TOMCZYK, Karolina, JURASZ, Karolina, CHOJNACKA, Natalia, KLARYCKI, Jakub, PODGÓRSKA, Dominika, CYMER, Radosław, RZESKA, Ewa and SANECKI, Miłosz. Hospital Hallucinosis - where to look for the cause of the delirious syndrome in a geriatric patient and what management to implement. Journal of Education, Health and Sport. 2024;53:102-124. eISSN 2391-8306.
https://dx.doi.org/10.12775/JEHS.2024.53.008
https://apcz.umk.pl/JEHS/article/view/47807
https://zenodo.org/records/10522795

The journal has had 40 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences); Health Sciences (Field of medical and health sciences).
Punkty Ministerialne z 2019 - aktualny rok 40 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 04.01.2024. Revised: 06.01.2024. Accepted: 16.01.2024. Published: 17.01.2024.

Hospital Hallucinosis - where to look for the cause of the delirious syndrome in a geriatric patient and what management to implement

Karolina Tomczyk
https://orcid.org/0009-0008-6295-1166; k.tomczyk1997@gmail.com
Karolina Jurasz
https://orcid.org/0009-0004-4818-3261; kaja97jurasz@gmail.com
Natalia Chojnacka
https://orcid.org/0009-0000-6454-5032; natipati2@interia.pl
Jakub Klarycki
https://orcid.org/0009-0001-4168-0001; jakubklarycki@gmail.com
Dominika Podgórska
https://orcid.org/0009-0005-0023-9630; podgorska1997@gmail.com
Radosław Cymer
https://orcid.org/0009-0007-7165-2806; radoslaw.cymer@outlook.com
Ewa Rzeska
https://orcid.org/0009-0000-4141-2819; ewarzy@gmail.com
Miłosz Sanecki
https://orcid.org/0009-0009-2453-8482; miloszsanecki7@gmail.com

Karolina Tomczyk
District Hospital in Stalowa Wola; Poland, 37-450 Stalowa Wola Staszica 4
https://orcid.org/0009-0008-6295-1166
Karolina Jurasz
Ludwik Rydygier Memorial Hospital in Cracow Osiedle Złotej Jesieni 1, 31-826 Kraków
https://orcid.org/0009-0004-4818-3261
Natalia Chojnacka
Dr. Karol Jonscher Hospital in Lodz ul. Milionowa 14, 93-113 Łódź
https://orcid.org/0009-0000-6454-5032
Jakub Klarycki
District Hospital in Stalowa Wola Staszica 4, Stalowa Wola 37-450
https://orcid.org/0009-0001-4168-0001
Dominika Podgórska
St. Jadwiga Queen Clinical Regional Hospital No. 2 in Rzeszow Lwowska 60, Rzeszów 35-301
https://orcid.org/0009-0005-0023-9630
Radosław Cymer
Lower-Silesian Center of Oncology, Pulmonary and Hematology in Wroclaw pl. L. Hirszfelda 12, 53-413 Wrocław
https://orcid.org/0009-0007-7165-2806
Ewa Rzeska
District Hospital in Pultusk Gajda-Med Sp. z o.o. Ul. Teofila Kwiatkowskiego 19, 06-102 Pułtusk
https://orcid.org/0009-0000-4141-2819
Miłosz Sanecki
St. Jadwiga Queen Clinical Regional Hospital No. 2 in Rzeszow Lwowska 60, Rzeszów 35-301
https://orcid.org/0009-0009-2453-8482

Abstract

Delirium syndrome is a serious, and often underestimated, problem arising in elderly patients. The number of accurate diagnoses of this acute condition is significantly lower than actuall present. This is often due to the attribution of its symptoms to the underlying disease. Delirium syndrome, by leading to perceptual disturbances in the patient, impairs his functioning and threatens health and even life of a patient. The pathophysiology of the onset of delirium is not well understood, with many factors influencing its development. Those directly related to the patient (predisposing), as well as triggering factors. In geriatric patients, the risk of developing delirium is much higher than in younger patients due to the depletion of the body's functional reserves. Homeostasis of the body's systems is disturbed even with small negative stimuli. It is important to closely observe the patient, taking a well-gathered history of the patient's baseline health status and the changes that have occurred in the patient's condition. A well-conducted physical examination and diagnostic imaging is essential. There is no universal scheme for managing a patient who is delirious. It is important to take an personalized approach and quickly find the cause and try to treat it. We can use commonly available scales and guidelines for diagnosing the delirious syndrome, such as ICD-10, DSM-5 or CAM, to make the accurate diagnosis easier. It has been shown that with the help of non-pharmacological preventive management, we can significantly reduce the number of consciousness disorders that appear in elderly patients under the course of delirium. In severe cases, pharmacotherapy comes to our aid.

Keywords: delirium, geriatry, psychiatry, acute condition

Introduction

Delirium (delirium syndrome) is an acute or subacute condition that proceeds with a reversible disturbance of consciousness. The patient finds himself in autopsychic orientation, he knows who he is. However, the allopsychic orientation is disturbed, pateint has no awareness of place, time and surroundings. A problem in the clear perception of reality dominates. There appears distortion and falsification of reality in the form of illusions and hallucinations. The patient experiences cognitive impairment, inability to direct and maintain attention, limited reception and processing of incoming stimuli [1, 2]. Delirium can progress in three forms: hyperactive with agitation, hypocative with retardation and mixed [3]. Delirium appears rapidly, the severity of symptoms is variable over time, often with an increase in the early evening hours. The duration is highly variable, ranging from a few hours, to a few days, weeks and sometimes even months, but according to the definition, the condition cannot last more than 6 months [4]. Typically, the patient struggles with the discomfort for about 1-2 weeks. The cause can be related to the patient's health, the substances he or she is taking or has stopped taking, or the coexistence of the triggers. It is hard to find a single stimulant that causes delirium syndrome. Usually the cause of delirium is multi-factorial, especially in the elderly, whose predisposition makes them more vulnerable to the negative effects of delirium-inducing stimuli [5].

Epidemiology

Literature findings on the incidence of delirium in the geriatric population vary and depend on the patient's condition prior to the onset of delirium, the reason for hospitalization, the length of stay in the hospital, the type of the department, and the surgical and pharmacological treatment provided [5]. However, all sources remain unanimous that the number of diagnosed cases is significantly underestimated, especially if the delirium syndrome is hypoactive and/or overlaps with dementia [6,7,8].

The prevalence of delirium in the elderly is estimated at about 1-3%. In the United States, more than 2.6 million people in geriatric populations suffer from delirium each year. It is the most

common complication of hospitalization of patients over the age of 65. In hospital emergency departments, between 9.6% and 12.3% of patients develop a delirious syndrome. In internal medicine wards, this figure rises to 18-35%. In surgical department admission, it rises to 74%, and in intensive care units (ICUs) it rises to as much as 80% of patients with mechanically assisted ventilation. Among geriatric patients admitted to the hospital, half of them develop symptoms of delirium. Despite such high numbers, the underestimation of the percentage of undetected cases of delirium is put at 60%[3,9].

The occurrence of delirium in a patient, in addition to inconvenient symptoms, also implies a high risk of mortality. In internal medicine wards, a patient with delirium has a 1.5 times higher risk of death in the following year, and in the emergency department - a 70% higher risk within 6 months of admission [10]. Delirium occurring in the postanesthesia care unit increases the risk of death by 5 times within 6 months, and in the ICU it increases the risk of mortality by 2.4 times [9].

Etiology

Many researchers have made the connection between delirium and advanced age [11]. Geriatric patients show less adaptability to changing conditions, their homeostasis can be shaken much more easily than that of the average young adult. The brain's adaptive capacity and its reserves of functional reserve decrease, putting them at risk of developing symptoms of delirium much more quickly [3,4,12]. If the propensity is high, the intensity of the harmful stimulus to trigger the onset of the reaction may be relatively low [13].
Delirium develops as a consequence of metabolic disorders, acute somatic conditions, toxin poisoning or intracranial disorders [3]. For a delirium syndrome to develop, one simple mechanism is not enough. There is an overlap of inflammatory, endocrine factors, oxidative stress, neuronal aging, disruption of the sleep-wake cycle, stress factors and neurotransmitter deficiency that lead to acute brain dysfunction.[4,14].
From the available studies, it appears that the cholinergic system plays a notable role in the development of delirium. The degree of cognitive deficits in patients treated with anticholinergic drugs such as atropine, scopolamine, tricyclic antidepressants (TCAs), and benzodiazepines (BZDs) correlates with the concentration of these substances in the blood serum. Opiates and non-steroidal anti-inflammatory drugs (NSAIDs) as well as beta-lactam antibiotics, lithium, β-

blockers, antipsychotics and quinolones also increase the risk of anticholinergic effects [4]. Among neurotransmitters, dopamine also plays a pro-delirium function. Dopaminergic drugs and substances such as L-DOPA, dopamine agonists, as well as bupropion and cocaine can lead to the unpleasant experience of delirium.
In addition, the cholinergic system is also influenced by norepinephrine and serotonin, which together with dopamine regulate the sleep-wake cycle [4,15].
From a clinical point of view, the course of mayhem syndrome can be divided into hyperactive, hypoactive and complex-mixed.[16]. The development of this condition is influenced by both predisposing factors and triggering factors. A summary of these is shown in Figure 1 [3,7,17].

Predisposing factors	**Triggers**
Old age, especially >65 years old	Surgeries, surgical interventions
History of delirium	Electrolyte imbalances
Dementia syndrome	Infections, somatic conditions
Malnutrition, dehydration	Blood loss
Abuse of substances, medications, alcohol	Medications, polypragmasia
Depression	Drugs, or cancellation of them
Social isolation, impairment	Immobilization of the patien
Anemia	Lack of sleep
Impaired vision, hearing	Change of surroundings, staying in a foreign place
Fatigue	Prolonged maintenance of a urinary catheter
Disorders of the sleep-wake cycle	Toxins
Multimorbidity	Endocrine disorders

Figure 1

In the case of delirium syndrome, one can see a clear relationship between the susceptibility of the patient, the trigger factor, and the onset of symptoms. If the body shows an increased predisposition, a small harmful stimulant is enough to cause delirium, which in a healthy body would not be an issue [13].

A number of studies show a particular link between delirium and the advanced age of the patient. Aging is associated with a decline in physiological and adaptive reserves. Maintaining homeostasis in systems becomes an increasing undertaking for the body. Common inflammatory conditions due to chronic diseases of the kidneys, liver, heart, lungs, central nervous system, among others, increase excitability in the context of the onset of maya [17,18]. Multimorbidity occurring in a patient is associated with the intake of multiple drugs from different groups, with a wide spectrum of action. It is not uncommon for polypragmasy to lead to toxic interactions of these drugs and the occurrence of numerous adverse symptoms. When using multiple drugs by a patient, special attention should be paid to the risk of aggravation of their effects, the occurrence of intoxication or abstinence syndrome. In addition, the use of herbal medicines, so beloved by patients, whose effects are hard to determine, can have a negative impact [3,9].

Factors that are not directly related to the patient, but affect the body indirectly, also have a significant impact on the onset of delirium. A change of surroundings, an increase in the intensity of light or sound stimuli reaching the patient, a stay in a hospital or nursing home, loss of contact with loved ones, being cared by strangers, all the things mentioned lead to the onset of acute stress, which very often will be prolonged. Constant activation of the sympathetic nervous system effectively depletes the body's protective reserves, leading to changes in homeostasis and greatly increasing the chances of delirium. In acute inflammation, as well as trauma, there is also an increase in cortisol levels, which is also relevant to the patient's symptoms [9,14].

Causes of delirium (showed in Figure 2), we can divide into groups, depending on the underlying cause point [3].

somatic	- heart attack - heart failure - cardiac arrhythmia - shock	- respiratory failure - dehydration - malnutrition - pain
metabolic disorders	- kidney failure - liver failure - anemia - hypoxia	- hypoglycemia - thyroid disease - electrolyte imbalacnes - acid-base homeostasis imbalances
central nervous system disorders	- head injuries - epilepsy - post-stroke condition - cerebrovascular diseases (encephalopathy)	- meningitis - migraine - subdural hematoma - brain tumors
systemic disease	- poisoning - infection - cancer	- multi-organ trauma - heat stroke - perioperative conditions
idiopathic mental disorders	- mania - depression - schizophrenia	
psychoactive substances and drugs	- complications of pharmacotherapy - poisoning - withdrawal syndrome	

Figure 2.

However, it is important to note that in geriatric patients, the cause of the delirium syndrome is rarely clearly established. This is related to the co-occurrence of the above-mentioned conditions and triggers [4,7,9].

Clinical manifestation

In the clinical process of diagnosing a patient for delirium syndrome, three main presentations have been distinguished: hypoactive delirium, hyperactive delirium, and mixed delirium [3,16].

Hyperactive delirium

Patients often have anxiety, restlessness and associated motor agitation. Increased psychomotor drive and emotional lability predominate. Positive symptoms such as illusions, hallucinations or delusions are not uncommon. Visual hallucinations occurring in patients are characterized by color saturation, and are vivid, scenic and mobile. Much less frequently, but tactile, auditory or olfactory hallucinations also occur [1].

In the case of delusions, the patient has the feeling of being the protagonist of a given scenery, oneiric delusions prevail. Patients try to escape from a given scenario, attempt to leave the bed, remove vascular catheters or a urethral catheter [16]. The patient's mood is often consistent with the content of the delusions.

These patients are agitated, speak in a loud, unstructured manner and are often incomprehensible to those around them [1]. There is a significant risk of aggressive, self-destructive or paranoid behavior. The threat to the life and health of the individual concerned and those around him increases significantly [3,16].

The patient may develop a specific manipulative syndrome - pulling threads, plucking fabrics, rearranging and correcting objects. Movement disorders appear - myoclonus, intention tremors and changes in muscle tension, often threatening falls and injury [1]. Stimulation of the autonomic system can manifest not only in the patient's readiness to run away or behave aggressively, but also manifest somatically as excessive sweating, tachycardia, pupil dilation - especially in delirium associated with toxin intoxication or in the course of abstinence syndrome [3].

Hypoactive delirium

This course is characterized by withdrawal, deterioration of the patient's contact with the environment. The patient often does not comprehend where he is, what is happening around him. He perceives the world as distorted, and the phenomena reaching him are falsified. Drowsiness prevails in him, and his response to stimuli is often impaired [3,16]. This form occurs in greater

numbers in the course of delirium in geriatric patients, often remaining unrecognized which is associated with a higher rate of complications and mortality [1,7,19].

Delirium with a mixed course

This is the most common presentation, occurring in more than half of patients. The patient may have a predominantly hypo- or hyperactive form, but cases are also encountered when symptoms alternate in their extrema [3,16].

Insomnia occurring at night and sleepiness during the day lead to a reversal of the daytime rhythm. The analgosedation used to reduce pain, drug or facilitate the patient is often mistaken for rest and recuperation of the patient, leading to sleep deprivation [16]. Symptoms of delirium usually fluctuate over time, and are most severe in the evening hours [4].

Diagnosis

Delirium syndrome is a condition easy to miss. Its diagnosis requires close observation of the patient, a carefully taken history, a thorough physical examination, laboratory and imaging exams. The basis of the diagnosis is the determination of the patient's baseline mental status and the severity of any changes that occur over a period of hours or days [5]. Often, we are already able to make a suspicion of cognitive impairment or isolate key features of a delirious patient based on a brief bedside examination [1,7].

In order to establish a diagnosis of delirium, it is required to identify symptoms (at least of mild intensity) in each of the following areas.
1. Attention-deficit disorder
2. Global cognitive deterioration

To help physicians,there are frequently used scales and guidelines for diagnosing delirium, such as ICD-10 (International Classification of Diseases - Tenth Edition) [20], DSM-5 (Diagnostic and Statistical Manual of Mental Disorders) [21] or CAM (Confusion Assessment Method) [22]. The scales are shown in Figures 3,4,and 5.

3. Psychomotor disorders
4. Disturbances of the diurnal rhythm
5. Emotional disorders

ICD-10

Figure 3.

DSM-5

Criterion	
A	A disturbance in attention (i.e., reduced ability to direct, focus, sustain, and shift attention) and awareness (reduced orientation to the environment)
B	The disturbance develops over a short period of time (usually hours to a few days), represents a change from baseline attention and awareness, and tends to fluctuate in severity during the course of a day.
C	An additional disturbance in cognition (e.g. memory deficit, disorientation, language, visuospatial ability, or perception).
D	The disturbances in Criteria A and C are not better explained by a pre-existing, established or evolving neurocognitive disorder and do not occur in the context of a severely reduced level of arousal, such as coma
E	There is evidence from the history, physical examination or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal, or exposure to a toxin, or is due to multiple etiologies.

Figure 4.

CAM

The diagnosis of delirium can be determined when conditions 1 and 2 and 3 and/or 4 are met	
1. Acute Onset and Fluctuating Course	This feature is usually obtained from a family member or nurse and is shown by positive responses to the following questions: Is there evidence of an acute change in mental status from the patient's baseline? Did the (abnormal) behaviorfluctuateduring the day, that is, tend to come and go, or increase and decrease in severity?
2. Inattention	This feature is shown by a positive response to the following question: Did the patient have difficulty focusing attention, for example, being easily distractible, or having difficulty keeping track of what was being said?
3. Disorganized Thinking	This feature is shown by a positive response to the following question: Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?
4. Altered Level of Consciousness	This feature is shown by any answer other than "alert" to the following question: Overall, how would you rate this patient's level of consciousness? (alert [normal], vigilant [hyperalert], lethargic [drowsy, easily aroused], stupor [difficult to arouse], or coma [unarousable])

Figure 5.

The basis for differentiation is to distinguish delirium from dementia. The main criterion here is time. Symptoms in the case of dementia are long-lasting, more than 6 months, the build-up of symptoms is slower than in delirium. In the case of delirium syndrome, we expect a rather acute course, with suddenly developed symptoms of high intensity [15].

Treatment and prevention

We must treat delirium as an acute condition that threatens the life and health of the patient [4,9]. Patient should be constantly monitored, and management should be personalized, depending on age, cause and body capacity. Each step must be thought out and introduced with precaution. Too rapid compensation of electrolyte imbalance can lead to disorders associated with hypernatremia

or hyperkalemia, patient's overhydration can lead to circulatory failure [3]. The first and most important step in our action is non-pharmacological management, i.e. seeking to identify the cause of the delirium and remove it. In the case of hospitalized patients, it is recommended to start up quickly and restore pre-hospitalization function as soon as possible. Bedside rehabilitation of the patient is often suggested. Care should be taken to keep the number of changing stimuli reaching the patient as low as possible - try to keep the environment stable, both in terms of where the patient is, but also the personnel in contact with the patient. Noise or too harsh lighting also have a bad effect [4]. It is necessary to take care of the correct diurnal rhythm and sleep hygiene of the patient [9]. If the patient's symptoms occur as a consequence of somatic or metabolic disorders, the doctor's task is to diagnose and treat them as soon as possible. A well-gathered history of current and past illnesses, medications taken, chronic or acute pain is the key to making an accurate diagnosis.

It is important to take into account the opportunity to contact the family. Ensure that the patient knows what is the day, what time it is and what events of the day have taken place. Make it possible for patient to wathc TV and read the newspapers.

Non-pharmacological management plays an important role in the prevention of delirium, the steps of which are included in Figure 6 [3].

1	Ensuring the correct functioning of the patient's cognitive functions - friendly, homogeneous environment, proper lighting, no noise, limiting the number and variability of medical staff to the required minimum, constant contact with the family, access to new news from the patient's environment - radio, TV, newspaper, explaining to the patient where he is, for what purpose, ensuring that the patient receives auditory stimuli correctly - hearing aid.
2	Early patient mobilization and rehabilitation
3	To neutralize the risk of developing infection - the earliest possible catheterization of the patient, and in the case of a developed infection, effective treatment
4	Treatment of patient's pain, constant control of pain scale
5	Control patient's hydration status, supply fluids orally/ intravenously, avoid constipation
6	Taking care of proper nutrition of the patient, supplementing deficiencies of micro and macroelements
7	Making sure the patient sleeps properly, avoiding daytime naps, controlling the sleep-wake cycle

Figure 6.

When non-pharmacological methods fail and the patient is agitated, aggressive or poses a danger to himself or those around him, pharmacology can step in. In delirium with agitation, the most common drugs used are antipsychotics - olanzapine, haloperidol, quetiapine. The use of benzodiazepines (BZD) should be reserved for the treatment of abstinence syndrome or as a second-line treatment when antipsychotics do not work [1,3].

Homeostasis in elderly patients is unstable and sensitive to fluctuations. And in fact, a small change can propagate to the development of a delirious syndrome. Patients over the age of 65 should be monitored especially carefully during their hospitalization. The number of delirium cases that occur is significantly underestimated. A large proportion of them are attributed to the underlying disease. Prophylactic management with non-pharmacological, multicomponent treatments has been shown to be effective and has gained widespread acceptance as the most effective strategy for treating delirium [23].

Disclosures

Author's cotribution:

Conceptualization – Karolina Tomczyk, Karolina Jurasz, Dominika Podgórska

Formal analysis – Ewa Rzeska, Jakub Klarycki

Investigation – Jakub Klarycki, Miłosz Sanecki, Radosław Cymer

Writing - rough preparation –Karolina Tomczyk, Natalia Chojnacka, Dominika Podgórska

Writing - review and editing – Karolina Jurasz, Radosław Cymer, Miłosz Sanecki

Visualization – Ewa Rzeska, Natalia Chojnacka

All authors have read and agreed with the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

Funding statement: No external funding was received to perform this review.

Statement of institutional review committee: not applicable.

Statement of informed consent: not applicable.

Statement of data availability: not applicable.

[1]

Piotr Gałecki, (Psychiatria, Szulc A, Urban E. *Psychiatria*. Edra Urban & Partner, Copyright; 2020.

[2]

Ralston SH, Penman ID, Strachan MWJ, Hobson RP. *Davidson's Principles and Practice of Medicine*. 23rd ed. Churchill Livingstone/Elsevier; 2018.

[3]

Cybulski M, Krajewska-Kułak E, Gabryelewicz T. *Wielkie Zespoły Geriatryczne* . (Zaucha-Nowotarska I, AD VERBUM Iwona Kresak, eds.). Edra Urban & Partner Sp. z o.o.; 2021.

[4]

Iglseder B, Frühwald T, Jagsch C. Delirium in geriatric patients. *Wiener Medizinische Wochenschrift*. Published online January 10, 2022. doi:https://doi.org/10.1007/s10354-021-00904-z

[5]

Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. *The Lancet*. 2014;383(9920):911-922. doi:https://doi.org/10.1016/s0140-6736(13)60688-1

[6]

Oh ES, Fong TG, Hshieh TT, Inouye SK. Delirium in Older Persons. *JAMA*. 2017;318(12):1161. doi:https://doi.org/10.1001/jama.2017.12067

[7]

Mattison MLP. Delirium. *Annals of Internal Medicine*. 2020;173(7):ITC49-ITC64. doi:https://doi.org/10.7326/aitc202010060

[8]

Ritter SRF, Cardoso AF, Lins MMP, Zoccoli TLV, Freitas MPD, Camargos EF. Underdiagnosis of delirium in the elderly in acute care hospital settings: lessons not learned. *Psychogeriatrics*. 2018;18(4):268-275. doi:https://doi.org/10.1111/psyg.12324

[9]

Hshieh TT, Inouye SK, Oh ES. Delirium in the Elderly. *Clinics in Geriatric Medicine*. 2020;36(2):183-199. doi:https://doi.org/10.1016/j.cger.2019.11.001

[10]

Pandharipande PP, Girard TD, Jackson JC, et al. Long-Term Cognitive Impairment after Critical Illness. *New England Journal of Medicine*. 2013;369(14):1306-1316. doi:https://doi.org/10.1056/nejmoa1301372

[11]

Setters B, Solberg LM. Delirium. *Primary Care: Clinics in Office Practice*. 2017;44(3):541-559. doi:https://doi.org/10.1016/j.pop.2017.04.010

[12]

Bugiani O. Why Is Delirium More Frequent in the elderly? *Neurological Sciences*. 2021;42(8). doi:https://doi.org/10.1007/s10072-021-05339-3

[13]

Inouye SK. Delirium in Older Persons. *New England Journal of Medicine*. 2006;354(11):1157-1165. doi:https://doi.org/10.1056/nejmra052321

[14]

Dunne SS, Coffey JC, Konje S, et al. Biomarkers in delirium: A systematic review. *Journal of Psychosomatic Research*. 2021;147:110530. doi:https://doi.org/10.1016/j.jpsychores.2021.110530

[15]

Bugiani O. Delirium and dementia in the elderly: sometimes associated or always together? *European Neurology*. Published online March 23, 2023. doi:https://doi.org/10.1159/000530226

[16]

Janiszewska, E. (2019) Zespół majaczeniowy (delirium) u krytycznie chorych pacjentów na oddziale intensywnej terapii. Praktyka zawodowa, 11-12, s. 6-11. https://www.ptpaio.pl/dokumenty/81.pdf

[17]

Ahmed S, Leurent B, Sampson EL. Risk factors for incident delirium among older people in acute hospital medical units: a systematic review and meta-analysis. *Age and Ageing*. 2014;43(3):326-333. doi:https://doi.org/10.1093/ageing/afu022

[18]

Ormseth CH, LaHue SC, Oldham MA, Josephson SA, Whitaker E, Douglas VC. Predisposing and Precipitating Factors Associated With Delirium. *JAMA Network Open*. 2023;6(1):e2249950. doi:https://doi.org/10.1001/jamanetworkopen.2022.49950

[19]

Marcantonio ER. Delirium in hospitalized older adults. *New England Journal of Medicine*. 2017;377(15):1456-1466. doi:https://doi.org/10.1056/nejmcp1605501

[20]

World Health Organization. The ICD-10 Classification of mental and behavioural disorders. Clinical descriptions and diagnostic guidelines. World Health Organization, Geneva 1992.

[21]

Meagher DJ, Morandi A, Inouye SK, et al. Concordance between DSM-IV and DSM-5 criteria for delirium diagnosis in a pooled database of 768 prospectively evaluated patients using the delirium rating scale-revised-98. *BMC Medicine*. 2014;12(1). doi:https://doi.org/10.1186/s12916-014-0164-8

[22]

Inouye SK. Clarifying Confusion: The Confusion Assessment Method. *Annals of Internal Medicine*. 1990;113(12):941. doi:https://doi.org/10.7326/0003-4819-113-12-941

[23]

Hshieh TT, Yue J, Oh E, et al. Effectiveness of Multicomponent Nonpharmacological Delirium Interventions. *JAMA Internal Medicine*. 2015;175(4):512. doi:https://doi.org/10.1001/jamainternmed.2014.7779