



The role of the physical environment in conversations between people who are communication vulnerable and health-care professionals: a scoping review

Steffy E. A. Stans, Ruth J. P. Dalemans, Luc P. de Witte, Hester W. H. Smeets & Anna J. Beurskens

To cite this article: Steffy E. A. Stans, Ruth J. P. Dalemans, Luc P. de Witte, Hester W. H. Smeets & Anna J. Beurskens (2016): The role of the physical environment in conversations between people who are communication vulnerable and health-care professionals: a scoping review, *Disability and Rehabilitation*, DOI: [10.1080/09638288.2016.1239769](https://doi.org/10.1080/09638288.2016.1239769)

To link to this article: <http://dx.doi.org/10.1080/09638288.2016.1239769>



© 2016 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 05 Dec 2016.



Submit your article to this journal [↗](#)



Article views: 99



View related articles [↗](#)



View Crossmark data [↗](#)

The role of the physical environment in conversations between people who are communication vulnerable and health-care professionals: a scoping review

Steffy E. A. Stans^{a,b}, Ruth J. P. Dalemans^a, Luc P. de Witte^{a,b}, Hester W. H. Smeets^a and Anna J. Beurskens^{a,b}

^aFaculty of Health, Zuyd University of Applied Sciences, Heerlen, the Netherlands; ^bResearch School CAPHRI, Maastricht University, Maastricht, the Netherlands

ABSTRACT

Purpose: The role of the physical environment in communication between health-care professionals and persons with communication problems is a neglected area. This study provides an overview of factors in the physical environment that play a role in communication during conversations between people who are communication vulnerable and health-care professionals.

Method: A scoping review was conducted using the methodological framework of Arksey and O'Malley. The PubMed, PsycINFO, CINAHL and Cochrane Library databases were screened, and a descriptive and thematic analysis was completed.

Results: Sixteen publications were included. Six factors in the physical environment play a role in conversations between people who are communication vulnerable and health-care professionals: (1) lighting, (2) acoustic environment, (3) humidity and temperature, (4) setting and furniture placement, (5) written information, and (6) availability of augmentative and alternative communication (AAC) tools. These factors indicated barriers and strategies related to the quality of these conversations.

Conclusions: Relatively small and simple strategies to adjust the physical environment (such as adequate lighting, quiet environment, providing pen and paper) can support people who are communication vulnerable to be more involved in conversations. It is recommended that health-care professionals have an overall awareness of the potential influence of environmental elements on conversations.

ARTICLE HISTORY

Received 6 November 2015
Revised 14 September 2016
Accepted 19 September 2016

KEYWORDS

Communication; conversations; neurological disorders; physical environment

► IMPLICATIONS FOR REHABILITATION

- The physical environment is an important feature in the success or disturbance of communication.
- Small adjustments to the physical environment in rehabilitation can contribute to a communication-friendly environment for conversations with people who are communication vulnerable.
- Professionals should consider adjustments with regard to the following factors in the physical environment during conversations with people who are communication vulnerable: lighting, acoustic environment, humidity and temperature, setting and furniture placement, written information, and availability of AAC (augmentative and alternative communication tools).

Introduction

Effective communication in conversations between clients and professionals plays an important role in client-centred care, shared decision making and preventable adverse events in health-care.[1–5] Their conversations often relate to (health-related) goals, activity choices, medical treatment, and the evaluation of treatment. Such conversations between clients and health-care professionals are often complicated and multidimensional; this is partly due to the complexity of communication itself, but is also due to time constraints, emotions, different expectations and factors in the social and physical environment.[5]

Conversations are even more challenging if a client is communication vulnerable.[6] There are different definitions of people who are communication vulnerable in literature.[7,8] We define people who are communication vulnerable as people who, due to a disease or medical condition, have difficulty expressing themselves and/or understanding information in particular environments or situations. Their communication difficulties can be mild

to severe, and can be due to their sensory, emotional, physical, or cognitive (dis)abilities.[9] In this paper we focus on people who are communication vulnerable due to neurological disorders.[10]

According to the International Classification of Functioning, Disability and Health (ICF),[11] the physical, social and attitudinal environment has an impact on conversations. A great deal of research has been conducted regarding the impact of the social and attitudinal environment on conversations, and more specifically the personal skills required to communicate effectively with clients in conversations.[12–14] Less attention has been paid to the impact of the physical environment on conversations in general and in particular to the quality of conversations between people who are communication vulnerable and health-care professionals. The physical environment has an influence on people's abilities to participate and engage in activities.[11] The ICF defines the physical environment as the natural environment, human-made changes to the environment and products and technology.[15] Products and technology involve naturally occurring things (e.g. trees and plants), fabricated things (e.g. chairs, written

information) and technological objects (e.g. computers).[11,16] Research has shown that factors in the physical environment have an impact on the activities and communication of people who experience communication difficulties.[17] Examples of factors influencing conversations are noise and the arrangement of furniture.[17]

Since the physical environment and other ICF environmental factors (support and relationships, attitudes, and services, systems and policies) have a reciprocal relationship,[18] more knowledge is needed about the impact of the physical environment in order for professionals and health-care systems to create communication friendly environments. Adapting or modifying existing physical environments, and designing new environments that promote universal communication access, is important.[19]

A literature review by O'Halloran and colleagues concentrated on the acute hospital setting when describing the environmental (both social and physical) barriers and facilitators that play a role in the communication between professionals and people with communication disability.[20] Other studies focus on how the physical environment can be adjusted for a group of people with a specific illness or characteristic, such as aphasia friendly environments [17] or environments for people with dementia.[21] O'Halloran concludes that more insights are needed about the factors in physical environments when communicating with people who have had a stroke, traumatic brain injury or who have dementia.[20] Neurological disorders often lead to communication difficulties. People with different diagnoses experience different communication difficulties and needs, and therefore physical environments should be created that contribute to the communicative needs of specific individuals. Many of these communicative needs, however, may be applicable for more than one person, or for more than one diagnosis. When looking at the communicative needs of a larger target group, communication accessible environments can be created that support communication for a large group of people who are communication vulnerable, irrespective of a specific diagnosis.

The role of the physical environment in communication is a neglected area, and an up-to-date review of the literature is missing. A better understanding of communication friendly environments for conversations with health-care professionals can contribute to more accessible and empowering client-centred care for people who are communication vulnerable.[20,22] This literature review takes a broad look at health-care settings, and focuses on the target group of people who are communication vulnerable due to neurological disorders, since many people with neurological disorders are communication vulnerable. The aim of this scoping review is to provide an overview of factors in the physical environment that play a role in communication during conversations between people who are communication vulnerable and health-care professionals.

Methods

A scoping review was conducted to provide an extensive overview of the literature related to factors in the physical environment that play a role in communication between people who are communication vulnerable and health-care professionals. Scoping reviews are suitable for studying broad topics, are used to comprehensively and systematically map the relevant literature, and to identify key concepts and gaps in research.[23,24] The current scoping review was conducted using the methodological framework of Arksey and O'Malley.[23] This framework identifies five stages in conducting a scoping study; the methods used in the current review will be described according to these stages.

Identifying the research question

The research question for this review was: which factors in the physical environment play a role in communication between people who are communication vulnerable and health-care professionals, during conversations in health-care settings?

Identifying relevant studies

Published scientific literature was searched via electronic scientific databases (PubMed, PsycINFO, CINAHL and the Cochrane Library) and reference lists in order to obtain a comprehensive set of literature on this topic.

The research team developed a list of search terms and filtering options based on orientation searches, which led to search outcomes that best fitted the research question. A library expert was consulted for advice on search strategies in the electronic databases. A strategy for searching PubMed was used as the main protocol, and modified for other databases. The keywords were applied to titles and abstracts.

Three main keywords were combined using the Boolean term "AND". The first main terms were "adult" AND "communication disorders" in combination with neurological disorders that may affect communication: OR aphasia, OR dementia, OR Parkinson's disease, OR dysarthria, OR amyotrophic lateral sclerosis, OR multiple sclerosis, OR brain injuries, OR stroke. We chose to do a broad search on communication disorders and used some specific diagnoses (using "OR") to search for more literature about diagnoses which are often linked to communication difficulties due to neurological conditions in the literature. Our first objective was to search only "communication disorders", however, we found during several orientation searches that adding some neurological search terms that are often linked to communication difficulties gave more relevant search outcomes. We therefore used the Boolean term 'OR', so as not to exclude any other neurological diagnosis.

The second main keyword "environment" was used including the following related terms: OR environment design, OR health facility environment, OR hospital design, OR construction. Finally, the third main keyword, "communication", was used with the following related terms: OR health communication, OR communication barriers, OR communication aids for disabled OR interpersonal relations. The keyword "conversations" was specifically not used because in Medical Subject Headings (MESH) this is linked to interviews, and pilot searches revealed that this led to irrelevant search outcomes. The MESH term "dialogue" was not used because it led to outcomes related to drama. The MESH term "discussion" was also not used because it led to outcomes related to ethics, focus groups and motivational interviewing. The keywords "computer communication networks" and "social environment" were excluded using the Boolean term "NOT", since these produced irrelevant output, with no focus on the physical environment. No publication date restriction was used in the search. The following general inclusion criteria were used to filter the search: published in English, Dutch or German languages, adults and research about health-care settings.

Study selection

In the study selection phase, the relevance of the literature was assessed in three steps: title level, abstract level and full text level. In the first selection step, three researchers (SS, RD, HS) assessed the titles independently, using a three-point scale (0 = irrelevant; 1 = possibly relevant; 2 = relevant). These scores were totalled and articles with scores of 2 or more were included in the sample.

Consequently, any uncertainties or discrepancies at this early stage in the review did not eliminate publications for assessment at the abstract level. Predefined inclusion criteria at the title level were: (a) people who are communication vulnerable and health-care professionals as the target groups, (b) communication as a main theme or subtheme, and (c) physical environment as a main theme or subtheme.

During the second selection step, at the abstract level, two researchers (SS, HS) assessed the included publications for relevance by reading the abstracts, using the same scoring procedure as in step one. These scores were summed and articles with scores of 1 or more were included in the sample. The predefined additional inclusion criteria for this level were: (a) the study had to reflect a natural (not laboratory) environment; (b) the participants in the study were communication vulnerable due to neurological disorders; (c) focus on conversations with professionals.

Exclusion criteria were: (a) studies focusing only on the environment in non-health surroundings and settings (e.g. public spaces) (studies about conversations between health-care professionals and people in the home environment were included), (b) studies focusing only on communication between professionals or between people who are communication vulnerable, (c) studies about “snoezelen” (Dutch for controlled multisensory stimulation environment), or (d) studies merely about “wayfinding”.

In the third selection step, two researchers (SS, HS) assessed the remaining full texts. To define the inclusion criteria for this level, a small subset of studies (15) was used. The final inclusion criteria were: (a) the study had to present information relevant to conversations between people who are communication vulnerable and health-care professionals, (b) the study had to present a direct association between the physical environment and conversations with professionals. The inclusion of information was not limited by the methodological quality of the research [23–25]. Each article was discussed by the two researchers to decide upon inclusion or exclusion. Inconsistencies or uncertainties were discussed with a third researcher (RD) who also checked the article for the selection criteria. The reference lists of the publications included in this third step were checked for additional relevant publications.

Charting the data

After the final full text inclusion, a data extraction form was developed based on a small set of full texts and a research team consultation. This data extraction form consisted of descriptive elements (author, year, location and aim of the study, study design, study population, and setting). Two researchers (SS, HS) independently charted the data and subsequently discussed inconsistencies.

Collating, summarizing and reporting the results

A summary was made of the main characteristics of the literature, using the descriptive elements of the data extraction form. Thereafter, the researchers conducted a thematic analysis of the information in the publications. In the first phase of the thematic analysis, two researchers (SS, HS) read the publications independently and highlighted text fragments related to the scoping review research question. In the second phase, these text fragments were independently placed in an Excel file and, based on discussion, a final Excel file including all relevant information was developed. In the third phase, labels were added to the text fragments independently by the two researchers (SS, HS) and the text fragments were ordered according to these labels. Three

researchers discussed the formulated labels, and developed factors and sub-factors.

Results

Based on the initial 5048 hits in the databases, 16 publications were included in this review (Figure 1), published between 1989 and 2015. Two publications were included in the final selection based upon the reference list search. Of the 152 excluded publications in the full text phase, 115 publications were excluded because they were not about conversations between people who are communication vulnerable due to a neurological condition and health-care professionals. The other 37 publications were excluded because no direct association was made between communication and physical environment. The included publications comprised book chapters, discussion reports and articles about empirical research.

Descriptive summary of the articles

The characteristics of the publications are presented in Table 1, in which the author, year and country, aim of the study, study design, study population and the setting of the studies are described. A total of 16 publications were included, consisting of two qualitative studies, seven quantitative studies, one mixed method research, one discussion report and four literature reviews. One book chapter was included. The research articles embraced a wide range of settings and target groups. These settings were: long-term care settings, hospitals, dementia facilities, acute stroke units, ALS clinics, speech and language therapy practices, and professionals visiting the home environment. Various target groups within the scope of “people who are communication vulnerable” were included in the publications: for example people with dysarthria, aphasia, dementia, Parkinson’s disease, or ALS.

Thematic summary of the articles

A thematic analysis of the articles revealed factors in the physical environment that influence the conversations between people who are communication vulnerable and health-care professionals. These factors were: (1) lighting (3 articles); (2) acoustic environment (11 articles); (3) humidity and temperature (3 articles); (4) setting and furniture placement (8 articles); (5) written information (5 articles); and (6) availability of augmentative and alternative communication (11 articles). Some articles describe more than one factor. The factors are further described using sub-factors in which barriers and strategies were identified (Figure 2). First, the factors with regard to human-made changes to the environment are described, followed by the factors related to products and technology (written information and AAC) [15]. Since the results are a thematic summary, the order of the factors does not give an indication of their relevance or priority.

Lighting

In studies about conversations with people with dementia [26] or a stroke [27], lighting was described as having an influence on communication. Both the type of light and the position of lighting were considered important. Barriers mentioned were poor lighting, compromised light and standing in front of a light source [27]. Day and colleagues explain that light particularly affects people with dementia because they often suffer from visual deficits,

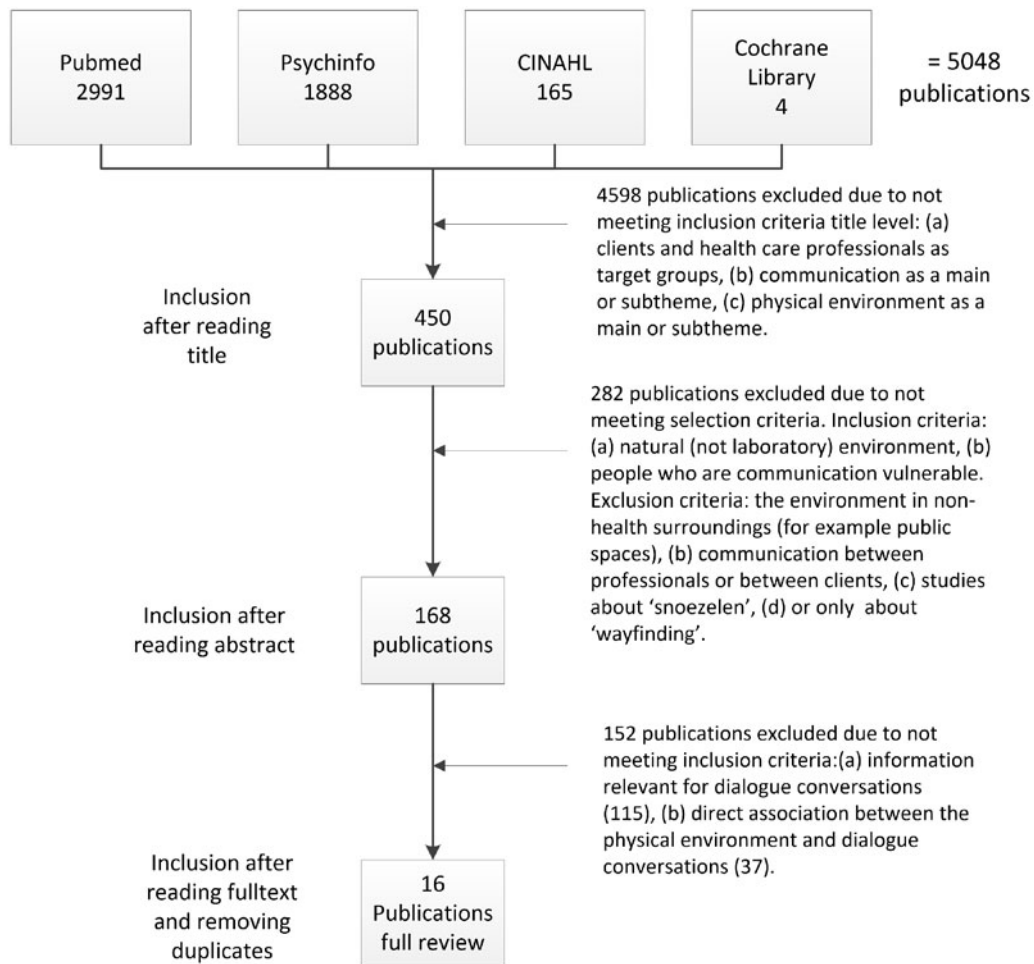


Figure 1. This Figure illustrates the number of publications included during each phase of this review.

such as difficulties with colour discrimination, depth perception and sensitivity to contrast.[28]

Strategies mentioned to overcome light as a barrier to communication were using adjustable light, brightening the light, using indirect lighting sources, using natural light, and using light providing visual contrast.[26,29] Direct light can also be filtered through sheer draperies and shades, and professionals can observe whether the faces of people speaking are in good light.[26]

Acoustic environment

Sound in an environment, such as (excessive) noise and background noise, was often described as disturbing to conversations between people who are communication vulnerable and health-care professionals.

Several studies mentioned that noise is a barrier to communicating for people with aphasia,[30] cognitive communication barriers,[20,27] spasmodic dysphonia,[29] stroke,[20,27] dementia,[26,28] ALS,[29,31] and hospitalized elderly people.[32,33] In the studies of Park and Song [33] and Ruan and Lambert,[32] noisy environments were rated as one of the most important environmental barriers to communication by patients and nurses. O'Halloran and colleagues describe examples such as oxygen being delivered through a facemask, which can create between 75 and 90 dB of background noise at the level of the person's ears, and radiology equipment which also creates significant background noise.[20] Hull and Griffin [34] described how the acoustic characteristics of environments were often not suitable for

communication; hard surfaces and square or rectangular spaces create an unusual amount of reverberation and, therefore, distortion of the sound (and speech) in that environment.[34]

Strategies to change the acoustic environment, such as modifying sound levels (shutting doors and windows), using better acoustic materials, or moving to a quiet environment, were often mentioned as strategies to facilitate conversations between people who are communication vulnerable and professionals.[26,31,35] Carpeting, softer furniture and drapes could be helpful to absorb sound and reduce reverberation.[34] According to Bruce and colleagues changes in the auditory environment led to more focused and less stressful interactions for the target group of people who suffered from dementia.[26] Light and sound level meters were also reported as useful for monitoring environmental barriers and for making appropriate adjustments.[26] Howe [29] noted, however, that noise can also be a facilitator for people with Parkinson's disease, as they spoke more loudly when background noise was present.

Humidity and temperature

Humidity and temperature were identified in three articles as important factors during conversations. Howe [29] reported in her review that temperature changes, environmental irritants in the air and humidity can be barriers for people who are communication vulnerable. In the studies of Park and Song [33] and Ruan and Lambert,[32] uncomfortable room temperature and poorly lit rooms were identified by elderly patients and professionals as possible communication barriers in conversations.

Table 1. Descriptive summary of studies included in the scoping review (in alphabetical order).

Author, year, & country	Aim of the study	Study design	Study population	Setting	Factors
Ball, Beukelman, & Pattee [31] 2004 USA	To study the relationships between speech intelligibility and communication effectiveness as rated by speakers with ALS and their listeners.	Quantitative research: descriptive quantitative design. Measures of: speech intelligibility ("SIT"), self-perceptions of communication effectiveness ("CETI-M"), and listener perceptions of communication effectiveness ("CETI-M")	People with ALS and communication partners <i>N</i> = 25 people with ALS <i>N</i> = 29 communication partners	Regional medical centre specialty clinic for people with ALS	Acoustic environment
Bruce, Brush, Sanford, & Calkins [26] 2013 USA	To report on effectiveness of the ECAT in meeting the practice needs of SLPs for determining environmental barriers to communication among clients with dementia, and developing strategies for environmental modifications to facilitate communication.	Quantitative research: time series design Questionnaires at four points in time, information about clients collected twice.	Clinicians, i.e. SLPs, nurses, physical and occupational therapists providing services for clients with dementia <i>N</i> = 71 clinicians	Long-term care settings	Lighting, acoustic environment, setting and furniture placement, low tech AAC
Day, Carreon, & Stump [28] 2000 USA	To analyze and review existing studies of design and well-being for people with dementia to enhance the design of dementia facilities and to provide direction for future research.	Review of empirical research	People with dementia	Dementia facilities in different settings both short- and long-term facilities	Lighting, acoustic environment
Garrett, & Huth [37] 2002 USA	To examine differences in conversational parameters when: contextual support (i.e. graphic topic setters) was available; personal events versus current events were discussed; interactions with two conversational partners were compared; and an instructional protocol was introduced during interactions with the second partner.	Quantitative case study: Single subject reversal-withdrawal design. Observational measures under three conditions (no graphic context, graphic context, graphic context plus instruction) in 24 sessions.	Participants with aphasia and research communication partners Participants with aphasia: <i>N</i> = 1 Communication partners: <i>N</i> = 2	Not defined	Low tech AAC
Ho, Weiss, Garrett, & Lloyd [38] 2005 USA	To determine whether participants with global aphasia were more successful at initiating and maintaining social interactions with familiar conversational partners when remnants, pictographic symbols, or no symbols were available.	Quantitative research: combination of ABA (before, during and after treatment) and alternating treatment. Single subject design, based on observations.	Participants with global aphasia <i>N</i> = 2	Acute rehabilitation hospital	Low tech AAC
Howe [50] 2008 Australia	To discuss why contextual factors are important for speech-language pathologists to address in their clinical practice, describe how environmental factors are coded in the ICF, identify environmental factors that are relevant for people with communication disorders, and identify personal factors that are relevant for people with communication disorders.	Literature review	People with communication disorders	Not defined	Lighting, acoustic environment, humidity and temperature, setting and furniture placement, written information, low tech AAC, high tech AAC, professional awareness of physical environment

(continued)

Table 1. Continued

Author, year, & country	Aim of the study	Study design	Study population	Setting	Factors
Howe, Worrall, & Hickson [17] 2004 Australia	Define aphasia friendly environments, critically evaluate the relevant literature, and highlight the gaps in research in this area.	Literature review	People with aphasia	Not defined	Acoustic environment, written information, low tech AAC, high tech AAC
Hull [49] 1989 USA	Discuss the impact of the environment on vision and auditory, and present suggestions for improving those environments so that communication can be facilitated for older adults.	Book chapter	Hearing impaired older adults	Not defined	Acoustic environment, setting and furniture placement
Jensen, Løvholta, Sørensen, Blüdnikow, Iversena, Hougaard, Mathiesena, & Forchhammer [36] 2015 Denmark	(1) To develop a procedural guideline for interdisciplinary staff to communicate with in-patients with aphasia, (2) to develop an interdisciplinary training course and educate all staff members, and (3) to make available a set of shared communication tools.	Mixed-methods research qualitative and quantitative outcomes Questionnaires before and after Semi-structured interviews	Nursing staff members $N = 31$ In-hospital patients with aphasia	Hospital	Written information, low tech AAC
O'Halloran, Hickson, & Worrall [20] 2008 Australia	Review the literature on the environmental factors that influence communication between adults with communication disabilities and their health-care providers in the acute hospital setting within the framework of the ICF.	Literature review	Adults with communication disabilities	Acute hospital environment	Setting and furniture placement, written information, low tech AAC, high tech AAC
O'Halloran, Grohn, & Worrall [30] 2012 Australia	Integrate and synthesize the findings of three separate studies conducted within a larger program of research, to develop a new taxonomy of the range of environmental factors that influence communication between patients with communication disabilities and their health-care providers.	Qualitative meta synthesis (three studies)	Patients with communication disabilities (dysarthria, aphasia, visual, auditory) Metasynthesis: 1st study $N = 10$ patients, 2nd study $N = 10$ professionals, 3rd study $N = 65$ patients	Acute hospital stroke unit	Acoustic environment, setting and furniture placement, written information, low tech AAC
O'Halloran, Worrall, & Hickson [27] 2011 Australia	Identify the environmental factors that create barriers and/or facilitate a patient's ability to communicate everyday health-care needs and analyze these environmental factors in order to develop a descriptive list of the environmental factors that influence a patient's ability to communicate.	Qualitative research: Participant observations	Patients in acute stroke units $N = 65$ patients	Acute stroke unit	Lighting, acoustic environment, written information, low tech AAC, high tech AAC
Park, & Song [33] 2005 South-Korea	Determine and then compare the communication barriers perceived by older in-patients and nurses caring for them, with the aim of identifying the disparities between the perceptions of the two parties.	Quantitative research: Descriptive survey design "Communication-Barriers Questionnaire"	Nurses and older hospitalized patients $N = 100$ patients $N = 136$ nurses	Hospital	Acoustic environment, humidity and temperature, setting and furniture placement

(continued)

Table 1. Continued

Author, year, & country	Aim of the study	Study design	Study population	Setting	Factors
Ruan, & Lambert [32] 2008 China	Identify the major communication barriers perceived both by nurses and elderly patients and to determine the differences in the level of importance on the communication barriers between nurses and elderly patients.	Quantitative survey research "Demographic Characteristics Questionnaire for Nurses, "Demographic Characteristics Questionnaire for Elderly Patients, and "Communication- Barriers Questionnaire"	Nurses and older hospitalized patients <i>N</i> = 75 patients <i>N</i> = 84	Hospital	Acoustic environment, humidity and temperature, setting and furniture placement
Waller, Dennis, Brodie, & Cairns [39] 1998 UK	Describe the design and evaluation of a computer-based communication system called "TalksBac" with four non-fluent adults with aphasia.	Quantitative research: Uncontrolled before and after design. Measures of: language impairment ("The Western Aphasia Battery"), semantic knowledge ("The Pyramids and Palmtrees Test"), functional communication ("Revised Edinburgh Functional Communication Profile"). Comparison of: observations of aided and unaided conversations.	People with non-fluent aphasia <i>N</i> = 4	Speech and language therapy practice, & home environment	High tech AAC
Weitzel et al. [51] 2011 USA.	Describe the special care needs of hospitalized patients with dementia and provide recommendations for health-care providers to meet those needs.	Discussion report	Hospitalized people with dementia	Hospital	Acoustic environment, setting and furniture placement, low tech AAC

Setting and furniture placement

The characteristics of the setting and furniture placement were also identified in the literature as having an impact on conversations. For example, unfamiliar (hospital) environments could hinder conversations between people who are communication vulnerable and professionals.[32,33,35] Weitzel and colleagues [35] explained that people who suffer from dementia in particular can be impaired by an unfamiliar environment, since it limits their ability to understand explanations, follow directions, report symptoms, ask for help, and maintain relationships with professionals. Excessive stimuli (e.g. visual or acoustic distractions) in the immediate environment can hinder people who are communication vulnerable from focusing on a conversation,[29,30] especially people who suffer from dementia.[20] The lack of single rooms in a health-care facility can limit the opportunity to have conversations about difficult topics requiring privacy and/or fewer distractions.[30]

Strategies put forward to overcome barriers in rooms and furniture include using a familiar and constant environment, rearranging furniture in the room to make sure that people sit at eye level, and that all people are completely visible and sitting at a distance between 3–6 feet from each other.[26,29,34,35] Park and Song advise providing a detailed admission orientation in which necessary adjustments are discussed,[33] as the factors may contradict each other. For example rearranging the furniture may

make the environment of the person who is communication vulnerable less familiar.

Written information

The availability of written information was described as a facilitator in conversations with people who are communication vulnerable, to help them understand information from professionals.[27,30] Research shows that people who had a stroke or with cognitive communication impairments benefited from written information. O'Halloran and colleagues found that clients with cognitive communication impairments did not receive any written information to help them recall the detailed information given to them verbally during discharge.[30] When providing written information it is essential that the written information is communicatively accessible for the different target groups.[17,20] Suggested strategies to enhance the communication accessibility of written information are: large print, the use of short sentences, sufficient white space surrounding the words, less detailed information, and graphic representations of the topics.[17,27,29,30] The use of pen and paper can also be beneficial in conversations between these target groups and professionals.[17] Pen and paper can be used as a strategy to write keywords, use drawings or prompt clients to write.[36] Dialog notebooks can be used in which patients or professionals write their notes during conversations.[36] O'Halloran and colleagues noted that it is important that pen and

Factors in the physical environment	
Lighting	
Barriers: <ul style="list-style-type: none"> • Poor lighting • Compromised light • Standing in front of a light source 	Strategies: <ul style="list-style-type: none"> • Adjustable light • Brightening the light • Indirect light • Natural light • Light providing visual contrast
Acoustic environment	
Barriers: <ul style="list-style-type: none"> • Noise • Background noise • Reverberation 	Strategies: <ul style="list-style-type: none"> • Modifying sound levels • Acoustic materials • Quiet environment
Humidity and temperature	
Barriers: <ul style="list-style-type: none"> • Temperature changes • Environmental irritants in the air • Humidity • Uncomfortable room temperature • Poorly lit rooms 	
Setting and furniture placement	
Barriers: <ul style="list-style-type: none"> • Unfamiliar environment • Lack of single rooms • Visual distractions 	Strategies: <ul style="list-style-type: none"> • Familiar and constant environment • Sitting at eye level • All persons are visible • Sitting 3-6 feet from each other
Written information	
<ul style="list-style-type: none"> • Written information • Pen and paper • Communication accessible written information: a large print, the use of short sentences, sufficient white space surrounding the words, less detailed information and graphic representations of the topics 	
Availability of AAC	
AAC low tech Visual tools: signs or cue cards, alphabet boards, pictures (charts), communication boards, pain charts, graphic topic setters, pictographic books, picture pointing board, Talking Mats Memory tools: remnant books, diaries and watches, memory aids, memory wallets, memory books (with autobiographical information), external memory aids, labeling items, daily schedules with prompts, real objects	
AAC high tech Synthesized speech devices, "TalksBac", "Dragon naturally speaking", "Write: outloud", "Co: Writer", pocket talker, and amplified speech.	

Figure 2. Factors in the physical environment which play a role in conversations between people who are communication vulnerable and healthcare professionals.

paper are directly available during conversations, to help clients to express themselves.[20]

Augmentative and alternative communication

Several articles noted the availability of augmentative and alternative communication tools (AAC) as communication-facilitating

objects in the physical environment.[17,20,26,27,30] According to the literature, the availability of AAC can facilitate and support communication between people who are communication vulnerable and professionals.[17,20,26] AAC should be tailored to the needs of the person concerned.[17,27,30] Both low tech AAC (non-electronic) and high tech AAC (electronic) were mentioned in the included publications.

Low tech AAC. The literature explains that people who are communication vulnerable can benefit from non-electronic visual tools or information during conversations,[20] such as signs or cue cards,[26] alphabet boards,[17,20,30] pictures (charts),[30,36] communication boards,[30] pain charts,[30] graphic topic setters,[17,37] pictographic books,[38] picture pointing boards,[36] translated picture resources,[36] and tools such as Talking Mats [17,29]. Visual cues were used to increase communication effectiveness (e.g. for people who suffer from dementia), or to help with following instructions (e.g. for people with communication disabilities).[27,30]

Weitzel and colleagues [35] and Bruce and colleagues [26] described that augmentative aids which focus on compensating memory have also proved to be valuable in improving conversations. Examples of these aids are: remnant books, diaries and watches, memory aids, memory wallets, memory books (with autobiographical information), external memory aids, labelling items, daily schedules with prompts and the use of real objects to aid communication.[26,35]

High tech AAC. High tech electronic AAC were mentioned to support conversations, mostly facilitating verbal expression. Examples are synthesized speech devices,[29] "TalksBac",[17,29] "Dragon naturally speaking",[17] "Write: outloud",[17] "Co: Writer",[17] and amplified speech.[27] Howe and colleagues reported in two publications [17,29] that electronic AAC systems such as synthesized speech devices serve as facilitators to support conversations for people with aphasia and dysarthria. Another AAC that appeared to be helpful in supporting communication for people who suffer from severe aphasia, was the program "TalksBac".[17,29,39] Waller and colleagues,[39] found that the use of TalksBac led to an increase in the communication-vulnerable person's control of the conversation, and an increase in the communication partner's understanding of the person who is communication vulnerable. Amplified speech of good sound quality can also support conversations with professionals for people who, for example, suffer from a communicative impairment.[27]

Discussion

This scoping review aimed to provide an overview of factors in the physical environment that contribute to communication in conversations between people who are communication vulnerable and health-care professionals. In total, 16 publications were included, containing various types of publications (book chapters, discussion papers, and research articles) and different types of research (literature reviews, qualitative and quantitative designs). The findings revealed six factors that can have an influence on conversations: (1) lighting, (2) acoustic environment, (3) humidity and temperature, (4) setting and furniture placement, (5) written information, and (6) the availability of AAC.

The findings of the studies in the current review did not always explain why the factors in the physical environment had a positive or negative influence on conversations. For example, in the studies by Park and Song [33] and Ruan and Lambert,[32] a questionnaire was used to explore the communication barriers perceived by older patients and nurses. The results of this questionnaire included, for example, the factors "uncomfortable room temperature" and "poorly lit room". Due to the nature of the data collection method, there was no further insight about how and why room temperature and poorly lit rooms influenced communication.

The results in the included studies were based upon observations from the perspective of the researcher,[27,30,37–39] the

views of health-care professionals,[26,30,32,33] the existing literature or the knowledge of the authors themselves.[20,28,29,34,35] It was striking that in most of the included studies the perspective of people who are communication vulnerable themselves is lacking; although their point of view should be leading. Only four studies included the views of people who were communication vulnerable in their research,[30–33] leading to an insufficient insight into the experienced facilitators and barriers of people who are communication vulnerable.

Since this study did not examine the quality of the studies reviewed, readers should not perceive the results as proven effects, but (according to the aim of this scoping review) as factors that are important to consider during conversations between people who are communication vulnerable and health-care professionals. The methodologies and designs in the articles were not always described in detail; for example in the Howe study [29] the method was described as a "review", but it did not specify what kind of review.

In this review the well-established Arksey and O'Malley framework [23] was used to systematically conduct a scoping review from scientific databases.

The use of the ICF as a theoretical foundation to describe the physical environment contributed to a widespread acknowledged interdisciplinary definition of the studied area. In this review, reports written in English, Dutch as well as German were considered, however it is possible that studies written in other languages could also have met the inclusion criteria.

Several challenges relating to the search strategy will be further discussed. Searching for literature about the physical environment was a challenge since the term is not commonly used in research, and it is not a MESH term, although the term "physical environment" is an acknowledged term in the ICF. We used multiple synonyms to ensure that all relevant publications about the physical environment were included. Furthermore, in the search process we used the keyword "communication disorders" to include studies about people with communication disorders. We added neurological diagnoses that are often linked to communication difficulties with the Boolean operator "OR" to further expand our literature search. We did not include all neurological search terms, since this would lead to an enormous number of terms and therefore also publications. If a publication was found about another neurological diagnosis which was not included as a MESH term, but was related to the communication difficulties of the client, it was included during the study selection phase. Despite the rigorous search process, some studies could have been missed.

Although AAC are part of the physical environment as "objects", we did not specifically include AAC in our search strategy since we did not focus on AAC as dedicated devices for individuals, but as objects that could be present in the physical environment to support conversations. The research on AAC is extensive, and focusing on specific AAC would blur the emphasis on the physical environment.

The current scoping review excluded studies about children, because their communication difficulties often relate to their development and require different, specific adjustments. Conversations with children also have a different process, as parents most often play an important role in their health-care process and decisions.

In this review, we specifically searched for information about the role of the physical environment in health-care settings, since effective communication is essential in these settings for client-centred care and shared decision making.[1,4] The first setting to provide communication friendly environments should be the health-care setting, since these settings are fundamentally aimed

at supporting people with an impairment. Health-care environments could set an example for other environments, such as public spaces.

Current research about communication between clients and professionals often focuses on the attitudinal and social environment; for example verbal communication strategies are studied, such as types of questions, double checking, listening etc.[40,41] This scoping review reveals that factors in the physical environment also have an important impact on conversations. These factors might also be supportive for conversations with clients who are not necessarily communication vulnerable. We can wonder why we provide wheelchair access ramps, but are often unaware that we can also provide communication access ramps.[42,43]

The literature described strategies that can be used to implement changes to the physical environment: the awareness of health-care professionals, and the use of toolkits or questionnaires. An overall awareness by health-care professionals of the potential influence of environmental elements on conversations is recommended. O'Halloran and colleagues [30] argued, therefore, that professionals should receive knowledge about interventions related to adjusting the physical environment to improve conversations. Howe [29] focused on speech and language pathologists, who should address both personal and environmental factors when providing interventions for people who are communication vulnerable. Bruce and colleagues [26] developed a toolkit, the Environment and Communication Assessment Toolkit (ECAT) which provides an assessment of the physical environment, information about the impact of the environment on communication, and resources to make recommendations and implement interventions. This toolkit includes, for example, a tool that helps to identify the appropriate text size for a person with dementia.[26] The results of their study showed that the ECAT increased the awareness of environmental modifications, influenced the practice of recommending environmental modifications, and was beneficial in diverse elements of clinical practice. The current review revealed no other assessments that examine the physical environment. Such assessments do exist; however, these probably did not emerge in this search because they often contain only a small number of questions about the environment in relation to communication. Examples are: the Craig Handicap Assessment and Reporting Technique (CHART),[44] Measure of the Quality of the Environment (MQE),[45] Measure of the Stroke Environment (MOSE),[46] and the Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39).[47] Furthermore, assessments often focus on one diagnosis, such as the Profile of the Communication Environment of the Adult Aphasic.[48] A systematic review looking at all measures which include questions about communication friendly environments might be valuable.

Clinical implications and future research

Health-care professionals need to have a broader view of the impact of the environment and the broad range of supportive adjustments in the physical environment when communicating with people who are communication vulnerable. However, professionals often have to work in inappropriate environments [49] and do not have the ability to change this environment. Professionals need the support of institutional governance and health-care systems to make the physical environments of institutions communication accessible.[19] On the other hand, as the results of this review reveals, small adjustments can contribute to a communication friendly environment for conversations.

The findings of this review reveal the need for greater awareness in health-care professionals with regard to factors in the

physical environment. Educational training should pay attention to the importance of the six factors, an awareness of the impact of the physical environment on conversations, and skills to adjust the environment.

Most articles in this review described observational research, and research studying the needs of people who are communication vulnerable from their own perspective, is lacking. More research is needed to address these gaps, in order to better understand the impact of the physical environment for people who are communication vulnerable, and to provide professionals with relevant tools and strategies to improve their conversations. Qualitative methods could be used in future research to better understand how people who are communication vulnerable and health-care professionals perceive the influence of the physical environment during conversations. Quantitative methods could be used to study the effect which the factors identified in this research have on conversations. Tools such as the ECAT [26] could be combined for use as quantitative measurements of the physical environment.

Conclusions

Our review found that relatively small and simple strategies to adjust the environment (e.g. improving lighting, reducing noise, using pen and paper, and using AAC such as talking mats) can support communication in conversations. Adjusting the physical environment can enable people who are communication vulnerable to express themselves better, understand others better, and be involved in decisions affecting their care and daily life. It is recommended that health-care professionals have an overall awareness of the potential influence of environmental factors on conversations. To date, as this scoping review confirms, little attention has been paid to how and why these factors influence conversations, and how people who are communication vulnerable perceive them.

Disclosure statement

The authors have no conflict of interest to declare.

References

- [1] McGilton KS, Sorin-Peters R, Sidani S, et al. Patient-centred communication intervention study to evaluate nurse-patient interactions in complex continuing care. *BMC Geriatr.* 2012;12:61.
- [2] Bartlett G, Blais R, Tamblyn R, et al. Impact of patient communication problems on the risk of preventable adverse events in acute care settings. *Cmaj.* 2008;178:1555–1562.
- [3] Dalemans RJ, De Witte LP, Beurskens AJ, et al. An investigation into the social participation of stroke survivors with aphasia. *Disabil Rehabil.* 2010;32:1678–1685.
- [4] Elwyn G, Edwards A, Kinnersley P. Shared decision-making in primary care: the neglected second half of the consultation. *Br J Gen Pract.* 1999;49:477–482.
- [5] Sheldon LK, Barrett R, Ellington L. Difficult communication in nursing. *J Nurs Scholarsh.* 2006;38:141–147.
- [6] Hemsley B, Balandin S, Worrall L. Nursing the patient with complex communication needs: time as a barrier and a facilitator to successful communication in hospital. *J Adv Nurs.* 2012;68:116–126.

- [7] Blackstone SW. Augmentative communication news. *Augment Commun.* 2009;21:1–5.
- [8] Costello JM, Patak L, Pritchard J. Communication vulnerable patients in the pediatric ICU: Enhancing care through augmentative and alternative communication. *J Pediatr Rehabil Med.* 2010;3:289–301.
- [9] Stans SE, Dalemans R, de Witte L, et al. Challenges in the communication between 'communication vulnerable' people and their social environment: An exploratory qualitative study. *Patient Educ Couns.* 2013;92:302–312.
- [10] WHO. 2015 What are neurological disorders? 2015; [cited 30-11-2015]. Available from: <http://www.who.int/features/qa/55/en/>
- [11] World Health Organization. Geneva: World Health Organization; 2001; [cited 2015 Dec 15]. Available from: <http://www.who.int/classifications/icf/icfbeginnersguide.pdf?ua=1>
- [12] Silverman J, Kurtz S, Draper J. *Vaardig communiceren in de gezondheidszorg.* Den Haag: Boom Lemma uitgevers; 2014.
- [13] Mazzi MA, Rimondini M, Deveugele M, et al. What do people appreciate in physicians' communication? An international study with focus groups using videotaped medical consultations. *Health Expect.* 2013;18:1215–1226.
- [14] Uitterhoeve RJ, Bensing JM, Grol RP, et al. The effect of communication skills training on patient outcomes in cancer care: a systematic review of the literature. *Eur J Cancer Care (Engl).* 2010;19:442–457.
- [15] WorldHealthOrganization. International classification of functioning, disability and health: ICF. Geneva: World Health Organization; 2001. [cited 2015 Nov 30]. Available from: <http://www.who.int/classifications/icf/en/>.
- [16] Kielhofner G. *Model of human occupation.* Baltimore: Lippincott Williams & Wilkins; 2008.
- [17] Howe TJ, Worrall LE, Hickson LMH. What is an aphasia-friendly environment? *Aphasiology* 2004;18:1015–1037.
- [18] Bricout JC, Gray DB. Community receptivity: the ecology of disabled persons' participation in the physical, political and social environments. *Sjdr.* 2006;00:1–21.
- [19] Hammel J, Jones R, Smith J, et al. Environmental barriers and supports to the health, function, and participation of people with developmental and intellectual disabilities: report from the State of the Science in Aging with Developmental Disabilities Conference. *Disabil Health J.* 2008;1:143–149.
- [20] O'Halloran R, Hickson L, Worrall L. Environmental factors that influence communication between people with communication disability and their healthcare providers in hospital: a review of the literature within the International Classification of Functioning, Disability and Health (ICF) framework. *Int J Lang Commun Disord.* 2008;43:601–632.
- [21] Soril LJ, Leggett LE, Lorenzetti DL, et al. Effective use of the built environment to manage behavioural and psychological symptoms of dementia: a systematic review. *PLoS One* 2014;9:e115425.
- [22] Wylie K, McAllister L, Davidson B, et al. Changing practice: implications of the World Report on Disability for responding to communication disability in under-served populations. *Int J Speech. Lang Pathol.* 2013;15:1–13.
- [23] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol.* 2005;8:19–32.
- [24] Halas G, Schultz AS, Rothney J, et al. A scoping review protocol to map the research foci trends in tobacco control over the last decade. *BMJ Open* 2015;5:e006643.
- [25] Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci.* 2010;5:69.
- [26] Bruce C, Brush JA, Sanford JA, et al. Development and evaluation of the environment and communication assessment toolkit with speech-language pathologists. *Semin Speech Lang.* 2013;34:42–51.
- [27] O'Halloran R, Worrall L, Hickson L. Environmental factors that influence communication between patients and their healthcare providers in acute hospital stroke units: an observational study. *Int J Lang Commun Disord.* 2011;46:30–47.
- [28] Day K, Carreon D, Stump C. The therapeutic design of environments for people with dementia: a review of the empirical research. *Gerontologist* 2000;40:397–416.
- [29] Howe TJ. The ICF Contextual Factors related to speech-language pathology. *Int J Speech Lang Pathol.* 2008;10:27–37.
- [30] O'Halloran R, Grohn B, Worrall L. Environmental factors that influence communication for patients with a communication disability in acute hospital stroke units: a qualitative metasynthesis. *Arch Phys Med Rehabil.* 2012;93:S77–S85.
- [31] Ball LJ, Beukelman DR, Pattee GL. Communication effectiveness of individuals with amyotrophic lateral sclerosis. *J Commun Disord.* 2004;37:197–215.
- [32] Ruan J, Lambert VA. Differences in perceived communication barriers among nurses and elderly patients in China. *Nurs Health Sci.* 2008;10:110–116.
- [33] Park EK, Song M. Communication barriers perceived by older patients and nurses. *Int J Nurs Stud.* 2005;42:159–166.
- [34] Hull RH, Griffin KM. *Environmental factors in communication with older persons.* Communication disorders in aging. Thousand Oaks, CA, US: Sage Publications; 1989.
- [35] Weitzel T, Robinson S, Barnes MR, et al. The special needs of the hospitalized patient with dementia. *MEDSURG Nursing* 2011;20:13–19.
- [36] Jensen LC, Lovholt AP, Sorenson IR, et al. Implementation of supported conversation for communication between nursing staff and in-hospital patients with aphasia. *Aphasiology* 2015;29:57–80.
- [37] Garrett KL, Huth C. The impact of graphic contextual information and instruction on the conversational behaviours of a person with severe aphasia. *Aphasiology* 2002;16:523–536.
- [38] Ho KM, Weiss SJ, Garrett KL, et al. The effect of remnant and pictographic books on the communicative interaction of individuals with global aphasia. *Aac.* 2005;21:218–232.
- [39] Waller A, Dennis F, Brodie J, et al. Evaluating the use of TalksBac, a predictive communication device for nonfluent adults with aphasia. *Int J Lang Commun Disord.* 1998;33:45–70.
- [40] Jesus TS, Silva IL. Toward an evidence-based patient-provider communication in rehabilitation: Linking communication elements to better rehabilitation outcomes. *Clin Rehabil.* 2016;30:315–328.
- [41] Kurtz S, Silverman J, Draper J. *Teaching and learning communication skills in medicine.* 2nd ed. Oxford: Radcliffe Medical Press; 2005.
- [42] Dalemans RJP. *Stroke survivors with aphasia and their social participation Maastricht: Maastricht University; 2010.*
- [43] Kagan A, Gailey GF. *Functional is not enough: training conversation partners for aphasic adults.* San Diego: Singular Publishing Group; 1993.
- [44] Whiteneck GG, Charlifue SW, Gerhart KA, et al. Quantifying handicap: a new measure of long-term rehabilitation outcomes. *Arch Phys Med Rehabil.* 1992;73:519–526.

- [45] Foley KR, Girdler S, Bourke J, et al. Influence of the environment on participation in social roles for young adults with down syndrome. *PLoS One* 2014;9:e108413.
- [46] Babulal GM, Tabor Connor L. The measure of stroke environment (MOSE): development and validation of the MOSE in post-stroke populations with and without aphasia. *Top Stroke Rehabil.* 2016;1–10.
- [47] Hilari K, Byng S, Lamping DL, et al. Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39): evaluation of acceptability, reliability, and validity. *Stroke* 2003;34: 1944–1950.
- [48] Lubinski R, editor. *Environmental systems approach to adult aphasia*: New York: Lippincott, Williams & Williams; 2001.
- [49] Hull RH. Environmental factors in communication with older persons. In: Hull RH, Griffin KM, editors. *Communication disorders in aging*. Michigan: SAGE Publications; 1989. p. 153–161.
- [50] Howe TJ. The ICF contextual related to speech-language pathology. *Int J Speech Lang Pathol.* 2008;10:27–37.
- [51] Weitzel T, Robinson S, Barnes MR, et al. The special needs of the hospitalized patient with dementia. *Medsurg Nurs.* 2011;20:13–18. quiz 9.