

Smart-Phone Based Application for Frailty: Proposal for Rapid and Routine Perioperative Frailty Assessment

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Background: Frailty, a state of decreased physiological reserve, is a distinct concept of biological rather than chronological age and underlying mechanisms are different from aging. Frailty has been associated with adverse surgical outcomes. Nevertheless, frailty is rarely assessed during the perioperative period. Some prominent reasons include complex and time consuming assessments and the lack of an universally accepted tool. We propose a readily usable smartphone-based application based on broadly used frailty models, information from patients, healthcare professionals, and laboratory investigations for perioperative frailty assessment.

Methods: We describe a proposal based on a theoretical model combined with technology to develop a smartphone-based application for frailty assessment. It combines variables from frailty models such as 1) 5-meter gait speed 2) chair standing time 3) grip strength, and 4) MoCa scores with information entered by patients and healthcare professionals. Telemetric sensors on smartphones can capture specific datapoints from patients. Gait speed is assessed by Haversine formula (distance between the start and end point divided by duration). The in-built timer function can measure the time duration a patient takes to sit and stand from a chair 10 times. These data combined with medical history, grip strength, and MoCa scores could assess frailty using the validated CGA-FI Index. We designed the user interface to suit mixed age groups with large buttons to help elderly patients. The interface incorporates elements of modern design, and mixes them with intuitive usage.

Conclusion: With the ubiquity of smartphones amongst healthcare providers, opportunities exist to leverage these tools for improved patient care. When used routinely, our application could create a standardized and structured summary of frailty resulting in rapid perioperative assessment. Moreover, this tool can easily be updated with validated metrics aiming to tailor specific requirements. Future directions include a series of pilot studies and a small-scale pilot randomized controlled trial to determine if the intervention can demonstrate change.

