

PREDIKTORI ISHODA LEČENJA HIRURŠKIH PACIJENATA U JEDINICI INTENZIVNE NEGE: PREGLED LITERATURE

Slobodanka Bogdanović Vasić¹, Dragan Joković², Katarina Pavić¹, Roland Antonić¹, Branimirka Arandžević³, Nikola Savić^{4,5}

¹ Akademija strukovnih studija Šabac, Odsek za medicinske i poslovno-tehnološke studije, Šabac, Republika Srbija

² Opšta bolnica „dr Laza K. Lazarević“, Šabac, Republika Srbija

³ Katedra za zdravstvenu negu, Medicinski fakultet Univerziteta u Novom Sadu, Novi Sad, Republika Srbija

⁴ Medicinska škola „Miša Pantić“, Valjevo, Republika Srbija

⁵ Fakultet zdravstvenih i poslovnih studija, Univerzitet Singidunum, Valjevo, Republika Srbija

* Korespondencija: Slobodanka Bogdanović Vasić, Odsek za medicinske i poslovno-tehnološke studije, Akademija strukovnih studija Šabac, Hajduk Veljkova 10, 15000 Šabac, Republika Srbija; email: s.bogdanovicvasic@gmail.com

SAŽETAK

Intenzivna nega podrazumeva negu životno ugroženih pacijenata, tj. negu kritično obolelih pacijenata, kojima je potreban intenzivan nadzor, lečenje i nega u cilju održavanja hemodinamske i respiratorne ravnoteže, kako bi se smanjio broj komplikacija i smrtnih ishoda. Starenje stanovništva, povećana složenost nege, kao i sve raznovrsnija patologija i simptomatologija određenih bolesti i stanja, utiču na povećanje potrebe za uslugama intenzivne nege u svim granama medicine, pre svega u hirurgiji. Cilj ovog preglednog rada jeste da se identifikuju prediktori ishoda lečenja hirurških pacijenata u jedinicama intenzivne nege (JIN). Podaci su prikupljeni pretraživanjem nekoliko baza podataka: *PubMed*, *Google Scholar*, *Web of Science* i *Embase*. Pretraživanje je sprovedeno za poslednjih dvadeset godina korišćenjem sledećih ključnih reči: jedinica intenzivne nege, hirurgija, prediktori i ishod lečenja. U našu analizu uključeni su radovi koji su analizirali kliničke ishode hirurških pacijenata koji su boravili u JIN. Uočava se da su prediktori ishoda lečenja hirurških pacijenata u JIN: težina kliničke slike pacijenta pre hospitalizacije, vrsta i obim operativnog zahvata, godine starosti, gojaznost, broj komorbiditeta, postoperativne komplikacije, ali i stepen organizovanosti zdravstvene službe i kompetentnost zdravstvenog osoblja. Stoga, na lokalnom, regionalnom i globalnom nivou treba razraditi kontinuirano praćenje i evaluaciju prediktora ishoda lečenja hirurških pacijenata u JIN, imajući u vidu da se hospitalizuju životno ugroženi pacijenti i da postoji visok rizik od komplikacija i smrtnog ishoda. Identifikovanje prediktora ishoda lečenja hirurških pacijenata u JIN, doprineće donošenju strategija za unapređenje lečenja ovih pacijenata.

Ključne reči: hirurgija, jedinica intenzivne nege, prediktori, lečenje, ishodi, komplikacije

Uvod

Hirurgija je grana medicine koja se bavi izučavanjem i lečenjem, pre svega hirurškim (operativnim) putem, različitih bolesti, povreda i deformiteta. Sa većim i bržim razvojem tehnologije i produžetkom životnog veka, povećava se i broj povreda i bolesti, pa samim tim i obim hirurškog tretmana povređenih i obolelih lica. Razvojem transplantacione hirurgije, kao i modaliteta lečenja onko-hirurških pacijenata, produžava se životni

vek pacijenata za koje ranije nije bilo mogućnosti za izlečenje, ili se bar stavlja bolest pod kontrolu (1). Integralni deo hirurgije, kao i svih drugih medicinskih grana je zdravstvena nega, koja, kako u svetu, tako i kod nas, datira od najranijeg perioda. Njena specifičnost u navedenoj oblasti u odnosu na druge nege, jeste u tome što se prevashodno sprovodi u stacionarnim uslovima po principima progresivne nege i što obuhvata sve indikatore i

PREDICTORS OF TREATMENT OUTCOME OF SURGICAL PATIENTS IN THE INTENSIVE CARE UNIT: LITERATURE REVIEW

Slobodanka Bogdanović Vasić¹, Dragan Joković², Katarina Pavić¹, Roland Antoni¹, Branimirka Arandžević³, Nikola Savić^{4,5}

¹Academy of Vocational Studies Šabac, Department of Medical and Business-Technological Studies, Šabac, Republic of Serbia

²General Hospital "dr Laza K. Lazarević", Šabac, Republic of Serbia

³Department of Health Care, Faculty of Medicine, University of Novi Sad, Novi Sad, Republic of Serbia

⁴Medical School "Miša Pantić", Valjevo, Republic of Serbia

⁵Faculty of Health and Business Studies, Singidunum University, Valjevo, Republic of Serbia

* Correspondence: Slobodanka Bogdanović Vasić, Department of Medical and Business-Technological Studies, Academy of Vocational Studies Šabac, Hajduk Veljkova 10, 15000 Šabac, Republic of Serbia; email: s.bogdanovicvasic@gmail.com

SUMMARY

Intensive care involves the care of life-threatening patients, i.e. care of critically ill patients who need intensive monitoring, treatment and care in order to maintain hemodynamic and respiratory balance, in order to reduce the number of complications and deaths. The aging of the population, the increased complexity of care, as well as the increasingly diverse pathology and symptomatology of certain diseases and conditions, influence the increase in the need for intensive care services in all branches of medicine, primarily in surgery. The aim of this review is to identify predictors of treatment outcomes for surgical patients in intensive care units (ICUs). Data were collected by searching several databases: PubMed, Google Scholar, Web of Science and Embase. A search was conducted for the past twenty years using the following keywords: intensive care unit, surgery, predictors, and treatment outcome. Included in our analysis were papers that analyzed the clinical outcomes of surgical patients who stayed in the ICU. It is observed that the predictors of the outcome of the treatment of surgical patients in ICU are: the severity of the patient's clinical picture before hospitalization, the type and scope of the operation, age, obesity, number of comorbidities, postoperative complications, but also the degree of organization of the health service and the competence of the health staff. Therefore, at the local, regional and global level, continuous monitoring and evaluation of predictors of treatment outcomes for surgical patients in the ICU should be developed, bearing in mind that life-threatening patients are hospitalized and that there is a high risk of complications and death. By identifying the predictors of the outcome of the treatment of surgical patients in the ICU, it will contribute to the adoption of strategies to improve the treatment of these patients.

Key words: surgery, intensive care unit, predictors, treatment, outcomes, complications

Introduction

Surgery is a branch of medicine that deals with the study and treatment of different diseases, injuries and deformities, primarily by means of surgical (operative) intervention. With the greater and faster development of technology and the extension of life expectancy, the number of injuries and diseases increases, and therefore, the scope of surgical treatment of injured and ill persons. With the development of transplant surgery, as

well as of treatment modalities for onco-surgical patients, the life expectancy of patients for whom there was previously no possibility of treatment is extended, or at least the disease is brought under control (1). An integral part of surgery, as well as of all other medical branches is health care, which dates back to the earliest period both in the world and in our country. Its specificity in the mentioned field compared to other types of care is that it

standarde u preoperativnom, perioperativnom i postoperativnom periodu (1,2). Jedinica intenzivne nege (JIN) predstavlja zasebnu organizaciju i prostornu/geografsku celinu, koja funkcioniše u saradnji sa drugim odeljenjima u određenoj zdravstvenoj ustanovi (3). Pored dobro organizovanog prostora, JIN karakteriše kontinuirano prisustvo medicinskog osoblja i oprema za izvođenje različitih terapijskih i dijagnostičkih procedura, koja nije standardna na drugim/niziim nivoima progresivne nege (4).

U većini razvijenih zemalja, hirurški pacijenti čine najveći broj pacijenata hospitalizovanih u JIN. Određivanje težine stanja ovih pacijenata pre bilo koje hirurške intervencije i dalje predstavlja težak i odgovoran posao, jer komplikacije do kojih može doći imaju velikog značaja za krajnji ishod lečenja, i mogu značajno uticati na pojavu smrtnih ishoda (5). Značaj proučavanja prediktora u hirurgiji je utoliko veći, što različita akutna stanja, bolesti i povrede koreliraju sa potrebom za hirurškim zbrinjavanjem, kako konzervativnim, tako i operativnim, koje se često sprovodi upravo u JIN. Cilj ovog preglednog rada je da se identifikuju prediktori ishoda lečenja hirurških pacijenata lečenih u JIN-u.

Metod

Podaci za ovaj pregledni rad su prikupljeni pretraživanjem nekoliko baza podataka: *PubMed*, *Google Scholar*, *Web of Science* i *Embase*. Pretraživanje je sprovedeno za poslednjih dvadeset godina korišćenjem sledećih ključnih reči: jedinica intenzivne nege, hirurgija, prediktori i ishod lečenja (komplikacije i mortalitet). U našu analizu uključeni su samo oni radovi koji su analizirali ishode lečenja (komplikacije i mortalitet) hirurških pacijenata koji su boravili u JIN.

Otvoren i zatvoren sistem intenzivne nege

Istraživanja na ovu temu vrše se u čitavom svetu, a u našem istraživanju akcenat smo stavili na pacijente koji se isključivo hirurški zbrinjavaju, iako to nije jedini kriterijum za smeštaj pacijenta u JIN. Polemika se u određenim studijama vodi, pre svega, oko načina organizovanja intenzivne nege hirurških pacijenata, gde se kao dva osnovna modela organizacije pominju tzv. otvoreni i zatvoreni sistem. U otvorenom sistemu intenzivne nege pacijenti se zbrinjavaju u prisustvu hirurga i/ili interniste, te se samo po potrebi konsultuje in-

tenzivista. Nasuprot njemu, u zatvorenom sistemu, intenzivista preuzima stalnu i punu odgovornost za zbrinjavanje pacijenta i donosi sve odluke od njegovog prijema do otpusta (6). Iako se smatra da i jedan i drugi model imaju svoje prednosti, istraživanja u većini zemalja pokazuju da je zatvoreni sistem korisniji za pacijente, naročito one kritično obolele i sa multitraumama (7).

Preoperativni, perioperativni i postoperativni prediktori ishoda

Rezultati dosadašnjih studija potvrđuju, da je teško identifikovati koji pacijenti su pod većim rizikom od komplikacija i smrtnog ishoda nakon operativnog lečenja u odnosu na druge pacijente (8). Međutim, prediktori ishoda hirurških pacijenata dele se na one koji su poznati u preoperativnom periodu, one koji su direktno povezani sa hirurškom intervencijom, kao i na individualne faktore koji doprinose riziku nastanka komplikacija i vode smrtnom ishodu (5).

Preoperativno stanje pacijenta je značajan prediktor, tim pre što osobe koje nemaju komorbiditete, tačnije pridružene bolesti (dijabetes, hipertenziju, srčane bolesti itd.), i koje su mlađe i fizički zdravije imaju veću šansu da ne razviju neku od komplikacija. Procena fizičke kondicije pacijenata može pomoći u oporavku pacijenata, kao i bolji laboratorijski rezultati (npr. hemoglobin, elektroliti, kreatinin itd.) (8,9). Brojna istraživanja ukazuju da stres, anksioznost, depresivne reakcije i psihička destabilizacija mogu negativno uticati na imunološki sistem, dovesti ga u stanje imunosupresije, i time smanjiti sposobnost organizma da se oporavi posle hirurške intervencije (10). Istraživanja dalje pokazuju, da su dužina trajanja operativnog zahvata, složenost operacije, starije godine korisnika usluga, viši indeks telesne mase i hitnost postupka povezani sa lošijim ishodima (11-16). Perioperativni indikatori su oni koji utiču na ishod lečenja tokom samog hirurškog zahvata (npr. vrsta anestezije, dužina operacije, vrsta hirurške intervencije, monitoring vitalnih funkcija, pravovremeno reagovanje u slučaju komplikacija, itd.), a postoperativni na oporavak posle hirurške intervencije (kvalitet postoperativne nege, upravljanje bolom, prevencija infekcija, rehabilitacija, posttraumatski stres, depresija, itd.) (17,18). Ipak, za pouzdaniju procenu ishoda, treba uzeti u obzir i druge faktore, kao što su: sastav tima (hirurškog i anesteziološkog) koji će

is primarily carried out in inpatient conditions according to the principles of progressive care, which encompasses all indicators and standards in preoperative, perioperative and postoperative period (1,2). The intensive care unit (ICU) is a separate organizational and spatial/geographical unit, which functions in cooperation with other departments in the healthcare institution (3). In addition to a well-organized space, the ICU is characterized by the continuous presence of medical staff and equipment used for carrying out various therapeutic and diagnostic procedures, which is not standard at other/lower levels of progressive care (4).

In the majority of developed countries, surgical patients account for the largest number of patients hospitalized in ICUs. Determining the severity of condition of these patients before any surgical intervention is still a difficult and responsible task, because complications that may occur are of great importance for the final treatment outcome, and can significantly affect the occurrence of fatal outcomes (5). The significance of studying predictors in surgery is therefore greater, as various acute conditions, diseases and injuries correlate with the need for surgical treatment, both conservative and operative, which is often performed in the ICU. The aim of this review article is to identify treatment outcomes of surgical patients treated in the ICU.

Methods

Data for this review article were collected by searching a few databases: PubMed, Google Scholar, Web of Science and Embase. The search has been conducted for the last twenty years using the following key words: intensive care unit, surgery, predictors and treatment outcome (complications and mortality). Only those studies that analyzed treatment outcomes (complications and mortality) of surgical patients who stayed in ICUs were included in our analysis.

Open and closed system of intensive care

Research on this topic has been conducted all around the world, and in our study the research effort has focused on patients who are treated solely surgically, although this is not the only criterion for admitting a patient to the ICU. In certain studies, a debate is going on primarily

about the way of organizing intensive care for surgical patients, where the so-called open and closed systems are mentioned as two main models of organization. In the open system of intensive care, patients are cared for in the presence of a surgeon and/or an internist, while an intensivist is consulted only if it is necessary. On the other hand, in the closed system, the intensivist takes on the continuous and full responsibility for the care of the patient and makes all decisions from his admission to discharge (6). Although it is considered that both models have advantages, research in most countries has shown that the closed system is more useful for patients, especially those who are critically ill and with multiple traumas (7).

Preoperative, perioperative and postoperative predictors of treatment outcomes

The results of previous studies confirm that it is difficult to identify which patients are at a higher risk of complications and death after operative treatment compared to other patients (8). However, the predictors of outcome of surgical patients are classified as those that are known in the preoperative period, those that are directly related to surgical intervention, as well as individual factors that contribute to the risk of complications and lead to death (5).

The preoperative condition of the patient is a significant predictor, especially because persons who do not have comorbidities (diabetes, hypertension, heart diseases, etc.), that is, associated diseases, and who are younger and physically healthier have a greater chance of not developing any of the complications. The assessment of patient's physical condition can help in patient's recovery, as well as better laboratory findings (e.g. hemoglobin, electrolytes, creatinine, etc.) (8,9). Numerous studies have shown that stress, anxiety, depressive reactions and psychological destabilization can negatively affect the immune system, lead to the state of immunosuppression, and thus reduce the body's ability to recover after surgical intervention (10). Moreover, research has shown that the duration of operative procedure, the complexity of the operation, older age of service users, higher body mass index and the urgency of the procedure are associated with worse outcomes (11-16).

vršiti zahvat, njihova sposobnost i veštine, lekovi, raspoloživa oprema, podatak da li je intervencija hitna ili elektivna, pa čak i doba godine, doba dana tj. dan u nedelji kada se vrši hirurška intervencija (npr. manji rizik je ukoliko je intervencija radnim danom u odnosu na vikend) i dr. (17,18).

Najpoznatiji sistem klasifikacije fizičkog statusa bolesnika, ali i koristan prediktor mogućeg operativnog i postoperativnih rizika, jeste dobro poznata ASA klasifikacija fizičkog stanja bolesnika (engl. *The American Society of Anesthesiologists* - ASA). Prema ASA - klasifikaciji, bolesnici za anesteziju se grupišu u jednu od šest grupa, pri čemu prva grupa podrazumeva da je bolesnik zdrav i da ima vrlo mali rizik za anesteziju, a grupa šest označava bolesnika sa dokazanom smrću mozga koji je kandidat za davanje organa.

Postoje indeksi koji su usko specifični za određene organske sisteme, koji u zavisnosti o kojem sistemu je reč obuhvataju analizu uticaja niza faktora na umiranje ili komorbiditete, kao npr. Čarlsonov indeks komorbiditeta (engl. *Charlson Comorbidity Index* - CCI) i revidirani indeks srčanog rizika (engl. *Revised Cardiac Risk Index* - RCRI) (19,20). Najčešće korišćeni indeksi/skorovi za predviđanje umiranja u JIN su: skor akutne fiziologije i hronične zdravstvene evaluacije (engl. *Acute Physiology and Chronic Health Evaluation* - APACHE) (21), model verovatnoće umiranja (engl. *Mortality Probability Models* - MPM) (22), skor pojednostavljene akutne fiziologije (engl. *Simplified Acute Physiology Score* - SAPS) (23), sekvencijalna procena zatajenja organa (engl. *Sequential Organ Failure Assessment* - SOFA) (24) i hirurški Apgar skor (engl. *Surgical Apgar Score* - SAS) (25).

Evropsko društvo za intenzivnu medicinu izdalo je smernice za smeštaj pacijenata u JIN, i to onih koji su nestabilnog zdravstvenog stanja ili u visokom riziku za razvoj komplikacija (26). Nešto kasnije, Amerčki koledž je objavio šire smernice za prijem pacijenata u JIN prema određivanju prioriteta, u rasponu od prioriteta 1 (gde se ubrajaju pacijenti koji će imati najviše koristi od prijema) do prioriteta 4 (u koji se ubrajaju oni za koje se smatra da neće imati nikakve koristi) (27).

Osnovni problemi hirurških pacijenata, pa samim tim i zdravstvene nege u JIN su: poremećaj svesti, krvarenje, bol, sva stanja koja iniciraju kontinuirano praćenje vitalnih parametara ili njihovo merenje na pola sata (invazivni i neinvazivni monitoring), politraumatizam, primena nekonvencio-

nalne terapije i drugih terapijskih postupaka (oksigenoterapija, transfuzija pune krvi ili njenih derivata, stalna infuzion terapija, intubacija, mehanička ventilacija), strah od ishoda operativnog lečenja, mogućnost nastanka ranih postoperativnih komplikacija (povišena telesna temperatura, infekcija, povraćanje), stanje imunosupresije, ograničena pokretljivost ili nepokretnost pacijenata (što može usloviti oštećenje integriteta kože, poremećaj cirkulacije, opstipaciju i dr.), deficit u samozbrinjavanju (nemogućnost samostalnog hranjenja, obavljanja lične higijene) i dr. (1,2).

Određene studije ukazuju da preoperativna slabost može biti prediktor neželjenih postoperativnih ishoda (28). Pojedine smernice preporučuju preoperativnu terapiju intravenskim rastvorima, kao i hemodinamsku optimizaciju radi usklađivanja potrošnje i isporuke kiseonika, što opet, kod visokorizičnih hirurških pacijenata, ima za cilj smanjenje postoperativnih komplikacija i umiranja (29). U prilog tome govore i rezultati studije koja je potvrdila da upotreba preoperativne hirurške sigurnosne kontrolne liste, koja obuhvata 19 stavki, u cilju osiguranja bezbednosti pacijenta, pre uvođenja u operacionu salu, kao i pre izlaska iz nje, dovodi do smanjenja komplikacija koje mogu rezultirati čak i smrtnim ishodom (30).

Stručnost i brojnost zdravstvenih radnika kao indikator ishoda

Pored faktora koji su vezani za samog pacijenta, doprinos u krajnjem ishodu ima osoblje koje je kompetentno i posebno obučeno za rad u JIN. Smatra se da edukovani i posvećeni intenzivisti i medicinske sestre, koji poseduju usko specijalizovane veštine za realizaciju invazivnih i neinvazivnih dijagnostičko-terapijskih postupaka, mogu pružiti bolji tretman i negu od onih koji nisu prošli obuku (31,32). Istovremeno, osobe koje su radno angažovane u JIN treba da razviju i veštine kritičkog razmišljanja/mišljenja (33). Smatra se, da rano uočavanje određenih promena u stanju pacijenta predstavlja takođe prediktor preživljavanja, adekvatnog lečenja i što bržeg kućnog oporavka - rehabilitacije. Pored znanja i veština, potreban je dovoljan broj osoblja za pružanje ovako superiornog oblika praćenja, podrške i nege pacijenata, ali i potpuna prostorna opremljenost uz materijalne resurse (oprema, bolesnički kreveti, aparati, itd.). Radi sprečavanja komplikacija ležanja i ograničene pokretljivosti, članove tima čine i fizioterapeuti (34).

Perioperative indicators are those that affect the treatment outcome during the surgical procedure itself (e.g. type of anesthesia, length of operation, type of surgical intervention, monitoring of vital functions, timely response in case of complications, etc.), while postoperative indicators affect recovery after surgical intervention (quality of postoperative care, pain management, prevention of infections, rehabilitation, post-traumatic stress, depression, etc.) (17,18). However, for a more reliable assessment of the outcome, other factors should be considered, such as the following: team members (surgical and anesthesiological) that will perform the procedure, their ability and skills, medications, available equipment, information on whether the intervention is urgent or elective, and even the time of the year, the time of the day, that is, the day of the week when the surgical intervention is performed (e.g. the risk is lower when the intervention is performed on a weekday compared to the weekend), etc. (17,18).

The most well-known classification system of the patient's physical status, as well as a useful predictor of possible operative and postoperative risks is the well-known ASA classification of the patient's physical condition (ASA – The American Society of Anesthesiologists). According to the ASA classification, patients for anesthesia are grouped into one of six groups, where the first group means that the patient is healthy and has a very low risk for anesthesia, while the sixth group indicates a patient with the proven brain death who is a candidate for donation of organs.

There are indices that are narrowly specific for certain body systems, which depending on the given system include the analysis of numerous factors influencing mortality and comorbidities, such as Charlson Comorbidity Index (CCI) and Revised Cardiac Risk Index (RCRI) (19,20). The most commonly used indices/scores for predicting mortality in the ICU are: Acute Physiology and Chronic Health Evaluation (APACHE) (21), Mortality Probability Models (MPM) (22), Simplified Acute Physiology Score (SAPS) (23), Sequential Organ Failure Assessment (SOFA) (24) and Surgical Apgar Score (SAS) (25).

The European Society of Intensive Care Medicine (ESICM) published guidelines for the admission of patients to the ICU, namely those who are in an unstable state or at a high risk of developing complications (26). Later, the American

College published broader guidelines for admitting patients to ICUs according to priorities, ranging from priority 1 (patients who will most benefit from the admission) to priority 4 (for patients who are thought to have no benefits) (27).

The main problems of surgical patients, and therefore, of health care in the ICU include the following: loss of consciousness, bleeding, pain, all conditions that require the continuous monitoring of vital parameters or their measurement every half hour (invasive and non-invasive monitoring), polytraumatism, administration of unconventional therapy and other therapeutic procedures (oxygen therapy, transfusion of whole blood or its products, continuous infusion therapy, intubation, mechanical ventilation), fear of the outcome of operative treatment, the possibility of early postoperative complications (elevated body temperature, infection, vomiting), the state of immunosuppression, limited mobility or immobility of patients (which can cause damage to skin integrity, circulatory disorders, constipation, etc.), deficit in self-care (inability to take food independently, perform personal hygiene) etc. (1,2).

Certain studies indicate that preoperative weakness may be a predictor of adverse postoperative outcomes (28). Certain guidelines recommend preoperative therapy with intravenous solutions, as well as hemodynamic optimization in order to harmonize oxygen consumption and delivery, which is aimed at reducing postoperative complications and mortality in high-risk surgical patients (29). This is supported by the results of the study, which confirmed that the use of the preoperative surgical safety checklist, including 19 items aimed at ensuring the patient's safety before entering the operating room, as well as before leaving it, led to a reduction in complications, which can even result in a deathly outcome (30).

Expertise and number of healthcare workers as an indicator of success

In addition to factors related to the patient himself, the contribution to the final outcome is made by staff who are competent and specially trained to work in the ICU. It is believed that educated, dedicated intensivists and nurses, who have highly specialized skills for the realization of invasive and non-invasive diagnostic-therapeutic procedures, can provide better treatment and care than those who did not undergo training (31,32).

Zbrinjavanje hirurških pacijenata sa različitim oboljenjima i povredama u JIN predstavlja veliki izazov za hirurga, koji osim bazičnih propedeutičkih metoda, koristi vrlo kompleksne i sofisticirane terapijske i operativne procedure u cilju stabilizacije stanja pacijenta. Medicinske sestre, pored učešća u zavisnim, međuzavisnim i nezavisnim sestrinskim intervencijama u JIN, pružaju usluge nege pacijenata i koriste u sestrinskoj praksi instrumente procene životne ugroženosti pacijenata (engl. *Early Warning Score*), skale za procenu bola (numeričke, verbalno-analogne, multidimenzionalni upitnik i dr.), skale za procenu stanja svesti (engl. *Glasgow Coma Score* i *AVPU Score*), skale za procenu stanja traumatizovanih pacijenata (engl. *Trauma Score*), skale za procenu rizika od nastanka tromboflebitisa (engl. *Jackson Scale*), dekubitusa (engl. *Norton, Braden i Knoll*) i rizika od pada (engl. *Morse Fall Scale*) (2).

Kolaboracija između hirurga, anesteziologa i medicinskih sestara neophodna je od trenutka prijema do momenta otpusta, u cilju blagovremene detekcije stanja pacijenta i brze intervencije.

Najčešće komplikacije hirurških pacijenata u JIN

Rezultati pojedinih istraživanja pokazuju, da su najčešće komplikacije kod hirurških pacijenata u JIN infekcije. Informacije o vrstama infekcija, njihovim uzročnicima i ishodima mogu doprineti razvoju strategije za prevenciju, blagovremenu dijagnostiku, lečenje i raspodelu postojećih resursa (35). Pandemija korona virusa pokrenula je mnogobrojna pitanja oko načina zbrinjavanja hirurških pacijenata, kako bi se smanjio negativan uticaj određenih prediktora i minimizirao rizik od nastanka infekcije. Predloženo je odlaganje elektivnih operacija, kao i obezbeđivanje ustanova u kojima se neće zbrinjavati kovid pozitivni pacijenti, ali i pravilna upotreba lične zaštitne opreme (36).

Zaključak

Starost pacijenta, njegovo zdravstveno stanje pre smeštanja u JIN, prisustvo drugih bolesti (komorbiditeta), složenost i tok operativnog zahvata, postoperativnih komplikacija i kompetetnost kadra su najznačajniji prediktori ishoda lečenja hirurških pacijenata u JIN. U cilju poboljšanja ishoda hirurških pacijenata lečenih u JIN usled različite etiologije, neophodno je pored optimizacije stanja

pacijenata pre operacije, tokom operativnog zahvata i nakon istog, standardizovati sistem edukacije i sertifikacije osoblja za rad u JIN. Takođe, neophodno je kontinuirano izveštavati o ishodu lečenja pacijenata u JIN, kako bi se preduzele preventivne i korektivne mere u cilju sprečavanja komplikacija, zaštite zdravlja pacijenata i smanjivanja letalnih ishoda.

Konflikt interesa

Autori su izjavili da nema konflikta interesa.

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At the same time, persons who are employed in the ICU should also develop skills of critical thinking (33). It is believed that early detection of certain changes in the patient's condition is also a predictor of survival, adequate treatment and faster recovery at home - rehabilitation. In addition to knowledge and skills, a sufficient number of staff is needed to provide such a superior form of monitoring, support and patient care, as well as complete equipment of facilities with material resources (equipment, patient beds, devices, etc.). In order to prevent complications of lying down and limited mobility, team members are physiotherapists, as well (34).

Taking care of surgical patients with different diseases and injuries in the ICU is a big challenge for a surgeon, who, in addition to basic propaedeutic methods, uses very complex and sophisticated therapeutic and operative procedures in order to stabilize the patient's condition. Nurses, besides taking part in dependent, interdependent and independent nursing interventions in the ICU, provide patient care service and use instruments for assessing life threatening conditions in their nursing practice (Early Warning Score), scales for the assessment of pain (numerical, verbal-analogue, multidimensional questionnaire, etc.), scales for assessing the state of consciousness (Glasgow Coma Score and AVPU Score), scales for assessing the state of traumatized patients (Trauma Score), scales for assessing the risk of thrombophlebitis (Jackson Scale), pressure ulcers (Norton, Braden, Knoll) and the risk of fall (Morse Fall Scale) (2).

The collaboration between surgeons, anesthesiologists and nurses is necessary from the moment of admission to the moment of discharge, aimed at the timely detection of patient's condition and quick intervention.

The most common complications in surgical patients in the ICU

The results of certain studies have shown that the most common complications in surgical patients in the ICU are infections. The information about types of infections, their causes, and outcomes can contribute to the development of strategies for the prevention, timely diagnosis, treatment and distribution of existing resources (35). The corona virus pandemic has initiated

numerous questions related to the way of taking care of surgical patients. In order to reduce the negative impact of certain predictors and minimize the risk of infections, it has been proposed to postpone elective surgeries, as well as to provide institutions, where covid positive patients would not be cared for, as well as the proper use of personal protective equipment (36).

Conclusion

The patients' age, his health condition before the admission to the ICU, the presence of other diseases (comorbidities), the complexity and course of the operation, the absence of postoperative complications and the competence of staff are the most important predictors of the outcome of the treatment of surgical patients in the ICU. In order to improve the outcome of surgical patients treated in the ICU due to various etiologies, it is necessary, in addition to optimizing the condition of patients before surgery, during and after surgery, to standardize the system of education and certification of staff for work in the ICU. Also, it is necessary to continuously report on the outcomes of treatment of patients in the ICU, in order to take preventive and corrective measures aimed at preventing complications, and therefore, better protection of patients' health and reduction in the number of deathly outcomes.

Competing interests

The authors declared no competing interests.

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