Example

Research Methodology in Musculoskeletal Physiotherapy Part 1

Theoretical examination

Name: . . . . . .

Student number . . . . . .

Please note:

- Do not detach pages (keep all pages together in this booklet)
- IF a page would become detached – please write you student number at the top of the page (not your name (blinded assessment)).
- You have 2 hours and 45 minutes to complete this exam.
- There are 8 questions (several have sub-questions). There are 53 marks in total.
- Write all your answers in this booklet within the text-boxes provided.
- WRITE CLEARLY. No attempts will be made at deciphering writings that are difficult to read.
- You may want to prepare your answer on scrap paper. Only use the scrap paper provided. Hand in the scrap paper together with the answer booklet.
- You are allowed to use a non-scientific calculator or the calculator on your phone. Other smart phone use is not permitted throughout the exam.

GOOD LUCK with the exam.

1) What are (broadly speaking) the five stages of the research process? (5 marks)

2) In a large hospital patients with end-stage osteoarthritis of the hip receive a total hip prosthesis. The orthopedic specialists of the hospital use a new approach for total hip replacement, the so-called anterior approach. The main advantage of this new surgical procedure is that the anterior approach may be associated with fewer complications, such as infections. The hospital initiates a scientific study in which the number of complications that occur following total hip replacements is registered. In the following two years, 5 patients that received a new hip using the anterior approach encountered a complication while 145 patients that underwent the anterior approach did not.

2A) Classify the epidemiological study design of this study. (2 marks)

2B) Which frequency measure can be determined and calculate it. (2 marks)

One of the research questions of this study is whether the anterior approach is associated with fewer complications than the standard posterior approach. Therefore, patients that underwent a total hip replacement using the posterior approach were also included in the study. In 285 patients who received a total hip prosthesis using the posterior approach no complication occurred and 15 patients who underwent the posterior approach did experience a complication.

2C) Which risk measure (or measure of association) can be determined, calculate the risk and what would be the conclusion of this result? (3 marks)

The risk might be biased by the presence of a confounder.

2D) Give the definition of a confounding variable. (3 marks)

2E) What could be a potential confounder in the study described above and explain why. (2 marks)

2F) Describe (mention and explain) three methods that can be used to control for confounding. (3 marks)

3) Describe four advantages and four disadvantages of the design of cohort studies. (8 marks)

4) You are conducting a large clinical trial and you want to use a questionnaire which evaluates quality of life in people with knee osteoarthritis. Unfortunately, there is no validated and specific questionnaire available in Dutch for people with this pathology. There is however an appropriate Spanish-language questionnaire that is methodologically sound. Please describe the different steps that are required to develop a Dutch-language version of the Spanish-language questionnaire so it will meet the methodological standards required to use the translated questionnaire in clinical research. (5 marks)

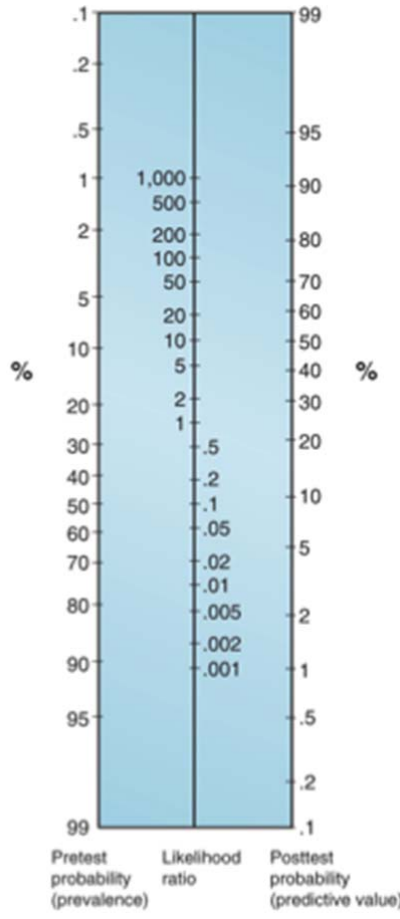
5) You are conducting a study to determine the diagnostic accuracy of a clinical test (the Lachman test) to identify people with an anterior cruciate ligament (ACL) tear. Arthroscopic confirmation of the ACL tear is the reference test. Two hundred and seventy (270) patients underwent both the clinical test and the arthroscopy. The results are as follows:

- True positive: 180 patients
- True negative: 58 patients
- False positive: 5 patients
- False negative: 27 patients

5A) Set up the 2x2 table and calculate the accuracy, sensitivity, positive predictive value and positive likelihood ratio. (5 marks)

5B) How do you interpret the value you calculated for the positive likelihood ratio? (2 marks)

5C) Using the figure below, what is the post-test probability that a patient with a positive Lachman test has an ACL tear? (2 marks)



6) List 5 design characteristics of a methodologically strong diagnostic accuracy study and explain the importance of each characteristic. (5 marks)

7) Based on a pilot study, you know that 60% of the people with low back pain will recover following a specific physiotherapy program. You plan to conduct a study to develop a prediction model to be able to identify before the treatment starts who will respond to the program. You selected 16 potential predictor variables (or prognostic factors) you like to investigate. Considering the rule of thumb that you need 10 patients per potential predictor variable in the limiting sample size, how big does your total sample of patients need to be in order to be able to run the prediction study? Also, factor in that 10% of your participants will drop-out of the study. Report the intermediate steps for your calculations below (including brief explanations for each step), rather than just the final result of your calculations. (4 marks)

8) What is an inception cohort and provide a relevant example where using a clear description of an inception cohort is important (2 marks)

The exam ends here.

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