

# Danish Stroke Register

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# Danish Stroke Register

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- Aim: To improve the quality of patients with acute stroke and TIA treatment by measuring implementation of national clinical guidelines
- Startet in 2003
- Initiated by the owners of the hospitals
- A national multidisciplinary steering committee of stroke specialists was established
  - Doctors, nurses, physio- and occupational therapists, epidemiologist

# Danisk Stroke Register History

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- A set of process indicators were developed from national multidisciplinary stroke guidelines
  - A timeframe for the single indicator was defined
  - Standards of good quality were defined
  - Ambitious with focus on good quality of care – not on what is possible on a given time point for practical or organizational reasons
- One effect indicator was chosen: 30 days mortality
- Goal: > 90 % of Danish Stroke patients in the register

# Process indicators

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## From 2004

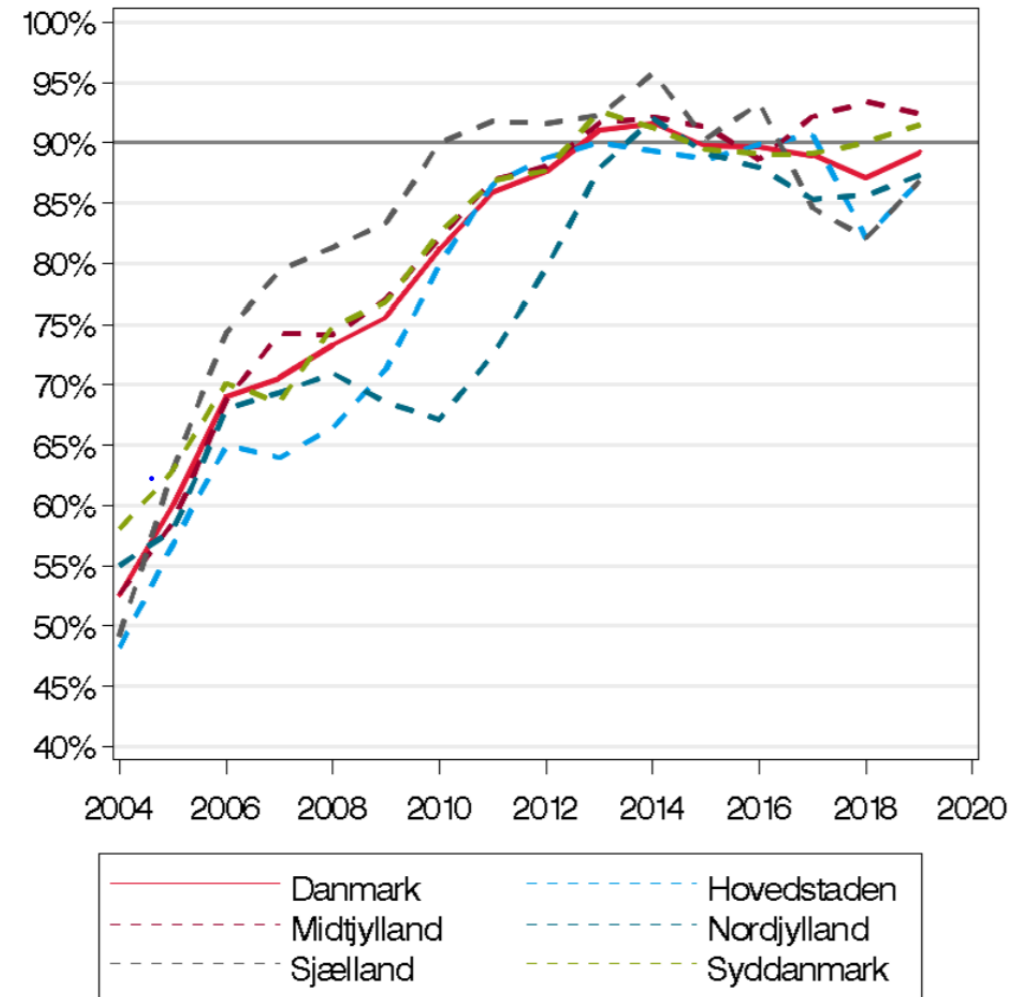
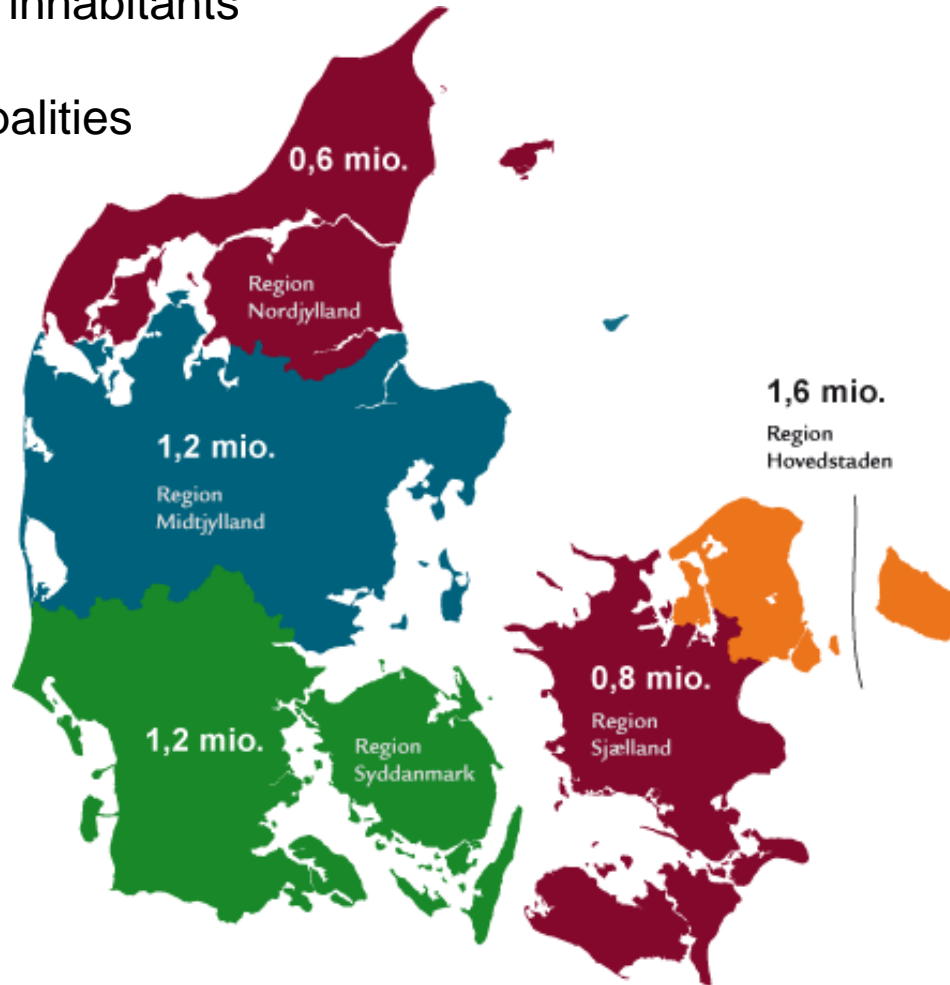
- Admission to stroke unit (day 1)
- Initiation of antiplatelet therapy (day 2)
- Initiation of anticoagulation in patients with atrial fibrillation (day 14)
- CT/MRI (day 1)
- **Evaluation physiotherapist (day 2)**
- Evaluation occupational therapist (day 2)
- Estimation of risk of undernutrition (day 1)
- Screening for dysphagia (day 1)
- Mobilisation (day 1)
- **Operation of symptomatic carotid stenosis (within 14 days)**

## From 2011

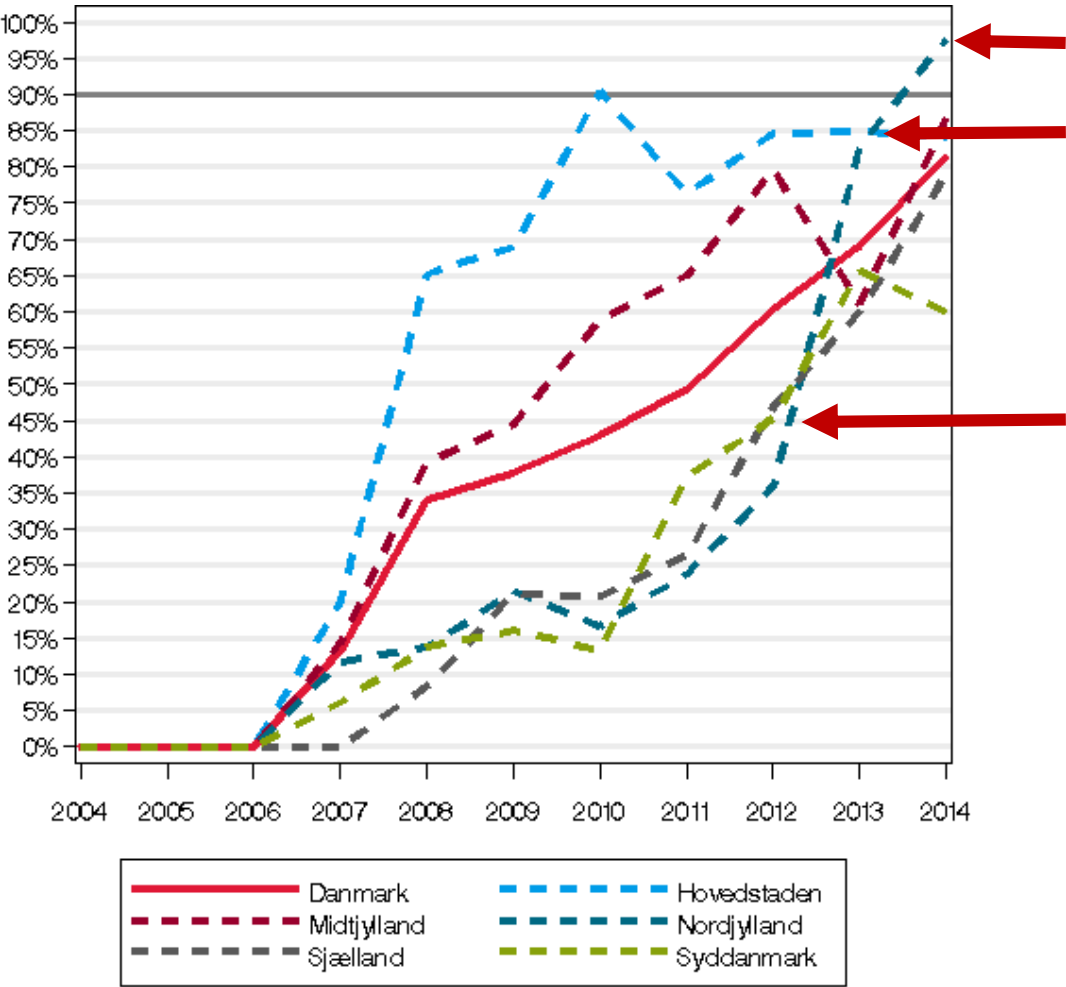
- Thrombolysis within an hour
- **Proportion of ischemic stroke patients receiving reperfusion therapy**
- Reperfusion with endovascular therapy
- Functional outcome after 3 months in patients receiving endovascular therapy

# Evaluation physiotherapist day 2. Standard 90 %

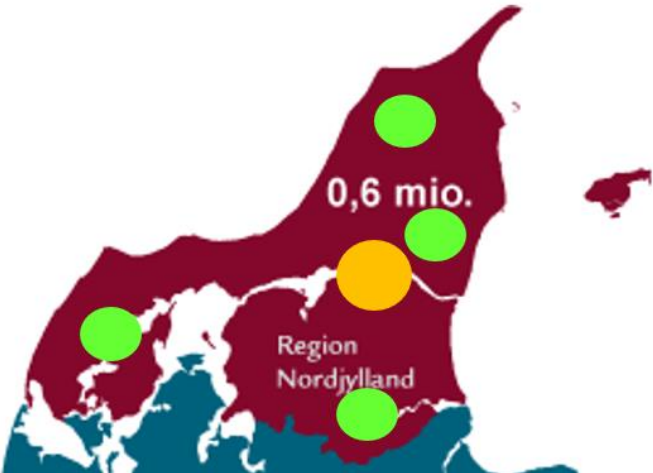
Denmark:  
5.8 million inhabitants  
5 regions  
98 municipalities



# Operation af symptomatic carotid stenosis within 14 days after admission to hospital



2012



# Reperfusion therapy: Thrombolysis and Thrombectomy

- Thrombolysis fully implemented in Denmark 2008
- Quality of reperfusion therapy monitored in Danish Stroke Register since 2011

Proportion of patients with acute ischemic stroke receiving thrombolysis	
2011	13 %
2012	12 %
2013	14 %
2014	15 %

2014

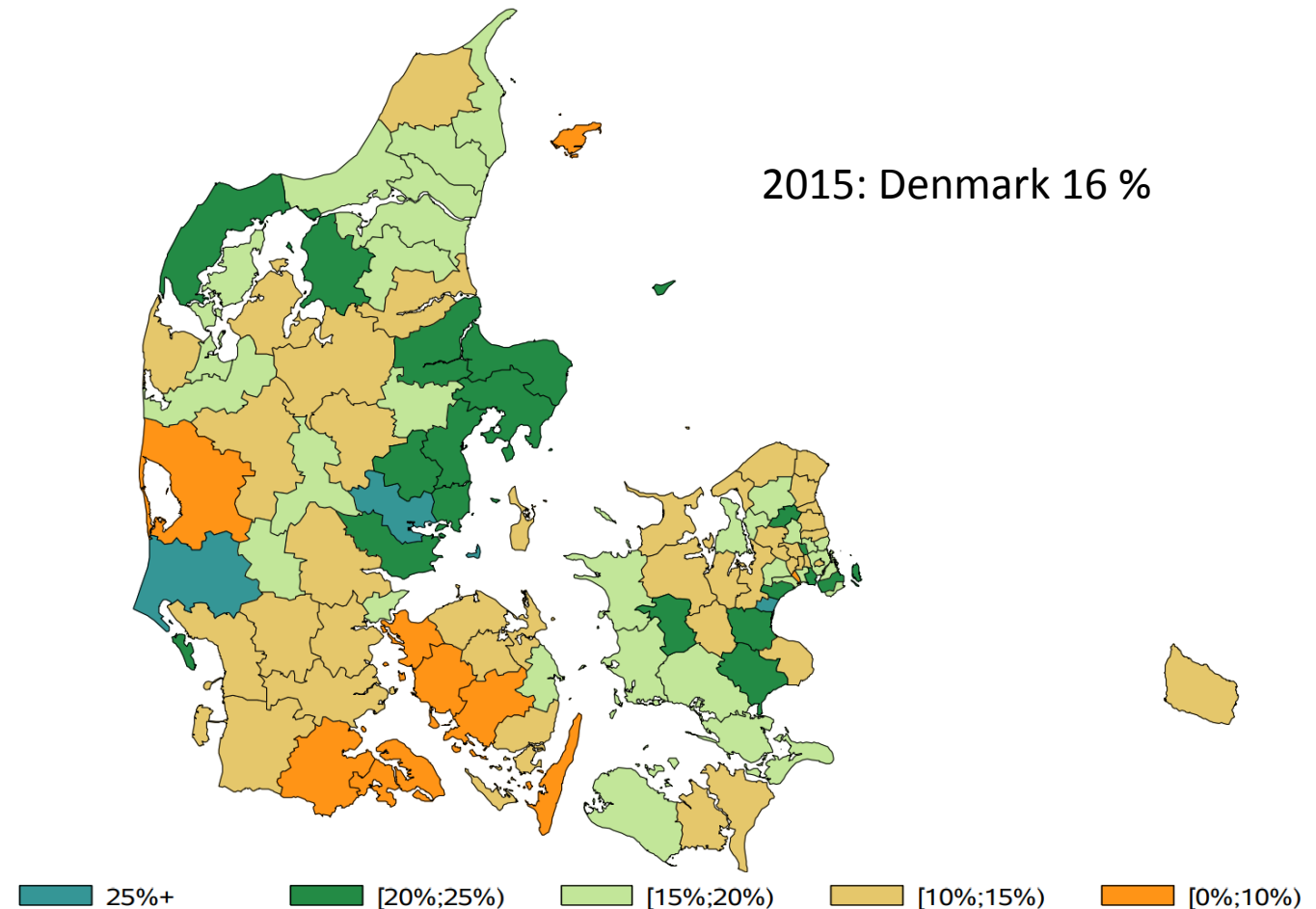
Variation between regions: 11-18%

Variation municipalities: 4-39%

# Presentation of data matters!

Proportion of patient with acute ischemic stroke receiving reperfusion therapy: Standard 10 %

	Standard	Tæller/ opfyldt	Tæller/ nævner	Uoplyst antal (%)	Aktuelle år 2018 % 95% CI
<b>Hovedstaden</b>					
Albertslund	ja	9 / 47	0 (0)	19	(9 - 33)
Allerød	ja	10 / 50	0 (0)	20	(10 - 34)
Ballerup	ja	23 / 95	0 (0)	24	(16 - 34)
Bornholms Regionskommune	ja	21 / 85	0 (0)	25	(16 - 35)
Brøndby	nej	14 / 106	0 (0)	13	(7 - 21)
Dragør	ja	8 / 40	0 (0)	20	(9 - 36)
Egedal	ja	33 / 91	0 (0)	36	(26 - 47)
Fredensborg	ja	17 / 91	0 (0)	19	(11 - 28)
Frederiksberg	ja	35 / 137	0 (0)	26	(18 - 34)
Frederikssund	ja	27 / 134	0 (0)	20	(14 - 28)
Furesø	ja	33 / 104	0 (0)	32	(23 - 42)
Gentofte	ja	26 / 110	0 (0)	24	(16 - 33)
Gladsaxe	ja	37 / 121	0 (0)	31	(23 - 40)
Glostrup	ja	19 / 70	0 (0)	27	(17 - 39)
Gribskov	ja	20 / 116	0 (0)	17	(11 - 25)



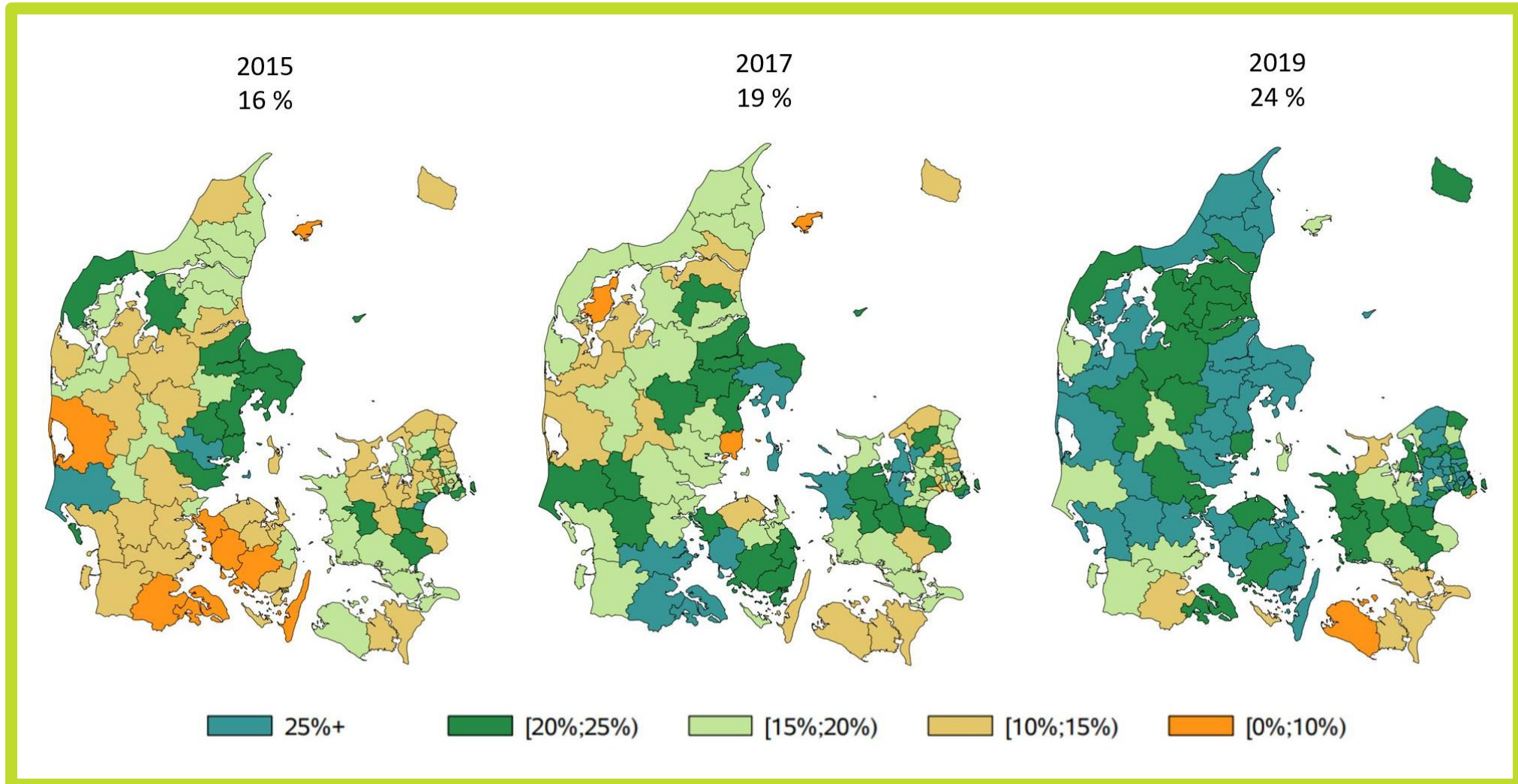


# Reperfusion therapy

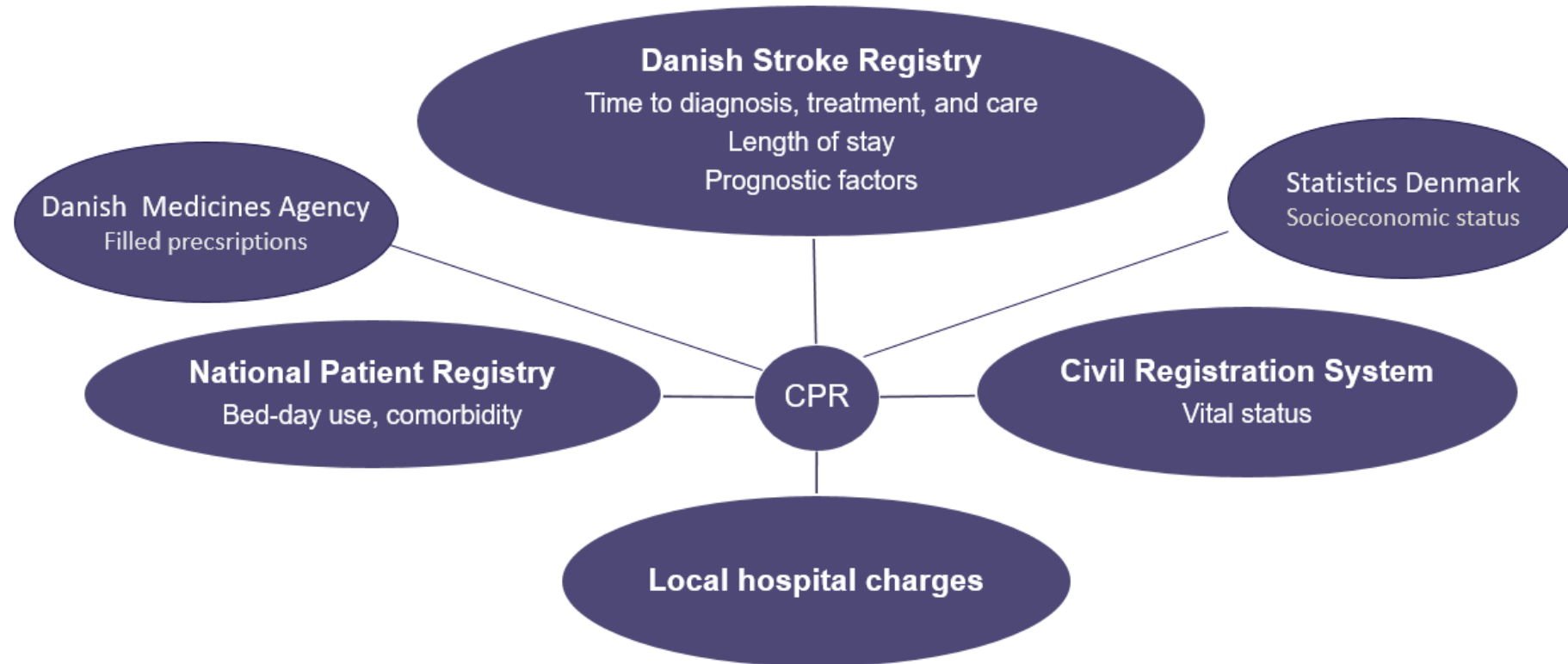
- National Quality programme
  - Learning and Quality teams in every region
  - Introduction to the PDSA method
  - National meetings with exchange of experiences
- Since 2006 Thrombolysis within 4½ hours
- 2015: Thrombectomy within 6 hours
  - The standard was increased to 20 %
- 2018: Thrombectomy 6-24 hours
- 2018: Thrombolysis in patients with unknown onset
  - The standard was increased to 25 %



# Proportion of patient with acute ischemic stroke receiving reperfusion therapy



# Data sources



# Effectiveness: Processes of care and 30 days mortality

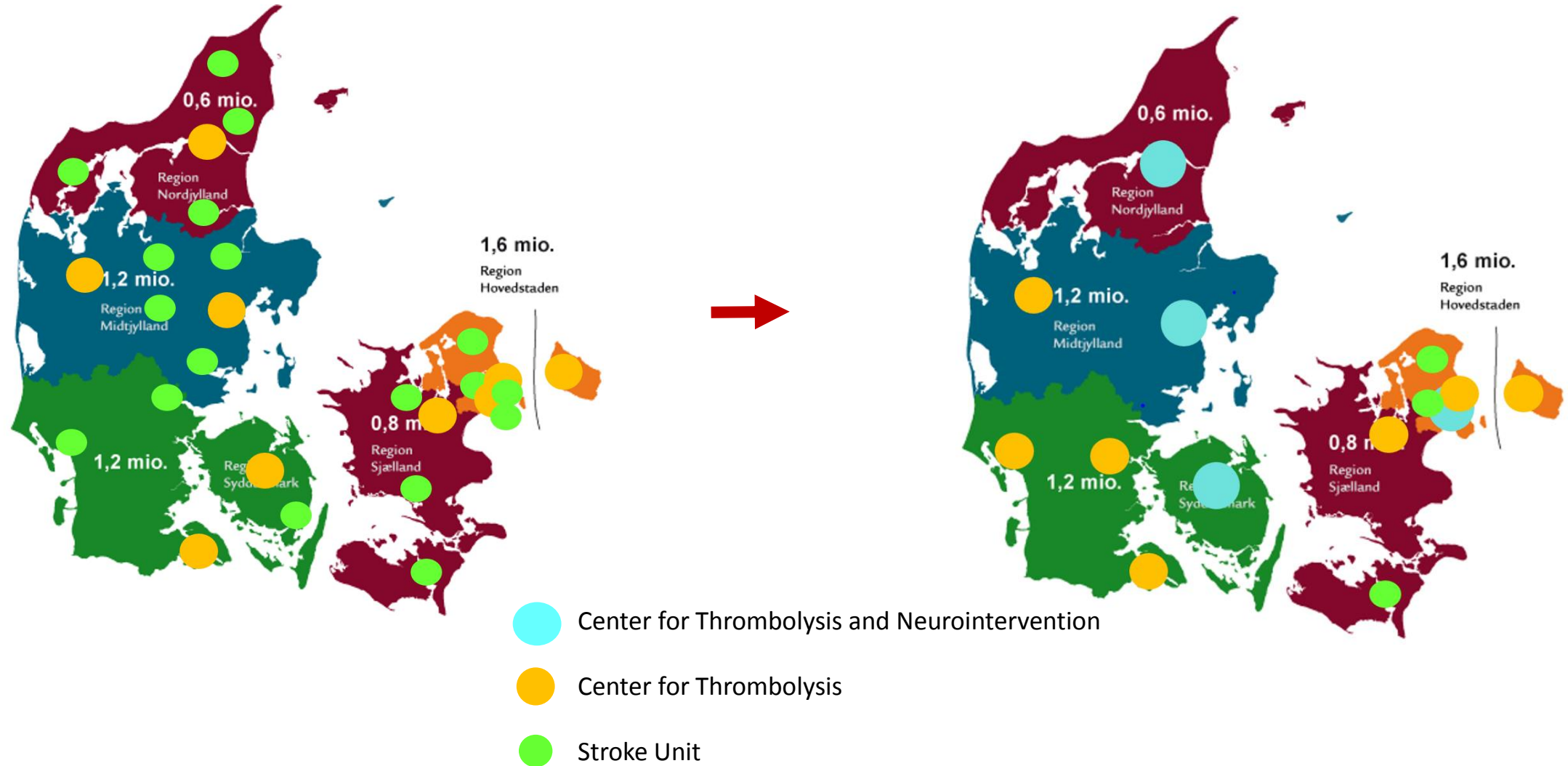
Number of Process Indicators fulfilled	Mortality (%)	Adjusted MRR (95% CI)
0	51 / 626 (8.2)	1.00 (reference)
1	103 / 1323 (7.8)	1.07 (0.65 to 1.49)
2	111 / 1950 (5.7)	0.83 (0.51 to 1.15)
3	95 / 2305 (4.1)	0.60 (0.36 to 0.84)
4	109 / 2450 (4.5)	0.63 (0.38 to 0.87)
5	81 / 2581 (3.1)	0.48 (0.29 to 0.68)
6	46 / 1519 (3.0)	0.45 (0.24 to 0.66)

# Effectiveness: Selected processes of care and length of stay/hospital costs

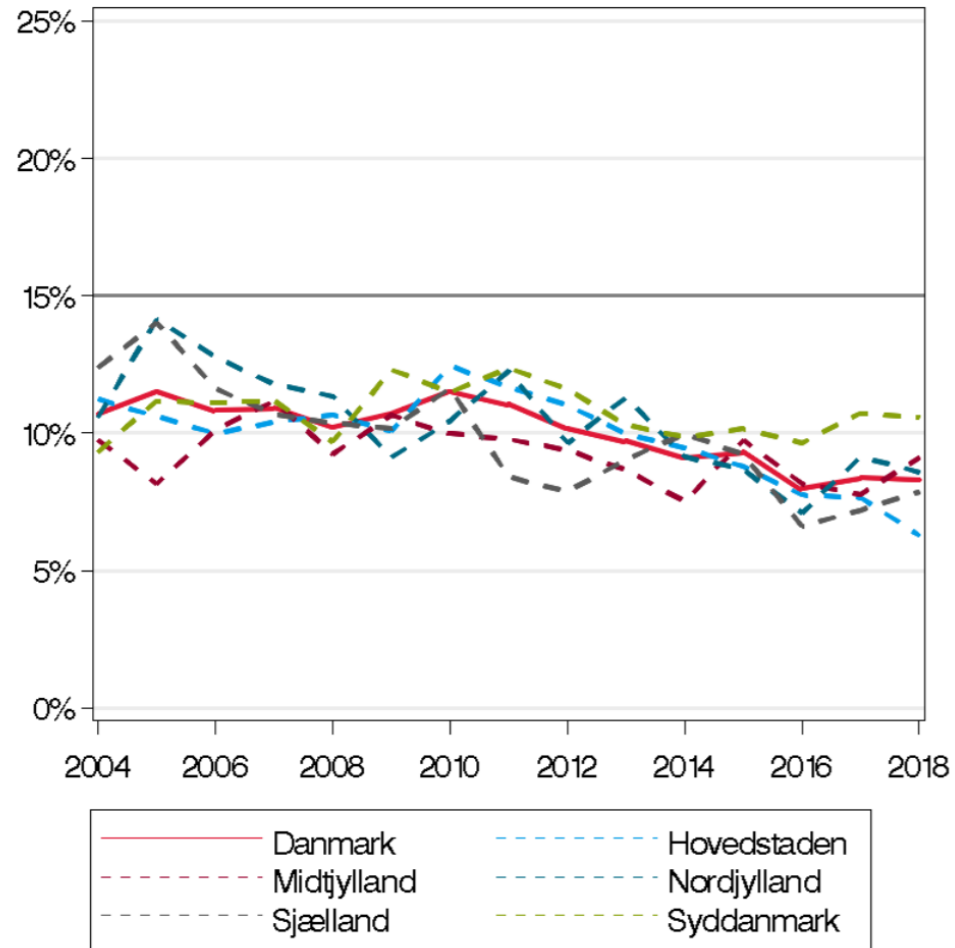
Process of care limit, days)	(time	Adjusted ratio, length of stay	Adjusted ratio, hospital cost	Potential bed-day savings (USD)
Stroke unit (2)		0.71 (0.65-0.77)	0.65 (0.50-0.85)	3351 (2537-4165)
Antiplatelet therapy (2 )		0.80 (0.73-0.87)	0.77 (0.66-0.90)	2169 (1295-3043)
Anticoagulant therapy (14)		0.78 (0.62-0.98)	0.84 (0.55-1.30)	2178 (-667-5024)
CT/MRI scan (2/1)		0.82 (0.74-0.91)	0.86 (0.72-1.02)	1099 (471-1727)
Physiotherapy (2)		0.87 (0.81-0.93)	0.80 (0.73-0.87)	1414 (1124-1703)
Occupational therapy (2)		0.85 (0.80-0.91)	0.80 (0.74-0.87)	1442 (1095-1789)
Nutritional assessment (2)		0.83 (0.77-0.90)	0.79 (0.69-0.91)	2489 (1917-3062)
Swallowing assessment (2/1)		0.78 (0.69-0.87)	0.78 (0.69-0.88)	2257 (1946-2569)
Mobilization (2/1)		0.67 (0.61-0.73)	0.70 (0.62-0.79)	3527 (2847-4207)

*Med Care. 2009;47:575-82*

# Stroke organisation Denmark 2010 - 2020



# 30 day mortality has decreased





# Future directions

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## Rehabilitation

- Plan for rehabilitation to primary care
- Functional outcome (modified Rankin Scale) for all patients after 3 months (one year?)

## Subarachnoid hemorrhage included

- The four Danish Departements of Neurosurgery have become active in the register



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# Thank you