

Opšti principi hitnog zbrinjavanja trovanja u ambulanti lekara opšte medicine – izazovi i prepreke

Marija Ž. Lazarević¹, Dragana M. Trifunović Balanović²

¹Dom Zdravlja „Dr Milenko Marin“ Loznica,

²Dom Zdravlja Voždovac, Beograd

Sažetak

Uvod. Blagovremeno prepoznavanje akutnog i hroničnog trovanja, kao i farmakodinamskih mehanizama i patofiziologije trovanja od izuzetnog je značaja u ambulanti opšte medicine.

Cilj rada. Utvrditi stepen informisanosti i obrazovanosti lekara na primarnom nivou zdravstvene zaštite o predviđenim merama u slučajevima zbrinjavanja trovanja.

Metod. Lekarima zaposlenim u službi opšte medicine na teritoriji Republike Srbije prosleđen je elektronski upitnik "Urgentno zbrinjavanje trovanja u ambulanti opšte medicine". Upitnik se sastojao od 13 pitanja koja se odnose na iskustvo ovih lekara u praksi.

Rezultati. Na primarnom nivou zdravstvene zaštite u poslednjih pet godina registrovan je porast stope trovanja lekovima, preparatima i biološkim supstancama sa 0,14 na 0,21, dok se trovanje supstancama nemedicinskog porekla nalazi u značajnom padu sa 0,30 na 0,19 na 1000 stanovnika. Iskustvo lekara zaposlenih u ambulanti opšte medicine vezano za slučajeve akutnog i hroničnog trovanja pratili smo posmatrajući upitnik u kojem se pokazalo da se 71,43% doktora susretalo u praksi sa ovim stanjem. Lekari su se češće susretali (41,07%) sa zadesnim slučajevima trovanja, dok se (21,43%) više puta susrelo sa namernim trovanjem. Veći procenat ovih slučajeva (44,65%) je zbrinjavano na licu mesta. O postojanju Nacionalnog centra za kontrolu trovanja informisano je 53,57%, a mere detoksikacije su poznate za 58,93% lekara. Dodatno usavršavanje iz oblasti trovanja je poželjno po mišljenju 75% lekara.

Diskusija. Unošenje otrova različitim putem u organizam može biti uzrok smrti pacijenata ukoliko se pravovremeno ne prepozna, pri prvom kontaktu lekara, u ambulanti opšte medicine.

Zaključak. Informisanost i obrazovanost lekara u ambulanti opšte medicine, kao i spremnost na dodatno usavršavanje pokazalo se kao važan faktor u zbrinjavanju pacijenata koji se u slučajevima trovanja prvobitno obraćaju izabranim lekarima za pomoć. Kontinuirano obrazovanje predstavlja meru neophodnu za unapređenje kvaliteta pružanja zdravstvene pomoći u slučajevima akutnih i hroničnih trovanja.

Ključne reči: trovanje, akutno zbrinjavanje, opšta medicina

General principals of emergency poisoning treatment in the general practice office – challenges and obstacles

Marija Z. Lazarevic¹, Dragana M. Trifunovic Balanovic²

¹Health care centre „Dr Milenko Marin“ Loznica,

²Health care centre Voždovac Belgrade

Abstract

Introduction. Timely recognition of acute or chronic poisoning, as well as the pharmacodynamic mechanisms and pathophysiology of poisoning, is of the utmost importance in the general practice office.

Objective. We aimed to find out the rate of awareness and education of primary healthcare physicians on necessary measures in the case of poisoning treatment.

Method. Physicians working in general practice in the Republic of Serbia were sent an electronic questionnaire "Urgent poisoning treatment in the general practice office". The questionnaire had 13 questions referring to the physician's practical experience.

Results. The rise of medication, product, and biological substance poisoning rate was registered at the primary healthcare level in the last five years and it went from 0,14 to 0,21. Poisoning with non-medical substances is on the steep decline, from 0,30 to 0,19 per 1000 inhabitants. We followed the experience of general physicians (GPs) from outpatient clinics, concerning the cases of acute and chronic poisoning, by examining the questionnaire which showed 71,43% of GPs met with this condition. Physicians were more likely to be met with accidental poisoning (41,07%), while (21,43%) were met with multiple intentional poisonings. A larger percentage of these cases (44,65%) were treated on-site. About the existence of the National Poisoning Control Center knew 53,57% of physicians and 58,93% were familiar with detoxication measures. Additional expertise in the area of poisoning is necessary in the opinion of 75% of physicians.

Discussion. Poison intake, in different ways, into a body, may cause a patient's death if not recognized on time, at the initial encounter in the general physician's office.

Conclusion. Awareness and education of the GPs in the outpatient clinics, as well as, readiness to learn additional skills proved to be an important factor in taking care of poisoned patients who call on their GPs first. Continuous education is a necessary measure for the improvement of healthcare quality in the treatment of acute and chronic poisoning.

Keywords: poisoning, acute treatment, general practice

Uvod

Blagovremeno prepoznavanje akutnog i hroničnog trovanja u ambulanti opšte medicine je od izuzetnog značaja za ishod daljeg lečenja pacijenata. Dobro prepoznavanje farmakodinamskih mehanizama i patofiziologije trovanja može sprečiti progresiju kliničkih manifestacija, kao i smrtni ishod koji se u nekim slučajevima dešava.

Na primarnom nivou zdravstvene zaštite u poslednjih pet godina registrovan je rast stope trovanja lekovima, preparatima i biološkim supstancama sa 0,14 na 0,21, dok se trovanje supstanci nemedicinskog porekla nalazi na nivou od 01,01 (uočen je pad od 01,09)^{1,2}.

Uzroci najčešćih trovanja se razlikuju u zavisnosti od porodičnog, radnog i socijalnog okruženja pacijenata (samotrovanja lekovima, kao i korozivnim sredstvima u domaćinstvu - koncentrovana sirćetna kiselina, proizvodi na bazi aktivnog hlora ili kiseonika za čišćenje sanitarne i vodovodne instalacije, beljenje i industrijski deterdženti). Od trovanja lekovima najčešće se susrećemo sa trovanjem benzodiazepinima usled lake dostupnosti ovih lekova³⁻⁵. Eliminacija preko usta unesenog otrova⁶ izazvanim povraćanjem, draženjem uvule, nakon unošenja 300–400 ml vode može predupređiti ozbiljnije kliničke komplikacije ukoliko se sprovede u ambulanti opšte medicine 60 minuta nakon gutanja, ako je pacijent svestan i spreman da sarađuje i ukoliko nije reč o korozivnoj materiji i ugljovodonicima koji se ne smeju udahnuti u pluća. U istim slučajevima se može primeniti i ispiranje želuca. Trovanje gasovima⁷ podrazumeva primenu aktivnog kiseonika, bronhodilatatora i kortikosteroida. Sedativno-hipnotički, antiholinergički, holinergički, simpatomimetski i opijatni sindrom kod trovanja lekovima⁸ je neophodno prepoznati na primarnom nivou zdravstvene zaštite kako bi se pravilno zbrinuo pacijent i primenio odgovarajući protivotrov.

Cilj

Utvrđiti stepen informisanosti i obrazovanosti lekara na primarnom nivou zdravstvene zaštite o predviđenim merama u slučajevima zbrinjavanja trovanja.

Metod

U prvom delu istraživanja analizirali smo najčešće uzroke trovanja u Republici Srbiji koristeći Zdravstveno-statistički godišnjak Republike Srbije, Instituta za javno zdravlje Srbije „Dr Milan Jovanović Batut“.

U drugom delu istraživanja lekarima zaposlenim u ambulanti opšte medicine na teritoriji Republike Srbije od 15.12.2022. do 15.01.2023. godine prosleđen je elektronski upitnik "Urgentno zbrinjavanje trovanja u ambulanti opšte

Introduction

Timely recognition of acute or chronic poisoning in the general practice office is of the utmost importance for the patient's treatment outcome. Proper recognition of the pharmacodynamic mechanisms and pathophysiology of poisoning may prevent the progression of clinical manifestations, as well as, the lethal outcome that may arise in some cases.

The rise of medication, product, and biological substance poisoning rate was registered at the primary healthcare level in the last five years and it went from 0,14 to 0,21 while poisoning with non-medical substances is at the level 01,01 (noticeable decline of 01,09)^{1,2}.

The causes of the most frequent poisonings defer depending on the patient's family, working, and social surroundings (medication self-poisoning, as well as, household corrosive substances – concentrated acetic acid, active chlorine, or oxygen-based products intended for the cleaning of sanitary or pipe installations, bleaching, and industrial detergents). As far as medication poisoning is concerned, the most frequent is benzodiazepine poisoning due to their easy access³⁻⁵. Ingestion of 300-400 ml of water and then pushing up the uvula may instigate vomiting and thus eliminate the through mouth ingested poison⁶ which can forestall severe clinical complications if performed in GP's office 60 minutes after ingestion, that is if the patient is alert and ready to cooperate and if it's not a corrosive substance or hydrocarbons which mustn't be inhaled into lungs. In the same cases, stomach lavage may be performed. Gas poisoning treatment⁷ includes the application of active oxygen, bronchodilators, and corticosteroids. Sedative-hypnotic, anticholinergic, cholinergic, sympathomimetic, and opiate syndrome in medication poisoning⁸ is necessary to identify at the primary healthcare level to take care of the patient properly and use an adequate antidote.

Objective

We aimed to find out the rate of awareness and education of primary healthcare physicians on necessary measures in the case of poisoning treatment.

Method

In the first part of the research we analyzed the most frequent causes of poisoning in the Republic of Serbia using the Health-statistical yearbook of the Republic of Serbia of the Public Health Institute „Dr Milan Jovanovic Batut“.

In the second part of the research we sent an electronic questionnaire "Urgent poisoning treatment in general practice office" to the GPs working in outpatient clinics in the Republic of Serbia, from December 15th, 2022 to January

medicine”. Uпитnik se sastojao od 13 pitanja koja se odnose na iskustvo ovih lekara u praksi.

Na osnovu trenutnog preseka stanja procenjivali smo učestalost različitih vrsta trovanja u gradskoj i ruralnoj sredini, kao i reakciju, informisanost, spremnost, obrazovanost i sposobnost lekara za brzo i adekvatno zbrinjavanje pacijenata. Ovi podaci su prikazani deskriptivnim statističkim metodama.

Rezultati

U prvom delu istraživanja analizom podataka Zdravstveno-statističkog godišnjaka Republike Srbije Beograd, Instituta za javno zdravlje Srbije „Dr Milan Jovanović Batut“, utvrdili smo da je u poslednjih pet godina registrovan porast stope trovanja lekovima, preparatima i biološkim supstancama sa 0,14 na 0,21, dok se trovanje supstancama nemedicinskog porekla nalazi u značajnom padu sa 0,30 na 0,19 na 1000 stanovnika.

Uпитnik je u potpunosti popunilo 56 lekara zaposlenih u ambulantama opšte medicine na teritoriji Republike Srbije. Rezultati odgovora koje su dali lekari prikazani su u tabeli 1.

15th, 2023. The questionnaire had 13 questions related to their practical experience.

Based on the current intersection of the situation, we assessed the frequency of different sorts of poisoning in city and rural areas, as well as, the reaction, awareness, readiness, education, and capability to adequately treat a patient. These data were shown using descriptive statistical methods.

Results

In the first part of the research we analyzed the data from the Health-statistical yearbook of the Republic of Serbia of the Public Health Institute of Serbia „Dr Milan Jovanovic Batut“, Belgrade, and we found the rise of medication, product, and biological substance poisoning rate in the last five years and it went from 0,14 to 0,21 while poisoning with non-medical substances is on the steep decline, from 0,30 to 0,19 per 1000 inhabitants.

The questionnaire was completed by 56 physicians working in outpatient clinics in the Republic of Serbia. The results of the physicians’ answers are shown in Table 1.

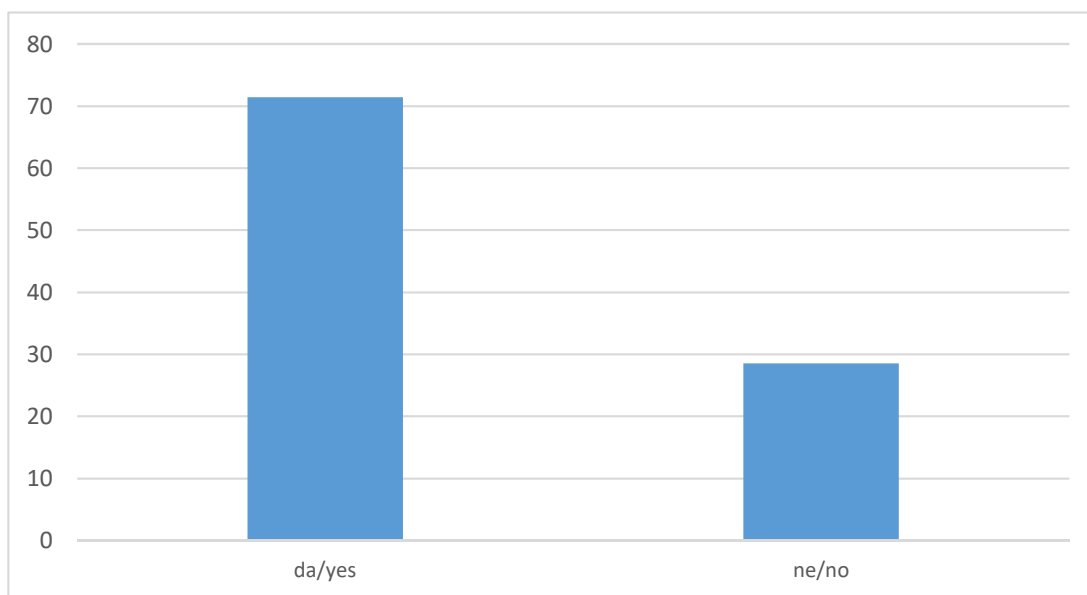
Tabela 1. Urgentno zbrinjavanje trovanja u ambulanti opšte medicine
Table 1. Urgent treatment of poisoning in general physician’s office

Red. br./No	Pitanje/ Question	N(%)
1.	Zaposlen sam u ambulanti opšte medicine koja pokriva: I work in the general practice office covering: a. Gradsku sredinu/ City area b. Ruralnu sredinu/ Rural area c. Gradsku i ruralnu sredinu/ City and rural areas	a. 37 (66,07) b. 17 (30,36) c. 2 (3,57)
2	Radim kao lekar u službi opšte medicine: I work as a physician in general practice: a. Manje od 5 godina/ Less than 5 years b. Od 5 do 10 godina/ From 5 to 10 years c. Više od 10 godina/ More than 10 years	a. 35 (62,50) b. 17 (30,36) c. 4 (7,14)
3.	Da li ste se u svojoj praksi susretali sa slučajevima trovanja? Did you encounter poisoning cases in your practice? a. Da/Yes b. Ne/No	a. 40 (71,43) b. 16 (28,57)
4.	Koliki je broj slučajeva trovanja sa kojima ste se susreli? How many cases of poisoning did you encounter? a. Od 0 do 5/ From 0 to 5 b. Od 5 do 10/ From 5 to 10 c. Više od 10/ More than 10	a. 39 (69,64) b. 10 (17,86) c. 7 (12,50)

5.	<p>U svojoj praksi češće ste se sretali sa: In your practice you more frequently encountered:</p> <ul style="list-style-type: none"> a. Zadesnim slučajevima trovanja/Accidental poisoning cases b. Namernim slučajevima trovanja/ Intentional poisoning cases c. Podjednako/ Equal d. Nijedno/ None 	<ul style="list-style-type: none"> a. 23 (41,07) b. 12 (21,43) c. 5 (8,93) d. 16 (28,57)
6.	<p>Da li ste slučajna trovanja zbrinjavali na licu mesta? Did you treat accidental poisoning on-site?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Nijedno/ Neither 	<ul style="list-style-type: none"> a. 25 (44,65) b. 15 (26,78) c. 16 (28,57)
7.	<p>Da li ste pozvali službu hitne medicinske pomoći? Did you call an ambulance?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Nijedno/Neither 	<ul style="list-style-type: none"> a. 29 (51,79) b. 11 (19,64) c. 16 (28,57)
8.	<p>Da li ste pacijente upućivali na sekundarni nivo zdravstvene zaštite? Did you refer patients to a secondary health level?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Nijedno/Neither 	<ul style="list-style-type: none"> a. 33 (58,93) b. 7 (12,5) c. 16 (28,57)
9.	<p>Da li ste pacijente upućivali u Nacionalni centar za kontrolu trovanja? Did you refer patients to the National Poisoning Control Center?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Nijedno/Neither 	<ul style="list-style-type: none"> a. 30 (53,57) b. 10 (17,86) c. 16 (28,57)
10.	<p>Da li vam je poznat broj telefona na koji možete prijaviti slučaj trovanja? Do you know the phone number where you can report a case of poisoning?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No 	<ul style="list-style-type: none"> a. 38 (67,86) b. 18 (32,14)
11.	<p>Da li su vam poznate mere detoksikacije? Are you aware of the detoxification measures?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Delimično/Partly 	<ul style="list-style-type: none"> a. 33 (58,93) b. 15 (26,78) c. 8 (14,29)
12.	<p>Da li smatrate da vam je potrebna dodatna obuka iz oblasti toksikologije koja se bavi zbrinjavanjem slučaja trovanja? Do you think you need additional expertise in the area of toxicology related to the treatment of poisoning cases?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Delimično/Partly 	<ul style="list-style-type: none"> a. 42 (75,00) b. 10 (17,86) c. 4 (7,14)
13.	<p>Da li biste želeli da se uključite u neki od programa kontinuiranog medicinskog usavršavanja iz oblasti toksikologije? Would you like to enter some of the programs of continuous medical education in the toxicology area?</p> <ul style="list-style-type: none"> a. Da/Yes b. Ne/No c. Nisam siguran/ I'm not sure 	<ul style="list-style-type: none"> a. 43 (76,79) b. 9 (16,07) c. 4 (7,14)

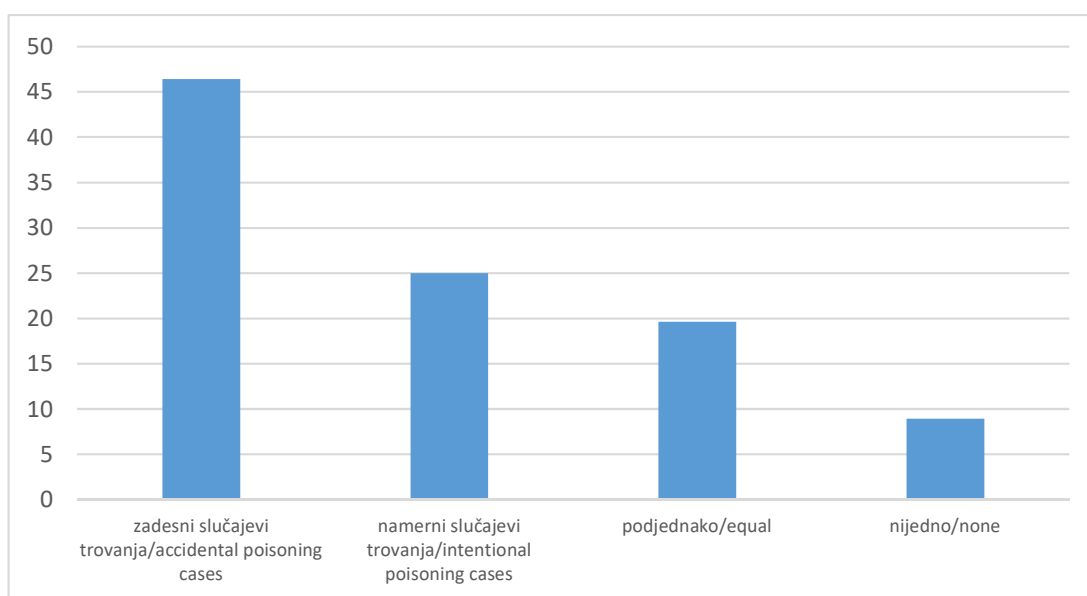
U ovom upitniku pokazalo se da se 71,43% doktora susretalo u praksi sa ovim stanjem. Lekari su se češće sretali (41,07%) sa zadesnim slučajevima trovanja, dok se 21,43% više puta susrelo sa namernim trovanjem (Grafikon 1. i 2).

This questionnaire showed 71,43% of physicians encountered poisoning cases in their practice. Physicians more frequently encountered (47,43%) accidental poisoning cases, while (21,43%) met several times with intentional poisoning (Figure 1 and 2).



Grafikon 1. Slučajevi trovanja u ambulantama opšte medicine

Figure 1. Poisoning cases in GP's office



Grafikon 2. Vrste trovanja u ambulantama opšte medicine

Figure 2. Sorts of poisoning in GP's office

Veći procenat ovih slučajeva (44,65%) je zbrinjavan na licu mesta. O postojanju Nacionalnog centra za kontrolu trovanja informisano je 53,57%, a mere detoksikacije su poznate za 58,93% lekara. Dodatno usavršavanje iz oblasti trovanja je poželjno po mišljenju 75% lekara.

Diskusija

U ambulanti opšte medicine zaposleni se često susreću sa akutnim stanjima opasnim po život pacijenata, pa je obučenosť i brza intervencija lekara važna za ishod ovih stanja. Savremeni protokoli za hitan i neodložan pristup za lečenje povređenih i obolelih zahtevaju unapređenje znanja i veština, kao i opreme i lekova koji su dostupni u službama opšte medicine. Često se lekari suočavaju sa trovanjima kao jednom vrstom urgentnog stanja na terenu u udaljenim ambulantama opšte medicine i neophodno je osigurati sve mere neophodne za zbrinjavanje ovih pacijenata.

U savremenom svetu, pa i kod nas, epidemiološka situacija je sve lošija usled sve veće izloženosti opioidima što dovodi do trajnog povećanja učestalosti trovanja i letalnog ishoda. Samim tim se i lekari u ambulanti opšte medicine češće sreću sa ovom vrstom trovanja, bez obzira da li je reč o urbanoj ili ruralnoj sredini. Istraživanja u Americi, koja se odnosi na stope smrtnosti od trovanja drogama izazvane opioidima u periodu od 1999. do 2015. godine, pokazuju da je ova stopa potcenjena jer specifični lekovi koji dovode do smrti često nisu identifikovani u potvrdama o smrti. Podaci su dobijeni iz dosijea Centra za kontrolu i prevenciju bolesti (CDC) višestrukih uzroka smrti (MCOĐ). Zvanično je registrovano 33.091 smrtnih slučajeva trovanja opijatima u 2015. godini, a stvarni broj je 39.999⁹.

U našem istraživanju zaključili smo da je u poslednjih pet godina registrovan porast stope trovanja lekovima, preparatima i biološkim supstancama sa 0,14 na 0,21, dok se trovanje supstancama nemedicinskog porekla nalazi u značajnom padu sa 0,30 na 0,19 na 1000 stanovnika. Usled porasta stope trovanja medicinskim sredstvima u svetu i kod nas, Komisija sačinjena od 30 stručnjaka iz pet naučnih društava dala je panel smernica u vezi sa lečenjem trovanja farmaceutskim lekovima i alternativnim preparatima. Oni su posmatrali osam segmenta i dali preporuke za adekvatno zbrinjavanje trovanja: (1) procena sposobnosti i početna trijaža; (2) dijagnostički pristup i uloga toksikoloških analiza; (3) pomoćna nega; (4) dekontaminacija; (5) poboljšanje eliminacije; (6) mesto protivotrova; (7) specifičnosti u vezi sa trovanjem drogama i (8) karakteristike trovanja kardiotoksičnim supstancama¹⁰.

Ugljen monoksid je gas koji nastaje nepotpunim sagorevanjem ugljenikovih jedinjenja i vodeći je uzrok trovanja u svetu. Značaj obrazovanosti lekara u svim sredinama je ključan faktor za sprečavanje smrtnog ishoda. Ova vrsta trovanja moguća je i u ruralnim i u urbanim sredinama, pa su pravovremene mere zbrinjavanja od velikog značaja i u ovim

A higher percentage of these cases (46,43%) was treated on-site. The existence of the National Poisoning Control Center was known to 53,57% of physicians and the measures of detoxification to 58,93%. In the opinion of 75% of physicians, additional expertise in the area of poisoning was desirable.

Discussion

In a GP's office, the employees often meet acute conditions that may be life threatening to patients' lives, so physician's skillfulness and fast intervention are important for the outcome of these conditions. Contemporary protocols for urgent and immediate approach to the treatment of injured and diseased need knowledge and skill improvement, as well as, equipment and medications which are available in GP offices. Very often, physicians encounter poisoning cases, as a sort of urgent condition, in remote outpatient clinics and it's necessary to ensure all necessary measures for the treatment of these patients.

In the modern world, and here as well, the epidemiological situation is getting worse due to a higher exposure to opioids which leads to a permanent increase in poisoning incidence and lethal outcomes. Therefore, GPs encounter this sort of poisoning more often no matter whether it's in urban or rural area. The studies in the States show death rates from drug poisoning, caused by opiates from 1999 to 2015, are underrated because specific medications that led to death were not identified in death certificates. The data were obtained from the Centers for Disease Control and Prevention's (CDC) multiple causes of death (MCOĐ). Officially, 33.091 deaths by opiate poisoning were registered in 2015, and the real number is 39.999⁹.

Our research showed the rise in poisoning rate for medications, products, and biological substances in the last five years and it went from 0,14 to 0,21, while poisoning with non-medical substances declined significantly from 0,30 to 0,19 per 1000 inhabitants. Due to the increase in poisoning rate with medical products, around the world and here as well, the Commission made of 30 experts from five scientific societies produced guidelines for the treatment of poisoning from pharmaceutical medications and alternative products. They looked into eight segments and gave recommendations for adequate poisoning treatment: (1) assessment of capabilities and initial triage; (2) diagnostic approach and the role of toxicological analyses; (3) backup care; (4) decontamination; (5) improvement of elimination; (6) site of antidote; (7) specifics of drug poisoning, and (8) characteristics of poisoning with cardiotoxic substances¹⁰.

Carbon monoxide is a gas produced by partial combustion of carbon-containing compounds and it is the leading cause of poisoning worldwide. The importance of physicians' education everywhere is the key factor for preventing lethal

slučajevima. Cilj rada Medić i sar. je bio analiza slučaja akutnog trovanja ugljen monoksidom kod pet radnika industrije nafte. Zbog zdravstvenih tegoba, nastalih nakon udisanja ugljen monoksida iz neispravnih gasnih instalacija, radnike je ekipa hitne medicinske pomoći u toku noći transportovala na odeljenje urgentne medicine. Uzeti su uzorci venske krvi za merenje karboksihemoglobina i gasne analize na prijemu i nakon 120 minuta. Sprovedena je infuzija i oksigenoterapija 100% kiseonikom preko maske poluotvorenog tipa. Nakon sprovedene terapije, dolazi do potpunog oporavka radnika. Brzo prepoznavanje simptoma trovanja i početak adekvatne hitne terapije pokazali su se kao ključni faktor za povoljan ishod lečenja. Primena preventivnih mera u smislu obrazovanosti radnika i sprovođenja zdravstveno- bezbednosnih mera na radu, i u radnom okruženju su izuzetno važne za sprečavanje ovakvih zadesa i početak odgovarajuće urgentne terapije je od ključnog značaja za povoljan ishod lečenja¹¹.

Analizom epidemioloških podataka zaključili smo da postoje slučajna i namerna trovanja, i to kod određene kategorije pacijenata (psihijatrijski bolesnici, psihički i emocionalno nestabilne osobe) i starosne grupe (starije). Cilj rada Banjac N. i sar. bio je da se analizira prehospitarno zbrinjavanje akutnih trovanja kroz retrospektivnu analizu podataka iz protokola u jednogodišnjem periodu, 2006. godine u SHMP Banja Luka, potvrdi broj, vrstu po uzroku i stepen težine trovanja i broj namernih samotrovanja kao pokušaja samoubistva. U SHMP su registrovana i pregledana 532 bolesnika sa različitim vrstama akutnih trovanja. Oni smatraju da se većina akutnih trovanja može zbrinuti u bolnici, a to zavisi od nivoa organizovanosti zdravstvenih ustanova, mogućnosti posmatranja i eventualnih potreba za hospitalizacijom. Prevencija pokušaja samoubistva i potrebe za hospitalizacijom su od suštinskog značaja za mentalno zdravlje celokupne populacije¹².

Posle pandemije koronavirusom 2019. očekuje se da će depresivnost i anksioznost biti najčešći psihopatološki fenomeni, koji za posledicu imaju često pokušaj samoubistva i sve češće trovanje lekovima. Rad Kuljančić i sar. ima za cilj da se pokaže slučaj u kojem je „okidač“ za pokušaj samoubistva bila trenutna situacija tokom pandemije Covid-19. Pokušaj samoubistva bio je trovanje lekovima protiv HIV. Nakon detoksikacije i inicijalnog zbrinjavanja u Urgentnom centru, pacijent je primljen na psihijatrijsku kliniku gde je primenjena potporna i kognitivno-bihevioralna psihoterapija radi poboljšanja njegovog mentalnog stanja.¹³

Pesticidi su supstance koje se široko koriste u poljoprivredi i koje su čest uzrok akutnih trovanja. Zbog česte udaljenosti ovih mesta na kojima se dešava trovanje od bolničkih ustanova, pacijenti se najčešće obraćaju izabranim lekarima koji koristeći dostupne lekove i sredstva i preduzimaju prve mere njihovog zbrinjavanja. Cilj rada Kostić i sar. je analiza slučajeva trovanja pesticidima u 2020. godini, prema podacima Laboratorije za toksikologiju, Instituta za sudsku medicinu.

outcomes. This sort of poisoning is possible, in both, rural and urban areas, so timely treatment measures are of great importance in these cases. Medić et al. aimed their research to analyze the case of actual carbon monoxide poisoning in five workers in the oil industry. Due to health problems that emerged from inhaling carbon monoxide from faulty gas installations, the workers were transported by ambulance to the ER during the night. Vein blood samples were obtained for measuring carboxyhemoglobin and gas analyses, right away and after 120 minutes. They got I.V.s and 100% oxygen therapy through half-open masks. After the therapy, they recovered completely. Fast recognition of poisoning symptoms and the start of adequate urgent therapy proved to be a key factor for favorable treatment outcomes. Application of preventive measures related to workers' education and implementation of health and safety measures at the workplace are of the utmost importance for the prevention of such accidents, and the start of adequate urgent treatment is the key to favorable treatment outcome¹¹.

Analyzing epidemiological data, we concluded there are accidental and intentional poisonings, especially in certain patient categories (psychiatric patients, psychologically and emotionally unstable persons) and age groups (elderly). Banjac N. et al. analyzed prehospitally treatment of acute poisonings through retrospective data analysis from the protocol, for a year-long period in 2006 in the ER Banja Luka. They confirmed the number, sort of cause, and degree of severity of poisoning, as well as, the number of intentional self-poisoning as a form of suicide attempt. The ER registered and examined 532 patients with different sorts of acute poisoning. They think acute poisonings could be taken care of in the hospitals, and it depends on the level of organization of health facilities, possibilities of follow-up, and eventual need for hospitalization. Prevention of suicide attempts and the need for hospitalization are of essential importance for the mental health of the entire population¹².

After the coronavirus pandemic in 2019, it is expected depression and anxiety will be the most common psychopathological phenomena which consequentially may lead to frequent attempts of suicide and medication poisoning. The article of Kuljančić et al. presented the case report of a patient in whom „the trigger“ for attempted suicide was the current situation during the Covid-19 pandemic. A suicide was attempted by the intake of HIV medications. After detoxification and initial treatment in the ER, the patient was admitted to a psychiatric ward where he received supportive and cognitive-behavioral psychotherapy for the improvement of his mental health.¹³

Pesticides are widely used substances in agriculture and are a common cause of acute poisonings. Due to the remoteness of these places, where poisonings occur, from the hospitals, patients often call on their GPs who use available medications and products, as the first line of treatment. Kostić et al.

nu u Nišu. Trovanja pesticidima prikazana su u 18 slučajeva, što čini 8,11% od ukupnog broja trovanja. Organofosfatni pesticidi su prikazani u devet slučajeva, glifosat u pet, pendimetalin u dva, dok su metolachlor i piperonil-butoksid dokazani u jednom slučaju. Podaci o slučajevima trovanja ukazuju na to da je obrazovanost o pravilnoj primeni pesticida neophodna kako bi se smanjio broj aktuelnih i hroničnih trovanja¹⁴.

Trovanja pesticidima, namerna i slučajna, su česta, posebno u nerazvijenim zemljama i zemljama u razvoju. Cilj istraživanja Maksimović i sar. bio je da se analizira klinička slika pacijenata koji su hospitalizovani zbog akutnog trovanja organofosfatom (OPP) ili karbamatnim pesticidima (CP), kao i da se analiziraju faktori koji potencijalno utiču na težinu i ishode trovanja. Urađena je retrospektivna studija preseka. Utvrđeno je da vrsta unetog pesticida značajno utiče na težinu i ishod trovanja, kao i na efikasnost protivotrova¹⁵.

Kadmijum i olovo su široko rasprostranjeni i nerazgradivi zagađivači od velikog značaja za ljudsko zdravlje. U stvarnom životu izloženi smo mešavinama hemikalija, a ne pojedinačnim hemikalijama, i stoga je od najveće važnosti da procenimo njihovu toksičnost. U studijama Anđelković i sar. posmatrana je toksičnost kadmijuma i olova. Sveobuhvatna zapažanja navode da izlaganje smešama kadmijuma i olova proizvodi izraženije efekte u poređenju sa odgovorom primećenim nakon izlaganja rastvorima pojedinačnih metala. Međutim, potrebna su dalja istraživanja da bi se potvrdila toksikokinetička ili toksikodinamska međudelovanja između ova dva toksična metala u organizmima¹⁶.

U proizvodnji plastike ftalati se široko koriste kao plastifikatori za mešanje i povećanje fleksibilnosti proizvoda od polivinil hlorida, a mogu da se oslobađaju u okolini. Utvrđeno je da su tri najveće kategorije toksičnosti ftalata kardiotoksičnost, hepatotoksičnost i nefrotoksičnost, a prvih 20 bolesti uključuju kardiovaskularne bolesti, bolesti jetre, urološke, endokrine i genitalne bolesti¹⁷⁻¹⁸. Sve ove simptome je neophodno prepoznati na primarnom nivou zdravstvene zaštite kako bi se sprečila progresija bolesti koja se može završiti letalno.

Akutna trovanja lekovima za lečenje kardiovaskularnih bolesti su retka u poređenju sa trovanjem drugim lekovima, ali često dovode do ozbiljnih funkcionalnih poremećaja različitih organskih sistema i karakteriše ih visok mortalitet. Visoka dostupnost i zastupljenost ovih lekova je faktor rizika za namerna i slučajna trovanja sa kojima se srećemo u ambulanti opšte medicine. Cilj rada Kovačević i sar. bio je da predstavi analizu podataka o aktuelnom trovanju lekovima koji se koriste u kardiovaskularnoj terapiji bolesti u Republici Srbiji u periodu od 2010. do 2018. godine na osnovu objavljenog Nacionalnog godišnjaka Centra za kontrolu trovanja Vojnomedicinske akademije u Beogradu. Broj pacijenata koji su pregledani pod sumnjom na trovanje lekovima za lečenje kardiovaskularnih bolesti u periodu 2010–2018. godine kretao se od četiri do šest procenata pregleda godišnje, dok se broj hos-

tic et al. analyzed in their research the cases of pesticide poisonings in 2020, according to the data from the Toxicology lab of the Institute for Forensic Medicine in Nis. Pesticide poisonings were reviewed through 18 poisoning cases, which made up to 8,11% of the total number of poisonings. Organophosphate pesticides were found in nine cases, glyphosate in five, pendimethalin in two, while metolachlor and piperonyl-butoxide were confirmed in one case. Data on the poisoning cases show that education on the proper use of pesticides is necessary to reduce the number of current and chronic poisonings¹⁴.

Pesticide poisonings, intentional or accidental, are frequent, especially in undeveloped and developing countries. Maksimovic et al. analyzed the clinical presentation of patients hospitalized for acute organophosphate (OPP) or carbamate pesticides (CP) poisoning, as well as, factors for potentially influencing the poisoning severity and outcomes. A retrospective cross-sectional study was performed. It was confirmed the sort of ingested pesticide significantly influenced the poisoning severity and outcome, as well as, the efficacy of the antidote¹⁵.

Cadmium and lead are widely spread and non-degradable pollutants of huge impact on human health. In real life, we are exposed to a mixture of chemicals, and not only a single chemical, therefore it's of essential importance to evaluate their toxicity. In the studies of Anđelkovic et al., the toxicity of cadmium and lead was observed. Comprehensive observations showed that exposure to mixtures of cadmium and lead produced more pronounced effects compared to responses noticed after exposure to the solutions of a single metal. However, further research is needed to confirm toxicokinetic or toxicodynamic inter-reaction between these two toxic metals in the body¹⁶.

In plastic production, phthalates are widely used as plasticators for mixing and increasing the flexibility of polyvinyl chloride products, and they may be released into the environment. It was confirmed, the three biggest categories of toxicity of phthalates are cardiotoxicity, hepatotoxicity, and nephrotoxicity, and the first 20 diseases include cardiovascular, liver, urology, endocrine, and genital diseases¹⁷⁻¹⁸. It's necessary to identify all these symptoms at the primary healthcare level to prevent disease progression which may end lethally.

Acute poisonings with cardiovascular medications are rare compared to poisonings with other medications but they often lead to serious functional disorders of different organ systems and are characterized by high mortality. The high availability and presence of these medications is a risk factor for intentional and accidental poisonings we encounter in the GP office. Kovacevic et al. presented a data analysis of current medication poisonings related to medications used in the treatment of cardiovascular diseases in the Republic of Serbia from 2010 to 2018. It was based on the National

pitalizovanih, zbog trovanja lekovima, kretao od sedam do 11 procenata svih hospitalizovanih pacijenata. Smrtni ishodi su najčešće posledice akutnog trovanja blokatorima Ca²⁺ kanala (50%) i beta blokatorima (40%), uglavnom u kombinaciji sa lekovima koji se koriste u lečenju psihijatrijskih bolesti, kao što su benzodiazepini, antiepileptici i antipsihotici. Kada je u pitanju istovremeno uzimanje više različitih lekova, koji imaju depresivni efekat na kardiovaskularni sistem, neophodno je bolničko lečenje pacijenata, ali i adekvatno i savremeno prepoznavanje stanja pri prvom kontaktu u ambulanti opšte medicine¹⁹.

Zaključak

Unošenje otrova različitim putem u organizam može biti uzrok smrti pacijenata ukoliko se pravovremeno ne prepozna pri prvom kontaktu lekara u ambulanti opšte medicine. Primena nespecifične i specifične terapije, kao i kliničkog lečenja od strane izabranih lekara može sprečiti teške posledice koje mogu biti nepovratne, pa i kobne za pacijenta.

Informisanost i obrazovanost lekara u ambulanti opšte medicine, kao i spremnost na dodatno usavršavanje pokazalo se kao važan faktor u zbrinjavanju pacijenata, koji se u slučajevima trovanja prvobitno obraćaju izabranim lekarima za pomoć.

yearbook of the Center for Poisoning Control of the Military Medical Academy in Belgrade. The number of examined patients suspected of cardiovascular medication poisoning from 2010–2018 went from 4% to 6% of exams per year, while the number of hospitalized patients, due to medication poisoning, went from 7% to 11% of all hospitalized patients. Death outcome is the most common consequence of acute poisoning with Ca²⁺ channel blockers (50%) and beta-blockers (40%), usually combined with medications for the treatment of psychiatric diseases, such as benzodiazepines, antiepileptics, and antipsychotics. When consuming more medications, at the same time, with a depressing effect on the cardiovascular system, hospitalization is necessary but also adequate and contemporary recognition of the condition at the initial contact in the GP office¹⁹.

Conclusion

Poison intake, in different ways, into one's body may be the cause of patient's death if it's not timely identified at the initial contact in the GP office. Application of non-specific and specific therapy, as well as, clinical treatment by a GP may prevent grave consequences which may be irretrievable and even fatal for the patient.

GP's awareness and education, as well as, readiness for advanced training proved to be an important factor in patient treatment since GPs are the first ones to whom they come for help.

Reference/ Literatura

- Zdravstveno-statistički godišnjak Republike Srbije. Beograd: Institut za javno zdravlje Srbije "Dr Milan Jovanović Batut", 2021. Available from: <https://www.batut.org.rs/download/publikacije/pub2021a.pdf>
- Zdravstveno-statistički godišnjak Republike Srbije. Beograd: Institut za javno zdravlje Srbije "Dr Milan Jovanović Batut", 2016. Available from: <https://www.batut.org.rs/download/publikacije/pub201620180419.pdf>
- Čirić T, Baralić K, Marić D, Javorac D, Đorđević AB, Miljković EA, et al. Causes of acute poisoning with a fatal outcome in the Republic of Serbia in the period from 2010 to 2018. *Arch Pharm* 2022;72(Suppl 4):S593–S594.
- Katić K, Stojadinović A, Mijatović V, Grujić M. Acute poisoning in children and adolescents hospitalized at the institute of child and youth health care of Vojvodina between 2015–2017. *Med Pregl* 2019;72(7-8):209–15.
- Đorđević S, Perković Vukčević N, Antunović M, Kilibarda V, Vuković Ercegović G, Jović Stošić J, et al. Olanzapine poisoning in patients treated at the National Poison Control Centre in Belgrade, Serbia in 2017 and 2018: a brief review of serum concentrations and clinical symptoms. *Arh Hig Rada Toksikol* 2022;73(2):126–30.
- Bulat P, Mandić-Rajčević S. Health risks due to the use of pesticides. In: Use of pesticides in plant production and environmental protection, 2019. p. 217–27.
- Peričević-Medić S, Ljujić J, Mikov I, Španović M, Sakač S. Emergency carbon monoxide poisoning therapy for petroleum industry workers. *Naučni časopis urgentne medicine HALO* 194;2020;26(3):138–42.
- Roksandić BI, Delić BS, Aracki NS, Petrović RD. Acute poisoning as urgent cases and care measures. *ABC-časopis urgentne medicine* 2020;20(1):11–9.
- Ruhm, CJ. Corrected US opioid-involved drug poisoning deaths and mortality rates, 1999–2015. *Addiction* 2018;113(7):1339–44.
- Mégarbane B, Oberlin M, Alvarez C, Balen F, Beaune S, Bédry R, et al. Management of pharmaceutical and recreational drug poisoning. *Ann Intensive Care* 2020;10(1):157.
- Medić SP, Ljujić J, Mikov I, Španović M, Sakač S. Urgentno zbrinjavanje trovanja ugljen monoksidom kod radnika naftne industrije. *Naučni časopis urgentne medicine HALO* 194 2020;26(3):138–42.
- Banjac N, Maravić-Oplakan G, Vukadinović S. Acute poisoning by chemical agents in the Emergency Department in Banja Luka. *ABC-časopis urgentne medicine* 2008; 8(1-2):50–3.
- Kuljančić D, Cvjetković-Bošnjak M. Pokušaj suicida u Covid 19 javnozdravstvenoj krizi. *Timočki medicinski glasnik* 2021;46(4):194–6.
- Kostić E, Vujović M. Toksikološki izveštaji o trovanju pesticidima u jugoistočnom regionu Srbije tokom 2020. godine. XXVI savetovanje o biotehnologiji. Čačak, 2021. Zbornik radova. Univerzitet u Kragujevcu, Srbija, 2021;313–8.
- Maksimović ŽM, Jović-Stošić J, Vučinić S, Perković-Vukčević N, Vuković-Ercegović G, Škrbić R, et al. Acute organophosphate and carbamate pesticide poisonings—a five-year survey from the National Poison Control Center Of Serbia. *Drug Chem Toxicol* 2023;46(1):113-121.
- Andjelkovic M, Buha Đorđević A, Antonijević E, Antonijević B, Stanić M, Kotur-Stevuljević J, Bulat Z. Toxic effect of acute cadmium and lead exposure in rat blood, liver, and kidney. *Int J Environ Res Public Health* 2019;16(2):274.
- Singh S, Li SSL. Phthalates: toxicogenomics and inferred human diseases. *Genomics* 2011;97(3):148–57.
- Sree CG, Buddolla V, Lakshmi BA, Kim YJ. Phthalate toxicity mechanisms: An update. *Comp Biochem Physiol C Toxicol Pharmacol* 2023;263:109498.
- Kovačević M, Baralić K, Djordjević AB, Čurčić M, Miljković EA, Bulat Z, et al. Acute poisonings by drugs used for the treatment of cardiovascular diseases in the Republic of Serbia. *Arch Pharm* 2022;72(Suppl. 4):S597–S598.

Primljen - Received - 30.04.2023.

Ispravljen - Corrected - 12.10.2023.

Prihvaćen - Accepted - 31.10.2023.