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Environmental Audit of UK Hospitals to Design Safer Facilities for Frail and/or Confused Older People

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ABSTRACT

This paper reports the outputs of 2 pilot studies to develop an environmental audit tool for care facilities using a checklist and a hierarchical task analysis. Ten wards at 6 hospitals (10 wards) were audited using the checklist and 3 wards assisted with the development of the HTA. It was found that the audit tool needed further development to include empirical measurements (lighting, contrast and signage) and international environmental standards. The HTA described a complex hierarchy of tasks and subtasks for the goal of going to the toilet without assistance for a frail and/or confused older person in an unfamiliar environment. There is a need for an in-depth understanding of the person-environment interaction to support patient autonomy (reduce the level of disorientation and distress) and improve safety. A validated environmental audit tool will support the delivery of (and evaluate) system level and design solutions.

Keywords: environmental audit, older people, dementia
INTRODUCTION

In the US the 65+ population is projects to more than double from 40.2 million in 2010 to 88.5 million in 2050 (Vincent and Velkoff, 2010). It has been reported that at least 35% of older people (65+ years) have some sort of disability (e.g. difficulty in hearing, vision, mobility, cognition, self-care), with over 15% needing assistance. For the 80+ years population this increases to over 55% and almost 30% needing assistance (Dept. of Health and Human Services, 2011).

The World Alzheimer’s Report (Alzheimer’s Disease International, 2010) has estimated that there are 35.6 million people living with dementia worldwide in 2010. They predict that this may increase to 65.7 million by 2030 and 115.4 million by 2050, with nearly two thirds living in low and middle income countries. In the UK it has been suggested that people with dementia over the age of 65 years may be occupying up to 25% of acute hospital beds at any one time (Alzheimer’s Society, 2009). This paper reports the outputs of 2 pilot studies to develop an evidence-based environmental audit tool for care facilities using a checklist and hierarchical task analysis.

ENVIRONMENTAL AUDIT

The first pilot study developed an audit checklist to evaluate the environmental design of acute care settings with a focus on autonomy and independence for a confused patient (dementia/delirium). Three published environmental audit tools (Royal College of Psychiatrists. 2010; Dementia Services Development Centre, 2007; Calkins, 1988) were used as the basis for the tool (Hett, 2011).

The Royal College of Psychiatrists (2010, 2011) National Audit of Dementia Environmental Checklist was used to gather information (by self-report) about aspects of the ward physical environment known to impact on people with dementia (PWDem) in acute, community and mental health hospitals in England and Wales. An expert consensus group reviewed data and ideas from professional recommendations and guidance documents (Housing Corporation, 2004; Day et al, 2000; Department of Health, 2007; Brawley, 2001) to agree a series of checklist items that was used to collect data from 144 hospitals. The full report was published after this pilot study so the findings have been included for discussion.

The Dementia Services Development Centre (2007, 2011) Dementia Design Audit Tool offers a framework for making decisions about the design of spaces for PWDem. It was produced from expert consensus, literature and examples of best practice and then piloted in a range of settings. Calkins (1988) offers an early example of universal design recommendations for dementia based on professional opinion.

The audit checklist had sections for signage, flooring/walls, lighting, layout and monitoring (sight lines), physical support (grab rails), hygiene facilities and design for patient independence. It was evaluated at 6 UK hospitals (acute and longer stay), 3 of which also participated in the Royal College of Psychiatrists audit. This included 1 mental health trust (2 sites/wards) for longer term dementia care with an average stay of 6 weeks, and 3 acute trusts (4 sites) for 3 orthopaedic wards and 5
acute medical/care of elderly wards with an average stay of 3-10 days. The findings for signage, flooring and lighting are discussed in this paper.

2.1 Signage

It was found that the signage varied across the hospitals from only text, to text with a picture or symbol with a range of different (some contrasting) colours (Figure 1). PWDem may have semantic memory impairment resulting in problems recognising words, objects and pictures (Adlington et al, 2009). The use of primary colours (Wijk et al, 1999) and concrete nomenclature (rather than abstract) with supporting diagrams is likely to be helpful. For all older people it is likely that improving contrast, font size and signage placement may increase independent navigation and successful use of hygiene facilities (Namazi and Johnson, 1991a). In a study where patients (with no confusion) were interviewed about contributory factors for falls, difficulties were identified with distance perception, in particular underestimating distances between objects due to the greater size and distance between hospital fixtures compared to domestic environments (Morse et al. 1987).

The results from the Royal College of Psychiatrists audit (2011) found that fewer than half of wards (48%) reported that key areas were clearly marked; 56% reported that information (words and pictures) on signs was in clear contrast to the background; and 38% reported that signs/maps were large, bold and distinctive.

Figure 1  Examples of Signage from Environmental Audit Pilot Study

The pilot study found that the route from the patient bed to the toilet/bathroom varied in terms of the layout (distance and route) and signage. In the multi-bed bays there was usually at least 1 bed without directional information (signage or sightline) to locate the toilet from the bed.

The Royal College of Psychiatrists audit (2011) reported that only 15% used colour schemes to help PWDem find their way around the ward; and only 28% reported that signs to locate the toilet were visible from the patient’s bed area/door of room. However, 90% of wards reported that toilet and bathroom doors had signs and 87% had toilet and bathroom doors of a different colour to the walls, with a surprising 38% of wards using toilet paper of a different colour to the wall.
2.2 Flooring

There was a marked difference in flooring between the older (polished, shiny finish) and newer (matt finish) acute wards (Figure 2). As older people may have increased sensitivity to glare a matt (less reflective) floor has been found to be beneficial (Bright et al, 1991; Torrington and Tregenza, 2007).

The Royal College of Psychiatrists (2011) report found that 95% of wards self-reported that floors were plain or subtly patterned; and that 93% (134/144) of floor surfaces were subtly polished rather than high gloss, with 78% reported as non-slip.

![Figure 2. Examples of flooring with a shiny and matt finish, and pattern to indicate doorways](image)

2.3 Lighting

The pilot study found that 80% of the wards had insufficient lighting; this would need to be measured and compared with international standards. One of the newer acute wards had night lighting for the floor around the bed and near the toilet which would be particularly beneficial for people with visual impairment or low vision (Wright et al, 1999).

Serious sight loss affects about two million people and the main causes of sight loss are related to ageing, so most people with sight loss are also aged over 65. Among those over 75, it is estimated that around 100,000 people will have a diagnosis of both dementia and sight loss (Thomas Pocklington, 2010). The Royal College of Psychiatrists audit (2011) did not consider lighting so no comparative data are available.

3 GOING TO THE TOILET: HIERARCHICAL TASK ANALYSIS

Hierarchical task analysis (HTA) is used to provide a more in-depth analysis by dividing a task (goal) into a hierarchy of operations (Kirwan and Ainsworth, 1992). To further develop the environmental audit tool an HTA of a frequent activity
(going to the toilet independently) was carried out to identify features which may support or hinder independence and autonomy.

In a previous paper, it was proposed that Maslow’s Hierarchy of Needs could be used as a model to explore the motivators for movement and barriers that might be associated with in-patient falls (Hignett and Masud, 2006). The level one needs (physiological) motivation for movement may include bladder and bowel function (to support homeostasis), hunger, thirst and activity. If these needs are not met by caregivers, then the patient will be highly motivated to achieve them independently, resulting in movement from the bed and introducing the risk of falling. This formed the basis for the hierarchical task analysis (HTA) to achieve the goal of going to the toilet independently (Figure 3).

![Hierarchical Task Analysis from bed to toilet](image1)

**Figure 3. Hierarchical Task Analysis from bed to toilet**

![Hierarchical Task Analysis for getting out of bed without staff assistance](image2)

**Figure 4. Hierarchical Task Analysis for getting out of bed without staff assistance (Step 2)**
One of the first barriers/enablers that will be encountered may be when trying to get out of bed without staff help (Figure 4). The use of bed rails has been discussed since the 1960s, with Fagin and Vita (1965) commenting that 'to many conscious patients, side rails are frightening and imply dangerous illness. To others, side rails are irritating and humiliating because they emphasize the confining aspects of hospitalization.' Most patients want to retain their independence, in particular with respect to elimination needs (Chung, 2009), for example 'on numerous occasions seriously ill patients climbed over the bed rails to go to the bathroom, thus averting the embarrassment of a soiled bed' (Parrish and Weil, 1958).

Figure 5. Hierarchical Task Analysis for locating the toilet (Step 4)

The challenge of locating the toilet will be supported or complicated by the characteristics of the pathway between the bed and bathroom. This was found to include the signage (Figure 5), distance to the bathroom, number of directional turns between the two destinations, the availability of support (hand rails), obstacles in the path, bathroom configuration, direction of door swing, and the space within bathroom (Pati et al., 2009). Figure 6 shows two layouts that, it is suggested, have been designed to (a) provide hand rails for patients for physical impairment, giving support (hand rails) between the bed and the toilet along the head wall, and (b) give a direct sight line for patients with cognitive impairment from the bed head to the toilet pan (Namazi and Johnson, 1991b).

4 DISCUSSION AND CONCLUSION

During the development of the pilot tool, it was felt that a major limitation was the lack of environment measures. For example ‘the space has good levels of artificial lighting’ (Dementia Services Development Centre, 2007); ‘signs/maps are large, bold and distinctive’ (Royal College of Psychiatrists, 2011). Further pilot work is being carried out to continue the development of the environmental audit.
tool using empirical measurements for lighting, contrast and signage based on ISO recommendations in a nursing home care facility.

Figure 6. Design for (a) frail patients with hand rails from bed to toilet (Pati et al., 2009) and (b) confused patients with a direct sight line of the toilet (NHS Estates, 1998)

The Thomas Pocklington Trust (2009, 2010) reported that models for dementia care have previously not given sufficient emphasis to broader issues of ageing e.g. visual impairment. This has resulted in design guidance for people with sight loss focusing on maximising independence and with a higher level of detail and more precise specifications than design guidance for people with dementia. There are common principles between the two sets of guidance but there are also potential conflicts, for example memory objects placed along circulation routes to assist in way-finding for PWDem could become hazards and obstacles for people with sight loss. They recommended the development of a sensory model of care practice for dementia care settings. However, staff in acute hospitals may be ‘unaware of a dementia condition in their patients…and the admission itself can lead to the worsening of the effects of dementia…due to the disorientation and distress that arise from separation from familiar people, environment and routine’ (Royal College of Psychiatrists, 2011). The HTA identified environmental enablers as well as barriers but the main finding was the complexity of achieving the goal of the simple hygiene task.

It has been estimated that the cost implications of hospital admission for PWDem include a greater risk of medical problems leading to an extended recovery period with an increased length of stay. These costs have been estimated to be in excess of £6 million per year in an average general hospital (National Audit Office, 2007). There is a need for an in-depth understanding of the person-environment interaction to support patient autonomy (reduce the level of disorientation and distress) and improve safety. A validated environmental audit tool will support the delivery of (and evaluate) system level and design solutions.
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