EPUAP Report: Heel Pressure Ulcers: Back to Basics

I am very grateful to EPUAP for awarding me the Exchange Scholarship to visit Professor Cees Oomens at Eindhoven University of Technology (TU/e), Netherlands before he retires. The knowledge, guidance, and mentorship I have received from Prof Oomens has been invaluable both for my pressure ulcer research and for a future academic career.

The visits to TU/e allowed me to learn new research methodologies, whilst enhancing my understanding of key literature in the field of pressure ulcers. Over the past year, ten subject-specific 3D models of the heel and lower leg were modelled from MRI data to investigate the internal stress and strains that occur in the heel soft tissues of a patient in bedrest. Simulations were performed for both healthy and atypical foot geometry (i.e. healthy and Haglund's deformity) with two loading scenarios: a prescribed displacement, and a gravitational body load. The influence of the calf, foot orientation and mattress stiffness were also assessed. The results obtained, identified that those with Haglund's deformity exhibit higher internal strains in the heel soft tissue compared to the healthy foot and that the shape and size of the calf has an influence on the formation of heel pressure ulcers. A prescribed displacement is inaccurate for simulating the weight of the foot on a mattress as this differed greatly per subject (e.g. a size 11 foot will not weigh the same as a size 4 foot) and thus limits the clinical interpretation of results. A more realistic boundary condition (i.e. a gravitational body load) should therefore be applied. Foot posture influenced the location of the strain and in those with Haglund's deformity was found to be higher where the deformity is located. A softer mattress resulted in lower strains in the heel, subsequently lessening the chance of a pressure ulcer forming. Assumptions regarding the material properties made a significant difference to the results.

The work to date has been presented at the EPUAP Annual meeting in Lyon 2019 and has been written in the form of a review paper and an original article that will be submitted for publication. The next stages of this research will encompass some common devices for pressure ulcer prevention (dressings, boots) in order to better understand which are more effective and why, and whether some actually pose additional risks.

I was privileged to work under Prof Oomens in his final year and endeavour to pass on some of his knowledge and expertise to a new generation of researchers. I wish him all the very best and thank him for the time and encouragement he has shown me throughout this scholarship.

"If it excites you and scares you at the same time, it probably means you should do it!"