chicago, IL, USA (Stata 2001).

## RESULTS

Dynamics results in patients with alcoholic and postoperative delirium are showed in Table 1.

Patients in alcoholic delirium, with statistical significance  $p < 0.01$  are unemployed, single, alcohol abuse, nicotine, with hard work father and low education of the father, mental heredity, hospital treatment and rehabilitation. In patients with delirium in the surgical treatment with signification  $p < 0.01$  are: age, acute stress, multimorbidity, followed by migration. In both groups appears low maternal education, and conducting in-house, professional insecurity and frequent occupational incapacity (sickness).

The results of the EPQ personality test does not give significant differences in extroversion and the Lie scale and difficult to explore, and can be seen in Table 2 ( $p < 0.01$ ). Results in patients with the genesis of alcoholic delirium with statistical significance of  $p < 0.01$ , the prominent psychoticism, and in patients with delirium in the surgical treatment is expressed neuroticism Table 3.

In addition to tremor ( $p < 0.01$ ) and his fear modalities occur in all forms of alcoholic delirium genesis and values are more pronounced than in patients with surgical delirium.

In HDRS scores in group of patients with alcoholic delirium depression is highly expressed, which among other cognitive genesis and then gives a quasi-retardation (transient psychomotor syndrome) ( $p < 0.01$ ) (Table 4).

In surgical group of patients with delirium anxiety and signs of vegetative dystonia are statistically significant, but they are in a group of patients with alcoholic delirium but in different events. Total HDRS is the statistical significance of  $p < 0.01$  pronounced in patients with alcoholic delirium.

**Table 1.** Sociodemographic data–logistic analyses of the groups: Delirium AD and Delirium HD

Variables	Delirium AD $\mu \pm SD$	Delirium HD $\mu \pm SD$	$\chi^2*$	$p^s$	OR	CI	
						Lower	Upper
Gender (male/female)	72/3	58/17	57.460	0.001	0.375	0.179	0.785
Age (mean $\pm$ SD)	42.91 $\pm$ 5.15	57.13 $\pm$ 3.31	63.550	0.001	1.120	1.082	1.159
Years treatment's	9.40 $\pm$ 3.35	2.30 $\pm$ 2.45	27.640	0.001	0.660	0.620	0.795
Marital status: Married/Single	26/49	60/15	74.770	0.001	0.570	0.650	0.710
Education: >8;12>12	15/40/20	20/42/13	38.242	0.050	0.451	0.790	1.120
Employment	16/59	51/26	75.192	0.001	0.657	0.540	0.670
Abuse: alcohol	73/2	12/63	53.234	0.001	0.179	0.860	0.990
Abuse: nicotine	56/19	29/46	50.880	0.001	0.585	0.770	0.890
Father's education: <8; 2;>12	9/59/7	12/53/10	58.124	0.001	0.615	0.720	1.130
Father's occupation: Worker/Clerk	44/31	46/29	61.113	0.001	0.715	0.560	0.870
Mother's education: <8;12;>12	22/51/2	20/49/6	11.018	0.012	0.515	0.560	0.765
Mother's occupation: Housewife/Clerk	57/18	40/35	10.347	0.080	0.945	0.680	1.267
Heredity mental disorders	44/31	18/57	48.001	0.001	0.953	0.875	1.130
Migration	36/39	42/33	10.004	0.075	0.740	0.675	0.926
Avoiding's occupation	15/60	36/39	13.550	0.080	0.750	0.770	0.980
Apsentism's	53/22	38/37	29.190	0.001	0.650	0.760	1.126
Hospital's treatment	45/30	28/47	45.073	0.001	0.620	0.720	1.100
Rehabilitation	22/53	12/63	29.453	0.001	0.815	0.890	1.015
Stress acute's	27/48	46/29	21.043	0.011	0.735	0.650	0.910
Multimorbiditet	23/52	47/28	20.639	0.007	1.100	0.170	3.157

N<sub>0</sub> of subjects =150; Delirium AD N<sub>0</sub> =75 and Delirium HD N<sub>0</sub> =75

**Table 2.** Analysis of individually characteristics of delirium AG and HG groups (EPQ)

Question	Delirium AD $\mu \pm SD$	Delirium HD $\mu \pm SD$	$\chi^2*$	$p^s$	OR	CI	
						Lower	Upper
Extroversion	10.10 $\pm$ 1.30	13.15 $\pm$ 1.75	29.530	0.050	1.210	0.730	1.115
Neuroticism	12.30 $\pm$ 2.40	18.15 $\pm$ 1.90	83.820	0.001	0.660	0.575	0.715
Psychoticism	17.10 $\pm$ 1.10	8.15 $\pm$ 1.20	91.115	0.001	0.635	0.550	0.715
Lie-scale	6.35 $\pm$ 1.75	5.10 $\pm$ 1.70	16.715	0.070	1.150	0.830	0.950

N<sub>0</sub> of subjects =150; Delirium AD N<sub>0</sub> =75 and Delirium HD N<sub>0</sub> =75

**Table 3.** Analysis anxiety groups delirium AD and HD (BAI)

Variables	Delirium AD μ±SD	Delirium HD μ±SD	χ <sup>2</sup> *	p <sup>§</sup>	OR	CI	
						Lower	Upper
Numbness	2.18±0.55	0.95±0.87	210.670	0.001	0.660	0.850	9.750
Sensation of heat	1.73±0.80	0.93±0.85	205.850	0.001	0.630	0.950	1.115
Instability in legs	1.85±0.80	1.15±0.85	183.870	0.001	0.650	0.880	0.980
Inability to relax	2.16±0.70	1.10±0.80	200.150	0.001	0.659	0.890	1.015
Fear of the worst	1.35±0.75	1.20±0.97	115.250	0.011	0.650	0.770	0.985
Dizziness	1.90±0.70	0.95±0.87	184.770	0.001	0.760	0.770	0.985
Heart palpitation	2.40±0.97	1.50±0.95	219.665	0.056	0.698	0.775	0.995
Instability	1.81±0.80	0.95±0.85	185.340	0.001	0.650	0.870	0.995
Horridness	2.15±0.65	0.80±0.75	227.540	0.001	0.850	0.954	1.115
Nervousness	1.61±0.70	1.25±0.85	95.875	0.001	0.655	0.640	0.870
Sensation of choking	1.55±0.75	0.85±0.83	201.780	0.001	0.763	0.940	1.190
Shivering of hands	2.15±0.95	0.95±0.80	234.028	0.001	0.670	0.766	0.885
Sensation of shivering	2.00±0.67	0.90±0.80	163.350	0.001	0.655	0.663	0.870
Fear of losing control	1.55±0.60	0.95±0.68	193.783	0.001	0.653	0.770	0.985
Breathing difficulties	2.00±0.82	1.10±0.83	234.100	0.001	0.760	0.876	0.950
Fear of death	1.51±0.77	1.15±0.77	193.375	0.001	0.695	0.780	0.990
Frightfulness	1.50±0.75	0.97±0.88	185.695	0.001	0.653	0.765	0.886
Digestion difficulties	1.50±0.90	0.98±0.60	132.335	0.001	0.665	0.650	0.880
Unconsciousness	1.25±0.70	0.70±0.60	140.290	0.001	0.647	0.748	0.935
Blush	1.15±0.66	0.97±0.65	177.783	0.001	0.540	0.675	0.815
Sweating	1.97±0.75	0.97±0.85	211.110	0.001	0.670	0.804	1.115
BAI -total	37.27±2.95	21.27±3.05	227.970	0.001	0.780	0.870	0.990

N<sub>0</sub> of subjects =150; Delirium AD N<sub>0</sub> =75 and Delirium HD N<sub>0</sub> =75

**Table 4.** Analyses of depressiveness of the groups: Delirium AD and Delirium HD (HDRS)

Question	Delirium AD μ±SD	Delirium HD μ±SD	χ <sup>2</sup> *	p <sup>§</sup>	OR	CI	
						Lower	Upper
Depression	12.81±0.42	8.33±0.21	45.970	0.001	1.690	0.970	1.350
Anxiety	7.10±0.50	9.95±0.22	37.810	0.003	0.995	0.860	0.985
Cognitive disorders	11.66±0.43	6.33±0.21	27.870	0.002	0.995	0.810	0.945
Retardation	9.91±0.41	6.40±0.25	22.535	0.002	1.210	0.910	1.210
Vegetative disorders	7.12±0.25	10.36±0.24	16.440	0.005	0.975	0.925	1.120
HDRS-Total	46.50±5.40	40.31±0.21	25.670	0.001	0.925	0.870	1.120

N<sub>0</sub> of subjects =150; Delirium AD N<sub>0</sub> =75 and Delirium HD N<sub>0</sub> =75

**Table 5.** Logistic analyses of the group Delirium AD and Delirium HD (MMSE)

Questionnaire	Delirium AD μ±SD	Delirium HD μ±SD	p <sup>§</sup>	OR	CI	
					Lower	Upper
Orientation/time	9.73±0.90	9.77±0.98	0.052	0.693	-0.175	0.097
Orientation/space	9.61±0.90	9.71±0.87	0.049	0.689	-0.174	0.095
Memorization	2.57±0.51	2.72±0.48	0.001	0.363	-0.227	-0.085
Focusing/Calculating	4.05±0.75	4.20±1.09	0.005	0.698	-0.293	-0.019
Reproduction	2.31±0.53	2.47±0.70	0.001	0.465	-0.252	-0.069
Language– nomination	1.40±0.52	1.67±0.49	0.001	0.371	-0.347	-0.201
Repetition	0.21±0.40	0.57±0.49	0.001	0.334	-0.430	-0.299
Coordination	2.22±0.60	2.45±0.72	0.001	0.483	-0.327	-0.137
Gnosis	0.33±0.47	0.75±0.43	0.001	0.320	-0.481	-0.351
Cognition	0.19±0.39	0.65±0.47	0.001	0.323	-0.519	-0.393
MMSE -Total	23.69±3.05	26.07±0.34	0.001	0.590	-0.350	-0.075

N<sub>0</sub> of subjects =150; Delirium AD N<sub>0</sub> =75 and Delirium HD N<sub>0</sub> =75

§Sig. P: level of significance, p calculated from univariant logistic regression

The largest numbers of parameters that define depression with retardation tell about their cognitive genesis of the findings of the MMSE. Total score ("total") is a highly significant  $p < 0.01$  as shown in Table 5.

In MMSE test, there were no statistically significant differences in mean scores between patients with alcoholic delirium and delirium of surgical genesis with the high value of time ( $p = 0.050$ ) and place ( $p < 0.05$ ). Remembering, attention/calculation, coordination, praxis and gnosis have low values and small significance. Reproduction occurs more in the group of patients with delirium actual alcoholic genesis ( $p = 0.050$ ), with similar results in the appointment and repeat.

Discriminant function shows differences between AD and HD patients: canonical correlation ( $rc$ ) = 0.671; Wilkison's lambda ( $\lambda_{nj}$ ) = 0.673,  $p < 0.01$ , OR = 0.560 (95%) CI = 0.570-0.810).

## DISCUSSION

The first result of this paper is that the patients with the alcoholic delirium have high statistical significance: unemployed, ruined marriage, highly dependent on alcohol and nicotine. Patients with delirium alcoholic's genesis had 9.40 unsuccessful years of treatment, which, with a shorter abstinence or stress ended delirium. Family analysis shows the low education of the father and the hard work of mother and father, with a significant mental heredity. Frequent change of job, illness, hospital treatment and rehabilitation has resulted in further several social segregation, has resulted in delirium.

Delirium in the surgical treatment of patients present in the elderly, after 2.30 years of treatment, suggesting more serious, recurring and multicausal disease. Stress is caused by insufficient preparation for surgical treatment and forced it by migration, sick leave, hospital treatment and rehabilitation with social insecurity which leads to segregation.

Family is the first important causal factor resulting in delirium. The family should be kept in mind in the form of a significant hereditary (which gives neglect, deprivation and poor role models), and later manifested in the form of possession of scarce skills to establish and maintain adequate secondary family. That part has less significance in delirium HD, but it talking about the shortcomings of the secondary functionality of the family and support.

Personality of individual suffering from delirium is responding to family weakness manifested in impulsive tendencies (biological) or oral tendencies (psychodynamic), and family environment suitable space in which to show the weaknesses. Socio-economic factors are actually present: anomie, insecurity, lack of opportunities, in the form that has been nominated as a transition. This set of factors is sufficient to impair the majority of the population in transition, and endangering the vulnerable

groups of persons predisposed to delirious clinical picture is only multiplied (Graham et al. 2007).

Psychological factors in our analysis show significant results for extraversion on Lie scale. This suggests that there is a tendency for social exposing, as well as to their safety and the status issue with alcohol beverage show in better condition. In this way, by HG delirium are signs the neuroticism, which can be seen transiently, and psychosis in a state of delirium with AG talking about permanent personal injury (EPQ).

Delirium AG and HG is the widest field for the analysis of somatic anxiety: numbness, uncertainty in the legs, tachycardia, dyspnea, and the conditions that give fear of losing control until than at ophobia. Such conditions are sufficient sum for panic attacks who may be suicidal (Novakovic et al. 2006), and homicidal (Lester et al. 2003). High levels of tremor talk about the overall metabolic and psychological imbalance, where nervousness, fright, sweating and other parameters are part of the base of the huge imbalance in both groups (BAI).

The results of the test give HDRS anxiety and vegetative disorders such shallow levels of fear and metabolic disorders (pronounced delirious HG). Depressed parameters are cognitive in character, both sets of variables pronounced in the group with delirium AG. Psychomotor behavior as the part of pseudo mania is when delirious patients showed "laughter beneath the gallows," a person's life is in danger over immature grasp of the near-death (Moran et al. 2003).

MMSE test finalize the situation in a clear minimum exploration of remembering, coordination, praxis, gnosis and cognition. Appointment and play fragments showed that patients in the spatial and temporal disorientation (Novaković et al. 2007b). Lesions are prominent in delirium AG and are insignificant in delirium HG. Finally discriminative function (more in the form of a statistical confirmation) shows the high statistical difference ( $p = 0.001$ ) among patients in delirium AD in relation to delirium HD.

### Attempting to contribute the treatment of delirium

Delirium is mortal, but deadly (when it comes to homicidal behavior). The major problem in the treatment of delirium is a multimorbidity condition, partly agitation, anxiety and disalienation (hallucinatory syndrome and convulsive crisis). High levels of somatic and psychopathology requires the same level of professional response (Roy 2003). Anxiolysis, cropping agitation and sedation is achieved as follows: in liquid forms dosing- Risperidone, Haloperidol, Lorazepam, Midazolam and Diazepam, but due to the severity of the symptoms look after the dose, because that is not decisive! Barbiturates are given to the last, and some form of dialysis in intoxication (Souza et al. 2013). Rational treatment is an effective only if preserved the vital functionality (Pretorius et al. 2013).

Detoxification rehydration and correction of electrolyte imbalance took the lead in a position to adequately carry out further therapeutic procedures. Entering the liquid (electrolyte-free anti edema to us brain therapy) and extending airways (bronchodilators) is the degree of resistance of these organs (average about 3 l / pro die). Cropping brain edema, the establishment of cardio-respiratory functionality, eliminating the possibility of convulsive crisis, given enough space to calm delirium (hallucinations) as an essential mental disorders. Nootropics treatment (Leung et al. 2006) is an extension (Pettersen & Wyller 2007) in connection with the basic condition for which the patient is receiving treatment (Schlösser et al. 2007) provided that all therapeutic measures are working properly at the same time (Jakovljević 2009).

## CONCLUSION

Delirium in the alcohol group is prolonged, with higher-alienation, depression, cognitive character with organic lesions of cerebral functions. In surgical patients, delirium is the result of elder age, acute stress, multimorbidity with neuroticism, frequent vegetative dystonia (HDRS), and transient lesion in the MMSE test. Delirium in both groups requiring intensive care and multi-disciplinary work.

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Correspondence:

Professor Ivan Dimitrijević, MD, PhD, Neuropsychiatrist  
Clinic for Psychiatry, Clinical Center of Serbia, University of Belgrade  
Pasterova 2, 11000 Belgrade, Serbia  
E-mail: dr.ivan54@yahoo.com