


Smrtnost od ishemijske bolesti srca i akutnog infarkta miokarda u Gradu Zagrebu i Republici Hrvatskoj od 2001. do 2016. godine

Mortality from ischemic heart disease and acute myocardial infarction in the City of Zagreb and Republic of Croatia 2001-2016

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SAŽETAK: Cilj je ovog rada bio analizirati kretanje mortaliteta od ishemijske bolesti srca (IHD) i akutnog infarkta miokarda (AMI). Provedena je retrospektivna analiza podataka mortaliteta i bolničkog morbiditeta za Republiku Hrvatsku i Grad Zagreb. Analizirani su podatci o broju umrlih od IHD-a (dijagnoza I20-I25 prema Desetoj reviziji Međunarodne klasifikacije bolesti) i umrlih od AMI-ja (dijagnoza I21). Rezultati ovog istraživanja utvrdili su da se tijekom razdoblja od 1. siječnja 2001. do 31. prosinca 2016. broj umrlih osoba od AMI-ja kontinuirano smanjuje. Dobno standardizirane stope smrtnosti od AMI-ja tijekom spomenutog razdoblja niže su za 55,6 % u Gradu Zagrebu i 35,6 % u Hrvatskoj. Kako se broj umrlih osoba od skupine IHD-a nije bitno smanjio, može se zaključiti da se na području čitave države i Grada Zagreba sve više umire od drugih sastavnica skupine IHD prema kojima je potrebno usmjeriti veću pozornost.

SUMMARY: The aim was to analyze ischemic heart disease (IHD) and acute myocardial infarction (AMI) mortality. Data on the respective mortality and in-hospital morbidity for the City of Zagreb and Republic of Croatia were retrospectively analyzed. The analysis included data on the number of deaths due to IHD (International Classification of Diseases-10th Revision (ICD-10) code I20-I25) and deaths due to AMI (ICD-10 code I21). Study results revealed the number of deaths from AMI to have continuously decreased from January 1, 2001 until December 31, 2016. During the study period, the age-standardized death rates from AMI decreased by 55.6% and 35.6% in Zagreb and Croatia, respectively. As the number of deaths due to the IHD group of syndromes did not show substantial decline, it was concluded that deaths due to IHD entities other than AMI were on an increase in both Zagreb and Croatia as a whole, calling for more attention to be paid to them.

KLJUČNE RIJEČI: ishemijska bolest srca, akutni infarkt miokada, smrtnost, Republika Hrvatska.

KEYWORDS: ischemic heart disease, acute myocardial infarction, mortality, Republic of Croatia.

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Uvod

Od ishemijske bolesti srca (IHD, prema engl. *ischemic heart disease*) u Hrvatskoj umire svaka peta osoba¹, a standardizirana stopa smrtnosti od IHD-a u državi je dvostruko viša od prosjeka zemalja članica Europske unije.² Vodeća manifestacija IHD-a jest akutni koronarni sindrom (ACS, prema engl. *acute coronary syndrome*). Epizoda ACS-a nije povezana samo s mortalitetom, ponovnim velikim ishemijskim događajima ili invaliditetom, nego uzrokuje smanjenje kvalitete života te znatno opterećuje zdravstveni sustav. Prema rezultatima nedavno objavljenog istraživanja, epizoda ACS-a u zemljama Europske unije uzrokuje gubitak radne sposobnosti koji traje prosječno 70 radnih dana, uz posredni trošak zbog bolesti od 13.953 EUR-a.³

Introduction

In Croatia, every fifth death is due to ischemic heart disease (IHD)¹, and the standardized death rate from IHD is twofold the average reported from the European Union (EU) countries.² Acute coronary syndrome (ACS) is the leading manifestation of IHD. ACS episode is not only associated with mortality, recurrent major ischemic events or disability but it also results in reduced quality of life and considerable burden upon healthcare system. According to the results of a recent study conducted in EU countries, ACS episode leads to the loss of working capacity for 70 workdays on average, along with indirect disease related cost of 13,953 €.³

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Kako bi se omogućilo pravodobno, učinkovito i na smjernicama utemeljeno liječenje ACS-a, Hrvatsko kardiološko društvo zajedno s ključnim dionicima zdravstvenog sustava postupno je u posljednjim dvama desetljećima optimiziralo medikamentno i invazivno liječenje ACS-a, slično drugim europskim zemljama. Osim brojnih znanstvenih, stručnih, preventivnih i promotivnih aktivnosti, 2005. godine je provedena regionalizacija kardiološke skrbi. Pokretanjem Hrvatske mreže intervencijskog liječenja akutnog infarkta miokarda, uz osnivanje novih centara intervencijske kardiologije⁴⁻⁶, postupno je na području cijele zemlje osigurano suvremeno revaskularizacijsko liječenje⁷ metodom perkutane koronarne intervencije (PCI, prema engl. *percutaneous coronary intervention*).

Svrha je ovog rada bila analizirati kretanje mortaliteta od IHD-a i akutnog infarkta miokarda (AMI, prema engl. *acute myocardial infarction*) te učestalost bolničkog liječenja zbog AMI-ja u Republici Hrvatskoj i u Gradu Zagrebu.

Ispitanici i metode

Provedena je retrospektivna analiza podataka o mortalitetu i bolničkom morbiditetu uzrokovanih spomenutim bolestima Hrvatskog zavoda za javno zdravstvo za Republiku Hrvatsku i Grad Zagreb. Analizirani su podatci o broju umrlih od IHD-a (dijagnoza I20-I25 prema Desetoj reviziji Međunarodne klasifikacije bolesti) i umrlih od AMI-ja (dijagnoza I21) za razdoblje od 1. siječnja 2001. do 31. prosinca 2016. Rezultati su prikazani prema spolu i dobnim skupinama (<45, 45 – 64, >64 godine) te ukupno.

U skladu s procjenom stanovništva svake su godine izračunane dobno standardizirane stope smrtnosti (ASDR, prema engl. *age-standardized death rates*). Kako bi standardizirane stope bile što realnije, odnosno što bliže pravim vrijednostima općih stopa, standardizacija je rađena na osnovi Popisa stanovništva Republike Hrvatske iz 2011. godine.

Za razdoblje od 2009. do 2016. godine, od kada se u bolničkom sustavu primjenjuje dijagnostičko-terapijski sustav kao jedini i službeni način evidentiranja, obračunavanja i fakturiranja zdravstvenih usluga, analizirani su podatci o učestalosti bolničkog liječenja oboljelih od AMI-ja (dijagnoza I21).

Rezultati

Skupina IHD bila je uzrokom smrti 164 473 osobe u Hrvatskoj u razdoblju od 2001. do 2016. godine, a prosječan broj umrlih osoba godišnje iznosio je 10 280 (**tablica 1**). U Gradu Zagrebu u istom su razdoblju od IHD-a umrle 24 322 osobe, odnosno, prosječno 1520 godišnje (**tablica 2**).

In the past two decades, the Croatian Cardiac Society in collaboration with other key healthcare policymakers has gradually optimized medicamentous and invasive treatment of ACS, similar to other EU countries, all this in order to ensure timely and efficacious ACS treatment based on appropriate guidelines. Besides numerous scientific, professional, preventive and promotional activities, regionalization of cardiology care was performed in 2005. By launching the Croatian Network of Interventional Treatment of Acute Myocardial Infarction and establishment of new centers of interventional cardiology⁴⁻⁶, modern revascularization treatment⁷ by the method of percutaneous coronary intervention (PCI) has been gradually ensured all over the country.

The aim of this study was to analyze trends in the IHD and acute myocardial infarction (AMI) mortality and hospitalizations in the City of Zagreb (Zagreb) and Republic of Croatia (Croatia).

Subjects and Methods

Data on mortality and in-hospital morbidity collected at the Croatian Institute of Public Health for Zagreb and Croatia were retrospectively analyzed. The analysis included data on the number of deaths due to IHD (International Classification of Diseases-10th Revision (ICD-10) code I20-I25) and deaths due to AMI (ICD-10 code I21) from January 1, 2001 until December 31, 2016. Results were expressed according to gender and age groups (<45, 45-64 and >64 years) and cumulative.

Age-standardized death rates (ASDR) were calculated for each year according to population estimates. Standardization was based on the 2011 census to make ASDR as close as possible to the real values of general rates.

Data on the prevalence of hospitalization for AMI (ICD-10 code I21) were analyzed for the 2009-2016 period, since when the diagnostic-therapeutic system has been used in hospitals as the only and formal mode of recording, accounting and billing healthcare services.

Results

During the 2001-2016 period, the IHD group of syndromes was the cause of 164,473 deaths in Croatia, while the average number of deaths per year was 10,280 (**Table 1**). In Zagreb, there were 24,322 deaths from IHD or 1520 per year on average during the study period (**Table 2**).

TABLE 1. Mortality from acute myocardial infarction and ischemic heart disease in Croatia, 2001-2016.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
No AMI	4370	4323	4257	4258	4252	4143	3807	3683	3615	3792	3479	3521	3456	3384	3647	3493
No IHD	8871	8829	10436	9173	9948	9822	9676	10101	10542	11264	10866	11464	10772	10831	11509	10369
No of all deaths	49552	50569	52575	49756	51790	50378	52367	52151	52414	52096	51019	51710	50386	50839	54205	51542
%AMI/IHD	49.26	48.96	40.79	46.42	42.74	42.18	39.34	36.46	34.29	33.66	32.02	30.71	32.08	31.24	31.69	33.69
%AMI /all deaths	8.82	8.55	8.10	8.56	8.21	8.22	7.27	7.06	6.90	7.28	6.82	6.81	6.86	6.66	6.73	6.78

No = number; AMI = acute myocardial infarction (I21, international classification of disease code); IHD = ischemic heart disease (I20-I25, international classification of disease codes).

TABLE 2. Mortality from acute myocardial infarction and ischemic heart disease in the City of Zagreb, 2001-2016.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
No AMI	751	644	620	671	662	631	587	549	543	546	490	473	507	452	463	429
No IHD	1567	1399	1635	1381	1443	1510	1462	1502	1577	1576	1547	1593	1549	1557	1557	1467
No of all deaths	8040	8161	8380	7890	8442	8214	8631	8319	8471	8465	8396	8329	8360	8359	8821	8528
%AMI/IHD	47.93	46.03	37.92	48.59	45.88	41.79	40.15	36.55	34.43	34.64	31.67	29.69	32.73	29.03	29,74	29.24
%AMI/all deaths	9.34	7.89	7.40	8.50	7.84	7.68	6.80	6.60	6.41	6.45	5.84	5.68	6.06	5.41	5.25	5.03

No = number; AMI = acute myocardial infarction (I21, international classification of disease code); IHD = ischemic heart disease (I20-I25, international classification of disease codes).

U razdoblju od 2001. do 2016. godine od AMI-ja je u Hrvatskoj umrlo ukupno 61 480 osoba (7,5 % svih umrlih), među kojima je bilo 40,2 % žene. Od ukupnoga broja umrlih od AMI-ja mlađe od 45 godina bilo je 1317 osoba (2,1 % svih umrlih), u dobi između 45 i 64 godine bilo je njih 14 906 (24,2 %), a starije od 65 godina bilo je 45 257 osoba (73,6 %). Broj umrlih od AMI-ja i udio prema dobnim skupinama i spolu za područje cijele zemlje prikazani su u **tablici 3**.

U Gradu Zagrebu u istom je razdoblju od AMI-ja umrlo 9018 osoba (6,7 % svih umrlih), među kojima je bilo 39,6 % žena. Od ukupnoga broja umrlih od AMI-ja 166 osoba (1,8 %) bilo je mlađe od 45 godina, njih 2164 (24,0 %) u dobi između 45 i 64 godine, dok je 6688 osoba (74,2 %) bilo starije od 65 godina. Broj umrlih i udio prema dobnim skupinama i spolu za Grad Zagreb prikazani su u **tablici 4**.

In Croatia, there were 61,480 deaths from AMI (7.5% of all-cause deaths), 40.2% of them women, during the 2001-2016 period. Of these, 1317 (2.1% of all deaths) persons were aged <45, 14,906 (24.2%) were aged 45-64, and 45,257 (73.6%) were aged >65. The number of deaths from AMI and their proportion according to gender and age groups for Croatia are shown in **Table 3**.

In Zagreb, there were 9018 deaths due to AMI (6.7% of all-cause deaths), 39.6% of them women, during the 2001-2016 period. Of 9018 deaths from AMI, 166 (1.8%) were recorded in persons aged <45, 2164 (24.0%) in those aged 45-64, and 6688 (74.2%) in persons aged >65. The number of deaths due to AMI and their proportion according to gender and age groups in Zagreb are presented in **Table 4**.

TABLE 3. Mortality (number of deaths) from acute myocardial infarction in Croatia according to age and gender, 2001-2016.

Age/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<45 y	118	97	106	120	85	88	89	94	75	62	78	73	57	52	73	50
45-64 y	1190	1114	1078	1025	1046	974	881	905	876	910	849	858	787	785	835	793
>64 y	3062	3112	3073	3113	3121	3081	2837	2684	2664	2820	2552	2590	2612	2547	2739	2650
Total	4370	4323	4257	4258	4252	4143	3807	3683	3615	3792	3479	3521	3456	3384	3647	3493
% Female	40.3	39.8	38.9	40.4	39.5	39.4	40.1	39.2	41.5	40.9	40.7	41.7	40.3	40.5	40.3	40.2

y = year

TABLE 4. Mortality (number of deaths) from acute myocardial infarction in the City of Zagreb according to age and gender, 2001-2016.

Age/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<45 y	20	12	14	16	10	10	12	13	9	8	5	6	6	4	10	11
45-64 y	214	153	162	169	157	141	131	136	109	131	130	106	109	113	109	94
>64 y	517	479	444	486	495	480	444	400	425	407	355	361	392	335	344	324
Total	751	644	620	671	662	631	587	549	543	546	490	473	507	452	463	429
% Female	37.4	40.4	40.0	38.5	39.9	37.7	37.3	37.9	41.3	40.5	39.6	41.4	42.0	39.4	42.3	39.9

y = year

Kretanje ASDR-a od AMI-ja u Hrvatskoj i u Gradu Zagrebu prikazano je na **slici 1**. U razdoblju od 2001. do 2016. uočava se kontinuirani pad stopa. Tako je vidljivo da je ASDR od AMI-a u 2001. godini u Gradu Zagrebu iznosila 114,7/100 000, slično području cijele države (117,7/100 000 stanovnika). Stope smrtnosti od AMI-a za 2016. godinu bitno su se promijenile i za područje cijele države iznosile su 75,8/100 000, dok je za Grad Zagreb stopa bila 50,9/100 000 stanovnika. Dobno standardizirana stopa smrtnosti od AMI-ja za 2016. u usporedbi s 2001. godinom smanjila se u Gradu Zagrebu za 55,6 %, dok je u istom razdoblju u Hrvatskoj stopa smanjena za 35,6 %.

Trends in ASDR due to AMI in Zagreb and Croatia are illustrated in **Figure 1**. There was a continuous ASDR decline during the 2001-2016 period. In 2001, the ASDR from AMI in Zagreb was 114.7/100,000 and was comparable to the results recorded for Croatia (117.7/100,000 population). In 2016, the ASDR from AMI showed substantial decline, i.e. 75.8/100,000 and 50.9/100,000 for Croatia and Zagreb, respectively, yielding a decrease by 55.6% in Zagreb and 35.6% in Croatia.

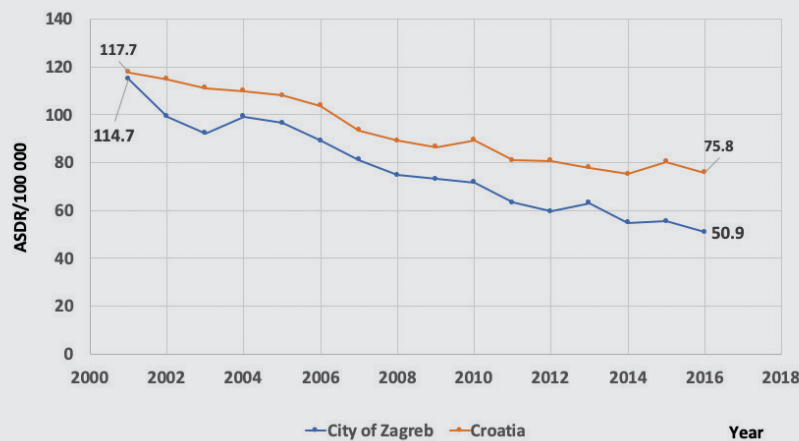


FIGURE 1. Age-standardized mortality rate from acute myocardial infarction in Croatia and the City of Zagreb for all age groups, 2001-2016.

ASDR = age-standardized death rate

Na **slici 2** prikazano je kretanje ASDR-a od AMI-ja za osobe u dobi od 0 do 64 godine. Stopa smrtnosti od AMI-ja u Gradu Zagrebu za radno sposobnu populaciju za 2001. iznosila je 38,9/100 000 i bila je nešto manja od državnoga prosjeka koji je iznosio 40,5/100 000 stanovnika. Analiza ASDR-a za AMI u

Figure 2 shows trends in ASDR due to AMI for the population aged 0-64. In Zagreb, death rate from AMI was 38.9/100,000 for active population and was slightly lower than the national rate of 40.5/100,000. Analysis of ASDR from AMI in active population in 2016 showed it to be 16.3/100,000 and 24.5/100,000

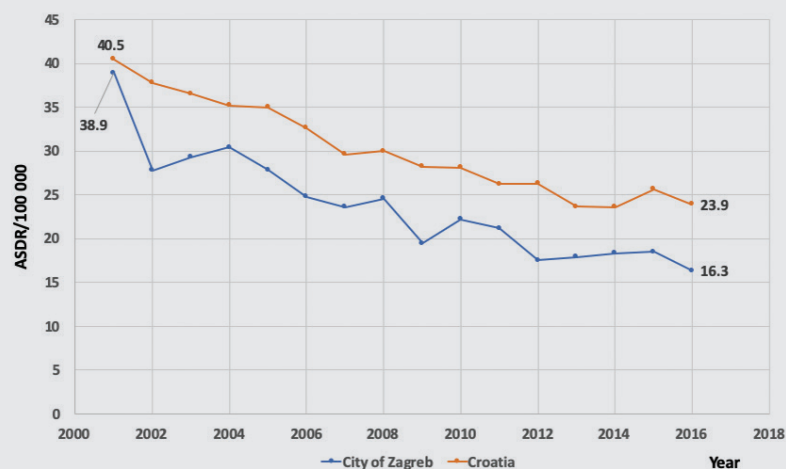


FIGURE 2. Age-standardized mortality rate from acute myocardial infarction in Croatia and the City of Zagreb for 0-64 age groups, 2001-2016.

ASDR = age-standardized death rate

radno sposobne populacije za 2016. godinu pokazuje da je stopa za Grad Zagreb bila 16,3/100 000, a za cijelu zemlju 24,5/100 000 stanovnika. Dobno standardizirana stopa smrtnosti od AMI-ja u radno sposobnoj populaciji u 2016. u usporedbi s 2001. godinom smanjila se u Gradu Zagrebu za 58,1 %, dok je u istom razdoblju u Hrvatskoj stopa bila smanjena za 39,5 %.

Trend bolničkog liječenja zbog AMI-ja u porastu je i u Gradu Zagrebu i cijeloj zemlji. Podatci o broju hospitalizacija za razdoblje od 2009. do 2016. godine prikazani su na **slici 3**. U Gradu Zagrebu na početku promatranog razdoblja zabilježena je 1151 (15,4 %) hospitalizacija zbog AMI-ja. Tijekom 2016. godine u Gradu Zagrebu zabilježeno je 12,5% hospitalizacija zbog iste bolesti. Porast broja hospitalizacija u navedenom razdoblju u Gradu Zagrebu iznosio je 14,4 %, a u cijeloj državi 41,5 %.

for Zagreb and Croatia, respectively. In comparison to 2001, the ASDR from AMI was reduced by 58.1% in Zagreb and 39.5% in Croatia.

Hospitalization for AMI was found to be on an increase both in Zagreb and in Croatia. Data on the number of respective hospitalizations during the 2009-2016 period are shown in **Figure 3**. At the beginning of the study period, 1151 (15.4%) hospitalizations for AMI were recorded in Zagreb, whereas their percentage declined to 12.5% in 2016. During this period, the number of hospitalizations increased by 14.4% in Zagreb and by 41.5% in Croatia.

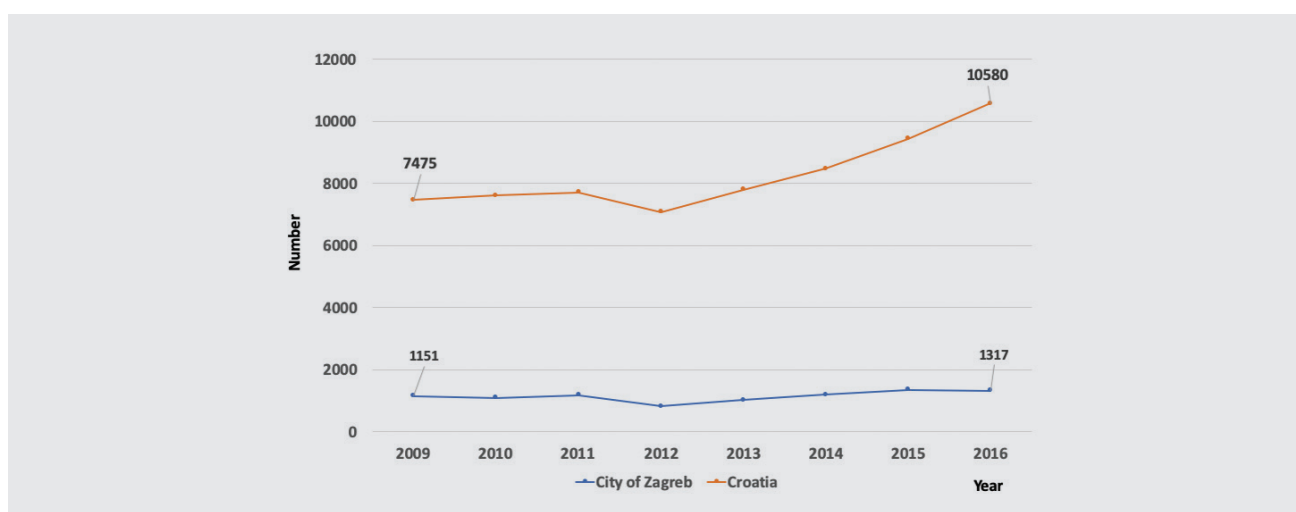


FIGURE 3. Hospitalization for acute myocardial infarction in Croatia and the City of Zagreb, 2009-2016.

ASDR = age-standardized death rate

Rasprava

Translacija rezultata suvremenog liječenja ACS-a na ishode kliničke prakse vidljiva je u brojnim zemljama^{6,8-10}, a potvrđuju je i rezultati ovog istraživanja. Analizirani su podaci rutinske mortalitetne i morbiditetne statistike. Broj umrlih osoba od AMI-ja u razdoblju od 2001. do 2016. smanjio se i u Hrvatskoj i u Gradu Zagrebu. Kako se broj osoba umrlih od IHD-a nije bitno smanjio, može se zaključiti da se u promatranom razdoblju na području čitave države i Grada Zagreba više umire od drugih sastavnica skupine IHD.

Trend snizivanja stopa ASDR-a za AMI već je opisan u Gradu Zagrebu u razdoblju od 1979. do 2001.¹¹ i Hrvatskoj od 1998. do 2008. godine¹², a sada je vidljiv i u rezultatima ovog istraživanja. Tako se u Gradu Zagrebu ASDR za AMI kontinuirano snizuje i 2016. u odnosu prema 2001. godini niži je za 55,6 %, odnosno 58,1 % u radno sposobnoj populaciji. U istom razdoblju za područje cijele Hrvatske stope su bile niže za 35,6 %, odnosno 39,5 %. Stope bolničkog liječenja od AMI-a u razdoblju od 2009. do 2016. godine pokazuju tendenciju porasta, i to za 14,4 % u Gradu Zagrebu i 41,5 % diljem zemlje. Povećanje broja hospitalizacija može se objasniti velikim dijelom osni-

Discussion

Translation of the results obtained by current treatment of ACS to the outcomes recorded in clinical routine has been evident in many countries^{6,8-10}, and confirmed by the present study analyzing data on routine mortality and morbidity statistics. During the 2001-2016 period, the number of deaths from AMI decreased both in Zagreb and in Croatia. As the number of deaths from IHD showed no substantial decline, it was concluded that deaths due to IHD entities other than AMI were on an increase in both Zagreb and Croatia during the study period.

A declining trend in ASDR from AMI has already been reported in the 1979-2001 period for Zagreb¹¹ and in the 1998-2008 period for Croatia¹², now substantiated again by the results of the present study. In Zagreb, the ASDR from AMI decreased steadily, to be lower by 55.6% and 58.1% in active population in 2016 as compared with 2001. During this period, the respective ASDR declined by 35.6% and 39.5% in Croatia. In the 2009-2016 period, the rate of hospital treatment for AMI increased by 14.4% in Zagreb and 41.5% in Croatia. This increase in the number of hospitalizations could be greatly ascribed to

vanjem novih centara intervencijske kardiologije, zbog čega dolazi do premještanja bolesnika, kao i boljom dijagnostikom.

Razlozi za sniženje ASDR-a za AMI u razdoblju od 2001. do 2016. kompleksni su, ali svakako to su kvalitetnije liječenje, bolja dostupnost kardiološke skrbi, bolja dijagnostika, kao i mjere primarne i sekundarne prevencije. Poznato je da za ishode AMI-a važnu ulogu imaju mnogi čimbenici – od vremena traženja medicinske pomoći nakon početka tegoba, opsega promjena u koronarnoj cirkulaciji, učinkovitog liječenja prisutnih čimbenika kardiovaskularnog rizika i komorbiditeta, pa sve do načina organizacije zdravstvene skrbi i udjela troškova za zdravstvo u bruto domaćem proizvodu.^{7,13-15}

Od 1999. godine počeli su se intenzivnije provoditi programi promicanja zdravlja i prevencije bolesti, što pridonosi boljoj informiranosti i znanju široke javnosti o zdravim životnim navikama, mogućnostima prevencije te ranog prepoznavanja simptoma AMI-ja i potrebi hitne intervencije.¹⁶ Organizacija Hrvatske mreže intervencijskog liječenja akutnog infarkta miokarda, primjena dokazano djelotvornog liječenja te kvalitetnije zbrinjavanje bolesnika koje provode djelatnici hitne medicinske službe (HMS) glavni su uzroci smanjenja smrtnosti od AMI-ja u Hrvatskoj. Prosječno vrijeme čekanja na intervenciju tima HMS-a kod AMI-ja, odnosno intervencije 1. stupnja hitnosti, u Zagrebu iznosi 8 minuta.¹⁷ Prema zadnjim objavljenim statističkim podacima Eurostata u Hrvatskoj, dostupnost angiografskih uređaja u 2015. najveća je u usporedbi sa svim europskim zemljama – 1,6/100 000 stanovnika.¹⁸ Isti izvor navodi za 2016. godinu da su stope transluminalne koronarne angioplastike (354/100 000 stanovnika) i aortokoronarnog premoštenja (106/100 000 stanovnika) među najvišima u Europi.¹⁹ U Zagrebu je smješteno 43 % svih zdravstvenih resursa Hrvatske²⁰, pa ne čudi činjenica da unutar kruga od 8 km od središta Grada Zagreba postoje četiri visokovolumna centra u kojima se PCI u bolesnika s AMI-jem može provesti cjelodnevno, svih 7 dana u tjednu. Diljem zemlje urgentna PCI kod AMI-ja provodi se u još 10 intervencijskih centara, od kojih su neki udaljeni i do 100 km od županijskih bolnica. Veća je dostupnost novih generacija stentova i balona s otpuštanjem lijeka nužnih za optimalne rezultate intervencijske kardiologije glede učinkovitosti i sigurnosti.^{21,22} Istodobno je utvrđena povećana kvaliteta propisivanja i izvanbolničke potrošnje kardiovaskularnih lijekova²³, što potvrđuje da se rezultati iz randomiziranih istraživanja i smjernica primjenjuju u svakodnevnoj kliničkoj praksi.

Zaključno, na temelju analize podataka o mortalitetu i bolničkom morbiditetu u Hrvatskoj i Gradu Zagrebu u razdoblju od 2001. do 2016. godine, ovo je istraživanje utvrdilo da se broj osoba umrlih od AMI-ja stalno smanjuje. Dobno standardizirane stope smrtnosti od AMI-ja tijekom navedenih 16 godina snižene su za više od trećine diljem Hrvatske i više od polovice u Gradu Zagrebu. No, kako se u spomenutom razdoblju broj osoba umrlih od skupine IHD nije bitno smanjio, može se zaključiti da se na području cijele države i Grada Zagreba sve više umire od drugih sastavnica skupine IHD prema kojima valja usmjeriti veću pozornost.

the establishment of new interventional cardiology centers, which resulted in numerous patient transfers, as well as to better diagnostics.

The reasons for reduction in ASDR from AMI during the 2001-2016 period are complex; however, they certainly include higher treatment quality, improved availability of cardiologic care, better diagnostics, as well as measures of primary and secondary prevention. Many factors are known to play a major role in AMI outcome, e.g., time elapsed from initial symptoms to medical attention, extent of changes in coronary circulation, efficient management of cardiovascular risk factors and comorbidities, mode of healthcare organization, and proportion of healthcare costs in gross domestic product.^{7,13-15}

Since 1999, the actions promoting health and disease prevention have been intensified, contributing to public awareness and knowledge of healthy lifestyle, possibilities of disease prevention, as well as early recognition of AMI symptoms and need of urgent intervention¹⁶. Establishment of the Croatian Network of Interventional Treatment of AMI, implementation of the evidence based efficacious treatment, and efficient AMI management by the Emergency Medicine Service (EMS) staff are the main contributors to the reduced AMI mortality in Croatia. In Zagreb, the average waiting time to EMS team intervention for AMI, i.e. 1st degree emergency intervention, is 8 minutes.¹⁷ According to the latest Eurostat statistical data, in 2015, the availability of angiographic devices in Croatia was highest across all European countries, i.e. 1.6/100,000 population.¹⁸ In 2016, Eurostat reports the rates of transluminal coronary angioplasty and aortocoronary shunting in Croatia to among highest in Europe (354/100,000 and 106/100,000, respectively).¹⁹ About 43% of the Croatian healthcare resources are located in Zagreb²⁰, thus it is no wonder that four high-volume centers performing PCI in AMI patients 24 h a day/seven days a week are located within 8 km of the Zagreb downtown. In addition, urgent PCI for AMI has been performed at another 10 interventional centers, some of them located up to 100 km from county hospitals. Availability of new-generation stents and drug-eluting balloons required for optimal efficacy and safety of interventional cardiology has also been upgraded.^{21,22} At the same time, the quality of prescribing and outpatient use of cardiovascular drugs has been improved²³, confirming the results from randomized studies and guidelines to have been implemented in daily clinical routine.

In conclusion, analysis of data on mortality and in-hospital morbidity in Zagreb and Croatia during the 2001-2016 period revealed the number of deaths due to AMI to have continuously decreased. During the study period, the ASDRs from AMI were reduced by more than one-third all over Croatia and by more than half in Zagreb. However, the number of deaths due to the IHD group of syndromes showed no substantial decline from 2001 to 2016, suggesting that deaths due to other IHD group entities were on an increase in both Zagreb and Croatia; accordingly, more attention should be paid to those other IHD entities.

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