

# Sindrom postintenzivne skrbi – kako ga prepoznati, prevenirati, liječiti

## Post-intensive care syndrome – how to recognize, prevent, and treat it

Vedrana Djak<sup>1</sup>, Slađana Režić<sup>2</sup>

<sup>1</sup> KBC Zagreb, Odjel intenzivne i postintenzivne skrbi, Zavod za respiracijsku insuficijenciju, bolesti plućne cirkulacije i transplantaciju pluća, Jordanovac 104, 10 000 Zagreb, Hrvatska / UHC Zagreb, Intensive and post-intensive care unit, Respiratory insufficiency, lung circulation and lung transplant institute, Jordanovac 104, 10 000 Zagreb, Croatia

<sup>2</sup> KBC Zagreb, Odjel za osiguranje i unapređenje kvalitete zdravstvene zaštite, Kišpatićeva 12, 10 000 Zagreb, Hrvatska / UHC Zagreb, Department for Health care quality assurance and improvement, Kišpatićeva 12, 10 000 Zagreb, Croatia

### Sažetak

Sindrom postintenzivne skrbi (PICS) podrazumijeva tjelesna, kognitivna i mentalna oštećenja koja se javljaju tijekom boravka na Odjelu intenzivne skrbi, nakon otpusta s Odjela intenzivne skrbi ili otpusta iz bolnice te dugoročne prognoze pacijenata na odjelima intenzivne skrbi.

Od tjelesnih oštećenja najčešće je prisutna polineuropatija. Kognitivna oštećenja uključuju oštećenja pamćenja, poteškoće u izvršavanju funkcija, jezika, pažnje i vizualno-prostornih sposobnosti. Depresija, anksioznost i posttraumatski stresni poremećaj najčešća su mentalna oboljenja u sindromu postintenzivne skrbi.

Prevenција PICS-a zahtijeva provođenje ABCDEFGH postupaka koji uključuje sprječavanje delirija, ranu rehabilitaciju, obiteljsku intervenciju i praćenje pacijenta od trenutka prijema na Odjel intenzivne skrbi do otpusta. Dnevnik praćenja, prehrana, sestrinska skrb i upravljanje okolišem tijekom liječenja pacijenta iznimno su važni u prevenciji PICS-a.

Liječenje sindroma postintenzivne skrbi treba započeti što ranije, a u liječenje je potrebno uključiti multidisciplinarni tim (liječnik koji vodi pacijenta, neurolog, psihijatar, fizioterapeut, radni terapeut i logoped). Cilj je ovog rada pojasniti značaj sestrinskih intervencija u prevenciji sindroma postintenzivne skrbi.

**Glavne riječi:** sindrom postintenzivne skrbi, intenzivna skrb, kognitivno oštećenje, prevencija, liječenje, sestrinska skrb

**Kratak naslov:** Sindrom postintenzivne skrbi

### Abstract

Post-intensive care syndrome (PICS) includes physical, cognitive, and mental impairments that occur during intensive care, after discharge from intensive care, or after discharge from the hospital, as well as long-term prognoses for patients in intensive care units.

Polyneuropathy is the most common of the physical impairments. Cognitive impairments include impaired memory and difficulties in performing various functions, including language, attention, and visual-spatial abilities. Depression, anxiety, and post-traumatic stress disorder are the most common mental illnesses making up the post-intensive care syndrome.

Prevention of PICS requires the implementation of ABCDEFGH procedures, which include prevention of delirium, early rehabilitation, family intervention, and monitoring of the patient from the moment of admission to the ICU until discharge. A monitoring diary, nutrition, nursing care, and environmental management during patient treatment are extremely important in the prevention of PICS.

Treatment of post-intensive care syndrome should start as early as possible, and a multidisciplinary team (the treating physician, neurologist, psychiatrist, physiotherapist, occupational therapist, and speech therapist) should be involved in the treatment. This paper aims to explain the importance of nursing interventions in the prevention of post-intensive care syndrome.

**Keywords:** post-intensive care syndrome, intensive care, cognitive impairment, prevention, treatment, nursing care

**Running head:** Post-intensive care syndrome

Received January 24<sup>th</sup> 2022;

Accepted May 9<sup>th</sup> 2022;

**Autor za korespondenciju/Corresponding author:** Slađana Režić, mag. med. techn., KBC Zagreb, Kišpatićeva 12, 10 000 Zagreb, Hrvatska; e-mail: srezic@kbc-zagreb.hr

### Uvod

Intenzivna medicina osobito se razvila u posljednjih četvrt stoljeća što je posljedica tehničkih inovacija za poboljšanje pomoćne cirkulacije i respiratorne opreme na odjelima intenzivnog liječenja (JIL). Zbog navedenog, kratkoročni ishodi pacijenata na intenzivnoj skrbi, uključujući mortalitet i 28-dnevno preživljavanje, značajno su se poboljšali [1]. Nadalje, porast starije populacije velik je društveni izazov za razvijene zemlje. Predviđa se da će do 2050. godine postotak osoba starijih od 65 godina biti više od 20 % u većem dijelu svijeta [2]. Povećanje starije populacije znači i veći broj

### Introduction

Intensive medicine has developed dramatically in the last quarter of the century as a result of technical innovations and guidelines for improving circulatory support and respiratory equipment in intensive care units (ICUs). For these reasons, the short-term outcomes of intensive care patients, including mortality and 28-day survival, have improved significantly [1]. Furthermore, population ageing is a major societal challenge for developed countries. Predictions say that by 2050, 20% of people in most countries will be over 65 [2]. Population ageing will also

starijih pacijenata u bolnicama, osobito na odjelima intenzivne skrbi.

Dob je loš prognostički faktor za mortalitet pacijenata na intenzivnoj skrbi, osobito onih sa sepsom [3]. Osobe u dobi od 65 godina i više čine oko 60 % pacijenata sa sepsom i oko 80 % smrtnih slučajeva [4]. Starenjem populacije u svijetu, broj se pacijenata sa sepsom povećao, što je utjecalo na dugoročnu prognozu pacijenata na intenzivnoj skrbi. Yende i suradnici analizirali su dva multinacionalna randomizirana kontrolirana ispitivanja izvijestivši da je jedna trećina pacijenata otpuštenih s intenzivne skrbi umrla u roku od 6 mjeseci, a preostali pacijenti, odnosno jedna trećina, imali su predviđeni mortalitet unutar 6 mjeseci. To ukazuje na prisutnost trajnih funkcionalnih smetnji u aktivnostima svakodnevnog života [1]. Iz navedenog također možemo zaključiti da se ne mogu procjenjivati samo kratkoročne prognoze poput 28-dnevnog preživljavanja i stope preživljavanja na odjelima intenzivnog liječenja već i dugoročni ishodi kod pacijenata na intenzivnoj skrbi.

S obzirom na trenutnu i evoluirajuću situaciju na intenzivnoj skrbi, Američko društvo za intenzivnu medicinu održalo je konferenciju radi rješavanja subakutnih/kroničnih fizičkih i psihičkih problema nakon otpusta s intenzivne skrbi na kojoj je predložen pojam postintenzivni sindrom (PICS) [5]. Sindrom postintenzivne skrbi jest tjelesni, kognitivni i mentalni poremećaj koji se javlja tijekom boravka pacijenta na intenzivnoj skrbi ili nakon otpusta iz bolnice. Može se javiti još za vrijeme boravka pacijenta na odjelu, ali češće se javlja nakon otpusta s Odjela intenzivne skrbi. Kod nekih se pacijenata javlja neposredno nakon otpusta, dok se kod drugih pacijenata javlja nekoliko mjeseci nakon otpusta s Odjela intenzivne skrbi. Smatra se da čimbenici rizika određene bolesti ili poremećaji zbog kojih je pacijent na Odjelu intenzivne skrbi, poput sepse ili multiorganskog zatajenja organa, ali i čimbenici kao što su dugotrajna mehanička ventilacija, primjena kortikosteroida, primjena analgetika i sedativa doprinose razvoju sindroma postintenzivne skrbi [5]. Nakamura i suradnici nedavno su predložili koncept sindroma postakutne skrbi koji se temelji na dokazima prema kojima akutna skrb za starije osobe uključuje poteškoće u disfagiji i povezanost s produljenim boravkom na intenzivnoj skrbi [6].

## Patofiziologija sindroma postintenzivne skrbi

### Tjelesna oštećenja

Nakon otpusta s Odjela intenzivne skrbi kod vitalno ugroženih pacijenata dugoročno dolazi do tjelesnih oštećenja koja se mogu manifestirati slabosti mišića u obliku polineuropatije, miopatije, neuromiopatije i poremećaja mišićnog tonusa [7].

Postavljanje dijagnoze tjelesnog oštećenja stečenog na Odjelu intenzivnog liječenja postavlja se prema skali Vijeća za medicinska istraživanja (*eng. Medical Research Council*) pri čemu se određuje snaga različitih mišićnih skupina gornjih i donjih ekstremiteta. Zbroj bodova < 48 testiranih skupina mišića u više od dva navrata u razmaku od 24 sata kriterij je za postavljanje dijagnoze tjelesnog oštećenja stečenog na Odjelu intenzivnog liječenja [8]. Polineuropatija

affect the increase in elderly patients in hospitals, especially in ICUs.

Age is negative prognostic factor for patient mortality in the ICU, especially in patients with sepsis [3]. Persons aged 65 and older make up about 60% of patients with sepsis and about 80% of mortalities [4]. With population ageing increasing worldwide, the number of patients with sepsis has increased, and that in turn influenced the long-term prognosis for patients in the ICU. Yende et al. analyzed two multinational randomized controlled trials, reporting that one-third of patients discharged from intensive care died within 6 months, and the remaining patients, or one-third, had predicted mortality within 6 months. That indicates the presence of permanent functional disorders in everyday life activities [1]. We can also conclude from the above that not only short-term prognoses such as 28-day survival and survival rates in intensive care units but also long-term outcomes in intensive care patients cannot be assessed.

Given the current and evolving situation in intensive care, the American Society of Critical Care Medicine held a conference to address subacute/chronic physical and mental problems after discharge from intensive care, proposing the term post-intensive care syndrome (PICS) [5]. The post-intensive care syndrome is a physical, cognitive, and mental disorder that occurs during a patient's stay in intensive care or after discharge from the hospital. It can occur during a patient's stay in the ward, but it occurs more often after discharge from the ICU. In some patients, it occurs immediately after discharge, while in others it occurs several months after discharge from the ICU. Risk factors for certain diseases or disorders that cause the patient to be in the ICU are considered to be sepsis or multiorgan organ failure, but factors such as prolonged mechanical ventilation, corticosteroids, analgesics, and sedatives contribute to the development of post-intensive care syndrome [5]. Nakamura et al. recently proposed the concept of post-acute care syndrome based on evidence that acute care for the elderly involves dysphagia difficulties and is associated with prolonged intensive care [6].

## The pathophysiology of post-intensive care syndrome

### Physical impairments

After discharge from intensive care, patients with life-threatening conditions experience long-term physical damage that can manifest as muscle weakness in the form of polyneuropathy, myopathy, neuromyopathy, and muscle tone disorders [7].

The diagnosis of physical impairments acquired in the intensive care unit is made according to the Medical Research Council scale, which is used to determine the strength of different muscle groups in the upper and lower extremities. A score lower than 48 for the tested muscle groups recorded more than twice in 24-hour intervals is a criterion for diagnosing physical impairment acquired in the intensive care unit [8]. Polyneuropathy is the most common impairment, followed by neuropathy [9]. The pathophysi-

je najčešća po pojavnosti, a slijedi ju neuropatija [9]. Patofiziološki su mehanizmi multifaktorijalni [10]. Mikrovaskularna ishemija, katabolizam i nepokretnost mogu dovesti do trošenja skeletnih mišića, dok mikrovaskularna ozljeda s rezultirajućom ishemijom živca, disfunkcija natrijevih kanala i ozljeda mitohondrija živaca mogu pridonijeti neuropatiji povezanoj s kritičnim bolestima, miopatiji ili oboje [10]. Tjelesnom oštećenju stečenom na Odjelu intenzivne skrbi pridonosi produljena mehanička ventilacija te dulji boravak na Odjelu intenzivne skrbi [11].

### Kognitivna oštećenja

Kritično bolesni pacijenti doživljavaju visoku razinu tjelesnog i psihološkog stresa koja može rezultirati pojavom kognitivnih oštećenja kod onih sa sindromom postintenzivne skrbi. Novi ili pogoršani poremećaji kognitivnih funkcija traju mjesecima do godinama nakon otpusta iz bolnice, što dovodi do smanjene kvalitete života pacijenta [12]. Kognitivna oštećenja uključuju oštećenja u području pamćenja, izvršavanja funkcija, jezika, pažnje i vizualno-prostornih sposobnosti.

Hipoglikemija, hiperglikemija, fluktuacije glukoze u serumu, delirij i bolnički akutni simptomi stresa identificirani su kao mogući čimbenici rizika za trajno kognitivno oštećenje nakon kritične bolesti [13]. Postoje snažni dokazi da kod pacijenata koji su razvili delirij za vrijeme boravka na Odjelu intenzivne skrbi postoji povećan rizik od dugoročnih oštećenja kognitivne disfunkcije [2].

Demencija je bolest kognitivne disfunkcije, a brojne studije izvijestile su o povezanosti demencije i intenzivnog liječenja [14]. Među 10 348 pacijenata na intenzivnoj skrbi koji su preživjeli do otpusta iz bolnice, demencija je novootkrivena u 1648 (15,0 %) tijekom 3 godine praćenja u usporedbi s 12,2 % u općoj populaciji [14]. Nadalje, već postojeći kognitivni poremećaji u populaciji pacijenata na intenzivnom liječenju rašireni su. Usporedna studija izvijestila je da je 37 % kritično bolesnih pacijenata starijih od 65 godina na intenzivnoj skrbi već imalo kognitivno oštećenje [15]. Postojeće kognitivno oštećenje također utječe na kognitivne funkcije i pojavu sindroma postintenzivne skrbi.

### Mentalna oštećenja

Depresija, anksioznost i posttraumatski stresni poremećaj (PTSP) glavne su mentalne bolesti u sindromu postintenzivne skrbi. Karakteriziraju ih nametljiva sjećanja koja proizlaze iz kombinacije istinitih događaja nakon otpusta s intenzivnog odjela [16]. Stoga bi svaki pacijent sa sumnjom na sindrom postintenzivne skrbi trebao proći formalnu mentalnu procjenu. Sustavni pregled Davydowa i suradnika pokazao je da su dvije studije od sedam studija pokazale da je ženski spol značajan prediktor PTSP-a nakon boravka na Odjelu intenzivne skrbi [17]. Već postojeća depresija, anksioznost, PTSP, niža razina obrazovanja i zlouporaba alkohola povećavaju rizik od mentalnih bolesti stečenih na intenzivnoj skrbi.

Što se tiče prevencije i liječenja, sustavna revizija i metaanaliza o učinkovitosti rane rehabilitacije s ciljem prevencije sindroma postintenzivne skrbi kod pacijenata u kritičnom stanju koji su proveli Fukeo i suradnici pokazala je da rana

ological mechanisms are multifactorial [10]. Microvascular ischemia, catabolism, and immobility can lead to skeletal muscle wear, while microvascular injury resulting in nerve ischemia, sodium channel dysfunction, and nerve mitochondrial injury may contribute to critical illness-related to neuropathy, myopathy, or both [10]. Prolonged mechanical ventilation and a longer stay in the intensive care unit contribute to the physical damage acquired in the intensive care unit [11].

### Cognitive impairments

Critically ill patients experience high levels of physical and psychological stress that can result in the occurrence of cognitive impairment in patients with post-intensive care syndrome. New or exacerbated cognitive function impairments last for months to years after discharge from the hospital, leading to a reduced quality of life for the patient [12]. Cognitive impairments include impaired memory and difficulty performing various functions, including language, attention, and visual-spatial abilities.

Hypoglycemia, hyperglycemia, serum glucose fluctuations, delirium, and nosocomial acute stress symptoms have been identified as possible risk factors for permanent cognitive impairment following critical illness [13]. There is strong evidence that patients who develop delirium during their stay in the intensive care unit have an increased risk of long-term cognitive impairment [2].

Dementia is a cognitive dysfunction disease. Numerous studies have reported an association between dementia and intensive care [14]. Among the 10,348 intensive care patients who survived until hospital discharge, dementia was newly diagnosed in 1,648 (15.0%) over 3 years of follow-up, compared with 12.2% in the general population [14]. Furthermore, pre-existing cognitive impairments are widespread in intensive care patients. A comparative study reported that 37% of critically ill patients over the age of 65 in ICUs already had some sort of cognitive impairment [15]. Pre-existing cognitive impairments also affect cognitive functions and the onset of the post-intensive care syndrome.

### Mental impairments

Depression, anxiety, and post-traumatic stress disorder (PTSD) are the most common mental illnesses making up the post-intensive care syndrome. They are characterized by intrusive memories arising from a combination of true events after discharge from the intensive care unit [16]. Therefore, every patient with suspected post-intensive care syndrome should undergo a formal mental assessment. A systematic review by Davydow et al. showed that two of the seven studies showed that the female gender was a significant predictor of PTSD after intensive care [17]. Pre-existing depression, anxiety, PTSD, lower levels of education, and alcohol abuse increase the risk of mental illness acquired in the ICU.

Regarding prevention and treatment, a systematic review and meta-analysis on the effectiveness of early rehabilitation to prevent post-intensive care syndrome in critically ill patients conducted by Fukeo et al. showed that early reha-

rehabilitacija nije značajno poboljšala ishode povezane s mentalnim statusom pacijenata (bolnička anksioznost i depresija) [18]. Među pacijentima koji su vodili dnevnik intenzivne njege započete četvrti dan nakon prijema, rezultati simptoma PTSP-a nakon 12 mjeseci značajno su smanjeni u odnosu na one koji nisu vodili dnevnik [19]. Dnevnik je predstavljao dnevni zapis pacijenata, napisan jasnim jezikom od strane zdravstvenog osoblja i/ili obitelji, s popratnim fotografijama. Sustavni pregled utjecaja dnevnika intenzivne skrbi ukazuje na to da su četiri od pet randomiziranih ispitivanja pokazala značajno smanjenu stopu novonastalog PTSP-a nakon 3 mjeseca uz upotrebu dnevnika intenzivne skrbi [20].

S obzirom na dugoročne ishode mentalnih bolesti u PICS-u, Patel i suradnici prospektivno su promatrali 255 pacijenata sa šokom i akutnim respiratornim distress sindromom (ARDS) prijavljujući incidenciju PTSP-a povezanu s prijemom na intenzivnu skrb. Uočili su da se PTSP pojavio kod 12 % pacijenata u roku od 1 godine nakon otpusta s Odjela intenzivne skrbi [21]. Iz tog razloga na odjelima intenzivnog liječenja trebalo bi se razmotriti prepoznavanje mentalne bolesti stečene na intenzivnoj skrbi nakon koje slijedi rano liječenje.

### Dijagnoza sindroma postintenzivne skrbi

Kod svakog pacijenta na Odjelu intenzivne skrbi trebalo bi obratiti pažnju na znakove i simptome koji mogu ukazati na sindrom postintenzivne skrbi. Liječnik i medicinska sestra trebali bi prepoznavati nove ili pogoršane kognitivne, psihijatrijske i fizičke znakove i simptome PICS-a. Kognitivne poteškoće često uključuju poteškoće u izvršavanju potrebnih zadataka i poteškoće s pažnjom, koncentracijom, pamćenjem, brzinom mentalne obrade i izvršnom funkcijom. Psihijatrijske tegobe mogu se značajno razlikovati te uključuju anksioznost, depresiju ili PTSP. Tjelesne tegobe uključuju slabost koja se kreće od generalizirane slabe pokretljivosti i višestrukih padova do kvadripareze i tetrapareze.

Iako se dijagnoza sindroma postintenzivne skrbi može uspostaviti na Odjelu intenzivne skrbi, češće se dijagnosticira nakon otpusta pacijenta iz bolnice prilikom kontrola u ambulantama. Ne postoji standardno testiranje za sindrom postintenzivne skrbi. Za kognitivno vrednovanje prikladna je upotreba Montrealske kognitivne procjene, a za depresiju i anksioznost preporuka je provesti neki od upitnika za procjenu anksioznosti i depresije. Ako se pacijent žali na slabost, preporučuje se učiniti elektromiografiju i ispitivanje živčane provodljivosti. Najbolje je uključiti multidisciplinarni tim koji vodi pacijenta te osim liječnika uključuje neurologa, psihijataru, fizioterapeuta, radnog terapeuta i logopeda.

### Prevenција sindroma postintenzivne skrbi

#### ABCDEF GH snop

ABCDE snop poznat je kao snop intervencija kojima se prevenira ili djeluje na rizike povezane sa sedacijom, delirijem i nepokretnosti pacijenta. ABCDE snop sastoji se od:

bilitation did not significantly improve outcomes related to patients' mental status (hospital anxiety and depression) [1]. Among patients who kept intensive care diaries started on the fourth day after admission, PTSD symptoms after 12 months were significantly reduced compared to those patients who did not keep diaries [19]. The diary was a patient's daily record, written in understandable language by health care professionals and/or families, with accompanying photographs. A systematic review of the impact of the intensive care diary indicates that four out of five randomized trials showed a significantly reduced rate of newly developed PTSD after 3 months when the intensive care diary was used [20].

Given the long-term outcomes of mental illness in PICS, Patel et al. prospectively observed 255 patients with shock and acute respiratory distress syndrome (ARDS), reporting the incidence of PTSD associated with intensive care admission. They observed that PTSD occurred in 12% of patients within 1 year of discharge from the intensive care unit [21]. Because of that, ICUs should identify mental illnesses acquired in intensive care and follow up with early treatment.

### The diagnosis of post-intensive care syndrome

Every patient in the intensive care unit should be monitored for signs and symptoms that may indicate post-intensive care syndrome. The physician and nurse should recognize new or worsening cognitive, psychiatric, and physical signs and symptoms of PICS. Cognitive difficulties often include difficulties in performing necessary tasks, attention, concentration, memory, speed of mental processing, and executive function difficulties. Psychiatric problems can vary significantly and include anxiety, depression, or PTSD. Physical problems include weakness ranging from generalized poor mobility and multiple falls to quadriparesis and tetraparesis.

Although the post-intensive care syndrome is sometimes diagnosed in the intensive care unit, it is more often diagnosed after the patient is discharged from the hospital during outpatient check-ups. There is no standard testing for post-intensive care syndrome. Cognitive evaluation is done using the Montreal Cognitive Assessment. Regarding depression and anxiety, it is recommended to conduct anxiety and depression assessments using assessment questionnaires. If the patient complains of weakness, it is recommended to perform electromyography and nerve conduction tests. It is best to involve a multidisciplinary team that includes a neurologist, psychiatrist, physiotherapist, occupational therapist, and speech therapist, in addition to the physician managing the patient.

### Prevention of post-intensive care syndrome

#### ABCDEF GH bundle

The ABCDE bundle is an intervention bundle used to prevent or reduce risks connected with sedation, delirium, and patient immobility. The ABCDE bundle consists of:

- **A** (*eng. airway management*): upravljanje dišnim putovima, procjena, sprječavanje i upravljanje boli;
- **B** (*eng. breathing assessment*): procjena disanja, uključujući dnevne prekide mehaničke ventilacije, ispitivanja spontanog buđenja i ispitivanja spontanog disanja;
- **C** (*eng. choice of analgesia and sedation*): izbor analgezije i sedacije, koordinacija skrbi i komunikacija;
- **D** (*eng. delirium assessment*): procjena delirija, prevencija i liječenje;
- **E** (*eng. early mobility and exercise*): rana mobilnost i vježbe [22].

Navedeni su također čimbenici rizika za razvoj sindroma postintenzivne skrbi. Nadalje, FGH može se dodati na popis za prevenciju sindroma postintenzivne skrbi. FGH uključuje:

- **F** (*eng. family involment*): uključenost obitelji, naknadne preporuke;
- **G** (*eng. good communication*): dobra komunikacija;
- **H** (*eng. handout materials*): dijeljeni materijali o sindromu postintenzivne skrbi [22].

U daljnjem tekstu prikazana je važnost uspostave rane mobilnosti pacijenta (tjelesna rehabilitacija), preporuke za praćenje (klinike za intenzivno liječenje) s novim smjernicama, uključujući prehranu, sestriinsku skrb, važnost vođenja dnevnika na Odjelu intenzivnog liječenja te kontrola nad okolišem u kojem pacijent obitava.

## Prehrana

Nutritivna terapija ključna je za prevenciju sindroma postintenzivne skrbi, posebice prevenciju mišićne slabosti i tjelesnih oštećenja. Odgovarajuća isporuka energije i unos proteina najvažniji su čimbenici za sintezu mišića, a pacijenti s manjom tjelesnom masom u povećanom su riziku od nastanka mortaliteta [23]. Cilj prethodnih istraživanja nutritivne terapije bio je istražiti mortalitet i infektivne komplikacije kao ishode. Postoji snažna veza između nutricionističke terapije i sindroma postintenzivne skrbi [24].

Iako su istraživanja pokazala da je osiguranje isporuke energije parenteralnom prehranom povezano sa smanjenjem sindroma postintenzivne skrbi, prekomjerno hranjenje moglo bi izazvati oštećenja i pogoršati mišićnu slabost [25, 26]. Stoga bi trebalo poticati odgovarajuću isporuku energije i izbjegavati prekomjerno hranjenje [27]. Odgovarajući proteini posebno su važni za kritično bolesne pacijente, a njihova odgovarajuća isporuka s ukupnom energijom mogla bi smanjiti sindrom postintenzivne skrbi.

Međutim, brojna su istraživanja pokazala da isporuka proteina sama po sebi ne smanjuje incidenciju nastanka sindroma [28]. Budući da je sinteza mišićnih proteina maksimizirana odgovarajućom tjelovježbom kod zdravih osoba, nutritivna terapija uz primjerenu tjelovježbu i rehabilitaciju u kombinaciji potrebna je kritično bolesnim pacijentima [29]. Što se tiče posebne vrste prehrane, leucin je aminokiselina za koju se smatra da potiče sintezu mišićnih proteina [30]. No, primjena specifičnih aminokiselina, uključujući leucin, nije pokazala djelotvornost u kritičnoj skrbi [31].

- **A** (*airway management*): airway management, assessment, prevention, and pain management.
- **B** (*breathing assessment*): breathing assessment, including daily interruptions of mechanical ventilation, spontaneous awakening tests, and spontaneous breathing tests.
- **C** (*choice of analgesia and sedation*): choice of analgesia and sedation, care, and communication coordination.
- **D** (*delirium assessment*): delirium assessment, prevention, and treatment.
- **E** (*early mobility and exercise*): early mobility and exercise [22].

Risk factors for the development of post-intensive care syndrome are also listed. Furthermore, FGH can be added to the list for the prevention of post-intensive care syndrome. FGH includes:

- **F** (*family involvement*): family involvement, additional recommendations.
- **G** (*good communication*): good communication.
- **H** (*handout materials*): handout materials about post-intensive care [22].

The following text highlights the importance of establishing early patient mobility (physical rehabilitation), recommendations for follow-up (intensive care clinics) with new guidelines, including nutrition and nursing care, and the importance of keeping an intensive care diary and controlling the patient's environment.

## Nutrition

Nutritional therapy is vital for the prevention of post-intensive care syndrome, especially the prevention of muscle weakness and physical damage. Adequate energy supply and protein intake are the most important factors for muscle synthesis, and patients with lower body weight are at increased risk of mortality [23]. Previous research on nutritional therapy has aimed to investigate mortality and complications involving infections as outcomes. There is a strong link between nutritional therapy and post-intensive care syndrome [24].

Although research has shown that ensuring sufficient energy supply through parenteral nutrition is associated with a reduction in post-intensive care syndrome, excessive provision of nutrients could cause damage and worsen muscle weakness [25, 26]. Therefore, an adequate energy supply should be provided while at the same time avoiding the excessive provision of nutrients [27]. Providing the right kind of proteins is especially important for critically ill patients. Adequate protein delivery within total energy could reduce post-intensive care syndrome.

However, studies have shown that protein delivery alone does not reduce the incidence of the syndrome [28]. Because muscle protein synthesis is maximized by appropriate exercise in healthy individuals, nutritional therapy along with appropriate exercise and rehabilitation are needed in critically ill patients [29]. Leucine is an amino acid that is thought to stimulate muscle protein synthesis [30]. However, the use of specific amino acids, including leucine, is not effective in critical care [31].

## Sestrinska skrb za pacijenta sa sindromom postintenzivne skrbi

Jedna od najvažnijih intervencija medicinskih sestara kontinuirana je provedba postupaka za prevenciju sindroma postintenzivne skrbi, uključujući snop postupaka ABCDEFGH. Uz optimalnu analgeziju, medicinske sestre mogu podržati sigurnu blagu sedaciju boraveći u blizini pacijenata [32]. Pomoću lagane sedacije pacijenti se mogu pripremiti za zadovoljavanje viših razina ljudskih potreba [32].

Nefarmakološke intervencije također mogu biti važne u povratku pacijenta u uobičajene dnevne funkcije u bolničkom okruženju, kao i uključenost obitelji koja ima ključnu ulogu. Pružanje informacija uključujući i informacije koje se odnose na sindrom postintenzivne skrbi članovima obitelji i korištenje dnevnika intenzivne njege mogu ojačati vezu između pacijenta i članova obitelji te medicinskog osoblja [33].

Rana rehabilitacija i mobilizacija mogu poboljšati tjelesnu funkciju kod pacijenata s kritičnom bolesti. Nadalje, kratkoročna i visokofrekventna rehabilitacija i poman odabir intervencija za uspostavu mobilizacije poboljšavaju funkcionalne sposobnosti pacijenata. Medicinske sestre olakšavaju mobilnost pacijenata tijekom 24 sata i stoga pridonose poboljšanju funkcionalnih sposobnosti pacijenata. Proces oporavka od sindroma postintenzivne skrbi dugotrajan je i zahtijeva kontinuitet zbrinjavanja.

Dnevnik s Odjela intenzivne skrbi popunjavaju liječnici, medicinske sestre i obitelji pacijenata kako bi zabilježili stanje pacijenta za vrijeme boravka na Odjelu intenzivnog liječenja te se čuvaju kako bi pacijent mogao pročitati što mu se događalo tijekom boravka na Odjelu intenzivne skrbi, osobito za vrijeme dok je bio analgoosediran. Dnevnik za pacijenta piše član obitelji ili zdravstveni djelatnik poput medicinske sestre, ali ga može zabilježiti i pacijent, ovisno o njegovu zdravstvenom stanju. Dnevnik intenzivne skrbi mogu pomoći u orijentaciji pacijenta u vremenu, ali i prostoru te bi mogli spriječiti nastanak sindroma postintenzivne skrbi ublažavanjem anksioznosti, depresije i simptoma posttraumatskog stresnog poremećaja [34].

Pokazalo se da vođenje dnevnika smanjuje simptome PTSP-a ne samo kod pacijenata već i u njihovim obiteljima [34]. Dnevnik pripada pacijentu pri otpustu s Odjela intenzivne skrbi.

## Savjetovanje i psihoterapija

Specijalne psihološke usluge nakon kritične bolesti općenito nisu dostupne diljem Europe. U nekim zemljama Europe, primjerice u Velikoj Britaniji, postoji nekoliko smjernica za liječenje anksioznosti, depresije i PTSP-a nakon boravka na Odjelu intenzivnog liječenja. Od temeljnih načela smatra se da je važno imati pristup „gledaj i čekaj“ (*eng. watch and wait*) za one pacijente koji se dobro nose sa svojim simptomima te im se na taj način pruža prostor i mogućnosti da vide mogu li upotrebljavati svoje uobičajene strategije suočavanja kako bi se pomirili sa svojim iskustvom [35].

Međutim, pacijente treba ponovno procjenjivati u odgovarajućim intervalima kako bi se osiguralo smirivanje njihovih simptoma. Ako se to ne dogodi, treba im ponuditi terapi-

## Nursing care in patients with post-intensive care syndrome

One of the most important nurse interventions is the continuous implementation of procedures that prevent post-intensive care syndrome, including the ABCDEFGH bundle. With optimal analgesia, nurses can support safe mild sedation by closely watching patients [32]. Using mild sedation, patients can be prepared for higher human needs [32].

Nonpharmacological interventions may also be important in returning the patient to normal daily functions in a hospital setting. Family involvement also plays a significant role. Providing information to family members (including information related to post-intensive care syndrome) and the use of intensive care diaries can strengthen the link between the patient, family members, and medical staff [33].

Early rehabilitation and mobilization can improve physical function in patients with a critical illness. Furthermore, short-term and high-frequency rehabilitation and careful selection of interventions to establish mobilization improve patients' functional abilities. Nurses facilitate the mobility of patients for 24 hours and therefore contribute to improving the functional abilities of patients. The process of recovery from post-intensive care syndrome is lengthy and requires continuity of care.

Intensive care diaries are written by physicians, nurses, and patient's families to record the patient's condition during the stay in the ICU and are kept so that the patient can read what happened to him or her during the intensive care unit stay, especially if he or she was analgoosedated. The patient diary is kept by a family member or health care professional, e.g., a nurse, but can also be recorded by the patient, depending on his or her medical condition. Intensive care diaries can help orient the patient in time and space and could prevent the development of post-intensive care syndrome by alleviating anxiety, depression, and symptoms of post-traumatic stress disorder [34].

Keeping a diary has showed to reduce the symptoms of PTSD, not only in patients but also in their families [34]. The diary is given to the patient at discharge from the intensive care unit.

## Counseling and psychotherapy

Special psychological services after a critical illness are generally not available across Europe. In some European countries, such as the United Kingdom, there are guidelines for treating anxiety, depression, and PTSD after a stay in the intensive care unit. It is fundamental to have a “watch and wait” approach for those patients who are coping with their symptoms, thus giving them space and opportunities to see if they can use their usual strategies for coping to come to terms with their experience [35].

However, patients should be re-evaluated at appropriate intervals to ensure that their symptoms subside; if this does not happen, they should be offered therapy. Those with severe symptoms at the first assessment should be offered therapy immediately, if those symptoms have detrimental

ju. Onima s visokom razinom simptoma prilikom prve procjene, a koji imaju štetan učinak na njihovo svakodnevno funkcioniranje, treba odmah ponuditi terapiju. Psihoaktivne lijekove treba ponuditi samo kad se pacijenti ne osjećaju sposobnima uključiti se u terapiju.

Uobičajene teme kojima se pacijenti bave na savjetovanju odnose se na pokušaje shvaćanja onoga što se dogodilo na intenzivnoj skrbi, pomirenje s fizičkim promjenama koje u nekim slučajevima mogu biti trajne i suočavanje s uznemirujućim uspomjenama ili noćnim morama [36].

## Zaključak

Sindrom postintenzivne skrbi uključuje tjelesna, kognitivna i mentalna oštećenja koja se javljaju tijekom boravka na Odjelu intenzivne skrbi ili nakon otpusta s Odjela intenzivne skrbi, kao i dugoročnu prognozu pacijenata s intenzivnog liječenja. Za prevenciju PICS-a važno je provoditi ABCDEFGH postupke i nove terapijske strategije uključujući vođenje dnevnika, uspostavu pravilne prehrane i upravljanje okolišem koji potiče ozdravljenje. Medicinska sestra ima važnu ulogu te je implementacija sestrijskih intervencija ključna u prevenciji sindroma postintenzivne skrbi.

## Nema sukoba interesa

effects on their everyday functioning. Psychoactive drugs should be offered only when patients do not feel capable to engage in therapy.

Common topics expressed by patients involved in counseling relate to attempts to understand what happened in intensive care, reconciling with physical changes, which in some cases may be permanent, and coping with disturbing memories or nightmares [36].

## Conclusion

Post-intensive care syndrome (PICS) includes physical, cognitive, and mental impairments that occur during intensive therapy or after discharge from the intensive care unit, and long-term prognoses for patients treated in intensive care units. To prevent PICS, it is important to implement ABCDEFGH procedures and new therapeutic strategies, including keeping a diary, establishing a proper diet, and managing an environment that promotes healing. The nurse has an important role, and the implementation of nursing interventions is crucial in preventing post-intensive care syndrome.

## Authors declare no conflict of interest

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