

# Post Operator Delirium Increasing the Hospital Financial Burden

Haxhire Gani<sup>1</sup>, Majlinda Naco<sup>2</sup>, Greta Gani<sup>3</sup>, Franceska Beqiri<sup>4</sup>, Herion Dredha<sup>5</sup>

<sup>1, 2, 5</sup>UHC Mother Theresa - TIRANA (Albania)

<sup>3</sup>Student Istanbul Technical University - Istanbul (Turkey)

<sup>4</sup>Student Royal College of Surgeon in Ireland Medical University of Bahrain - Bahrain (Bahrain)

UHC. "Mother Teresa", Dept. of Surgery, Clinic of Urology, Tirana, Albania

**Abstract:** Delirium is a clinical syndrome which is difficult to define exactly<sup>(1)</sup> but involves abnormalities of thought, perception and levels of awareness. Postoperative delirium (POD) is a frequent postoperative disorder to the sick and elderly, and always has been associated with extended of day stay in hospital, and certainly more cost for the hospital as well. Additionally, delirium is associated with increased postoperative complications, longer length of stay, longer intensive care unit stay (ICU), and much higher rates of discharge to a nursing home<sup>(1)</sup>. Delirium is a frequent post operative disorder to the sick and elderly<sup>[2,3]</sup>, and has always been associated with extent<sup>[4]</sup> of day stay in hospital, and certainly more cost for the hospital as well. The Postoperative delirium on elderly patients causes an increased mortality and an increasing of mental status deterioration characterized by reduction of environmental recognition as well as the disorder of alertness<sup>(1)</sup>. The purpose of this study is to evident the post operator delirium effects on financial burden of the hospital<sup>(5)</sup>. **Material and methods:** In this study are included<sup>(5)</sup> all patients aged over 65 years old admitted in the urology clinic, who underwent surgery. The number of patients was 1496. The patients who had post operator delirium were 280 patients, ( 18% of all patients). It is calculated the average day stay as well as the medicamental cost without hospital service, hotel service daily meals in cases that did not have delirium and those who did. **Results:** On the average the patients with delirium stayed in the hospital more than the patients without delirium with a significant statistical difference between them  $t=5.12$   $p<0.01$ . During one year the average day stay was 8.9 days and the patients with delirium stayed on the average 9.8 days. On the average, the patients with delirium stayed in the hospital more than the patients without delirium with a significant statistical difference between them ANOVA  $F=26.2$   $P<0.01$ . The average daily cost for patients admitted in urology was 2000 Albanian money (14 Euro). The average cost for patients without delirium was 17.800 Albanian money (127 euro). The average cost for patients with delirium was 19.600 Albanian money ( 140 euro) with a statistically important difference between them of  $p<0.01$ . Because of the increasing of the medicamental cost, the hospital financial burden increases as well. **Conclusion:** Post operator delirium increases the hospital financial burden, with a statistically important difference of  $p<0.01$ .

**Keywords:** Delirium.

## 1. Introduction

According<sup>(6)</sup> to the American Psychiatric Association, Delirium is defined as "a disturbance of consciousness with reduced ability to focus, sustain, or shift in attention, a change in cognition (memory deficit, disorientation, disordered speech) or the development of clutter perception. Age-related changes in physiology and pharmacology can affect every aspect of perioperative care. The changes in surgical demographics will compel the anesthesiologist to become familiar with the physiology and clinical care of the aged.

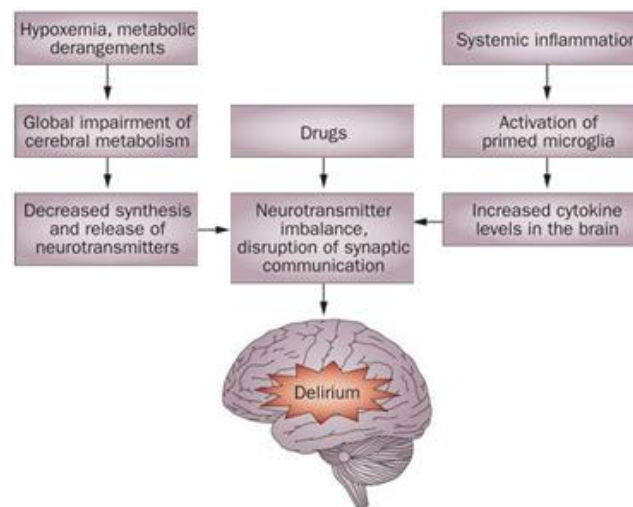
Age-related diseases such as cerebral arteriosclerosis, Alzheimer's and Parkinson's disease are all more common with advancing age. Most strokes affect those older than 70 years and the risk doubles every 10 years after age 55. The prevalence rates for dementia and Alzheimer's disease double approximately every five years from rates of 2 to 3 percent in the age category of 65 to 75 years to more than 30 percent in persons age 85 and older. Onset of symptoms in Parkinson's disease usually occurs between ages 60 and 69, although in 5 percent of patients the first signs are seen prior to age 40. About 1 percent of persons age 65 and older and 2.5 percent of those older than age 80 have Parkinson's disease.<sup>[7,8,9]</sup> Delirium is a very costly disorder, and health services costs associated with diagnosing, treating, and the

consequences that flow from it are very high. Impairment of eyesight and hearing, certainly associated with higher incidence of this disorder. Causes of postoperative psychotic disorders are multi-factorial. Mechanisms that contribute to the postoperatively psychotic disorder (POPD) are not very known. A lot of theories support abnormal neurotransmissions.<sup>(1)</sup>

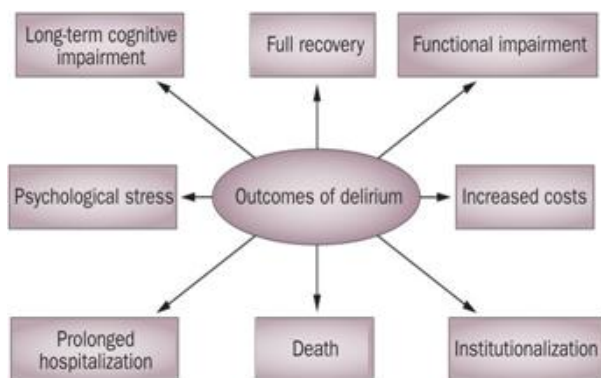
Increase in magnitude with advancing age, represent aging. Many theories emphasize aberrant neurotransmission. One of the most widely accepted mechanisms is cholinergic deficiency; increased serum anticholinergic activity is associated with delirium<sup>[10]</sup> Other hypotheses invoke abnormalities in melatonin and serotonin,<sup>[11,12]</sup> with abnormal tryptophan metabolism unifying these ideas because tryptophan is Neuronal damage is an alternative explanation, secondary either to oxidative stress.<sup>[13]</sup> or inflammation. Proinflammatory cytokines increase in postoperative delirium,<sup>[14]</sup> especially interleukin-6 and interleukin-8.<sup>[15]</sup> In addition, elevations in C-reactive protein occur in delirious patients. A link between inflammation and neurotransmission has been proposed, with inflammation-induced perivascular edema leading to hypoxia and subsequent reduced synthesis of acetylcholine.<sup>[16]</sup> It is generally thought that delirium represents global brain dysfunction. Electroencephalographic findings reveal a decrease in the fast alpha frequencies and an increase in the

slower theta rhythm. [17] In hypoactive delirium, hypoperfusion occurs globally in the frontal, temporal, and occipital lobes, and focally in the caudatehead, thalamus, and lenticular nuclei. Delirium improves once blood flow returns to normal, suggesting that cerebral hypoperfusion may play a role. [18] Effects of aging on the nervous system include: selective attrition of cerebral and cerebellar cortical neurons neuron loss within certain areas of the thalamus, locus ceruleus, and basal ganglia ,general reduction in neuron density, with loss of 30 percent of brain mass by age 80 decreased numbers of serotonin receptors in the cortex ,reduced levels of acetylcholine and acetylcholine receptors in several regions of the brain decreased levels of dopamine in the neostriatum and substantia nigra and reduced numbers of dopamine receptors in the neostriatum. The association of serotonergic, cholinergic and dopaminergic systems, respectively with mood, memory, and motor function, may partially account for depression, loss of memory and motor dysfunction in the elderly.

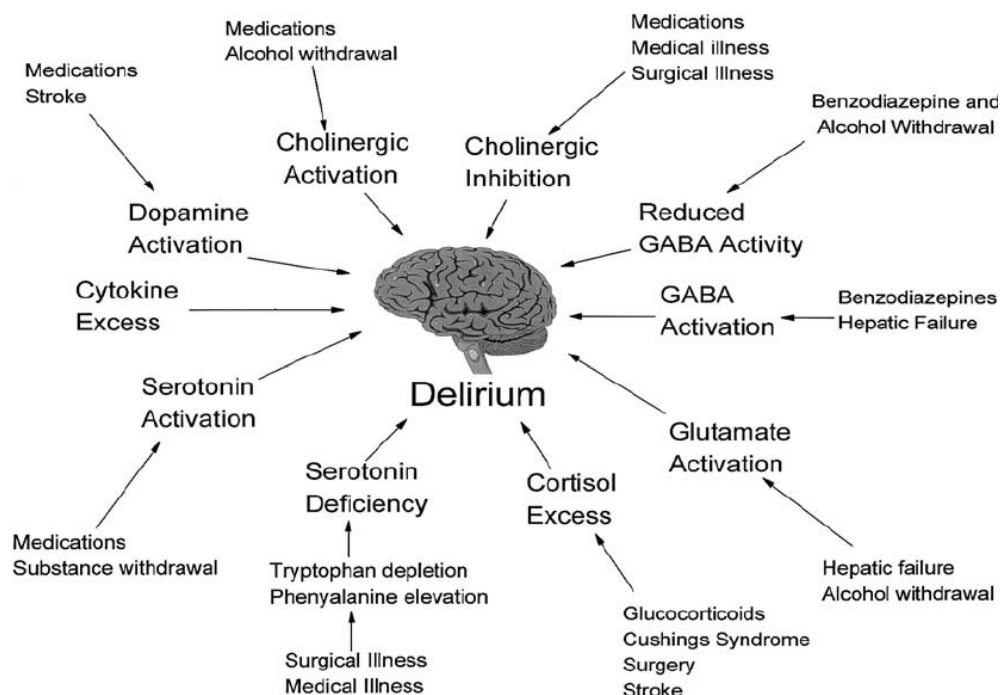
**Relationships between various etiological factors in delirium. systemic inflammation can be the result of systemic infection, trauma or surgery.** Neurotransmitters with possible roles in delirium include acetylcholine, dopamine, 5-hydroxytryptamine, norepinephrine, glutamate and ?-aminobutyric acid. [20]



The outcomes of delirium are summarized in Figure 1. [12]



Phathophysiology-of delirium. The evidence –suport multiple mechanisms of delirium – (21)



According [22,5] to the American Psychiatric Association, Delirium is defined as "a disturbance of consciousness with the reduction of the ability to focus, sustain, or change in focus, a change in the recognition (memory deficit, disorientation, spoken of untidiness) or the development of

perception mess. Postoperative complications specific to elderly surgical patients such<sup>(5)</sup> as delirium will be increasingly relevant in the coming decades. Delirium postoperative has been associated with increased morbidity and mortality and long hospital stay . With increase of the

average age the elderly surgery has increases as well. Old age is a multy factor proces where adaptive capacity is gradually reduced and gradual reducion of funcional ability of many systems is seen. With the increase of the average age the surgeries in elderly are also increased<sup>1</sup>. The surgery plays an important role on emotional and spiritual deterioration on elderly. The delirium causes an increased mortality and an increasing of mental status deterioration characterized by reduction of environmental recognition as well as the disorder of alertness.

**Aim of study**

Is to evident the post operator delirium effects<sup>5</sup> on financial burden of the hospital.

**2. Material and Methods**

In this study are included all patients aged over 65 years old admitted in the urology clinic, who underwent surgery. This study is prospective and random. Patients that had been diagnosed and treated for psychiatric problems ( Alzheimers, Dementia senile, Scysophrenia) were excluded from the study.

All patients are evaluated preoperators for their minimental status with MMSE. Minimental examination (MMSE) is a questionnaire for the evaluation of the recognizable function. It is an easy method and valuable in trust. The highest result is 30 and a lower result 23 shows for recognition damage [23,24]. Anyways it is suggested that the most significant [25].recognition damage is with 21 points. The effectiveness of routine screening of postoperative Delirium (POD)in the elderly using Confusion Assessment Method(CAM)<sup>[26]</sup>. Psychiatrists are not necessary in this case. The number of patients was 1496.

**3. Results**

The patients who had post operator delirium were 270 patients, (18%of all patients).It is calculated the average day stay as well as the medicamental cost without hospital service, hotel service daily meals in cases that did not have delirium and those who did investigations

These should be guided by the clinical presentation and are aimed at identifying an underlying cause of the delirium. Typical investigations that can be performed include:

Full history, including collateral history and cognition testing, e.g. mini mental state examination. Full examination - look for sources of infection, including the ears and throat; look for rashes, lymphadenopathy and check for constipation.

Bloods - include FBC, U&Es and creatinine, glucose, calcium, magnesium, LFTs, TFTs, cardiac enzymes, and PSA. Creatinine is vital to obtain an estimated glomerular filtration rate (eGFR), as this may indicate impaired renal function and affect the handling of medications, and may predispose to drug-induced delirium. Urine dipstick testing and microscopy. Blood cultures and serology, if indicated. ECG. Pulse oximetry and arterial blood gas, if indicated. Are evaluated all the data taken from patients and from their

examinations as: age, usage of medications, symptoms and problems, biochemical and clinical balance, hemodynamic examination, and preoperative, intra operative and postoperative evaluations.

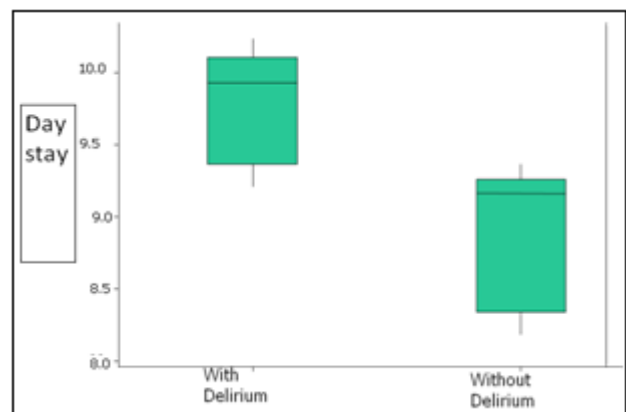
**Table 1: General Data.**<sup>(27)</sup>

Age	65-70 years	71-75 years	76-80 years	>80 years	Total number of patients
Females	36	22	19	6	83
Males	162	138	133	56	489
Females	20	12	10	8	50
Males	148	149	147	50	494
Females	15	10	8	6	39
Males	142	80	78	41	341

**Table 2: Post-operativ Delirium Incidence.**<sup>(27)</sup>

age	Female	Men	Total
65-70 years	1	76	77
71-75 years	1	73	74
76-80 years	1	70	71
>80 years	1	47	48

On the average the patients with delirium stayed in the hospital more than the patients without delirium with a significant statistical difference between them t=5.12 p<0.01. During one year the average day stay was 8.9 days and the patients with delirium stayed on the average 9.8 days.



**Figure:** Average day stay in hospital for patients with delirium and without delirium.<sup>(27)</sup>

On the average, the patients with delirium stayed in the hospital more than the patients without delirium with a significant statistical difference between them ANOVA F=26.2 P<0.01. The average daily cost for patients admitted in urology was 2000 Albanian money (14 Euro). The average cost for patients without delirium was 17.800 Albanian money (127 euro). The average cost for patients with delirium was 19.600 Albanian money (140 euro) with a statistically important difference between them of p<0.01. Because of the increasing of the medicamental cost, the hospital financial burden increases as well.

Authors also note that the patients with postoperative delirium have a tendency to increase their day stay in hospital compared to the patients without delirium, but with the same preoperative phisic status, with the same type of surgery and anaesthesia as well as with no intraoperative differences. This, because a patient with dysfunctional



conscience, damaged, can rip off periferic IV, urinar catheter, sometimes even the central one. These actions have their own effect in the disease's evolution. The factors that precipitate postoperative delirium are many, some are modifiable and some immovable. The more factors that precipitate postoperative delirium, the more evident is delirium.<sup>(28)</sup>-(JAMA 1996;275:852-857).

#### 4. Conclusions

From this study it is evidently noticed that postoperative delirium in elderly in urology has an important influence in the increasing of the day stay in hospital than the patients who didn't have delirium, even though they were in the same conditions, morbidity and physic status, with a statistically important difference between them . (ANOVA F=26.2 P<0.01.) and certainly more cost for the hospital as well. Post operator delirium increases the hospital financial burden, with a statistically important difference of p<0.01.

#### 5. Recommendations

It is the duty of the anaesthetist doctor that the good management if the preoperative, intraoperative and post operative period, is very important, not only in the good physical state of the elder patient, but in the psychic status as well. So it prevents the postoperative delirium, which would bring decrease of the day stay in hospital as well the financial burden.

#### References

- [1] Haxhire Gani, Rudin Domi, Nertila Kodra, Pirro Prifti, Majlinda Naco, Vjollca Beqiri, Durata Torba, Rajmonda Tare Med Arh. 2013 Feb; 67(1): 45-
- [2] Charlene M. Vollmer, RN, BSN-BC, Jennifer Bond, MS, RN, CCRN, Brenda M. Eden, MS, APN, ACNS-BC, David S. Resch, MD, Linda Fulk, RN, Sherry Robinson, PhD, GCNS, Larry F. Hughes, PhD. Urologic Nursing. Incidence, Prevalence, and Under-recognition of Delirium In Urology Patients. Disclosures Urol Nurs. 2010;30(4):235-241,254.
- [3] Inouye SK. Delirium in older persons. N Engl J Med. 2006;354:1157-65. [PubMed]
- [4] Hosking MP, Warner MA, Lobdell CM, Offord KP, Melton LJ, 3rd. Outcomes of surgery in patients 90 years of age and older. Jama 1989;261:1909-15. A case series of 795 surgical patients 90 years of age and older and their long-term outcomes.
- [5] ANAESTH, PAIN & INTENSIVE CARE; VOL.18 NO.3(2014):JULY-SEPTEMBER
- [6] Rudolph JL, Jones RN, Rasmussen LS, Silverstein JH, Inouye SK, Marcantonio ER. Independent vascular and cognitive risk factors for postoperative delirium. Am J Med. 2007; 120: 807-813
- [7] Muravchick S. The physiologic and pharmacologic implications of aging. 37<sup>th</sup> Annual Refresher Course Lectures and Clinical Update Program. American Society of Anesthesiologists. 1986; No. 275
- [8] The Aging Brain. *Geriatrics*. 1998; 53.
- [9] Hendrie HC. Epidemiology of alzheimer's disease. *Geriatrics*. 1997; 52:S4-S8. Uitti RJ. Tremor:

- How to determine if the patient has parkinson's disease. *Geriatrics*. 1998; 53:30-36.
- [10] Mussi C, Ferrari R, Ascari S, et al. Importance of serum anticholinergic activity in the assessment of elderly patients with delirium. *J Geriatr Psychiatry Neurol* 1999;12(2):82-6.
  - [11] Balan S, Leibovitz A, Zila SO, et al. The relation between the clinical subtypes of delirium and the urinary level of 6-SMT. *J Neuropsychiatry Clin Neurosci* 2003;15(3):363-6.
  - [12] Lewis MC, Barnett SR. Postoperative delirium: the tryptophan dysregulation model. *Med Hypotheses* 2004;63(3):402-6.
  - [13] Karlidag R, Unal S, Sezer OH, et al. The role of oxidative stress in postoperative delirium. *Gen Hosp Psychiatry* 2006;28(5):418-23.
  - [14] Rudolph JL, Ramlawi B, Kuchel GA, et al. Chemokines are associated with delirium after cardiac surgery. *J Gerontol A Biol Sci Med Sci* 2008;63A(2):184-9.
  - [15] de Rooij SE, van Munster BC, Korevaar JC, et al. Cytokines and acute phase response in delirium. *J Psychosom Res* 2007;62(5):521-5.
  - [16] Hala M. Pathophysiology of postoperative delirium: systemic inflammation as a response to surgical trauma causes diffuse microcirculatory impairment. *Med Hypotheses* 2007;68(1):194-6.
  - [17] Plaschke K, Hill H, Engelhardt R, et al. EEG changes and serum anticholinergic activity measured in patients with delirium in the intensive care unit. *Anaesthesia* 2007;62(12):1217-23.
  - [18] Yokota H, Ogawa S, Kurokawa A, et al. Regional cerebral blood flow in delirium patients. *Psychiatry Clin Neurosci* 2003;57(3):337-9.
  - [19] Authors: Tamara G. Fong, MD; Samir R. Tulebaev, MD; Sharon K. Inouye, MD, MPH Medscape Source :NAT.REV.NEUR. 2009 ,PUBLISHING GROUP, Delirium in Elderly Adults: Diagnosis, Prevention and Treatment
  - [20] NYU College of Nursing, New York, NY
  - [21] E. R. Marcantonio, J. L. Rudolph, D. Culley, Review Article: Serum Biomarkers for Delirium. *The Journals of Gerontology Series A Biological Sciences and Medical Sciences* 61(12):1281-1286. DOI: 10.1093/geron/61.12.1281
  - [22] American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders (ed 4)—Text revision (DSM-IV-TR). Washington, DC, American Psychiatric Association, 2000
  - [23] World Health Organization: ICD-10 <http://apps.who.int/classifications/apps/icd/icd10online/>. [Accessed 8 February 2011].
  - [24] Adamis D, Sharma N, Whelan PJ, Macdonald AJ. Delirium scales: a review of current evidence. *Aging Ment Health* 2010; 14:543-555.
  - [25] Goldenberg G, Kiselev P, Bharathan T, et al. Predicting postoperative delirium in elderly patients undergoing surgery for hip fracture. *Psychogeriatrics* 2006; 6:43-48. Cited Here...Si kriter vlersues eshet perdorur CAM pa gene nevoja per pranine mjekut psikjater
  - [26] Inouye SK, van Dyck CH, Alessi CA, Balkin S, Siegel AP, Horwitz RI. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Ann Intern Med*. 1990;113(12):941-948.

- [27] British Journal of Medicine & Medical Research 18(1): 1-10, 2016, Article no.BJMMR.25865 ISSN: 2231-0614, NLM ID: 101570965 SCIENCEDOMAIN international [www.sciencedomain.org](http://www.sciencedomain.org) The Importance of Postoperative Delirium (POD) on Elderly Patients in Urology in Increasing the Day Stay in Hospital Haxhire Gani<sup>1\*</sup>, Pirro Prifti<sup>1</sup>, Rudin Domi<sup>1</sup>, Majlinda Naco<sup>1</sup>, Vjollca Beqiri<sup>1</sup>, Bilbil Hoxha<sup>1</sup> and Aurel Janko<sup>1</sup> UHC "Mother Teresa", Tirana, Albania.
- [28] Inouye SK, Charpentier PA. Precipitating factors for delirium in hospitalized elderly persons. Predictive model and interrelationship with baseline vulnerability. JAMA 1996;275:852-857