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HRVATSKO GASTROENTEROLOŠKO DRUŠTVO

**HRVATSKA MREŽA INTERVENCIJSKE GASTROENTEROLOGIJE –  
ENDOSKOPSKA RETROGRADNA KOLANGIOPANKREATOGRAFIJA**  
*(CRO-GASTRONET - ERCP)*

**THE CROATIAN INTERVENTIONAL GASTROENTEROLOGY NETWORK –  
ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY**  
*(CRO-GASTRONET - ERCP)*

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Konsenzus Hrvatskog gastroenterološkog društva listopad 2019. godine

RADNA SKUPINA HRVATSKOG GASTROENTEROLOŠKOG DRUŠTVA ZA IZRADU MREŽE  
INTERVENCIJSKE GASTROENTEROLOGIJE (CRO-GASTRONET) – ERCP

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## WHITE PAPER

*Croatian Society of Gastroenterology Consensus October 2019*

*CROATIAN SOCIETY OF GASTROENTEROLOGY WORKING GROUP FOR THE DEVELOPMENT OF  
INTERVENTIONAL GASTROENTEROLOGY NETWORK (CRO-GASTRONET) – ERCP*

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Zagreb, October 2019



Jedan od ključnih elemenata zdravstvene zaštite nedvojbeno je dostupnost. Imati jednaku zdravstvenu zaštitu i mogućnost ostvarenja najviše razine zdravstvene usluge temeljno je pravo svakog pojedinca. To pravo nije samo humano i etički neosporno, nego je i definirano zakonom. U tom smislu jasno je da pravo na zdravstvenu zaštitu ne smije biti privilegija već imperativ postupanja.

Znanjem, entuzijazmom i dobrom organizacijom, čak i u materijalno ograničenim okolnostima, može se postići vrlo mnogo. Republika Hrvatska je zemlja posebnih geografskih obilježja i koliko je to čini lijepom u svojoj raznolikosti toliko nerijetko otežava dostupnost najkvalitetnijim oblicima zdravstvene zaštite i zdravstvenih postupaka. Formiranjem visoko specijaliziranih centara objedinjenih u dobro organiziranu mrežu i uz organiziranu i koordiniranu komunikaciju zdravstvenih djelatnika, svim bolesnicima sa specifičnom i zahtjevnom problematikom može biti pružena najbolja zdravstvena zaštita.

U gastroenterologiji akutni kolangitis, akutni bilijarni pankreatitis i komplikacije kolecistektomije u obliku postoperacijskih ozljeda žučovoda, dijagnoze su koje zahtijevaju postupak endoskopske retrogradne kolangiopankreatografije (ERCP) unutar 72 sata, a u pojedinim slučajevima i unutar 24 sata. Nažalost, činjenica je da trenutno u Republici Hrvatskoj takvi bolesnici nerijetko čekaju na intervenciju znatno duže jer ne postoji organizirana mreža slanja i prihvata spomenute kategorije bolesnika.

Radna skupina Hrvatskog gastroenterološkog društva izradila je predložak "Hrvatske mreže intervencijske gastroenterologije – ERCP" i nakon široke javne rasprave Skupština Društva prihvatila je spomenuti dokument kao konsenzus Hrvatskog gastroenterološkog društva. Implementacijom navedenog konsenzusa u svakodnevnu kliničku praksu osigurava se ostvarivanje prava svih građana Republike Hrvatske na jednaku dostupnost najbolje zdravstvene zaštite, očuvanje i poboljšanje zdravlja uz dulji i kvalitetniji život velikog broja ovih bolesnika. Mreža CRO-GASTRONET-ERCP osmišljena je i s nakanom da se svim zdravstvenim djelatnicima, u svim zdravstvenim ustanovama Republike Hrvatske olakša brza komunikacija s devet visoko specijaliziranih tercijarnih centara za djelatnost ERCP-a sa ciljem uske suradnje u smislu najboljeg i najbržeg mogućeg liječenja bolesnika s dijagnozama akutnog kolangitisa, akutnog bilijarnog pankreatitisa ili komplikacija kolecistektomije u obliku postoperacijskih ozljeda žučovoda. Jasno definiranim postupnicima omogućit će se standardizacija zdravstvenih usluga u korist bolesnika, ali i najučinkovitije korištenje ekonomskih resursa. Svaki početak je težak, ali se kako predvidive tako i nepredvidive prepreke mogu uspješno riješiti zajedničkim konstruktivnim radom i naporima svih dionika zdravstvenog sustava.

Prof. dr. sc. Neven Ljubičić, dr. med.  
Predsjednik Hrvatskog gastroenterološkog društva



*Availability is undoubtedly one of the key elements of the healthcare system. The fundamental right of every person is to have the highest level of healthcare service based on excellence and equality. This right is indisputable not only from the human and ethical viewpoint, but is also defined by law. In this regard, it is clear that the right to healthcare service must not be merely a privilege but rather an imperative.*

*A great deal can be achieved with knowledge, enthusiasm and good organization, even under circumstances of material restrictions. Republic of Croatia is a country of specific geographical features, which makes it beautiful in all its diversity but often makes the availability of specialized forms of healthcare service and procedures difficult. By forming highly specialized centers integrated into a well-organized network and with organized and coordinated communication of healthcare professionals, all patients with specific and demanding problems can be provided with the best healthcare service.*

*In gastroenterology, acute cholangitis, acute biliary pancreatitis and cholecystectomy complications in terms of postoperative bile duct injuries are diagnoses requiring endoscopic retrograde cholangiopancreatography (ERCP) within 72 hours, and in some cases within 24 hours. Unfortunately, the fact is that currently in the Republic of Croatia, such patients often have to wait for intervention considerably longer because there is no organized network of referring and admitting this category of patients.*

*A working group of the Croatian Society of Gastroenterology has developed a model for the Croatian Interventional Gastroenterology Network-ERCP and, following a broad public discussion, the Assembly of the Society accepted the document as a consensus of the Croatian Society of Gastroenterology. The implementation of this consensus into everyday clinical practice provides for exercising the rights of all citizens of the Republic of Croatia to equal availability of the best healthcare service, and for preservation and improvement of health with longer and better quality life for a large number of these patients. The CRO-GASTRONET-ERCP has also been designed to facilitate all healthcare professionals at all healthcare institutions in the Republic of Croatia fast communication with nine highly specialized tertiary centers for ERCP, with the aim of achieving close cooperation in providing the best and fastest possible treatment of patients with the diagnoses of acute cholangitis, acute biliary pancreatitis or cholecystectomy complications in terms of postoperative bile duct injuries. Clearly defined protocols will make it possible to standardize healthcare services to the benefit of patients, but also to use economic resources most efficiently. Every beginning is hard, but both foreseeable and unforeseeable obstacles can be resolved successfully with joint constructive action and efforts of all stakeholders of the healthcare system.*

*Professor Neven Ljubičić, MD, PhD  
President, Croatian Society of Gastroenterology*



## UVOD

Endoskopska retrogradna kolangiopankreatografija (ERCP), inicijalno dijagnostička, potom dijagnostičko-terapijska, a danas ponajprije terapijska metoda, razvijana tijekom proteklih 50 godina, ima nezamjenjivu ulogu u liječenju bolesti pankreatobilijarnog sustava. To je metoda koja kombinira endoskopiju i dijaskopiju sa ciljem vizualizacije i intervencije u području žučnih i pankreasnih vodova. Postupak započinje tako da se pod kontrolom video kamere, tj. endoskopa dođe do mjesta utoka pankreatobilijarnog voda u početni dio tankog crijeva. S obzirom da su glavni žučni i pankreasni vod daleko manjeg promjera od lumena tankog crijeva u njih se ulazi posebnim priborom i zahvat se dalje izvodi pod kontrolom rendgenskih zraka koje ocrtavaju vodove ispunjene radiološkim kontrastom. ERCP je invazivna metoda i kao takva sa sobom nosi rizik od razvoja kolangitisa, pankreatitisa, ozljede i perforacije žučnog voda. Procjenjuje se da čak 7,9 % pacijenata razvije neku od navedenih komplikacija, a daleko najčešća komplikacija je post-ERCP pankreatitis s prevalencijom od 5,4 % (1). Bitno je naglasiti da je broj komplikacija i uspješnost samog postupka u direktnoj vezi s iskustvom endoskopičara, tj. s brojem postupaka koje pojedinac obavi u godini dana. Uzevši u obzir invazivnost postupka i učestalost komplikacija, samom zahvatu mora prethoditi sveobuhvatna dijagnostička obrada koja obuhvaća laboratorijske i slikovne metode. U slučaju koledokolitijaze, endoskopski ultrazvuk (EUZ) i magnetna kolangiopankreatografija (MRCP) imaju podjednaku dijagnostičku pouzdanost u detekciji konkremenata (2).

Prema vremenu intervencije razlikujemo hitni ERCP (postupak koji se izvodi unutar 24 sata od prijma u bolnicu), rani ERCP (postupak koji se izvodi 24-72 sata nakon prijma) i odgođeni ERCP (postupak koji se izvodi nakon 72 sata od prijma) (3). Akutni kolangitis, akutni bilijarni pankreatitis i postoperacijske komplikacije kolecistektomije u smislu ozljeda žučnih vodova s ekstraluminacijom žuči i/ili rezidualnim konkrementima u žučnim vodovima nedvojbene su indikacije koje zahtijevaju brzu endoskopsku intervenciju (4-7).

## AKUTNI KOLANGITIS

Akutni kolangitis je upala žučnih vodova uzrokovana ascenzijom bakterija iz tankog crijeva zbog neadekvatne drenaže žuči. Najčešće je uzrokovan koledokolitijazom, tj. kamenom u žučnom vodu, ili opstrukcijom glavnog žučnog voda zbog kompresije tumorom. Procjenjuje se da teški akutni kolangitis uzrokuje smrtnost između 11 % i 27 % (8).

## INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP), initially diagnostic, then diagnostic and therapeutic, and nowadays primarily a therapeutic method, developed over the past 50 years, has an indispensable role in the treatment of diseases of the pancreatobiliary system. It is a method that combines endoscopy and diascopy with the aim of visualizing and intervening in the area of bile and pancreatic ducts. The procedure begins by reaching the junction of the pancreatobiliary duct and the first part of the small intestine under the guidance of a video camera, i.e. endoscope. As the main bile and pancreatic ducts are by far smaller in diameter than the lumen of the small intestine, they are entered with special equipment and further procedure is carried out under the control of x-rays that delineate the ducts filled with contrast medium. ERCP is an invasive method and as such carries the risk of developing cholangitis, pancreatitis, bile duct injury and perforation. It is estimated that as many as 7.9% of patients develop some of the above complications, the most common one being post-ERCP pancreatitis with a prevalence of 5.4% (1). It should be noted that the number of complications and the success of the procedure itself are directly correlated with the endoscopist's experience, i.e. with the number of the procedures performed by the endoscopist annually. Considering the invasiveness of the procedure and the frequency of complications, the intervention must be preceded by a comprehensive diagnostic workup, which includes both laboratory and imaging methods. In the case of choledocholithiasis, endoscopic ultrasound (EUS) and magnetic cholangiopancreatography (MRCP) are equally diagnostically reliable in detecting stones (2).

According to timing of the intervention, distinction can be made between emergency ERCP (performed within 24 hours following hospital admission), early ERCP (performed 24-72 hours following admission) and delayed ERCP (performed more than 72 hours following admission) (3). Acute cholangitis, acute biliary pancreatitis and postoperative complications of cholecystectomy in the form of bile duct injury with extralumination of bile and/or residual stones in bile ducts are unequivocal indications requiring prompt endoscopic intervention (4-7).

## ACUTE CHOLANGITIS

Acute cholangitis is inflammation of bile ducts caused by bacteria ascending from the small intestine due to inadequate biliary drainage. It is most commonly caused by choledocholithiasis, i.e. bile duct stones, or by obstruction of the main bile duct due to compression by tumor. The mortality rate of severe acute cholangitis is estimated to be between 11% and 27% (8).

Terapijski pristup bolesniku s akutnim kolangitisom uvelike zavisi o težini kliničke slike. Tokijski kriteriji (9) jasno definiraju karakteristike teškog, srednje teškog i blagog akutnog kolangitisa (tablica 1).

The treatment approach for a patient with acute cholangitis depends greatly on the gravity of the clinical picture. The Tokyo criteria (9) clearly define the characteristics of severe, moderate and mild acute cholangitis (Table 1).

Tablica 1. Karakteristike akutnog kolangitisa

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Teški akutni kolangitis</b> (najmanje jedan od kriterija)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ul style="list-style-type: none"> <li>- Kardiovaskularna disfunkcija (potreba za noradrenalinom ili dozama dopamina <math>\geq 5 \mu\text{g/kg}</math> u minuti)</li> <li>- Promijenjeno stanje svijesti</li> <li>- Poremećaj funkcije pluća (<math>\text{PaO}_2/\text{FiO}_2</math> omjer <math>&lt; 300</math>)</li> <li>- Poremećaj funkcije bubrega (oligurija i/ili koncentracije kreatinina u serumu <math>&gt; 177 \mu\text{mol/L}</math>)</li> <li>- Poremećaj funkcije jetara (<math>\text{PV-INR} &gt; 1,5</math>)</li> <li>- Poremećaj koagulacije (broj trombocita <math>&lt; 100 \times 10^9/\text{L}</math>)</li> </ul> |
| <b>Srednje teški akutni kolangitis</b> (najmanje dva kriterija)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul style="list-style-type: none"> <li>- Leukocitoza ili leukopenija (<math>&gt; 12 \times 10^9/\text{L}</math> ili <math>&lt; 4 \times 10^9/\text{L}</math>)</li> <li>- Vrućica (<math>&gt; 39^\circ\text{C}</math>)</li> <li>- Dob (<math>\geq 75</math> godina)</li> <li>- Žutica (<math>&gt; 85 \mu\text{mol/L}</math>)</li> <li>- Hipoalbuminemija (<math>&lt;</math> donje granice normalne vrijednosti)</li> <li>- Svi pacijenti koji ne odgovaraju na započetu terapiju iako ne zadovoljavaju gore navedene kriterije</li> </ul>                                                                                               |
| <b>Blagi akutni kolangitis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul style="list-style-type: none"> <li>- Svi koji ne zadovoljavaju kriterije za teški i srednje teški akutni kolangitis</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Table 1 Characteristics of acute cholangitis

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Severe acute cholangitis</b> (at least one of the criteria)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>- Cardiovascular dysfunction (requiring noradrenaline or dopamine <math>\geq 5 \mu\text{g/kg per min}</math>)</li> <li>- Disturbance of consciousness</li> <li>- Respiratory dysfunction (<math>\text{PaO}_2/\text{FiO}_2</math> ratio <math>&lt; 300</math>)</li> <li>- Renal dysfunction (oliguria and/or serum creatinine <math>&gt; 177 \mu\text{mol/L}</math>)</li> <li>- Hepatic dysfunction (<math>\text{PV-INR} &gt; 1.5</math>)</li> <li>- Coagulation dysfunction (platelet count <math>&lt; 100 \times 10^9/\text{L}</math>)</li> </ul> |
| <b>Moderate acute cholangitis</b> (at least two criteria)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>- Leukocytosis or leukopenia (<math>&gt; 12 \times 10^9/\text{L}</math> or <math>&lt; 4 \times 10^9/\text{L}</math>)</li> <li>- Fever (<math>&gt; 39^\circ\text{C}</math>)</li> <li>- Age (<math>\geq 75</math> years)</li> <li>- Jaundice (<math>&gt; 85 \mu\text{mol/L}</math>)</li> <li>- Hypoalbuminemia (<math>&lt;</math> lower limit of normal)</li> <li>- Any patients who do not respond to the initiated treatment despite not meeting the above criteria</li> </ul>                                                                     |
| <b>Mild acute cholangitis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>- All those who do not meet the criteria for severe and moderate acute cholangitis</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

Bolesnici sa slikom teškog akutnog kolangitisa ponajprije definiranim kao zatajenje jednog ili više organ-skih sustava zahtijevaju intenzivno liječenje i hitni ERCP u roku od 24 sata od prijma u bolnicu (9,10). U bolesnika sa srednje teškim kolangitisom postoji veliki rizik nastanka zatajenja jednog ili više organskih sustava te je i u tim slučajevima nužno osigurati adekvatnu bilijarnu drenažu unutar 72 sata od prijma u bolnicu (rani ERCP). Odgađanje hitne i rane retrogradne kolangiopankreatografije i uspostave adekvatne bilijarne drenaže u bolesnika s teškim ili srednje teškim akutnim kolangitisom povezano je s velikom stopom smrtnosti i većom incidencijom ponovne hospitalizacije unutar 30 dana od otpusta, što značajno povisuje troškove liječenja posebice u starijih bolesnika u kojih postoji značajan komorbiditet (11,12). Pri tome je uputno

Patients with severe acute cholangitis, defined primarily as dysfunction of one or more organ systems, require intensive treatment and emergency ERCP within 24 hours of hospital admission (9,10). Patients with moderate cholangitis are at a great risk of dysfunction of one or more organ systems, hence in those cases it is necessary to provide adequate biliary drainage within 72 hours of hospital admission (early ERCP). Delay in emergency as well as early retrograde cholangiopancreatography and in the establishment of adequate biliary drainage in patients with severe or moderate acute cholangitis is associated with a high mortality rate and higher incidence of rehospitalization within 30 days of discharge, which significantly increases treatment costs, especially in elderly patients with significant comorbidities (11,12). In the first step, it is advisable to

u prvom aktu osigurati adekvatnu bilijarnu drenažu, a potom u nastavku rješavati sam uzrok opstrukcije poput primjerice koledokolitijaze. U bolesnika sa slikom blagog akutnog kolangitisa potrebno je učiniti rani zahvat ako liječenje antibioticima nema zadovoljavajući učinak ili je blagi akutni kolangitis progredirao u srednje teški ili teški akutni kolangitis (13).

## AKUTNI BILIJARNI PANKREATITIS

Akutni bilijarni pankreatitis je akutna upala gušterače, a katkad i okolnog tkiva, uzrokovana neadekvatnom drenažom pankreasnih i bilijarnih sokova zbog opstrukcije glavnog pankreatobilijarnog voda kamenom. S obzirom na težinu kliničke slike razlikujemo blagi, srednje teški i teški akutni pankreatitis koji karakteriziraju znakovi zatajenja organa i/ili razvoj peripankreasnih kolekcija (14,15). Smrtnost akutnog pankreatitisa je na razini 4-7 %, a u slučajevima teškog akutnog pankreatitisa stopa smrtnosti je jako visoka i iznosi 20-30 % (16,17).

Razvojem endoskopskog ultrazvuka (EUS) i magnetne kolangiopankreatografije (MRCP) ERCP je postao u prvom redu terapijska metoda u zbrinjavanju bolesnika s akutnim pankreatitisom. Bolesnici kod kojih treba inzistirati na hitnoj obradi, a potom gotovo u pravilu i ranom ERCP-u - unutar 72 sata, su ponajprije bolesnici s:

1. akutnim pankreatitisom u kojih postoje i znakovi akutnog kolangitisa (tablica 1) (16) i
2. akutnim pankreatitisom u kojih uz dilataciju žučnih vodova postoje jasni laboratorijski pokazatelji kolestatskog sindroma i povišene koncentracije bilirubina u serumu, a posebice ako se radi o srednje teškoj do teškoj bolesti (tablica 2) (18,19).

ensure adequate biliary drainage, and then to resolve the very cause of obstruction, such as choledocholithiasis. Patients with mild acute cholangitis require an early procedure if antibiotic treatment fails to yield a satisfactory effect or if mild acute cholangitis has progressed to moderate or severe acute cholangitis (13).

## ACUTE BILIARY PANCREATITIS

Acute biliary pancreatitis is acute inflammation of the pancreas, and occasionally of the surrounding tissue, caused by inadequate drainage of pancreatic and biliary juices due to the obstruction of the main pancreaticobiliary duct by stone. With regard to the severity of the clinical picture, a distinction can be made between mild, moderate and severe acute pancreatitis characterized by signs of organ failure and/or development of peripancreatic collections (14,15). The mortality rate of acute pancreatitis is 4%-7%, whereas in cases of severe acute pancreatitis the mortality rate is very high, reaching 20%-30% (16,17).

With the development of EUS and MRCP, ERCP has become primarily a therapeutic method in the management of patients with acute pancreatitis. The patients in which urgent workup should be insisted on, and then almost always requiring early ERCP within 72 hours, are primarily patients with:

- 1) acute pancreatitis who also have signs of acute cholangitis (Table 1) (16), and
- 2) acute pancreatitis who, in addition to bile duct dilation, also have clear laboratory markers of cholestatic syndrome and elevated serum bilirubin levels, in particular in the case of moderate to severe disease (Table 2) (18,19).

Tablica 2. Procjena težine akutnog pankreatitisa – sustav BISAP

| Sustav BISAP (Bedside Index of Severity in Acute Pancreatitis)                                                                                                                                                                                                                |                          |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----|
| Ureja > 8,9 mmol/L                                                                                                                                                                                                                                                            | DA                       | NE |
| Poremećaj stanja svijesti (GCS < 15)                                                                                                                                                                                                                                          | DA                       | NE |
| SIRS (≥2 komponente)                                                                                                                                                                                                                                                          | DA                       | NE |
| • temperatura <36°C ili >38°C                                                                                                                                                                                                                                                 | <input type="checkbox"/> |    |
| • frekvencija srca >90/min                                                                                                                                                                                                                                                    | <input type="checkbox"/> |    |
| • frekvencija disanja >20/min ili pCO <sub>2</sub> <4,3 kPa                                                                                                                                                                                                                   | <input type="checkbox"/> |    |
| • leukociti <4 x 10 <sup>9</sup> /L ili >12 x 10 <sup>9</sup> /L ili >10% nezrelih stanica                                                                                                                                                                                    | <input type="checkbox"/> |    |
| Dob > 60 godina                                                                                                                                                                                                                                                               | DA                       | NE |
| Pleuralni izljev                                                                                                                                                                                                                                                              | DA                       | NE |
| Prisutnost svake pojedine komponente predstavlja jedan bod (0-5)<br>Ukupan zbroj bodova 0-2 = mortalitet < 2 %<br>Ukupan zbroj bodova 3-5 = mortalitet >15 %<br>GCS – Glasgow Coma Scale; SIRS – Systemic Inflammatory Response Syndrome (sindrom sustavnog upalnog odgovora) |                          |    |

Table 2. Assessment of severity in acute pancreatitis: Bedside Index of Severity in Acute Pancreatitis (BISAP)

| BISAP score                                                                                      |     |    |
|--------------------------------------------------------------------------------------------------|-----|----|
| BUN >8.9 mmol/L                                                                                  | YES | NO |
| Abnormal mental status (GCS <15)                                                                 | YES | NO |
| SIRS (≥2 components)                                                                             | YES | NO |
| • Temperature <36 °C or >38 °C                                                                   | □   |    |
| • Heart rate >90/min                                                                             | □   |    |
| • Respiratory rate >20/min or pCO <sub>2</sub> <4.3 kPa                                          | □   |    |
| • White blood count (WBC) <4x10 <sup>9</sup> /L or >12x10 <sup>9</sup> /L or >10% immature cells | □   |    |
| Age >60 years                                                                                    | YES | NO |
| Pleural effusion                                                                                 | YES | NO |

BUN = blood urea nitrogen; GCS = Glasgow Coma Scale; SIRS = systemic inflammatory response syndrome

Odgoda pravodobne kvalitetne dijagnostike i pravodobne terapijske intervencije dovodi do povećanja i onako visokog mortaliteta ovih bolesnika.

Postponing timely and proper diagnosis and timely treatment intervention results in an increase of the already high mortality in these patients.

## KOMPLIKACIJE KOLECISTEKTOMIJE

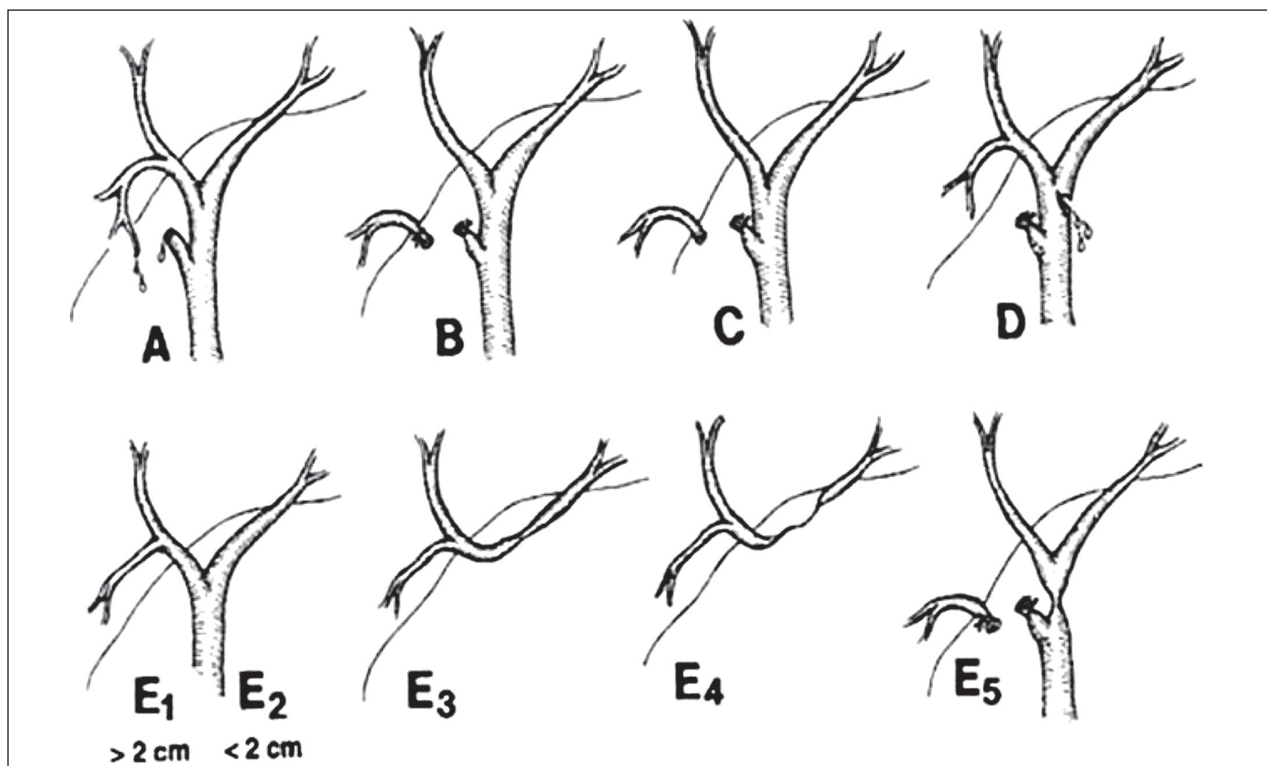
Ekstraluminacija žuči kao posljedica ozljede žučnih vodova tijekom kolecistektomije opasna je komplikacija koja zahtijeva hitnu intervenciju s obzirom na brojne komplikacije u smislu nastanka bilijarnog peritonitisa, sepse i septičkog šoka čija je smrtnost prema literaturnim podacima 30 % (20). Iako učestalost ove komplikacije nije točno poznata, procjenjuje se da se javlja u oko 0,5-2,2 % svih kolecistektomija (22), i to dva do četiri puta češće u onih izvedenih laparoskopskom tehnikom (23-25). Apsolutna metoda izbora u zbrinjavanju postoperacijskog bilijarnog „leakage“-a je endoskopska retrogradna kolangiografija s nekoliko dostupnih metoda izvedbe: postavljanje endo-bilijarnog stenta, s bilijarnom sfinkterotomijom ili bez nje i ovisno o nalazu s ekstrakcijom ili bez ekstrakcije rezidualnog konkrementa u koledokusu ili postavljanjem nazobilijarne drenaže (26-28). Brojne studije zorno pokazuju da je optimalno vrijeme ERC-a između 24 i 72 sata od pojave znakova ekstraluminacije žuči (29) što jasno ukazuje da je u bolesnika s ozljedom žučnih vodova nužno učiniti hitni, a u nešto lošijoj varijanti rani ERCP (Strasberg A i D, sl. 1).

## CHOLECYSTECTOMY COMPLICATIONS

Extralumination of bile as a consequence of bile duct injury during cholecystectomy is a dangerous complication requiring urgent intervention given the numerous complications in the form of the development of biliary peritonitis, sepsis and septic shock, the mortality of which, according to the literature, is 30% (20). Although the incidence of these complications is not precisely known, it is estimated to occur in 0.5%-2.2% of all cholecystectomies (22), and two to four times more frequently in those performed by laparoscopic technique (23-25). The method of choice in the management of postoperative biliary leakage is endoscopic retrograde cholangiography (ERC) with several performance methods available, e.g., placement of an endobiliary stent, with or without biliary sphincterotomy and, depending on the findings, with or without extraction of residual common bile duct stone, or placement of nasobiliary drainage (26-28). Numerous studies clearly demonstrate that the optimal time for ERC is between 24 and 72 hours from the onset of signs of extralumination of bile (29), which clearly suggests that patients with a bile duct injury require an emergency, or as a suboptimal option, early ERCP (Strasberg A and D, Figure 1).

|        |                                                                                                                                          |
|--------|------------------------------------------------------------------------------------------------------------------------------------------|
| Tip A  | Ekstraluminacija žuči u području <i>ductusa cysticus</i> /akcesornih vodova/malih intrahepatičkih vodova bez jasnog gubitka kontinuiteta |
| Tip B  | Transekcija i ligiranje akcesornog ili aberantnog žučnog voda iz desnog jetrenog reznja sa stazom žuči                                   |
| Tip C  | Transekcija aberantnog žučnog voda i gubitak kontinuiteta sa zajedničkim žučnim vodom                                                    |
| Tip D  | Parcijalna ozljeda glavnog hepatičnog ili žučnog voda                                                                                    |
| Tip E1 | Ozljeda glavnog hepatičnog voda više od 2 cm udaljena od konfluensa                                                                      |
| Tip E2 | Ozljeda glavnog hepatičnog voda manje od 2 cm udaljena od konfluensa                                                                     |
| Tip E3 | Ozljeda konfluensa bez separacije                                                                                                        |
| Tip E4 | Ozljeda konfluensa sa separacijom                                                                                                        |
| Tip E5 | Ozljeda aberantnog desnog posteriornog voda sa strikturom zajedničkog žučnog voda                                                        |

|         |                                                                                                                                          |
|---------|------------------------------------------------------------------------------------------------------------------------------------------|
| Type A  | Extralumination of bile in the area of <i>ductus cysticus</i> /accessory ducts/small intrahepatic ducts without clear loss of continuity |
| Type B  | Transection and ligation of an accessory or aberrant bile duct from the right liver lobe with cholestasis                                |
| Type C  | Transection of an aberrant bile duct and loss of continuity with the common bile duct                                                    |
| Type D  | Partial injury to the common hepatic or bile duct                                                                                        |
| Type E1 | Injury to the common hepatic duct more than 2 cm from the confluence                                                                     |
| Type E2 | Injury to the common hepatic duct less than 2 cm from the confluence                                                                     |
| Type E3 | Injury to the confluence without separation                                                                                              |
| Type E4 | Injury to the confluence with separation                                                                                                 |
| Type E5 | Injury to the aberrant right posterior duct with stricture of the common bile duct                                                       |



Sl. 1. Klasifikacija ozljeda žučnih vodova po Strasbergu / Fig. 1. Strasberg classification of bile duct injuries.

Dok se u stručnim krugovima vode rasprave o najboljem mogućem pristupu endoskopske sanacije, jedno je sigurno - rana intervencija u specijaliziranom centru sa stručnim i iskusnim kadrom imperativ je koji smanjuje mortalitet, morbiditet i trošak liječenja ove skupine bolesnika.

#### ENDOSKOPSKA RETROGRADNA KOLANGIO-PANKREATOGRAFIJA (ERCP) U REPUBLICI HRVATSKOJ

U Republici Hrvatskoj endoskopska retrogradna kolangiopankreatografija (ERCP), nekad dijagnostička, a danas ponajprije terapijska metoda radi se već četrdeset godina. ERCP je kao rutinska dijagnostičko-terapijska metoda ugovorena s Hrvatskim zavodom za zdravstveno osiguranje (HZZO) u sveukupno devet „akutnih“ bolnica u Republici Hrvatskoj (tablica 3).

While the professional circles are discussing the best possible approach to endoscopic management, one thing is certain – early intervention in a specialized center with qualified and experienced personnel is an imperative that reduces mortality, morbidity and treatment costs for this patient group.

#### ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOG-RAPY (ERCP) IN THE REPUBLIC OF CROATIA

Endoscopic retrograde cholangiopancreatography, once diagnostic and nowadays primarily a therapeutic method, has been performed in the Republic of Croatia for forty years now. ERCP is performed as a routine diagnostic and therapeutic method under a contract with the Croatian Health Insurance Fund (CHIF) in nine 'acute' hospitals in the Republic of Croatia (Table 3).

Tablica 3. ERCP ugovoren s Hrvatskim zavodom za zdravstveno osiguranje (HZZO) u devet akutnih bolnica u Republici Hrvatskoj prema godinama

Table 3. Croatian Health Insurance Fund (CHIF) ERCP number in nine acute hospitals in the Republic of Croatia according to years

| „Akutne“ bolnice / 'Acute' hospitals | 2016. | 2017. | 2018. | Godišnje / Yearly |
|--------------------------------------|-------|-------|-------|-------------------|
| KB Dubrava                           | 723   | 741   | 655   | 705               |
| KBC Sestre milosrdnice               | 369   | 427   | 540   | 445               |
| KBC Rijeka                           | 482   | 420   | 425   | 442               |
| KB Osijek                            | 383   | 454   | 380   | 406               |
| KBC Zagreb (Rebro)                   | 403   | 405   | 404   | 404               |
| KBC Split                            | 270   | 324   | 444   | 346               |
| KB Sveti Duh                         | 255   | 258   | 265   | 259               |
| OB Zadar                             | 191   | 242   | 232   | 222               |
| KB Merkur                            | 159   | 150   | 186   | 165               |

KB – Clinical Hospital; KBC – Clinical Hospital Centre; OB – General Hospital

Broj izvršitelja (endoskopičara), a posebice broj pretraga po svakom izvršitelju znatno varira od bolnice do bolnice (tablica 4).

The number of those performing the procedure (endoscopists), and especially number of procedures *per* endoscopist varies greatly among hospitals (Table 4).

Tablica 4. Broj pretraga po svakom izvršitelju u „akutnim“ bolnicama

Table 4. Number of procedures per each endoscopist in 'acute' hospitals

| „Akutna“ bolnica / 'Acute' hospital | Godišnje / Per year | >200 | 100-200 | 50-100 |
|-------------------------------------|---------------------|------|---------|--------|
| KB Dubrava                          | 705                 | 2    | 1       |        |
| KBC Sestre milosrdnice              | 445                 | 1    | 1       | 1      |
| KBC Rijeka                          | 442                 |      | 2       | 1      |
| KB Osijek                           | 406                 | 1    | 1       |        |
| KBC Zagreb (Rebro)                  | 404                 |      | 2       | 2      |
| KBC Split                           | 346                 |      | 1       | 1      |
| KB Sveti Duh                        | 259                 |      | 1       | 2      |
| OB Zadar                            | 222                 | 1    |         |        |
| KB Merkur                           | 165                 |      | 1       |        |

KB – Clinical Hospital; KBC – Clinical Hospital Centre; OB – General Hospital

Na drugoj strani, potrebe za ERCP-om, ponajprije kao terapijskom metodom su velike. To se jasno ogleda u broju ERCP-a koji su fakturirani HZZO-u (apendiks 1). Jasno je da su potrebe „akutnih“ bolnica za ERCP-om velike i da najveći broj „akutnih“ bolnica u Republici Hrvatskoj nema ni prostornih ni kadrovskih uvjeta za obavljanje metode ERCP-a. U tom smislu je razvidno da dostupnost navedene metode nije jednaka na čitavom teritoriju Republike Hrvatske što u velikoj mjeri utječe na konačni ishod akutnog bilijarnog pankreatitisa i posebice akutnog kolangitisa.

On the other hand, the needs for ERCP, primarily as a therapeutic method, are extensive. This is clearly reflected in the number of ERCPs invoiced to the CHIF (Appendix 1). It is apparent that 'acute' hospitals are in great need of ERCP and that the majority of 'acute' hospitals in the Republic of Croatia lack both the facilities and the staff necessary to perform the ERCP method. In this regard, it is evident that the availability of this method is not uniform across the Republic of Croatia, which greatly influences the final outcome of acute biliary pancreatitis and in particular of acute cholangitis.

## CILJEVI HRVATSKE MREŽE INTERVENCIJSKE GASTROENTEROLOGIJE (CRO-GASTRONET) – ERCP

U Republici Hrvatskoj postoji nekoliko dobrih primjera organizacije zdravstvenih ustanova u nacionalne dijagnostičko-terapijske mreže poput mreže interven-

## OBJECTIVES OF THE CROATIAN INTERVENTIONAL GASTROENTEROLOGY NETWORK (CRO-GASTRONET) – ERCP

Republic of Croatia has several good examples of organizing healthcare institutions into national diagnostic

cijske kardiologije ili primjerice mreže intervencijske neuroradiologije. U kontekstu činjenice da u Republici Hrvatskoj živi relativno mali broj stanovnika te da je shodno tome relativno mali broj specifične kazuistike, postoji potreba za formiranjem visoko specijaliziranih centara objedinjenih u dobro organiziranu mrežu upućivanja pacijenata sa specifičnom problematikom. Kao što je već navedeno, najveći broj „akutnih“ bolnica u Republici Hrvatskoj nema ni prostornih ni kadrovskih uvjeta za obavljanje metode ERCP-a. U tom smislu jasno je da dostupnost navedene metode nije jednaka na čitavom teritoriju Republike Hrvatske što u velikoj mjeri utječe na konačni ishod akutnog biliarnog pankreatitisa i posebice akutnog kolangitisa. Kvalitetno rješenje navedenog problema je upravo formiranje visoko specijaliziranih centara objedinjenih u dobro organiziranu mrežu unutar koje će se upućivati bolesnici sa specifičnom i zahtjevnom problematikom. Jedino na takav način organizirani sustav ima potencijal istodobno pružiti visoku kvalitetu liječenja uz ekonomsku isplativost.

Hrvatska mreža intervencijske gastroenterologije - ERCP (*CRO-GASTRONET-ERCP*), vodeći se spomenutim pretpostavkama, ima za cilj organizirati centre s već postojećom infrastrukturu, stručnim kadrom i iskustvom kao mjesta kojima će gravitirati točno definirana populacija određenog geografskog područja. Akutni kolangitis, akutni biliarni pankreatitis i komplikacije kolecistektomije u obliku postoperacijske ozljede žučovoda dijagnoze su koje zahtijevaju ERCP unutar 72 sata, a u pojedinim slučajevima i unutar 24 sata. Nažalost, činjenica je da trenutno u Republici Hrvatskoj takvi bolesnici nerijetko čekaju na intervenciju znatno duže jer ne postoji organizirana mreža slanja i prihvata takvih bolesnika. Uspostavom egzaktno definirane mreže značajno bi se smanjio mortalitet i učestalost niza komplikacija, posebice u starijim dobnim skupinama u kojih postoji značajan komorbiditet. Sve navedeno zasigurno bi smanjilo trošak i poboljšalo ishode liječenja tih bolesnika.

S obzirom na postojeću zdravstvenu, prometnu, komunikacijsku i drugu infrastrukturu, te udaljenost do 150 km od bolnica s tog područja do već postojećih sedam visoko specijaliziranih centara s razvijenom intervencijskom gastroenterologijom koji svakodnevno osiguravaju mogućnost 24-satnog hitnog ili ranog ERCP-a (KBC Osijek, KBC Rijeka, KBC Sestre milosrdnice, KBC Split, KBC Zagreb, KB Dubrava, KB Sveti Duh) morao bi se osigurati transport bolesnika s jasnim indikacijama (teški i srednje teški akutni kolangitis, akutni pankreatitis s dilatacijom žučnih vodova i laboratorijskim pokazateljima kolestatskog sindroma i povišenim koncentracijama bilirubina u serumu) do specijaliziranih, navedenih centara unutar 24, odnosno 72 sata, zavisno o kojoj se indikaciji radi.

and treatment networks, such as the Interventional Cardiology Network or the Interventional Neuroradiology Network. In view of the fact that Republic of Croatia has a relatively small population and consequently a relatively small number of specific cases, there is the need to form highly specialized centers integrated into a well-organized network for referral of patients with specific problems. As has already been mentioned, the majority of 'acute' hospitals in the Republic of Croatia lack both the facilities and the staff to perform the ERCP method. Thus, it is clear that the availability of this method is not uniform across the Republic of Croatia, which greatly influences the final outcome of acute biliary pancreatitis and in particular of acute cholangitis. A good solution for this problem is precisely the establishment of highly specialized centers integrated into a well-organized network which patients with specific and demanding issues would be referred to. Only a system organized in this manner has the potential to provide high-quality treatment and cost efficiency at the same time.

The Croatian Interventional Gastroenterology Network-ERCP (*CRO-GASTRONET-ERCP*), guided by the above assumptions, has the aim of organizing centers with pre-existing infrastructure, professional staff and experience as the sites with a clearly defined catchment population from a particular geographic area. Acute cholangitis, acute biliary pancreatitis and cholecystectomy complications in the form of post-operative bile duct injury are all diagnoses requiring ERCP within 72 hours, and in some cases within 24 hours. Unfortunately, the fact is that currently in the Republic of Croatia such patients often have to wait for intervention considerably longer because there is no organized network of referral and admission of such patients. The establishment of a precisely defined network would significantly reduce the mortality and prevalence of a series of complications, especially in older age groups with significant comorbidities. All this would certainly reduce the costs and improve treatment outcomes in those patients.

Given the existing healthcare, transport, communication and other infrastructure, and distance of up to 150 km from the hospitals in a certain area to the existing seven highly specialized centers with developed interventional gastroenterology that provide 24-hour emergency or early ERCP on a daily basis (Osijek University Hospital Centre (UHC), Rijeka UHC, Sestre milosrdnice UHC, Split UHC, Zagreb UHC, Dubrava University Hospital (UH), and Sveti Duh UH), transport would need to be provided for patients with clear indications (severe or moderate acute cholangitis, acute pancreatitis with bile duct dilation and lab markers of cholestatic syndrome and elevated serum bilirubin levels) to the above mentioned specialized centers within 24 or 72 hours, depending on the indication.

Grad Zagreb, Zagrebačka županija te županije sjeverozapadne Hrvatske (Karlovačka županija, Sisačko-moslavačka županija, Bjelovarsko-bilogorska županija, Koprivničko-križevačka županija, Međimurska županija, Varaždinska županija i Krapinsko-zagorska županija), uključujući i Požeško-slavonsku županiju i Virovitičko-podravsku županiju (smeđe obojene na sl. 2) teritorijalne su jedinice čije bi sveukupno stanovništvo u slučaju potrebe za ERCP-om i s jasnom indikacijom bilo upućivano u jedan od specijaliziranih centara u gradu Zagrebu (tablica 5). Vukovarsko-srijemska županija, Osječko-baranjska županija i Brodsko-posavska županija gravitirale bi KBC-u Osijek (žuto obojeno na sl. 2), dok bi županije jugozapadne Hrvatske (Istarska županija, Primorsko-goranska županija i Lička županija) gravitirale KBC-u Rijeka (tamno plavo obojano na sl. 2). Južne županije (Dubrovačko-neretvanska županija, Splitsko-dalmatinska županija i veći dio Šibensko-kninske županije) gravitirale bi KBC-u Split (zeleno obojano na sl. 2), dok bi grad Knin s okolicom i Zadarska županija gravitirali OB Zadar (narančasto obojano na sl. 2) (tablica 5). KB Merkur bi s obzirom na kadrovski i organizacijski potencijal zadržao obavljanje djelatnosti ERCP-a za svoje gravitirajuće područje (tablica 5).

Prema vlastitim dosadašnjim iskustvima u svakodnevnom radu kao i prema iskustvima drugih "mreža" poput mreže intervencijske kardiologije za očekivati je pojedine probleme koji će se javljati posebice na početku uvođenja sustava na svim njegovim razinama. Jedan od problema bi mogao biti predugački vremenski slijed od dolaska bolesnika u hitnu službu do postavljanja dijagnoze. Kada se postavi dijagnoza, postoje problemi u komunikaciji s tercijalnim centrom, često i međusobno nepovjerenje, te nepoznavanje kriterija za hitni, odnosno rani ERCP. Postupnikom koji bi izradila Radna skupina Hrvatskog gastroenterološkog društva za hitni i rani ERCP, koji bi se potom uputio svim hitnim službama u svim „akutnim“ bolnicama, naznačeni problemi provedbe bi se u velikoj mjeri minimalizirali ili u potpunosti uklonili. Hrvatsko gastroenterološko društvo preuzima zadaću trajne edukacije zdravstvenih kadrova koji će omogućiti razvoj i održavanje *Hrvatske mreže intervencijske gastroenterologije* što uključuje i kontrolu kvalitete rada u svakom od centara u kojemu se radi ERCP.

The City of Zagreb, Zagreb County and the counties of northwest Croatia (Karlovac, Sisak-Moslavina, Bjelovar-Bilogora, Koprivnica-Križevci, Međimurje, Varaždin and Krapina-Zagorje), including the Požega-Slavonia and Virovitica-Podravina Counties (brown-colored in Figure 2) are territorial units the overall population of which, in case of the need for ERCP and with clear indication, would be referred to one of the specialized centers in the City of Zagreb (Table 5). Vukovar-Srijem, Osijek-Baranja and Brod-Posavina Counties would be catchment areas of the Osijek UHC (yellow-colored in Figure 2), while the counties of southwest Croatia (Istria, Primorje-Gorski Kotar and Lika) would be catchment areas of the Rijeka UHC (dark blue-colored in Figure 2). The southern counties (Dubrovnik-Neretva, Split-Dalmatia and the majority of the Šibenik-Knin County) would be catchment areas of the Split UHC (green-colored in Figure 2), while the town of Knin with its surroundings and the Zadar County would be catchment areas of the Zadar General Hospital (GH) (orange-colored in Figure 2) (Table 5). Merkur UH would, given its staff and organizational potential, continue performing ERCP activities for the respective catchment area (Table 5).

Based on our own previous experience in daily routine, as well as the experience of other networks, such as the Interventional Cardiology Network, certain problems are to be expected that will occur especially in the initial introduction of the system at all its levels. One of the problems could be too long a time sequence from patient arrival to emergency department to diagnosis. Once the diagnosis is established, there are problems in communication with the tertiary center, frequently also mutual mistrust, and lack of familiarity with the criteria for emergency or early ERCP. A protocol that would be developed by the working group of the Croatian Society of Gastroenterology for emergency and early ERCP, which would then be sent to all emergency departments in all 'acute' hospitals, would to a large extent minimize or completely eliminate the suggested problems in implementation. The Croatian Society of Gastroenterology assumes the task of continuously training healthcare professionals who will enable the development and maintenance of the Croatian Interventional Gastroenterology Network, which also includes monitoring the quality of work in each of the centers performing ERCP.

Tablica 5. Prikaz ustanova u kojima se radi ERCP s gravitacijskim područjima i brojem osiguranika  
 Table 5. Hospitals performing ERCP activities and their respective gravitational areas and number of insured persons

| Ustanova / Institution | Gravitacijsko područje / Catchment area                      | Broj osiguranika / No. of insured persons |
|------------------------|--------------------------------------------------------------|-------------------------------------------|
| KBC Sestre milosrdnice | Centar, Trešnjevka                                           | 158521                                    |
|                        | Zagrebačka županija – Zagreb County                          | 57193                                     |
|                        | Karlovačka županija – Karlovac County                        | 118824                                    |
|                        | Sisačko-moslavačka županija – Sisak-Moslavina County         | 154908                                    |
|                        |                                                              |                                           |
| KBC Zagreb             | Maksimir, Novi Zagreb                                        | 190705                                    |
|                        | Zagrebačka županija – Zagreb County                          | 95393                                     |
|                        | Varaždinska županija – Varaždin County                       | 164459                                    |
|                        | Bjelovarsko-bilogorska županija – Bjelovar-Bilogora County   | 108787                                    |
|                        |                                                              |                                           |
| KB Dubrava             | Sesvete, Dubrava                                             | 180063                                    |
|                        | Zagrebačka županija – Zagreb County                          | 50871                                     |
|                        | Međimurska županija – Međimurje County                       | 106847                                    |
|                        | Koprivničko-križevačka županija – Koprivnica-Križevci County | 107581                                    |
|                        | Virovitičko-podravska županija – Virovitica-Podravina County | 77040                                     |
|                        | Požeško-slavonska županija – Požega-Slavonia County          | 70030                                     |
|                        |                                                              |                                           |
| KB Merkur              | Medveščak, Trnje, Peščenica-Žitnjak                          | 135110                                    |
|                        |                                                              |                                           |
| KB Sveti Duh           | Črnomerec, Susedgrad, Zaprešić                               | 166674                                    |
|                        | Krapinsko-zagorska županija – Krapina-Zagorje County         | 123506                                    |
|                        | Zagrebačka županija – Zagreb County                          | 82877                                     |
|                        |                                                              |                                           |
| KBC Rijeka             | Primorsko-goranska županija – Primorje-Gorski Kotar County   | 292501                                    |
|                        | Istarska županija – Istria County                            | 217050                                    |
|                        | Ličko-senjska županija – Lika-Senj County                    | 47731                                     |
|                        |                                                              |                                           |
| KBC Osijek             | Osječko-baranjska županija – Osijek-Baranja County           | 280683                                    |
|                        | Vukovarsko-srijemska županija – Vukovar-Srijem County        | 161844                                    |
|                        | Brodsko-posavska županija – Brod-Posavina County             | 143709                                    |
|                        |                                                              |                                           |
| KBC Split              | Splitsko-dalmatinska županija – Split-Dalmatia County        | 460591                                    |
|                        | Dubrovačko-neretvanska županija – Dubrovnik-Neretva County   | 129411                                    |
|                        | Šibensko-kninska županija – Šibenik-Knin County              | 86357                                     |
|                        |                                                              |                                           |
| OB Zadar               | Zadarska županija – Zadar County                             | 174257                                    |
|                        | Šibensko-kninska županija – Šibenik-Knin County              | 18463                                     |

KB – Clinical Hospital; KBC – Clinical Centre; OB – General Hospital



|       |                        |        |                        |
|-------|------------------------|--------|------------------------|
| I.    | ZAGREBAČKA             | XII.   | BRODSKO-POSAVSKA       |
| II.   | KRAPINSKO-ZAGORSKA     | XIII.  | ZADARSKA               |
| III.  | SISAČKO-MOSLAVAČKA     | XIV.   | OSJEČKO-BARANJSKA      |
| IV.   | KARLOVAČKA             | XV.    | ŠIBENSKO-KNINSKA       |
| V.    | VARAŽDINSKA            | XVI.   | VUKOVARSKO-SRIJEMSKA   |
| VI.   | KOPRIVNIČKO-KRIŽEVAČKA | XVII.  | SPLITSKO-DALMATINSKA   |
| VII.  | BJELOVARSKO-BILOGORSKA | XVIII. | ISTARSKA               |
| VIII. | PRIMORSKO-GORANSKA     | XIX.   | DUBROVAČKO-NERETVANSKA |
| IX.   | LIČKO-SENJSKA          | XX.    | MEĐIMURSKA             |
| X.    | VIROVITIČKO-PODRAVSKA  | XXI.   | GRAD ZAGREB            |
| XI.   | POŽEŠKO-SLAVONSKA      |        |                        |

Sl. 2. Mreža ERCP-a / Fig. 2. ERCP network

## UTJECAJ NA PRORAČUN HRVATSKOG ZAVODA ZA ZDRAVSTVENO OSIGURANJE

U kontekstu najčešćih ponajprije terapijskih zahvata koji će se raditi u okviru Mreže intervencijske gastroenterologije (CRO-GASTRONET) – ERCP bit će ERCP sa sfinkterotomijom i ekstrakcijom konkrementa, jedinične uprosječne cijene 8.415,00 kuna te ERCP sa sfinkterotomijom i bez nje i s postavljanjem stenta u žučni vod uprosječne cijene 10.633,00 kuna. S obzirom da je očekivani broj hitnih i ranih ERCP-a koji dolaze iz ustanova koje nemaju mogućnosti obavljanja ERCP-a kao terapijske metode oko 303 slučaja godišnje (apendiks 1), pretpostavka je da je u kontekstu uprosječne cijene ERCP-a na razini jedne godine nužno osigurati tri milijuna kuna kao posebnu stavku unutar proračuna Hrvatskog zavoda za zdravstveno osiguranje pod nazivom Mreža intervencijske gastroenterologije (CRO-GASTRONET) – ERCP (tablica 6).

Tablica 6. Mreža intervencijske gastroenterologije (CRO-GASTRONET) - ERCP (broj ERCP-a godišnje, broj ERCP-a iz ustanova koje nemaju ERCP, uprosječna cijena ERCP-a i stavka unutar proračuna HZZO)

Table 6. Interventional gastroenterology network (no. of ERCP annually, no. of ERCP from institutions lacking ERCP, average price of ERCP, Item within chif budget)

| Broj ERCP-a godišnje /<br>No. of ERCP annually | Broj ERCP-a iz ustanova koje nemaju<br>ERCP / No. of ERCP from institutions<br>lacking ERCP | Uprosječna cijena terapijskog ERCP-a<br>/<br>Average price of therapeutic ERCP | Stavka unutar proračuna HZZO /<br>Item with CHIF budget |
|------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------|
| 3346                                           | 303                                                                                         | 9.500,00 kuna                                                                  | 3.000.000,00 kuna                                       |

## ZAKLJUČAK

Uključivanje Hrvatske mreže intervencijske gastroenterologije – ERCP u svakodnevno liječenje bolesnika s akutnim kolangitisom, akutnim bilijarnim pankreatitisom i postoperacijskim komplikacijama kolecistektomije osigurava spašavanje života, brzi povratak radne sposobnosti te dulji i kvalitetniji život velikog broja bolesnika koji obolijevaju od navedenih bolesti. Akutni kolangitis, akutni bilijarni pankreatitis i komplikacije kolecistektomije u obliku postoperacijske ozljede žučovoda, dijagnoze su koje zahtijevaju ERCP unutar 72 sata, a u pojedinim slučajevima i unutar 24 sata. Nažalost, činjenica je da trenutno u Republici Hrvatskoj takvi bolesnici nerijetko čekaju na intervenciju znatno duže, jer ne postoji organizirana mreža slanja i prihvata takvih bolesnika.

Grad Zagreb, Zagrebačka županija te županije sjeverozapadne Hrvatske (Karlovačka županija, Sisačko-moslavačka županija, Bjelovarsko-bilogorska županija, Koprivničko-križevačka županija, Međimurska županija, Varaždinska županija i Krapinsko-zagorska županija), uključujući i Požeško-slavonsku županiju i Virovitičko-podravsku županiju, teritorijalne su jedinice čije bi sveukupno stanovništvo u slučaju potrebe za ERCP-om i s jasnom indikacijom bilo upućivano

## IMPACT ON THE BUDGET OF THE CROATIAN HEALTH INSURANCE FUND

The most common, primarily treatment procedures that will be performed within the Interventional Gastroenterology Network (CRO-GASTRONET)-ERCP include ERCP with sphincterotomy and extraction of concretions, with the average unit price of HRK 8.415.00, and ERCP with or without sphincterotomy and stent placement in the bile duct with the average price of HRK 10.633.00. Given the expected number of emergency and early ERCPs coming from institutions that lack the possibility of performing ERCP as a therapeutic method, of about 303 cases annually (Appendix 1), it is assumed that in view of the average price of ERCP at the annual level, it is necessary to allocate three million HRK as a separate item within the budget of the CHIF under the title Interventional Gastroenterology Network (CRO-GASTRONET)-ERCP (Table 6).

## CONCLUSION

The implementation of the Croatian Interventional Gastroenterology Network-ERCP into everyday treatment of patients with acute cholangitis, acute biliary pancreatitis and postoperative complications of cholecystectomy ensures saving lives, quick recovery of work capacity, and longer and better quality of life for a large number of patients suffering from these diseases. Acute cholangitis, acute biliary pancreatitis and cholecystectomy complications in the form of postoperative bile duct injury are diagnoses requiring ERCP within 72 hours, and in some cases within 24 hours. Unfortunately, such patients often have to wait for intervention considerably longer because there is no organized network for referring and admitting such patients.

The City of Zagreb, Zagreb County and the counties of northwest Croatia (Karlovac, Sisak-Moslavina, Bjelovar-Bilogora, Koprivnica-Križevci, Međimurje, Varaždin and Krapina-Zagorje), including the Požega-Slavonia and Virovitica-Podravina Counties, are territorial units the overall population of which, in case of the need of ERCP and with clear indication, would be referred to one of the specialized centers in the City of Zagreb. Vukovar-Srijem, Osijek-Baranja and Brod-Posavina Counties would be catchment areas of

u jedan od specijaliziranih centara u gradu Zagrebu. Vukovarsko-srijemska županija, Osječko-baranjska županija i Brodsko-posavska županija gravitirale bi KBC-u Osijek, dok bi županije jugozapadne Hrvatske (Istarska županija, Primorsko-goranska županija i Lička županija) gravitirale KBC-u Rijeka. Južne županije (Dubrovačko-neretvanska županija, Splitsko-dalmatinska županija i veći dio Šibensko-kninske županije) gravitirale bi KBC-u Split, dok bi grad Knin s okolicom i Zadarska županija gravitirali u OB Zadar. KB Merkur bi s obzirom na kadrovski i organizacijski potencijal zadržao obavljanje djelatnosti ERCP-a za svoje gravitirajuće područje.

Sasvim je jasno da policentričnim pristupom diferentna dijagnostika i diferentno liječenje ove kazuistike ima nedvojbeno kratkoročnu, ali i dugoročnu ekonomsku opravdanost. Sveobuhvatnost i dostupnost jedni su od temeljnih načela zdravstvene zaštite Republike Hrvatske, a upravo bi se uspostavljanjem mreže intervencijske gastroenterologije – ERCP osigurala ista razina i kvaliteta liječenja šire populacije naše zemlje, a ne samo onog manjeg broja ljudi koji sada gravitiraju velikim bolnicama u kojima je ova diferentna terapija dostupna zahvaljujući postojećim prostornim, ljudskim i ostalim resursima.

the Osijek UHC, while the counties of southwest Croatia (Istria, Primorje-Gorski Kotar and Lika) would be catchment areas of the Rijeka UHC. The southern counties (Dubrovnik-Neretva, Split-Dalmatia and the majority of the Šibenik-Knin County) would be catchment areas of the Split UHC, while the town of Knin with its surroundings and the Zadar County would be catchment areas of the Zadar GH. Merkur UH would, given its staff and organizational potential, continue performing ERCP procedures for its respective catchment area.

It is quite clear that with a polycentric approach, the differential diagnosis and differential treatment of these cases have an unequivocal, both short-term and long-term economic justification. Comprehensiveness and availability are among the fundamental principles of healthcare system in the Republic of Croatia, and it is precisely establishment of the interventional gastroenterology network – ERCP that would provide the same level and quality of treatment for overall population of our country, and not just for the smaller catchment population of large hospitals in which this differential therapy is available owing to the existing spatial, human and other resources.

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Hrvatski  
zavod za  
zdravstveno  
osiguranje

Croatian  
Health  
Insurance  
Fund

## APENDIKS 1 – APPENDIX 1

| USTANOVA / INSTITUTION                           | BROJ POSTUPAKA ERCP-A PO GODINAMA /<br>NUMBER OF ERCP PROCEDURES ACCORDING TO YEARS |            |            |            |            | UKUPAN BROJ POSTUPAKA /<br>TOTAL NUMBER OF<br>PROCEDURES |
|--------------------------------------------------|-------------------------------------------------------------------------------------|------------|------------|------------|------------|----------------------------------------------------------|
|                                                  | 2014. god.                                                                          | 2015. god. | 2016. god. | 2017. god. | 2018. god. |                                                          |
| KBC Osijek                                       | 142                                                                                 | 190        | 204        | 316        | 168        | 1020                                                     |
| KBC Rijeka                                       | 285                                                                                 | 328        | 277        | 335        | 448        | 1673                                                     |
| KBC Sestre milosrdnice                           | 272                                                                                 | 369        | 430        | 745        | 959        | 2775                                                     |
| KBC Split                                        | 220                                                                                 | 188        | 215        | 211        | 276        | 1110                                                     |
| KBC Zagreb                                       | 254                                                                                 | 299        | 412        | 342        | 294        | 1601                                                     |
| KB Dubrava                                       | 609                                                                                 | 718        | 697        | 374        | 1416       | 3814                                                     |
| KB Merkur                                        | 9                                                                                   | 6          | 13         | 29         | 35         | 92                                                       |
| KB Sveti Duh                                     | 134                                                                                 | 150        | 195        | 197        | 240        | 916                                                      |
| Klinika za tumore                                | 3                                                                                   | 2          | 0          | 1          | 2          | 8                                                        |
| Klinika za dječje bolesti                        | 0                                                                                   | 1          | 0          | 0          | 0          | 1                                                        |
| OB Bjelovar                                      | 30                                                                                  | 42         | 27         | 31         | 18         | 148                                                      |
| OB Dubrovnik                                     | 0                                                                                   | 0          | 0          | 0          | 1          | 1                                                        |
| OB Gospić                                        | 0                                                                                   | 1          | 0          | 0          | 0          | 1                                                        |
| OB Karlovac                                      | 8                                                                                   | 27         | 38         | 57         | 16         | 146                                                      |
| Opća i veteranska bolnica<br>Hrvatski ponos Knin | 4                                                                                   | 3          | 6          | 4          | 6          | 23                                                       |
| OB Koprivnica                                    | 28                                                                                  | 32         | 33         | 32         | 24         | 149                                                      |
| OB Nova Gradiška                                 | 3                                                                                   | 2          | 2          | 11         | 3          | 21                                                       |
| OB Pakrac                                        | 2                                                                                   | 12         | 6          | 8          | 11         | 39                                                       |
| OB Požega                                        | 8                                                                                   | 7          | 25         | 31         | 53         | 124                                                      |
| OB Ivo Pedišić Sisak                             | 13                                                                                  | 12         | 12         | 8          | 7          | 52                                                       |
| OB Ogulin                                        | 0                                                                                   | 4          | 7          | 9          | 2          | 22                                                       |
| OB Pula                                          | 0                                                                                   | 0          | 41         | 27         | 12         | 80                                                       |
| OB Slavonski Brod                                | 9                                                                                   | 7          | 20         | 39         | 39         | 114                                                      |
| OB Šibenik                                       | 1                                                                                   | 3          | 7          | 11         | 17         | 39                                                       |
| OB Varaždin                                      | 33                                                                                  | 24         | 22         | 9          | 8          | 96                                                       |
| OB Vinkovci                                      | 6                                                                                   | 0          | 2          | 0          | 3          | 11                                                       |
| OB Virovitica                                    | 19                                                                                  | 10         | 46         | 33         | 40         | 148                                                      |
| OB Vukovar                                       | 8                                                                                   | 6          | 11         | 10         | 14         | 49                                                       |
| OB Zabok                                         | 11                                                                                  | 12         | 34         | 33         | 37         | 127                                                      |
| OB Zadar                                         | 523                                                                                 | 487        | 516        | 421        | 268        | 2215                                                     |
| OB Našice                                        | 2                                                                                   | 5          | 14         | 3          | 7          | 31                                                       |
| OB Čakovec                                       | 8                                                                                   | 12         | 22         | 19         | 35         | 96                                                       |

KB – Clinical Hospital; KBC – Clinical Hospital Centre; OB – General Hospital; Klinika za dječje bolesti – Clinic for Children Diseases; Opća i veteranska bolnica – General and Veteran Hospital



Hrvatski  
zavod za  
zdravstveno  
osiguranje

Croatian  
Health  
Insurance  
Fund

APENDIKS 2 – APPENDIX 2

| Županija – County                                                 | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
|                                                                   | <b>OP. NEPOZNATA - UNKNOWN</b>                                                        | <b>13</b>       |
| Bjelovarsko-bilogorska – Bjelovar-Bilogora County                 | Berek                                                                                 | 1.228           |
|                                                                   | Bjelovar                                                                              | 37.652          |
|                                                                   | Čazma                                                                                 | 7.335           |
|                                                                   | Daruvar                                                                               | 10.978          |
|                                                                   | Dežanovac                                                                             | 2.250           |
|                                                                   | Đulovac                                                                               | 2.945           |
|                                                                   | Garešnica                                                                             | 9.325           |
|                                                                   | Grubišno Polje                                                                        | 5.785           |
|                                                                   | Hercegovac                                                                            | 2.095           |
|                                                                   | Ivanska                                                                               | 2.538           |
|                                                                   | Kapela                                                                                | 2.617           |
|                                                                   | Končanica                                                                             | 2.013           |
|                                                                   | Nova Raca                                                                             | 2.986           |
|                                                                   | Rovišće                                                                               | 4.389           |
|                                                                   | Severin                                                                               | 776             |
|                                                                   | Sirač                                                                                 | 2.006           |
|                                                                   | Šandrovac                                                                             | 1.491           |
|                                                                   | Štefanje                                                                              | 1.799           |
|                                                                   | Velika Pisanica                                                                       | 1.476           |
|                                                                   | Velika Trnovica                                                                       | 1.223           |
|                                                                   | Veliki Grđevac                                                                        | 2.591           |
|                                                                   | Veliko Trojstvo                                                                       | 2.498           |
|                                                                   | Zrinski Topolovac                                                                     | 791             |
| <b>Županija bjelovarsko-bilogorska – Bjelovar-Bilogora County</b> |                                                                                       | <b>108.787</b>  |
| Brodsko-posavska – Brod-Posavina County                           | Bebrina                                                                               | 2.997           |
|                                                                   | Brodski Stupnik                                                                       | 2.650           |
|                                                                   | Bukovlje                                                                              | 2.941           |
|                                                                   | Cernik                                                                                | 3.241           |
|                                                                   | Davor                                                                                 | 2.790           |
|                                                                   | Donji Andrijevc                                                                       | 3.344           |
|                                                                   | Dragalić                                                                              | 1.160           |
|                                                                   | Garcin                                                                                | 4.221           |
|                                                                   | Gornja Vrba                                                                           | 2.343           |

| Županija – County                                          | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija brodsko-posavska – Brod-Posavina County           | Gornji Bogičevci                                                                      | 1.664           |
|                                                            | Gundinci                                                                              | 1.755           |
|                                                            | Klakar                                                                                | 2.140           |
|                                                            | Nova Gradiška                                                                         | 12.782          |
|                                                            | Nova Kapela                                                                           | 3.686           |
|                                                            | Okučani                                                                               | 2.742           |
|                                                            | Oprisavci                                                                             | 2.210           |
|                                                            | OrioVaC                                                                               | 5.219           |
|                                                            | Podcrkavlje                                                                           | 2.405           |
|                                                            | Rešetari                                                                              | 4.129           |
|                                                            | Sibinj                                                                                | 6.275           |
|                                                            | Sikirevci                                                                             | 2.168           |
|                                                            | Slavonski Brod                                                                        | 55.386          |
|                                                            | Slavonski Šamac                                                                       | 1.840           |
|                                                            | Stara Gradiška                                                                        | 1.086           |
|                                                            | Staro Petrovo Selo                                                                    | 4.491           |
|                                                            | Velika Kopanica                                                                       | 3.085           |
|                                                            | Vrbje                                                                                 | 1.906           |
|                                                            | Vrpolje                                                                               | 3.053           |
| <b>Županija brodsko-posavska – Brod-Posavina County</b>    |                                                                                       | <b>143.709</b>  |
| Županija dubrovačko-neretvanska - Dubrovnik-Neretva County | Blato                                                                                 | 3.682           |
|                                                            | Dubrovačko Primorje                                                                   | 1.945           |
|                                                            | Dubrovnik                                                                             | 47.597          |
|                                                            | Janjina                                                                               | 558             |
|                                                            | Konavle                                                                               | 9.384           |
|                                                            | Korčula                                                                               | 5.916           |
|                                                            | Kula Norinska                                                                         | 1.648           |
|                                                            | Lastovo                                                                               | 896             |
|                                                            | Lumbarda                                                                              | 1.285           |
|                                                            | Metković                                                                              | 16.964          |
|                                                            | Mljet                                                                                 | 1.295           |
|                                                            | Opuzen                                                                                | 3.131           |
|                                                            | Orebić                                                                                | 4.099           |
|                                                            | Ploče                                                                                 | 9.428           |
|                                                            | Pojezerje                                                                             | 903             |
|                                                            | Slivno                                                                                | 1.918           |
|                                                            | Smokvica                                                                              | 907             |
|                                                            | Ston                                                                                  | 2.427           |

| Županija – County                                                 | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija dubrovačko-neretvanska - Dubrovnik-Neretva County        | Trpanj                                                                                | 740             |
|                                                                   | Vela Luka                                                                             | 4.122           |
|                                                                   | Zazablje                                                                              | 707             |
|                                                                   | Župa Dubrovačka                                                                       | 9.859           |
| <b>Županija dubrovačko-neretvanska - Dubrovnik-Neretva County</b> |                                                                                       | <b>129.411</b>  |
| Županija Grad Zagreb – City of Zagreb County                      | Nepoznato                                                                             | 2.428           |
|                                                                   | Brezovica                                                                             | 12.003          |
|                                                                   | Čnomerec                                                                              | 39.866          |
|                                                                   | Donja Dubrava                                                                         | 36.260          |
|                                                                   | Donji Grad                                                                            | 36.874          |
|                                                                   | Gornja Dubrava                                                                        | 61.697          |
|                                                                   | Gornji Grad - Medveščak                                                               | 29.343          |
|                                                                   | Maksimir                                                                              | 49.085          |
|                                                                   | Novi Zagreb - Istok                                                                   | 58.026          |
|                                                                   | Novi Zagreb - Zapad                                                                   | 64.879          |
|                                                                   | Peščenica - Žitnjak                                                                   | 56.255          |
|                                                                   | Podsljeme                                                                             | 19.761          |
|                                                                   | Podsused - Vrapče                                                                     | 46.719          |
|                                                                   | Sesvete                                                                               | 75.479          |
|                                                                   | Stenjevec                                                                             | 54.941          |
|                                                                   | Trešnjevka - Jug                                                                      | 67.342          |
|                                                                   | Trešnjevka - Sjever                                                                   | 54.597          |
|                                                                   | Trnje                                                                                 | 42.872          |
| <b>Županija Grad Zagreb – City of Zagreb County</b>               |                                                                                       | <b>808.427</b>  |
| Županija istarska – Istria County                                 | Bale                                                                                  | 1.247           |
|                                                                   | Barban                                                                                | 2.569           |
|                                                                   | Brtonigla                                                                             | 1.602           |
|                                                                   | Buje                                                                                  | 4.712           |
|                                                                   | Buzet                                                                                 | 6.078           |
|                                                                   | Cerovlje                                                                              | 1.543           |
|                                                                   | Fažana                                                                                | 3.810           |
|                                                                   | Funtana                                                                               | 1.105           |
|                                                                   | Gradišće                                                                              | 1.413           |
|                                                                   | Grožnjan                                                                              | 681             |
|                                                                   | Kanfanar                                                                              | 1.713           |
|                                                                   | Karojba                                                                               | 1.449           |
|                                                                   | Kastelir - Labinci                                                                    | 1.537           |
|                                                                   | Krsan                                                                                 | 3.031           |

| Županija – County                        | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija istarska – Istria County        | Labin                                                                                 | 11.668          |
|                                          | Lanišće                                                                               | 299             |
|                                          | Ližnjan                                                                               | 4.346           |
|                                          | Lupoglav                                                                              | 871             |
|                                          | Marčana                                                                               | 4.426           |
|                                          | Medulin                                                                               | 7.254           |
|                                          | Motovun                                                                               | 902             |
|                                          | Novigrad                                                                              | 4.416           |
|                                          | Oprtalj                                                                               | 751             |
|                                          | Pazin                                                                                 | 8.878           |
|                                          | Piće                                                                                  | 1.761           |
|                                          | Poreč                                                                                 | 19.597          |
|                                          | Pula                                                                                  | 58.471          |
|                                          | Raša                                                                                  | 3.031           |
|                                          | Rovinj                                                                                | 15.730          |
|                                          | Sveta Nedelja                                                                         | 3.015           |
|                                          | Sveti Lovreč                                                                          | 1.033           |
|                                          | Sveti Petar u Šumi                                                                    | 1.105           |
|                                          | Svetvincenat                                                                          | 2.194           |
|                                          | Tar-Vabriga                                                                           | 2.418           |
|                                          | Tinjan                                                                                | 1.720           |
|                                          | Umag                                                                                  | 14.752          |
|                                          | Višnjan                                                                               | 2.360           |
|                                          | Vižinada                                                                              | 1.159           |
|                                          | Vodnjan                                                                               | 6.365           |
|                                          | Vrsar                                                                                 | 2.508           |
|                                          | Žminj                                                                                 | 3.530           |
| <b>Županija istarska – Istria County</b> |                                                                                       | <b>217.050</b>  |
| Županija karlovačka – Karlovac County    | Barilović                                                                             | 2.884           |
|                                          | Bosiljevo                                                                             | 1.055           |
|                                          | Cetingrad                                                                             | 1.872           |
|                                          | Draganić                                                                              | 2.624           |
|                                          | Duga Resa                                                                             | 10.615          |
|                                          | Generalski Stol                                                                       | 2.386           |
|                                          | Josipdol                                                                              | 3.543           |
|                                          | Kamanje                                                                               | 732             |
|                                          | Karlovac                                                                              | 52.432          |
|                                          | Krnjak                                                                                | 1.435           |

| Županija – County                                                   | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija karlovačka – Karlovac County                               | Lasinja                                                                               | 1.429           |
|                                                                     | Netretić                                                                              | 2.564           |
|                                                                     | Ogulin                                                                                | 12.851          |
|                                                                     | Ozalj                                                                                 | 6.083           |
|                                                                     | Plaški                                                                                | 1.865           |
|                                                                     | Rakovica                                                                              | 2.381           |
|                                                                     | Ribnik                                                                                | 349             |
|                                                                     | Saborsko                                                                              | 545             |
|                                                                     | Slunj                                                                                 | 4.696           |
|                                                                     | Tounj                                                                                 | 1.003           |
|                                                                     | Vojnić                                                                                | 3.953           |
|                                                                     | Žakanje                                                                               | 1.527           |
| <b>Županija karlovačka – Karlovac County</b>                        |                                                                                       | <b>118.824</b>  |
| Županija koprivničko-križevačka – Koprivnica-Križevci County        | Drnje                                                                                 | 1.675           |
|                                                                     | Đelekovec                                                                             | 1.382           |
|                                                                     | Đurđevac                                                                              | 7.937           |
|                                                                     | Ferdinandovac                                                                         | 1.529           |
|                                                                     | Gola                                                                                  | 2.212           |
|                                                                     | Gornja Rijeka                                                                         | 1.631           |
|                                                                     | Hlebine                                                                               | 1.195           |
|                                                                     | Kalinovac                                                                             | 1.407           |
|                                                                     | Kalnik                                                                                | 1.206           |
|                                                                     | Kloštar Podravski                                                                     | 2.920           |
|                                                                     | Koprivnica                                                                            | 30.134          |
|                                                                     | Koprivnički Bregi                                                                     | 2.093           |
|                                                                     | Koprivnički Ivanec                                                                    | 1.944           |
|                                                                     | Križevci                                                                              | 19.972          |
|                                                                     | Legrad                                                                                | 1.961           |
|                                                                     | Molve                                                                                 | 1.964           |
|                                                                     | Novigrad Podravski                                                                    | 2.541           |
|                                                                     | Novo Virje                                                                            | 1.083           |
|                                                                     | Peteranec                                                                             | 2.522           |
|                                                                     | Podravske Sesvete                                                                     | 1.514           |
|                                                                     | Rasinja                                                                               | 2.858           |
|                                                                     | Sokolovac                                                                             | 3.005           |
|                                                                     | Sveti Ivan Žabno                                                                      | 4.597           |
|                                                                     | Sveti Petar Orehovec                                                                  | 4.206           |
|                                                                     | Virje                                                                                 | 4.093           |
| <b>Županija koprivničko-križevačka – Koprivnica-Križevci County</b> |                                                                                       | <b>107.581</b>  |

| Županija – County                                           | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija krapinsko-zagorska – Krapina-Zagorje County        | Bedekovčina                                                                           | 7.696           |
|                                                             | Jesenje                                                                               | 1.399           |
|                                                             | Klanjec                                                                               | 2.750           |
|                                                             | Konjšćina                                                                             | 3.470           |
|                                                             | Kraljevec na Sutli                                                                    | 1.565           |
|                                                             | Krapina                                                                               | 11.892          |
|                                                             | Krapinske Toplice                                                                     | 5.103           |
|                                                             | Kumrovec                                                                              | 1.437           |
|                                                             | Lobor                                                                                 | 2.551           |
|                                                             | Mače                                                                                  | 2.345           |
|                                                             | Marija Bistrica                                                                       | 5.688           |
|                                                             | Mihovljan                                                                             | 1.790           |
|                                                             | Novi Golubovec                                                                        | 893             |
|                                                             | Oroslavje                                                                             | 5.900           |
|                                                             | Petrovsko                                                                             | 2.429           |
|                                                             | Pregrada                                                                              | 6.108           |
|                                                             | Radoboj                                                                               | 3.139           |
|                                                             | Stubičke Toplice                                                                      | 2.716           |
|                                                             | Sveti Križ Začretje                                                                   | 5.792           |
|                                                             | Tuhelj                                                                                | 1.981           |
|                                                             | Veliko Trgovišće                                                                      | 4.637           |
|                                                             | Zabok                                                                                 | 8.908           |
|                                                             | Zagorska Sela                                                                         | 828             |
|                                                             | Zlatar                                                                                | 5.702           |
|                                                             | Zlatar Bistrica                                                                       | 2.387           |
| <b>Županija krapinsko-zagorska – Krapina-Zagorje County</b> |                                                                                       | <b>123.506</b>  |
| Županija ličko-senjska – Lika-Senj County                   | Brinje                                                                                | 2.790           |
|                                                             | Donji Lapac                                                                           | 1.581           |
|                                                             | Gospić                                                                                | 12.374          |
|                                                             | Karlobag                                                                              | 898             |
|                                                             | Lovnac                                                                                | 994             |
|                                                             | Novalja                                                                               | 4.610           |
|                                                             | Otočac                                                                                | 9.001           |
|                                                             | Perušić                                                                               | 2.302           |
|                                                             | Plitvička Jezera                                                                      | 4.109           |
|                                                             | Senj                                                                                  | 6.802           |
|                                                             | Udbina                                                                                | 1.533           |
|                                                             | Vrhovine                                                                              | 737             |
| <b>Županija ličko-senjska – Lika-Senj County</b>            |                                                                                       | <b>47.731</b>   |

| Županija – County                                  | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|----------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija međimurska – Međimurje County             | Belica                                                                                | 2.948           |
|                                                    | Čakovec                                                                               | 27.008          |
|                                                    | Dekanovec                                                                             | 700             |
|                                                    | Domašinec                                                                             | 1.945           |
|                                                    | Donja Dubrava                                                                         | 1.721           |
|                                                    | Donji Kraljevec                                                                       | 3.946           |
|                                                    | Donji Vidovec                                                                         | 1.218           |
|                                                    | Goričan                                                                               | 2.415           |
|                                                    | Gornji Mihaljevec                                                                     | 1.771           |
|                                                    | Kotoriba                                                                              | 2.940           |
|                                                    | Mala Subotica                                                                         | 5.157           |
|                                                    | Mursko Središće                                                                       | 5.797           |
|                                                    | Nedelišće                                                                             | 11.472          |
|                                                    | Orehoviac                                                                             | 2.522           |
|                                                    | Podturen                                                                              | 3.458           |
|                                                    | Prelog                                                                                | 7.214           |
|                                                    | Pribislavec                                                                           | 3.182           |
|                                                    | Selnica                                                                               | 2.571           |
|                                                    | Strahotines                                                                           | 2.654           |
|                                                    | Sveta Marija                                                                          | 2.072           |
|                                                    | Sveti Juraj na Bregu                                                                  | 4.887           |
|                                                    | Sveti Martin na Muri                                                                  | 2.339           |
|                                                    | Šenkovec                                                                              | 2.856           |
|                                                    | Štrigova                                                                              | 2.318           |
|                                                    | Vratišinec                                                                            | 1.736           |
| <b>Županija međimurska – Međimurje County</b>      |                                                                                       | <b>106.847</b>  |
| Županija osječko-baranjska – Osijek-Baranja County | Antunovac                                                                             | 3.661           |
|                                                    | Beli Manastir                                                                         | 8.810           |
|                                                    | Belišće                                                                               | 10.087          |
|                                                    | Bilje                                                                                 | 5.142           |
|                                                    | Bizovac                                                                               | 4.133           |
|                                                    | Čeminac                                                                               | 2.741           |
|                                                    | Čepin                                                                                 | 10.485          |
|                                                    | Darda                                                                                 | 6.249           |
|                                                    | Donja Motičina                                                                        | 1.488           |
|                                                    | Donji Mihaljac                                                                        | 8.626           |
|                                                    | Draž                                                                                  | 2.248           |
|                                                    | Drenje                                                                                | 2.311           |

| Županija – County                                         | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija osječko-baranjska – Osijek-Baranja County        | Đakovo                                                                                | 25.635          |
|                                                           | Đurđenovac                                                                            | 5.912           |
|                                                           | Erdut                                                                                 | 6.349           |
|                                                           | Ernestinovo                                                                           | 2.117           |
|                                                           | Feričanci                                                                             | 1.890           |
|                                                           | Gorjani                                                                               | 1.412           |
|                                                           | Jagodnjak                                                                             | 1.745           |
|                                                           | Kneževi Vinogradi                                                                     | 3.862           |
|                                                           | Koška                                                                                 | 3.507           |
|                                                           | Levanjska Varoš                                                                       | 883             |
|                                                           | Magadenovac                                                                           | 1.733           |
|                                                           | Marijanci                                                                             | 2.178           |
|                                                           | Našice                                                                                | 15.463          |
|                                                           | Osijek                                                                                | 102.538         |
|                                                           | Petlovac                                                                              | 2.071           |
|                                                           | Petrijevci                                                                            | 2.598           |
|                                                           | Podgorac                                                                              | 2.660           |
|                                                           | Podravska Moslavina                                                                   | 1.030           |
|                                                           | Popovac                                                                               | 1.727           |
|                                                           | Punitovci                                                                             | 1.639           |
|                                                           | Satnica Đakovačka                                                                     | 1.975           |
|                                                           | Semeljci                                                                              | 3.915           |
|                                                           | Strizivojna                                                                           | 2.336           |
|                                                           | Šodolovci                                                                             | 1.382           |
|                                                           | Trnava                                                                                | 1.422           |
|                                                           | Valpovo                                                                               | 10.505          |
|                                                           | Viljevo                                                                               | 1.814           |
|                                                           | Viskovci                                                                              | 1.644           |
|                                                           | Vladislavci                                                                           | 1.696           |
|                                                           | Vuka                                                                                  | 1.064           |
| <b>Županija osječko-baranjska – Osijek-Baranja County</b> |                                                                                       | <b>280.683</b>  |
| Županija požeško-slavonska – Požega-Slavonija County      | Brestovac                                                                             | 3.350           |
|                                                           | Čaglin                                                                                | 2.076           |
|                                                           | Jakšić                                                                                | 3.725           |
|                                                           | Kaptol                                                                                | 3.018           |
|                                                           | Kutjevo                                                                               | 5.569           |
|                                                           | Lipik                                                                                 | 5.498           |
|                                                           | Pakrac                                                                                | 7.714           |

| Županija – County                                           | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija požeško-slavonska – Požega-Slavonija County        | Pleternica                                                                            | 10.152          |
|                                                             | Požega                                                                                | 23.937          |
|                                                             | Velika                                                                                | 4.991           |
| <b>Županija požeško-slavonska – Požega-Slavonija County</b> |                                                                                       | <b>70.030</b>   |
| Županija primorsko-goranska – Primorje-Gorski Kotar County  | Bakar                                                                                 | 8.322           |
|                                                             | Baška                                                                                 | 2.012           |
|                                                             | Brod Moravice                                                                         | 732             |
|                                                             | Cres                                                                                  | 3.093           |
|                                                             | Crikvenica                                                                            | 11.193          |
|                                                             | Čabar                                                                                 | 3.275           |
|                                                             | Čavle                                                                                 | 7.385           |
|                                                             | Delnice                                                                               | 5.432           |
|                                                             | Dobrinj                                                                               | 2.460           |
|                                                             | Fužine                                                                                | 1.514           |
|                                                             | Jelenje                                                                               | 5.352           |
|                                                             | Kastav                                                                                | 10.603          |
|                                                             | Klana                                                                                 | 1.895           |
|                                                             | Kostrena                                                                              | 4.662           |
|                                                             | Kraljevica                                                                            | 4.381           |
|                                                             | Krk                                                                                   | 7.105           |
|                                                             | Lokve                                                                                 | 910             |
|                                                             | Lopar                                                                                 | 1.302           |
|                                                             | Lovran                                                                                | 3.882           |
|                                                             | Mali Lošinj                                                                           | 8.714           |
|                                                             | Malinska-Dubašnica                                                                    | 3.727           |
|                                                             | Matulji                                                                               | 11.377          |
|                                                             | Mošćenička Draga                                                                      | 1.435           |
|                                                             | Mrkopalj                                                                              | 1.051           |
|                                                             | Novi Vinodolski                                                                       | 4.984           |
|                                                             | Omišalj                                                                               | 3.446           |
|                                                             | Opatija                                                                               | 11.514          |
|                                                             | Punat                                                                                 | 2.232           |
|                                                             | Rab                                                                                   | 8.228           |
|                                                             | Ravna Gora                                                                            | 2.224           |
|                                                             | Rijeka                                                                                | 121.354         |
|                                                             | Skrad                                                                                 | 957             |
|                                                             | Vinodolska Općina                                                                     | 3.444           |
|                                                             | Viškovo                                                                               | 16.563          |

| Županija – County                                                 | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija primorsko-goranska – Primorje-Gorski Kotar County        | Vrbnik                                                                                | 1.367           |
|                                                                   | Vrbovsko                                                                              | 4.374           |
| <b>Županija primorsko-goranska – Primorje-Gorski Kotar County</b> |                                                                                       | <b>292.501</b>  |
| Županija sisačko-moslavačka – Sisak-Moslčavina County             | Donji Kukuruzari                                                                      | 1.324           |
|                                                                   | Dvor                                                                                  | 3.946           |
|                                                                   | Glina                                                                                 | 7.793           |
|                                                                   | Gvozd                                                                                 | 2.361           |
|                                                                   | Hrvatska Dubica                                                                       | 1.658           |
|                                                                   | Hrvatska Kostajnica                                                                   | 2.425           |
|                                                                   | Jasenovac                                                                             | 1.728           |
|                                                                   | Kutina                                                                                | 21.238          |
|                                                                   | Lekenik                                                                               | 5.496           |
|                                                                   | Lipovljani                                                                            | 3.037           |
|                                                                   | Majur                                                                                 | 946             |
|                                                                   | Martinska Ves                                                                         | 3.042           |
|                                                                   | Novska                                                                                | 12.374          |
|                                                                   | Petrinja                                                                              | 22.619          |
|                                                                   | Popovača                                                                              | 10.901          |
|                                                                   | Sisak                                                                                 | 44.164          |
|                                                                   | Sunja                                                                                 | 4.841           |
|                                                                   | Topusko                                                                               | 2.558           |
|                                                                   | Velika Ludina                                                                         | 2.457           |
| <b>Županija sisačko-moslavačka – Sisak-Moslavina County</b>       |                                                                                       | <b>154.908</b>  |
| Županija splitsko-dalmatinska – Split-Dalmacija County            | Baška Voda                                                                            | 3.076           |
|                                                                   | Bol                                                                                   | 1.968           |
|                                                                   | Brela                                                                                 | 1.729           |
|                                                                   | Cista Provo                                                                           | 2.001           |
|                                                                   | Dicmo                                                                                 | 2.952           |
|                                                                   | Dugi Rat                                                                              | 7.139           |
|                                                                   | Dugopolje                                                                             | 3.873           |
|                                                                   | Gradac                                                                                | 2.931           |
|                                                                   | Hrvace                                                                                | 3.630           |
|                                                                   | Hvar                                                                                  | 5.049           |
|                                                                   | Imotski                                                                               | 10.592          |
|                                                                   | Jelsa                                                                                 | 3.881           |
|                                                                   | Kaštela                                                                               | 39.833          |
|                                                                   | Klis                                                                                  | 5.186           |
|                                                                   | Komiža                                                                                | 1.666           |

| Županija – County                                      | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|--------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija splitsko-dalmatinska – Split-Dalmacija County | Lećevica                                                                              | 555             |
|                                                        | Lokvičići                                                                             | 750             |
|                                                        | Lovrec                                                                                | 1.498           |
|                                                        | Makarska                                                                              | 16.367          |
|                                                        | Marina                                                                                | 4.610           |
|                                                        | Milna                                                                                 | 1.297           |
|                                                        | Muč                                                                                   | 3.736           |
|                                                        | Nerežišća                                                                             | 945             |
|                                                        | Okrug                                                                                 | 3.366           |
|                                                        | Omiš                                                                                  | 15.463          |
|                                                        | Otok                                                                                  | 5.325           |
|                                                        | Podbablje                                                                             | 4.565           |
|                                                        | Podgora                                                                               | 2.753           |
|                                                        | Podstrana                                                                             | 10.244          |
|                                                        | Postira                                                                               | 1.681           |
|                                                        | Prgomet                                                                               | 605             |
|                                                        | Primorski Dolac                                                                       | 777             |
|                                                        | Proložac                                                                              | 3.527           |
|                                                        | Pučišća                                                                               | 2.182           |
|                                                        | Runovići                                                                              | 2.240           |
|                                                        | Seget                                                                                 | 4.763           |
|                                                        | Selca                                                                                 | 1.836           |
|                                                        | Sinj                                                                                  | 24.502          |
|                                                        | Solin                                                                                 | 25.890          |
|                                                        | Split                                                                                 | 174.213         |
|                                                        | Stari Grad                                                                            | 2.970           |
|                                                        | Sućuraj                                                                               | 502             |
|                                                        | Supetar                                                                               | 4.654           |
|                                                        | Sutivan                                                                               | 1.027           |
|                                                        | Šestanovac                                                                            | 1.844           |
|                                                        | Šolta                                                                                 | 2.251           |
|                                                        | Trilj                                                                                 | 8.648           |
|                                                        | Trogir                                                                                | 13.501          |
|                                                        | Tučepi                                                                                | 2.047           |
|                                                        | Vis                                                                                   | 2.173           |
|                                                        | Vrgorac                                                                               | 6.763           |
|                                                        | Vrlika                                                                                | 1.778           |
|                                                        | Zadvarje                                                                              | 250             |

| Županija – County                                            | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija splitsko-dalmatinska – Split-Dalmacija County       | Zagvozd                                                                               | 1.121           |
|                                                              | Zmijavci                                                                              | 1.866           |
| <b>Županija splitsko-dalmatinska – Split-Dalmatia County</b> |                                                                                       | <b>460.591</b>  |
| Županija šibensko-kninska – Šibenik-Knin County              | Bilice                                                                                | 2.493           |
|                                                              | Biskupija                                                                             | 1.241           |
|                                                              | Civljane                                                                              | 196             |
|                                                              | Drniš                                                                                 | 7.033           |
|                                                              | Eršenik                                                                               | 648             |
|                                                              | Kijevo                                                                                | 326             |
|                                                              | Kistanje                                                                              | 2.639           |
|                                                              | Knin                                                                                  | 13.413          |
|                                                              | Murter-Kornati                                                                        | 2.098           |
|                                                              | Pirovac                                                                               | 1.884           |
|                                                              | Primošten                                                                             | 2.793           |
|                                                              | Promina                                                                               | 988             |
|                                                              | Rogoznica                                                                             | 2.487           |
|                                                              | Ružić                                                                                 | 1.427           |
|                                                              | Skradin                                                                               | 3.714           |
|                                                              | Šibenik                                                                               | 46.033          |
|                                                              | Tisno                                                                                 | 3.156           |
|                                                              | Tribunj                                                                               | 1.658           |
|                                                              | Unešić                                                                                | 1.379           |
|                                                              | Vodice                                                                                | 9.214           |
| <b>Županija šibensko-kninska – Šibenik-Knin County</b>       |                                                                                       | <b>104.820</b>  |
| Županija varaždinska – Varaždin County                       | Bednja                                                                                | 3.524           |
|                                                              | Beretinec                                                                             | 2.140           |
|                                                              | Breznica                                                                              | 2.056           |
|                                                              | Breznički Hum                                                                         | 1.211           |
|                                                              | Cestica                                                                               | 4.891           |
|                                                              | Donja Voća                                                                            | 1.985           |
|                                                              | Gornji Knežinec                                                                       | 5.154           |
|                                                              | Ivanec                                                                                | 12.976          |
|                                                              | Jalžabet                                                                              | 3.080           |
|                                                              | Klenovnik                                                                             | 1.830           |
|                                                              | Lepoglava                                                                             | 6.689           |
|                                                              | Ludbreg                                                                               | 8.111           |
|                                                              | Ljubešćica                                                                            | 1.781           |
|                                                              | Mali Bukovec                                                                          | 1.967           |

| Županija – County                                                   | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija varaždinska – Varaždin County                              | Martijanec                                                                            | 3.480           |
|                                                                     | Maruševec                                                                             | 5.922           |
|                                                                     | Novi Marof                                                                            | 12.479          |
|                                                                     | Petrijanec                                                                            | 4.571           |
|                                                                     | Sračinec                                                                              | 4.769           |
|                                                                     | Sveti Đurd                                                                            | 3.449           |
|                                                                     | Sveti Ilija                                                                           | 3.318           |
|                                                                     | Trnovec Bartolovečki                                                                  | 6.517           |
|                                                                     | Varaždin                                                                              | 45.750          |
|                                                                     | Varaždinske Toplice                                                                   | 5.872           |
|                                                                     | Veliki Bukovec                                                                        | 1.315           |
|                                                                     | Vidovec                                                                               | 5.153           |
|                                                                     | Vinica                                                                                | 3.066           |
|                                                                     | Visoko                                                                                | 1.403           |
| <b>Županija varaždinska – Varaždin County</b>                       |                                                                                       | <b>164.459</b>  |
| Županija virovitičko-podravska – Virovitica-Podravina County        | Crnac                                                                                 | 1.241           |
|                                                                     | Čačinci                                                                               | 2.501           |
|                                                                     | Čadavica                                                                              | 1.709           |
|                                                                     | Gradina                                                                               | 3.251           |
|                                                                     | Lukač                                                                                 | 3.108           |
|                                                                     | Mikleuš                                                                               | 1.222           |
|                                                                     | Nova Bukovica                                                                         | 1.441           |
|                                                                     | Orahovica                                                                             | 4.880           |
|                                                                     | Pitomača                                                                              | 9.173           |
|                                                                     | Slatina                                                                               | 12.499          |
|                                                                     | Sopje                                                                                 | 2.083           |
|                                                                     | Suhopolje                                                                             | 5.798           |
|                                                                     | Špišić Bukovica                                                                       | 3.698           |
|                                                                     | Virovitica                                                                            | 20.590          |
|                                                                     | Voćin                                                                                 | 2.209           |
|                                                                     | Zdenci                                                                                | 1.637           |
| <b>Županija virovitičko-podravska – Virovitica-Podravina County</b> |                                                                                       | <b>77.040</b>   |
| Županija vukovarsko-srijemska – Vukovar-Srijem County               | Andrijaševci                                                                          | 3.814           |
|                                                                     | Babina Greda                                                                          | 3.096           |
|                                                                     | Bogdanovci                                                                            | 1.704           |
|                                                                     | Borovo                                                                                | 4.258           |
|                                                                     | Bošnjaci                                                                              | 3.359           |
|                                                                     | Cerna                                                                                 | 4.090           |

| Županija – County                                            | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija vukovarsko-srijemska – Vukovar-Srijem County        | Drenovci                                                                              | 4.380           |
|                                                              | Gradište                                                                              | 2.477           |
|                                                              | Gunja                                                                                 | 3.169           |
|                                                              | Ilok                                                                                  | 5.988           |
|                                                              | Ivankovo                                                                              | 7.264           |
|                                                              | Jarmina                                                                               | 2.329           |
|                                                              | Lovas                                                                                 | 1.085           |
|                                                              | Markušica                                                                             | 2.064           |
|                                                              | Negoslavci                                                                            | 1.110           |
|                                                              | Nijemci                                                                               | 4.020           |
|                                                              | Nuštar                                                                                | 5.252           |
|                                                              | Otok                                                                                  | 5.604           |
|                                                              | Privlaka                                                                              | 2.569           |
|                                                              | Staro Jankovci                                                                        | 3.973           |
|                                                              | Stari Mikanovci                                                                       | 2.629           |
|                                                              | Štitar                                                                                | 1.828           |
|                                                              | Tompojevci                                                                            | 1.310           |
|                                                              | Tordinci                                                                              | 1.841           |
|                                                              | Tovarnik                                                                              | 2.395           |
|                                                              | Trpinja                                                                               | 4.649           |
|                                                              | Vinkovci                                                                              | 33.637          |
|                                                              | Vodinci                                                                               | 1.835           |
|                                                              | Vrbanja                                                                               | 3.361           |
|                                                              | Vukovar                                                                               | 26.263          |
|                                                              | Županja                                                                               | 10.491          |
| <b>Županija vukovarsko-srijemska – Vukovar-Srijem County</b> |                                                                                       | <b>161.844</b>  |
| Županija zadarska – Zadar County                             | Benkovac                                                                              | 11.365          |
|                                                              | Bbinje                                                                                | 4.167           |
|                                                              | Biograd na Moru                                                                       | 6.111           |
|                                                              | Galovac                                                                               | 1.310           |
|                                                              | Gračac                                                                                | 3.906           |
|                                                              | Jasenice                                                                              | 1.613           |
|                                                              | Kali                                                                                  | 1.874           |
|                                                              | Kolan                                                                                 | 935             |
|                                                              | Kukljica                                                                              | 873             |
|                                                              | Lisane Ostrovičke                                                                     | 721             |
|                                                              | Nin                                                                                   | 3.042           |
|                                                              | Novigrad                                                                              | 2.379           |

| Županija – County                       | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total |
|-----------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Županija zadarska – Zadar County        | Obrovac                                                                               | 3.945           |
|                                         | Pag                                                                                   | 3.501           |
|                                         | Pakoštane                                                                             | 4.451           |
|                                         | Pašman                                                                                | 2.398           |
|                                         | Polača                                                                                | 1.460           |
|                                         | Poličnik                                                                              | 4.910           |
|                                         | Posedarje                                                                             | 3.753           |
|                                         | Povljana                                                                              | 703             |
|                                         | Preko                                                                                 | 4.244           |
|                                         | Privlaka                                                                              | 2.336           |
|                                         | Ražanac                                                                               | 3.095           |
|                                         | Sali                                                                                  | 2.312           |
|                                         | Stankovci                                                                             | 1.939           |
|                                         | Starigrad                                                                             | 2.116           |
|                                         | Sukošan                                                                               | 4.846           |
|                                         | Sveti Filip i Jakov                                                                   | 4.562           |
|                                         | Škabrnja                                                                              | 1.807           |
|                                         | Tkon                                                                                  | 809             |
|                                         | Vir                                                                                   | 3.338           |
|                                         | Vrsi                                                                                  | 2.099           |
|                                         | Zadar                                                                                 | 75.164          |
|                                         | Zemunik Donji                                                                         | 2.173           |
| <b>Županija zadarska – Zadar County</b> |                                                                                       | <b>174.257</b>  |
| Županija zagrebačka – Zagreb County     | Bedenica                                                                              | 1.322           |
|                                         | Bistra                                                                                | 6.256           |
|                                         | Brckovljani                                                                           | 6.182           |
|                                         | Brdovec                                                                               | 11.120          |
|                                         | Dubrava                                                                               | 4.220           |
|                                         | Dubravica                                                                             | 1.280           |
|                                         | Dugo Selo                                                                             | 17.885          |
|                                         | Farkaševac                                                                            | 1.555           |
|                                         | Gradec                                                                                | 3.362           |
|                                         | Ivanić-Grad                                                                           | 13.948          |
|                                         | Jakovlje                                                                              | 3.781           |
|                                         | Jastrebarsko                                                                          | 15.224          |
|                                         | Klinča Sela                                                                           | 5.034           |
|                                         | Kloštar Ivanić                                                                        | 5.877           |
|                                         | Krašić                                                                                | 2.242           |

| Županija – County                                          | Grad/općina/gradska četvrt grada Zagreba<br>Town/district/City of Zagreb municipality | Ukupno<br>Total  |
|------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------|
| Županija zadarska – Zadar County                           | Krvarsko                                                                              | 1.861            |
|                                                            | Križ                                                                                  | 6.478            |
|                                                            | Luka                                                                                  | 1.337            |
|                                                            | Marija Gorica                                                                         | 2.121            |
|                                                            | Orle                                                                                  | 1.821            |
|                                                            | Pisarovina                                                                            | 3.527            |
|                                                            | Pokupsko                                                                              | 2.013            |
|                                                            | Preseka                                                                               | 1.205            |
|                                                            | Pušća                                                                                 | 2.617            |
|                                                            | Rakovec                                                                               | 1.158            |
|                                                            | Rugvica                                                                               | 7.484            |
|                                                            | Samobor                                                                               | 38.412           |
|                                                            | Stupnik                                                                               | 3.832            |
|                                                            | Sveta Nedjelja                                                                        | 18.503           |
|                                                            | Sveti Ivan Zelina                                                                     | 15.108           |
|                                                            | Velika Gorica                                                                         | 62.980           |
|                                                            | Vrbovec                                                                               | 13.537           |
|                                                            | Zaprešić                                                                              | 25.019           |
|                                                            | Žumberak                                                                              | 636              |
| Županija zagrebačka – Zagreb County                        |                                                                                       | <b>308.937</b>   |
| Republika Hrvatska – ukupno<br>Republic of Croatia – total |                                                                                       | <b>4.161.956</b> |



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### Suplement časopisa

Djelmiš J, Ivanišević M, Mrzljak A. Sadržaj lipida u placenti trudnica oboljelih od dijabetesa. Acta Med Croatica 2001; 55 (Supl. 1): 47-9.

### Knjige i monografije

Guluyer AY, ur. Health indicators. An international study for the European Science Foundation. Oxford: M. Robertson, 1983.

### Poglavlje u knjizi

Weinstein I, Swartz MN. Pathogenic properties of invading microorganisms. U: Sodeman WA, ur. Pathologic physiology: mechanism of disease. Philadelphia: WB Saunders, 1974, 457-72.

### Disertacija ili magistarski rad

Cigula M. Aktivnosti nekih enzima u humanom serumu kao pokazatelji apsorpcije žive (disertacija). Zagreb: Medicinski fakultet, 1987, str. 127.

### Članak sa znanstvenog skupa

Christensen S, Oppacher F. An analysis of Koza's computational effort statistic for genetic programming. U: Foster JA, Lutton E, Miller J, Ryan C, Tettamanzi AG (ur.). Genetic programming. EuroGP 2002: Proceedings of the 5th European Conference on Genetic Programming; 2002 Apr 3-5; Kinsdale, Ireland. Berlin: Springer, 2002; 182-91.

### Članak objavljen u online znanstvenom časopisu

Terauchi Y, Takamoto I, Kubota N. Glucokinase and IRS-2 are required for compensatory beta cell hyperplasia in response to high-fat diet-induced insulin resistance. J Clin Invest [Internet]. 2007;117. [cited 2007 Aug 12]. Available from: <http://www.jci.org/cgi/content/full/117/1/246>

### Internetska stranica

Cancer-Pain.org [Internet]. New York: Association of Cancer Online Resources, Inc. c2000-01 [cited 2002 Jul 9]. Available from: <http://www.cancer-pain.org/>.

### Baza podataka na internetu

Who's Certified [Internet]. Evanston (IL): The American Board of Medical Specialists. c2000 [cited 2001 Mart 8]. Available from: <http://www.abms.org/newsearch.asp>

### Softver (program)

Epi Info [kompjutorski program]. Verzija 6. Atlanta, GA. Center for Disease Control and Prevention, 1994.

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### References – examples

*Journal article* (list all authors if there are 5 or less; list the first 3 authors and add et al. if there are 6 or more authors): Smerdelj M, Pečina M, Hašpl M. Surgical treatment of infected knee contracture after war injury. *Acta Med Croatica*. 2000;53:151-5.

#### *Journal supplement*

Djelmiš J, Ivanišević M, Mrzljak A. Sadržaj lipida u placenti trudnica oboljelih od dijabetesa. *Acta Med Croatica*. 2001;55 (Suppl 1):47-9. (in Croatian)

#### *Books and monographs*

Guluyer AY, editor. *Health Indicators. An International Study for the European Science Foundation*. Oxford: M. Robertson, 1983.

#### *Chapter in a book*

Weinstein I, Swartz MN. Pathogenic properties of invading microorganisms. In: Sodeman WA, editor. *Pathologic Physiology: Mechanism of Disease*. Philadelphia: WB Saunders, 1974;457-72.

#### *Doctoral dissertation or MS thesis*

Cigula M. Aktivnosti nekih enzima u humanom serumu kao pokazatelji apsorpcije žive. Doctoral dissertation. Zagreb: School of Medicine, 1987; p. 127. (in Croatian)

#### *Conference paper*

Christensen S, Oppacher F. An analysis of Koza's computational effort statistic for genetic programming. In: Foster JA, Lutton E, Miller J, Ryan C, Tettamanzi AG, editors. *Genetic Programming. EuroGP 2002: Proceedings of the 5<sup>th</sup> European Conference on Genetic Programming*; 2002 Apr 3-5; Kinsdale, Ireland. Berlin: Springer, 2002;182-91.

#### *Article in online journal*

Terauchi Y, Takamoto I, Kubota N. Glucokinase and IRS-2 are required for compensatory beta cell hyperplasia in response to high-fat diet-induced insulin resistance. *J Clin Invest* [Internet]. 2007;117. [cited 2007 Aug 12]. Available from: <http://www.jci.org/cgi/content/full/117/1/246>

#### *Web site*

Cancer-Pain.org [Internet]. New York: Association of Cancer Online Resources, Inc. c2000-01 [cited 2002 Jul 9]. Available from: <http://www.cancer-pain.org/>

#### *Database on the Internet*

Who's Certified [Internet]. Evanston, IL: The American Board of Medical Specialists. c2000 [cited 2001 Mar 8]. Available from: <http://www.abms.org/newsearch.asp>

#### *Software*

Epi Info [computer program]. Version 6. Atlanta, GA: Center for Disease Control and Prevention, 1994.

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