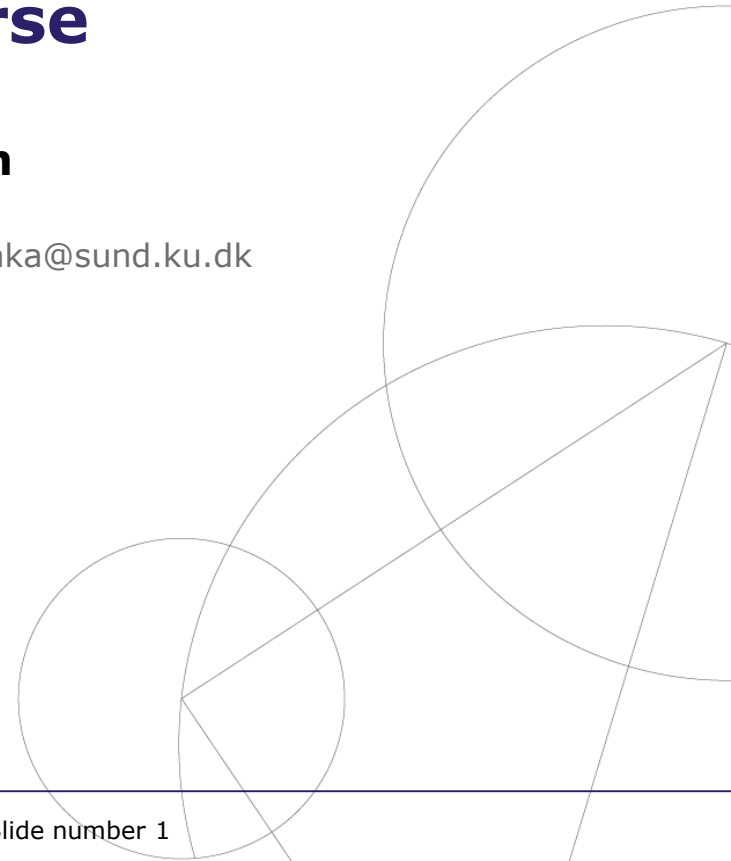




Summary of infectious disease epidemiology course

Mads Kamper-Jørgensen

Associate professor, University of Copenhagen, maka@sund.ku.dk





Aim

- Possess knowledge of frequent infectious diseases in Denmark
- Account for and calculate infectious disease frequency and association measures
- Be familiar with outbreak investigation, vaccination schedules, and infectious disease surveillance in Denmark
- Be familiar with challenges related to statistical analysis of infectious disease data
- Know of real-world infectious disease epidemiologic work in Denmark



OR with 95% confidence interval

- Example page 34

| | Ill | Well | |
|-----------------------------------|-----|------|----|
| Had lunch on the 23 rd | 18 | 14 | 32 |
| No lunch on the 23 rd | 19 | 43 | 62 |
| | 37 | 57 | 94 |

- Odds of being exposed among the ill: $18/19=0.95$
- Odds of being exposed among the well: $14/43=0.33$
- OR: $0.95/0.33=2.91$ (Giesecke rounds off)



OR with 95% confidence interval

- Divide 1 by each and add: $1/18+1/14\dots=0.20$
- Square root: $\text{kvrod}(0.20)=0.45$
- Multiply by 1.96: $0.45*1.96=0.88$
- Raise e to this number: $\text{eksp}(0.88)=2.42$
- LCL: $\text{OR}/2.42=1.20$
- UCL: $\text{OR}*2.42=7.03$
- Calculate by hand, then go to www.madskamper.dk/informationsbias



Introduction

- Infectious disease history and future in Denmark
- Epidemic, pandemic, and endemic state
- Incubation, infectious and latent period
- Case-fatality, attack and basic reproductive rate (R_0)
- Incidence calculation
- maka@sund.ku.dk





Surveillance

- Ongoing, systematic, analysis, outcome-specific, timely dissemination, prevention and control
- Trends, outbreaks, evaluate control, document distribution and spread, natural history, generate hypotheses, facilitate planning
- Indicator vs. event-based, passive vs. active, clinical vs. laboratory, sentinel
- Surveillance vs. research study
- Prioritizing: frequency, severity, cost, preventability, communicability, interest, international relevance
- Imperfect data, but for action
- krm@ssi.dk





Measures

- Transmission chain, severity and course of the infection
- Incidence (cumulative), prevalence (point and period)
- Point source, propagated spread
- Effective reproductive number
- SIR modelling
- Absolute, relative and attributable risk
- Odds ratio
- Confounding
- ako@ssi.dk





Infectious diseases

- Bacteria, viruses, fungi, prions
- Portal of entry: resp., gast., urogenit., skin
- Routes of transmission: person to person, air, food, water, insects
- Viral infections are not treated with antibiotics
- Individual and global prevention
- thf@ssi.dk





Outbreaks

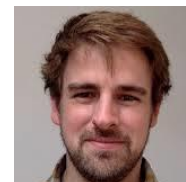
- An outbreak is more cases than expected in a specific area, population or period
- Confirm outbreak
- Confirm diagnosis
- Case definition
- Identify cases and obtain information
- Describe data
- Develop hypothesis
- Analytical study
- Implement control
- Communicate results
- lum@ssi.dk





Analysis

- Dependence calls for dynamic models
- Susceptible, infected, and recovered
- Assumptions: homogeneous mixing, large population, acquired immunity is lifelong, closed population, no latent period
- Easily carried out in R
- matthew@sund.ku.dk





Vaccination

- Vaccine component, adjuvant, preservatives
- Injection, oral, intranasal, pads?
- High-risk groups or routine vaccination
- Herd immunity
- Efficacy vs. effectiveness
- Prioritizing vaccination: seriousness of disease, effectiveness, safety, cost-effectiveness, side-effects, interaction with other vaccines, ethics, long-term consequences, monitoring, coverage
- tg@ssi.dk





Site visit

- Jan Wohlfahrt, chief statistician
mme@ssi.dk
- Heather Boyd, senior researcher
hoy@ssi.dk
- Maria Elmegaard, MScPH student
memn@ssi.dk
- Signe Holst Søgaaard, PhD student
siho@ssi.dk
- Klaus Rostgaard, statistician
klp@ssi.dk





Evaluation

- Dialogue based evaluation, who will help take notes?
- What worked, what did not work, suggestions for improvements
- You: participation, preparedness, different backgrounds, class attendance
- Us: labs, teachers, format, level, literature, duration, communication, unnecessary subjects, missing subjects, breaks, language



Exam

- 24-hour take-home exam
- December 11, 2017
- Passed/not passed
- No external censorship
- All aids are allowed
- 2 cases with a total of 9 questions
- 5 pages=12000 strokes (2400 per page), including spaces
- Figures, tables etc. as appendices
- Appendices do not count in the 12000 strokes
- Previous exam available at the website, but the course and the exam form changed



Stay well and good luck

- <https://www.youtube.com/watch?v=qKiQA5e-fPg>