Geographical Variation in Use of Intensive Care in Denmark: A Nationwide Study

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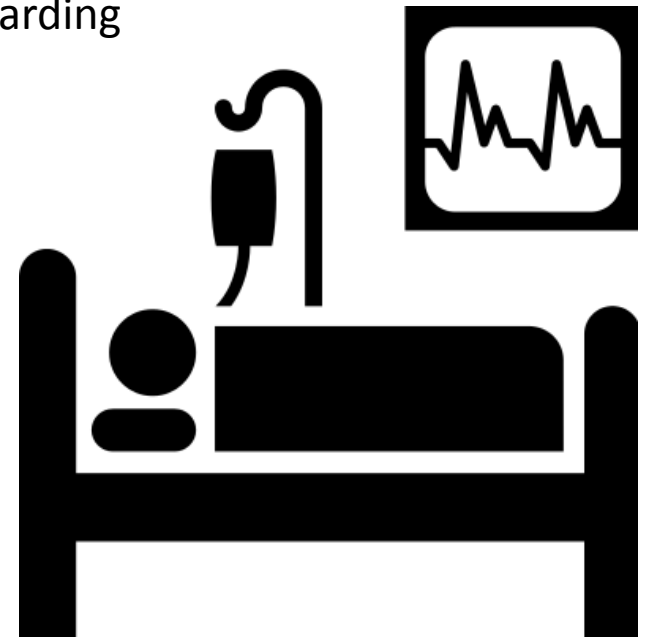[2]Aarhus University Hospital, Department of Anaesthesiology and Intensive Care, Aarhus University Hospital

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Introduction

- Intensive care constitutes a high proportion of healthcare costs

- Studies show large variation between countries regarding capacity and access to intensive care units

- Lack of well-defined triage criteria in Europe

- Tax-supported healthcare system in Denmark may show limited variation compared to previous US studies

Aim

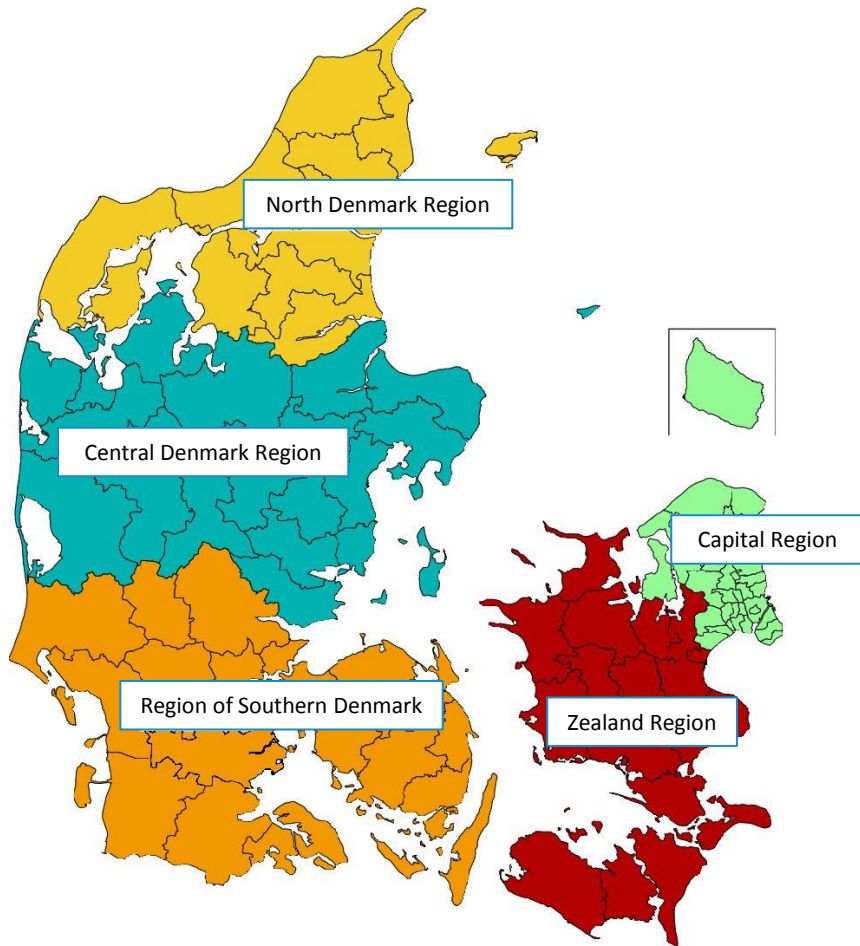Examine geographical variation in use of intensive care between regions and municipalities in Denmark

Objectives

1) Number of ICU patients per inhabitant

2) Proportion of ICU patients receiving
   - Mechanical ventilation
   - Non-invasive ventilation
   - Acute renal replacement therapy
   - Treatment with inotropes/vasopressors

Study design and setting

North Denmark Region

Central Denmark Region

Capital Region

Region of Southern Denmark

Zealand Region

Nationwide cross-sectional study

Patients living in Denmark, 2008-2012

Population statistics, Statistics Denmark

Structure of Danish health care system
- 98 municipalities
- 5 regions

ICU admissions and interventions

Danish Intensive Care Database

- Nationwide clinical quality database

- Holds data on intensive care admissions

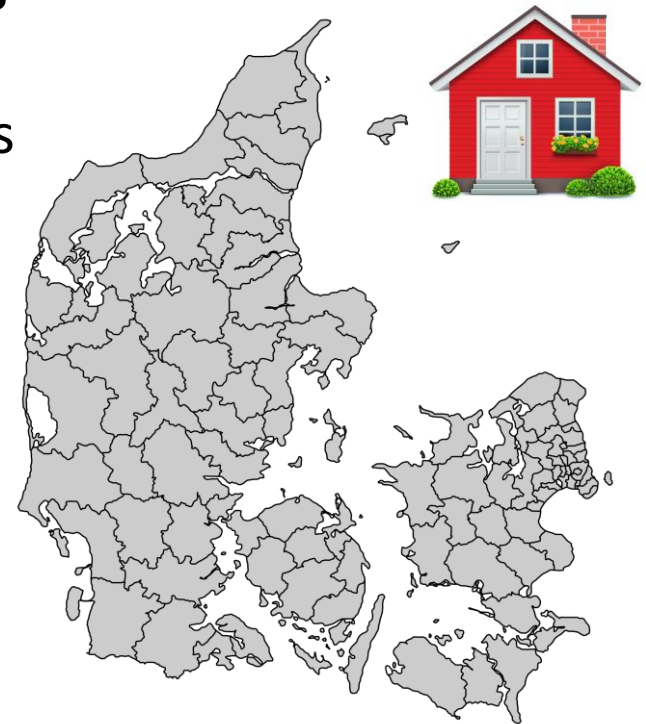- Based on data from the Danish National Registry of Patients

Recidency

Danish National Registry of Patients

- Data collection from Danish hospitals

- Holds data on:
  Dates of all admissions and discharges
  Discharge diagnoses
  Surgical procedures
  Diagnostic procedures
  Residences

Statistical methods

Computed for the whole country and seperately for the 98 municipalities and the 5 regions:

- **Standardized number of ICU patients per 1,000 person-years**
  Age- and gender standardized

- **Standardized proportion of ICU patients receiving specific interventions**
  Age-, gender- and comorbidity standardized

Results

	2008-2012
Patients admitted to ICU, n	117,370
Inhabitants, person-years	26,009,602

Results

Variation in number of patients admitted to ICU *(Regions)*

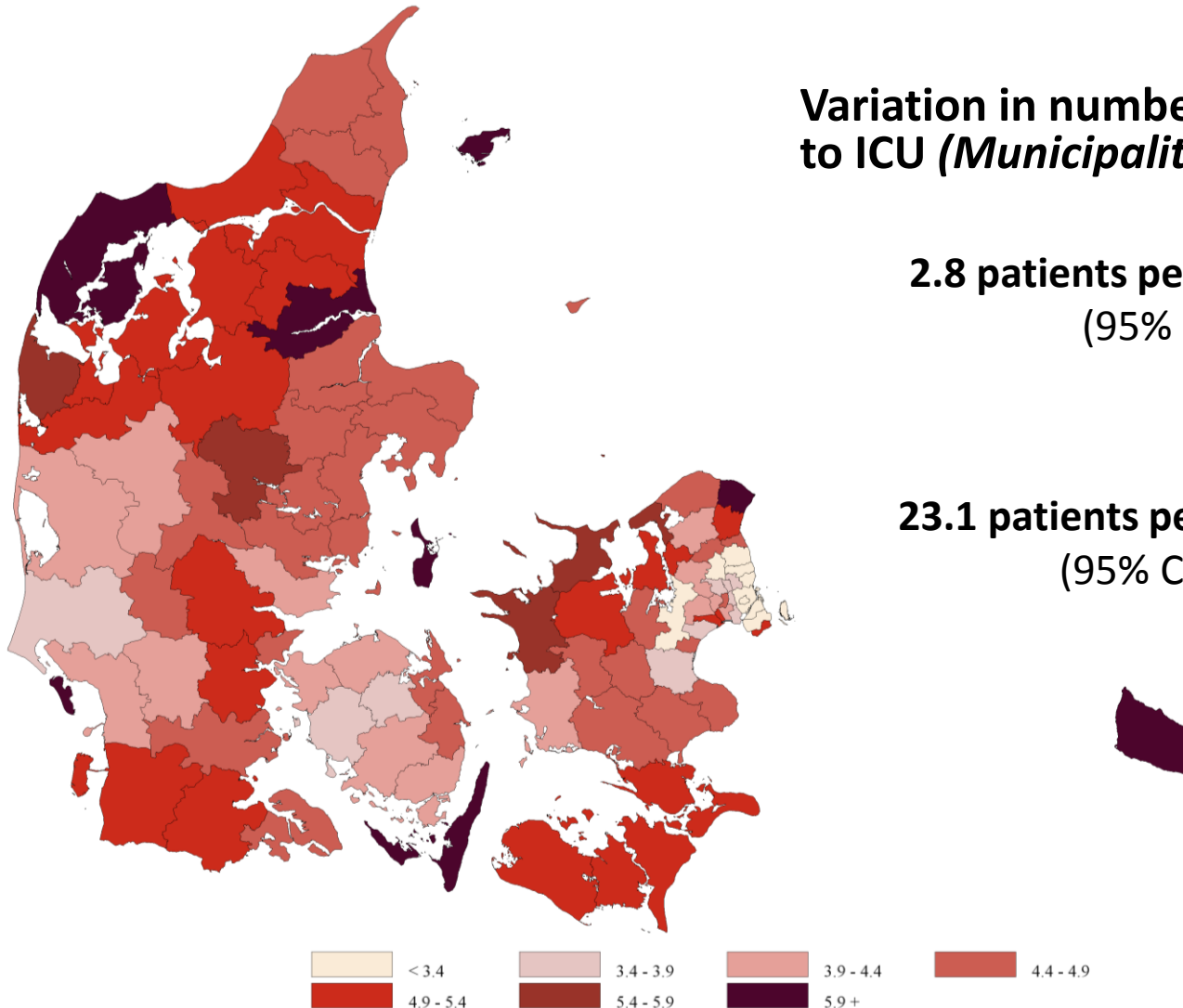| Standardized number of ICU patients per 1,000 person-years						
	Denmark	**Regions**				
		North Denmark Region	*Central Denmark Region*	*Region of Southern Denmark*	*Capital Region*	*Zealand Region*
ICU patients per 1,000 person-years[a] (95% CI)	4.3 (4.2; 4.3)	5.1 (5.0; 5.2)	4.6 (4.6; 4.7)	4.2 (4.1; 4.2)	3.7 (3.6; 3.7)	4.4 (4.3; 4.4)

[a] Age- and gender standardized

Results

Variation in number of patients admitted to ICU *(Municipalities)*

2.8 patients per 1,000 person-years
(95% CI, 2.8; 3.0)

to

23.1 patients per 1,000 person-years
(95% CI, 13.0; 33.1)

Legend:
- < 3.4
- 3.4 - 3.9
- 3.9 - 4.4
- 4.4 - 4.9
- 4.9 - 5.4
- 5.4 - 5.9
- 5.9 +

Results

Variation in use of intensive care interventions

Standardized proportion of treatments with specific intensive care interventions						
	Denmark	**Regions**				
		North Denmark Region	*Central Denmark Region*	*Region of Southern Denmark*	*Capital Region*	*Zealand Region*
Mechanical ventilation[b], % (95% CI)	41 (41; 41)	43 (42; 44)	37 (37; 38)	41 (40; 42)	45 (44; 46)	39 (38; 39)
Non-invasive ventilation[b], % (95% CI)	12 (12; 13)	9 (8; 9)	12 (12; 13)	15 (14; 15)	12 (12; 12)	14 (14; 15)
Acute renal replacement therapy[b], % (95% CI)	6 (6; 6)	5 (4; 5)	5 (5; 6)	6 (6; 6)	8 (7; 8)	6 (6; 7)
Inotropes/vasopressors[b], % (95% CI)	33 (33; 33)	34 (33; 35)	31 (31; 32)	38 (37; 38)	31 (30; 32)	33 (32; 33)

[b] Age-, gender-, and comorbidity standardized

Possible explanations

- Differences in clinical practice and culture

- Differences in registration and triage criteria

- Differences in capacity of ICUs and regular wards

- Differences in composition of the population and their morbidity patterns

Conclusion

There is geographical variation in use of intensive care

- Patients admitted to intensive care units

- Use of intensive care interventions