TRAM (Train and Retain Academic Musculoskeletal clinicians)
MB-PhD Project Summary

PhD project Title
Digital tools for remote monitoring of inflammatory rheumatic diseases

PhD supervisors (please provide name, affiliation and email) *[At least two supervisors]*	
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Background
The field of medicine, including rheumatology and immunology specialties, have been profoundly transformed over the past years by digital applications. Digital health encompasses several domains such as virtual visits, mobile health and smartphone apps, the electronic health record, wearable technology, digital therapeutics, artificial intelligence applications and machine learning. These technologies are exponentially available for medical usage, and this has been increased by the pandemic. In fact, several aspects of healthcare delivery have been strongly impacted by SARS-CoV-2 related restrictions, leading to a fast, yet not optimal, digitalisation of healthcare, leading to various remaining clinical unmet needs. For example, in rheumatology, the assessment of disease activity in people living with inflammatory rheumatic diseases such as rheumatoid arthritis or psoriatic arthritis, which mostly involves a physical joint assessment and count, became very challenging if not impossible over remote telephone interviews. In addition, clinical research, especially clinical trials requiring physical study visits and joint counts have been severely impacted by the reduction of face-to-face visits, leading to delays in recruitment and difficulties organizing follow-up visits. In this context, simple tools allowing a better remote monitoring and assessment of disease activity or amenable to delivering remote healthcare interventions in patients living with rheumatic diseases are required to maintain best practice and facilitate treat-to-target strategies for standard-of-care in Rheumatology.

Aims
This project overarching aim is to develop an online platform (available on Smartphone, Tablet and Computers) available to patients in the comfort of their home that can monitor disease activity by automatically detecting synovitis through pictures analyse, based on the pictures taken by the patients themselves through the online platform. This development will involve several sub-aims:

-Systematic literature review of existing digital offer for self-monitoring
-Patient evaluation: pre-design, by the organisation of focus groups in order to better understand patients' needs and preferences.
-Data collection, especially setting up a set of pictures in order to develop a machine learning algorithm able to detect synovitis on hands pictures.
-Development of the algorithm (in collaboration with a partner specialized in machine learning and artificial intelligence).
-Post development evaluation by a small group of health professionals and patients via mixed method approaches.
-Validation of the functionality and usability in a larger cohort of patients.

Training and experience provided *[Include types of methodologies that will be employed]*

-Knowledge in performing systematic literature review.
-Data collection in a population of patients living with inflammatory arthritis.
-Mixed methods patients surveys including quantitative and qualitative approaches.
-Data analysis and basic statistics.
-Training in experimental design in both pilot small groups of patients and larger observational cohort studies.

Expected outcomes

-Acquire knowledge in existing digital developments through a literature review.
-Better understanding of patients and health professional needs and expectations in terms of digital health in Rheumatology.
-Creation of a platform able to automatically detect synovitis in order to improve patient management and treat to target strategies.

Key References

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