Sposobnost upravljanja motornim vozilima u bolesnika s kardiovaskularnim bolestima

Driving Ability in Patients with Cardiovascular Diseases

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SAŽETAK: Da biste stekli pravo upravljanja motornim vozilom, morate uspješno riješiti testove poznavanja prometnih propisa, pred ovlaštenom komisijom pokazati praktično znanje upravljanja vozilom i, ne manje važno, ispuniti zdravstveni uvjete da biste dobili vozačku dozvolu. Kardiovaskularni poremećaji mogu uzrokovati nagli ispad moždanih funkcija i stoga su opasnost za sigurnost u prometu. Ti poremećaji, odnosno bolesna stanja mogu biti neposredni razlog za privremenu ili trajnu nesposobnost upravljanja motornim vozilom. Opisane su najčešće kardiovaskularne bolesti koje mogu utjecati na sposobnost upravljanja cestovnim vozilom kako vozača amatera, tako i vozača profesionalaca.

SUMMARY: Issuing driving license to a person requires previous successful results on testing the person's familiarity with traffic regulations, demonstrating practical driving skills, and the last but not the least, meeting the necessary health related criteria. Cardiovascular disorders can lead to sudden cerebral functional events, thus posing a risk for traffic safety. These disorders and diseases can be direct reasons for proclaiming temporary or permanent driving inability. The article describes the most common cardiovascular diseases that can influence driving ability in both private and commercial drivers.

KLJUČNE RIJEČI: sposobnost upravljanja motornim vozilom, vozači amateri i vozači profesionalci, stariji vozači, kardiovaskularni bolesnici i vožnja motornih vozila, razlike u prometnim propisima.

KEYWORDS: driving ability, private and commercial drivers, elderly drivers, driving and heart disease, difference in traffic regulations.

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Uvod

Da biste stekli pravo upravljanja motornim vozilom, morate uspješno riješiti testove poznavanja prometnih propisa, pred ovlaštenom komisijom pokazati praktično znanje upravljanja vozilom i, ne manje važno, ispuniti zdravstvene uvjete da biste dobili vozačku dozvolu. Kardiovaskularni poremećaji mogu uzrokovati nagli ispad moždanih funkcija i opasnost su za sigurnost u prometu. Ti poremećaji, odnosno bolesna stanja mogu biti neposredni razlog za privremenu ili trajnu nesposobnost upravljanja motornim vozilom.[1] O značenju cestovnoga prometa govori i činjenica da je 2013. godine u Hrvatskoj bilo registrirano 1 869 370 motornih vozila. Motorizirani cestovni promet jedno je od bitnih obilježja suvremene civilizacije.[2] Sve dobrobiti ovog fenomena, nažalost, i dalje plaćamo visokom cijenom ljudskog stradanja. S obzirom na moguće prometne nesre-

Introduction

Issuing driving license to a person requires previous satisfactory results on testing the person's familiarity with traffic regulations, demonstrating practical driving skills, and the last but not the least, meeting the essential health related criteria. Cardiovascular disorders can lead to sudden cerebral functional events, thus posing a risk for traffic safety. These disorders and diseases can be right reasons for proclaiming temporary or permanent driving inability. The article describes the most common cardiovascular conditions that can influence driving ability in both private and commercial drivers[1]. The importance of road traffic is best illustrated by the fact that 1 869 370 motor vehicles were registered in Croatia in 2013. Road traffic is one of the strong characteristics of modern civilization[2]. Unfortunately, all the benefits of this phenomenon continues

će, upravljanje vozilom opasna je aktivnost popraćena značajnim morbiditetom i mortalitetom[3]. Prema navodima Svjetske zdravstvene organizacije, godišnje u prometnim nesrećama pogiba 1,24 milijuna osoba[4]. Brojni čimbenici pridonose sigurnosti prometa: izgrađenost cestovne mreže, kvaliteta vozila, poštovanje prometnih propisa i, konačno, možda najvažnije, sposobnost upravljanja vozilom. Prateći demografsku sliku, životna se dob sve više produljuje, a posebno u zapadnim zemljama, što neminovno dovodi i do sve veće zastupljenosti starijih vozača. Među kardiovaskularnim rizicima životna je dob zauzela visoko mjesto.

Vozači

Europsko kardiološko društvo[5] (ESC) i moderne smjernice Kanadskog[3] (CCS) i Australskog kardiološkog društva[4] definirale su dvije grupe vozača: vozače amatere (engl. *private drivers*; PD) i profesionalne vozače (engl. *comercial drivers*; CD). Procijenjeno je da vozači amateri, ovisno o profesiji i životnoj dobi, godišnje provedu prosječno 250 sati za volanom. Međutim, broj sati koji provedu vozači profesionalci mnogo je veći. Upravljanje automobilom visoko je cijenjena sloboda u razvijenom svijetu, a profesionalnim vozačima sredstvo stjecanja zarade.

Diljem svijeta postoji određena regulativa kojom se procjenjuje sposobnost upravljanja motornim vozilom, posebno inzistirajući na zdravstvenoj sposobnosti vozača. Vozači dakle moraju ispuniti određene zdravstvene standarde kako bi se osiguralo da njihovo zdravstveno stanje ne ugrožava sigurnost vožnje. U razvijenim zemljama, među ostalim bolestima, vrlo su česte i kardiovaskularne bolesti[5-8].

Valja napomenuti da su izražene razlike među zemljama glede procjene sposobnosti za vožnju, ne samo među zemljama članicama Europske unije nego i unutar američkih država i Kanade. U nekim se zemljama vrednovanje sposobnosti za vožnju provodi u određenim centrima ili kod liječnika, uključujući i specijaliste medicine rada. U drugim pak zemljama, poput Kanade, liječnici su obvezni prijaviti mjerodavnim službama vozača koji privremeno ili trajno nije sposoban za vožnju[8]. Ovakva obveza postoji i u Hrvatskoj, no, nažalost, rijetko se provodi[9,10].

Predmet prijepora među ostalim je životna dob do koje vozači smiju upravljati motornim vozilom. U većini zemalja EU-a[1] upravljanje vozilom dopušteno je vozačima amaterima do 70. godine života (Danska, Finska, Norveška, Engleska, Švicarska i Nizozemska), a zatim se, ovisno o pozitivnoj zdravstvenoj procjeni, produžuje svake treće godine. U Austriji, Sloveniji, Njemačkoj, Francuskoj, a odnedavno i u Hrvatskoj životna dob nije ograničavajući čimbenik. Doslovno, što to znači u Hrvatskoj? Prema Zakonu o izmjenama i dopunama Zakona o sigurnosti prometa iz 2015. godine, vozačka dozvola za vozače amatere izdaje se s rokom valjanosti od 10 godina.

Pri produljenju vozačke dozvole „vozač se nije dužan podvrgnuti zdravstvenom pregledu za vozača osim u slučaju da je obveza zdravstvenog pregleda utvrđena zdravstvenom potvrdom na temelju koje je vozačka dozvola izdana". Za razliku od toga, profesionalni je vozač obvezan pristupiti kontrolnom zdravstvenom pregledu svakih pet godina.[11]

to be paid by the high price of human fatalities. Considering the potential traffic accidents, driving a motor vehicle is a dangerous activity associated with high morbidity and mortality[3]. According to the World Health Organization report, 1.24 million individuals are killed in traffic accidents per year[4]. Numerous factors contribute to road safety, including road network, vehicle quality, observing traffic regulations, and possibly the most important element of driving ability. Demographic surveys reveal a continuing trend of lifespan increase, in western countries in particular, which obviously leads to an ever greater proportion of elderly drivers. Advanced age ranks high on the list of cardiovascular risk factors.

Drivers

The European Society of Cardiology (ESC)[5] and current guidelines issued by the Canadian Cardiovascular Society (CCS)[3] and Cardiac Society of Australia and New Zealand[4] define two groups of drivers: private drivers (PD) and commercial drivers(CD). It is estimated that PDs spend 250 hours driving per year on average, depending on age and occupation. The figure is considerably greater in CDs. Driving a motor vehicle is a highly appreciated freedom in the modern world and for CDs a means to earn for living. Regulations on evaluating driving ability, with particular reference to health-related fitness, are in use all over the world. This means that drivers have to meet certain health standards to be sure that their medical condition will not impair driving safety. Among other diseases, the prevalence of cardiovascular diseases is very high in developed countries[5-8] It should be noted that there are considerable differences among countries in the mode of assessing driving ability, not only among European Union (EU) member countries but also between the USA and Canada. In some countries, evaluation of driving ability is performed at specialised centres or physician offices including specialists in occupational medicine. In others, like Canada, physicians are obliged to notify respective authorities on a driver being temporary or permanently unfit to drive[8]. This obligation is also found in the Croatian legislative, but unfortunately, it is rarely applied[9,10]. Among other issues, a matter of dispute is the age to which people are allowed to drive motor vehicles. In most EU countries[1], driving is authorised to PD until the age of 70 (Denmark,Finland, Norway, England, Switzerland and The Netherlands), and then their driving license is renewed every third year, depending on the person's positive health assessment. In Austria, Slovenia, Germany, France, and since recently Croatia, age is not a limiting factor for driving. What does it mean in Croatia? According to the Act on Amendments to the Traffic Safety Act from 2015, PDs are issued the 10-year driving license. On driving license renewal, "the driver need not undergo medical examination for drivers unless it is mandatory based on the health certificate upon which driving license has been Issued". Unlike this regulation, CD is obliged to follow up medical examination every five years[11].

Presuming that a PD was issued a driving license at the age of 18, when he/she was healthy and free from any limitations, having thus met the requirements to be allowed to drive until he/she dies. Of course, we do agree that ageing is not a disease

Pođimo od pretpostavke da je vozač amater stekao dozvolu nakon navršene 18. godine života u punom zdravlju i bez ikakvih ograničenja. Time je ispunio uvjet da bez ikakvih ograničenja vozi doslovno do smrti. Naravno, slažemo se da starenje nije bolest. Procesom starenja neminovno nastaju i promjene zdravstvenih sposobnosti koje mogu utjecati na sigurno upravljanje motornim vozilom. Neke se jednostavno prepoznaju (npr. slabljenje vida, sluha, poremećaji motorike, mentalne funkcije), dok druge poput kardiovaskularnih bolesti zahtijevaju medicinski nadzor i odgovarajuće liječenje. Također je poznata činjenica da će u osoba nakon 60. godine života njih 60 % imati povišene vrijednosti arterijskoga tlaka (AT), a neadekvatno regulirani AT može biti uzrokom niza neželjenih stanja, od aritmija do kardiovaskularnih incidenata[12-19]. Zdravstveni se pregledi, za razliku od Hrvatske, u Italiji, Španjolskoj i Irskoj provode svakih 10 godina, a po potrebi i svake treće godine. U Mađarskoj su vozači dužni pristupiti kontrolnome zdravstvenom pregledu nakon navršene 40. godine života[1].

Od 2008. godine Hrvatska je uspjela postupno smanjivati broj poginulih na cestama, no taj je broj ipak još uvijek viši od prosjeka zemalja članica EU-a. Tijekom 2013. godine u Hrvatskoj je na milijun stanovnika u cestovnome prometu poginulo 86 osoba, dok je prosjek u EU-u 52 osobe.

Ono što, međutim, zabrinjava jest da u cijelome promatranom razdoblju Hrvatska bitno zaostaje za prosjekom EU-a. Naime, onoliko koliko se broj poginulih smanjuje u Hrvatskoj, otprilike se u istom omjeru smanjuje i broj poginulih u EU-u. To govori da još uvijek nismo iskoristili sve mogućnosti za poboljšanje stanja, odnosno bržeg smanjenja broja poginulih na našim prometnicama. Svjesni smo, a na to upućuje i statistika, da su vozači mlađe životne dobi ipak najčešći krivci za prometne nesreće (uzroci su brzina, sklonost riziku, neiskustvo), međutim, životni se vijek produžuje, pa je sve veći udio starijih vozača.[17] Ovime se otvara vrlo osjetljiva rasprava. Može li se dopustiti da se zdravstvena sposobnost vozača amatera više nikada ne provjerava od dobivanja vozačke dozvole, naravno, ako nema zdravstvenih ograničenja pri prvom pregleda? Promatrajući dobnu strukturu stradalih vozača u Hrvatskoj, a odnosi se na 2012. godinu, u rasponu od 18. do 24. godine poginulo je 30 vozača, broj se znatno povećava u dobnoj skupini od 25. do 34. godine na 57 poginulih, a uporno se održava na 39 poginulih vozača u dobnoj skupini od 55 do 64 godine i starijih od 65 godina[2]. Činjenica je da su u Austriji u dvije godine na 580 000 vozača starijih od 75 godina u cestovnim prometnim nesrećama poginula 92 vozača, uz gotovo istovjetan broj od 88 poginulih na 610 000 mladih vozača, životne dobi od 20 do 24 godine[20].

Brojni su zdravstveni problemi koji utječu na sposobnost upravljanja vozilom te trajno ili privremeno onesposobljuju vozače. Prema australskim smjernicama o sposobnosti za vožnju[4], taksativno su navedene bolesti, odnosno stanja koja utječu na sposobnost upravljanja vozilom:

1. omaglice:
   - vazovagalna reakcija u 50%
   - sinkopa kardiovaskularne geneze (npr. aritmija)
   - epileptični napadaj u 10%
   - metabolički poremećaji (npr. hipoglikemija)

but this process is unavoidably accompanied by changes in the abilities that can influence driving safety. Some of these are easy to recognise (e.g., vision and hearing impairments, motor impairments, mental functions, etc.), whereas others like cardiovascular diseases require medical surveillance and appropriate treatment. It is also well known that 60% of individuals older than 60 have elevated values of arterial pressure and inappropriately controlled blood pressure can cause an array of undesired conditions, from arrhythmias to cardiovascular incidents[12-19]. Unlike Croatia, in Italy, Spain and Ireland, medical examinations are performed every ten years, and every third year if necessary. In Hungary, drivers are obliged to present for follow-up medical examination after the age of 40[1]. Although Croatia has gradually reduced the number of roads traffic deaths since 2008, the figure still exceeds the average recorded in EU member countries. In 2013, there was 86 traffic deaths per million in Croatia, while the EU average is 52 deaths per million. However, disturbing is the fact that Croatia has lagged behind the EU average throughout the period of observation. The number of traffic deaths has been decreasing in Croatia at approximately the same rate as in the EU, suggesting that we have failed to use all the opportunities to improve the situation, i.e. to reduce the number of road traffic fatalities at a faster rate. As also indicated by statistical data, we are aware that young drivers account for the majority of traffic accidents (the causes are high speed, proneness to risk, and lack of driving experience); on the other hand, life expectancy is ever longer, resulting in an increased proportion of elderly drivers[17]. This issue opens a very delicate debate. Is it allowable that PD health related driving ability is not tested ever since being granted a driving license, of course, in case there were no health-related limitations on initial examination? Considering age structure of the drivers killed in traffic accidents in Croatia in 2012, there were 30 deaths in the 18-24 age group, increasing significantly to 57 deaths in the 25-34 age group, and persisting at the figure of 39 deaths in the 55-64 and >65 age groups[2]. In Austria, there were 92 deaths in traffic accidents per 580,000 drivers older than 75 versus an almost the identical figure of 88 deaths per 610,000 young drivers aged 20-24 during a two-year period[20]. Numerous health problems influence is driving ability, causing permanent or temporary unfitness to drive. The Australian guidelines for driving ability assessment[4] provide a list of diseases and conditions that affect fitness to drive, as follows:

1. Blackouts:
   - vasovagal reaction in 50%
   - syncope of cardiovascular genesis (e.g., arrhythmia)
   - epileptic seizure in 10%
   - metabolic disorders (e.g., hypoglycemia)
   - effects of drugs
   - sleep disorders
2. Cardiovascular disease
3. Diabetes mellitus
4. Musculoskeletal disorders
5. Neurologic disorders (epilepsy, dementia, consciousness impairments of various genesis)
6. Psychiatric diseases
7. Sleep disorders
8. Vision impairments

- utjecaj lijekova
- poremećaji spavanja,

2. kardiovaskularne bolesti,
3. dijabetes,
4. muskuloskeletni poremećaji,
5. neurološki poremećaji (epilepsija, demencija, smetnje svijesti različite geneze),
6. psihijatrijske bolesti,
7. poremećaji sna,
8. smetnje vida.

Kardiovaskularne bolesti

U osoba s kardiovaskularnim bolestima postoji povećan rizik od prometnih nezgoda. Hrvatska se kao članica EU-a treba se pridržavati europskih propisa zdravstvene sposobnosti upravljanja motornim vozilom.

Pri kojem se stanju može kratkotrajno ili trajno uskratiti mogućnost upravljanja vozilom na temelju hrvatskoga Pravilnika o zdravstvenim pregledima vozača i kandidata za vozače[9]?

1. KORONARNA BOLEST SRCA

Vozači amateri (PD) i vozači profesionalci (CD) privremeno su ili trajno nesposobni:

1.1. *Koronarna bolest s učestalim napadima angine pektoris (AP), dok se terapijom ili drugim oblicima liječenja ne postigne stabilno stanje pri kojem je upravljanje vozilom sigurno.* Ovaj članak dijelom odgovara smjernicama ESC-a[1], CCS-a[3], međutim, ne uključuje mogućnost perkutane koronarne intervencije (PCI) po kojoj je PD vozačima, prema ESC i CCS smjernicama, ponovno upravljanje vozilom omogućeno nakon 7 dana, a CD vozačima 6 tjedana nakon intervencije (**tablica 1**).

1.2. Infarkt miokarda (MI):

1.2.1. odnosi se na PD (Pravilnik o zdravstvenim pregledima vozača i kandidata za vozače[9]): *upravljanje vozilom dopušteno je nakon što je prošlo najmanje šest mjeseci od infarkta i uspješno provedene rehabilitacije te bez AP i posljedica koje utječu na sigurno upravljanje vozilom.* Nije uključena mogućnost PCI-ja. To je bitna razlika u odnosu prema ESC-u[1], jer je PD vozačima dopušteno upravljanje vozilom 4 tjedna nakon akutnog MI, a CD vozačima nakon 6 tjedana. U slučaju urgentne PCI u akutnom MI, upravljanje vozilom PD vozačima dopušteno je 7 dana nakon intervencije, a CD vozačima 6 tjedana nakon intervencije.

1.2.2. U slučaju urgentne PCI u akutnom MI, upravljanje vozilom CD vozačima dopušteno je 6 tjedana nakon intervencije, no prije toga moraju ispuniti neke kriterije: uredno podnijeti test opterećenja: 90 % od maksimalnih vrijednosti bez depresije ST segmenta veće od 2 mm, bez reverzibilnog ispada kinetike

Cardiovascular Disease

Individuals with cardiovascular diseases are at an increased risk of traffic accidents. Croatia as an EU member country has to follow European legislative on health-related driving ability.What are the conditions the presence of which can entail temporary or permanent driving license suspension according to the Croatian Regulations on Medical Examinations of Drivers and Driver Candidates?[9]

1. CORONARY HEART DISEASE

The following conditions are associated with temporary or permanent unfitness to drive in both PD and CD:

1.1 *Coronary disease with recurrent angina pectoris (AP) episodes until drugs achieve a stable state therapy or other treatment modalities, yielding the person fit to drive safely.* This article in part corresponds to ESC[1] and CCS[3] guidelines; however, it does not include the possibility of percutaneous coronary intervention (PCI), after which resuming fitness for driving is possible in 7 days for PD and in 6 weeks for CD according to the ESC and CCS guidelines (**Table 1**).

1.2 Myocardial infarction (MI):

1.2.1 This refers to PD (Regulations on Medical Examinations of Drivers and Driver Candidates[9]): *fitness for driving is resumed after at least six months have elapsed since MI and successful rehabilitation, without AP and any sequels influencing driving safety.* The possibility of PCI is not included. These regulations differ substantially from ESC guidelines[1], according to which driving is allowed in 4 weeks of acute MI for PD and in 6 weeks for CD. In case of urgent PCI for acute MI, driving fitness is resumed in 7 days of the intervention for PD and 6 weeks of the intervention for CD.

1.2.2 In case of urgent PCI for acute MI, driving fitness is resumed in 6 weeks of the intervention for CD, but they previously have to meet the following criteria: regular exercise test result, 90% of maximal values without ST-segment depression greater than 2 mm, no reversible kinetic events on stress echocardiography or no major perfusion events on radionuclide ventriculography. The left ventricular ejection fraction (LVEF) should be >40%. In the Croatian Regulations on CD, MI is not mentioned at all, stating other cardiovascular diseases and disorders that Driving Ability in Patients with Cardiovascular Diseases influence driving safety, which in fact eliminate the category of bus and truck is driving (**Table 1**).

1.3 According to the Croatian Regulations, CD is unfit or temporarily unfit for driving after cardiac surgery for coronary heart disease (coronary artery bypass graft, CABG) or dysrhythmia (pacemaker implantation) when these conditions influence driving safety, thus, as a rule, eliminating the category of bus and truck driving[9]. This differs considerably from ESC[1] and CCS[3] guidelines, according to

na stresnoj ehokardiografiji, ili bez težeg ispada perfuzije na radionuklidnoj ventrikulografiji. Istisna frakcija lijeve klijetke mora biti > 40 %. Prema hrvatskom Pravilniku, u CD vozača uopće se ne spominje MI, nego se govori o ostalim bolestima i stanjima srca i krvnih žila kada utječu na sigurno upravljanje vozilom i njima se, u pravilu, ukida kategorija vožnje kamiona i autobusa (**tablica 1**).

1.3. Profesionalni su vozači, prema hrvatskom Pravilniku, *nesposobni ili privremeno nesposobni nakon operacije srca zbog koronarne bolesti srca (CABG) ili poremećaja ritma (ugrađen elektrostimulator srca), kada utječu na sigurno upravljanje vozilom*. I njima se, u pravilu, ukida kategorija vožnje kamiona i autobusa[9]. Velika je razlika u usporedbi s ESC[1] i CCS[3] smjernice: u CD vozača treba proći najmanje 6 tjedana nakon operacije do ponovljenog dopuštenja za vožnju ako nema drugih diskvalificirajućih stanja, a ponovno dopuštenje ovisi o nalazu na testu opterećenja. Prema hrvatskom Pravilniku[9], u PD vozača uopće se ne spominje trajanje vremenskog ograničenja nakon CABG-a i implantacije elektrostimulatora srca (ELS), već se govori o potrebi redovitih kontrola ELS-a kojima se potvrđuje uredna srčana funkcija. PD vozači nakon CABG-a, prema ESC-u[1] i CCS-u[3], ne smiju voziti jedan mjesec nakon otpusta iz bolnice, nakon ugradnje trajnog ELS-a upravljanje vozilom dopušteno je nakon jednog tjedna, a u CD vozača nakon 4 tjedna poslije zahvatu (**tablica 1**).

which at least 6 weeks should elapse from the operation to resume, fitness to drive unless there are some disqualifying states, while returning fitness to drive depends on the exercise test result. In the Croatian Regulations[9], the length of unfitness to drive after CABG and pacemaker implantation is not mentioned at all; instead, the need of regular pacemaker follow-ups to confirm normal cardiac function is stated. According to ESC[1] and CCS[3] guidelines, PDs having undergone CABG are not allowed to drive for 1 month and those with a permanent pacemaker for 1 week of discharge from the hospital; in case of CDs, they are not allowed to drive for 4 weeks of the procedure (**Table 1**).

2. ARTERIAL HYPERTENSION

According to the Croatian Regulations on Medical Examinations of Drivers and Driver Candidates, *PDs are evaluated as unfit or temporarily unfit for driving at arterial hypertension (AH) with systolic blood pressure greater than 160 mm Hg or diastolic blood pressure greater than 100 mm Hg. CDs are evaluated as unfit or temporarily unfit for driving at AH with complications and arterial pressure (AP) greater than 160/100 mm Hg, if influencing driving safety*[9]. This article in part corresponds to ESC guidelines where,interestingly, AH is not a disqualifying feature but CDs are proclaimed permanently unfit for driving in case of persistent AH values exceeding 180/100 mm Hg1. According to the recent Australian guidelines, PDs are considered temporarily unfit for driving in case of AH values persistently exceeding 200/110 mm Hg, treated or untreated. Their driving ability is resumed upon

TABLE 1. Ischemic heart disease – Fitness to drive according to the European Society of Cardiology (ESC)[1] and the Canadian Cardiovascular Society (CCS)[3] Guidelines.

Organisation	Condition	Private drivers	Commercial drivers
ESC	Stable angina	Driving allowed when symptoms controlled	Driving allowed for: - asymptomatic patients, - requiring no antianginal therapy - regular exercise evaluation
CCS	Stable angina	Driving allowed if asymptomatic	Driving allowed if asymptomatic
ESC	Myocardial infarction	Driving allowed 1 month post-MI	Driving allowed 6 weeks post-MI
CCS	STEMI or NSTEMI with significant LV damage	Driving allowed 1 month after discharge	Driving allowed 3 months after discharge
	NSTEMI with minor LV damage	Driving allowed after 48 h or 7 days whether 30 days whether PCI performed or not	Driving allowed after 7 days or PCI performed or not
ESC	PCI	Driving allowed 1 week following PCI	Driving allowed 6 weeks post-PCI
CCS	PCI	Driving allowed 48 hours post-PCI	Driving allowed 7 days after PCI
ESC	CABG	Driving allowed 1 month following CABG	Driving allowed 6 weeks following CABG
CCS	CABG	Driving allowed 1 month after discharge	Driving allowed 3 months after discharge

CABG = coronary artery bypass grafting; LV = left ventricular; MI = myocardial infarction; NSTEMI = non-ST elevation myocardial infarction; PCI = percutaneous coronary intervention; STEMI = ST elevation myocardial infarction.

NSTEMI with minor LV damage is classified as an MI defined only by elevated troponin with or without ECG changes in the absence of a new wall motion abnormality.

2. ARTERIJSKA HIPERTENZIJA

Prema hrvatskom Pravilniku o zdravstvenim pregledima vozača i kandidata, *vozači amateri se ocjenjuju nesposobnim ili privremeno nesposobnim kod arterijske hipertenzije (AH) sa sistoličkim tlakom višim od 160 ili dijastoličkim višim od 100 mmHg. Profesionalni vozači proglašavaju se nesposobnim ili privremeno nesposobnim kod AH s komplikacijama i arterijskim tlakom višim od 160/100 mm Hg, ako utječe na sigurno upravljanje vozilom*[9].

Ovaj članak dijelom odgovara smjernicama ESC-a, u kojima AH za amatere, zanimljivo, nije diskvalificirajuća, ali profesionalni vozači proglašavaju se trajno nesposobnima ako su vrijednosti AT-a trajno više od 180/100 mmHg[1]. Prema recentnim australskim smjernicama, PD vozači privremeno su nesposobni ako imaju AT trajno viši od 200/110 mmHg, liječen ili neliječen. Postaju sposobnima na temelju izvanrednih kontrolnih pregleda koje provodi liječnik obiteljske medicine ako je AT dobro medikamentno reguliran te ako nema nuspojava lijekova i organskih oštećenja koja mogu štetno utjecati na sigurnost vožnje. U CD vozača ljestvica AT-a spuštena je na 170/100 mmHg. Postaju sposobnima nakon 4 tjedna ako je uvedena ili korigirana medikamentna terapija i ostvareni dobri terapijski rezultati, te ako nema nuspojava lijekova i organskih oštećenja koja mogu štetno utjecati na sigurnost vožnje. Proglašenje sposobnosti za vožnju u CD vozača temelji se na obveznim redovitim jednogodišnjm nadzornim pregledima uz usku koordinaciju liječnika obiteljske medicine i specijalista[4].

3. SRČANA INSUFICIJENCIJA

Prema hrvatskom Pravilniku o zdravstvenim pregledima vozača i kandidata za vozače, *srčana je insuficijencija i za PD i za CD vozače uvrštena među ostale bolesti i stanja srca i krvnih žila koji utječu na sigurnost upravljanja vozilom.* Ovakva formulacija u PD i CD vozača koincidira s privremenom ili trajnom nesposobnosti[9].

Prema ESC smjernicama, PD vozači nesposobni su dok imaju simptome popuštanja srca u mirovanju. Vožnja se ponovljeno dopušta ako se simptomi povlače uz odgovarajuću terapiju. Za CD vozače kriteriji su mnogo stroži. Proglašavaju se sposobnima ako postaju asimptomatski, a nužno je da je istisna frakcija lijeve klijetke (LVEF) > 40 %, da nema diskvalificirajućih aritmija i da uredno podnose test opterećenja[1].

Australske su smjernice još decidiranije. PD vozači periodično se kontroliraju i sposobni su za vožnju u slučaju minimalnih simptoma i zadovoljavajućeg odgovora na terapiju. Ako simptomi postoje već u mirovanju, uz rezistenciju na terapiju (NYHA IV.), proglašavaju se trajno nesposobnima za vožnju. Za CD vozače uvedena je obaveza jednogodišnjega redovitog kardiološkog nadzora. Sposobni su ako su simptomi minimalni, pri LVEF > 40 % te ako pri testu opterećenja podnose 90 % maksimalnoga funkcionalnog kapaciteta[4].

4. VALVULNA BOLEST SRCA

Prema hrvatskom Pravilniku o zdravstvenim pregledima vozača i kandidata za vozače, PD i CD se, *u slučaju urođenih i stečenih bolesti srca (valvularnog aparata i drugih struktura*

specific follow-up examinations at family physician office if AH is efficiently controlled by medication, there are no drug side effects and no organic lesions that may have the adverse impact on driving safety. In CDs, the AH value is decreased to 170/100 mm Hg. They will resume their driving fitness in 4 weeks if medicamentous therapy has been introduced or corrected and good therapeutic results have been recorded, there are no drug side effects and no organic lesions that may have an adverse impact on driving safety. In CDs, resuming fitness to drive is proclaimed upon having undergone mandatory regular annual follow-up examinations with close coordination between the family physician and the respective specialist[4].

3. CARDIAC INSUFFICIENCY

In the Croatian Regulations on Medical Examinations of Drivers and Driver Candidates, *cardiac insufficiency is included in the group of other cardiovascular diseases and disorders influencing driving safety for both PD and CD.* In both PD and CD, this statement coincides with temporary or permanent unfitness to drive[9]. According to ESC guidelines, PDs are unfit to drive while having symptoms of heart failure at rest. Fitness for driving is resumed if the symptoms fall on appropriate therapy. In CDs, the criteria are much more stringent. In this category, driving fitness is resumed when they become asymptomatic, along with LVEF >40%, no disqualifying arrhythmias, and normal exercise test results[1].

Australian guidelines are even more precise. PDs are supposed to undergo periodic follow-ups and are considered fit to drive if having minimal symptoms and a satisfactory therapeutic response. Permanent unfitness to drive is proclaimed in the case of symptoms at rest and resistance to therapy (NYHA IV). In CDs, obligatory annual cardiologic follow-up has been introduced. They are considered fit to drive in case of minimal symptoms, along with LVEF >40% and 90% maximum functional capacity tolerance on exercise test[4].

4. VALVULAR HEART DISEASE

According to the Croatian Regulations on Medical Examinations of Drivers and Driver Candidates, *both PD and CD are proclaimed permanently or temporarily unfit to drive if suffering from congenital or acquired heart diseases (involving cardiac valves and other heart structures) that may influence driving safety.* In CD, no valvular heart disease is specified, instead the CD category is eliminated by this generalised statement[9]. According to ESC guidelines, PDs with valvular heart disease including postoperative state following cardiac surgery are evaluated as fit to drive if asymptomatic. CDs are proclaimed unfit for driving if symptomatic, and resuming driving fitness depends on the possible presence of other disqualifying factors after cardiac surgery (e.g., cardiac insufficiency, 'delayed' surgery) or data on embolic events despite anticoagulant therapy[1]. In English guidelines, approach to PDs is the same as in ESC guidelines, whereas CDs are proclaimed unfit to drive as long as their valvular heart disease is symptomatic. In case of cerebral embolism, they are evaluated as unfit to drive for 12 months, and then can be evaluated

srca), ocjenjuju nesposobnima ili privremeno nesposobnima ako utječu na sigurno upravljanje vozilom. Kod CD vozača ne specificira se određena valvulna bolest srca, već im se po takvoj uopćenoj formulaciji ukida kategorija profesionalnog vozača[9].

Prema ESC smjernicama, PD vozači se kod valvulne bolesti, uključujući i stanje nakon kardiokirurškog zahvata, ocjenjuju sposobnima ako su asimptomatski. Profesionalni se vozači proglašavaju nesposobnima ako su simptomatski, a ponovno dopuštenje za vožnju ovisi o tome jesu li prisutni drugi diskvalificirajući momenti nakon kardiokirurškog zahvata (npr. srčana insuficijencija, „zakašnjeli" operativni zahvat) ili podatci o emboličnim incidentima usprkos antikoagulantnoj terapiji[1].

Prema engleskim smjernicama, pristup vozačima amaterima istovjetan je ESC-u, a profesionalni se vozači proglašuju nesposobnim dok je valvulna bolest simptomatska. U slučaju cerebralnih embolija, ocjenjuju se nesposobnima tijekom 12 mjeseci, a zatim se, ovisno o specijalističkoj procjeni, mogu se proglasiti sposobnima za vožnju, uključujući i stanje nakon operacije ako nema drugih diskvalificirajućih momenata. Vrlo je zanimljiv pristup vozačima s aortnom stenozom. U slučaju simptomatske bolesti, obje su kategorije vozača trajno nesposobne za vožnju. Profesionalni bi se vozači, iako nemaju simptoma, morali i kod teške aortne stenoze jednom godišnje podvrgnuti testu opterećenja. Međutim, proglašuju se trajno nesposobnima[19] ako:

- specijalist kardiolog procijeni da zbog težine stanje ne mogu pristupiti testu opterećenja
- tijekom testiranja dolazi do pojave simptoma, nastupi pad AT-a i EKG promjene
- su nesposobni za test opterećenja zbog drugih razloga.

Australske su smjernice još mnogo specifičnije. Vozači amateri s valvulnom bolesti proglašuju se nesposobnim ako imaju simptome pri umjerenim opterećenjima. Ne smiju voziti najmanje 4 tjedna nakon operacije srca. Obvezni su redovito obavljati periodične nadzorne preglede, pri čemu se procjenjuje je li postignut zadovoljavajući terapijski odgovor, imaju li minimalne tolerantne simptome pri vožnji (bol u prsištu, palpitacije, zaduhu) i jesu li nakon operacije zaostali prihvatljivi mišićno-koštani bolovi i ne ograničavaju li sposobnost upravljanja vozilom.

Profesionalni vozači ne smiju voziti najmanje 4 tjedna nakon operacije valvule. Obvezni su obavljati periodični kontrolni, nadzorni pregled jednom godišnje. U slučaju simptomatske bolesti neovisno o operaciji, embolizmu, aritmiji, kardiomegaliji, patološki promijenjenom EKG-u, visokim vrijednostima AT-a ili trajnoj antikoagulantnoj terapiji, proglašuju se nesposobnima za vožnju. Tri mjeseca nakon operacijskog zahvata ultrazvučno se procjenjuje uspjeh zahvata. Ako su simptomi minimalni (bol u prsištu, palpitacije, zaduha, kao i muskuloskeletni bol), proglašuju se sposobnima uz redovite nadzorne kontrolne preglede[4].

5. KARDIOMIOPATIJE

Prema hrvatskom Pravilniku o zdravstvenim pregledima vozača i kandidata za vozače, *kardiomiopatije su kod obiju kate-*

as fit to drive depending on specialist assessment, including postoperative state, provided there are no other disqualifying factors. Quite interesting is the approach to drivers with aortic stenosis. In case of symptomatic disease, both driver categories are evaluated as unfit to drive permanently. Although free of symptoms, CDs with severe aortic stenosis are obliged to undergo exercise test once a year. However, in this category permanent unfitness to drive is proclaimed[19] if:

- cardiologist estimates that the driver cannot undergo exercise test due to disease severity,
- symptoms, AH decrease and ECG changes occur during exercise testing, and
- unable to undergo exercise test for some other reasons

Australian guidelines are even more specific. PDs with valvular heart disease are proclaimed unfit to drive if having symptoms at moderate exercise. They are not allowed to drive for at least 4 weeks following cardiac surgery. They are obliged to undergo regular periodic follow up examinations, where it is estimated whether a satisfactory therapeutic response has been achieved, whether there are minimal tolerance symptoms on driving (chest pain, palpitations, shortness of breath), and whether the residual postoperative musculoskeletal pain is acceptable and does not limit driving fitness. Commercial drivers are not allowed to drive for at least 4 weeks after valvular surgery and are obliged to undergo periodic follow-up examinations once a year. In case of symptomatic diseases irrespective of surgery, embolism, arrhythmia, cardiomegaly, pathologically altered ECG, elevated AH or permanent anticoagulant therapy, permanent unfitness for driving is proclaimed in CDs. Success of the procedure is assessed by ultrasonography 3 months of the surgery. If there are minimal symptoms (chest pain, palpitations, shortness of breath and musculoskeletal pain), patients are proclaimed fit to drive, however, with regular follow-up examinations.[4]

5. CARDIOMYOPATHIES

In the Croatian Regulations on Medical Examinations of Drivers and Driver Candidates, *cardiomyopathies are included in other cardiovascular diseases influencing driving ability for both PD and CD categories*[9]. According to ESC guidelines, PDs with cardiomyopathy are proclaimed unfit to drive in case of symptoms at rest. Once the symptoms have been properly controlled, PDs resume their driving ability, however, with mandatory regular follow-up examinations. CDs are allowed to drive if asymptomatic, free from embolic events and, of course, with regular periodic follow-up examinations. On recurrent embolism events in spite of oral anticoagulant therapy, this category is proclaimed permanently unfit to drive[1]. Australian guidelines are considerably broader and more precise. In the case of dilated cardiomyopathy, PDs are obliged to present for periodic follow-up examinations, while CDs are forced to undergo follow-up medical examination once a year. In PDs, driving fitness depends on the symptoms, which should be minimal (chest pain, palpitations, and shortness of breath). No paroxysmal arrhythmia should be recorded. In CDs, besides minimal symptoms (chest pain, palpitations, and shortness of breath), driving fitness also requires the ab-

gorije vozača uvrštene među ostale bolesti i stanja srca i krvnih žila koji utječu na sigurnost upravljanja vozilom[9]. Prema ESC-u, pri kardiomiopatijama PD vozači nesposobni su u slučaju simptoma u mirovanju. Jednom kada su simptomi pod kontrolom, proglašuju se sposobnima, ali podliježu redovitim nadzornim kontrolama. CD vozačima dopušta se upravljanje vozilom ako su asimptomatski i ako nisu imali emboličke incidente, ali, naravno, podliježu perodičnim zdravstvenim kontrolama. Kod ponovljenih embolizacija, usprkos peroralnoj antikoagulantnoj terapiji, trajno im se uskraćuje sposobnost za vožnju[1].

Australske su smjernice mnogo šire i egzaktnije. U slučaju dilatacijske kardiomiopatije PD vozač je obvezan pristupiti periodičnim kontrolnim nadzornim pregledima, a u CD vozača obvezno se jednom godišnje provodi medicinski nadzor kod kardiologa. Sposobnost PD vozača za vožnju ovisan je o simptomima koji moraju biti minimalni (bol u prsištu, palpitacije, osjećaj nedostatka zraka). Ne smiju biti registrirani paroksizmi aritmija. Kod CD vozača uvjeti za vožnju uključuju, osim minimalnih simptoma (bol u prsištu, palpitacije, osjećaj nedostatka zraka), odsutnost aritmija i nalaz LVEF > 40 %. U PD vozača s hipertrofijskom kardiomiopatijom nadzorni se pregled provodi periodično, a u CD vozača jednom godišnje. Bitan preduvjet za sposobnosti vožnje za PD vozača jesu minimalni simptomi (identični navedenima kod dilatativne kardiomiopatije), međutim, nužno je da osoba nema paroksizme aritmija, odnosno sinkopa. U CD vozača, osim minimalnih simptoma, LVEF treba biti > 40 %, nužno je da podnesu > 90 % maksimalnog testa opterećenja, ne smiju imati sinkopu, niti ventrikularnu aritmiju u Holteru EKG-a, a isključujući čimbenik također je i teška hipertrofija lijeve klijetke. Postavlja se pitanje je li u obitelji bilo slučajeva nagle smrti. U slučaju pozitivnog odgovora, CD vozač proglašava se trajno nesposobnim za vožnju[4].

6. VASKULARNE BOLESTI

Prema hrvatskom Zakonu o sigurnosti prometa na cestama, *vaskularne su bolesti za obje kategorije vozača uvrštene u ostale bolesti i stanja srca i krvnih žila koji utječu na sigurnost upravljanja vozilom*[9].

Prema australskim smjernicama, PD vozač ne smije voziti ako ima neoperiranu aortnu, torakalnu ili abdominalnu aneurizmu. Nakon operacije aneurizme smije voziti nakon 4 tjedna. Podložan je periodičnim specijalističkim pregledima, a dopustiv promjer aneurizme mora biti < 5 cm. Profesionalni vozači ne smiju voziti najmanje 3 mjeseca nakon operacije, nužni su jednom godišnje nadzorni pregledi, dopustiv promjer aneurizme je < 5 cm. Prema ESC-u, dopustiv promjer aneurizme aorte mora biti < 5, 5 cm[1]. Antikoagulantna terapija, pod uvjetom da je unutar preporučljivih vrijednosti, nije kontraindikacija za sposobnost upravljanja vozilom za obje kategorije vozača[4].

7. ARITMIJE

Prema hrvatskom Zakonu o sigurnosti prometa na cestama, vozači i kandidati za vozače amatere ocjenjuju se nesposobnima ili privremeno nesposobnima kada boluju od sljedećih bolesti ili stanja: *poremećaji ritma i bolesti srca s poremećajima svijesti, koji se ne mogu terapijski regulirati, kompletni*

sence of arrhythmias and LVEF >40%. Periodic and annual follow-up examinations are needed in PDs and CDs with hypertrophic cardiomyopathy, respectively. Minimal symptoms (the same as those listed for dilated cardiomyopathy) are the main precondition for driving fitness in PD; however, the person should be free from paroxysmal arrhythmia and syncope. In CD, besides minimal symptoms, additional requirements for driving fitness include LVEF >40%, tolerating >90% maximal exercise test, no syncope and no ventricular arrhythmia on Holter ECG; severe left ventricular hypertrophy is also a factor for exclusion. The subject is asked about the family history of sudden death. If yes, a CD is proclaimed permanently unfit for driving[4].

6. VASCULAR DISEASES

In the Croatian Traffic Safety Act, *vascular diseases are included in the group of other cardiovascular diseases influencing driving safety*[9]. According to Australian guidelines, PD is not allowed to drive if having an unoperated aortic, thoracic or an abdominal aneurysm. Upon aneurysm surgery, the person is not authorised to drive for 4 weeks postoperatively. PD is obliged to undergo periodic specialist examinations, while the acceptable aneurysm diameter is <5 cm. CDs are not allowed to drive for at least 3 months postoperatively, are obliged to undergo follow-up examinations once a year, and the acceptable aneurysm diameter is <5 cm[4]. According to ESC guidelines, the allowable aortic aneurysm diameter is <5.5 cm[1]. Anticoagulant therapy, provided it is within the recommended values, is not a contraindicationfor driving fitness for either PD or CD category[4].

7. ARRHYTHMIAS

According to the Croatian Traffic Safety Act, PD drivers and driver candidates are evaluated as unfit or temporarily unfit for driving if suffering from the following diseases or conditions: *dysrhythmias and heart disease with consciousness disturbances that cannot be controlled by therapy, and complete heart block when influencing driving safety. Irrespective of the type of examination, CDs and CD candidates are proclaimed unfit or temporarily unfit for driving in the case of cardiac and cardiovascular diseases and conditions with impaired conduction, complete heart block, second-degree atrioventricular (AV) block, and left bundle branch block (LBBB)*[9]. This statement shows that arrhythmias are defined in general, i.e. not divided in line with the latest classifications into bradyarrhythmias (sinus node diseases and conduction disorders) and tachyarrhythmias (supraventricular and ventricular). Attention should, in particular, be paid to the possible history data on the previous syncope demonstrated to be of arrhythmic genesis. Symptomatic bradyarrhythmias are indications for permanent pacemaker implantation. If the person is asymptomatic, then there is no indication for permanent pacemaker implantation, and according to the European, Canadian and American recommendations these disorders do not preclude driving fitness as long as they are asymptomatic. LBBB and fascicular block are not indications for permanent pacemaker implantation but do require appro-

srčani blok kada ima utjecaj na sigurno upravljanje vozilom. Profesionalni vozači i kandidati za vozače te skupine neovisno o vrsti pregleda, ocjenjuju se nesposobnima ili privremeno nesposobnima za upravljanje vozilom kod bolesti i stanja srca i krvnih žila i bolesti srca sa smetnjama provođenja, kompletni srčani blok, AV blok II stupnja, blok lijeve grane Hisovog snopa[9]. Iz ovoga je vidljivo da su aritmije izrazito uopćeno definirane, tj. da nisu podijeljene sukladno novijim podjelama na bradiaritmije (bolesti sinusnoga čvora i smetnje provođenja) i tahiaritmije (supraventrikularne i ventrikularne). Posebna se pozornost treba posvetiti mogućem anamnestičkom podatku o prethodnoj sinkopi za koju je dokazano da je aritmijske geneze. Simptomatske bradiaritmije indikacije se za ugradnju trajnog ELS-a srca. Ako su pak osobe bez simptoma, onda u njih nema indikacija za ugradnju ELS-a srca, a, prema europskim, kanadskim i američkim preporukama, nisu zapreka za vožnju sve dok bradiaritmije ne postanu simptomatske. Blok grane i fascikularni blok nisu indikacija za ELS, ali indiciraju obradu radi isključenja strukturne bolesti miokarda i moguće progresije smetnji provođenja. Nema podataka koji bi upućivali na to da sinkopa u tijeku supraventrikularne tahikardije može uzrokovati prometnu nezgodu. Vjerojatno je to iznimno rijetko zbivanje. Osobe s perzistentnom i permanentnom fibrilacijom ili undulacijom atrija mogu upravljati vozilom ako je postignuta adekvatna kontrola ritma. Nužni su traženje uzroka ovog poremećaja ritma i odgovarajuće liječenje.[5] Paroksizmi fibrilacije atrija opasniji su i mogu uzrokovati kratkotrajne omaglice, dijelom i zbog embоličnih incidenata. Prognoza bolesnika s Wolff-Parkinson-Whiteovim sindromom i drugim supraventrikularnim tahikardijama u pravilu je dobra i ne dovodi do sinkopa. U takvih pacijenata s manifestnom preekscitacijom preporučuje se kateterska ablacija, nakon koje, ako je uspješno provedena, stječu dopuštenje za upravljanje vozilom. Kateterska ablacija, odnosno izolacija plućnih vena sve se više spominje kao alternativno liječenje fibrilacije atrija. Najveći je broj ventrikularnih tahikardija (90 %) posljedica koronarne ishemije, iako je tek 20 – 30 % njih preboljeli IM. Jednom prisutna ventrikularna tahiaritmija može se ponoviti. Jedini sigurni pretkazatelj jest snižena vrijednosti LVEF (< 35 %)[5,21]. U takvim slučajevima moderna se terapija zasniva na ugradnji kardioverterskog defibrilatora (ICD). Osobe s ovim tipom ELS-a usprkos ciljanoj primjeni elektrošoka izložene su riziku od simptomatske ventrikulske aritmije sa sinkopom ili pomućenjem svijesti i time su pri vožnji rizik ne samo za sebe već i za druge[22]. Recentna ispitivanja provedena u Kanadi pokazala su da se na 100 000 pacijenta s ICD-om samo u njih 5 godišnje pojavi simptomatska aritmije. Taj je podatak definirao nove smjernice u procjeni sposobnost za upravljanje vozilom. CD vozačima trajno je uskraćena dozvola za vožnju, dok se PD vozačima u Europi vožnja dopušta 3 mjeseca nakon ugradnje ICD-a, a u Americi nakon 6 mjeseci. Pacijenti (PD) s prirođenim simptomatskim produženim QT sindromom, Brugadinim sindromom ili drugim kanalopatijama s paroksizmima ventrikulske fibrilacije nemaju dopuštenje za vožnju sve do ugradnje ICD-a[23].

Rasprava i zaključak

Uglavnom su opisane najčešće kardiovaskularne bolesti, odnosno stanja koja mogu utjecati na sposobnost upravljapriate workup to rule out structural myocardial disease and potential progression of conduction impairment. There are no data suggesting that syncope during supraventricular tachycardia could lead to a traffic accident. Most likely, it happens very rarely. Persons with persistent and permanent atrial fibrillation or undulation can drive if appropriate rhythm control has been achieved. It is necessary to search for the cause of rhythm impairment, followed by appropriate treatment[5]. Paroxysmal atrial fibrillation is by far more dangerous and can lead to short-term blackouts, in part due to embolic events. Patients with Wolff-Parkinson-White syndrome and other supraventricular tachycardias have a good prognosis, and these conditions do not lead to syncope. In these patients with manifest pre-excitation, catheter ablation is recommended; if successfully performed, the patients are then proclaimed fit for driving. Catheter ablation, i.e. pulmonary vein isolation has been ever more frequently suggested as an alternative treatment of atrial fibrillation. The majority of ventricular tachycardias (90%) occur consequentially to coronary ischemia, although only 20%-30% of these patients have a history of MI. When once present, ventricular tachyarrhythmia can recur. The only certain predictor is lowered ejection fraction (<35%)[5,21]. In such cases, current therapy is based on implantable cardioverter defibrillator (ICD). Individuals with this type of pacemaker are at a risk of symptomatic ventricular arrhythmia with syncope or impaired consciousness in spite of targeted electrical stimulation, thus posing a risk while driving not only for themselves but also for other traffic participants[22]. Recent studies conducted in Canada showed that symptomatic arrhythmia occurred in only 5 per 100,000 patients with ICD per year. This finding has resulted in new guidelines for assessment of driving ability. In CDs, driving license is permanently suspended, whereas PDs are allowed to drive 3 months after ICD implantation in Europe and after 6 months in America. PDs with the congenital symptomatic long-QT syndrome, Brugada syndrome or other channelopathies with ventricular fibrillation paroxysms are not allowed to drive until ICD implantation[23].

Discussion and Conclusion

The most common cardiovascular diseases and conditions that can influence driving ability in both private and commercial drivers are described. It is a little bizarre that the Croatian Regulations on Medical Examinations of Drivers and Driver Candidates refer to some diseases which are extremely rare, such as constrictive pericarditis or chronic pulmonary heart with symptoms of decompensation, whereas other diseases and conditions which are exceptionally more common are not defined but are included in the group of other cardiovascular diseases and conditions were influencing driving safety[9]. It should be noted that the ESC, CCS, English and Australian guidelines for assessment of driving fitness in cardiovascular patients are adjusted to the latest medical concepts, thus reducing the possibility of depriving commercial drivers of their economic status while being much more tolerant towards private drivers. In Croatia, cardiovascular diseases are the leading cause of mortality. According to the Croatian Central Bureau of Statistics, these diseases were the cause of

nja cestovnim vozilom kako vozača amatera, tako i profesionalaca. Pomalo je bizarno da se u hrvatskome Pravilniku o zdravstvenim pregledima vozača i kandidata za vozače spominju neke bolesti koje su izrazito raritetne poput konstriktivnog perikarditisa i kroničnoga plućnog srca sa znakovima dekompenzacije, dok se druge bolesti i stanja koji su neusporedivo učestaliji ne definiraju, već se uvrštavaju među ostale bolesti i stanja srca i krvnih žila koji utječu na sigurnost upravljanja vozilom[9].

Nužno je istaknuti da ESC, CCS te engleske i australske smjernice o sposobnosti upravljanja motornim vozilom kardiovaskularnih bolesnika, koje su prilagođene recentnim medicinskim spoznajama, smanjuju mogućnost gubitka ekonomskog statusa profesionalnih vozača i neusporedivo su tolerantnije prema vozačima amaterima.

U Hrvatskoj su kardiovaskularne bolesti vodeći uzrok smrtnosti. Prema podatcima Državnog zavoda za statistiku, u 2014. godini od njih je umrlo 24 112 osoba (47,43 %) svih umrlih[19]. U bolesnika s kardiovaskularnim poremećajima postoji povećan rizik od prometnih nezgoda. Nedavno provedena metaanaliza dokazala je relativni rizik od sudjelovanja u prometnim nezgodama za vozače s kardiovaskularnim poremećajima unutar EU-a 23 % veći od onih bez bolesti srca i krvnih žila[24].

U Španjolskoj su PD vozači obvezni svake desete godine pristupiti nadzornim, kontrolnim zdravstvenim pregledima. U studiji provedenoj na više od 5000 vozača u njih 11,6 % registrirani su kardiovaskularni poremećaji koji mogu utjecati na sposobnost za vožnju. Zanimljivo je da je najveći broj takvih poremećaja rezultirao privremenom nesposobnosti za vožnju, restrikcijama i obvezom češćih kontrolnih pregleda, a samo 1,6 % takvih vozača proglašeno je trajno nesposobnima za vožnju[8,17] U Hrvatskoj imamo velik broj prometnih nezgoda. Nerijetko, krivnja se isključivo prebacuje na nepridržavanje prometnih propisa, odnosno na preveliku brzinu vozača. Sve veći je broj vozača i starije životne dobi. Učestalost nezgoda najveća je u „mlađoj" životnoj dobi, ali znatno raste i nakon 70. godine života. Zdravstvenu provjeru vozača, i amatera i profesionalaca, trebalo bi unaprijediti i uskladiti sa standardima zemalja s velikom tradicijom motorizacije, a posebice s EU-om jer smo i mi članica te zajednice.

24,112 deaths or 47.43% of all-cause deaths in 2014[19]. Patients with cardiovascular disorders are at an increased risk of traffic accidents. A recent meta-analysis demonstrated the relative risk of being involved in traffic accidents to be by 23% higher in drivers with cardiovascular disorders as compared with those free from these disorders in EU[24].

In Spain, private drivers are obliged to present for follow-up examinations every tenth year. In a study including more than 5000 drivers, cardiovascular disorders that can influence driving ability was recorded in 11.6% of study subjects. Interestingly, the majority of these disorders resulted in temporary unfitness to drive, with restrictions and more frequent follow-up examinations, while only 1.6% of these drivers were proclaimed permanently unfit to drive[8,17]. In Croatia, the rate of traffic accidents is rather high. Noncompliance with traffic regulations, primarily high speed, is quite frequently identified as the main culprit. There are an ever growing proportion of elderly drivers. The incidence of traffic accidents is highest in 'young' age; however, it also rises significantly after the age of 70. Therefore, medical evaluation of drivers, both private and commercial, should be upgraded and coordinated with the standards valid in countries with the long tradition of road traffic, EU in particular, as Croatia is also part of this community.

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