Teaching Portfolio

Alessandra Meddis

Section of Biostatistics, Copenhagen University alme@sund.ku.dk

Teaching Experience

- Introduction to R for Basic Statistics: PhD course designed for health science researcher who wants to become more familiar with R for simple calculations, data management, data exploration and analysis. — 2-days, course responsible, September 2023 - Current
- Basic Statistics for health researchers: PhD course on basic statistical concepts and models illustrated with case studies from health science. — 2 days, lectures and exercises, September 2022 - Current
- Experimental Design in Neuroscience: Master level course whose focus is for the students to obtain sufficient knowledge regarding experimental design and methods in neuroscience to be able to read and critically evaluate scientific papers. — 4 days, exercises classes, September 2022 - Current
- Monthly Lecture for Master and PhD medical students at the Department of Infectious Disease at Hvidovre Hospital. Explain various statistic concepts and methods. This can vary from mixed model, to g-computation methods and survival analysis, based on students interests. — one hour lecture, June 2023 - Current
- REDDIE WP4 meeting – LTMLE for breakfast: Workshop for a research group collaboration (REDDIE) about emulating target trials in register data. — 2 days, lectures, May 2023

Supervision

- Supervision of Research Assistant : Christoffer Sejling, Biostatistics Section, Copenhagen University. Short-term project on causal inference with longitudinal observational study for cancer risk with denosumab treatment (Reference).
- Supervision of PhD project: Ditte Scofield, Department of Infectious Diseases. I provided supervision explaining how to define, perform and interpret the statistical analysis. Explain how do I help it
- PhD co-supervision: Sebastian Kinnberg Nielsen, Herlev and Gentofte Hospital, Cardiology. PHD project on defining a standard national follow up protocol for patients diagnosed with acute hearth conditions.
- Statistical consultant at the Department of Infectious Disease ah Hvidovre Hospital. I help medical doctors of various levels (mainly Master and Ph.D. students) to plan and perform statistical analysis. Via these consultations, I have informally supervised several Master and PhD students, for instance Karen Brorup Heje Pedersen (PhD project), and Sandra Tingsgård (PhD project).

Pedagogical training

- Introduction to University Pedagogy - April 2023
- University Pedagogy - May 2024

Teaching Philosophy

I started teaching relatively late in my academic journey, during my postdoctoral fellowship, as my PhD studies in Paris did not include English-language courses. However, in recent years, I have had some teaching experience: I started as a teaching assistant and have since progressed to become the main coordinator of a PhD course. From the beginning, I recognized the central role that students play in the learning process. My priority has always been to create a safe and supportive learning environment where students feel comfortable engaging in discussions. I value interactions with students as they are essential for assessing their understanding and adjusting the pace of my teaching accordingly.

I believe that a solid understanding of biostatistics requires some level of mathematical representation. Students must grasp the practical implications of statistical methods and the underlying assumptions. This process is often challenging but remains an important part of learning.

Teaching statistics to medical students I realized that conveying statistical concepts in a way that is both rigorous and intuitive demands significant expertise. To make these concepts relatable and applicable, I apply example-based lectures to be particularly effective. I emphasize that statistics is a challenging subject and that it is completely normal to have unresolved questions along the way. I follow a logical progression from very simple, practical examples to build a foundation of understanding introducing the corresponding formulas and explain the necessary assumptions step by step (See Example). The scaffolding ensures that students are not thrown into complex tasks without the connection to their own work, enhancing their understanding and engagement.

Through the pedagogical courses, I have learned the importance of clearly stating the Intended Learning Outcomes (ILOs) and aligning expectations, both when teaching in a course and during supervision. This approach establishes the type of collaboration and clarifies the roles and mutual expectations for both the students and myself. For instance, when teaching at Hvidovre Hospital, I often present the same research question analyzed using two distinct statistical approaches. Together, we explore the pros and cons of each method. From the start, I clarify that my goal is not for them to become entirely independent with statistics but rather to develop the ability to critically interpret statistical analyses.

I cherish interaction among students, as peer feedback can be a powerful learning tool. During lectures, I incorporate inductive exercises to encourage active thinking, and during exercise sessions, I promote group work. For my pedagogical project, I designed exercise classes where students were required to work in groups. At the end of each class, they had to produce an *output* with the exercises solutions. This output could take the form of a questionnaire or a short presentation (See Example). This approach significantly increased their engagement in class, and students reported feeling more comfortable participating and asking questions.

Moreover, I know that learning R (a coding language) can be frustrating for complete beginner. One key insight I have gained is that students do not enjoy learning through slides. Instead, they prefer working through the script alongside me and appreciate when I type as I explain, giving them the opportunity to ask questions in real time (See Example). While I still prepare slides with the examples we cover in class for them to reference later when at home, I rarely use them during the actual lesson. Even if I try to adjust time and pace during lectures, this is not always an easy task, when having heterogeneous group of students. In fact, I have experienced mixed feedback regarding the pace of the lecture, as it is closely related to their individual experience. To improve this, I have incorporated as many practical sessions as possible, which allow me to offer different levels of support based on each student's needs. For those who are more advanced, I also prepare optional exercises to keep them engaged and challenged while others can focus on mastering the basics.

Course Thaught

Course	Institution	Level	ECTS	N Students	Role	N Times
Introduction to R for Basic Statistics	UCPH	PhD	1.7	30-50	Course responsible	4 times per year
Basic Statistic for health researchers	UCPH	PhD	7.5	30	Co-teacher	2 times per year
Experimental Design in Neuroscience	UCPH	Master	10	15-25	Co-teacher	once a year
REDDIE WP4 meeting – LTMLE for breakfast	UCPH	PhD/Postdoc	-	15	Co-teacher	1

Students Feedback

In general, I receive positive student evaluations. Unfortunately I do not collect written feedback evaluations for the Introduction to R course, I mostly ask for oral feedback, during and after the course. I show some of the students comments from the Experimental Design in Neuroscience course that I collected during the pedagogical project:

"Very nice and good and helpful teacher"
"Pretty good. Statistics became fun."
"They were very learningful and help was always available as well."

Examples

Example-based lecture

Case: clinical trial on Dalteparin [3]

Data: $n = 85$ diabetic patients with peripheral arterial occlusive disease and chronic foot ulcers, randmomized (double-blind) to:

- Placebo ($n = 42$)
- Dalteparin ($n = 43$)

Outcome:

Category [2]	Label
intact skin	healed
decreased ulcer area $\geq 50\%$	improved
increased ulcer area $\geq 50\%$	impaired
decreased or increased ulcer area $< 50\%$	unchanged
amputation above/below ankle	amputation

Research question: Does Dalteparin improve the outcome, when injected once daily until ulcer healing or for a maximum of 6 months?

Relative risk

$$\widehat{RR} = \frac{a/(a+b)}{c/(c+d)}$$

Exposure \ Response	yes	no	total
yes	a	b	a+b
no	c	d	c+d
total	a+c	b+d	N

Standard error of $\log(\widehat{RR})$ and confidence interval of RR [7]

$$\widehat{\sigma} = \sqrt{\frac{1}{a} - \frac{1}{a+b} + \frac{1}{c} - \frac{1}{c+d}}$$

$$\log(RR) : CI_{95\%} = \left[\log(\widehat{RR}) - 1.96\,\widehat{\sigma}\ ;\ \log(\widehat{RR}) + 1.96\,\widehat{\sigma}\right]$$

$$RR : CI_{95\%} = \left[\widehat{RR} \cdot \exp(-1.96\,\widehat{\sigma})\ ;\ \widehat{RR} \cdot \exp(1.96\,\widehat{\sigma})\right]$$

Google Questionnaire for Exercise correction

Look at the part of the output where the χ 2 test is performed. What is the null-hypothesis of the test? What do you conclude from the p-value?

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Chi-square test

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 Pearson's Chi-squared test with Yates' continuity correction

data:  table2x2
X-squared = 7.4238, df = 1, p-value = 0.006437
```

Null hypothesis: no significant difference. From the p-value we conclude: it is below 0.05, there is a significant difference so we reject the null hypothesis

Look at the 95% confidence intervals for the risk difference, risk ratio and odds ratio and in each case explain what value shouldn't be included in the interval in order to have a significant difference between
the groups. Do the intervals agree with the conclusion obtained from the χ 2 test?

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The estimated risk difference is -41.6%  (CI_95%: [-68.2;-14.9]).
The estimated risk ratio is 0.335 (CI_95%: [0.167;0.670]).
The estimated odds ratio is 0.159 (CI_95%: [0.0455;0.555]).
```

RD: 0 RR: 1 OR: 1

Part of R-script for lecture

```r
#---------------------------------
#    LONG TO WIDE by reshape
#---------------------------------

db_wide.reshape<-reshape(db_long, direction="wide",
                         idvar="ID",
                         timevar = "year") # name of the variable that indicates the time (repetition)

head(db_wide.reshape)


#---------------------------------
#    WIDE TO LONG by reshape
#---------------------------------

db_long.reshape<- reshape(db_wide, direction="long",
                          idvar="ID",
                          varying=c("weight_2000","weight_2002"),
                          v.names="height", #define name for column for the repeated measure
                          timevar="visit") #define name for the column of time (repetition)
                        #  times=c("baseline","followup"))  #define values for the "timevar"

head(db_long.reshape)
table(db_long.reshape$visit)
```