

# STROKE UNITS AND STROKE CARE



# INTRODUCTION

## STROKE UNIT DEFINITION:

A specialized ward designated for acute stroke patients with continuous monitoring of vital parameters with a multidisciplinary team approach including specialist nursing staff.

Stroke is one of the leading causes of death and disability worldwide. About one third of patients die from stroke, one third will live with more or less severe impairments and about one third of patients can recover from stroke completely. The best chances for recovery from stroke are given when patients will be treated in stroke units. However only 30% of patients with acute stroke get treatment in stroke units in Europe and much less in low and middle income countries across the world.

Stroke units have already been established since the 1980s at first in Scandinavian countries and since the 1990s in the Anglo-Saxon countries and Germany. Stroke units are specialized centers with dedicated beds, offering a multidisciplinary treatment of strokes by dedicated stroke teams addressing the acute treatment as well as early rehabilitation and secondary prevention.

## The goals of stroke units are:

- To continuously monitor parameters such as **ECG, heart rate, blood pressure, respiration, oxygen saturation, temperature and glucose**, in order to prevent and treat complications
- To provide **thrombolysis treatment** for patients within the time window of **4.5 hours**,
- To provide **thrombectomy**, if possible
- To identify stroke causes in order to provide a **targeted treatment**
- To provide **early mobilization** and **rehabilitation**
- To provide **secondary prevention** in order to prevent infarct progression and recurrent events.

A recent Cochrane review that included 21 trials with 3,994 participants comparing stroke unit care with general ward treatments showed consistently improved outcomes for stroke units<sup>1</sup>. Patients are more likely to survive and become independent in stroke units. The best results were achieved from stroke units which are based in a dedicated ward. These outcomes were independent of patients age, sex or stroke severity and type.

The European Stroke Organisation (ESO) therefore recommends that all stroke victims should have access to stroke unit care and defines requirements and criteria for official stroke unit certification .

<sup>1</sup> Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. Cochrane Database of Systematic Reviews 2013, Issue 9.



# ORGANIZING THE STROKE CARE SUPPLY CHAIN

In order to provide adequate stroke care it is necessary to organize the complete stroke care supply chain which is starting with public awareness, includes the management of the emergency system, requires the implementation of stroke units for acute treatment and ends in systematic rehabilitation and secondary prevention (fig. 1).

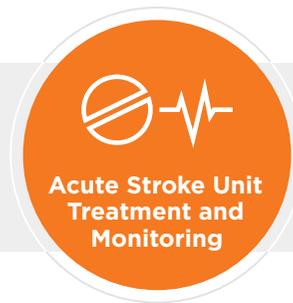


fig. 1 The supply chain of stroke care

**Public awareness** is important in order to inform people about stroke risk factors like hypertension, arrhythmia, diabetes, structural heart diseases and unhealthy living conditions. This also includes the recognition of stroke symptoms and appropriate reaction to such symptoms which requires an immediate emergency call and transport to the next stroke unit.

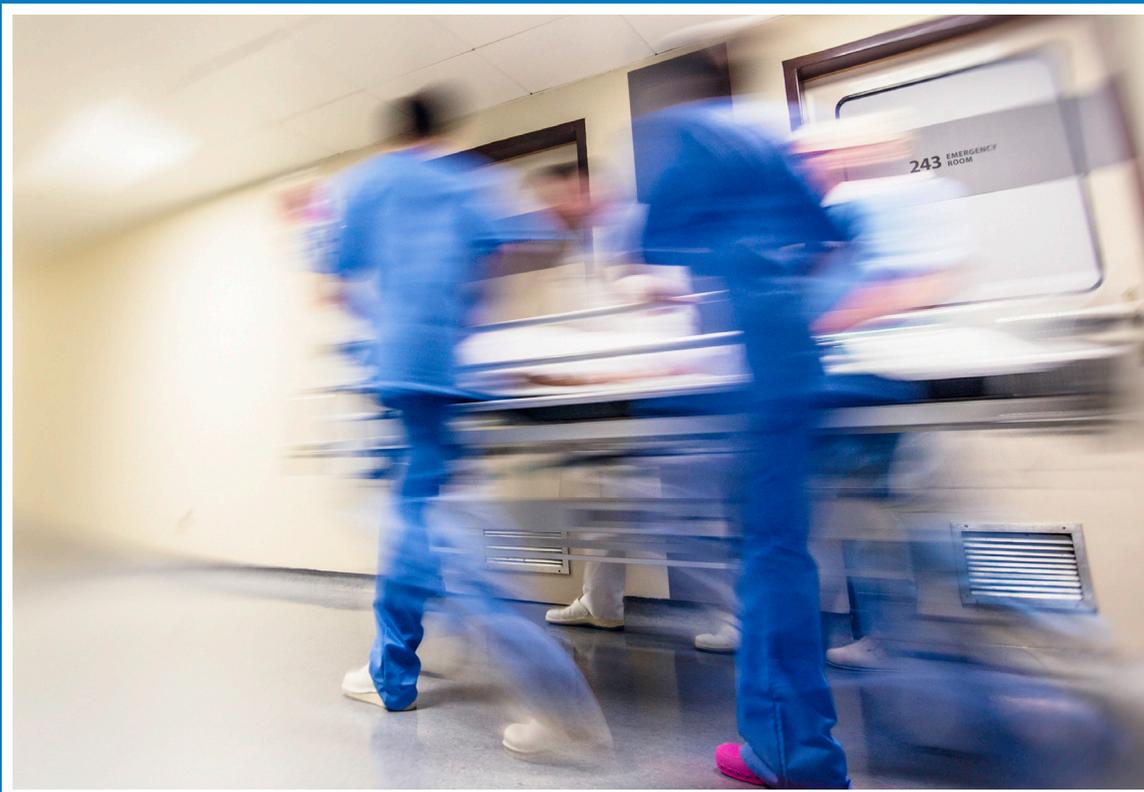
**Emergency management** will have to be organized in a way that stroke patients are recognized by the dispatch center and the emergency staff, that they know how to deal with stroke patients adequately, ensure a prenotification of staff in the next stroke unit and share procedures for handover with the stroke unit. This will require organizational standards and qualification of staff.

**Stroke unit treatment** consists of early diagnoses, thrombolysis therapy, and, since evidence based, also endovascular thrombectomy where appropriate, continuous monitoring of patients in order to recognize and prevent complications, early mobilization and rehabilitation as well as secondary prevention. This requires well defined infrastructural equipment, organizational procedures and highly qualified staff in an interdisciplinary team.

**Rehabilitation and secondary prevention** aims at restoring possible impairments and treating comorbidities that have been responsible for stroke in order to prevent recurrent strokes. This also includes a well organized discharge management and coordination with rehabilitation centers and outpatient physicians.

# REQUIREMENTS FOR THE ORGANIZATION OF STROKE UNITS

Stroke units are specialized centers in an acute hospital with dedicated beds, offering a multidisciplinary treatment of strokes by dedicated stroke teams addressing the acute treatment, early mobilization and rehabilitation as well as secondary prevention. This requires highly qualified staff, defined infrastructural equipment and well organized procedures.



## Staff requirements

Stroke units should be led by experienced neurologists specialized on stroke treatment and should be able to provide a 7 day 24 hour stroke service (on call outside of regular duty hours). They need to be supported by physicians in the field of cardiology, neuroradiology and neurosurgery (all on call).

Since continuous monitoring of patients is an essential part of stroke unit care in order to recognize and prevent complications, specialized stroke unit nurses dedicated exclusively to the stroke unit will be necessary. In order to be able to provide 7 day 24 hour continuous monitoring 1.5 - 2 nurses per bed are required on stroke units. They need intensive training in monitoring of stroke scales like NIHSS, have to be able to monitor vital parameters of patients, know procedures how to react in case of complications like dehydration, aspiration pneumonia, deep venous thrombosis, increasing blood pressure, recognition of progressive strokes, recurrent strokes or intracranial pressure.

In order to provide appropriate early mobilization and rehabilitation stroke units also need physiotherapists, speech therapists, occupational therapists and social workers. In cooperation with the stroke nurses they are responsible for early mobilization, recognition and treatment of dysphagia, the organization of discharge management and the planning of postacute rehabilitation.

It is essential that the stroke staff works as a multidisciplinary team. Stroke services cannot be delivered properly by just one discipline. The collaboration should be supported by standard operation procedures describing processes and division of labor.

## Infrastructural requirements

A stroke unit should at least comprise four beds located in a dedicated area (one bed for 100 patients per year). All beds have to be equipped with monitoring for ECG, blood pressure, oxygen measurement and pulse oximetry. Ventilation is not necessary since ventilated patients should be moved to the intensive care unit.

### The following diagnostic equipment should be available:

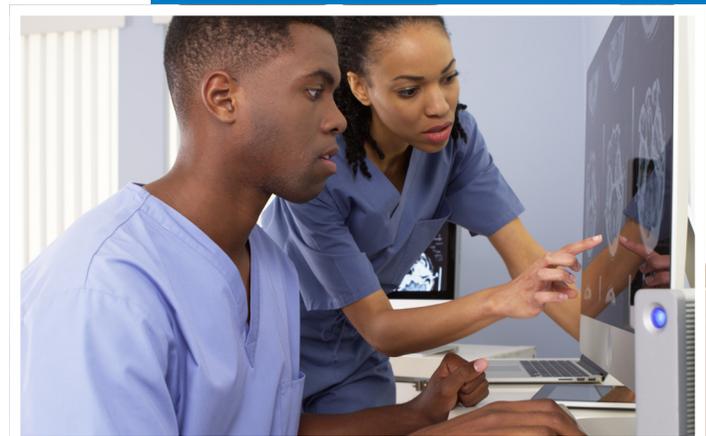
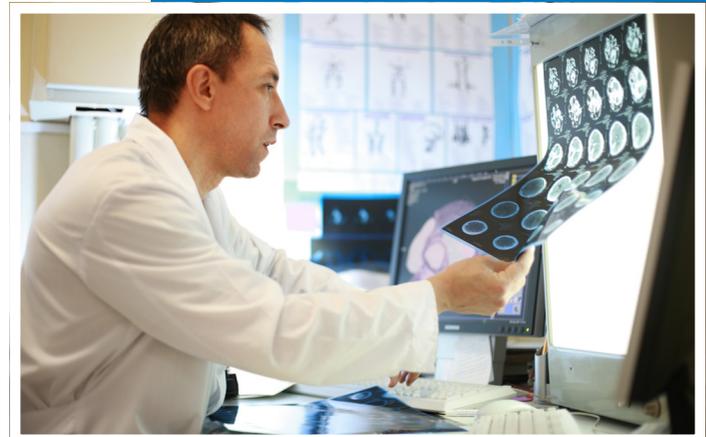
- CT-Scan
- Magnetic resonance Imaging (MRI), if available
- Doppler sonography
- Colour duplex sonography
- CT (MR-) angiography
- Rhythmological diagnostic measurement for atrial fibrillation
- Echocardiography (TTE and TEE)
- Clinical emergency laboratory

## Standard Operating Procedures (SOPs)

Since stroke units are complex organizations where different professions have to cooperate closely and procedures are very time critical, standard operation procedures are of crucial relevance. All procedures have to be well described and must be known by all staff. Therefore a medical and nursing stroke manual describing SOPs and qualifications conveying the SOPs to all staff are important instruments of stroke units. SOPs should be documented in the stroke manual and have to be revised according to the evaluation of experiences and guidelines<sup>3</sup>.

It also is important to measure data on stroke type, severity, procedures and outcome on a regular basis in order to continuously improve procedures. Therefore stroke units should participate in quality based registries such as RES-Q comparing own results against best practice from other stroke units.

In order to review procedures and outcome a certification of stroke units according to international best practice should also be considered. Certification is not an aim by itself but can provide systematic feedback as well as it can demonstrate a degree of excellence of stroke services<sup>4</sup>.

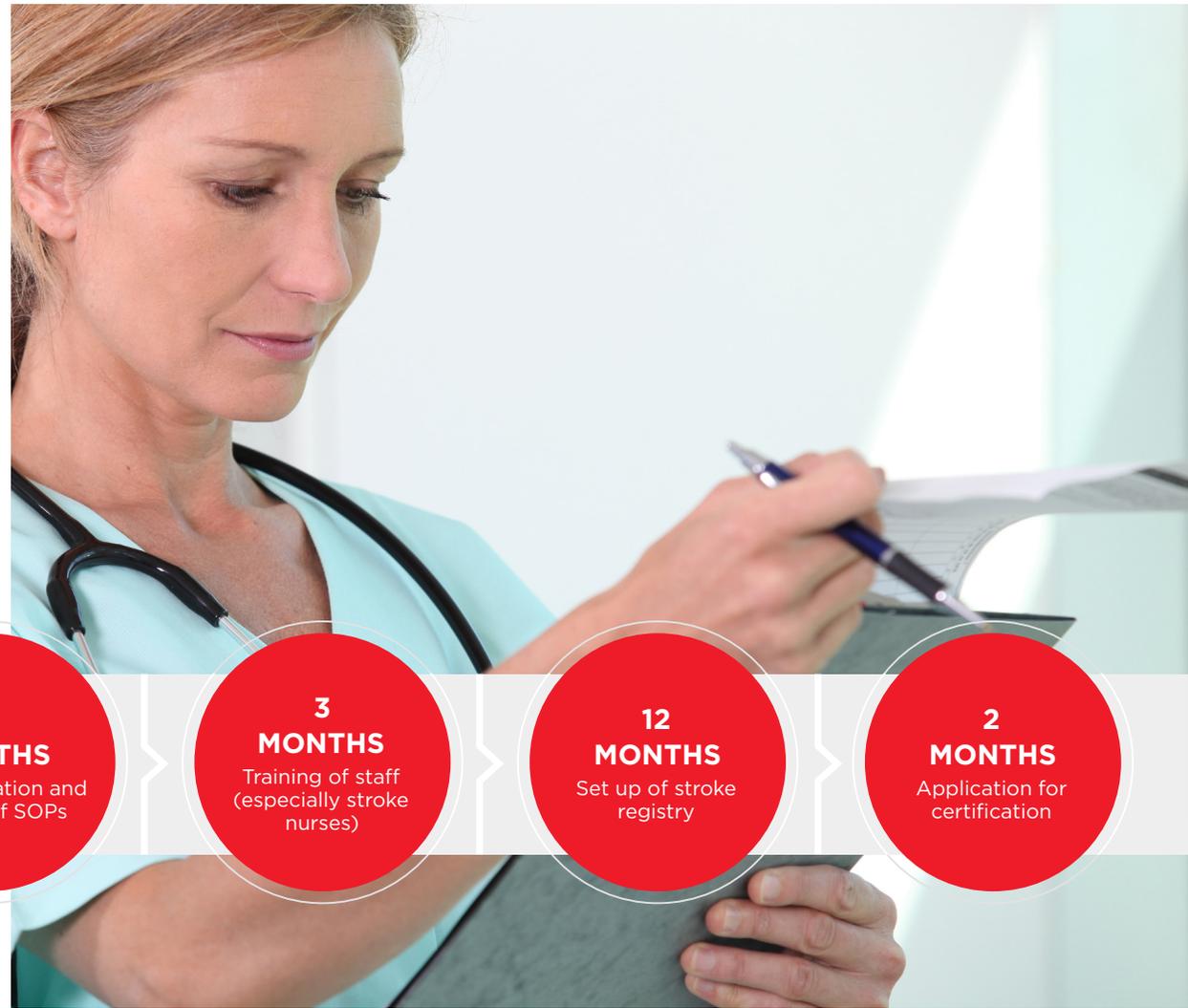


<sup>3</sup> A blueprint of a stroke manual with SOPs of important procedures can be made available.

<sup>4</sup> Certification criteria on procedures can also be provided as an additional document.

# HOW TO SET UP A STROKE UNIT

There is no exact blueprint for the procedures of setting up a stroke unit since this depends very much on the already existing infrastructures, staffing and procedures. However the following schedule may indicate steps and effort that are necessary to proceed on the pathway for planning a stroke unit.



Since these steps can be performed in parallel to a large extent, the time from initial decision to certification will usually require up to at least 15 month depending on existing experience. This process can be supported by an exchange of experience with existing stroke units or on site visits by neurologists or other staff.

# CURRICULUM VITAE

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## MEDICAL EDUCATION

1960 - 1966 Marburg, Hamburg, Wien Heidelberg.

## MEDICAL EXAMINATION

1966

## NEUROLOGICAL EDUCATION

1970 - 1974, Dortmund and University, Heidelberg

## SPECIALIST FOR NEUROLOGY

1974, Heidelberg

## DPT. OF NEURORADIOLOGY AND PSYCHIATRY

1974 - 1977 (1/2 yr.) (Medical High School Hannover)

## SPECIALIST FOR NEUROLOGY AND PSYCHIATRY

1977 (Hannover)

## SENIOR PHYSICIAN AND ASSISTANT MEDICAL DIRECTOR

1977 - 1983, Dpt. Neurology of the University of Giessen

## HABILITATION

1981

## C2-PROFESSOR OF NEUROLOGY

1983

## DIRECTOR OF NEUROL. DPT

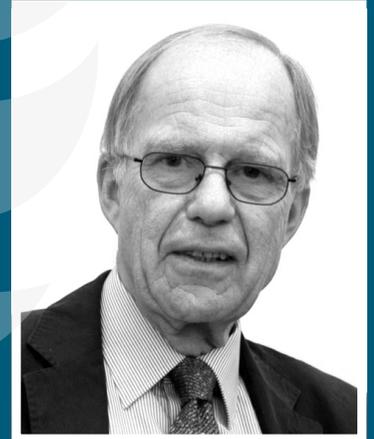
1983 - 2005, The Academic Hospital in Minden

## FIRST CHAIRMAN OF THE GERMAN STROKE SOCIETY

2001 - 2002 (FOUNDED 2001)

## GENERAL MANAGER OF THE GERMAN NEUROLOGICAL SOCIETY SPEAKER OF THE BOARD OF THE GERMAN STROKE SOCIETY

2005 - 2009



## 2010 - 2016:

- General Manager of the German Stroke Society (responsible for the Organisation of Stroke Unit Certifications in Germany)
- Chairman of the SU-Certification - Committee
- Medical Auditor for Stroke Unit - Certifications
- General Manager of the German Society of Neurointensive- and Emergency Medicine.(2010 -2014)

## SINCE 1.07.16:

Chairman of the SU-Certification Committee (of the German Society) including responsibility for international SU - Certifications

## SCIENTIFIC PRIORITIES:

Cerebrovascular diseases (Cerebellar infarction, Carotid surgery, Dissections, Thrombolysis, Organisation of stroke services in Germany)

## HONORARY MEMBER:

- German Society of Neurology
- German Stroke Society

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