

- 
-
- Acute Stroke Care inclusive Quality Control – Concepts in Germany

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Kazan, April 17th 2013



Stroke care

- point of inflection:

introduction of thrombolysis

indication about 20%

- domain of neurologists
- Stroke campaigns: stroke = emergency



Stroke units

- CT/NMR 24h
- neurologist 24h on duty
- thrombolysis possible
- monitoring



Challenges

- regional planning
- accreditation of hospitals for acute stroke care
- certification of stroke units

DER SPIEGEL

Nr. 13/28.3.94 - 5,00 DM



SIEG ÜBER DEN SCHLAGANFALL?

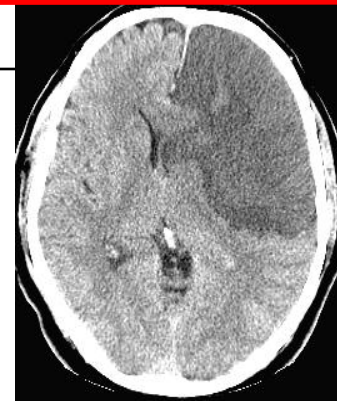
Erfolge mit
neuen
Therapien

KURDEN IN DEUTSCHLAND
**Der importierte
Bürgerkrieg**

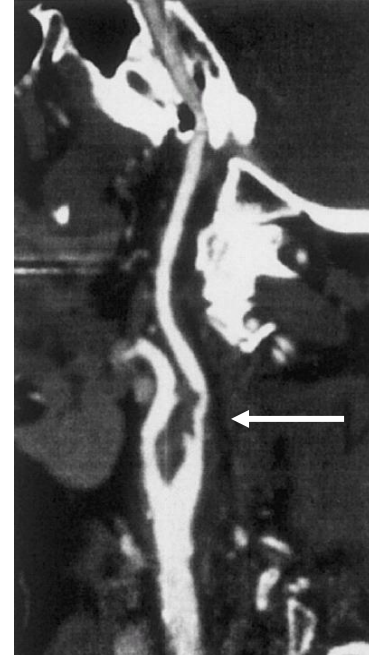


Diagnostic requirements after stroke

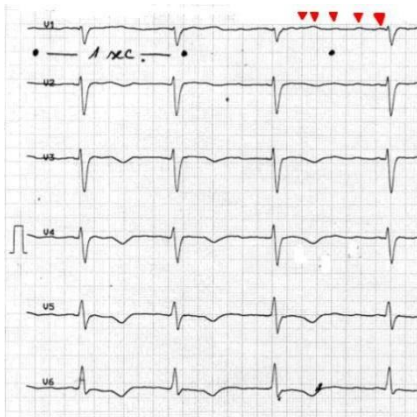
1. Brain imaging



2. Carotid imaging



3. Cardiac imaging



The clinical syndrome "cerebrovascular disease" (in Western European populations)

Duration of
symptoms

**Clinical syndrome
„cerebrovascular disease“**

**Clinical syndrome
„Transitoric Ischemic attack“
(TIA)**

**Clinical syndrome
„stroke“ (100)**

Pathology

**Ischemic
stroke (80)**

**Intracerebral
Haemorrhage
(15)**

**Subarachnoid
heamorrhage (5)**

Aetiology

**Cardio-
Embolism (22)**

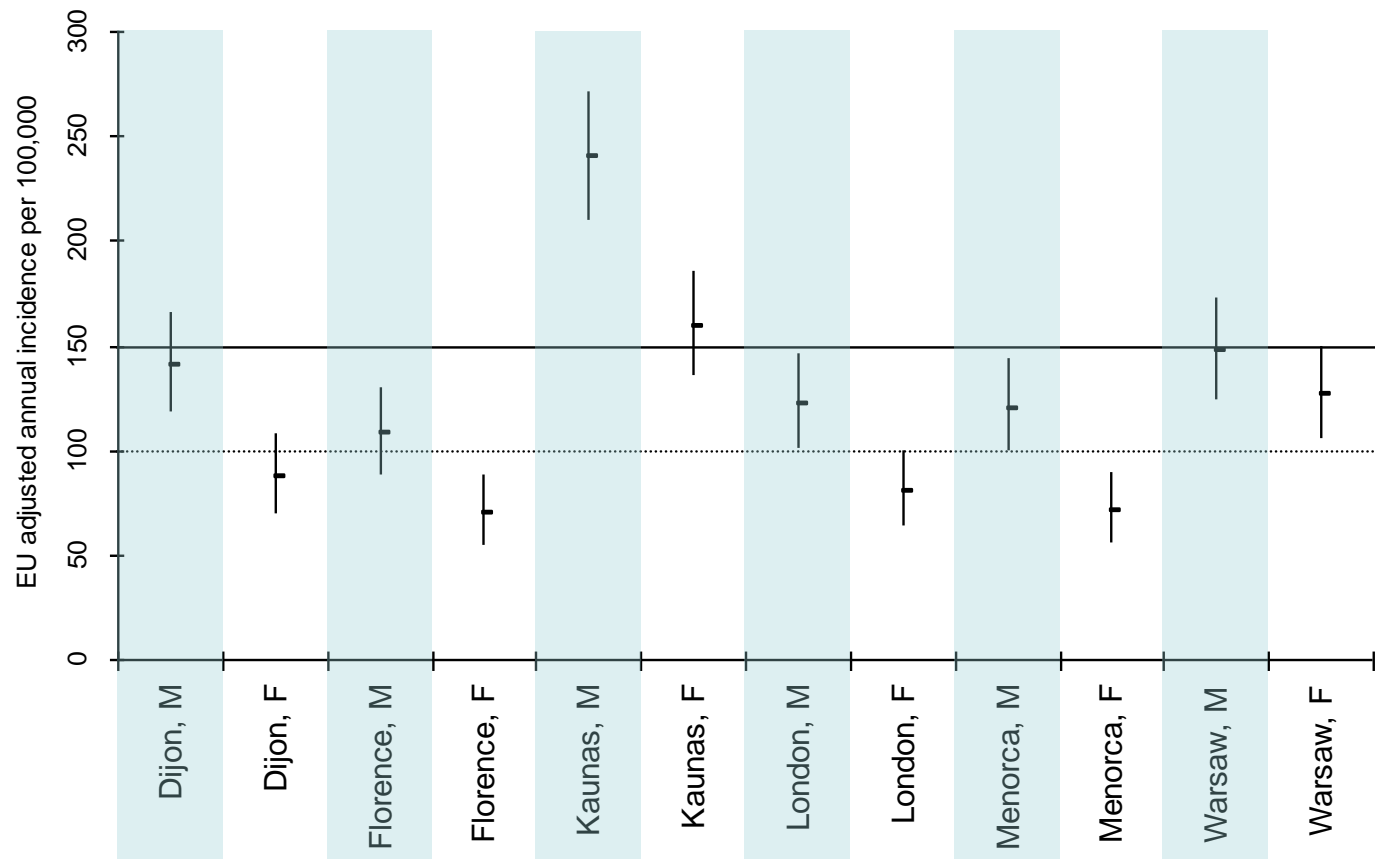
**Large artery
Atherosclerosis
(11)**

**Small artery
occlusion (18)**

**Concurrent/
Undefined aetiology
(28)**

European Registries of Stroke Collaboration

Incidence differences in Europe, 2004-2006

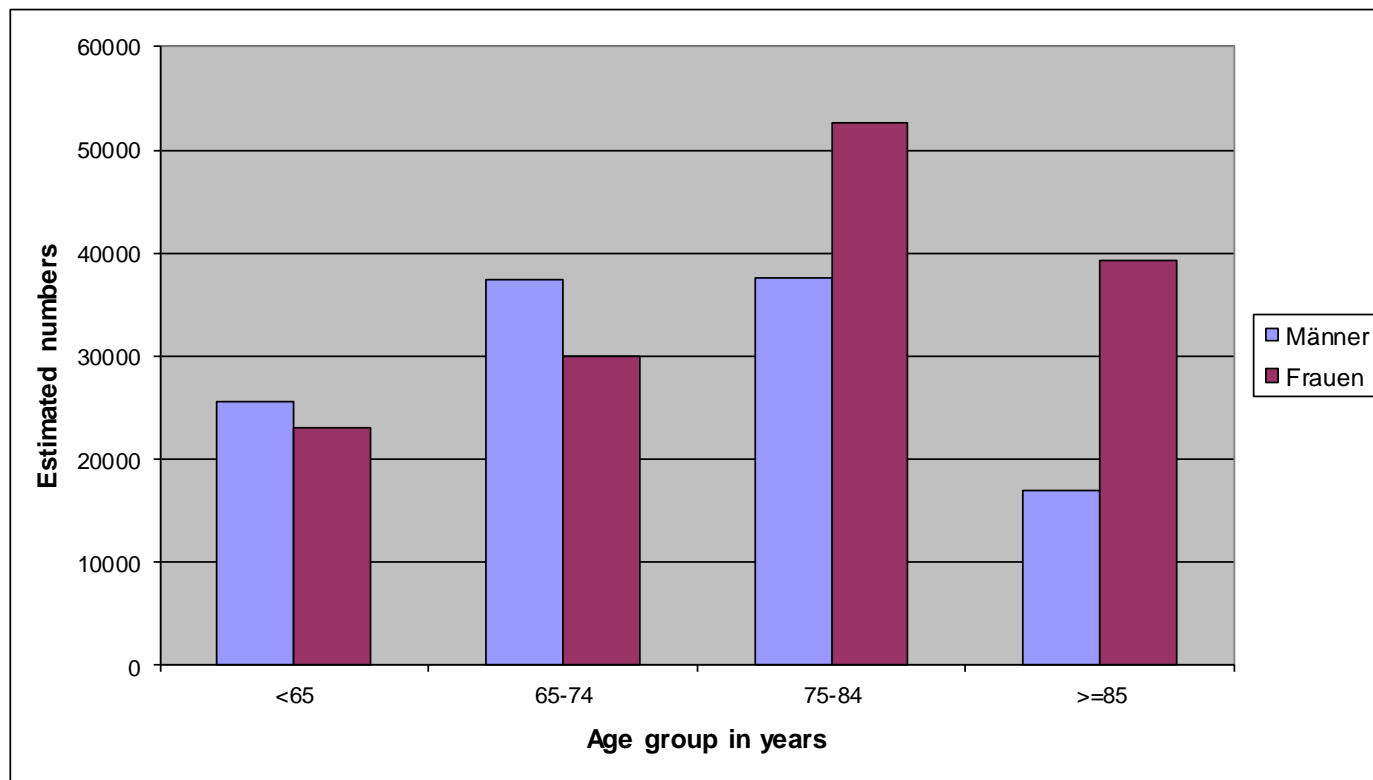


Annual stroke incidence rate and 95% CI per 100000 population adjusted to the European population for males (M) and females (F); the line represents the mean annual incidence rate adjusted to the European population for all centers

— for men
..... for women

Epidemiology of stroke in Germany (2008)

Estimated absolute numbers (first-ever & recurrent)



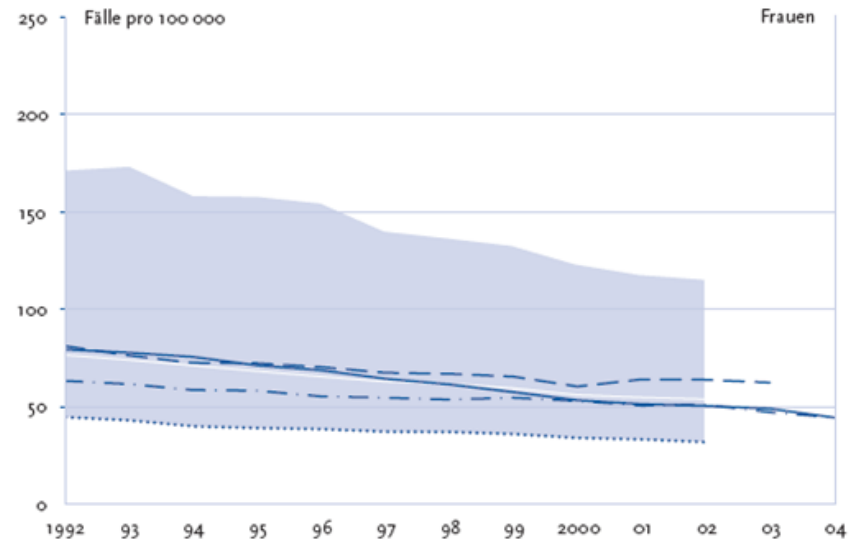
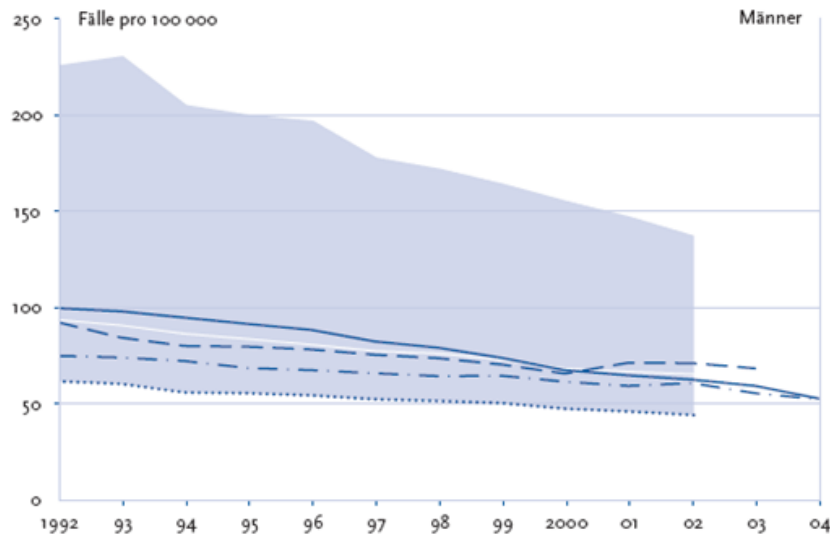
*based on estimates of the German population 2008
Heuschmann PU et al. Akt Neurologie 2010

Cost of neuropsychiatric diseases in Europa 2010

Disease	# (Million)	Costs (Million Euro)				%	Rang
		Direct Medical	Direct non-medical	Indirect	Total		
Total		296,374	186,250	315,101	797,725		
Depression	33,3	26,016	15,437	71,952	113,405	14,2%	1
Alzheimer and other dementia	6,3	16,949	88,214	0	105,163	13,2%	2
Psychosis	5	29,007	0	64,920	93,927	11,8%	3
Anxiety disorder	69,1	46,267	144	27,969	74,380	9,3%	4
Addiction	15,5	27,685	13,569	24,430	65,684	8,2%	5
Cerebrovascular diseases	8,2	42,352	16,769	4,932	64,053	8,0%	6
Headache	152,8	9,039	0	34,475	43,514	5,5%	7
.....							
Parkinson	1,2	7,029	5,519	1,386	13,933	1,7%	15

*based on estimates of ECNP/ EBC report 2011
for Europe (EU-27 plus Switzerland, Iceland, Norway)
Olesen J et al. Eur J Neurol 2012

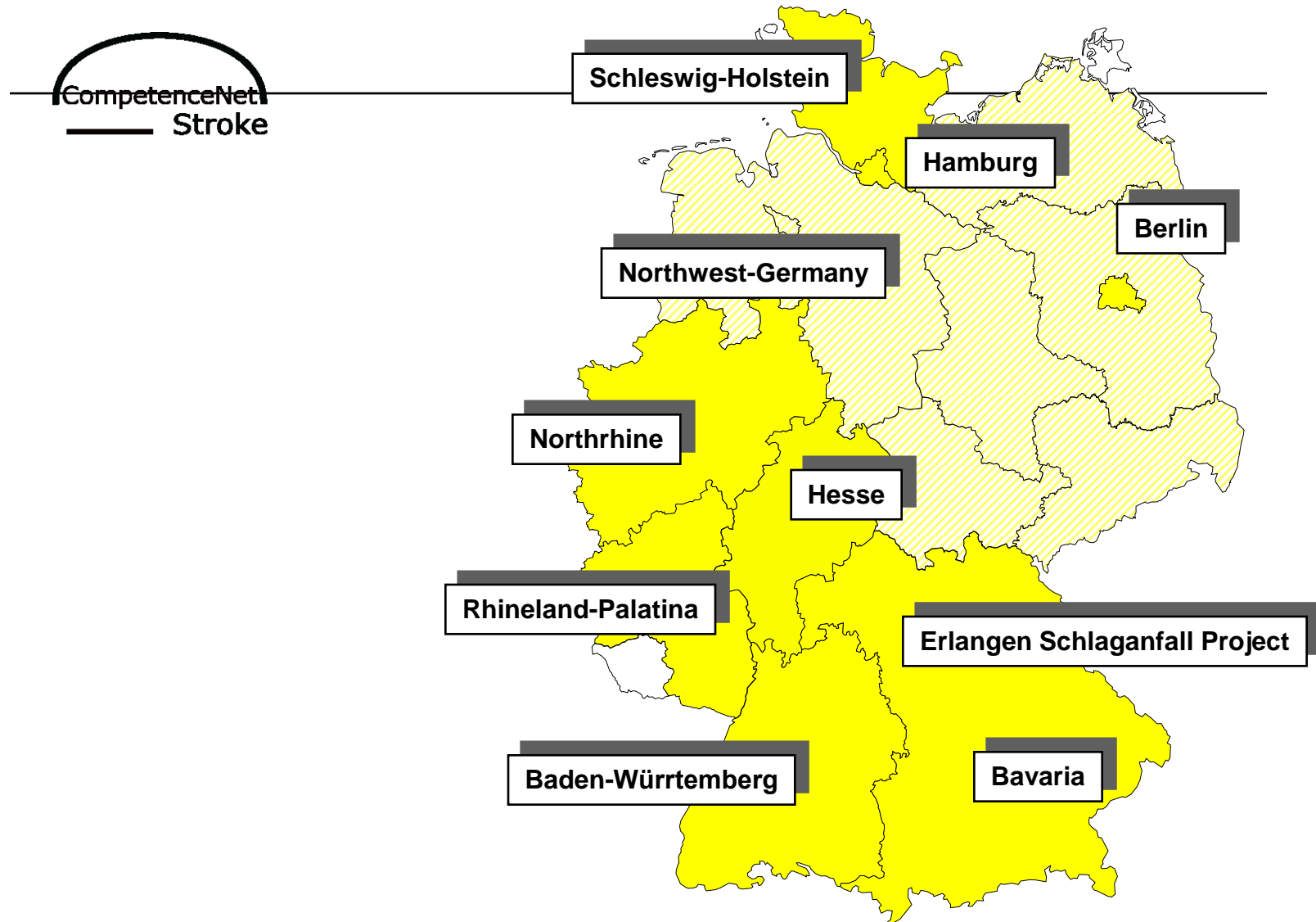
Time trends in stroke mortality in Europe



— Deutschland Frankreich Min EU15 Ø
- - - Niederlande - - - Großbritannien Max

*Routine mortality statistic (ICD-10: I60-I69); EU age adjusted rates
Robert Koch Institut 2010

German Stroke Register Study Group





German Stroke Registers Study Group

Data collection

- Participation mostly voluntary but compulsory for certified Stroke Units
- Documentation of individual data during hospitalization, including e.g. diagnostics, treatment, co morbidities, complications, early outcome



German Stroke Registers Study Group

Data collection

- Participation mostly voluntary but compulsory for certified Stroke Units
- Documentation of individual data during hospitalization, including e.g. diagnostics, treatment, co morbidities, complications, early outcome
- Evidence-based indicators for quality of stroke care were developed and regularly updated in a multidisciplinary process
- Continuous monitoring of quality of care at regional level by regular feedback and benchmarking between participating hospitals

16 Thrombolyse (bei Kliniken mit struktureller Voraussetzung für Thrombolysetherapie)

Kennzahl: ADSR14

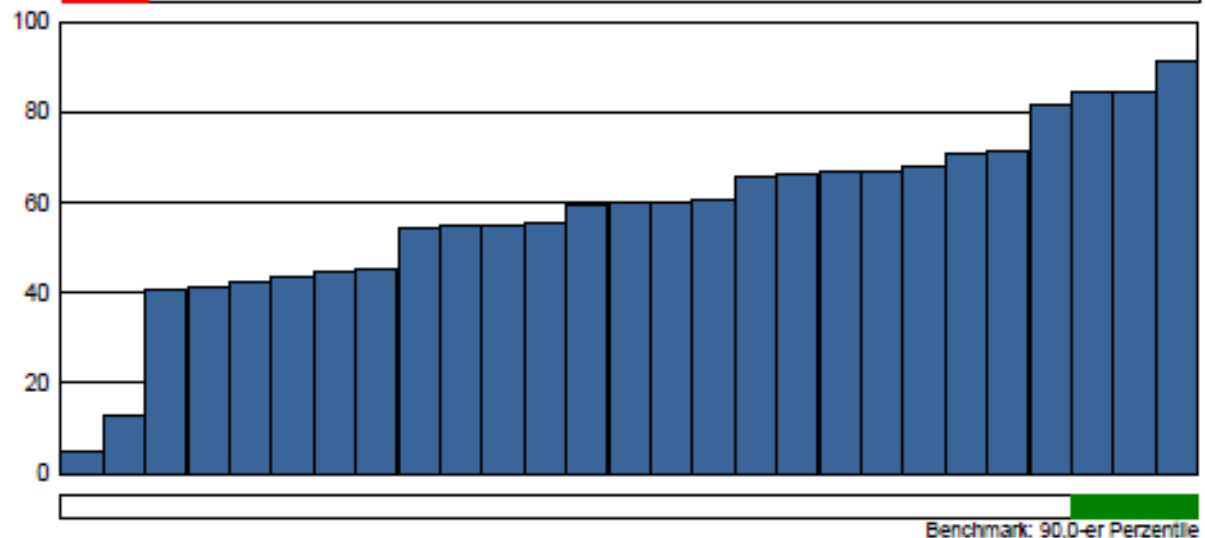
Ziel: Möglichst hoher Anteil an Patienten, die bei entsprechenden Voraussetzungen eine intravenöse Lysebehandlung erhalten

Rate: (Aktuell) 59,4 %
(Vorjahr) 62,0 %

Zähler: Patienten mit intravenöser Thrombolysetherapie

Nenner: Patienten mit Hirninfarkt im Alter von 18-80 Jahren mit einem Zeitintervall Ereignis-Aufnahme ≤ 2 h und Schweregrad NIHSS 4-25 zur Durchführung einer Thrombolysetherapie unter Ausschluss von Patienten mit intraarterieller Lyse

kritischer Bereich: 8,0-er Perzentile



German Stroke Registers Study Group

Quality indicators

Reference

- Antithrombotic therapy – antiplatelet medication ≤ 48 h after stroke onset
95%
- Antithrombotic therapy – antiplatelet medication at discharge
95%
- Antithrombotic therapy – anticoagulation at discharge in patients with AF
80%
- Brain imaging in stroke suspicious patients
95%
- Vascular imaging in patients with ischemic stroke or TIA
90%
- Screening of patients for swallowing disorders
90%
- Early rehabilitation – physiotherapy/ occupational therapy
90%
- Early rehabilitation – speech therapy
80%
- Early mobilisation
90%

Indicators used in European audits

European Implementation Score (EIS)

	Flanders-Belgium	Germany	Scotland	Catalonia-Spain	Sweden	England/Wales/ Northern-Ireland
Stroke unit care	+	+*	+		+	+
Brain imaging (CT and/or MRI)	+†	+	+‡	+‡	+	+‡
Carotid/vessel imaging	+	+			+	
Swallowing test		+	+	+‡	+	+‡
Thrombolytic therapy	+	+	+§		+	+
ECG during hospitalization	+			+		
Early aspirin or antiplatelet administration		+	+¶	+**		+
Early mobilization		+		+		
Assessment for rehabilitation (PT/OT)		+		+	+††	+‡‡
Assessment of mood disorders				+§§		+
Discharge on lipid lowering therapy	+¶¶		+¶¶	+***	+¶¶	+
Discharge on antiplatelet/ antithrombotic therapy	+†††	+	+‡‡‡	+§§§	+	
Discharge on blood pressure lowering therapy			+	+	+	+
Anticoagulants in patients with atrial fibrillation at discharge	+	+	+	+	+	+
Death during hospital period		+¶¶¶			+****	



German Stroke Registers Study Group

Data collection

- Participation mostly voluntary but compulsory for certified Stroke Units
- Documentation of individual data during hospitalization, including e.g. diagnostics, treatment, co morbidities, complications, early outcome
- Evidence-based indicators for quality of stroke care were recently developed in a multidisciplinary process
- Continuous monitoring of quality of care at regional level by regular feedback and benchmarking between participating hospitals
- Regular combined analyses for health services research, e.g. for
 - monitoring implementation of new therapies into practice
 - identifying patterns of stroke care at the national level
 - using data collection as sampling frame for spin-off projects


Time trends in acute stroke care

The example of Hesse



		Jahr	2007	2008	2009	2010
Nr.	Qualitätsindikatoren		%	%	%	%
1	Bildgebung	HE	96,7	97,8	98,5	99,0
		SU	99,0	99,3	99,3	99,6
2*	Bildgebung < 1h	HE	91,9	91,8	95,2	94,4
		SU	93,4	91,4	95,9	95,0
3	Gefäßdiagnostik	HE	86,2	83,8	89,0	90,6
		SU	93,9	87,9	92,4	92,9
4	Schluckscreening	HE	55,8	66,0	80,5	84,9
		SU	65,1	72,9	83,3	85,8
5*	Systemische Thrombolyse	HE	50,4	56,2	58,5	58,9
		SU	55,4	58,3	60,9	60,2
6	Akute Antiaggregation	HE	89,7	90,1	92,9	93,0
		SU	91,3	91,7	94,4	93,7
7	Physio-/Ergotherapie	HE	85,2	86,1	92,3	94,9
		SU	89,0	89,3	93,0	95,8
8	Logopädie	HE	69,4	72,0	83,6	88,4
		SU	78,8	80,8	87,2	91,3
9	Sek. Antiaggregation	HE	85,3	91,7	92,0	93,7
		SU	87,4	92,6	93,3	94,4
10	Sek. Antikoagulation	HE	54,5	59,2	62,2	67,2
		SU	57,4	59,4	63,8	69,1

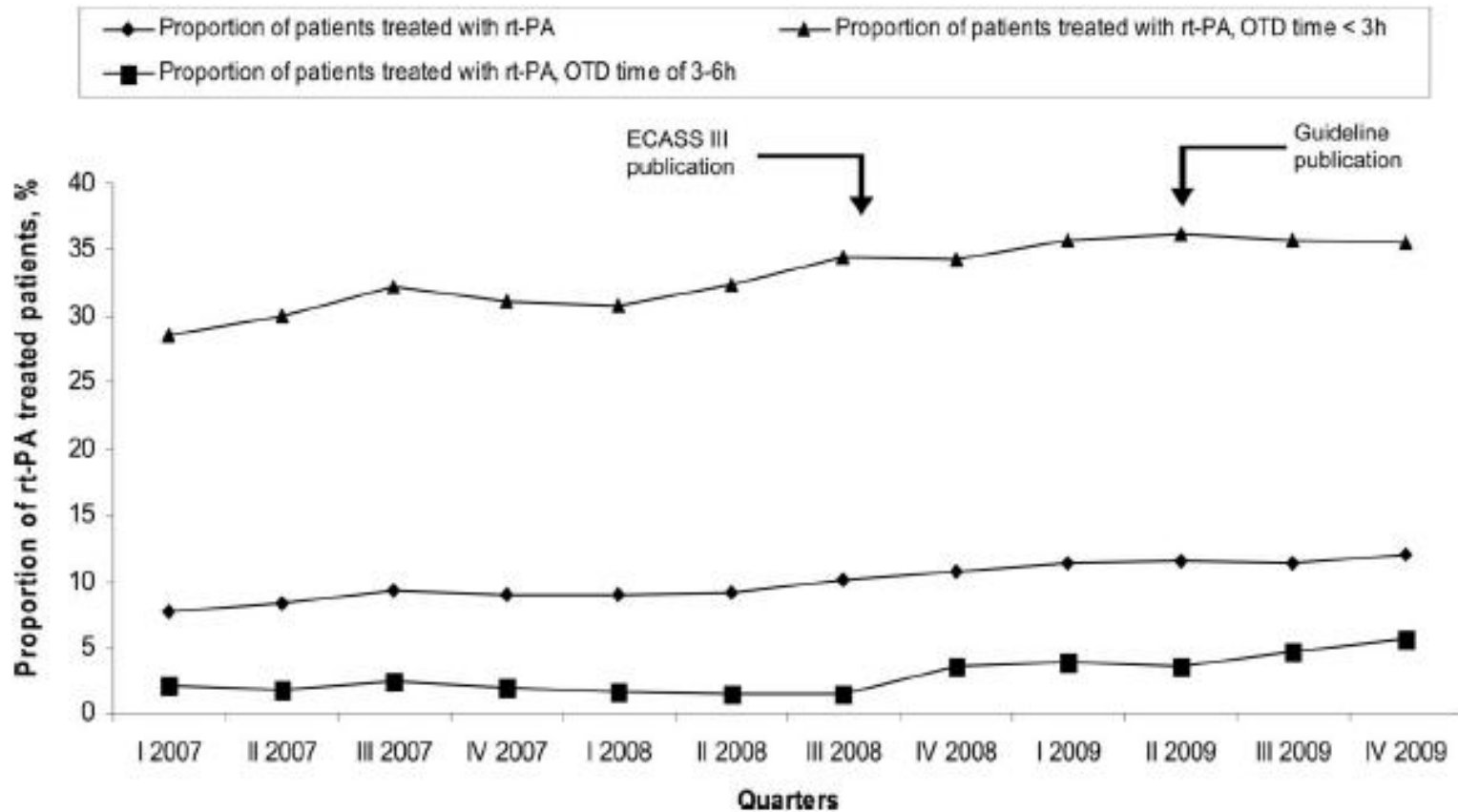
Time trends in i.v. thrombolysis, 2007-2009*



	2007	2008	2009
Patients receiving tPA, %			
Total	8,5	9,6	12,1
Onset to admission <3 Std..	29,7	32,1	36,3
Onset to admission >3 Std	1,1	1,1	2,4
Potentially eligible patients	55,1	65,2	66,8

*74 hospitals participating in the Stroke Register Northwest Germany with continuous documentation 2006-2009; ischemic strokes only;

Time trends in i.v. thrombolysis, 2007-2009*



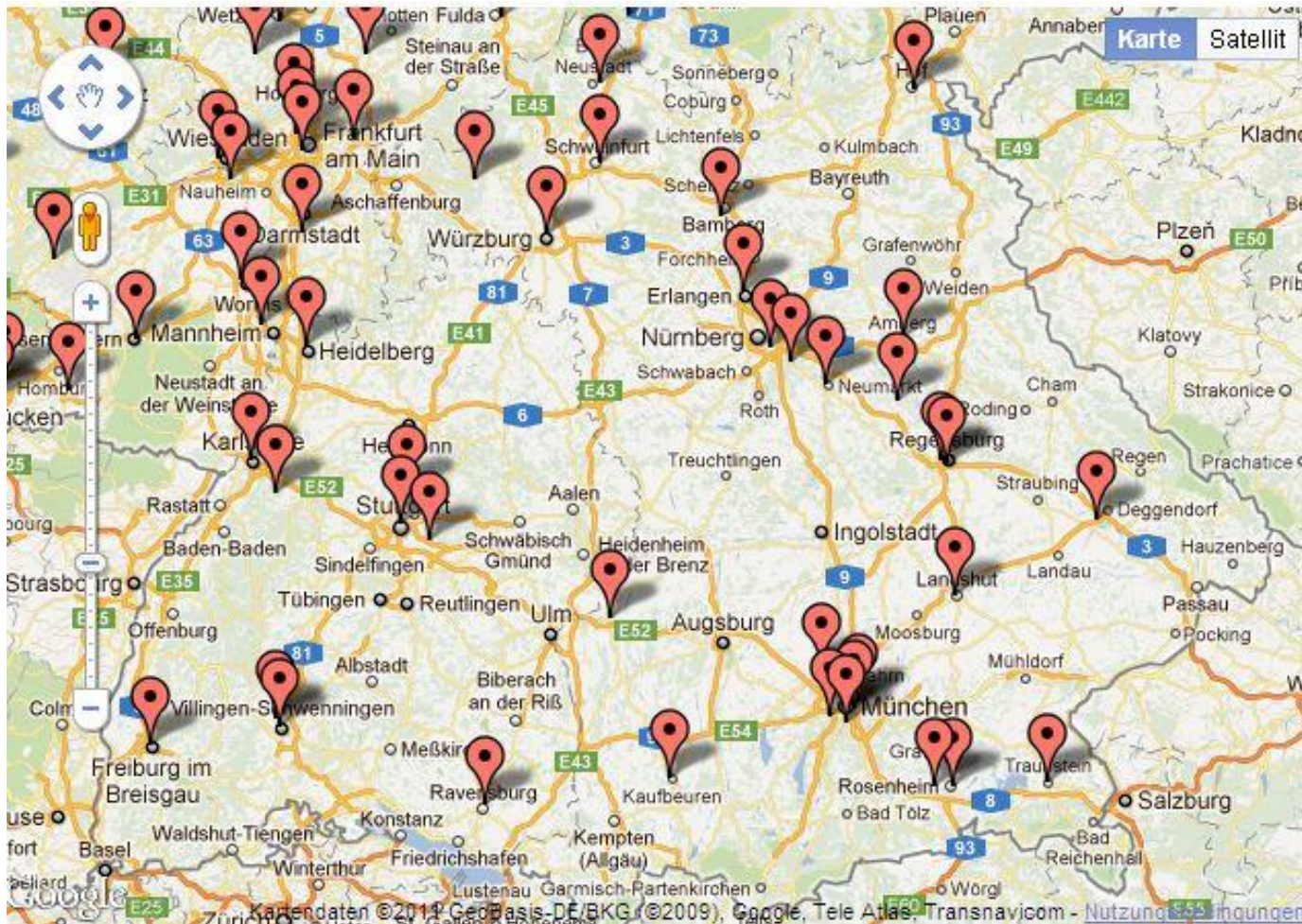
* Stroke Register Northwest Germany, number of patients with tPA N=9,262

Increase in tPA use 3-6 h since QIV 2008: OR 1.88 (95% CI 1.24-2.85) versus

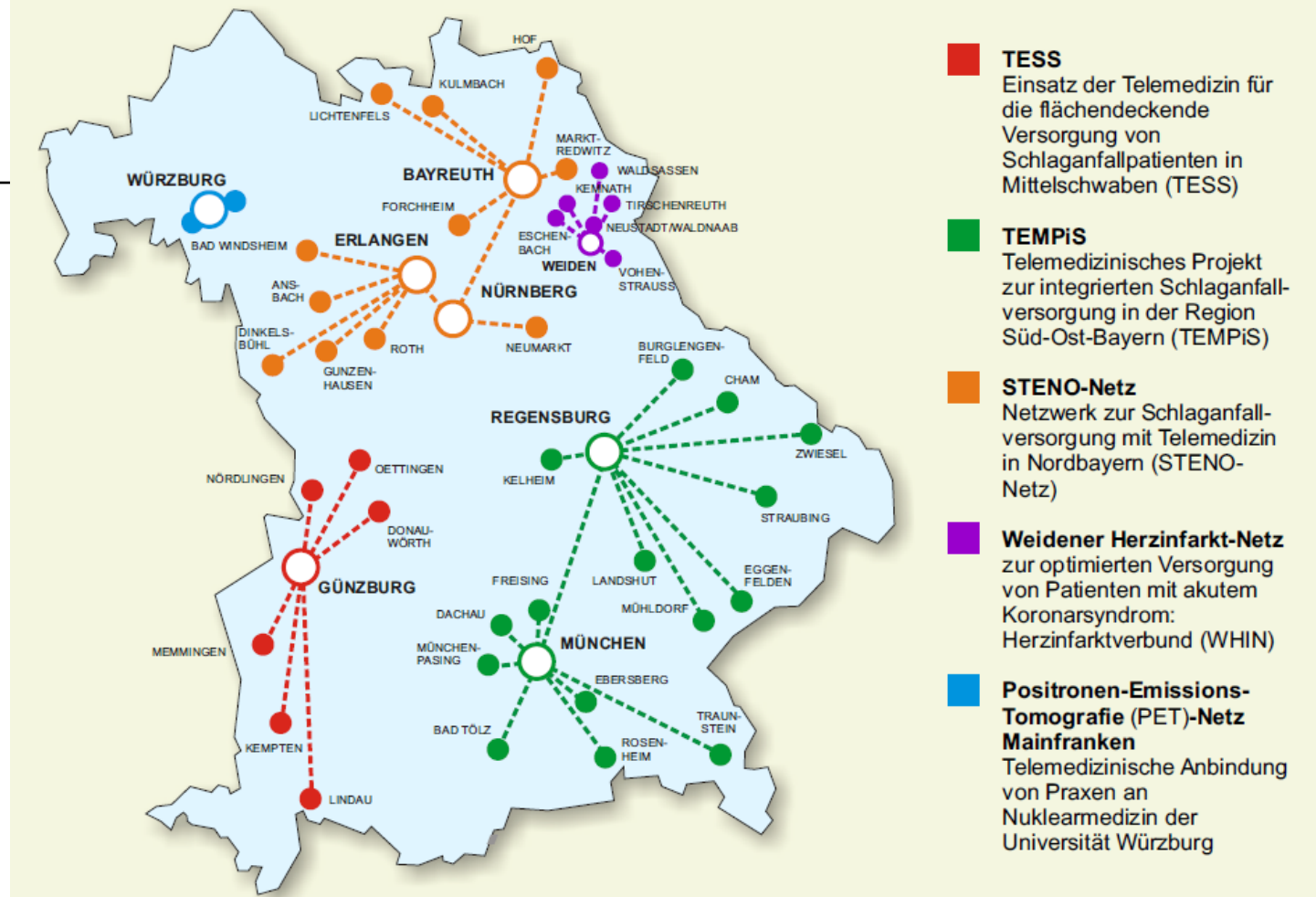
QI/II 2007

Minnerup J et al. Stroke 2011

Certified Stroke Units in Bavaria, 2011



Telemedizin-Netze in Bayern



- Reimbursement in routine care in Bavaria since 2006
- Since 2011: dedicated OPS 8-98b.01/.11 („Andere neurologische Komplexbehandlung mit Anwendung eines Telekonsildienstes“)

Outcome three month after first ever stroke European Registers of Stroke Collaboration

22% dead at 3 month

41% with poor outcome at 3 month

	Total	Dijon	Sesto Fiorentino	Kaunas	London	Menorca	Warsaw	p Value
Cumulative risk of death, % (95% CI) ^a	21.8 (20.0-23.7)	12.6 (8.9-16.3)	29.4 (22.3-36.4)	27.8 (24.7-30.9)	19.0 (15.4-22.5)	35.9 (25.1-46.8)	22.3 (15.3-29.4)	<0.001 ^b
Poor outcome, % (95% CI) ^c	41.3 (39.0-43.7)	32.4 (26.8-38.0)	41.9 (34.2-49.6)	45.9 (42.3-49.5)	40.4 (35.0-45.8)	49.2 (36.8-61.7)	34.2 (25.5-42.9)	0.001

Abbreviation: CI = confidence interval.

^a Derived from Kaplan-Meier estimates, total risk estimate weighted for center.

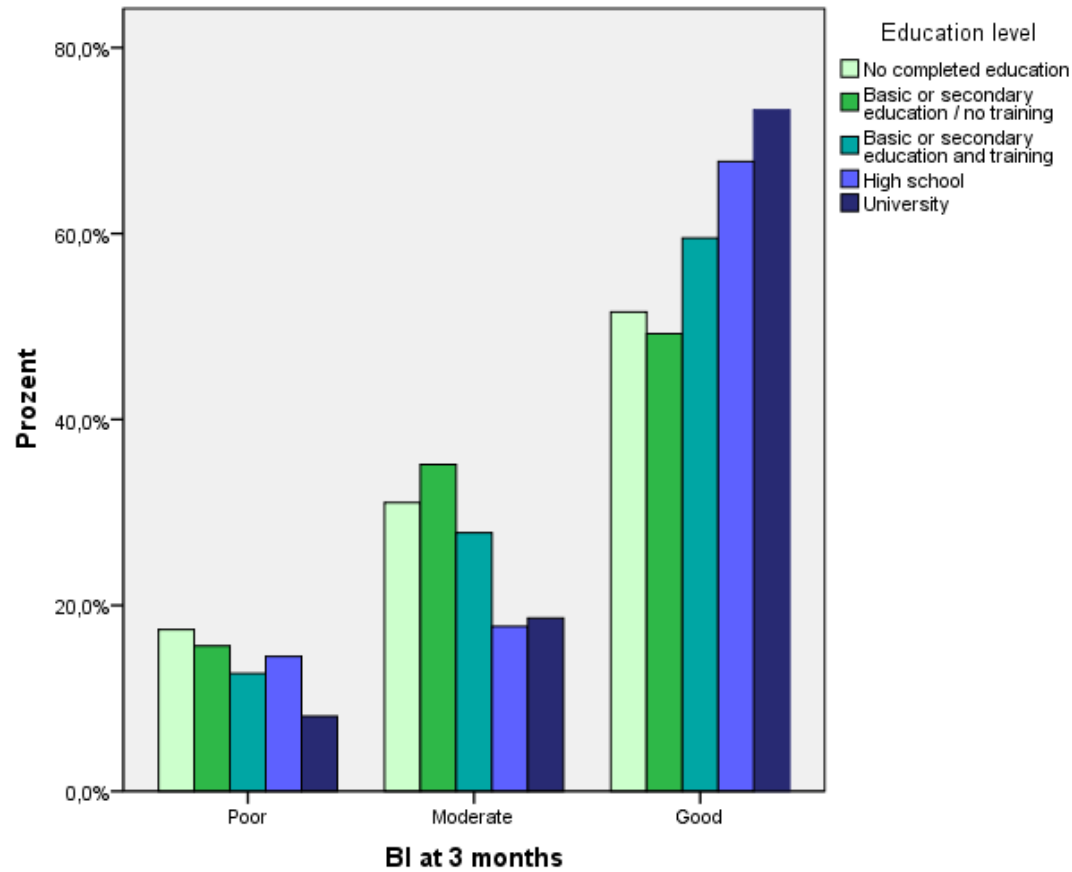
^b Log-rank test across centers.

^c Defined as death or dependent (Barthel Index < 12) or institutionalized due to stroke, total risk estimate weighted for center; all analyses were restricted to patients without missing values.

*2034 patients from 6 population-based stroke registers in Europe, 2004-2006

Functional recovery over three months

The Berlin Stroke register



Independent factor after adjustment for demographic and clinical characteristics, stroke severity, comorbidities and pre stroke functional status

Outcome after stroke

The Berlin Stroke Register

	In-hospital death		Poor outcome at discharge	
	Length of stay ≤7 days	Length of stay >7 days	Length of stay ≤7 days	Length of stay >7 days
Age ≥75y	14.1	22.6	13.2	3.5
Male sex	n.s.	6.2	n.s.	n.s.
Pre stroke disabled	9.0	n.s.	17.0	11.1
ICH	2.6	n.s.	2.4	1.9
Diabetes	n.s.	n.s.	2.1	2.7
Atrial fibrillation	n.s.	7.1	4.7	n.s.
Recurrent stroke	n.s.	n.s.	2.7	n.s.
Hypertension	n.s.	n.s.	10.3	n.s.
NIHSS ≥16	37.5	21.5	16.6	12.3
Pneumonia	n.s.	12.2	5.1	6.4
ICP	14.3	8.3	3.9	0.6
Other complications	14.6	12.6	6.1	6.4
Total explained	92.1	90.5	84.1	44.9

*16,518 stroke patients, 2007-2009; n.s. not statistically significant;
 poor outcome defined as mRS ≥3; attributable risks were estimated
 by average sequential attributable fractions

Berlin Stroke Alliance – Quality indicators rehabilitation

Quality indicators	Percent	Range between the three centres (%)
Long-term cardiac monitoring in patients with possible cardioembolic stroke	18	0 - 33
Nutrition counselling in obese patients	71	0 - 91
Control of blood pressure	85	76 - 93
Screening of cognitive function at admission	74	66 - 95
Screening for depression	62	11 - 79
Screening for swallowing function at admission	39	26 - 64
Assessment by a speech therapist	90	87 - 100
Management to reduce spasticity	65	23 - 97
Recovery of mobility	9	0 - 23
Recovery of walking function	30	26 - 50
Recovery of assistive upper limb function	13	0 - 100
Recovery of functional upper limb function	18	11 - 33
Application for/ facilitation of further rehabilitation or therapy	81	41 - 98
Counselling in social law issues	61	36 - 79

Secondary prevention after stroke

Of all stroke patients
....

... Drug use at hospital
discharge (%)

... Of those still
receiving at three
months (%)

Antihypertensiva

74,0

85,1

Antidiabetics

17,9

66,5

Anticoagulation

21,7

72,3

Antithrombotics

74,5

85,4

Statins

60,7

75,0

Challenges

- Demography: Proportion of people over 60 years

1950:	15%
1970:	20%
2001:	24%
2030:	34%

- Unemployment: 7.5% (october 2010)



Stroke incidence in Germany

- 82 110 000 inhabitants
- 196 000 strokes first-ever
- 66 000 recurrent strokes

Kolominsky-Rabas et al., Stroke 1998; 29: 2501-06



Outcome

- responsible for 8% of deaths
- third most frequent cause of death
- most frequent cause of severe disability (25% of survivors with Barthel < 60 after 3 months)



Thrombolysis

- possible in 50% of hospitals registered in ADSR (German Stroke Registers Study Group)
- 2008 performed in 7-10% of ischemic stroke patients registered in the ADSR

Heuschmann et al., Nervenheilkunde 2009; 28: 108-13



Stroke units in acute disease

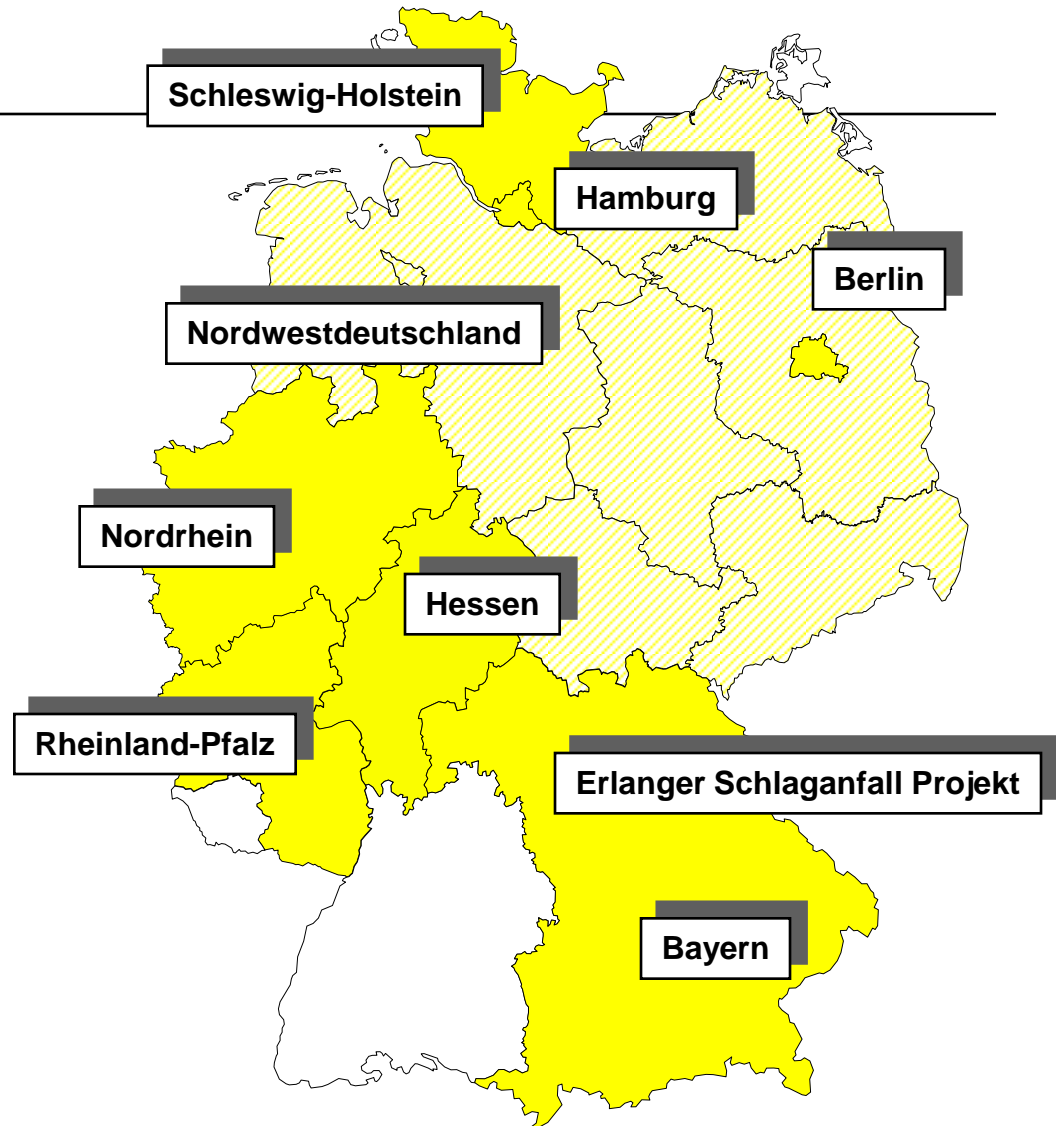
- 163 hospitals with stroke units certified by German Stroke Society (DSG) and German Stroke Foundation
- 950 beds (range 4 – 14)
- 19% stroke mimics



Audit activities in Germany

- The German Stroke Registers Study Group (ADSR) is a network of ongoing regional stroke registers for quality assurance and health care research in Germany

German Stroke Registers Study Group



Combined data analyses 2000-2005

Participating Hospitals: 564

Documented Patients: 275.766



Methods of Data Collection

- Data from consecutively admitted stroke patients are documented by treating physicians in a prospective way
- The data collection is continuously and ongoing
- Mandatory data set and standardised variable definitions are used (currently about 45 data items)



Audit activities in Germany

- Only focus on processes and outcome during stay in acute care hospital
- No organisational audit or audit of processes and outcome after hospitalisation
- Participation of hospitals not compulsory yet in all registers
- No verification of completeness in all registers



Audit activities in Germany

- Standardized development of quality indicators improved acceptance of audit activities substantially
- Large dataset allows using data for health services research (e.g. time trends in treatment, effectiveness of rare treatment concepts)



Methods of Data Collection

- Data assessment during hospitalisation includes information on diagnostics, treatment, complications, neurological deficits, disability, comorbidities, outcome as well as sociodemographic variables
- Individual patient level data are available
- Evidence-based indicators for quality of stroke care were recently developed in a multidisciplinary process



Audit activities in Germany

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Audit activities in Germany

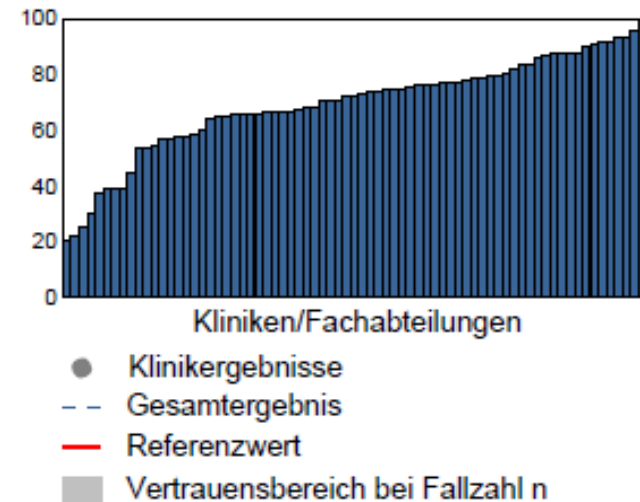
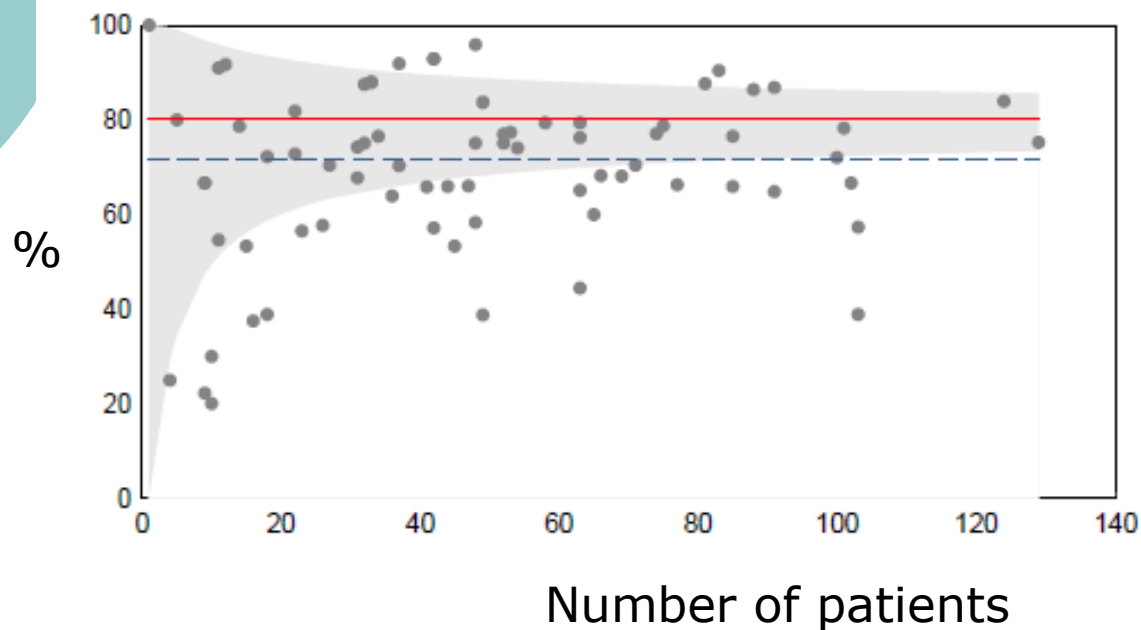
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Indicators for measuring quality of stroke care

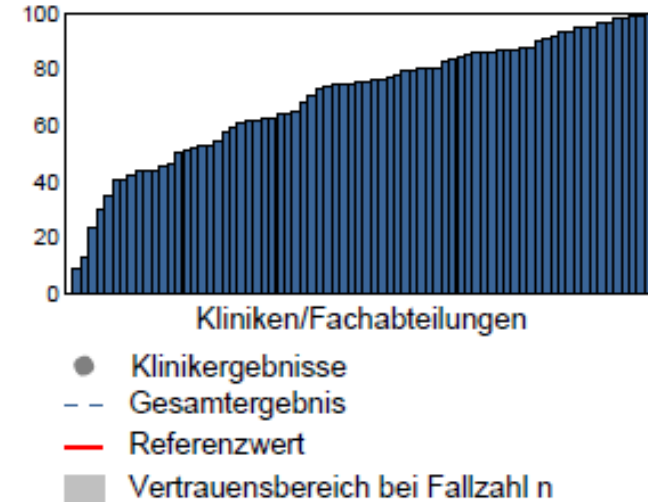
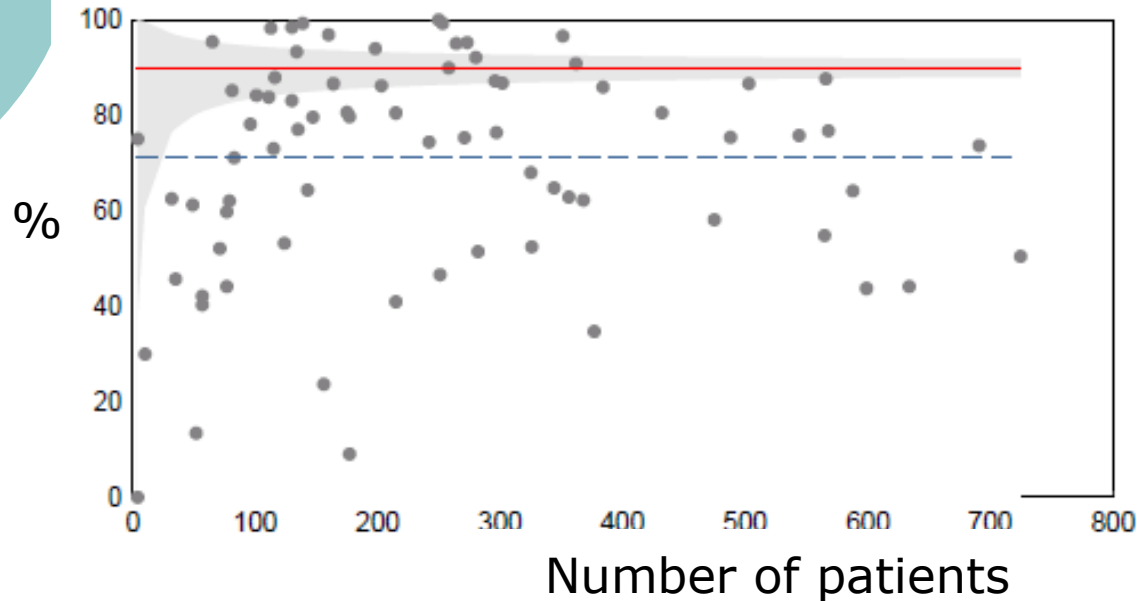
- Early brain imaging in stroke suspicious patients
- Vascular imaging in patients with ischemic stroke or TIA
- Early mobilization
- Early rehabilitation-Physiotherapy/occupational therapy
- Early rehabilitation-Speech therapy
- Screening for swallowing disorders
- Early antiplatelet medication
- Antiplatelet medication at discharge
- Anticoagulation at discharge in patients with atrial fibrillation
- Stroke education of patients and relatives

- Percentage of eligible patients receiving intravenous TPA-therapy
- Hospital-acquired pneumonia rate for ischemic stroke patients
- Seven day in-hospital case-fatality for ischemic stroke patients

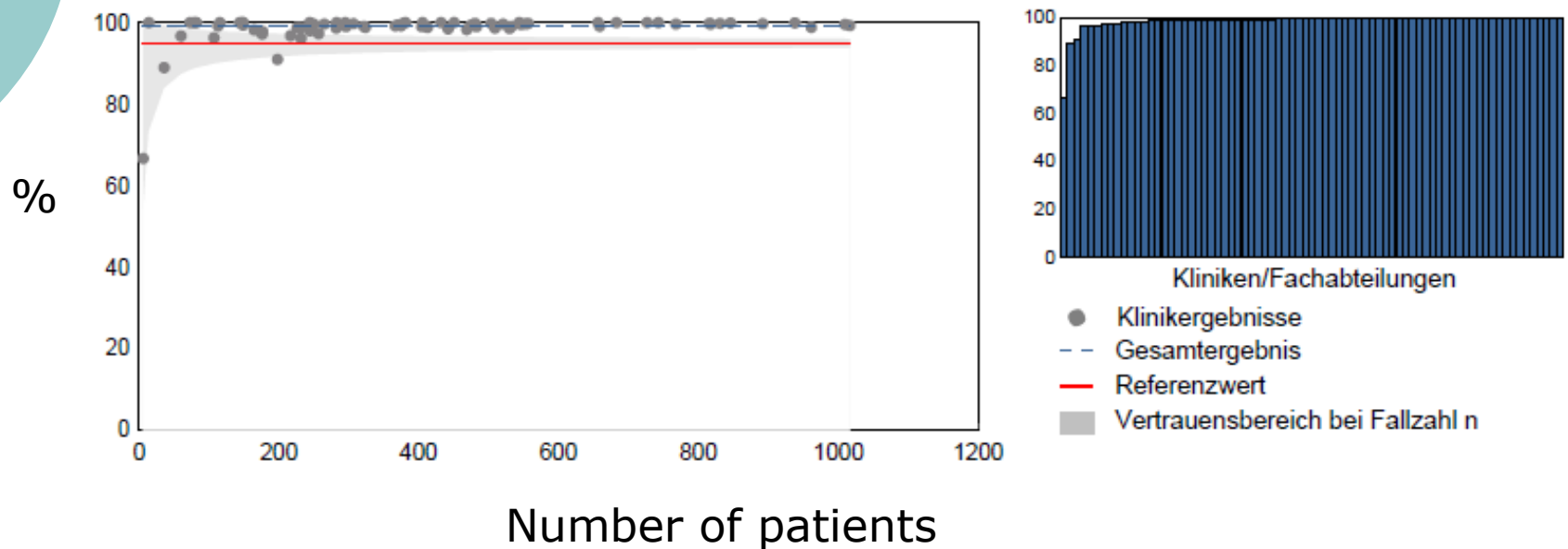
Anticoagulation at discharge in patients with atrial fibrillation



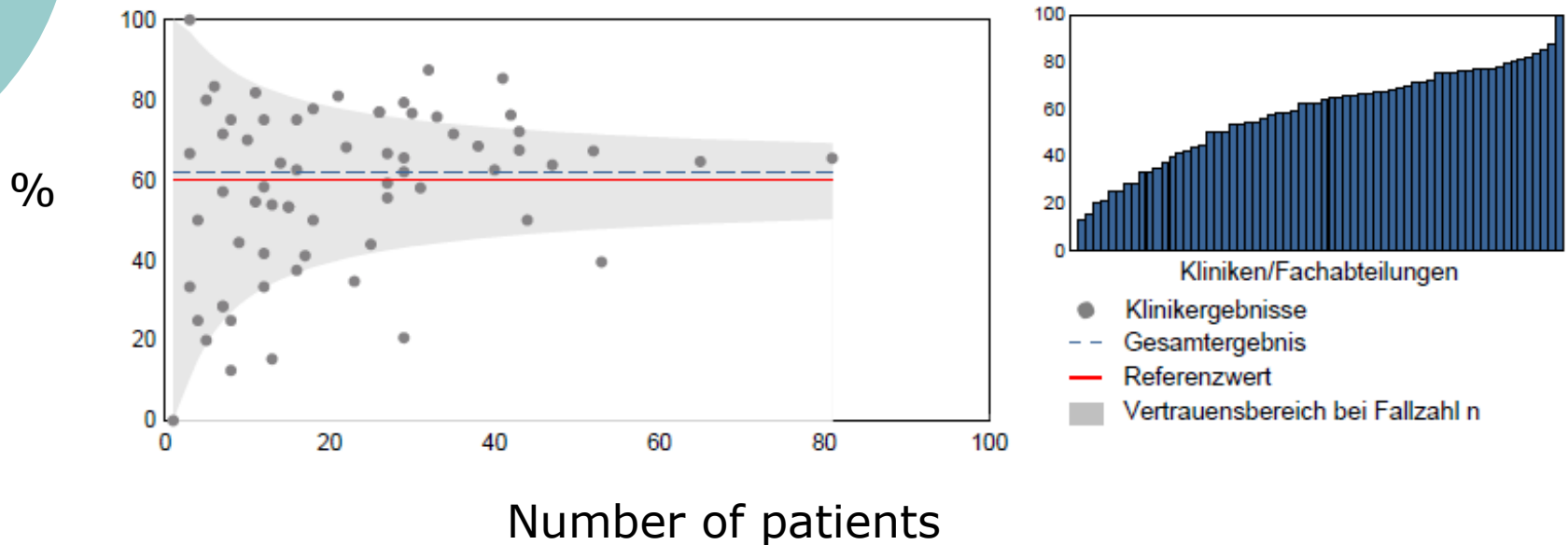
Screening for swallowing disorders



Brain imaging in stroke suspicious patients



Intravenous TPA-therapy in eligible patients





Thank you very much

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Audit activities in Germany

- Established in 1999 as self initiative to combine and standardize existing activities in collecting data on acute stroke care in Germany
- Due to the separation between acute care, rehabilitation care and outpatient care, current audit activities covering only the acute care sector



Audit activities in Germany

- Implementation of audit activities in acute care hospitals is part of legal act in Germany
- Legal entity of regional registers varies, mainly local agreements between health care providers, health insurance companies and medical authorities



Indicators for measuring quality of stroke care

- Evidence-based indicators for measuring quality of acute hospital stroke care developed by multidisciplinary board (Nov 03 to Dec 05), including e.g. German Stroke Register Study Group, German Stroke Society, German Society of Neurology, German Stroke Foundation
- Standardized approach for developing indicators was used based on
 - systematic literature review
 - independent external evaluation of the process and its results
 - prospective pilot study to evaluate the defined indicators in clinical practice



Indicators for measuring quality of stroke care

- Set of 24 indicators to measure performance of acute care hospitals, 7 indicators related to hospital structure, 14 indicators to processes and outcome during hospitalisation and 3 indicators to processes and outcome at follow up
- Covering 3 different health care dimensions (structure, process and outcome) and 3 different treatment phases (pre-hospital, in-hospital/acute, postacute)
- Implementation since mid of 2006 in all participating registers



Audit activities in Germany

- Participation in regional registers within the ADSR is voluntary in most regions but compulsory for Stroke Units certified by the German Stroke Society
- Continuous monitoring of quality of care at regional level by
 - regular feedback of results in 6 or 12 month time intervals
 - benchmarking between participating hospitals



Audit activities in Germany

- Regional data collection is also be used for spin-off projects (e.g. evaluation of health care interventions or regional stroke registers)
- Identifying patterns of stroke care at the national level and addressing health services research questions by a regular combined analyses of existing data
- Combined analyses were funded within the National Competencenet Stroke by the German Ministry of Education and Research

