COG WATCH

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Cognitive Rehabilitation of Apraxia & Action Disorganisation Syndrome

CogWatch

Information sheet for Healthcare Professionals

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Introduction

Stroke is recognized as the leading cause of disability. According to the World health organisation 15 million people worldwide suffer from a stroke each year (WHO 2004).

Following a stroke, people can experience a range of cognitive problems in addition to any difficulties in motor function. Cognitive problems strongly influence how well people functionally recover following stroke.

A recent study in the UK found that 68% of stroke patients showed characteristics of Apraxia and Action Disorganisation Syndrome (AADS) (BUCS 2007). AADS can result in an impairment of cognitive abilities to carry out activities of daily living (ADL) such as washing and dressing, preparing a meal or hot drink. Apraxia and Action Disorganisation Syndrome is defined as:-

- **Apraxia** A neurological disorder of learned purposive movement skill that is not explained by deficits of elementary motor or sensory systems (Rothi & Heilman 1997)
- ***Action Disorganisation Syndrome(ADS)***: Cognitive errors when performing multiple-steps tasks (Morady & Humphreys, 2009)

AADS patients whilst maintaining their motor skills, commit cognitive errors during every day goal orientated tasks which they used to perform automatically. Patients most typically **omit** steps of a task (e.g. make cereal without milk) or **sequence** the steps of the task incorrectly (add sugar before the cereal).

AADS has great impact on patients' individual independence, their families, and the national healthcare systems which have to provide continuous support and care. Thus, technological advances that address these personal and economic costs by enabling independent living of AADS patients would be of great value and must be developed.

Healthcare professionals recognise that **stroke care is typically short-term**; hospital based and often focuses on physical rather than cognitive rehabilitation. Regardless of their functional state, patients are often discharged on physical grounds with the assumption that cognitive rehabilitation, if needed, will continue at home. Yet current methods of treating AADS are hampered by a lack of recognition of the prevalence and impact of the condition amongst many practitioners, inadequate training for therapists, and limited evidence base for effective therapy.

Many people with AADS after stroke are left with life-long disability and suffer unnecessary social exclusion and mental health problems because of inadequate rehabilitation. Cost-effective care for stroke requires the promotion of maximal independence in the stroke patient with minimal hospital admissions, through provision of home-based (community) services.

To date this has involved relatively expensive care arrangements, with bolt-on therapy, that is often reactive in nature. Standard technologies have had little impact on therapy, and are often threatening to patients. Most rehabilitation is therefore still very 'low tech'. A more efficient system would put the patient and their family at the centre, utilise labour-saving technology, and provide sufficient data for healthcare professionals to monitor progress and intervene in proactive and timely fashion (Orpwood, 2009; Worthington and Waller 2009; Worthington, 2010).

The purpose of the project

The CogWatch project will focus on neurological patients with symptoms of Apraxia and Action Disorganisation Syndrome. It is proposed as a Personal Healthcare System (PHS) that aims to:-

- Be personalised to suit the needs of individual patients
- Offer long-term, continuous and persistent cognitive rehabilitation to maximise treatment impact
- Be affordable and customisable to reduce unnecessary costs
- Be portable**,** wearable and ubiquitous to allow patients to continue rehabilitation and increase independence within familiar environments when carrying out activities of daily living.
- Be practical and adaptable for home installation

To develop a high- tech, personalised healthcare system for AADS patients, CogWatch has adopted a multi-disciplinary and multi-sector approach that includes Physicians, neuropsychologists, healthcare professionals, a stroke charity, engineers and industrial partners with expertise in commercial exploitation and medical devices markets.

The Proposed Solution

CogWatch will use sensors embedded in everyday tools and objects (e.g., cutlery, plates, boxes, toaster, kettle), a wearable wrist device '***the CogWatch'*** that provides feedback about a task, using images sounds and vibrations, and a *Virtual Task* Execution (VTE) module – which is a large screen (see figure 1 below) that can guide patient's actions by providing words or images of the task being undertaken. The VTE module will synchronise virtual hand movements with the position of the users' hands using feedback from the sensors in each intelligent tool. Using movement prediction programs developed by the CogWatch partners, the system will identify the task being carried out and provide appropriate feedback. This feedback will:-

- Guide patients' actions
- Make patients aware of cognitive errors when they occur
- Make patients aware of the actions that they need to take in order to correct the errors
- Alert patients if their safety is at risk when handling tools and objects inappropriately

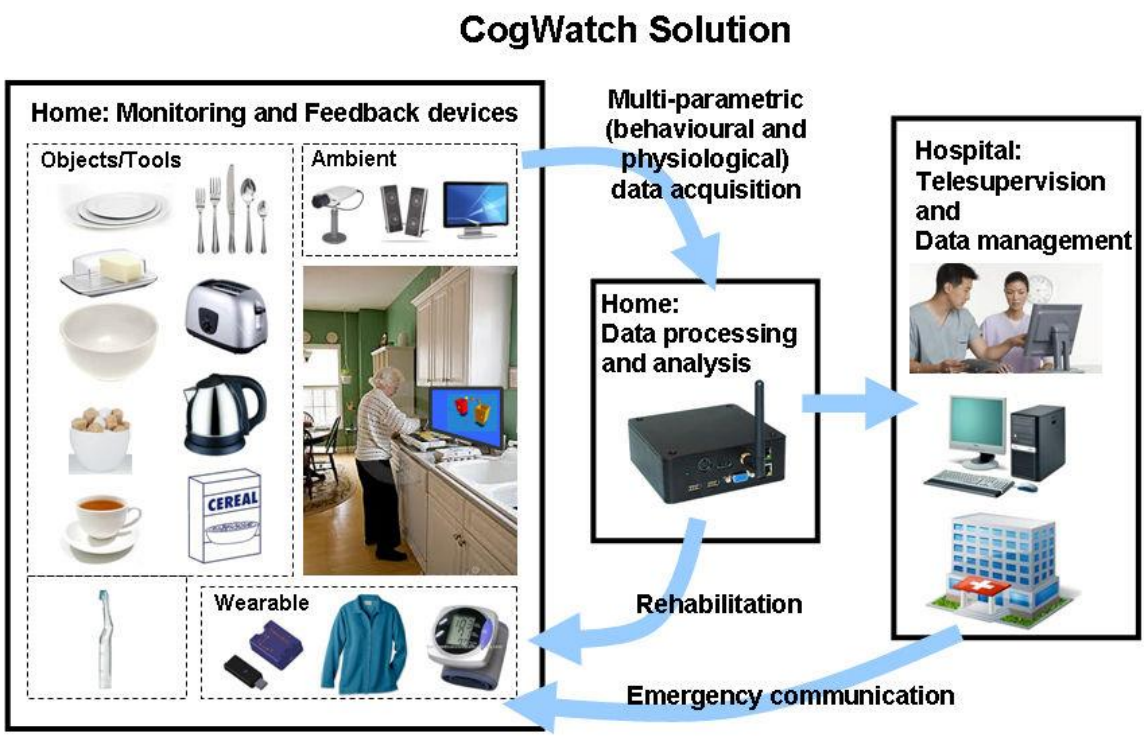

Figure 1 schematic representation of the Cog Watch system

Data collected by the CogWatch system can also be transmitted to a database at a healthcare centre or hospital where it will be available for relevant health professionals to access and use to monitor patients progress (Telesupervision).

Due to the nature of this project, the data will also be available to scientists and engineers who will use the information collated by the system to increase their understanding of AADS and improve the effectiveness of CogWatch

The CogWatch project will explore a scenario in which the three basic tasks of *meal preparation* and *eating*, *dressing* and *grooming* will be addressed. These tasks are used as a measure to assess patient's independence before they are discharged from hospital.

If CogWatch is successful it will enable stroke patients with AADS to enhance their cognitive deficits thus increasing their independence and quality of life.

Study Design

CogWatch has been funded by the European Commission; it is co-ordinated by the University of Birmingham includes several partners across various disciplines and industries. CogWatch will take approximately 3 years to develop:-

Months 1 – 18 – Pilot Phase

Development of prototype One based on information gained from professionals, carer givers and users including studies of 100 patients, using psychological and statistical action modelling, and then tested with patients in a laboratory setting.

Months 17 – 36 – Development of Prototype two based on information gained from Health Professional's, carers and service users. This will then be tested in the lab and the home for acceptability and efficacy.

Participation in the study

CogWatch was launched in November 2011 and during the first 6 months the project gained views of healthcare professionals, carers and service users. This information contributed to the development of the first Prototype.
This evaluation aims to test the usability, effectiveness and practicality of the CogWatch system – tea making and tooth brushing. Therefore we aim to do this through conducting focus groups with users, carers and healthcare professionals as well as gaining information from an online survey for health professionals in order to assess the following:

a) How well the technology is received by patients, their families and carers.

b) Reductions in care needs associated with provision of CogWatch

c) Utilisation of information provided by CogWatch by healthcare professionals

We are hoping to gather a number of opinions from healthcare professionals, care givers and users, in order to ensure that the CogWatch device best meets the needs of people with AADS once they return to live in the community; therefore, we would be most grateful if you could complete the short questionnaire which should only take 10 minutes.

If you require further information or have any questions regarding this project please do not hesitate to contact:-

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