Can an inner disposable glove be used under an electro-goniometric glove for measuring finger movement without loss of accuracy?

J. Connolly¹, J. Condell¹, K. Curran³, D. Small², P.V. Gardiner²
¹Letterkenny Institute of Technology, Letterkenny, Co Donegal, Ireland
²Altnagelvin hospital, Western Health and Social Care Trust, Londonderry, U.K.
³Intelligent Systems Research Centre, Ulster University, Londonderry, UK

Introduction

Improving joint mobility is an important outcome for patients with arthritis, but finger joint range of motion is rarely measured in clinic. Electronic gloves with movement sensors have been developed to measure joint movement accurately and it is now possible to assess dynamic mobility of the finger joints. However these gloves are expensive and it is likely that when carrying out measurements in the patient population they would be used with inner disposable gloves to avoid nosocomial infection. Establishing accuracy and usability of electronic gloves whilst wearing disposable inner gloves is therefore an important pre-requisite for studies in patients with arthritis.

Methods

This validation study was performed on a subject with normal range of movement and no visible signs of Rheumatoid Arthritis. We used two different types of electrogoniometric glove for the purpose of this study. One is the commercially available 5DT dataglove 14 Ultra (5DT, 2011) and the other was produced to our specifications by Tyndall National Institute, University College Cork (shown in Fig. 2a). We called this the “IMU glove”. We developed a graphical interface for both devices to facilitate detailed evaluation of joint movement in each finger (shown in Fig. 2b and 2d). Both gloves were tested using a protocol adapted from Dipietro, Sabatini, & Dario, (2003) (shown in Fig. 2c).

Results

Table 1 displays comparison of Coefficient of Variation (CV) readings for both data gloves, with and without a surgical glove worn underneath. Table 1 shows that wearing disposable gloves under electrogoniometric gloves is feasible without significant loss of accuracy.

Contact james.connolly@lyit.ie for further information