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INVESTIGATING THE USABILITY OF OFF-THE-SHELF SENSORS
AND USING PATIENT DATA TO DIAGNOSE FRAILTY

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BACKGROUND

- Healthcare systems overwhelmed with an increasing demand due to population aging
- Governments promoting remote/in-home rehabilitation as a potential solution to reduce costs and free up resources in critical hospitals
- Remote home rehabilitation can empower patients to have control over their own rehabilitation process
- Wearable sensor technology is transforming rehabilitation processes by providing valuable information which previously was not available, to health-care staff and patients

OBJECTIVES

1st Investigate usability of wearable sensors within elderly rural population

2nd Investigate effectiveness of "off the shelf sensors", e.g. activity trackers, in detecting/diagnosing frailty

ACTIVITY MONITORING WITH OFF-THE-SHELF SENSORS

PATIENT HEALTH RELATED AND USABILITY QUESTIONNAIRES

MATERIALS, METHODS AND EVALUATION

- In our SENDoc NPA project, we are evaluating the effectiveness of off-the-shelf wearables for monitoring and rehabilitating remote and rural patients
- We are conducting demonstrations in 4 partner locations, where healthy participants aged over 60 years will wear a Mi Band activity tracker (Mi Global Home, 2018), a data logger and a smartphone to attain comparable data
- The usability of this technology will be assessed from elders’ perspective
- The data attained will then be analysed in combination with medical patient data to identify frailty
- We hypothesise that off-the-shelf sensors can be used to automatically identify frailty
- Look at the correlation between patient physical activity and patient data.
- Number of steps and physical activity and exercises performed, sleep tracking and heart rate. The latter will be looked to calculate energy expenditure.
- Statistical methods and qualitative usability questionnaires will be applied to validate or reject this hypothesis.
- Artificial Intelligence and machine learning methods will be employed to classify frail and pre-frail patients from non-frail patients

EXPECTED OUTCOMES

Results are not available at this stage. However, we expect that on-time therapeutic and medical advice can assist patients to recover full capacity, before frailty becomes irreversible.

Other expected outcomes are:
- Enhanced understanding of elders’ perception about using wearable sensors to gain awareness about their level of physical activity and overall state of health
- Attaining usability metrics of the available off-the-shelf wearable sensors
- Identifying the difficulties (if any) and advantages faced by elderly people while using “off-the-shelf” wearable sensors
- Attaining patient data that can be analysed/compared across the 4 partner locations of SENDoc.
- Being able to diagnose frailty using related medical and patient data. The latter captured using off-the-shelf sensors.