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## **The Appropriateness of Adapting the Australian Environmental Assessment Tool–High Care (EAT-HC) for Persons With Dementia in Singapore**

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## The Appropriateness of Adapting the Australian Environmental Assessment Tool–High Care (EAT-HC) for Persons With Dementia in Singapore

### Abstract

**Objectives:** This study investigated the level of acceptance in Singapore of the eight principles of design underpinning the Environmental Assessment Tool–High Care (EAT-HC), which is commonly used in Australia to evaluate environments for the care of people living with dementia. A secondary goal was to identify topics particularly relevant to the Singaporean context, which are not included in the Australian EAT-HC. **Background:** This study was undertaken in preparation for the development of a Singaporean version of the Australian EAT-HC. **Methods:** Discussions from 23 focus groups involving 150 family caregivers, aged care staff, administrators, and architects were recorded and thematically analyzed to identify the characteristics of the principles underpinning the EAT-HC that are unlikely to be relevant in a Singaporean version and to identify additional topics required to tailor it to reflect the Singaporean culture. The thematic analysis was supplemented with quantitative data obtained through the use of simple Likert-type scales measuring the appropriateness of each principle in the Singaporean context. **Results:** The principles of design that underpin the EAT-HC were highly accepted by participants and provided a framework for a systematic exploration of Singaporean residential care for people with dementia. Some topics of particular relevance to Singapore were identified. These can be subsumed by the principles without the need for the principles to be changed. **Conclusion:** The results support the use of the design principles underpinning the EAT-HC as the foundation of a tool for the evaluation of Singaporean dementia facilities.

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Running Head: DESIGN PRINCIPLES FOR A SINGAPOREAN ENVIRONMENTAL TOOL

The appropriateness of adapting the Australian Environmental Assessment Tool – High Care  
(EAT-HC) for persons with dementia in Singapore

## Introduction

Singapore is a small island (719.9 square kilometres) in South East Asia that houses a multi-racial population of 5.6 million people, of which 516,692 are older adults aged 65 years and above (Singapore Department of Statistics, 2018). There are approximately 53,000 people living with dementia in Singapore (Alzheimer's Disease International, 2014; Singapore Department of Statistics, 2018). As in developed countries the provision of residential care is an important component of the services available to them. Most of the 15,205 beds are provided in situations where cost and the replication of a hospital environment have dictated the design of the buildings (Government of Singapore, 2017; Sun & Fleming, 2018). These buildings do not meet the needs of people living with dementia. Hospital-like environments are not home-like or familiar, comprising of negative stimulation and pay little attention to the cultural aspects of care (Grey et al., 2019). Facilities that are not purpose-built to meet the needs of people living with dementia result in the creation of stress-inducing environments for residents, family caregivers, and staff compromising their experience of health, wellness, safety, and the ability to build positive social connections (Wee et al., 2015; Tsai & Tsai, 2008). On the other hand studies have shown that the built environment can promote positive behaviours in people living with dementia and compensate for declining cognitive abilities.(Chaudhury, Cooke, Cowie, & Razaghi, 2017; Fleming & Purandare, 2010; Marquardt, Bueter, & Motzek, 2014)

There are no validated assessments tools available in the South-East Asian region to provide an evidence-based evaluation of dementia-specific aged care facilities to inform the remodelling of existing facilities and the planning of new facilities (Sun & Fleming, 2018). The availability of a validated environmental assessment tool would provide a reliable platform of communication and evaluation for all stakeholders in Singapore working to develop best

practice, evidence-based dementia enabling environments. Such a tool would help to address the challenges faced by residents living with dementia, their families, and staff by facilitating the identification of the strengths and weaknesses of the environments being used, enabling designs to be developed to systematically improve the environment. A tool appropriate in the cosmopolitan Singaporean context is also likely to be useful in other parts of South East Asia. A scoping review was conducted to find a tool that could be adapted to the Singaporean context (Sun & Fleming, 2018). The Environmental Assessment Tool High-Care (EAT-HC), a tool developed based on the Environmental Assessment Tool (EAT) (Fleming and Bennett, 2015) is a tool that is inclusive of people living with dementia who may be immobile or those requiring end of life care. The EAT-HC was identified by Sun and Fleming (2018) as the best available tool to provide a standardised assessment to guide and evaluate aged care facilities for people with dementia requiring high levels of care for the Singaporean Population. This tool is in common use in Australia and is recommended by the Australian Aged Care Quality and Safety Commission for use by aged care providers wishing to ensure that their buildings meet Standard 5 of the Australian Aged Care Quality Standards (Aged Care Quality and Safety Commission, 2018). The Aged Care Quality Standards are recommended outcomes provided by the Aged Care Quality and Safety Commission and standard 5 makes reference to the physical environment in residential care and the impact that it has on residents quality of life, independence, and wellbeing (Aged Care Quality and Safety Commission, 2018). The EAT-HC is designed to guide the user through an evaluation of the built environment against eight principles of design (Table 1.). The principles have their origin in Australia where they have informed the development of specialised dementia care units and the evaluation of residential aged care environments since the 1980s (Fleming, 2011; Fleming & Bennett, 2013; Fleming & Bennett, 2015; Fleming,

Goodenough, Low, Chenoweth, & Brodaty, 2016; Fleming, Kelly, & Stillfried, 2015; Smith et al., 2012). However, if the tool is to be used in Singapore, they must be subject to an examination of their relevance to the Singaporean context.

**Table 1.** *Eight Principles of Design underpinning the EAT-HC (Fleming and Bennett, 2015b, p. 3)*

1. Unobtrusively reduce risks

People with dementia require an internal and external environment that is safe, secure, and easy to move around in, if they are to make the best of their remaining abilities. However, obvious safety features and barriers will lead to frustration, agitation, and anger and so, potential risks need to be reduced unobtrusively.

2. Provide a human scale

The scale of a building will have an effect on the behavior and feelings of a person with dementia. The experience of scale is determined by three factors: the number of people that the person encounters, the overall size of the building, and the size of the individual components, such as doors, rooms, and corridors. A person should not be intimidated by the size of the surroundings or confronted with a multitude of interactions and choices. Rather scale should help the person feel in control.

3. Allow people to see and be seen

The provision of an easily understood environment will help minimize confusion. It is particularly important for people with dementia to be able to recognize where they are, where they have come from, and what they will find if they head in a certain direction. When they can see key places, such as a lounge room, dining room, their bedroom, kitchen,

and an outdoor area, they are more able to make choices and find their way to where they want to go. Buildings that provide these opportunities are said to have good visual access. Good visual access opens up opportunities for engagement and gives the person with dementia the confidence to explore their environment. It can also enable staff to see residents from where they spend most of their time. This reduces their anxiety and the anxiety of the residents.

#### 4. Manage levels of stimulation

*Reduce unhelpful stimulation:* Because dementia reduces the ability to filter stimulation and attend to only those things that are important, a person with dementia can become stressed by prolonged exposure to large amounts of stimulation. The environment should be designed to minimize exposure to stimuli that are not helpful. The full range of senses must be considered. Too much visual stimulation, for example, is as stressful as too much auditory stimulation.

*Enhance helpful stimulation:* Enabling the person with dementia to see, hear and smell things that give them cues about where they are and what they can do, can help minimize their confusion and uncertainty. Consideration needs to be given to providing redundant cueing i.e. providing a number of cues to the same thing, recognizing that what is meaningful to one person will not necessarily be meaningful to another. A person may recognize their bedroom, for example, because of a view, the presence of furniture, the colour of the walls, the light fitting, and/or the bedspread. Cues need to be carefully designed so that they do not add to clutter and become over-stimulating.

#### 5. Support movement and engagement

Aimless wandering can be minimized by providing a well-defined pathway, free of obstacles and complex decision points, that guides people past points of interest and gives them opportunities to engage in activities or social interaction. The pathway should be both internal and external, providing an opportunity and reason to go outside when the weather permits.

#### 6. Create a familiar place

The person with dementia is more able to use and enjoy spaces and objects that were familiar to them in their early life. The environment should afford them the opportunity to maintain their competence through the use of familiar building design (internal and external), furniture, fittings, and colors. This will involve an understanding of the personal background of the people living in the environment. The involvement of the person with dementia in personalizing the environment with their own familiar objects should be encouraged.

#### 7. Provide opportunities to be alone, with other residents, or with others from the community

People with dementia need to be able to choose to be on their own or spend time with others. This requires the provision of a variety of spaces, some for quiet conversation with one or two others and some for larger groups, as well as spaces where people can be by themselves. These internal and external spaces should have a variety of characters, e.g. a place for reading, looking out of the window, or talking, to cue the person to what is available and stimulate different emotional responses. Without constant reminders of who they were, a person with dementia will lose their sense of identity. Frequent interaction with friends and relatives can help maintain that identity. This is made easier when the

person is admitted from the local community as friends and relatives are able to drop in easily. The environment must include spaces for the resident and their visitors to use within the unit and in its immediate surrounds. These need to be attractive and comfortable to encourage visitors to come and spend time. Stigma remains a problem for people with dementia, so the unit should be designed to blend with the existing buildings and not stand out as a “special” unit. Where possible, a “bridge” should be built between the unit and the community by providing a space that is used by both the community and people with dementia. Where the unit is a part of a larger site, there should be easy access around the site so that people with dementia, their families, and friends can interact with other people who live there.

#### 8. Support the values and goals of care

An environment that embodies the values and goals of care, e.g. provides opportunities for engagement with the ordinary activities of daily living to support rehabilitation goals, will assist the patient with dementia to respond appropriately and the staff to deliver the desired care. The values and goals need to be clearly stated and the building designed both to support them and to make them evident to the person with dementia and staff. The building becomes the embodiment of the philosophy of care, constantly reminding the staff of the values and practices that are required while providing them with the tools they need to do their job.

### **Aim**

The aim of this study is to prepare the way for the adaptation of the EAT-HC for use in Singapore by investigating if the eight principles of design are an appropriate foundation for the

development of a Singaporean Environmental Assessment Tool and identifying culturally specific characteristics of the building that should be taken into account in the adaptation of the EAT-HC for use in Singapore.

### **Significance**

In Singapore, older adults aged 65 years and above make up 14.4 percent of the population, with the prevalence of dementia being 10 percent of older adults (Subramaniam et al., 2015; Sun & Fleming, 2018; Government of Singapore, 2019). With the growing ageing population, population of people living with dementia, and an old age support ratio of four and a half working adults to one older adults above 65, there is a growing number of residential aged care facilities developed to accommodate those who cannot, or choose not to, live in the community (Government of Singapore, 2019; Ministry of Health Singapore, 2019). The building of these facilities is progressing without a systematic framework for their design or evaluation. The sharing of an Australian framework has the potential to help aged care providers in South East Asia to assess their current facilities and develop new services in a more systematic way.

## **Methods**

### **Study Design**

A series of 23 focus groups conducted in 2016 provided the data for the study. The use of focus groups is a well-established method to capture and review cultural norms, beliefs and values of diverse communities in cross-cultural settings in a respectful and empowering manner (Kitchen, 2013). The thematic data available from the focus group discussions was supplemented with quantitative, descriptive data obtained through the use of Likert scales to report judgements on the level of appropriateness of each principle to the Singaporean context.

## Population and Sample

As the intention is to have the Singaporean EAT-HC used by all stakeholders involved in planning, design and operations of facilities caring for Singaporeans living with dementia focus group included individuals from different ethnicity who were working in an aged care setting or involved in the planning, policy, management, or design of the built environment. The views of people living with dementia were represented by the inclusion of family members. A convenience sample of seven nursing homes, an acute care geriatric team, community care organisation, government and design agencies, and an advocacy group was established. A call for expressions of interest in participating in the study distributed within these organisations resulted in the recruitment of 150 participants (Table 2.). Ethics approval for the study was obtained from the University of Wollongong Human Research Ethics Committee (HREC, application 2016/122)

**Table 2.** Demographics of Participants

Gender	Female	Age	21-30	31-40	41-50	51-60	61-70	
			38%	29%	17%	12%	3%	
Occupation								
Nurse	Allied	Administrator	Aged	Nurse	Nursing	Family	Architect	Other
Aged	Health		care	Acute	Aide	Caregiver		
Care			staff	Care				
45%	17%	11%	5%	5%	4%	3%	3%	7%

## Data Collection

A total of 23 focus groups were conducted with an average of seven participants per group. Focus groups were organised according to organisations and roles, such as aged care workers, management, administrative staff, and architects. Of the 23 focus groups, three focus groups, comprised of multi-disciplinary teams, as the organisations were made up of staff from different backgrounds. Participants attended an information session before the commencement of the study to ensure they had full knowledge of their role in the study, with allowance for withdrawal without consequences should they wish to do so. A handout containing all the focus group questions, a summary of the eight principles of design and questions on participants' demographic data was distributed during the information session. The handout allowed participants to familiarise themselves with the eight principles of design, the structure of the discussion, and questions involved before consent and commencement of the focus groups. The handout enabled participants, particularly those who did not have English as a first language, to have a clear understanding of their involvement in the study, clarify any questions about the principles of design, or the processes involved.

The handouts were available to the participants during the focus groups, allowing participants to refer to the description of the eight principles as the discussion developed. This helped to address cultural sensitivities, such as “facework” and collectivism. These are key considerations in undertaking focus groups in Asian communities (Lee & Lee, 2009), by allowing participants to refer to the eight principles of design at any time during discussion without the fear of having to be “impolite” or “irrelevant” should they need information. The participants were asked to discuss the suitability of the principles of design and to indicate their views on how appropriate each principle is in the Singaporean context. Their perception of the

level of appropriateness of each principle was recorded using a 7-point Likert scale. The answers ranged from “strongly disagree” to “strongly agree”, allowing participants to respond concisely and consistently.

An open discussion followed on the characteristics, barriers, and facilitators of each principle. The discussions were focussed on questions such as the motivations behind participants’ selection of score for the specific principle, how did they feel that the principle was appropriate for the development of a Singaporean tool, what were the cultural characteristics that should or should not be included, and what are the current barriers to implementation of the principle and facilitators of these principles. To ensure that all of the participants had an opportunity to respond an additional element of “indirect communication” was included by allowing participants to write their answer down if they did not wish to provide verbal answers. Providing an option for non-verbal responses has been found to increase the level of expression and participation in focus groups conducted in collective cultures (Lee & Lee, 2009). Participants were provided with as much time as they required to make written responses for each question. At the end of the FGD, participants were given additional time to review their written responses. All participants (n=150) completed the section on demographic data, and 144 handouts contained handwritten responses from the participants.

### **Data Analysis**

The process of analysis began as soon as discussions began with notes made during the process of discussion. Notes were made on the perceptions of group behaviour, participants’ body language, repetitive themes and concepts that arose from each focus group. All audio data collected from the focus group discussions were transcribed verbatim with reference to the memos made during the FGD into NVivo 11, a software program used in the analysis of rich

text-centric qualitative data enabling (QSR International Pty Ltd. 2015.). The process of open coding was repeated using NVivo, and a codebook was created. Upon completion of the codebook, key concepts were drawn out until the attainment of conceptual saturation.

## Results

The results are reported against the eight principles of design (Table 3.).

**Table 3.** *Level of acceptance of the eight principles of design*

<b>Principle (P)</b>	<b>Mean</b>	<b>Strongly Disagree (1)</b>	<b>Disagree (2)</b>	<b>Somewhat disagree (3)</b>	<b>Neither agrees or disagree (4)</b>	<b>Somewhat agree (5)</b>	<b>Agree (6)</b>	<b>Strongly Agree (7)</b>
1. Unobtrusive (discreet) reduce risks	6.01	0%	0%	1%	4%	13%	47%	35%
2. Provide a human scale	5.86	0%	1%	2%	5%	17%	49%	26%
3. Allow people to see and be seen	5.94	0%	1%	3%	6%	13%	40%	38%
4. Manage levels of stimulation	5.98	0%	1%	1%	6%	8%	54%	31%
5. Support movement and engagement	6.06	0%	1%	1%	3%	11%	42%	40%
6. Create a familiar place	6.20	0%	1%	1%	2%	5%	48%	43%
7. Provide opportunities to be alone, with other residents or with others from the community	6.02	0%	0%	1%	5%	16%	39%	39%
8. Support the values and goals of care	6.00	0%	1%	1%	3%	10%	43%	40%

### Unobtrusive safety

A large number of participants (82 percent) indicated that they “agreed” or “strongly agreed” that the principle of unobtrusively reducing risk is appropriate and should be included in the Singaporean version of the EAT-HC. However, the participants indicated mixed feelings about the balancing of risks and safety measures. They perceived a need for obtrusive measures to prevent injuries relating to falls and the need to present an overt appearance of implementing safety measures to family caregivers for fear of accusations of negligence. In addition, inadequate staffing, regulations, medical models of care, fear of liability and litigation, fear of job losses, cultural emphasis on quantity rather than quality of life were offered as reasons for the use of obvious safety measures. Nevertheless, participants recognised that obtrusive design impinges on the dignity of the residents and highlighted that residents are displaced and disempowered in such obtrusively safe environments and agree that the principle of unobtrusive design can enhance the quality of life for the residents. Suggestions include utilising technology as it can be an unobtrusive component in reducing risk.

### **Human Scale**

Three quarters (75 percent) of participants indicated that they “agreed” or “strongly agreed” that the principle of providing a human scale is appropriate in the implementation of aged care facilities in Singapore. However, participants were quick to highlight the cultural differences between Australia and Singapore when it came to the density of people encountered in a nursing home, the size of the building and the familiarity of fixtures and fittings. While recognising the confronting nature of residents waking up in an unfamiliar environment with 29 other people they acknowledged that land scarcity, an economy of scale, compliance with building regulations and fire safety, model of care, and cost of the development of nursing homes as reasons for the size and density of Singaporean nursing homes. Many indicated that the level

of personal space may be different for Singaporeans due to the collective culture and urbanised living in flats which have become a social norm. Singaporeans tend to favour sharing a room with other individuals and supported a cluster design resembling Housing Development Board (HDB) flats. To provide a clearer understanding of a Singaporean's perspective of a human scale, it is necessary to have an understanding of the built environment that 80 percent of Singaporeans call home, which are the HDB flats (HDB, 2019). HDB flats are modernised high rise and high-density blocks of flats with built environmental features that are unique to Singapore (HDB, 2019; Glendinning, 2014). For more than one million flats in Singapore, there are only six different sizes of flats ranging from 35 square metres to 130 square metres, containing between one to three bedrooms. Common characteristics identified by Generalova and Generalov (2014) include; a single living and dining room space, a kitchen which flows into a laundry area, and in flats that comprised of more than one bedroom, an ensuite accompanies the master bedroom. The overall structural design of the flats seeks to ensure maximum ventilation while minimising exposure to the intense heat and sunlight, as well as protection from torrential rain during the monsoon season (Glendinning, 2014). Open spaces on the ground floors known locally as "void decks" are a familiar sight, designed to build an inclusive community, they enable residents to utilise the area for social community activities and functions such as weddings, birthdays, and funerals (Generalova and Generalov, 2014; Glendinning, 2014; Housing & Development Board, 2019). These concrete structures also contain universal elements such as common corridors with handrails on floors above ground level and walking paths on the ground level outside the flats surrounded by greenery leading to community amenities, recreational facilities and public transport. HDB flats appear to embody an agreeable,

comfortable, and familiar scale for Singaporeans, reflecting an environment that is found in daily living, helping people to feel familiar and in control.

### **Allowing People to See and Be Seen**

A large majority (78 percent) of the participants indicated that they “agreed” or “strongly agreed” with the appropriateness of the principle of allowing people to see and be seen.

Participants agreed that it was vital that residents can be seen by staff and that visual cues will be helpful to both the staff and residents. The principle touches on the need for residents too, to have visual access to enable orientation and movement, allowing residents to navigate through their environment with ease, thus reducing their anxiety. Residents were observed to be in facilities that offer little visual access to enable navigation and orientation as a result of the environmental design and layout. Participants cited an emphasis on the safety of the residents, resulting in over-surveillance, leading to the loss of privacy for residents.

### **Manage stimulation**

Most of the participants (85 percent) indicated that they “agreed” or “strongly agreed” with the principle of managing levels of stimulation. Participants observed that no attempts have been made to the environment to regulate audio, olfactory, tactile, or visual stimuli. Living, dining and recreational activities were said to be carried out in one location. They attributed this to a lack of understanding of the impact overstimulation on residents. Some participants cited that the management of stimulation was an impossible task due to the lack of a variety of spaces in the environment, soundproofing, differences in resident’s needs, and funding to improve the environment. A participant provided examples of issues encountered with the management of positive stimulation as a result of a lack of knowledge or understanding. Quiet rooms that are designed to provide positive sensory experiences for residents became multi-purpose rooms,

doubling up as a storeroom or were left unused as surveillance of residents was not possible for staff. Instead of a room that promotes positive stimulation, some quiet rooms have become a holding area for residents who are noncompliant, which is contradictory to the room's objective as a space associated with positive sensory experiences. Participants acknowledged that there is a need for education and understanding to manage stimulation in the environment to reduce stressors and thereby improve the quality of life for residents with dementia. They cited the need for more innovative technological aids to help with lighting, temperature, surveillance, and sound control in the nursing home. Technology could also be utilised for personalised sensory stimulation or reminiscence therapy. Due to the multiracial population in Singapore, propositions for more culturally appropriate colours and signage were suggested. Participants request for richer, brighter colours instead of pastel colours or shades of black for background. Black was commonly associated with death. Signages should be inclusive of English, Mandarin, Malay and Tamil languages. Participants note that this may not possible on all signage but is ideal.

### **Support movement and engagement**

Participants (82 percent) strongly indicated that they “agreed” or “strongly agreed” with the principle of supporting movement and engagement. Participants shared their observations of external activity spaces such as gardens are found to be locked to deter access for reasons of safety. The complex uniform maze-like design and layout of nursing homes was seen to be restrictive in design, preventing residents from moving around the internal spaces. Participants recognised the discouragement of free moment, of walking, as a restriction of basic human rights. Participants touched on the reasons that have resulted in environmental designs that restrict movement and engagement, citing fear due to recommendations from family caregivers or staff as a result of the inability to be financially compensated should the resident require

additional medical care as a result of injury. Due to the vertical design of facilities, participants wanted to see more internal wandering paths with wider pathways for wheelchair accessibility, fewer exit doors and clutter. Better facility design to enable residents to travel between floors was also requested by participants.

### **Familiar Place**

Almost all participants (91 percent) indicated that they “agreed” or “strongly agreed” regarding the appropriateness of the principle of creating a familiar place. Hospitals or prisons were common descriptors used for the design of the built environment of nursing homes, though a small number of participants cited that they have observed nursing homes adopting the principle of creating a familiar place. Participants reported that the lack of familiarity in the environment brought about feelings of frustration and anger in residents living with dementia in aged care facilities. A diverse population of residents from a multiracial and multi-religious background was cited as an obstacle for providing a familiar environment by nursing staff, and it was hard to provide care that can meet the needs of each person. Participants however agreed that a familiar environment will encourage a person to be engaged, improve their wellbeing and quality of life. An environment that allows participants to include cultural or religious artefacts can contribute to a home-like and familiar environment contributing to the residents’ sense of identity.

### **Provide opportunities to be alone or with others**

Only 78 percent of participants indicated that they “agreed” or “strongly agreed” with the need for the implementation of the principle of providing opportunities to be alone, with other residents or with others from the community. A recurring theme in the discussion was about the lack of privacy in facilities and an overwhelming exposure to fellow residents in facility. As

mentioned, quiet rooms or spaces in which to be alone may not be inappropriately utilised, leaving residents with no appropriate private spaces. Spaces for religious or spiritual reflection that can be utilised alone or with other residents was a need identified by participants to be included in the design of facilities. Participants indicated that nursing homes are inaccessible as they can be geographically situated away from local communities. Families with children find it difficult to visit due to lack of family friendly spaces available. Participants shared that in some facilities, no chairs are available for families resulting in visits taking a physical and mental toll on visitors. Participants however have observed large events involving volunteers and residents being carried out in large halls, which enable interaction with the community. In discussions concerning the rationale for the lack of a variety of spaces, participants highlighted the lack of awareness and stigma that is prevalent in the design of environments for people living with dementia. People with dementia may be seen as confused, hostile and a danger to themselves and others and therefore they are not encouraged to come in contact with the broader community or to be alone.

To improve opportunities for connection with the community, participants suggested that designs should incorporate intergenerational spaces, nursing homes that do not contain fences or clear boundaries, computer rooms, rooms for religious or spiritual contemplation, communal spaces such as outdoor exercise spaces and the inclusion of technology to enable telehealth and engagement with the community.

### **Support the values and goals of care**

Most participants (83 percent) indicated that they “agreed” or “strongly agreed” with the principle of supporting the values and goals of care. Participants indicated that they have observed some environments that were disabling with a poor fit between the design of the

environment and the positive, enabling model of care presented by the nursing homes.

Participants explained that there was a need for collaboration and consultation between all stakeholders involved in the planning, design and development of the facility to avoid the design falling into a default hospital-like design. These stakeholders include the architects, builders, operators, staff, family caregivers and policy holders. Participants called for more discussion to consider the culture of care and current constraints, such as the issues surrounding the safety and autonomy of residents.

### **Discussion**

The quantitative results indicated that with a maximum score of 7 and means of 5.86 to 6.20 (SD =1.075 to 1.379) participants found that the principles of design were appropriate for use in evaluating the design of nursing homes in Singapore. The qualitative results support the application of the 8 principles. They were found to be aligned with the characteristics of the built environment that contribute to the well-being of people with dementia living in aged care facilities in Singapore. Additional facilities such technology, spaces for palliation and spiritual or religious spaces are required to meet the cultural needs of Singaporeans. For a facility to include the characteristics of the built environment that reflects the Singaporean culture, participants encouraged designs that resemble the built environmental of HDB flats and their surroundings. Participants found several key characteristics not mentioned in the description of the principles that, in their opinion, will significantly contribute to the usability and relevance of the Singapore Environmental Assessment Tool. They called for the recognition of the need to future-proof facilities by ensuring that technology can be integrated into the environment as it is found to be highly beneficial for active ageing interventions, telehealth and the introduction of unobtrusive safety features (Merkel, et al., 2019). They pointed out that the inclusion of spaces for palliative

care is a significant issue. Ng et al., (2016) reported that nursing homes in Singapore did not provide palliative care. Participants wish to see spaces that can provide for palliative care that preserved the dignity and privacy of the resident and their family. Space for religion or spirituality was also a key element identified in the study which was aligned with the evidence that 90 percent of nursing home residents in Singapore identified as having a religion (Tiong et al., 2013). Spaces where residents are able to display their personal religious artefacts and retire to engage in personal spiritual reflection can enhance residents experience of a home-like and familiar environment.

Participants were of the view that the application of the principles of design in facilities providing high levels of care for people living with dementia would enable residents to have a better quality of life and care. The implementation of the principles would provide significant benefits, promoting inclusion for residents, staff, families and people in the community and a sense of positive wellbeing.

### **Conclusion**

The study demonstrates that the eight principles of design that form the foundation of the EAT-HC are accepted as being suitable for the planning, development and evaluation of aged care facilities in Singapore. Participants were of the view that a cultural adaptation of the EAT-HC has the potential to improve the quality of life for residents living with dementia. Participants shared their observation, experience and understanding of barriers and facilitators in environments in Singapore for residents living with dementia. In addition, they identified culturally sensitive characteristics associated with environmental design such as technology, palliative care, spaces for spirituality should be included to reflect the needs of Singaporeans living with dementia. The study also suggested that there is a need for the design to evolve and to

embrace the characteristics of the local HDB flats for a familiar home-like environment that is true reflection of the identity of a Singaporean home. The evidence in this study sets the foundation for the development of a Singapore version of the EAT-HC, as it provides an understanding of the cultural needs of Singaporeans in the context of the aged care facilities. The acceptance of the eight principles of design, and the identified characteristics, facilitators and barriers of the built environment specific to the population supports the adaptation of the EAT-HC for Singapore.

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