

## STROKE UNIT – WHERE ALL STROKE PATIENTS SHOULD BE TREATED

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**SUMMARY** – Acute stroke is one of the leading causes of morbidity and mortality worldwide, and as the most important cause of morbidity and long-term disability imposes an enormous economic burden. Stroke units (SU) are an effective option to fight stroke. According to the European Stroke Organization, SU should provide coordinated multidisciplinary care provided by medical personnel specialized in stroke care. Helsingborg declaration from 1995 urged for organized management of acute stroke in order to reduce mortality below 20% (SU for all stroke patients) and to achieve independency in more than 70% of 3-month stroke survivors. At the beginning of 2001, the first Croatian SU was established at Sestre milosrdnice University Hospital in Zagreb as a hospital ward with dedicated multidisciplinary stroke team consisting of neurologists specialized in the management of cerebrovascular disease, trained nurses and rehabilitation personnel, together with other professionals to enable treatment of stroke patients according to current guidelines.

**Key words:** *Stroke therapy; Intensive care units – trends; Intensive care units – utilization; Cerebrovascular disorders – therapy*

Acute stroke is one of the leading factors of morbidity and mortality worldwide and as the most important cause of morbidity and long-term disability imposes an enormous economic burden. Stroke Units (SU) are an effective tool to fight stroke. According to the European Stroke Organization (ESO), SU should provide coordinated multidisciplinary care offered by medical, nursing and therapy staff specialized in stroke care. Helsingborg declaration from 1995 urged for organized management of acute stroke in order to reduce mortality below 20% (stroke units for all stroke patients) and to achieve independency of more than 70% of stroke survivors after 3 months.

Stroke patient needs a chain of recovery. Since it is widely known that 'time is brain', stroke neurologists

concentrate their efforts and organize their services on shortening the time from stroke onset to the treatment. Such organized stroke services include emergency call center (94 or 112), prehospital care (EMS), emergency room (ER), stroke units (SU), rehabilitation, and finally secondary prevention.

SU is a hospital unit that exclusively takes care of stroke patients. SU are characterized by specifically trained staff and a multidisciplinary approach to treatment and care. The disciplines representing the 'core' of the SU multidisciplinary team are medical, nursing, physiotherapy, occupational therapy, speech and language therapy, and social work. Other professionals that may have a role in the management of an acute stroke patient are (interventional) neuroradiologist, neurosurgeon, vascular surgeon, ophthalmologist, audiologist, rheumatologist, psychiatrist, clinical psychologist, dietitian, dentist, and chaplain.

A well stuffed and equipped SU should have dedicated beds for stroke patients, dedicated team consist-

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ing of stroke physicians, trained nurses and rehabilitation staff, immediate imaging 24/7 (CT/MR), written protocols and pathways for diagnostic procedures, acute treatment, monitoring to prevent complications and secondary prevention; further on, it is necessary to have availability of neurosurgery, vascular surgery, interventional neuroradiology and cardiology as well as the possibility to start mobilization immediately, access to early rehabilitation, and finally continuing staff education.

According to evidence based medicine (EBM), SU *vs.* conventional care brings reduction in one-year mortality, reduction in death and dependency, and reduction in death and institutional care. These benefits are not limited to any subgroup according to sex, age or stroke severity. Treatment of patients with ischemic stroke at SU significantly reduces mortality, disability and need of institutional care compared with treatment at general medical wards.

There are different types of SU: intensive care units and acute SU (acute stroke treatment 2-3 days and <1 week, typical for Central European countries like Austria, Germany, Croatia,...); comprehensive, i.e. combined acute and rehabilitation SU (acute phase + rehabilitation for several weeks, characteristic of northern European type like in Norway, Sweden, UK, ...); rehabilitation SU (admission 1 or 2 weeks of stroke onset); and mobile stroke team (offers stroke care and treatment at a variety of wards). Intensive care units are dedicated SU with facilities like ventilators and intensive and nonintensive monitoring. The units are focused on very acute care for a selected group of acute stroke patients and have little focus on rehabilitation. Acute SU provide acute care for patients but discharge them early (usually within 7 days) and have no or at best a modest focus on rehabilitation, they do not implement intensive care facilities but usually have facilities for noninvasive monitoring of vital signs. Combined acute-rehabilitation SU accepts stroke patients for acute treatment combined with early mobilization and rehabilitation for a period of at least 1-2 weeks. Mobile stroke team is established for hospitals where SU is not available, consisting of different professionals that treat stroke patients throughout the hospital wherever the patients may be. The combined acute-rehabilitation SU have shown best results.

The main indication for admission to acute SU is acute stroke with symptoms manifesting for less

than 24 hours, unstable stroke or stroke with progressive neurologic deficit, demand for specific therapy (thrombolysis) and need of early rehabilitation.

The favorable results recorded at SU probably are due to the fact that the needs of acute stroke patients can be met across different stages of the disease. A well organized SU should meet all stroke patient needs during the emergency, acute and subacute stages of the disease. During the emergency stage within the first 6-12 h of stroke onset, focus should be on the diagnosis and reduction of brain injury. In the acute stage from 12 to 72 h, focus should be on complication prevention, early mobilization, and start of rehabilitation. In the subacute stage, from day 3 to day 14, the care is focused on rehabilitation combined with prevention of complications as well as prevention of new strokes and other vascular events.

The acute stroke treatment at SU includes acute care and monitoring, medical assessment, medical history and examination (biochemistry, hematology), ECG, CT scanning and some selective examinations like carotid Doppler US and echocardiography. Early management includes medical assessment and ongoing rehabilitation. Medical assessment includes careful management of fluid balance, blood pressure, glucose metabolism, body temperature, adequate oxygenation and treatment of infections. Continuous monitoring is needed for heart rate, breathing rate and O<sub>2</sub> saturation, and discontinuous monitoring for blood pressure, blood glucose, vigilance (GCS), pupils, and neurologic status (NIH stroke scale). Nursing assessment includes early mobilization, careful positioning and handling, pressure area care, and avoiding urinary catheters. It is also necessary to include early involvement of rehabilitation. Finally, there has to be a discharge plan and last but not the least, successful cooperation with primary health care.

An efficient SU should provide, when compared with general ward care, evidence of reduced in-hospital mortality, less residual disability in survivors, and shorter hospital stay.

At Sestre milosrdnice University Hospital in Zagreb, the first Croatian Stroke Unit was implemented at the beginning of the year 2001 as a hospital ward with 10 beds and a dedicated multidisciplinary stroke team consisting of neurologists specialized in the management of cerebrovascular disease, trained nurses and rehabilitation staff, together with other profes-

sionals to enable treatment of stroke patients according to current guidelines. Our follow up results (to be published soon) showed that implementation of SU at our neurology department was associated with significant reduction of stroke related in-hospital fatality rate, strongly suggesting that development of SU network in Croatia should be given priority in the overall health management.

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## Sažetak

## JEDINICA ZA LIJEČENJE MOŽDANOG UDARA – MJESTO GDJE BI SE TREBALI LIJEČITI SVI BOLESNICI S MOŽDANIM UDAROM

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Moždani udar je jedan od glavnih uzroka pobola i smrtnosti u razvijenom svijetu, ali i vodeći uzrok invaliditeta. Jedinice za liječenje moždanog udara (JLMU) su dokazano učinkovit način u liječenju moždanog udara i to snižavanjem smrtnosti i zaostalog invaliditeta. Prema European Stroke Organization, JLMU bi trebale pružiti koordiniranu i multidisciplinarnu skrb s timom specijaliziranim za liječenje moždanog udara. Deklaracija iz Helsingborge 1995. godine pozvala je na organiziran pristup liječenju akutnog moždanog udara (JLMU za sve bolesnike s akutnim moždanim udarom) radi snižavanja smrtnosti ispod 20% i postizanja neovisnosti kod više od 70% bolesnika preživjelih 3 mjeseca nakon moždanog udara. Godine 2001. u okviru Klinike za neurologiju KB "Sestre milosrdnice" u Zagrebu osnovana je prva hrvatska JLMU s multidisciplinarnim timom koji se sastoji od neurologa specijaliziranih u liječenju cerebrovaskularne bolesti, primjereno obrazovanih medicinskih sestara i fizioterapeuta zajedno s drugim stručnjacima, što omogućava liječenje bolesnika s moždanim udarom prema današnjim smjernicama.

Key words: *Liječenje moždanog udara; Jedinice intenzivne skrbi – trendovi; Jedinice intenzivne skrbi – upotreba; Cerebrovaskularne bolesti – terapija*