Empowering Independence with Environmental Controls

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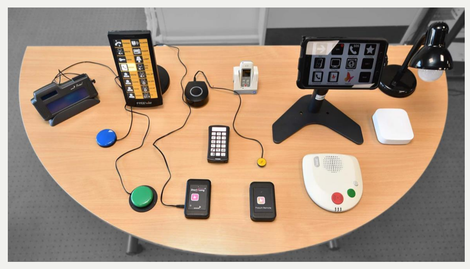
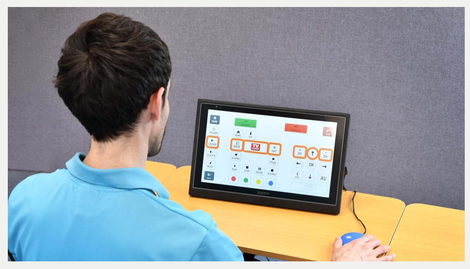
Introduction

Environmental control (EC) systems are a type of assistive technology that can be controlled by a wide variety of different methods (e.g. switches) and can assist people with physical disabilities to control a range of electronic devices in the home (e.g. televisions, systems for calling for help). These devices are generally prescribed to help people with reduced upper limb function that has occurred due to a neurological condition. Common examples include high-level spinal cord injury, motor neurone disease, multiple sclerosis and cerebral palsy. Systems can have a positive impact on improving independence and quality of life.

In Lothian, the EC service is one of only two services in Scotland that provides a full service from clinical assessment, procurement, fitting, training and on-going maintenance and servicing. At any one time it has around 100 active users living at home or a similar domestic setting. It also provides clinical assessment for NHS Borders. It is delivered by a team of clinical scientists and technologists specialising in Rehabilitation Engineering.





Aims

This work outlines recent innovations that have been undertaken by the EC service. The overall aims were to improve patient outcomes, to generate evidence for the provision of EC services, and to increase the autonomy of users living in the community.

Testing new ways to improve the patient interface and experience

The majority of EC systems require a screen to be mounted where it is easily visible to the user. Using a smart glasses display could remove this requirement. The aim of this study was to explore the usability and satisfaction of using smart glasses as a display screen when operating an EC system. A satisfaction questionnaire (QUEST 2.0) was undertaken with four participants, that captured data prior to and post a trial of using smart glasses with their current EC system. A semi-structured interview was carried out with participants to explore the impact that smart glasses have had on the satisfaction and usability of their device.

In general, the participants' satisfaction decreased after the trial. This was associated with disadvantages of the smart glasses which included creating a visual barrier and positioning. The most reported advantage was the use of the system in alternative positions where it is challenging to mount a standard display screen. Overall, the participants in this study did not benefit from the use of smart glasses, despite this, some key advantages to using the smart glasses were identified. With further development, there is potential that smart glasses could be an effective display for an EC system and support independence.

Partici-pant	Mean pre QUEST 2.0 score	Mean post QUEST 2.0 score	Quest 2.0 score change
P1	4.25	2.38	-1.88
P2	4.13	2.62	-1.50
P3	3.50	3.00	-0.50
P4	4.00	2.00	-2.00

Table 1: Mean QUEST 2.0 scores (5 = very satisfied, 4 = quite satisfied, 3 = more or less satisfied, 2 = not very satisfied and 1 = not satisfied at all)

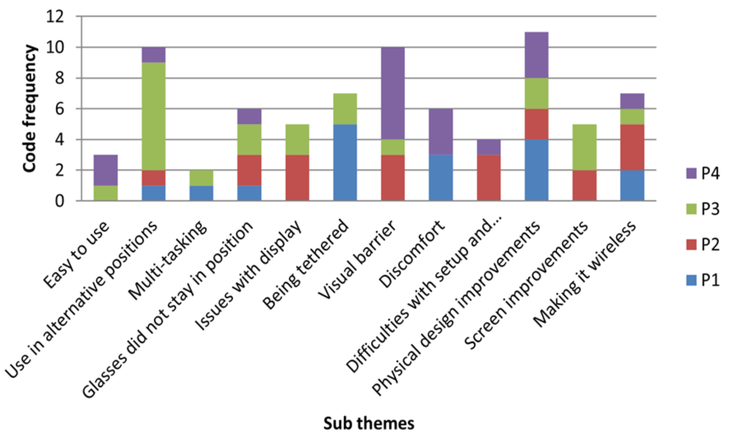


Figure 1: The code frequencies for each of the identified subthemes

Establishing the positive impact on mental health & psychological wellbeing

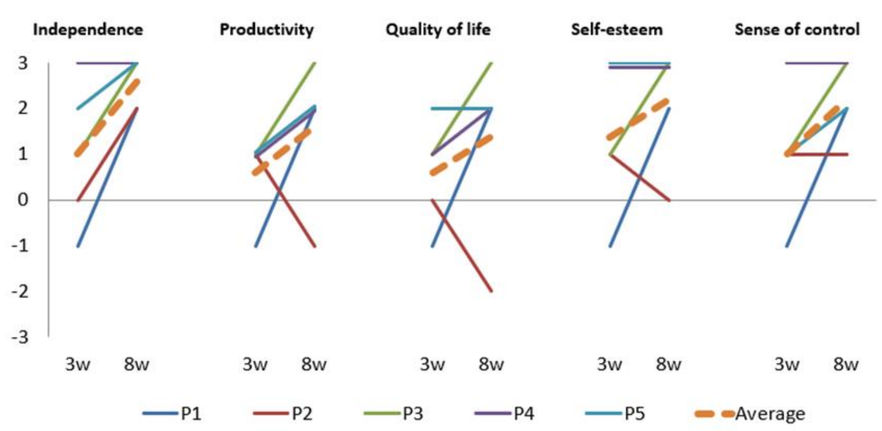


Figure 2: Examples of the participant's PIADS-10 individual item scores and average plotted as slopes between the 3 and 8 week time points. An upward slope indicates an increase in the positive effect.

Two well established instruments (PROMIS-10 and PIADS-10) were used to investigate the impact of EC systems on mental health and psychological well-being. Further data were collected using a custom designed questionnaire. Data were collected before intervention, at 3 weeks, and at 8 weeks post intervention.

Five participants took part in the study and completed the instruments in all three stages of the study. Four of the participants used a hand operated switch for access and one used a head tracker.

When considering the score change over the whole time period, this increased for all participants and the minimal clinically important difference threshold was surpassed for both of the mental health and psychological well-being instruments in all but one case. Results also demonstrated that the majority of participants were satisfied with their devices and relied less on family and carers to assist them controlling electronic devices around the home.

This study found that EC systems have a positive impact on users' mental health and psychological well-being. The study design also demonstrated the potential of using the PROMIS-10 instrument, the PIADS-10 instrument, and a study specific questionnaire to assess the impact of EC systems on users' mental health and psychological well-being. The approach could be used to build broader, high-quality evidence for the provision and use of EC systems.

Innovating service delivery & patient information

Service delivery

A gap was identified for patients, residing in the Lothians, that would benefit from Assistive Living Technology equipment (e.g. Alexa type smart home devices) but do not meet the EC service's eligibility criteria. The EC service worked with the Disabled Living Centre and the Neurological Occupational Therapy Service to trial a new way of integrating assistive living technology equipment assessments with routine home visits. Five occupational therapists participated in the trial and an evaluation of the project was undertaken. The results demonstrated that on-going training and ready access to expert support was required.

Due to the weakness of the above service delivery model, an alternative model was trialled. An occupational therapist was temporarily seconded to the EC service one day a week, with full support from the EC service team. Having an OT embedded within the team improved the skill mix of the team and addressed the training issues. There is ongoing work to make the OT role permanent within the service.

Patient information

The service has recently developed a new case study video which is hosted on the SMART Services' website and provides an informative and easy to understand overview of what an EC system can do. In addition, the handover documentation provided for EC systems has been re-designed with an emphasis on clear, easy to understand information.

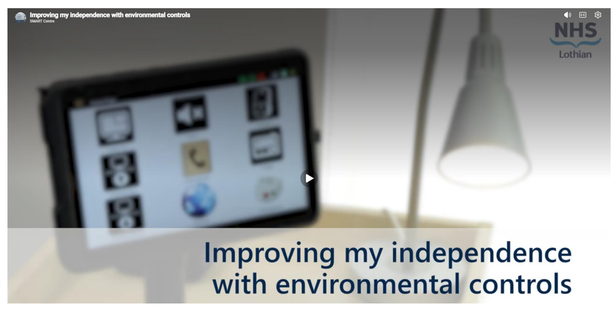


Figure 3: EC system video case study screenshot

Figure 4: Service handover information leaflet

Concluding remarks

EC systems can help people with disabilities to have more independence and autonomy and have a positive impact on quality of life. The EC service's purpose is to provide and manage these systems and ensure they are utilised to maximise their positive impact. The work highlighted by this poster demonstrates the commitment of the service to find innovative ways to meet its purpose, to improve outcomes for patients, and to promote independent and autonomous living in the community.

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