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The effectiveness of environment assessment tools to guide refurbishment of Australian residential aged care facilities: A systematic review

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Abstract

Objective

To determine applicability of environment assessment tools in guiding minor refurbishments of Australian Residential Aged Care Facilities.

Method

Studies conducted in residential aged care settings using assessment tools which address the physical environment were eligible for inclusion in a systematic review. Given these studies are limited; tools which have not yet been utilised in research settings were also included. Tools were analysed using a critical appraisal screen.

Results

Forty three publications met the inclusion criteria. Ten environment assessment tools were identified of which four addressed all seven minor refurbishment domains of lighting, colour and contrast, sound, flooring, furniture, signage and way finding. Only one had undergone reliability and validity testing.

Conclusion

There are four tools which may be suitable to use for minor refurbishment of Australian residential aged care facilities. Data on their reliability, validity and quality is limited.

Key Words

Facility design and construction; Evidence based facility design; Housing for the aged;

Nursing Homes; Environmental Design

Introduction

In 2011, there were 185,482 residential aged care beds in Australia distributed across 2760

facilities with 60% managed by "not for profit" organisations[1]. Significant changes to both

funding and regulations[2] challenge the aged care industry responses in the face of

demographic ageing, changing consumer expectations and levels of skilled care needed for

older people with complex medical conditions including dementia[3]. Comparative economic

modelling evaluating the cost of providing residential aged care services in Australia[2],[4]

illustrates a significant financial reach for organisations engaging in building new facilities.

Longer term profitability is hard to predict alongside other risks associated with construction

cost, construction timing, occupancy and operating costs[2]. Consequently aged care

providers, particularly not for profit organisations, need to compare the potential cost of, and

returns from, redeveloping or modernising existing facilities[4].

Refurbishment may be major or minor. Major refurbishment includes additional buildings,

extensions or structural improvements to the residential Aged Care Facilities (ACF)[5] and

minor refurbishment the improvements to finishes, furniture, fixtures and fittings that

provides a direct benefit in quality or functionality to residents' life that is beyond

aesthetics[5],[6]. Design elements of the newly built facility to accommodate various physical

and cognitive impairments of this group have been researched in both Europe and North

America[7],[8],[9]. Studies demonstrate positive findings for a range of design elements such as facility size [10], control of stimulation [11], lighting[12],[13], signage[14],[15], sound[16], visual access[11],[10], colour/contrast[17], and way finding[18],[19], in terms of impact on residents wellbeing or functional abilities. However, studies focusing on a single element (such as colour or décor) in isolation or omitting an assessment process or not incorporating the functional needs of occupants have not been successful in demonstrating a change in outcomes post interventions[20],[21],[22].

There are few guidelines for appropriate minor refurbishment of residential Aged Care Facilities either internationally or in Australia. Well researched guidelines to optimise the refurbishment outcomes for the ACF environment in the current financial and regulatory environment should mitigate where possible ageing related impairments and be maintenance friendly. The purpose of this systematic review was to identify and objectively evaluate environment assessment tools to determine which would be suitable for minor refurbishment of ACF.

Methods

We searched the Cinahl, Cochrane Library, PubMed, Trove databases and an ACF organisation's resource collection in addition to Google Advanced Search between May and November 2015 for references which described or reviewed ACF environmental assessment tools published between 1996 and 2015. Reference lists from included articles were also hand searched for additional studies. Other tools were identified by searching a number of

internet sites, particularly Australian government sites in the various states and territories. Further tools were identified by contact with researchers or experts in the field.

Our full list of search terms are shown in the Appendix and included terms such audit, screen and assessment. These were combined with terms such as residential aged care, nursing homes, and residential facilities and terms relating to the physical environment, design and refurbishment. The introduction of 'dementia' as a key word increased the results significantly. Finally, studies using the tools were also searched by entering the name of the tool.

Lighting, colour and contrast, sound, flooring, furniture, signage and way finding domains consistently appeared in the literature as considerations for improvement to function and wellbeing; are within the parameters of minor refurbishment and were then adopted by the researchers. The design elements of major refurbishment initiatives such as building size, configuration or layout, access to the outdoors, private bedrooms and bathrooms and total visual access were outside the scope of this study and were excluded.

Using the review question 'Can existing environment assessment tools be used to establish minor refurbishment priorities in an Australian residential aged care facility?' the relevance criteria were:

- Studies or resources available in full text and in English

- Employing tools developed to measure the physical environment in ACF

- Tools readily accessible and preferably include an instruction manual

- Measuring at least two established minor interior refurbishment domains associated with changes in function or ability (lighting, colour and contrast, sound, flooring, furniture, signage and way finding)

Studies related to behaviours, clinical health, therapeutic interventions, care needs, community or hospital settings and outdoor environments were not included. Each tool was populated into a table listing tool description; author/source; country of origin; purpose of tool; population or setting of tool; number and description of items; time to conduct; reliability; validity; quality; requirements for use; number of refurbishment domains addressed; studies using the tool; other points, strengths and limitations.

The quality component was assessed using a structured questionnaire, with a maximum of 5 points[23] (Figure 1).

INSERT FIGURE 1 HERE

Results

The literature was initially searched by the first author (24) and almost 3000 articles were identified and their titles and or abstracts reviewed. Of these, 101 relevant articles were retrieved in full with the second author (20) confirming eligibility. Disagreements were discussed and if needed, referred to the third researcher CB to arbitrate. This flow is presented in Figure 2.

The tools were examined to determine their potential to establish minor refurbishment priorities for Australian residential ACF. Ten from the United Kingdom, United States of America and Australia were identified as meeting our criteria and these are summarised in Table 1. Some tools had been subjected to prior reviews or studies and their strengths and limitations noted[25],[26],[27]. There was demonstrated evidence for the use of certain tools to audit the environment, but we investigated their use in the context of minor refurbishment in seven domains: lighting, colour and contrast, sound, flooring, furniture, signage and wayfinding.

The Dementia Services Development Centre's[28] Dementia Design Audit Tool (DDAT) includes questions on all seven refurbishment domains. This UK tool has 345 questions with 118 deemed essential items and 227 recommended items with the overall score weighted according to category. However we found no published data on the tool development nor any reliability and validity studies. Innes et al 's[29] study provides some validity, reliability and quality information on the tool (scoring 3 from 5). The DDAT has an explanation for each item but is time consuming to complete and score.

DesignSmart[30] is similar to DDAT and also addresses all seven refurbishment domains in detail. This Australian tool has 609 questions with 272 deemed required and 337 advisable with comprehensive explanations to assist with scoring. A literature review was undertaken to establish the tool criteria, however each criteria are not referenced or linked to the relevant literature. The authors advise that DesignSmart is not a research tool and thus has not undergone reliability and validity tests. Futhermore, there do not yet appear to be published

studies using the tool and the quality score was 0. Finally, Design Smart is time consuming to complete and purchasing the tool provides a lience to undertake the audit at one facility only. If more facilities are to be audited, then more tools need to be purchased.

Enhance the Healing Environment (EHE) Environmental Assessment Tool[31] covers all seven refurbishment domains. This UK tool has straightforward and short (59) questions scored on 5 point Likert scale with a section to add photographs. However there is a paucity of information on how to score the responses which provides options from 1 (barely met) through to 5 (totally met). The tool was described as being informed by research, best practice, surveys and field testing, but information regarding outcomes was not obtainable. No associated reliability or validity studies were found using the search strategy andwe also found no published studies using the tool. Consequently we assigned a quality score of 0. The tool does not include specifications for improvement. The tool authors recommend involving a range of people in the assessment as this enables discussions likely to encourage improvements in both the physical environment and the quality of care delivery.

The Environmental Audit Tool[32] is another Australian tool which encompasses six of the refurbishment domains with 72 questions which are scored yes, no or nor applicable. It does not include the flooring domain. Originally designed to assist with modifications to hospital wards to ensure suitability for people with dementia, EAT has been modified and tested. Reliability and validity studies have been conducted and quality rated as 5. EAT questions centres on 10 design principles to provide an environment that maintains the abilities of a person with dementia. Completion is striaght forward and information about how to use the tool is readily available.

Environmental Quality Assessment for Living (EQUAL) Checklists[8] were specifically developed for a quality of life study. The aim to describe environments as experienced by individuals. Data from room (112 items), unit (140 items) and facility (134 items) checklists were grouped to form 20 indices which encompass four of the refurbishment domains – furniture, lighting, colour/contrast and sound. It is acknowledged that these indices cannot be used as scales but extensive testing has been conducted by the authors with reliability and face validity yielding a quality score of 5. There were no additional studies identified that used EQUAL Checklists other than those by the authors.

The American Multiphasic Environment Assessment Procedure (MEAP)[33] is lengthy and complex to complete and has five instruments within the tool. Whilst reliability, validity and quality have been thoroughly examined, only one of the instruments addresses the physical environment and this encompasses two of the refurbishment domains (furniture and lighting) in 15 items from the 153 item Physical and Architectural Features checklist. Specifications for improvement are not provided and we could not find further studies that examines this further. MEAP requires expertise to complete.

The Professional Environmental Assessment Protocol (PEAP)[27] is an American tool developed to provide a standardised evaluation of special care units for people with dementia type disorders. Taking approximately 3 hours to complete by a trained professional, reliability, validity and quality have all been established. However the actual tool itself or a

manual was not found to be readily available in the public domain so the number and type of refurbishment domains included could not be examined.

Australia's Victorian Department of Health released the Residential Aged Care Services Built Environment Audit Tool in 2012[34]. The tool has 193 items across 5 domains including all seven minor refurbishment categories. Although the results do not appear to be published, the tool was pre-tested and trialled to ascertain reliability and a single study using the tool was reviewed to assess quality (score of 4). The first author of this study was one of the authors involved in the development of the tool. We could not find published studies which validated the tool. Specifications are included and referenced against relevant standards and resources. The tool kit with accompanying resources including photographs to assist comprehension of the tool recommendations is readily available.

The Sheffield Care Environment Assessment Matrix (SCEAM)[35] was developed in 2004. The SCEAM has 318 questions across several sections which address all seven minor refurbishment domains and can take up to half a day to complete. The SCEAM was developed for research purposes rather than commercial use and has not yet been fully validated[36]. Inter-rater reliability is high and the quality score is 5 with a number of studies using this tool. Uniquely, this tool captures the difference between a building as designed versus the building as used. Some terms eg 'pastiche' are specific to the UK and not applicable to Australia. The tool kit and accompanying information is readily available.

The American Therapeutic Environment Screening Survey for Nursing Homes (TESS-NH)[26] consists of 84 items across 13 domains. Widely used in studies, this tool has etsablished reliability and validity yielding a quality score of 5. TESS-NH has a small subscale (Special Care Unit Evironment Quality Scale) and a single global scale embedded within a survey so provides limited recommendations for refurbishment improvements. The TESS-NH has 12 from 31 items relating to four of minor refurbishment domains (lighting, furniture, wayfinding and sound). Scoring is on a categorical basis where a higher number respresents a more favourable atribute of the environment. The tool is quick and simple to conduct (approximately ¾ hour).

Discussion

Of the ten environment assessment tools reviewed, five addressed all seven minor refurbishment domains: DDAT[28], DesignSmart[30], EHE Environmental Assessment Tool[31], Residential Aged Care Built Environment Audit Tool[34] and SCEAM[35]. Thus any one of these tools may be considered foremost when addressing minor refubishment of residential aged care facilities in terms of lighting, colour and contrast, sound, flooring, furniture, signage and wayfinding. However, the EHE Environmental Assessment Tool has limited information available on the development and scoring as well as specifications for improvement. The scoring prompts are simple ie low scores highlight areas for action such as changing crockery or improve flooring as part of maintenance programs. Scoring is subjective with the assessor determining if an item is barely met or completely met without any criteria to guide the score allocation. These limitations would impede establishing rigorous refurbishment priorities and recommendations to obtain funding, which is largely

contested and limited. The EHE Environmental Assessment Tool was therefore not subject to further review.

DesignSmart is very similar to DDAT and was developed in Australia so has more signficance to the refurbishment of facilities in this country than the DDAT. DDAT scoring is 'yes' or 'no' to the items with essential and recommended items interwoven in each category. DesignSmart is also yes or no and has required and advisable items in each category. However DesignSmart has more detailed information relevant to refurbishment which is easily categorised – for example in the Lounge Area section, it has subsections listing room layout and furnishing; detailed design elements (tonal properties); lighting; acoustics; thermal comfort and signage whereas DDAT's lounge area section lists general features and different types of lounges. We did not consider DDAT in a further review.

This resulted in three tools which address all seven minor refurbishment domains to subsequently be considered for further validation. These are namely, DesignSmart[30], Residential Aged Care Built Environment Audit Tool[34] and SCEAM[35]. One of the authors of SCEAM proposes consideration of the EVOLVE (Evaluation of Older People's Living Environments)[37]. The first two are Australian tools whereas the latter are from the United Kingdom. EVOLVE has not yet been examined and DesignSmart and Residential Aged Care Built Environment Audit Tool do not yet have established reliability and validity. SCEAM has partial reliability and validity established but these have not been fully tested. These tools vary in length (DesignSmart with 608 items through to Residential Aged Care Built Environment Audit Tool with 193 items) and time to complete so the feasibility of using these tools when commencing renovations also needs to be examined.

One major limitation comes from our inability to obtain full details of the PEAP which meant the number and details of the minor refurbishment domains included in the PEAP could not be established. To recommend a tool for refurbishment, the criteria included ready access with the preferrable inclusion of an instruction manual. Minor refurbishment was limited to seven specific domains (we acknowledge there may be more). Our focus was on residential ACF and so there may or may not be useful generalisability to home, community or hospital care for older people.

Conclusion

Ten environmental design audit tools were systematically reviewed for their use in ACF minor refurbishment with a focus on seven domains. From the ten, four tools – DesignSmart[30], Residential Aged Care Built Environment Audit Tool[34] and SCEAM[35] and EVOLVE (Evaluation of Older People's Living Environments)[37] may be useful in providing guidance in refurbishing lighting, colour and contrast, sound, flooring, furniture, signage and wayfinding. However, all tools require further work to establish reliability, validity and quality. We propose that these four tools undergo further testing to determine their suitability for use in conducting minor refurbishment in Australian residential ACF.

Key Points

- Currently, there is little consensus on the best assessment tool to guide minor refurbishment of ACFs

- We identified 10 tools of which four included all seven minor refurbishment domains.

- Further work is recommended to provide reliability and validity studies on these tools before recommending the best instrument for future use

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