

INCREASING RISK OF POST-SURGERY INFECTIONS AMONG HIP FRACTURE PATIENTS: A NATIONWIDE STUDY 2005- 2016

Kaja Eriksrud Kjørholt¹, Søren P. Johnsen^{1,3}, Nickolaj R. Kristensen¹,
Daniel Prieto-Alhambra² and Alma B. Pedersen¹

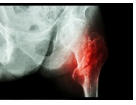
¹Department of Clinical Epidemiology, **Aarhus University Hospital**

²Centre for Statistics in Medicine, Nuffield Department of Orthopaedics, Rheumatology, and Musculoskeletal Sciences (NDORMS) **University of Oxford**

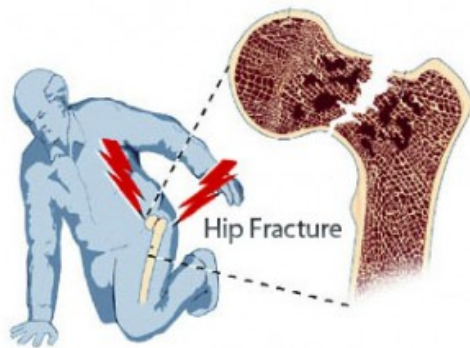
³Center for Clinical Health Services Research, Department of Clinical Medicine, **Aalborg University**

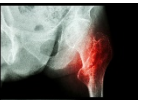
DISCLOSURES:

- Kaja E. Kjørholt, Søren P. Johnsen, Nickolaj R. Kristensen and Alma B. Pedersen declare that they have no conflict of interest.
- Daniel Prieto-Alhambra's department has received unrelated industry funding in the forms of: 1.research grants from Amgen and UCB Biopharma; 2.consultancy fees from UCB; and speaker fees from Amgen.

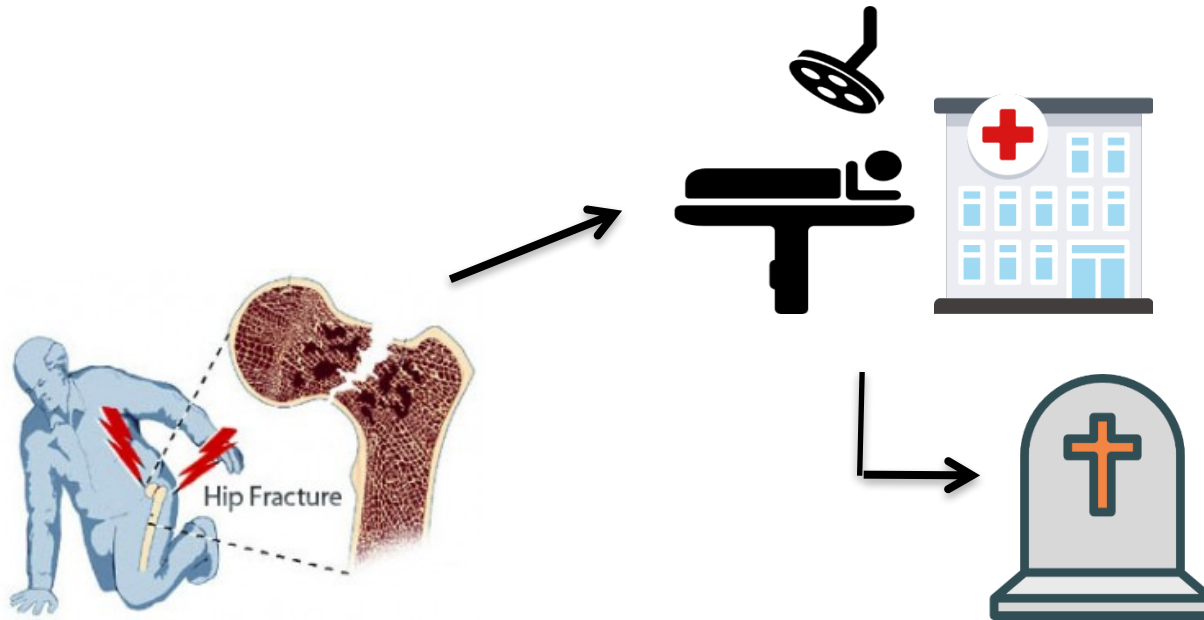


Background: Post-surgery infections





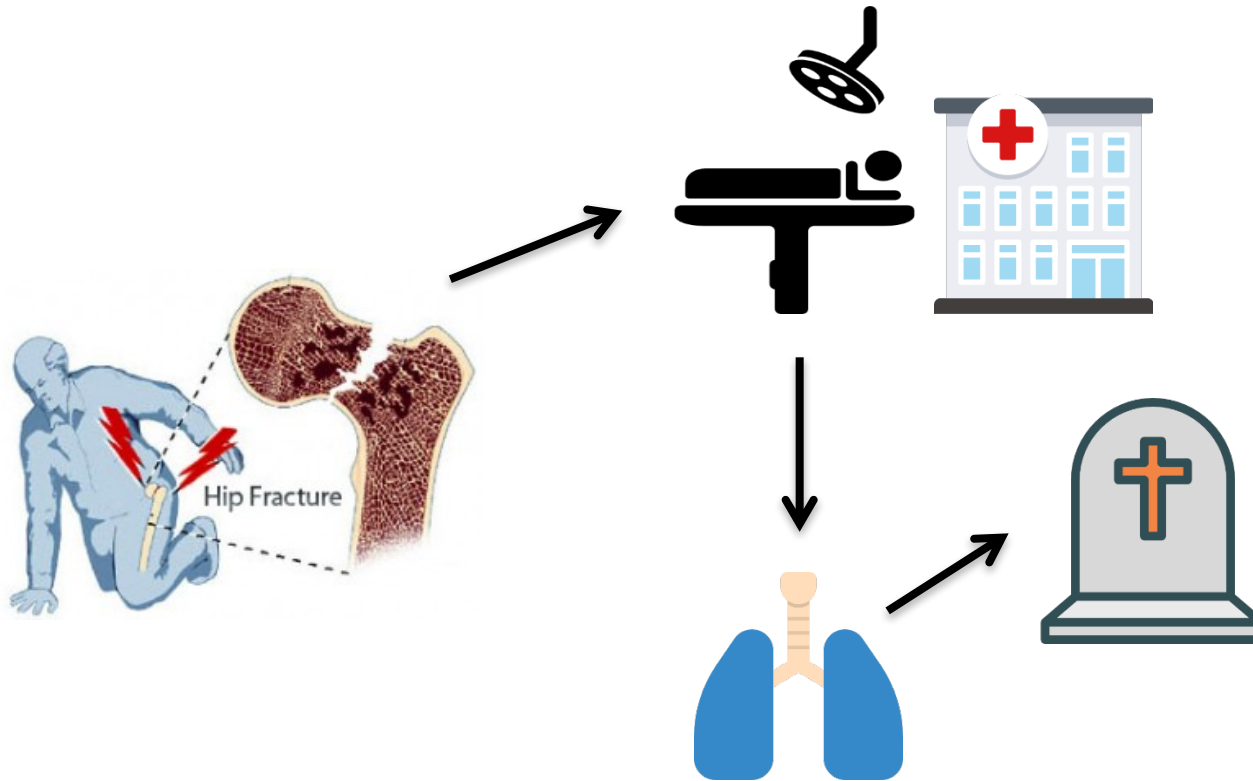
Background: Post-surgery infections



- 10 % Mortality within 30 days after surgery
- 30 % Mortality within 1 year after surgery

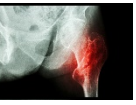


Background: Post-surgery infections

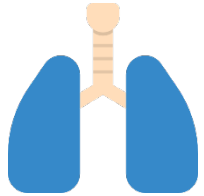


- Pneumonia is one of the leading causes of death among hip fracture patients⁽¹⁻³⁾

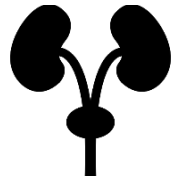
1. Chatterton BD. et al: 2015
2. Von Friesendorff M. et al: 2016
3. Sheikh HQ. et al: 2017



Background: Post-surgery infections

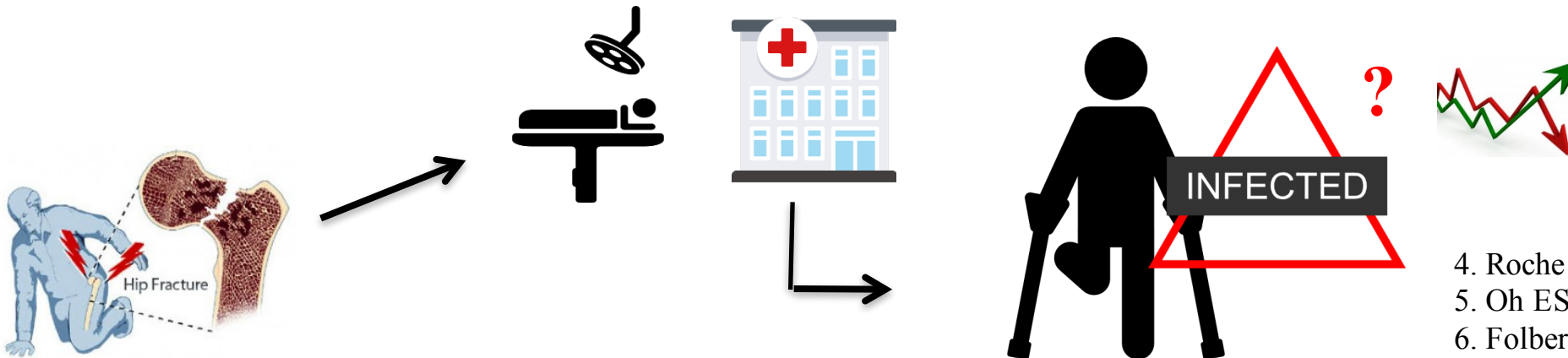


- 9-11 % develop pneumonia⁽⁴⁻⁷⁾

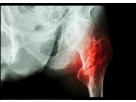


- 4-18 % develop urinary tract infection⁽⁴⁻⁶⁾

within a varying follow-up time
after hip fracture surgery

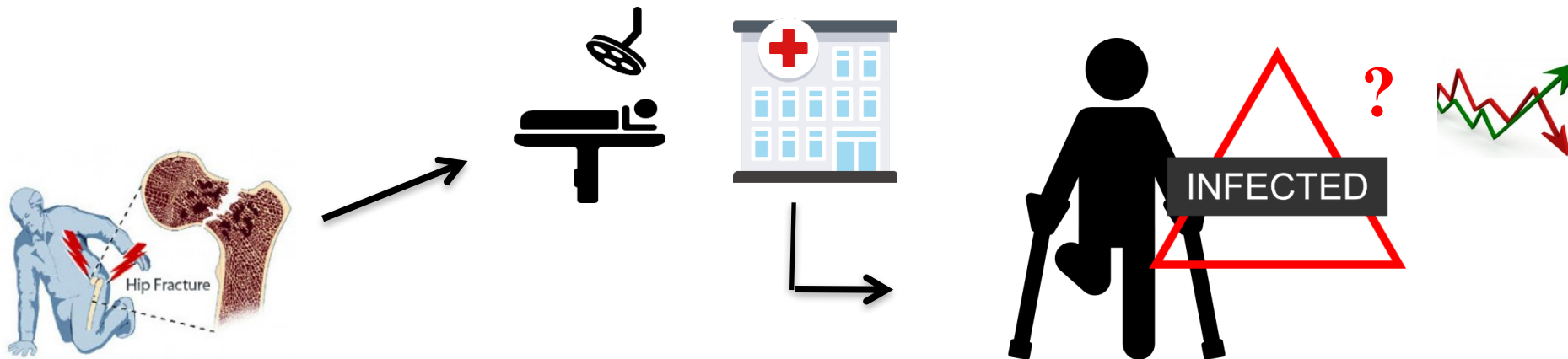


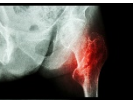
4. Roche JJ et al. 2005
5. Oh ES et al. 2016
6. Folbert EC et al. 2017
7. Hansson S et al. 2015



Background: Post-surgery infections

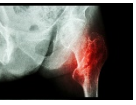
- Data on recent trends in the risk of infections is lacking



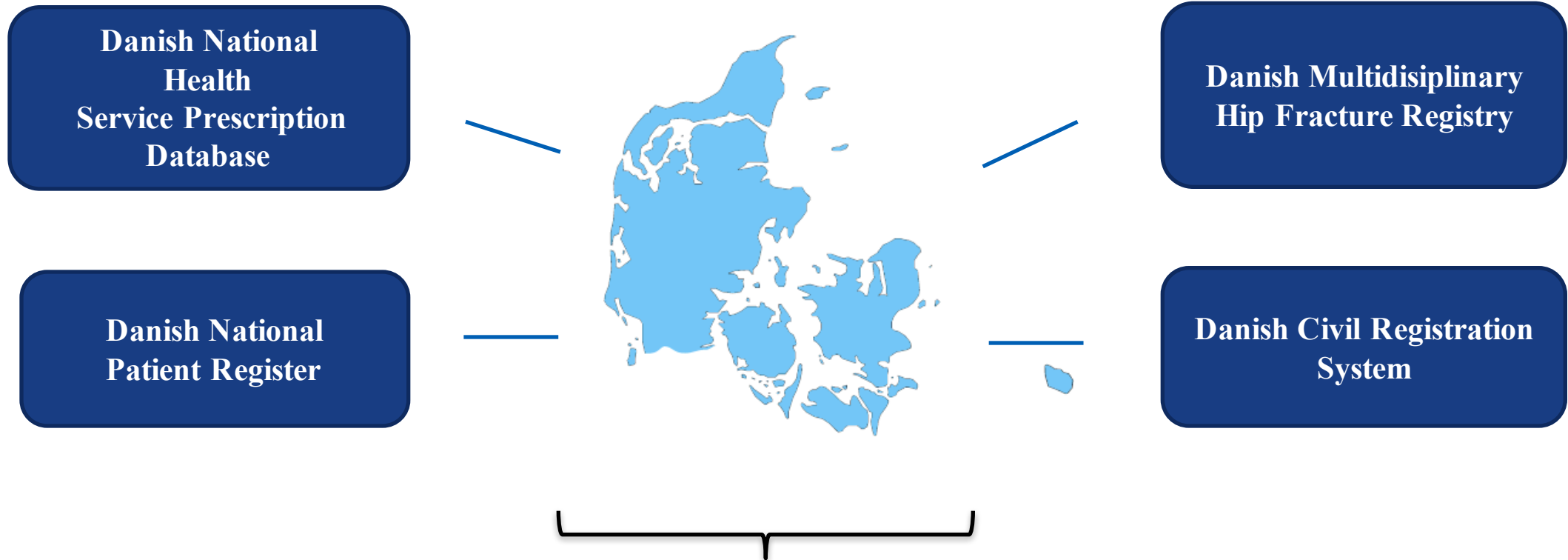


Objective

- To examine temporal trends in the risk of infections following hip fracture surgery in Denmark from 2005 to 2016
- Compare the trends of infections in hip fracture patients with a trend in the general population cohort



Data sources



We conducted a **population-based cohort study**, based on **individual-level linkage** of 4 different nationwide registries.



Study population

**Danish Multidisciplinary
Hip Fracture Registry**

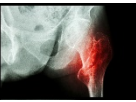


Hip fracture cohort:

Age >65 years

First-time hip fracture, 2005-2016





Study population

Danish Multidisciplinary
Hip Fracture Registry



Hip fracture cohort:

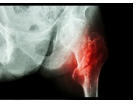
Age >65 years

First-time hip fracture, 2005-2016



74,771 Patients undergoing hip
fracture surgery





Study population

Danish Multidisciplinary
Hip Fracture Registry



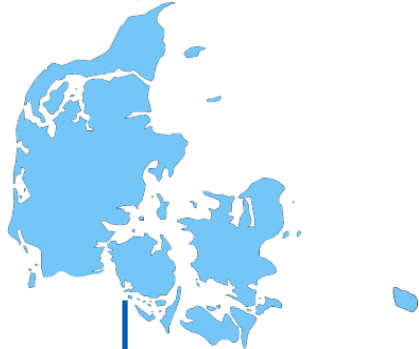
Hip fracture cohort:

Age >65 years

First-time hip fracture, 2005-2016



74,771 Patients undergoing hip
fracture surgery



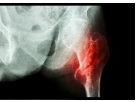
Danish Civil Registration
System



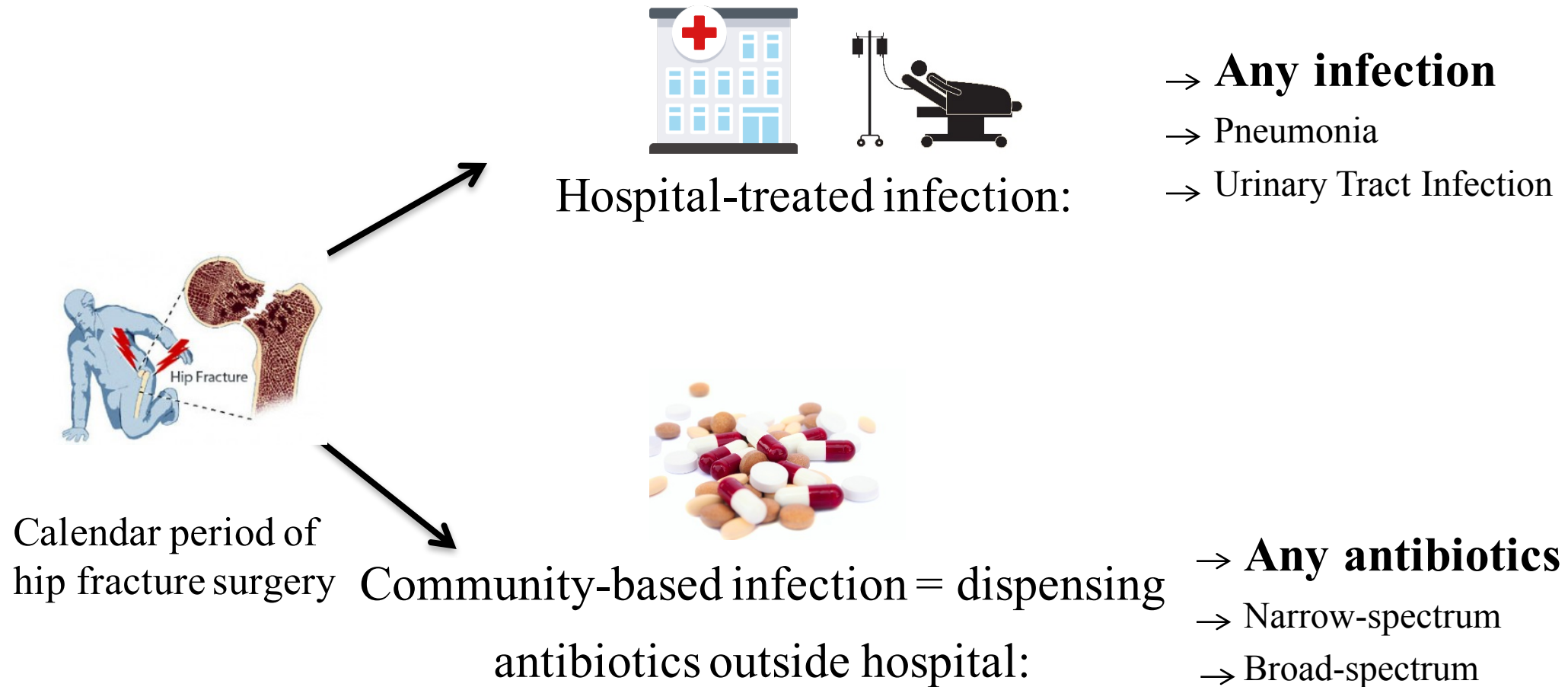
General population cohort:

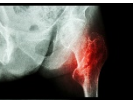
Matched 5 persons on age and gender from the
general population to each hip fracture patient





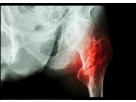
Outcome





Statistical analysis: Within 30 days after surgery:

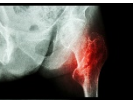
- Cumulative incidences of infection, considering death as competing risk
- Risk Ratio(RR):
 - Operation year 2005-2006 as reference
- Hazard Ratio (HR) to compare the risk with the matched cohort from the general population
 - General population cohort as reference



Any hospital-treated infection in hip fracture pt.: 30 Days

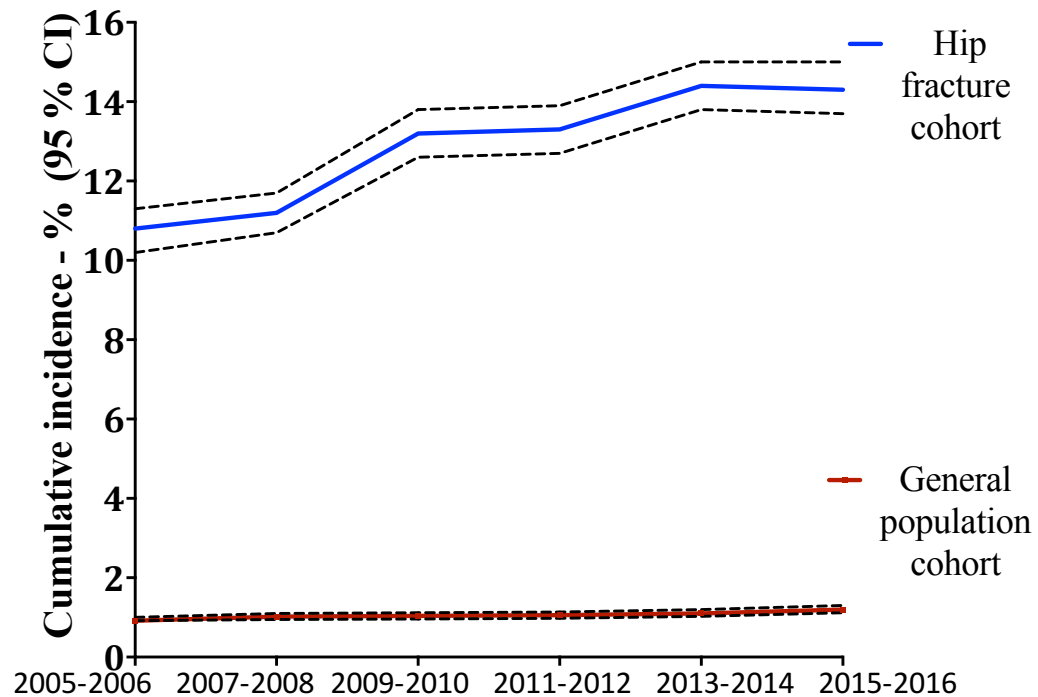
Calendar Period of Operation	Number of Infections	Cumulative Incidence % (95 % CI)	Adjusted* Risk Ratio (RR) (95 % CI)
2005-2006	1,339	10.8 % (10.2-11.3)	Reference
2007-2008	1,482	11.2 % (10.7-11.7)	1.03 (0.96-1.10)
2009-2010	1,679	13.2 % (12.6-13.8)	1.21 (1.13-1.30)
2011-2012	1,690	13.3 % (12.7-13.9)	1.22 (1.14-1.31)
2013-2014	1,771	14.4 % (13.8-15.0)	1.32 (1.23-1.41)
2015-2016	1,631	14.3 % (13.7-15.0)	1.32 (1.23-1.41)

*Adjusted by age, comorbidity level and sex

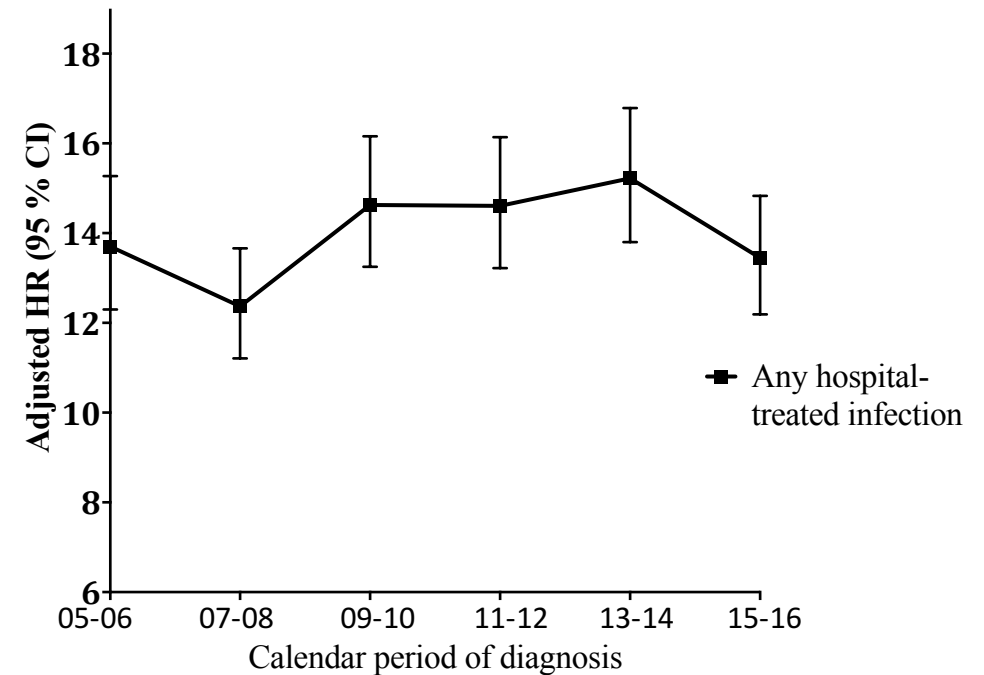


Any hospital-treated infection: Hip fracture vs general population

30 Days Cumulative incidence-%

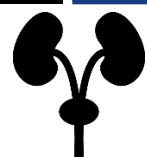


Time Trends of 30 Days Adjusted HR



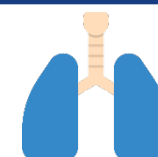


Hospital-treated infection in hip fracture pt.: 30 Days



Urinary tract infection

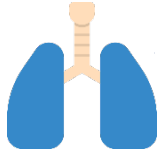
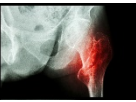
Calendar Period of Operation	Cumulative Incidence % (95 % CI)	Adjusted Cumulative Risk Ratio (95 % CI)
2005-2006	5.7 (5.3-6.1)	Reference
2007-2008	5.5 (5.1-5.9)	0.94 (0.85-1.04)
2009-2010	6.0 (5.6-6.4)	1.05 (0.95-1.16)
2011-2012	5.8 (5.4-6.2)	1.01 (0.91-1.12)
2013-2014	6.0 (5.5-6.4)	1.02 (0.92-1.13)
2015-2016	5.7 (5.3-6.1)	0.99 (0.89-1.10)



Pneumonia

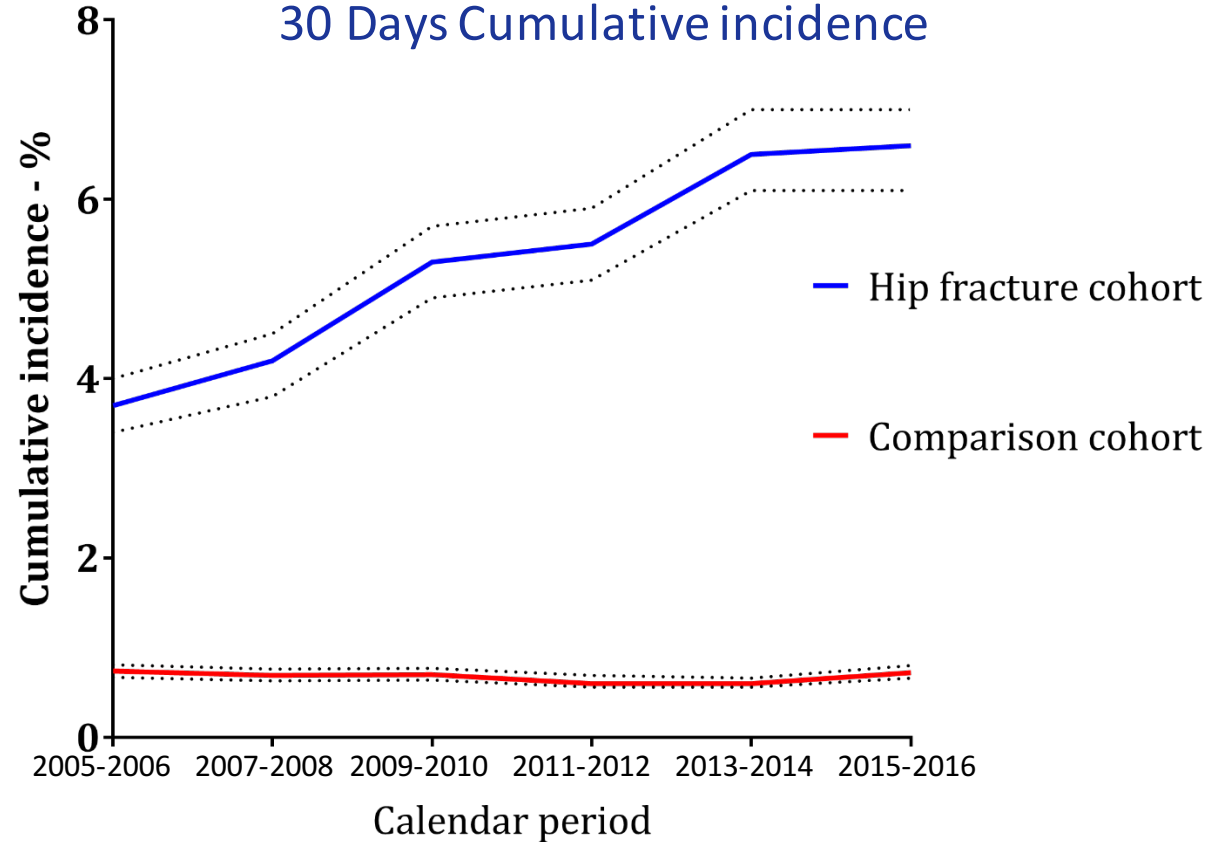
Calendar Period of Operation	Cumulative Incidence % (95 % CI)	Adjusted Cumulative Risk Ratio (95 % CI)
2005-2006	3.7 (3.4-4.0)	Reference
2007-2008	4.2 (3.8-4.5)	1.10 (0.96-1.26)
2009-2010	5.3 (4.9-5.7)	1.37 (1.20-1.56)
2011-2012	5.5 (5.1-5.9)	1.42 (1.25-1.61)
2013-2014	6.5 (6.1-7.0)	1.70 (1.50-1.92)
2015-2016	6.6 (6.1-7.0)	1.70 (1.49-1.92)



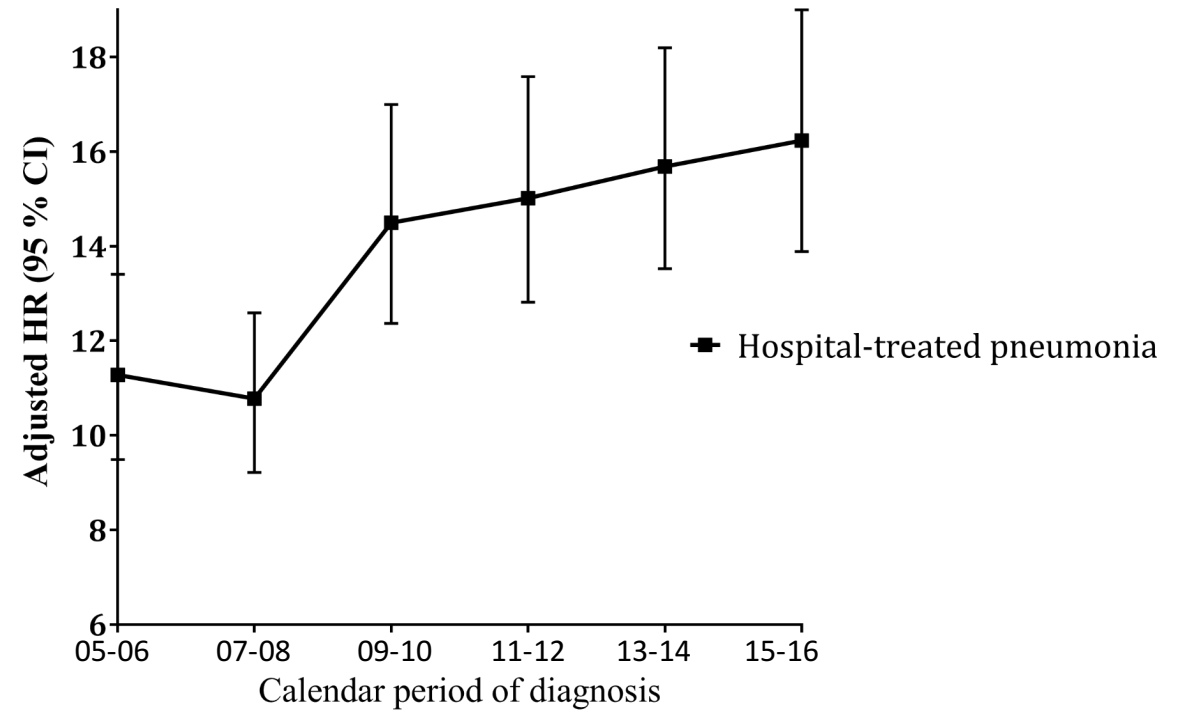


Hospital-treated pneumonia: Hip fracture vs general population

30 Days Cumulative incidence



Time Trends of 30 Days Adjusted HR



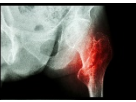


Any community-based antibiotics in hip fracture pt. : 30 Days

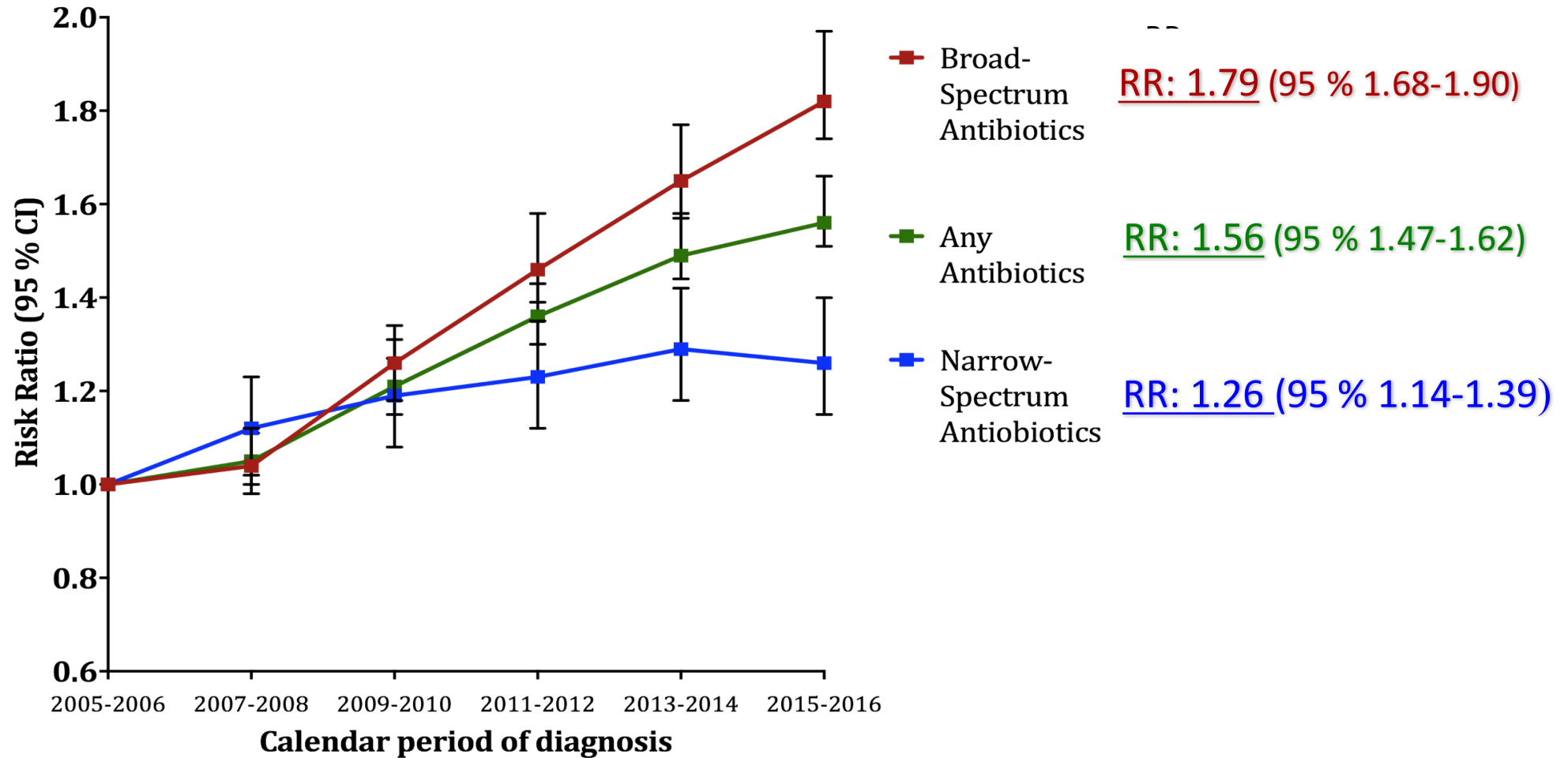


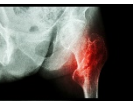
Calendar Period of Operation	Number of Prescriptions	Cumulative Incidence % (95 % CI)	Adjusted* Risk Ratio (RR) (95 % CI)
2005-2006	2,179	17.5 (16.8-18.2)	Reference
2007-2008	2,472	18.7 (18.0-19.3)	1.05 (1.00-1.11)
2009-2010	2,702	21.2 (20.5-22.0)	1.21 (1.15-1.27)
2011-2012	3,023	23.8 (23.1-24.5)	1.35 (1.28-1.41)
2013-2014	3,187	25.9 (25.2-26.7)	1.47 (1.40-1.55)
2015-2016	3,082	27.1 (26.3-27.9)	1.54 (1.47-1.67)

*Adjusted by age, comorbidity level and gender

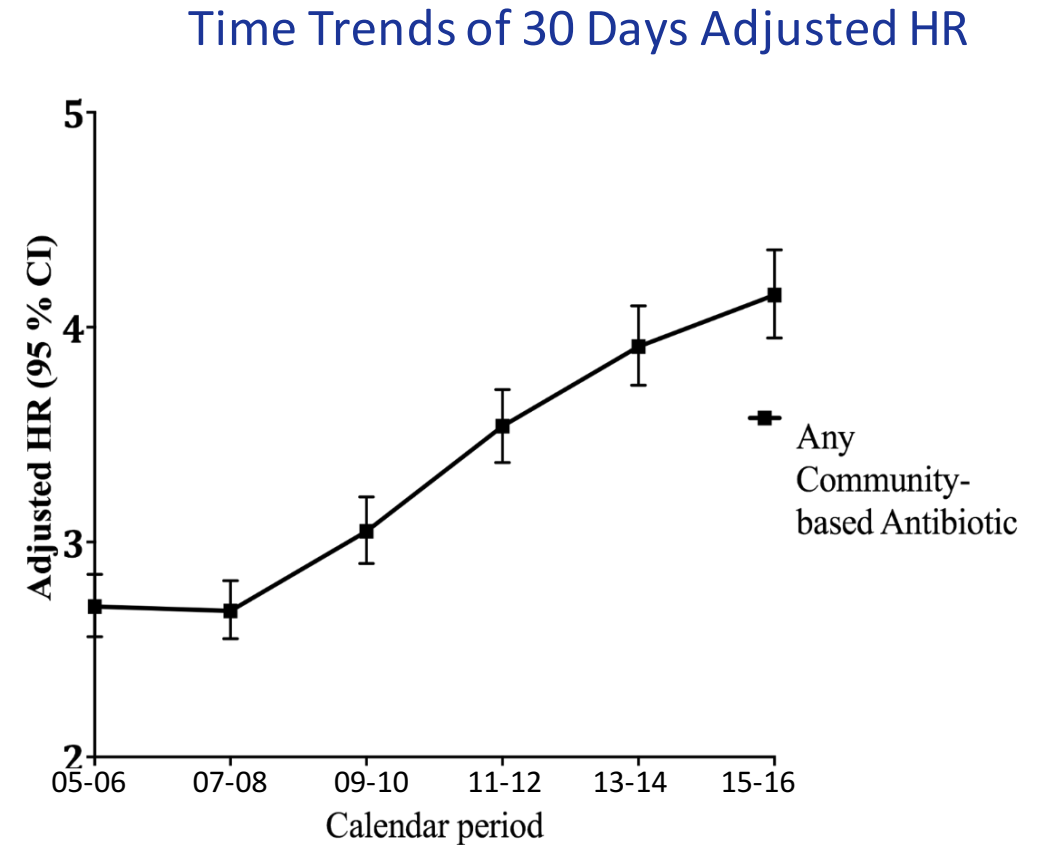
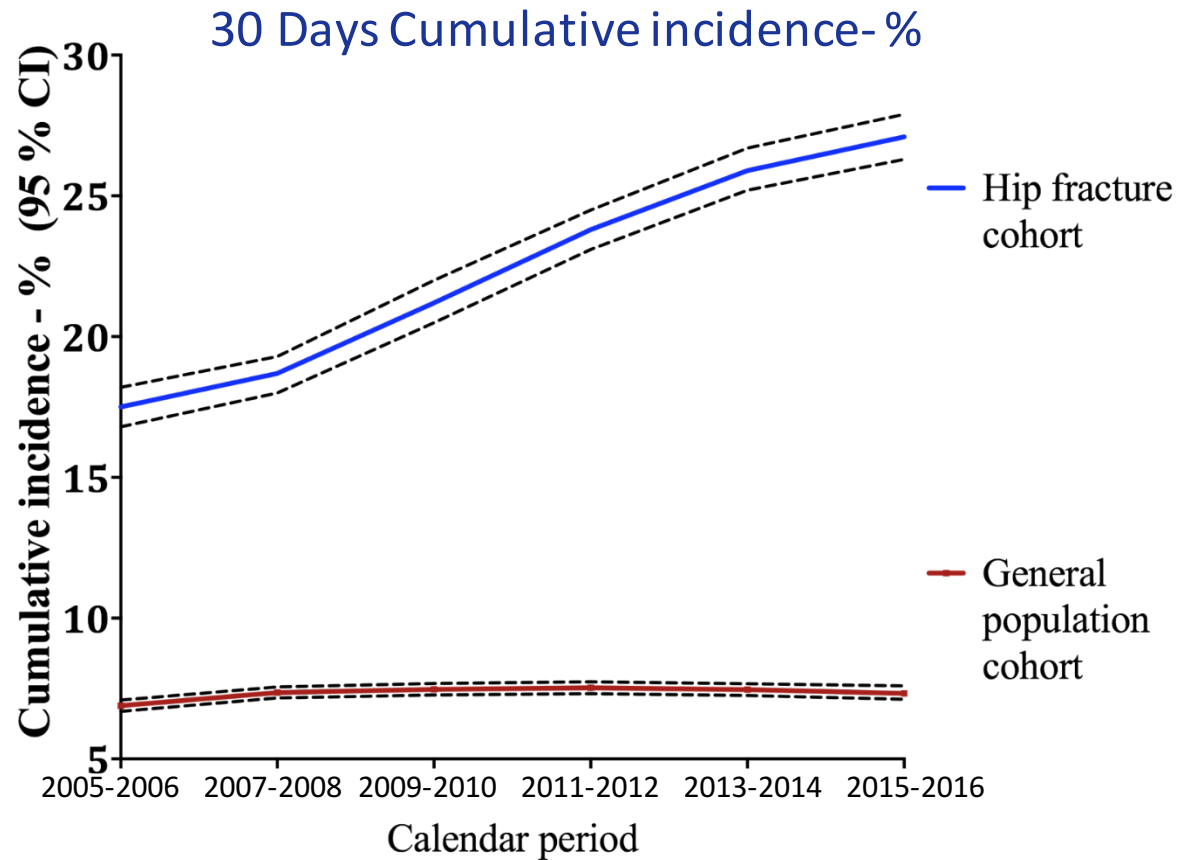


Community-based antibiotics in hip fracture pt. : 30 Days





Any community-based antibiotics: Hip fracture vs general population

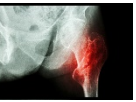




30-days mortality risk after hospital-treated infection

Postoperative infection within 30 days after surgery	Mortality rate pr. 1000 Person Years	Adjusted Hazard Ratio* (95 % CI)
Any infection		
Yes	8.43 (8.00-8.88)	2.72 (2.56-2.88)
No	3.34 (3.26-3.43)	Reference
Pneumonia		
Yes	14.83 (13.92-15.79)	4.18 (3.91-4.48)
No	3.40 (3.32-3.48)	Reference
Sepsis		
Yes	33.14 (29.60-37.11)	8.86 (7.88-9.95)
No	3.63 (3.56-3.71)	Reference
Reoperation due to infection		
Yes	7.50 (4.78-11.76)	2.95 (1.88-4.64)
No	3.75 (3.67-3.84)	Reference

*Adjusted by age, comorbidity level, sex, marital status and current medication use



Conclusion

2005

2016

- We found **increasing risk** of hospital-treated post-surgery infections and antibiotic use among hip fracture patients from 2005-2016
- The increase could not be explained by increase seen in general population
- Any type of infection is associated with high mortality after hip fracture surgery
- Thus, further focus on infections could potentially reduce high mortality in hip fracture patients

Thank you for the attention



AARHUS
UNIVERSITY

kkek@clin.au.dk