Geographical variation in acute readmission among hip fracture patients in Denmark

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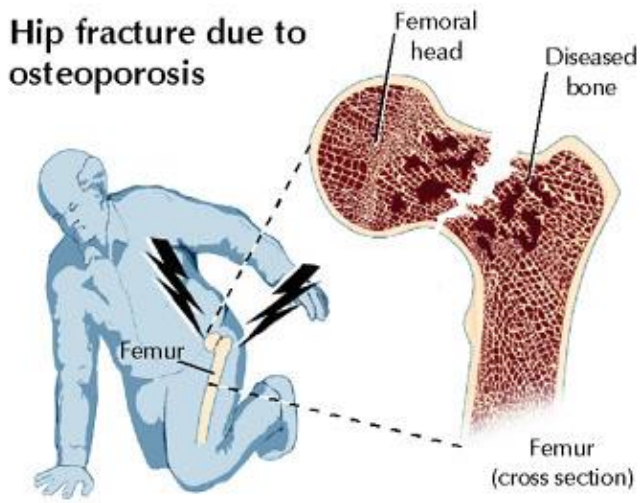
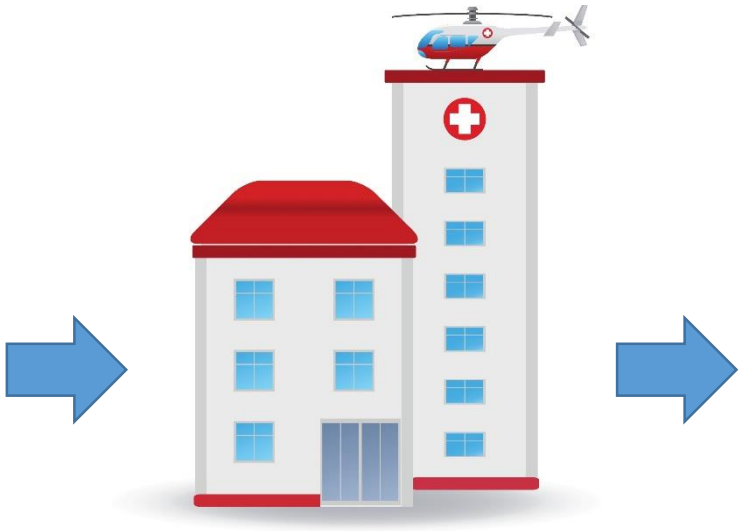
Introduction





All medical emergencies including hip fracture, are exclusively treated at public hospitals

Regions responsible for hospitals

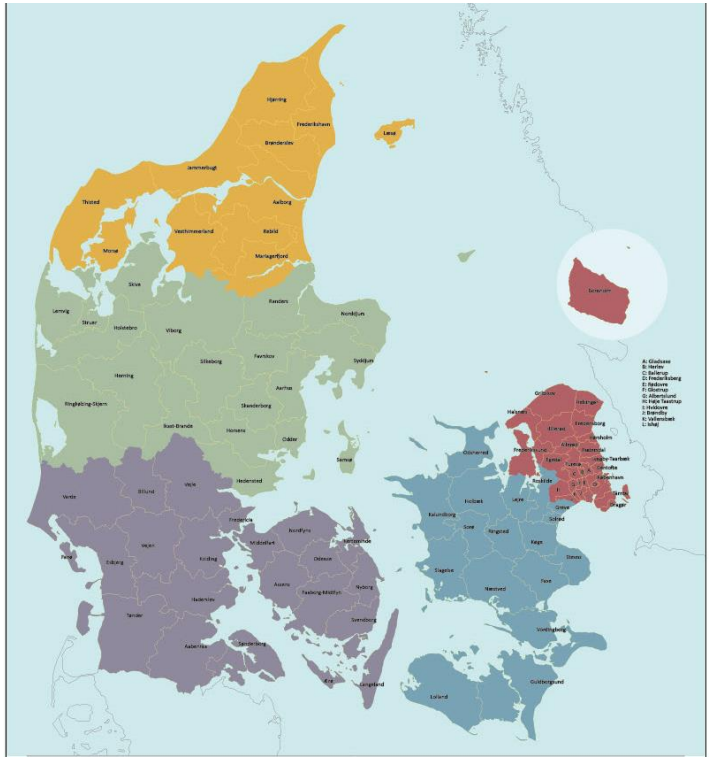
Guidelines for hospital care

Municipality responsible for nusing care, Rehabilitation and nursing homes

No guidelines for care

Objective:

Is the patient´s municipality of residence linked to readmission after hip fracture



Methods

The Danish Civil Registration System

The Danish National patient registry

The Danish Multidisciplinary hip fracture registry

Employment registry Statistic Denmark

Education registry Statistic Denmark

Immigration registry Statistic Denmark

Family income registry Statistic Denmark

56,666 Hip fracture patients

- **Aged 65 years**
- **Period: 2007-2016**

Definitions

Readmission :

- Defined as an acute all-cause readmission to any Danish hospital within 30 days after discharge for patients discharged alive after hip fracture.

Patient characteristic included :

- Sex
- Age (65-75 years, 75-85 years and >85)
- Fracture type (medial, pertrochanteric, subtrochanteric)
- Nutrition status (Body Mass Index)
- Comorbidity (charlson comorbidity index; low, medium high)
- Family mean income (four quartiles of increasing income)
- Highest obtained education (ground school, more than ground school, university)
- Cohabiting status (Living with a partner or living alone)

Hospital characteristic

- **Quality of care reflected by seven process performance measures** :
  1. Systematic pain assessment
  2. Being mobilized within 24 hours postoperatively
  3. Basic mobility assessment at admission
  4. Basic mobility assessment at discharge
  5. Post discharge rehabilitation program
  6. Treatment to prevent future osteoporotic fracture
  7. Initiation of treatment to prevent future fall accidents.

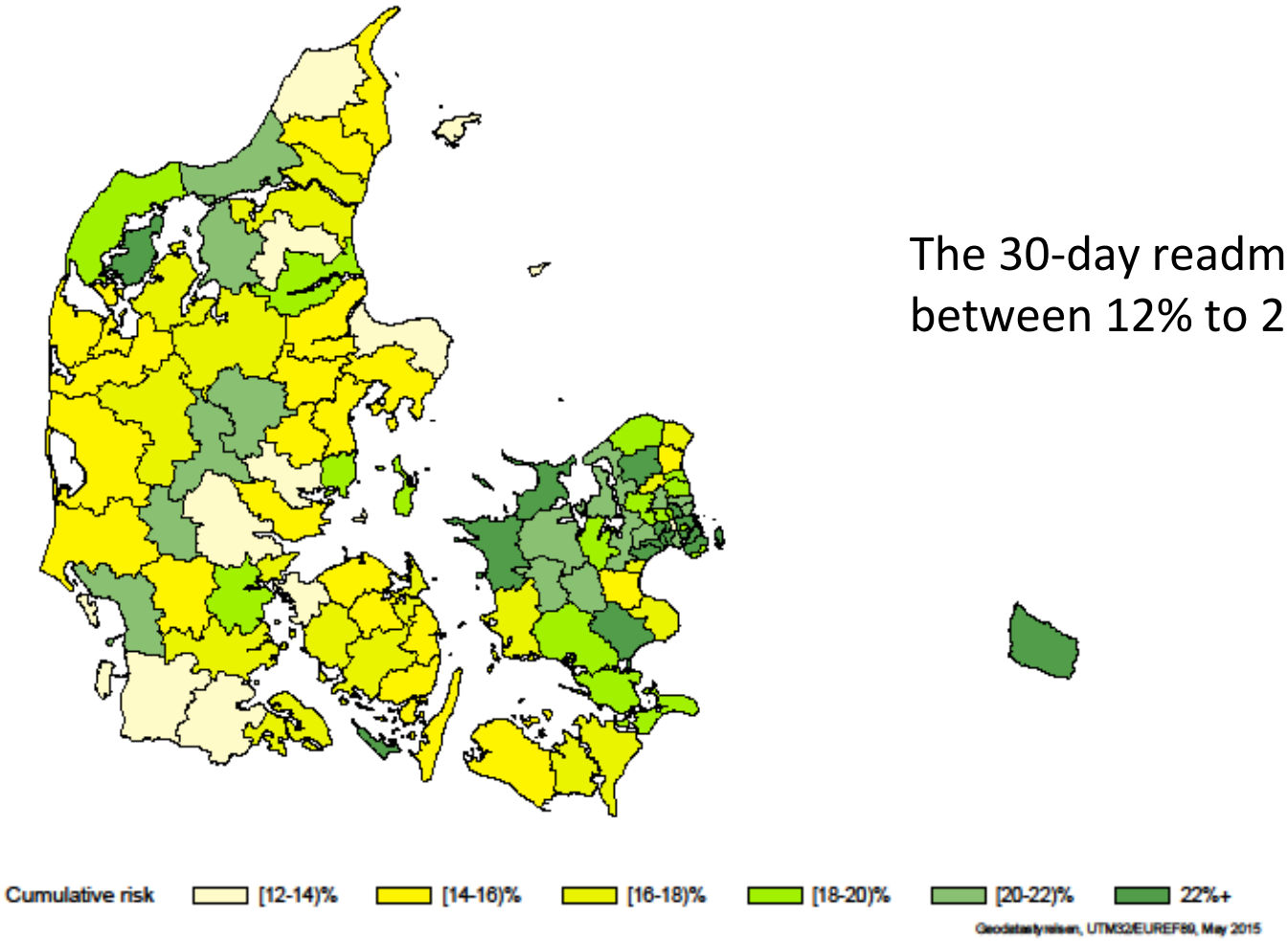
  Receiving quality of care categorized as (0-50 % 50-75 % and 75-100 %)

- **Hip fracture unit volumen** (<151, 152-350 and >350)

- **Time to surgery** (<24 hours, 24-48 hours, >48 hours)

- **Orthogeriatric specialization** (orthopaedic unit or orthogeriatric unit)

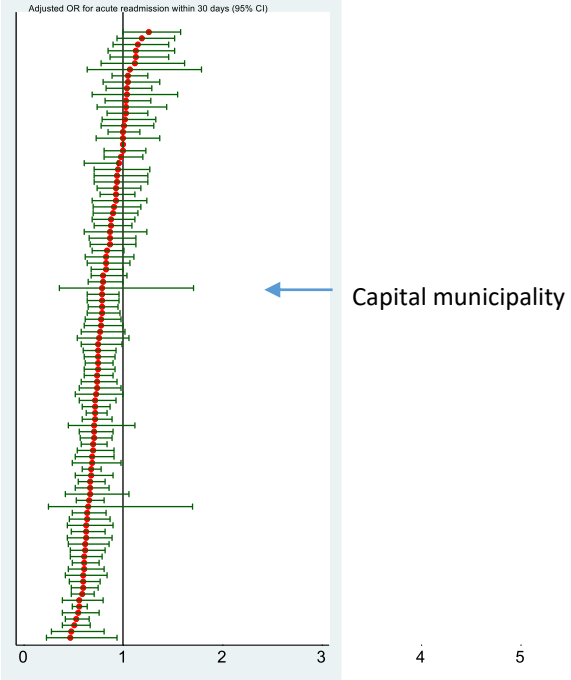
The cumulative risk for acute readmission



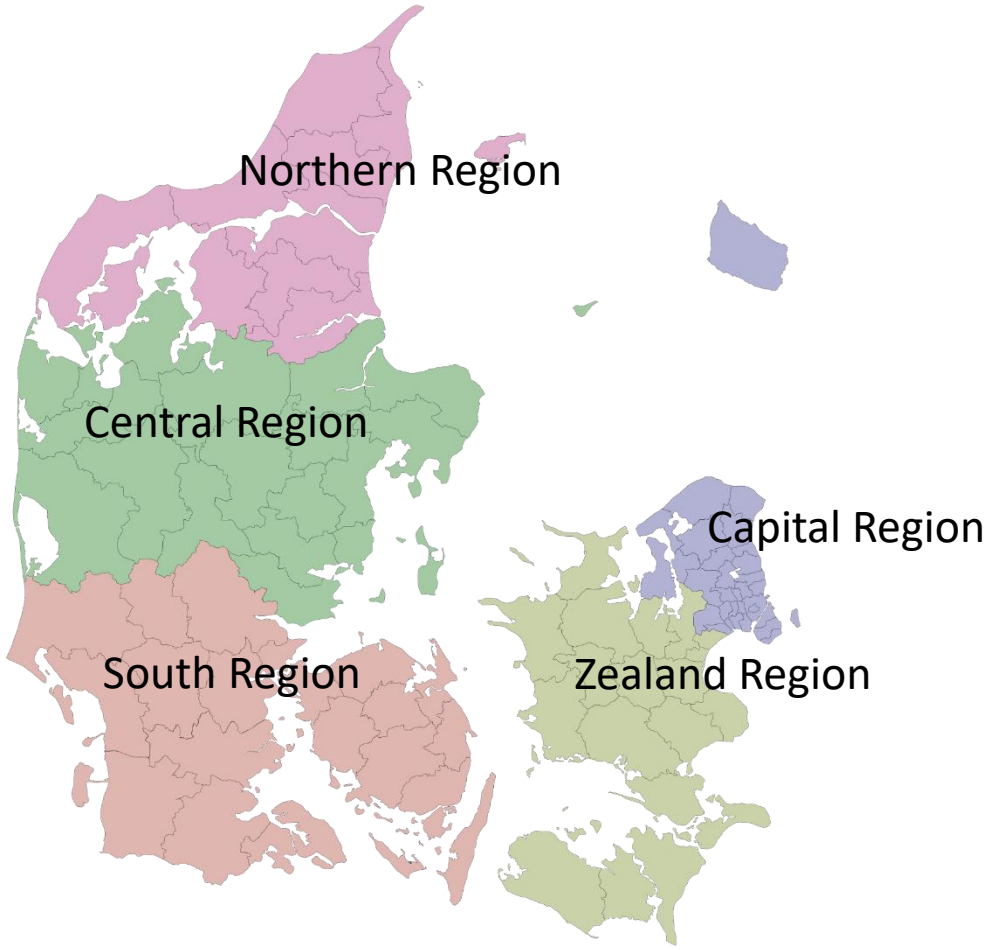
The 30-day readmission risk after hip fracture varied between 12% to 25 % for the 98 municipalities

Adjusted OR for readmission in the municipalties

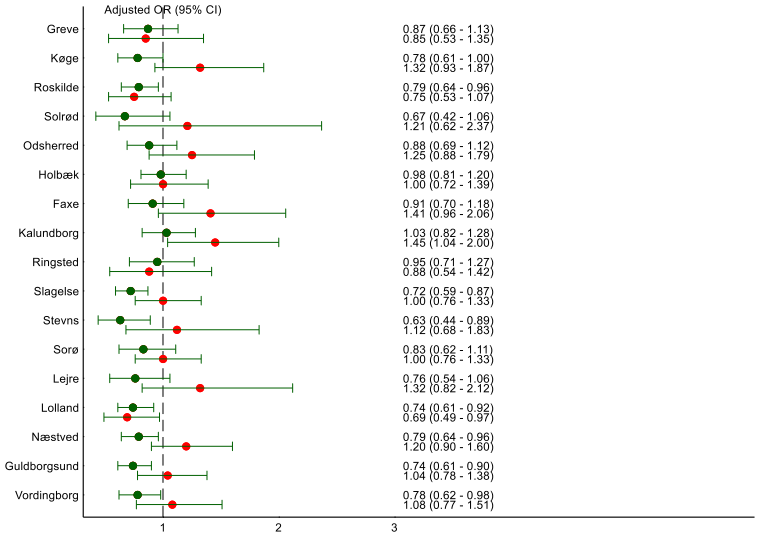
- 44 municipalities still had lower readmission rate compared to the capital municipality.
- The OR varied between
  0.75 (0.58-0.99) to 0.47 (0.23-0.94)
- Still variation after adjustment for hospital characteristics.



Interpretation of geographical variation in readmission risk



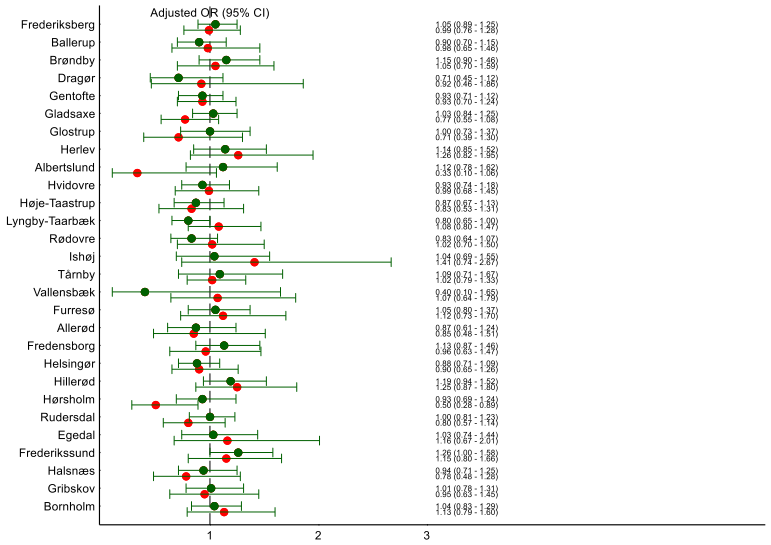
Adjusted OR for readmission (green) and mortality (red) within 30 days



Zealand Region

Capital municipality is reference

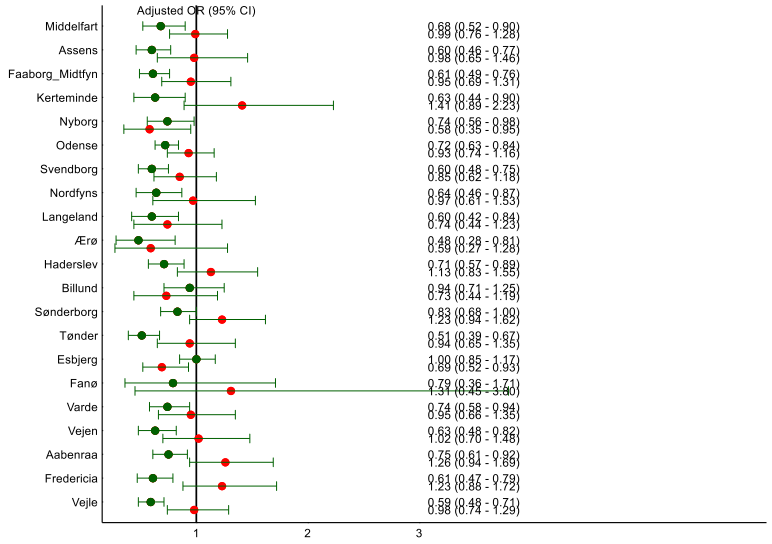
Adjusted OR for readmission (green) and mortality (red) within 30 days



Capital Region

Capital municipality is reference

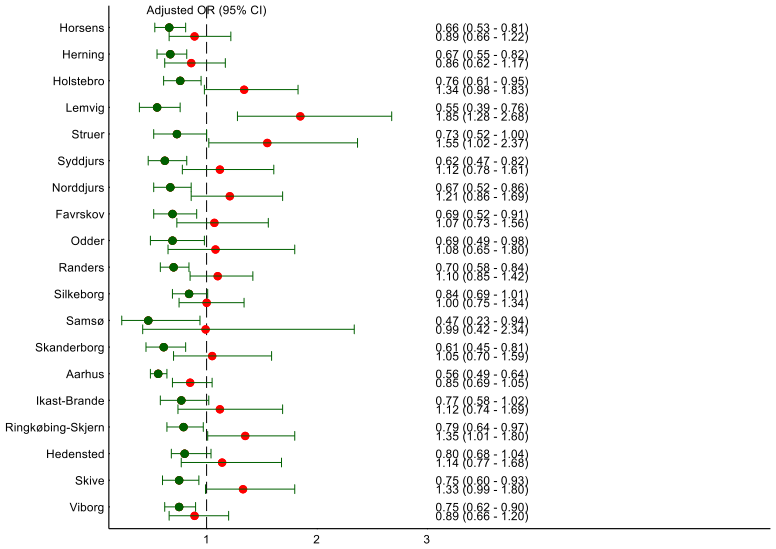
Adjusted OR for readmission (green) and mortality (red) within 30 days



Southern Denmark Region

Capital municipality is reference

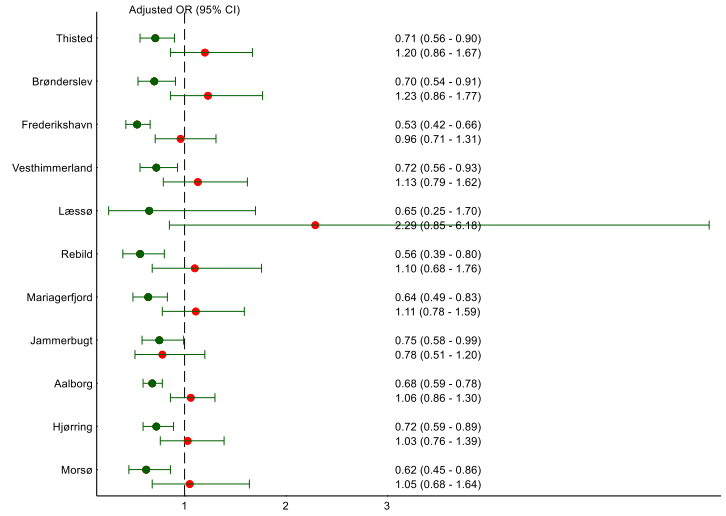
Adjusted OR for readmission (green) and mortality (red) within 30 days



Central Denmark Region

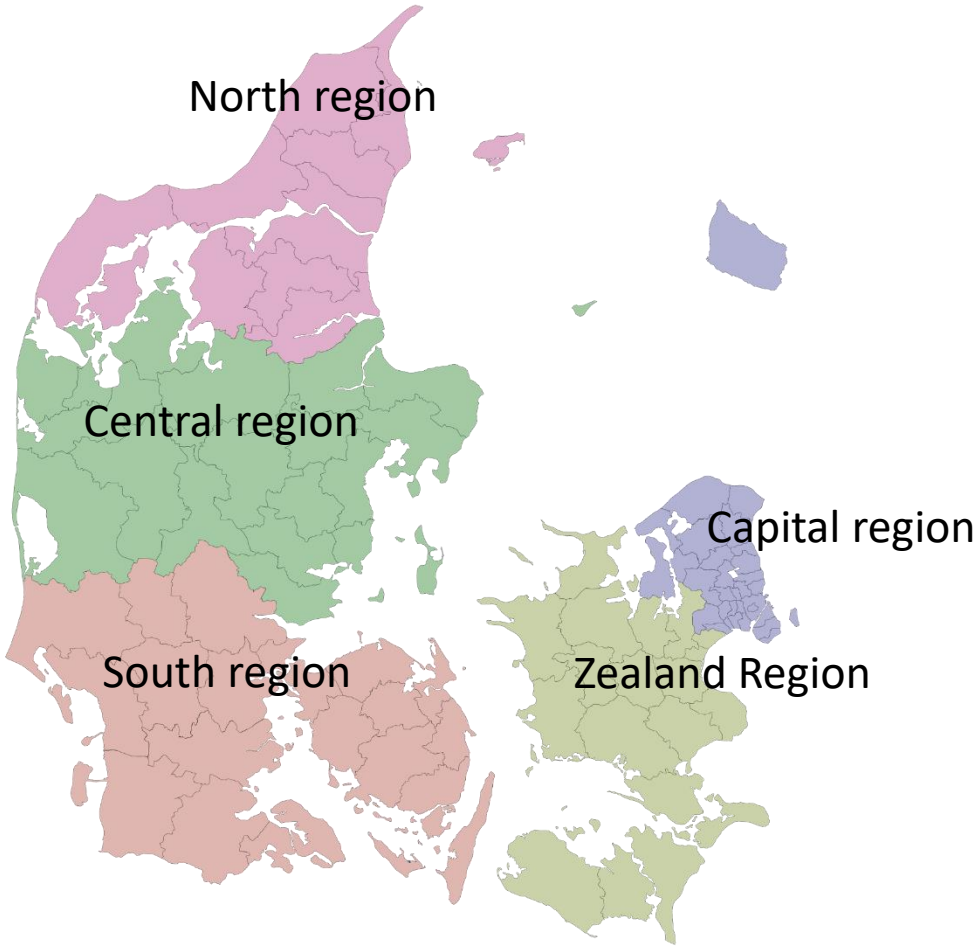
Capital municipality is reference

Adjusted OR for readmission (green) and mortality (red) within 30 days



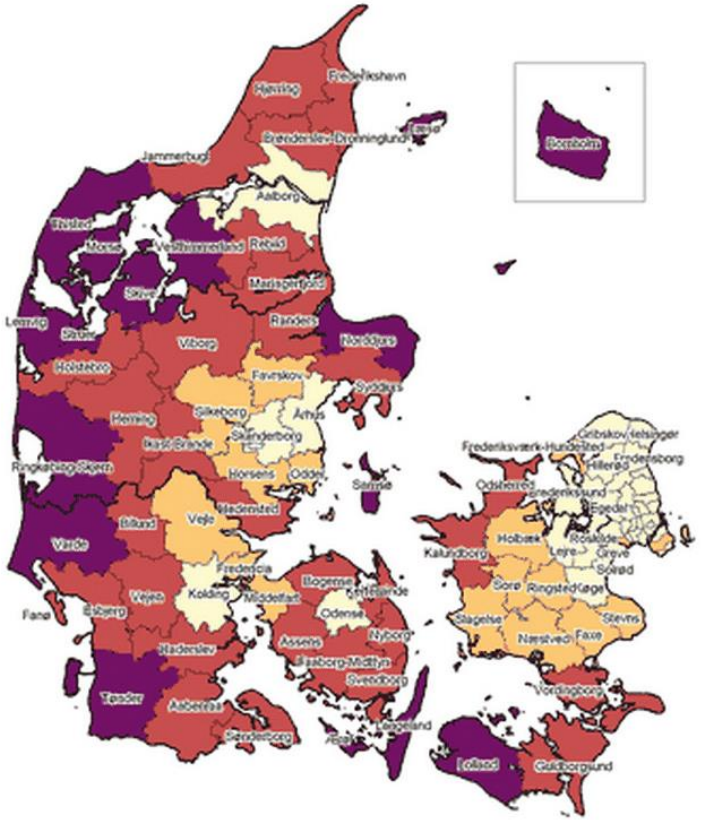
North Denmark Region

The five region



Type of municipality

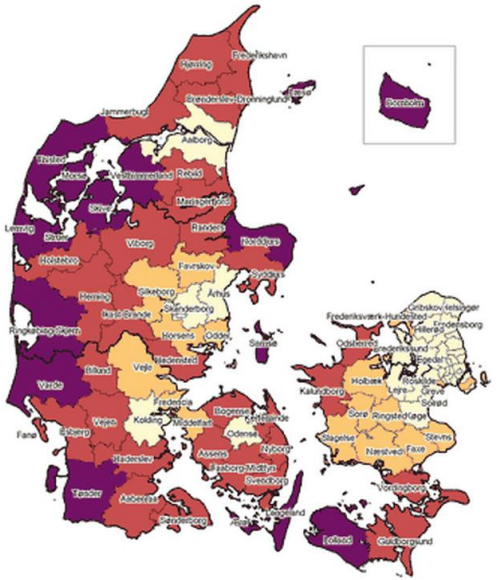
Urban municipalities = White areas
Between uran and rural municipalities = yellow areas
Rural municipalities = red areas
Peripheral municipalities = purple areas



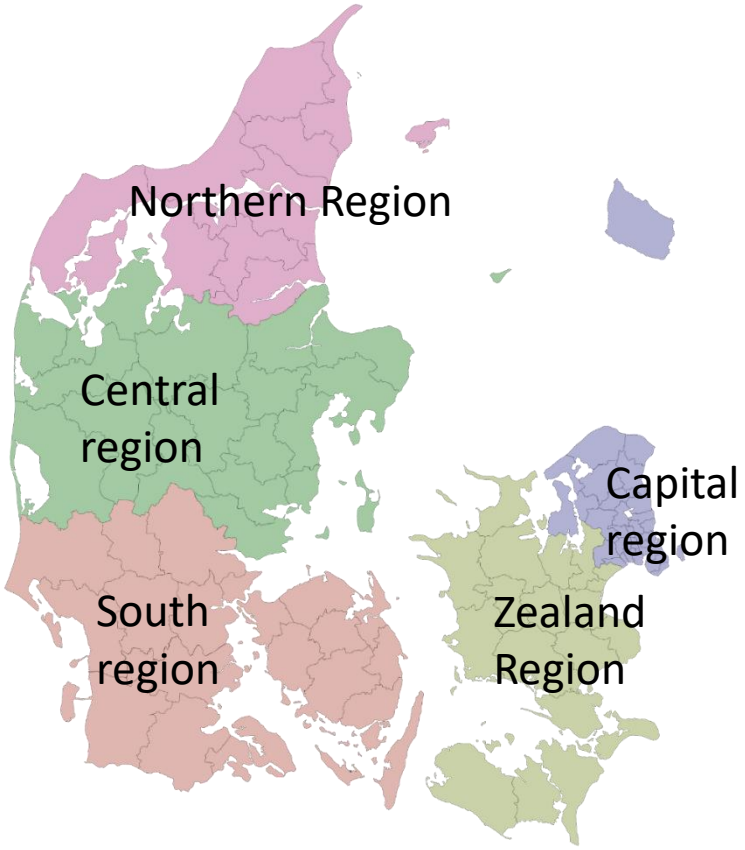
Type of municipality

	Readmitted	OR readmitted adjusted	Dead	OR death adjusted
Urban municipality	20 %	1.00 (reference)	7 %	1.00 (reference)
Between municipality	18 %	0.97 (0.89-1.06)	7 %	1.06 (0.95-1.19)
Rural municipality	17 %	0.99 (0.91-1.07)	7 %	1.07 (0.97-1.18)
Peripheral municipality	16 %	0.93 (0.84-1.03)	8 %	1.15 (1.01-1.30)

	Readmitted	OR readmitted adjusted	Dead	OR death adjusted
Not peripheral municipality	19 %	1.00 (reference)	7 %	1.00 (reference)
Peripheral municipality	16 %	0.93 (0.86-1.01)	8 %	1.09 (0.98-1.22)



Region



	Readmitted	OR readmitted adjusted	Dead	OR death adjusted
Capital	22 %	1.00 (reference)	8 %	1.00 (reference)
Zealand	19 %	0.81 (0.73-0.91)	7 %	1.08 (0.93-1.13)
South	17 %	0.71 (0.64-0.78)	7 %	0.98 (0.85-1.13)
Central	16 %	0.68 (0.61-0.75)	7 %	1.07 (0.93-1.24)
North	15 %	0.66 (0.58-0.74)	8 %	1.08 (0.91-1.28)

Take home meassage

- Substantial geographical variation in acute readmission risk and mortality within 30 days after discharge after hip fracture in Denmark.

- Differences in patient characteristics and hospitals characteristics did not explain the variation in readmission risk at the municipality level.

- Rural municipalities seems to have worse patient outcomes compared to urban municipalities.

- Further research should aim to identify characteristics at the municipality level which may explain the variation in acute readmission and mortality risk .