**Preliminary title:**

*Implementation of a Database and Analysis Functionality for Periprosthetic Joint Infection Data*

(Semester project or master thesis)

**Abstract**

The incidence of total hip arthroplasties (THA) and total knee arthroplasties (TKA) is rising worldwide, as both procedures successfully allow patients to regain mobility. Unfortunately, the number of revisions is likewise increasing and predicted to burden patients and health care providers tremendously. Periprosthetic joint infections (PJI) represent a primary cause of THA and TKA revisions. PJI, however, is a highly complex disease: its diagnostics and therapy require the analysis of heterogeneous, multimodal data from various medical faculties, including orthopaedics, microbiology, pathology, clinical chemistry and radiology at the clinical, cellular and molecular level. In clinical reality, a systems medicine approach is already in action: in PJI diagnostics and therapy, the impact of molecular components from the synovial fluid or molecular drug interactions must be considered just the same as the range of motion of the joint or psycho-cognitive factors. Depending on the pathogen, the virulence and the patient, however, the diagnostic accuracy and the therapy success can be extremely variable. Same diagnosis, same therapy, but different results? - The reason is obvious: every patient is unique. Currently, the evaluation of this high-dimensional data is still performed using manual work, as paper files are still the most prevalent data source in German hospitals. However, such an antiquated assessment does not fully exploit the potential of our systems medicine approach. Thus, innovative, digital analysis tools are urgently needed to further explore causal relationships in PJI diagnostics and therapy. Artificial intelligence (AI) methods are perfectly suited for an analysis of such multimodal data. Furthermore, AI methods allow for individualised prediction models. We therefore consider individualisation through digitalisation as the key to improve PJI diagnostics and therapy towards precision medicine. Currently however, data is gathered in Excel format, without clear structure in a decentralised and unsystematic way.

**Tasks**

- set up a working database model for weekly PJI board meetings
- establish a web interface for intuitive data input (for non IT experts, e.g. a study nurse)
- integrate retrospective (tabular) data
- provide data visualization and analysis
- chrome based
- use common tools/frameworks-engines etc. such as sqlite or postgres, vega etc.
- long term goal of this project is to provide data in a suitable form for clinical studies/ AI studies
- present your results in our lab

Offer

- Get in touch with rare medical data
- Highly educated & interdisciplinary environment
- Interaction and frequent feedback from medical and computer science experts
- (workplace at our lab at Klinikum rechts der Isar – subject to reservation)

References


Hinterwimmer, F, Lazic, I, Langer S, Burgkart R, von Eisenhart-Rothe R Predicting Complications In Primary TKA Using Machine Learning With Arthroplasty-Specific Data Effort Congress 2022


Contact

If you are interested, please send a brief application with CV and transcript of records to:

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