

# Organizational issues in stroke treatment: The Swiss paradigm - Stroke units

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## ABSTRACT

Stroke represents the leading cause of acquired disability in adults and poses a tremendous socioeconomic burden both on patients and the society. In this sense, prompt diagnosis and urgent treatment are needed in order to radically reduce the devastating consequences of this disease. Herein the authors present the new guidelines recently adopted by the Swiss Stroke Society concerning the establishment of stroke units. Standardized treatment and allocation protocols along with an acute rehabilitation concept seem to be the core of the Swiss stroke management system. Coordinated multidisciplinary care provided by specialized medical, nursing and therapy staff is of utmost importance for achieving a significant dependency and death reduction. It is believed that the implementation of these guidelines in the stroke care system would be beneficial not only for the stroke patients, but also for the health system.

**Key words:** Guidelines, organization, stroke, stroke centers, stroke units, Switzerland

## Introduction

Stroke is one of the major causes of death in industrialized countries. It is the leading cause of acquired disability in adults and has a tremendous socioeconomic impact on patients, their relatives and health systems.<sup>[1]</sup>

In Switzerland, the incidence of stroke has been estimated to be 150/100,000 (year 2000).<sup>[2]</sup> In 2004, the overall stroke event rate was 296.3/100,000 (287.7/100,000 in women, and 305.6/100,000 in men). The age-standardized event rate was 146/100,000 overall.<sup>[3]</sup> During the same year, the age-standardized mortality rate was significantly higher for men (31.4/100,000) than for women (25.6/100,000).<sup>[3]</sup>

Acute stroke care provided by Stroke Units (SU) has been found to be more costly but also more cost-effective than conventional care.<sup>[4-6]</sup> For example, Epifanov *et al.*, reported a mean cost of \$3,200 (USD) for ischemic stroke patients. In comparison with care provided in regular

neurological wards, this amount corresponds to a 7% increase of the mean cost per admission.<sup>[7]</sup> However, the modified Rankin scale was improved and post-acute inpatient costs were decreased.

The scope of this article is to illustrate the guidelines for establishing SU as these have been recently (2012) proposed by the Swiss Stroke Society.<sup>[8]</sup> These guidelines could be applicable not only in developed but also in developing countries worldwide, given sufficient resources.

## Stroke Units versus Stroke Centers

According to the Swiss Stroke Society, a distinction is to be made between SU and Stroke Centers (SC).<sup>[8]</sup> A SU is effective for all grades and all age groups of patients with stroke. It is equipped with monitored and non-monitored treatment beds. On the other hand, a SC comprises a SU and extends the concept of SU to specific structural, neuroradiological and neurosurgical services. The following section is devoted to SU organization.

## The Swiss Guidelines Concerning Stroke Units

The requirements are divided into seven categories.<sup>[8]</sup> Time requirements apply after arrival at the SU.

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1. Personnel:
  - a. Medical:
    - i. 10-hour presence of a Neurologist in the hospital during the day. At night and on weekends call service available (a consultant neurologist present within 35 minutes).
    - ii. The medical director is a neurologist with proven expertise in stroke treatment and at least 2 years of experience in cerebrovascular diseases.
    - iii. Neurologist with proven expertise in neurosonology and treatment of cerebrovascular diseases.
    - iv. Physician with at least 2 years training/work in a neurorehabilitation department.
    - v. Internist available in the institution on a 24/7 basis (24/7).
    - vi. Cardiologist at the bedside (<60 minutes).
  - b. Nursing:
    - i. Specialized in stroke (24/7).
  - c. Therapy:
    - i. Physiotherapists: Onset of therapeutic interventions within 24 hours, at least one treatment session per day (weekends included).
    - ii. Occupational and speech therapists: Onset of therapeutic interventions within a day (Monday-Friday) in case of deficits, considering the therapeutic requirements (ability of the patient to cooperate, clinically stable state).
    - iii. Social workers: Interventions that allow the patient to participate in social life and achieve the greatest possible independence in everyday life.
2. Diagnostic modalities:
  - a. Brain computed tomography (spiral CT) or magnetic resonance imaging (MRI) (visualization of head and neck arteries) within 25 minutes.
  - b. Systematized and documented swallowing evaluation (24/7) possible.
  - c. Neurosonological investigation (extra-/transcranial) available within 24 hours.
  - d. Implementation of cerebral angiography in cooperation with a SC (24/7).
  - e. Etiologic diagnosis and differential diagnosis of stroke (e.g., transesophageal echocardiography, hemostasis, electroencephalography) within the institution.
  - f. Neuropsychological investigation within two working days possible.
3. Monitoring:
  - a. 24/7 control (in monitored beds) of electrocardiogram (ECG), oxygen saturation, temperature, blood pressure, pulse, respiration, glucose (blood pressure measurements performed in a minimum of 15-minute intervals).
  - b. Control (in non-monitored beds) of ECG, oxygen saturation, temperature, blood pressure, pulse, respiration, glucose (up to 4-hourly).
  - c. At least 6-hourly monitoring of neurological findings (early detection of stroke progression, relapse, and other complications). After acute interventions: More frequent monitoring.
4. Specific acute treatment:
  - a. Immediate availability of intravenous thrombolytic therapy (24/7) (the Neurologist is responsible for the indications and the administration of thrombolysis).
  - b. Emergency neurosurgical and interventional neuroradiological interventions by Neurosurgeons and Radiologists (diagnostic and invasive neuroradiology or equivalent expertise). Transfer in 60 minutes according to a written agreement between the SU and the SC.
  - c. Carotid endarterectomy by qualified surgeons (neuro- or vascular surgeons) within 24 hours in their own center or in a SC.
5. Infrastructure:
  - a. Locally defined unit (SU) for stroke patients and treatment-defined path.
  - b. Minimum total number of beds: 6.
  - c. Minimum number of monitored beds for acute stroke patients in a certain locally defined unit: 3.
  - d. Non-monitored beds for acute stroke patients in a certain locally defined unit: 3.
  - e. Minimum number of admissions or evaluations of acute stroke patients per year (further transfers from SU to SC are also considered): 200.
  - f. Minimum number of acute thrombolyses or endovascular treatments per year: 20.
  - g. Available and sufficiently staffed emergency department within the institution.
  - h. Recognized multidisciplinary intensive care unit within the institution with invasive and non-invasive ventilation options.
  - i. Outpatients' consultation availability by a neurologist with proven expertise in stroke treatment. Alternatively, this is done in a SC or in a SU by a SC doctor.
6. Processes and quality assurance:
  - a. Standardized treatment and allocation protocols in coordination with local emergency services, acute care hospitals and other SU/SC.
  - b. The SC or the SU physician is responsible for the beds' disposal/planning.

- c. Acute rehabilitation concept (early initial assessment and rehabilitation within the acute care environment).
  - d. Swallow concept.
  - e. Collaboration with neurorehabilitation.
  - f. Defined treatment protocols and patient pathways for diagnosis, treatment, care, early rehabilitation, prevention, and transition to rehabilitation.
  - g. Stroke register.
  - h. Documentation of quantifiable quality indicators.
7. Training and research:
- a. Further education and training programs concerning stroke patients.

## Conclusions

Standardized treatment and allocation protocols along with an acute rehabilitation concept seem to be the core of the Swiss stroke management system. Coordinated multidisciplinary care provided by specialized medical, nursing, and therapy staff is of utmost importance for achieving a significant reduction of dependency or death. To this end, the Swiss paradigm of SU organization could serve as a benchmark for future health policy decisions.

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