



# Importance of motion sensors in the identification of older patients at risk of falling.



Chiara Mussi<sup>1</sup>, Andrea Cattabriga<sup>2</sup>, Carlo Tacconi<sup>2</sup>, Sabato Mellone<sup>3</sup>, Francesca Veltri<sup>1</sup>, Alice Ferri<sup>1</sup>, Sonia Bertoli<sup>1</sup>, Marco Bertolotti<sup>1</sup>, Lorenzo Chiari<sup>2,3</sup>

<sup>1</sup>Dipartimento di Scienze biomediche, Endocrinologiche e Neuroscienze, Cattedra di Geriatria, Università di Modena e Reggio Emilia

<sup>2</sup>CIRI Scienze della Vita e Tecnologie per la Salute, Università di Bologna

<sup>3</sup>Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione, Università di Bologna

## INTRODUCTION

Falls in the older population are one of the most common geriatric syndromes, due to their impact on disability and quality of life both for the patients and their families. Identifying causes of falls, often multifactorial and regarding multiple organs, is mandatory to prevent the fall event.

Together with well-known risk factors, nowadays there is the chance to refine and extend the search of useful elements by means of wearable motion sensors that are able to objectively measure parameters related to the mobility profile of the subject.

## AIM OF THE STUDY

The aim of the study is to identify quantifiable elements measured by the motion sensors that can be useful in identifying older patients at risk of falling and in building therapeutic programs (both non-pharmacologic and pharmacologic).

## PATIENTS AND METHODS

We report preliminary data related to a pilot study carried out on 90 patients (mean age 76.8±6.9 anni, 57.3% females) admitted to the Cardiogeriatric Ward of the Chair of Geriatrics of Nuovo Ospedale S. Agostino-Estense in Baggiovara. All patients were submitted to complete examination, 12-leads electrocardiogram, history of fall risks, blood pressure measurement and evaluation of orthostatic hypotension. Moreover, the principal tests for gait, balance and strength (standing balance, chair standing, Functional Reach test, Timed Up and Go test –TUG, Figure 1) were performed and instrumented with the wearable motion sensor shown in Figure 2. Patients were divided in two groups, according to their estimated clinical risk of falling.

Preliminary results support the hypothesis that it is feasible to instrument simple functional tests with minimal effort obtaining reliable measures which are in agreement with the clinical observation but perform much better than the traditional outcomes in discriminating between different risk groups.

Figure 1. Functional performance tests

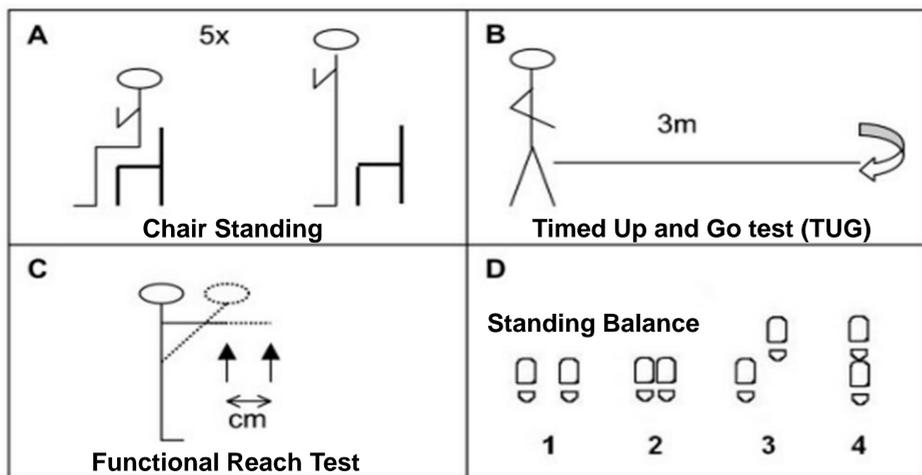
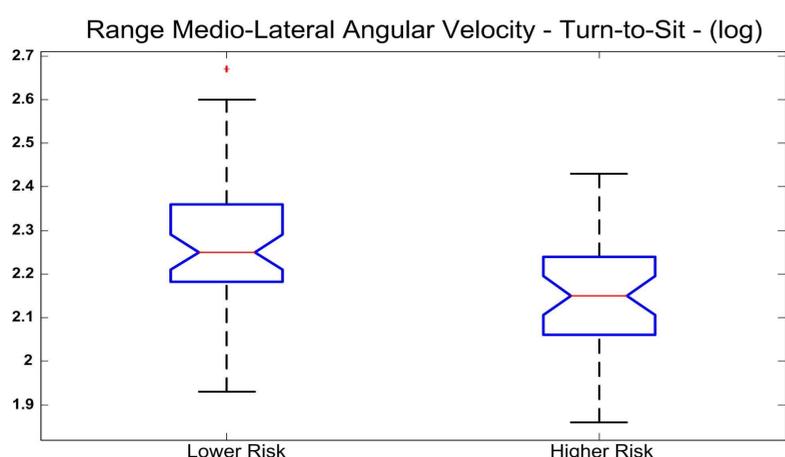
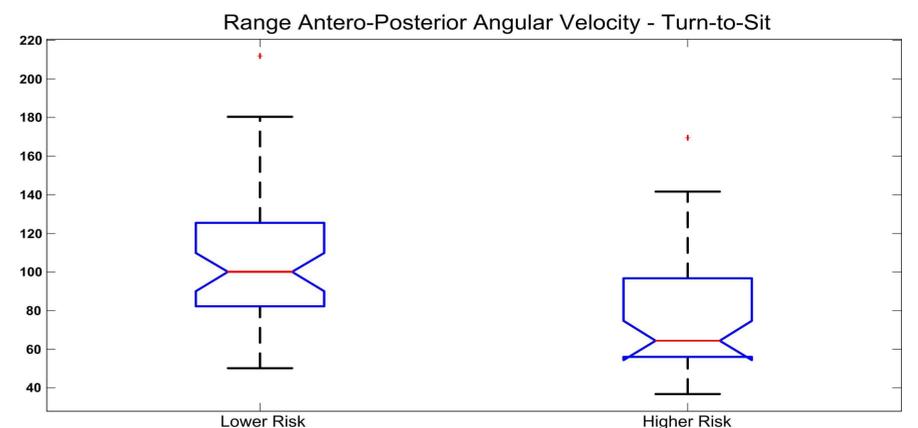
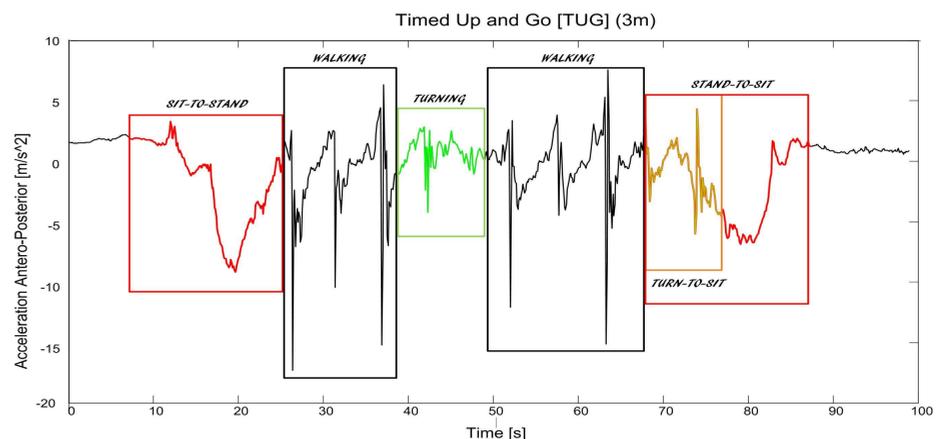
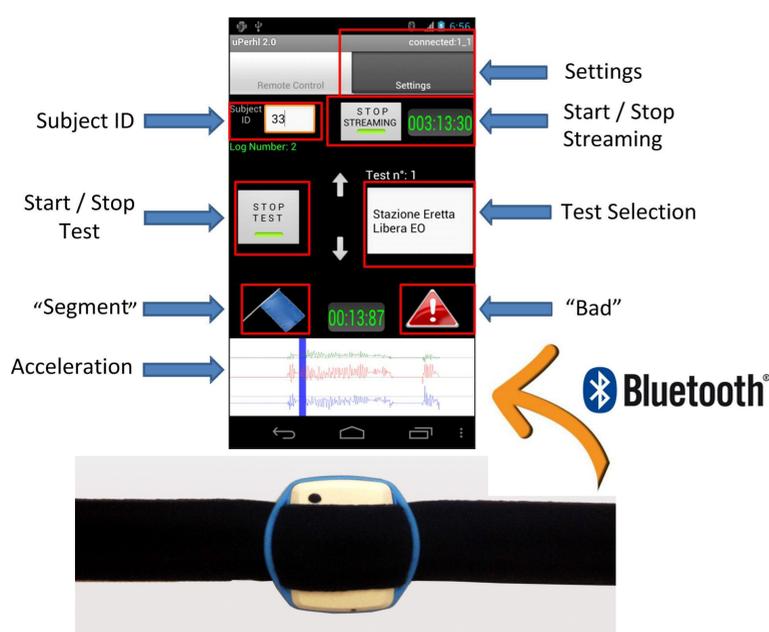


Figure 3. Wearable Motion Sensor



## CONCLUSIONS

We strongly believe that the routine use of wearable sensors will be able to add new and fundamental elements in the prevention of falls and of the subsequent disability.