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How to Reduce the Burden of Stroke

Reducing the burden of stroke is a complex issue, and there is some contention as to the best approach in identifying and treating patients at risk. Markku Kaste, MD, PhD, University of Helsinki, Finland, discussed possible strategies of stroke prevention and treatment.

Prof. Kaste favors the population approach in order to identify patients with low or medium risk (in addition to those at high risk) for stroke who benefit from primary preventative measures. This approach has been shown to have a major impact on the burden of stroke. No risk stratification method or treatment is 100% effective. "Doctors are trained to diagnose and treat patients with high risk of stroke. Even in optimal care of them, we are only able to reduce 15% of total stroke, which stresses the importance of primary prevention," said Prof. Kaste.

"Chain of recovery is important. However, the chain of recovery is only as strong as its weakest link," said Prof. Kaste. Acute stroke patients should be transported quickly to a well-organized stroke unit whenever possible, as treatment in specialized stroke units is associated with better short-term and long-term outcomes compared with routine medical departments [Kaste M et al. *Stroke* 1995; Inderdavik B et al. *Stroke* 1999]. Based on data from a study in Europe, only 14% of stroke patients in Europe are admitted to stroke units, and <10% of European hospitals that admit acute stroke patients have optimal facilities (Table 1) [Leys D et al. *Stroke* 2007].

Table 1. Breakdown of the Different Types of Hospitals Per Country.

Country	n	p/y	n≤50	CSC	PSC	AHW	None (%)
Austria	12	295 (50–800)	1	1	1	3	7 (58)
Belgium	9	200 (70–2000)	0	0	1	5	3 (33)
Czech Republic	15	400 (170–600)	0	2	0	9	4 (27)
Denmark	8	400 (180–1500)	0	0	0	5	3 (38)
Estonia	6	190 (40–710)	1	0	0	1	5 (83)
Finland	8	385 (130–1600)	0	0	2	5	1 (13)
France	121	200 (2–3000)	20	0	2	22	97 (80)
Germany	166	250 (12–1400)	10	12	7	89	58 (35)
Greece	17	200 (60–500)	0	1	0	1	15 (88)
Hungary	15	600 (100–1600)	0	0	2	9	4 (27)
Ireland	6	175 (50–400)	1	0	0	3	3 (50)
Italy	116	300 (3–1200)	4	4	3	40	69 (59)
Latvia	11	145 (21–450)	2	0	0	3	8 (73)
Lithuania	11	228 (120–1500)	0	0	0	4	7 (64)
Luxembourg	2	350 (250–350)	0	0	2	0	0 (0)
Netherlands	20	265 (50–900)	1	0	6	10	4 (20)
Norway	8	450 (80–600)	0	0	0	5	3 (38)
Poland	78	400 (10–1600)	4	1	2	31	44 (56)
Portugal	16	500 (200–922)	0	0	0	4	12 (75)
Slovakia	8	503 (300–960)	0	0	1	3	4 (50)
Slovenia	3	350 (200–650)	0	0	0	1	2 (66)
Spain	86	350 (25–1434)	7	5	2	35	44 (51)
Sweden	14	425 (100–1200)	0	1	1	10	2 (14)
Switzerland	11	120 (3–400)	4	3	0	2	6 (55)
United Kingdom	119	400 (6–1400)	5	13	0	56	50 (42)

CSC, PSC, AHW indicates number of hospitals meeting criteria for comprehensive stroke center, primary stroke center, and any hospital ward treating stroke patients; n, number of participating hospitals; n≤50, number of hospitals treating <50 patients per year in routine; None, hospitals not meeting criteria for comprehensive stroke center, primary stroke center, and any hospital ward treating stroke patients; p/y, median number of patients treated per year (range).

As we have already learned, time to thrombolysis is imperative [The ATLANTIS, ECASS, and NINDS r-tPA Study Group Investigators. *Lancet* 2004; SITS Investigators. *Stroke* 2008; SITS Investigators. *Stroke* 2009]. In past years, Prof. Kaste has seen a growth in thrombolysis rates within his hospital, and this trend continues. Last year, 276 stroke patients received thrombolysis in the neurological emergency room of his hospital. Twenty-eight percent of these patients were treated within 90 minutes of symptom onset. This is an indication of where stroke treatment is headed. Telemedicine is also provided for smaller hospitals, because it is more effective to transfer thrombolysis "know-how" than stroke patients, noted Prof. Kaste.

For optimal care to be provided, education, training, and up-to-date guidelines (both national and international) are necessary. Education must also include population-based education. Incorporating symptom recognition, how to act in a case of acute stroke, and risk information in the media setting to educate laypeople will have a huge impact on the burden of stroke.

Evidence-based information regarding the prevention and treatment of acute stroke is readily available, so it is time to transfer that knowledge into clinical practice, concluded Prof. Kaste. Wherever data are missing, it is our responsibility as clinicians to seek out new information and fill in the gaps. More readily available stroke units and faster response times will also contribute to better stroke outcomes in the future.

Stroke Prevention Among the Young with Heart Disease: Controversies in the Use of Antithrombotic Therapy

The neurodevelopmental sequelae of congenital heart disease (CHD) and its treatment are likely to limit the ultimate educational achievements, employability, insurability, and quality of life for these children, said J. William Gaynor, MD, Children's Hospital of Philadelphia, PA. The effects include cognitive deficits, such as a short attention span, delays in the development of motor skills, speech, and language; and impaired social competency and executive functions.

Children with CHD are at risk for stroke before and after surgery and even later in life. The frequency of vaso-occlusive stroke in children with CHD who undergo cardiac surgery is 5.4 cases per 1000 children. Age, duration of bypass, and reoperation may be associated with stroke risk [Domi T et al. *Pediatrics* 2008]. There remains an unmet need for data that concern the long-term prevalence of or specific risk factors for stroke, as well preventative therapies in the CHD population, concluded Dr. Gaynor.

The issue of whether to use antithrombotic therapy for stroke prevention in children with CHD remains unanswered due to a lack of data, said Fenella J. Kirkham, MD, UCL Institute of Child Health, University College London, London, UK. However, there is a 6-fold increased risk of stroke for these children compared with the general population [Fox C. 2010 unpublished]. According to Prof. Kirkham, although primary prevention may be difficult, we may be able to prevent recurrence if we understand the mechanisms, which include primary arterial disease, such as dissection and moyamoya, and cerebral sinovenous thrombosis, as well as embolus. Appropriate management of risk factors is then possible.

For all children with arterial ischemic stroke, including those with cardiac disease, the risk of clinical recurrence is increased in children with moyamoya and other vasculopathies and in those with genetic thrombophilia and raised lipoprotein (a) (Table 1).

Table 1. Multivariate Cox Regression for Risk of Recurrent Stroke in AIS.

Risk factor	Hazard ratio	CI for ratio	p value
Vasculopathy	3.1	1.9 to 4.9	0.001
Single prothrombotic	2.0	1.2 to 3.4	0.005
Raised Lp (a)	2.2	1.1 to 4.4	0.03

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Recurrent thromboembolism in neonates is very low and occurs in the first year of life (Figure 1) [Gunther G et al. *Stroke* 2000]. Risk factors for recurrent sinovenous thrombosis include older age, presence of thrombophilia, and failure to recanalize affected venous sinuses. The current guidelines allow for anticoagulation of these patients. Prof. Kirkham is less inclined to use anticoagulation except in these children. She suggests the use of aspirin but would also exclude or treat iron deficiency. She cautions that before beginning therapy, it is important to fully investigate the patient.

There is a reasonably well-established link between patent foramen ovale (PFO) and cryptogenic stroke in young patients, according to Steven Messé, MD, Hospital of the University of Pennsylvania, Philadelphia, PA. However, the risk of recurrent stroke is relatively low (~1.5% per year on aspirin), while percutaneous PFO closure is expensive, has