

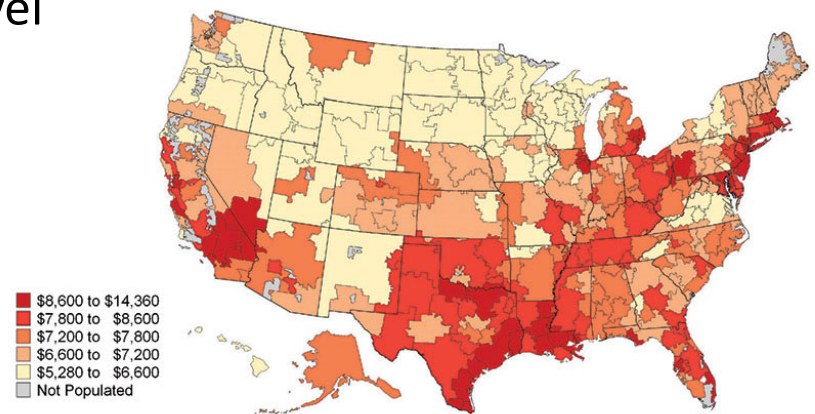
# Is high quality of care associated with higher costs?

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# Background

- Need to improve without increasing healthcare costs
- Understanding of the quality and cost relationship is limited
- Considerable geographical variation
  - Weak or even negative association at region level
  - Conflicting results at hospital level
  - No nationwide study at patient level



# Improvements in Quality of Care

- Require increase spending?
- Lead to a reduction in adverse outcome → lower costs?
- A better understanding is required



# Hip fracture patients are a well-suited case

- Common and costly injury
- Involving many aspects
- A tracer for hospital quality



# Hip fracture in the Danish healthcare system

- Mainly public owned and run
- Hip fracture patients treated at the nearest hospital.
- Unique Identifier number
- National Quality Registries



# The Danish Multi-disciplinary hip fracture registry

Seven process performance indicators reflecting four areas in the clinical guideline:



# 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

# Aim

To examine whether fulfilment of process performance measures individually and as a composite score are associated with in-hospital costs among hip fracture patients in a nationwide population-based cohort study.



# Methods

## **Hip fracture included:**

- 20,458 hip fracture from 2010 to 2013

## **Quality of care**

- Individual process performance measures
- Composite score

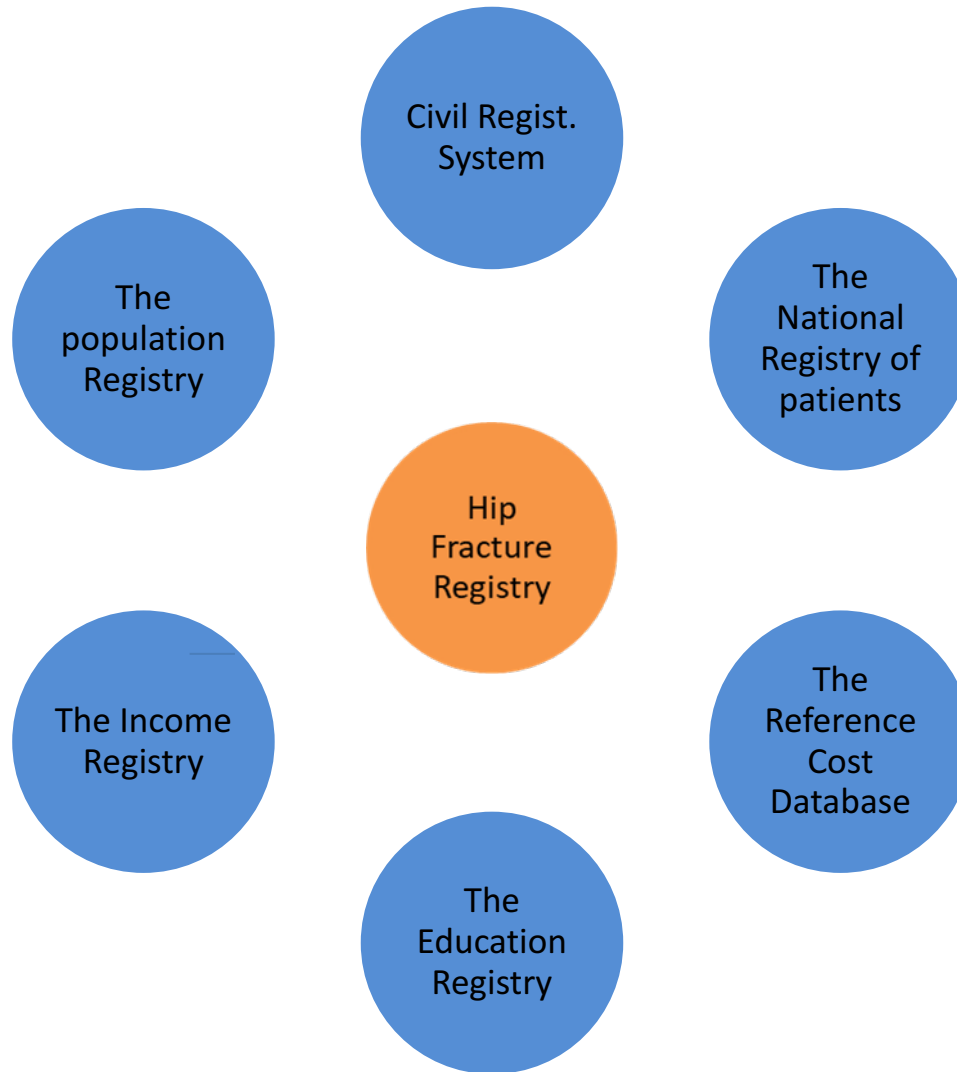
## **Total hospital cost**

Inflated to 2014

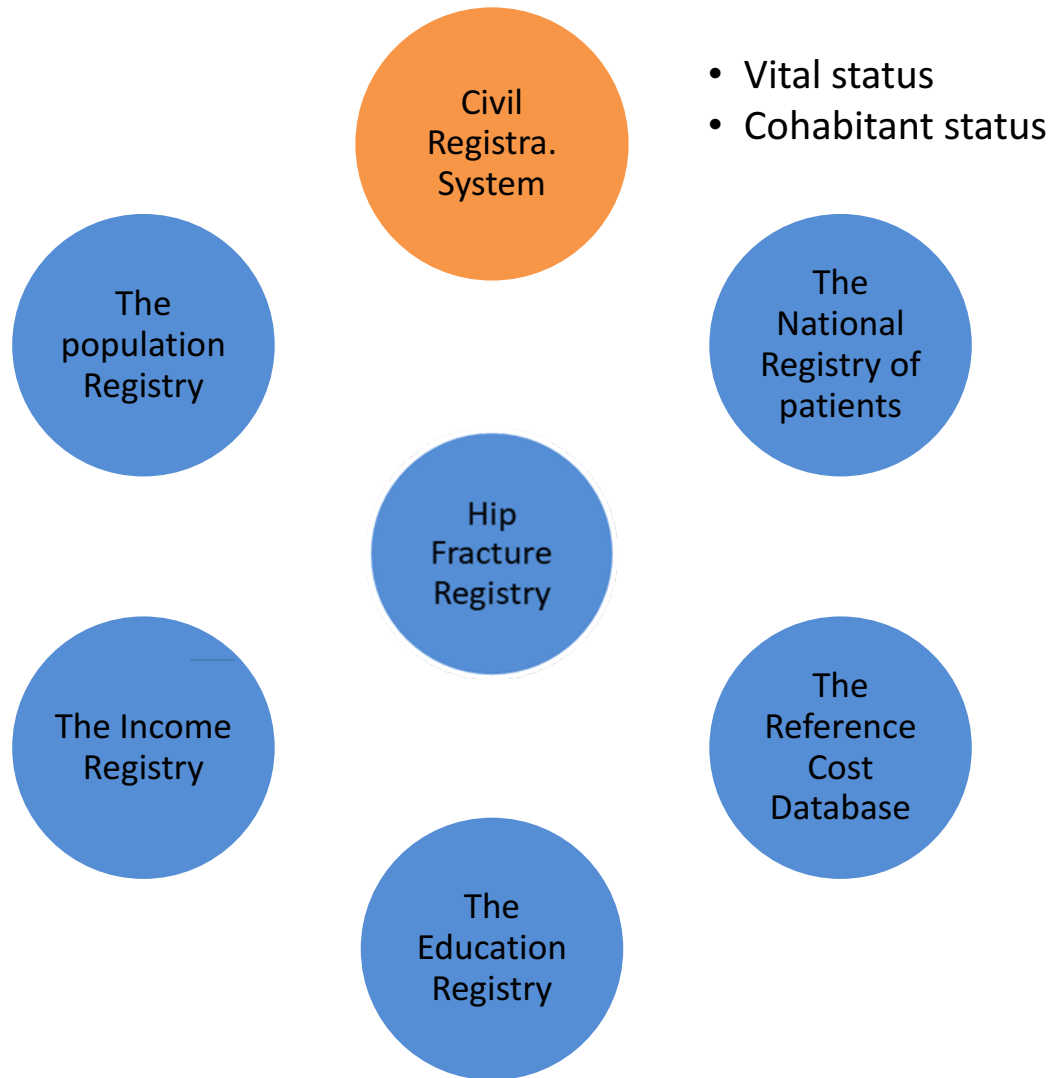
- Within index admission
- Within the first year
- According to cost categories



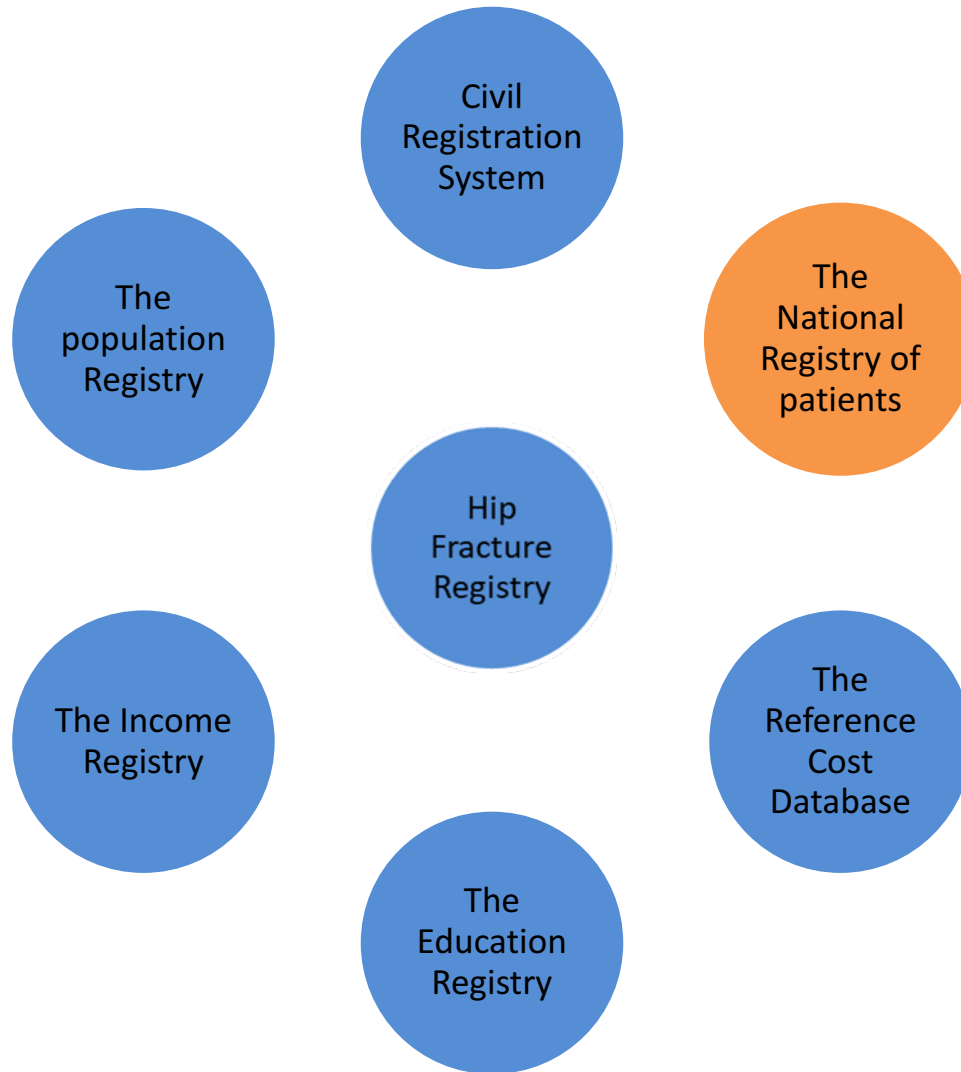
# Data sources



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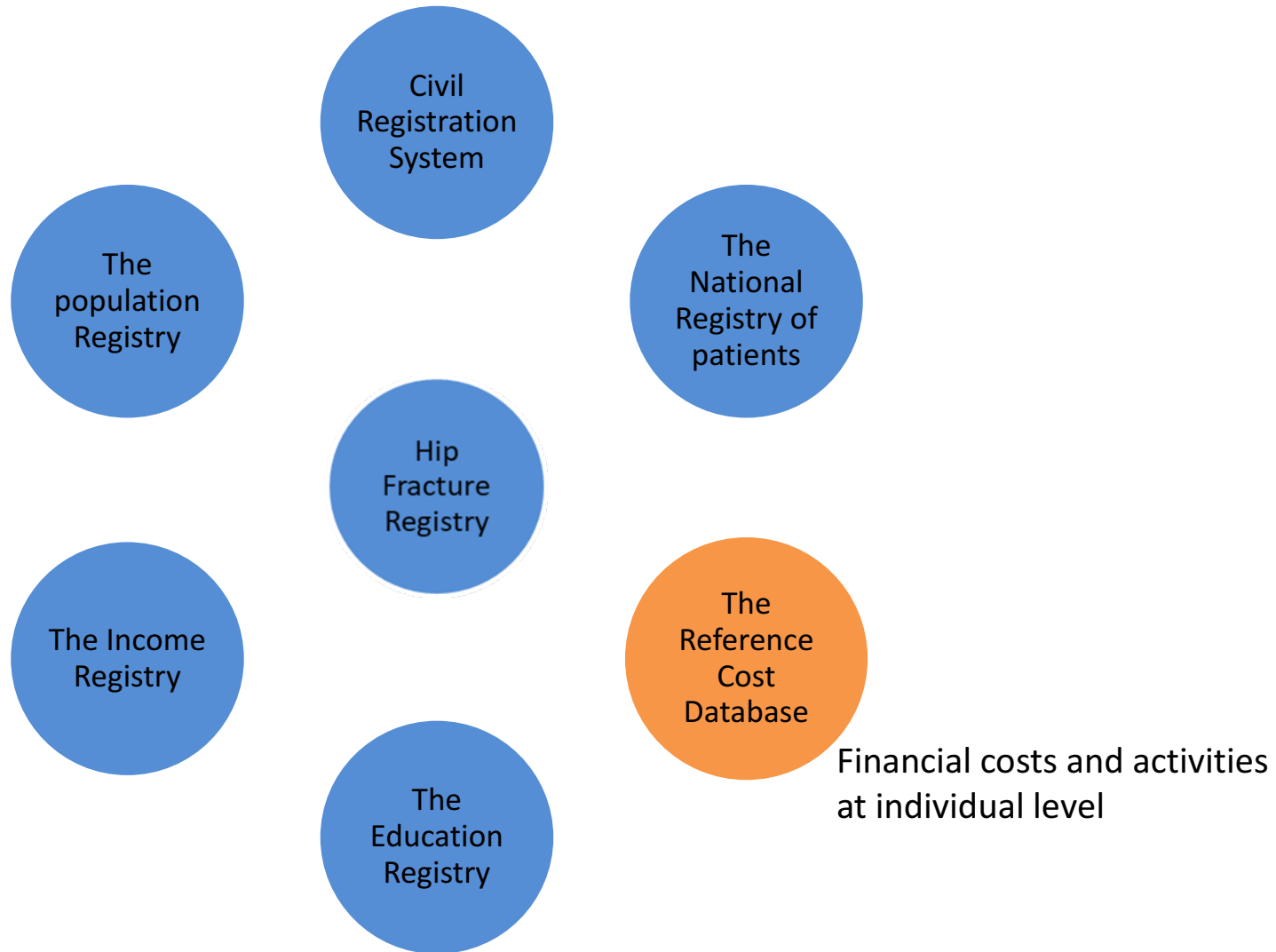


# Data sources



- All non-psychiatric hospital contacts.
- Dates and times of diagnoses/procedures

# Data sources

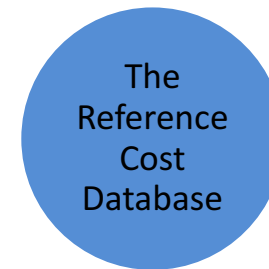


# Data sources

- Migrant status



- 5 year family income



- Highest obtained education



# Statistical analyses

- Multilevel linear regression
- Potential covariates: sex, age, nutrition status, frailty (residence), comorbidity and fracture severity.
- Log-transformation of costs
- Adjusted mean cost
- Multiple imputation



# Each process performance measures and hospital cost within the index admission in euro

	Difference in total cost	Unadjusted ratio (95 % CI)
Systematic pain assessment	-1,494	0.99 (0.97-1.01)
Mobilization < 24h postoperatively	-2,735	0.91 (0.89-0.92)
Basic mobility assessment at admission	-753	1.02 (0.98-1.07)
Basic mobility assessment at discharge	-860	0.93 (0.92-0.95)
Postdischarge rehabilitation program	-277	1.05 (1.02-1.08)
Anti-osteoporotic medication	-3,176	0.93 (0.91-0.95)
Prevention of future fall accidents	-1,066	0.99 (0.98-1.01)



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	Difference in total cost	Unadjusted ratio (95 % CI)	Adjusted difference in total cost	Adjusted ratio (95% CI)
Systematic pain assessment	-1,494	0.99 (0.97-1.01)	-1,695	0.98 (0.97-0.98)
Mobilization < 24h postoperatively	-2,735	0.91 (0.89-0.92)	-3,030	0.91 (0.91-0.92)
Basic mobility assessment at admission	-753	1.02 (0.98-1.07)	-2,837	0.95 (0.94-0.95)
Basic mobility assessment at discharge	-860	0.93 (0.92-0.95)	-947	0.99 (0.97-1.00)
Postdischarge rehabilitation program	-277	1.05 (1.02-1.08)	-304	1.01 (0.97-1.05)
Anti-osteoporotic medication	-3,176	0.93 (0.91-0.95)	-3,538	0.94 (0.94-0.95)
Prevention of future fall accidents	-1,066	0.99 (0.98-1.01)	-1,189	0.99 (0.98-0.99)

# Proportion of relevant processes and hospital cost

	Mean cost (p10-p90) <sup>1</sup> in euro	Unadjusted ratio <sup>2</sup> (95 % CI)	Adjusted mean	Adjusted ratio <sup>3</sup> (95%CI)
<b>Total cost index admission</b>				
<b>0-50 % fulfilment (ref.)</b>	15,141 (5,878-25,926)		16,865	
<b>50-75 % fulfilment</b>	12,766 (6,017-20,641)	0.96 (0.94-0.99)	14,220	0.98 (0.97-0.98)
<b>75-100 % fulfilment</b>	11,956 (6,277-18,834)	0.94 (0.92-0.96)	13,317	0.94 (0.94-0.95)

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<b>75-100 % fulfilment</b>	11,956 (6,277-18,834)	0.94 (0.92-0.96)	13,317	0.94 (0.94-0.95)
<b>Total cost first year</b>				
<b>0-50 % fulfillment (ref.)</b>	21,188 (6,650-39,696)		25,212	
<b>50-75 % fulfilment</b>	18,840 (7,000-33,890)	0.98 (0.95-1.02)	22,418	0.98 (0.97-0.99)
<b>75-100 % fulfilment</b>	18,288 (7,274-33,550)	0.98 (0.95-1.01)	21,762	0.97 (0.97-0.98)

## Cost categories driving the differences

	<u>0-50% Quality Mean</u>	<u>50-75 % Quality Mean</u>	<u>75-100 % Quality Mean</u>
Radiology	303	264	240
Surgery & anaesthesia	4,137	4,059	4,041
Further diagnostic	381	310	252
Further treatment	2,126	1,157	403
Therapy	777	625	698
Bedday	7,337	6,312	6,287
Outpatient services	79	40	36

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# Methodological considerations

- Confounding by indication, but
  - Only eligible patients in the analyses.
  - Adjustment without strong impact on the risk estimates.
- Data validity, but efforts were made to
  - Detailed written instructions
  - Regular clinical audits







Improvement in quality of care will not imply increased spending and may even lead to lower hospital costs for the index admission and within the first year.

**Thank you for your attention**