


Zavod za bolesti srca i krvnih žila i Odjel intenzivne kardiologije Kliničke bolnice Dubrava

The Institute for Cardiovascular Diseases and the Department for Intensive Cardiology Care at the University Hospital Dubrava

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SAŽETAK: Prema podacima Svjetske zdravstvene organizacije, kardiovaskularne bolesti vodeći su uzrok smrti i invaliditeta u svijetu. Odjel intenzivne kardiologije u Kliničkoj bolnici Dubrava osnovan je prije 20 godina sa svrhom intenzivnog liječenja i pružanja intenzivne zdravstvene njege vitalno ugroženim kardiološkim bolesnicima. Intenzivna je kardiologija od svojeg osnutka nekoliko puta renovirana i proširena radi poboljšanja pružanja zdravstvene skrbi upravo takvim bolesnicima. Liječenje i zdravstvena skrb zahtijevaju visoko obrazovan stručni tim, kvalitetnu medicinsku opremu i pomagala te preciznu dijagnostiku i kvalitetnu organizaciju rada.

SUMMARY: According to data from the World Health Organization, cardiovascular diseases are the leading cause of mortality and morbidity in the world. The Department for Intensive Cardiology Care at the University Hospital Dubrava was founded 20 years ago with the goal of providing intensive treatment and healthcare to cardiologic patients in mortal danger. The Department for Intensive Cardiology Care has been renovated and expanded several times since its foundation with the goal of improving the healthcare provided to such patients. Their treatment and healthcare require a highly-educated professional team, high-quality medical devices, and precise organization of diagnostics and treatment.

KLJUČNE RIJEČI: kardiovaskularne bolesti, intenzivna kardiologija, intenzivna zdravstvena skrb.

KEYWORDS: cardiovascular diseases, intensive cardiology care, intensive healthcare.

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Povijest

Odjel intenzivne kardiologije – Koronarna jedinica, prvi je put je osnovan u rujnu 1999. godine sa svrhom pružanja intenzivnog liječenja i provođenja intenzivne zdravstvene njege kardioloških bolesnika. Tek otvorena Koronarna jedinica sastojala se od pet bolesničkih postelja u jednoj sobi te od u zasebne sobi s još jednom bolesničkom posteljom u svrhu izolacije. Intenzivnu zdravstvenu skrb i liječenje omogućivali su centralni nadzor (monitoring) za kontinuirano praćenje elektrokardiograma (EKG), mogućnost mjerenja neinvazivnog i invazivnog arterijskog tlaka, hemodinamski monitoring, transportni respirator – Oxylog 1000 (bez aparata za mehaničku ventilaciju), EKG uređaj, generator za privremeni elektrostimulator i dr. Tim za liječenje i zdravstvenu njegu obavljali su jedan specijalist kardiolog, glavna sestra, 2 medicinske sestre više stručne spreme i 5 medicinskih sestara srednje stručne spreme. U vrijeme svojeg postojanja i djelovanja Koronarna se jedinica proširuje i preuređuje, a sve zbog veće potrebe za zdravstvenom njegom i liječenjem kar-

History

The Department for Intensive Cardiology Care – the Coronary Care Unit (CCU) – was first founded in September 1999 with the goal of providing intensive treatment and performing intensive healthcare procedures in cardiologic patients. The CCU initially comprised five patient beds in 1 room and an additional bed in a separate isolation room. Intensive healthcare and treatment were facilitated by a central monitoring system for continuous electrocardiogram (ECG) monitoring, a portable respirator – Oxylog 100 (without a mechanical ventilation device), an ECG device, a generator for temporary pacemakers, etc. The treatment and healthcare team consisted of 1 cardiologist, a head nurse, 2 nursing graduates and 5 nurses with completed vocational nursing schools. Over the course of its existence, the CCU has been expanded and reorganized due to the growing need for medical care and treatment of cardiologic patients. In September 2003 the CCU was transferred to a new and larger location on the 1st floor of the hospital

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dioloških bolesnika. U srpnju 2003. godine Koronarna jedinica premještena je na novi i veći prostor na 1. katu bolnice, uz Laboratorij za kateterizaciju srca. U to doba Koronarna se jedinica sastojala od 1 sobe sa 7 bolesničkih postelja, a uz nju se otvara Postkoronarna jedinica s još 6 bolesničkih postelja. Uz Laboratorij za kateterizaciju srca otvorena je angiosala za ugradnju trajnih elektrostimulatora srca s radiološkim aparatom.

Zdravstvena njega i liječenje unaprijeđeni kvalitetnijom i opsežnijom medicinskom opremom kao što su centralni nadzor (monitoring) i kontinuirano praćenje EKG-a s audiovizualnim i tekstnim zapisom, 2 aparata za mehaničku ventilaciju EVITA 4, 1 transportni respirator – Oxylog 3000, 1 ehokardiografski aparat s transezofagealnom sondom, prijenosni pulsni oksimetar, infuzomati, perfuzori, grijač za krv, I-stat analizador krvi, CTNI-analizador krvi, grijač bolesnika, aspiratori, defibrilator – Lifepak 15, telemetrije (postkoronarna), aparat za izvantjelesnu membransku oksigenaciju (ECMO), intraaortalna balonska crpka (angiosala). Zbog potrebe za većim brojem osoblja liječenje provode 4 specijalista kardiologa uz asistenciju specijaliziranih kardiologije, glavna medicinska sestra i uz nju 1 prvostupnica sestrinstva te 18 medicinskih sestara srednje stručne spreme. Godine 2014. zatvara se Postkoronarna jedinica i sala za ugradnju elektrostimulatora. Koronarna jedinica tada se sastojala od jedne sobe sa 7 bolesničkih postelja.

Funkcija i organizacija rada Odjela intenzivne kardiologije

Ustroj Zavoda za bolesti srca i krvnih žila čine: **Kardiologija I** – Odjel intenzivne kardiologije; **Kardiologija II** – Odjel za ishemijsku bolest srca i elektrostimulaciju s laboratorijem za invazivnu dijagnostiku i liječenje; **Kardiologija III** – Odjel za bolesti krvnih žila i srčanih zalistaka; **Kardiologija IV** – Odjel za kardiomiopatije, zatajivanje srca i transplantacijsku kardiologiju; Dijagnostički odjel za ehokardiografiju i neinvazivnu kardiološku dijagnostiku s Dnevnom bolnicom; Poliklinička djelatnost.

Na Zavodu se godišnje hospitalizira oko 4100 bolesnika, izvede se više od 1600 koronarografija, 870 intervencija na koronarnim arterijama, 45 perkutanih koronarnih intervencija (PCI) kronične potpune okluzije (CTO), 18 rotablacija, implantira se više od 300 trajnih elektrostimulatora srca (od toga 18 ugradbenih kardioverterskih defibrilatora, 8 uređaja za resinkronizacijsku terapiju). Od neinvazivne kardiološke dijagnostike obavi više od 4300 postupaka 24-satnog snimanja EKG-a, 3200 ergometrija, oko 3145 ehokardiografskih pregleda, 13 074 ambulantna pregleda te oko 2500 pregleda i obrada u Dnevnoj bolnici.

Na Odjelu intenzivne kardiologije na godišnjoj razini se zaprimi oko 950 bolesnika. Godine 2018. primljeno je 450 bolesnika s dijagnozom akutnog infarkta miokarda u kojih je obavljena hitna intervencija na koronarnim arterijama. Više od 60 zaprimljenih bolesnika bili su mehanički ventilirani, postavljeno je više od 150 centralnih venskih katetera, a vensko-arterijska izvantjelesna membranska oksigenacija primijenjena je u 4 bolesnika.

Dijagnoze koje zahtijevaju hitan prijam bolesnika u Koronarnu jedinicu jesu akutni infarkt miokarda, plućni edem, plućna embolija, akutno zatajivanje srca, disekcija aorte, paroksizmalni poremećaji ritma i frekvencije, infektivne bolesti srca. Zavod za bolesti srca i krvnih žila jedini je zavod u Kliničkoj bolnici Dubrava u kojemu dežurni liječnici i medicinske sestre provode postupke reanimacije bez anesteziološke pomoći.

next to the Laboratory for Heart Catheterization. At the time the CCU consisted of 1 room with 7 patient beds, and the Postcoronary Unit was opened next to it with 6 additional patient beds. An angiography procedure room for implantation of permanent pacemakers with a radiological device was also opened next to the Laboratory for Heart Catheterization.

Healthcare and treatment have been improved by the acquisition of additional and higher-quality medical equipment including central monitoring and continuous ECG with audio-visual and text data, two EVITA 4 devices for mechanical ventilation, 1 transportable respirator – Oxylog 3000, 1 echocardiography device with a transeophageal probe, a portable pulse oximeter, infusion pumps, perfusion devices, fluid warmers, an i-Stat blood analyzer, CTNI blood analyzer, patient heater, aspirators, a defibrillator – Lifepak 15, telemetry devices (postcoronary), an extracorporeal membrane oxygenation (ECMO) device, and an intra-aortic balloon pump (angiography procedure room). Due to the need for more personnel, the treatment was conducted by 4 cardiologists assisted by a cardiology resident, a head nurse, a nurse with a bachelor's degree in nursing, and 18 nurses with a vocational school degree. The Postcoronary Unit and the pacemaker implantation hall were shut down in 2014. At the time, the CCU comprised 1 room with 7 patient beds.

Function and activity of the Department for Intensive Cardiology Care

The Institute for Cardiovascular Diseases is organized as follows: **Cardiology 1** – Department for Intensive Cardiology Care; **Cardiology 2** – Department for Ischemic Heart Diseases and Pacemaker Implantation with a Laboratory for Invasive Diagnostics and Treatment; **Cardiology 3** – Department for Vascular and Cardiac Valve Diseases; **Cardiology 4** – Department for Cardiomyopathy, Heart Failure, and Transplantation Cardiology; Diagnostic Department for Echocardiography and Non-invasive Cardiological Diagnostics with a Day Hospital; Polyclinic.

The Institute hospitalizes about 4100 patients annually, which includes performing over 1600 coronarographies, 870 interventions on coronary arteries, 45 percutaneous coronary interventions (PCIs) for chronic total occlusion (CTO), 18 rotablation procedures, and more than 300 permanent pacemaker implantations (of which 18 implantable cardioverter defibrillators and 8 resynchronization therapy devices). Noninvasive cardiological diagnostics performed annually include over 4300 24-hour ECG monitoring procedures, 3200 exercise stress test procedures, approximately 3145 echocardiography examinations, 13 074 clinical examinations, and approximately 2500 examinations and patients processing procedures at the Day Hospital.

The Department for Intensive Cardiology Care treats about 950 patients annually. In 2018 it admitted 450 patients with a diagnosis of acute myocardial infarction, for which emergency interventions on the coronary arteries were performed. Over 60 of the patients underwent mechanical ventilation, approximately 150 central venous catheters were implanted, and extracorporeal membrane oxygenation was applied in 4 patients.

Diagnoses that require emergency admission to the CCU are acute myocardial infarction, pulmonary edema, pulmonary embolism, acute heart failure, aortic dissection, paroxysmal rhythm and frequency disturbances, and infectious heart diseases. The Institute for Cardiovascular Diseases is the only institute in the University Hospital Dubrava at which the on-

Medicinske sestre koje provode zdravstvenu njegu u Koronarnoj jedinici stručno su obrazovane za postupke reanimacije, ali i za razumijevanje zapisa EKG-a te prepoznavanje poremećaja i odstupanja od normale u zapisu EKG-a. Specifikacije u provođenju zdravstvene njege u Koronarnoj jedinici obuhvaćaju pripremu bolesnika za invazivnu obradu (koronarografija/hitna PCI, PCI CTO, transkateterska implantacija aortalnog zalistka, ugradnja kardiovaskularnih implantabilnih uređaja i dr.). Među specifičnosti još ubrajamo zbrinjavanje bolesnika nakon invazivne obrade, ali i nastalih komplikacija, zatim zdravstvenu njegu bolesnika s transplantacijom, zdravstvena njega bolesnika s ECMO aparatom, zdravstvena njega bolesnika s mehaničkom cirkulacijskom potporom lijevoj klijetki, zdravstvena njega bolesnika s elektrostimulatorom, primjena vazoaktivnih lijekova i visokih doza antikoagulantne ili trombolitičke terapije, asistiranje i zbrinjavanje bolesnika pri izvođenju perikardiocenteze, pleuralne punkcije, postavljanje torakalnog drena, uvođenja centralnoga venskog katetera, dijaliznog katetera.

Uz tim medicinskih sestara i liječnika intenzivne kardiologije neizostavna je suradnja s drugim specijalizacijama kao što su kardiotorakalna kirurgija, zatim vaskularna kirurgija u bolesnika s tromboembolijama u vezi s primjenom alteplaze ili s timom perfuzije u zbrinjavanju bolesnika s ECMO aparatom. Od suradnje s drugim bolničkim ustanovama valja istaknuti Opću bolnicu Koprivnica i Županijsku bolnicu Čakovec s kojima KB Dubrava čini prsten te pokriva hitne slučajeve, odnosno bolesnike s akutnim infarktom miokarda ili bolesnike kojima je za liječenje potrebna kompleksna invazivna obrada koju omogućuje Laboratorij za kateterizaciju srca.

Sadašnjost

U studenome 2018. godine projektom Europske unije dodijeljena su bespovratna sredstva Kliničkoj bolnici Dubrava, pa se stoga se u lipnju 2019. otvara novi prostor Odjela intenzivne kardiologije koji se sastoji od jedne sobe sa 6 bolesničkih postelja (**slika 1, slika 2**) i još dviju sa jednom posteljom u svrhu

call physicians and nurses perform reanimation procedures without anesthesiological assistance.

Nurses conducting treatment and care at the CCU are trained in reanimation procedures as well as in ECG analysis and recognizing signs of disorders and deviation from the norm in ECG results. The specifications for conducting treatment at the CCU include preparing patients for invasive processing (coronagraphy/emergency PCI, PCI CTO, transcatheter aortic valve implantation, implantation of cardiovascular devices, etc.). Duties also include care for patients after invasive processing or after resultant complications, care for transplant patients, patients with ECMO devices, and patients with left ventricular assist devices, care for patients with pacemakers, application of vasoactive drugs and high doses of anticoagulation or thrombolytic therapy, and assisting and caring for patients undergoing pericardiocentesis, thoracocentesis, chest drains, central venous catheter implantation, and dialysis catheter implantation.

The team of nurses and intensive cardiology specialists also cooperates with other specializations such as cardiothoracic surgery, vascular surgery specialists for patients with thromboembolism in order to apply alteplase, or the perfusion team for treatment with an ECMO device. Regarding cooperation with other hospital institutions, the Koprivnica General Hospital and Čakovec County Hospital deserve special mention since they form a ring together with University Hospital Dubrava which covers emergencies, i.e. patients with acute myocardial infarction or patients that require complex invasive processing made possible by the Laboratory for Heart Catheterization.

Current status

In November 2018, Dubrava hospital received a non-refundable grant from an EU project, which resulted in the opening of a new space for the Department for Intensive Cardiology Care in June 2019 which consisted of 1 room with 6 patient beds (**Figure 1, Figure 2**) and 2 more rooms with a single bed



FIGURE 1. The Department for Intensive Cardiology Care at the University Hospital Dubrava.



FIGURE 2. Patient area.



FIGURE 3. Single-bed isolation room.

izolacije na principu negativnog tlaka (**slika 3**). Novi su prostori uređeni i opremljeni visokokvalitetnim uređajima, medicinskom opremom te pomagalima za pružanje kvalitetnije i preciznije zdravstvene skrbi. Nabava nove dodatne opreme omogućuje i olakšava liječenje i zdravstvenu njegu, ali isto tako i dijagnostiku kardioloških bolesnika.

Medicinske sestre prolaze tečaj za rad s novom medicinskom opremom i pomagalima kao što su Dräger zidni sustav opskrbi stupovi, Infinity AcuteCare sustav – monitoring, Infinity PICCO SmartPod, CNAP sensor, etCO2Microstream SmartPod, stropni podizač bolesnika – Guldmann, respirator Evita 5, Oxylog 3000 plus, Defibrilatori Lifepak 20 i novi UZV aparat, Fresenius Kabi Aqila perfuzori i infuzomati, Dräger telemetrijski sustav za Dnevnu bolnicu.

Liječenje obavljaju dva specijalista kardiologije i specijalizanti kardiologije u asistenciji. Zdravstvenu njegu, uz glavnu odjelnu sestru, provodi još 1 prvostupnica sestrinstva i 16 medicinskih sestara srednje stručne spreme. Uz novi Odjel intenzivne medicine otvara se i novi Laboratorij za elektrofiziologiju opremljen Philipsovim angiografskim aparatom te novi prostor za Dnevnu bolnicu Zavoda za bolesti srca i krvnih žila. U tijeku su obnova i opremanje postojeće sale za invazivnu obradu i liječenje. Nedugo nakon otvorenja novih prostora Koronarna jedinica i Laboratorij za kateterizaciju srca proslavit će 20 godina svojega postojanja.

for negative pressure isolation (**Figure 3**). The new spaces were equipped with high-quality equipment and medical devices in order to provide improved and more precise medical treatment. The acquisition of additional gear allows and facilitates treatment and care as well as the diagnosis of cardiovascular patients.

Nurses must also undergo a training program for the new medical equipment such as the Dräger wall-mounted supply units, the Infinity AcuteCare system – monitoring, the Infinity PICCO SmartPod, CNAP sensor, etCO2Microstream SmartPod, a ceiling patient lift – Guldmann, Evita 5 respirator, Oxylog 3000 plus, the Lifepak 20 defibrillator and new ultrasound device, Fresenius Kabi Aqila perfusion and infusion pumps, and the Dräger telemetry system for the Day Hospital.

Treatment is performed by 2 cardiologists assisted by cardiology residents. Patient care is provided by the head nurse as well as 1 nurse with a bachelor's degree in nursing and 16 nurses with nursing vocational school degrees. A new Laboratory for Electrophysiology equipped with a Philips angiography device is also being opened, as well as a new space for the Day Hospital of the Department for Cardiovascular Diseases. The existing hall for invasive processing and treatment is also being renovated and equipped. The CCU and Laboratory for Laboratory for Heart Catheterization will celebrate their 20th founding anniversary soon after these new spaces are opened.