A novel method for identification of patients at risk of deterioration using FACS

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A novel method for identification of patients at risk of deterioration using FACS

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Abstract

Introduction

Facial displays are used by health professionals to assess the wellbeing of patients at risk of deterioration. Surprisingly, there is not a single early warning system based on the assessment of facial expressions. There is ample literature that supports the study of face expressions by means of anatomical based score systems, such as FACS (1). Preliminary studies suggested that outreach nurses identified mostly sadness and fear in patients at risk of deterioration (2). As part of a pilot study on analysing facial expressions in critical illness, this research has compared Action Units (AU in FACS terminology) from patients at risk of deterioration against AU inferred from 20 facial images of patients deemed to die.

Patients and Methods

Control group (CG): 20 facial images of patients terminally ill were selected from a public internet source (3) from which the relevant AUs were identified.

Experimental group (EG): Patients at risk of deterioration who agreed to participate in the pilot study on facial analysis in critical illness (HRA approved, IRAS 165739). After taking consent from the patients a 5 min video was recorded, encrypted and analysed later using FACS by a trained psychologist. The micro-expressions (or AU) were assessed for the upper face (UF), head position (HP), eyes position (EP), lips and jaw position (LJ) and lower face (LF). Variables are presented as mean±SD. The Pearson chi-square test was employed for inferential analysis (Systat, Inc. (v13.1) was used).

Results

The Control Group (N=20) was formed of eleven females and 9 males with an estimated age of 70±13 years old. The most frequent AU in the control group were AU43 (eye closure, 70%, $p < 0.001$) and AU15 (lip corner depressor, 65%, $p < 0.01$). There was not association between sex or age and AU (only valid for UF and LF).

The Experimental Group (N=4, five videos) was formed of 2 females and 2 males with an age of 63.4±3.2, the NEWS score was 6±4.3 and the pain score was zero during the recording of the video. The most frequently detected AU over multiple video frames were AU43 (80%) and AU15 (100%).

The comparison of AU43 and AU15 between both groups was not statistically significant.

Fig. 1. AU Lower Face

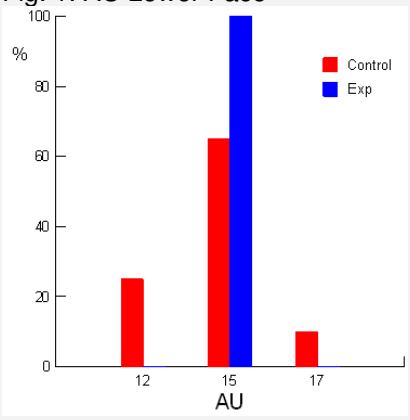
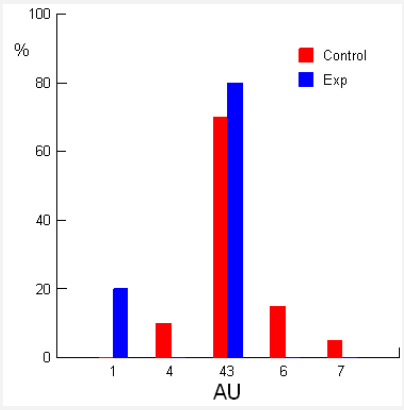


Fig 2. AU Upper Face



Conclusions

This research has demonstrated for the first time that patients at risk of deterioration and terminally-ill have similar patterns of AU in the lower and upper part of the face, with peak frequencies of AU 15 and 43 respectively.

References

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