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Describing participants in AAC research and their communicative environments:

Guidelines for research and practice

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Abstract

Purpose People who use augmentative and alternative communication (AAC) vary widely in their skills and communication needs. Interventions have been developed to meet different needs, but have met with varied success. Attempts to discover why interventions succeed or fail are hindered by the lack of detailed description of the research participants and the environments in which they communicate. This paper reviews the information commonly given about AAC research participants and presents guidelines for the description of people who use AAC, their conversation partners and their communicative environments.

Method Electronic databases were searched for AAC intervention research reports published between 1990 and 2004. Data on research participants and their communication environments were extracted from reviewed papers. Information given in published papers and variables known to affect communication were presented to an expert group. A modified Nominal Group technique was used to decide what information should be reported in AAC intervention research.

Results Guidelines for participant description that link with the World Health Organization International Classification of Functioning, Disability and Health¹ were developed from the results of the nominal group.

Conclusions Detailed information is needed to demonstrate efficacy of AAC interventions. Guidelines for participant description are presented and discussion of their utility is now needed.

Introduction

Augmentative and alternative communication (AAC) systems, such as signs, symbol charts or books and Voice Output Communications Aids (Speech Generating Devices), are often prescribed to people who have difficulties producing understandable speech, gesture and/or writing. In the last two decades there has been a tremendous drive to develop usable AAC systems and clinically effective and efficient methods of introducing them. Hopes have recently been voiced by leaders in the field that in the future clinicians will be able to match new clients to appropriate AAC systems and suitable methods of introducing them². However, this aspiration still seems a long term goal. At present it is not clear if some AAC systems and intervention methods are more successful than others, and if so, for whom. One of the difficulties of mapping systems and interventions to clients is that research reports have typically provided limited detailed information on the people using AAC, their communication partners or the environments in which they interact³⁻⁶, therefore potentially obscuring both endogenous and exogenous factors that may account for the success or failure of any system introduced.

People who use AAC vary widely. Taking the World Health Organization's International Classification on Functioning, Disability and Health¹ as a framework for discussion, people vary in their body structure and functions, their activities and participation and the environments in which they live and communicate⁷. Body functions that directly impact on natural forms of expression and communication via AAC include mental functions, incorporating receptive and expressive language; speech and voice functions; sensory functions of vision and hearing; and motor abilities. People who use AAC may have profound intellectual impairments⁸, more moderate intellectual difficulties^{9,10} or no difficulties in this area of functioning¹¹. Similarly, some people may

have receptive language difficulties¹² but others may not¹³, and some may have visual impairments¹⁴⁻¹⁶ or hearing impairments^{8,17}.

People who use AAC also vary in the activities in which they engage and the extent to which they currently do, need, or would like to, participate in life situations. For example, students in high school need to answer open questions in class and take an active role in discussion to facilitate learning¹⁸. Adults in group residential facilities are likely to have regular activities and daily routines in which they are supported by a key worker^{19,20}, whereas those in or seeking employment will have more varied communication opportunities²¹. Each of the activities in which children and adults who use AAC regularly engage will involve different types of interactions, with different communication partners and will consequently engender different communication needs. Similarly, the environments in which people communicate will differ in the extent to which they facilitate or hinder interaction, for example, in terms of noise and lighting levels, the number of potential communication partners and the support and attitudes of those partners.

Each of the above factors will impact on interaction and could affect the outcome of interventions employed to enhance communication by means of AAC. AAC intervention can focus directly on the person using the communication system, teaching them to use communication skills with the aim of increasing participation. Alternatively, intervention can focus on their communication partners. Training for partners involves teaching them how systems are used and how to maximize communication opportunities for the person using AAC in both one-to-one and group interaction^{3,22}, thereby promoting the generalization of skills developed by the person using AAC to everyday communication and their transition to independent communication. When considering

AAC intervention outcomes it is therefore important to consider not only factors pertaining to the person using AAC, as classified by ICF, but also who the targeted partners were and whether individual characteristics of the partners may have affected the outcome of the intervention. In addition to the attitudes and support provided by partners, researchers should also consider partners' relationship to the person using AAC, their prior knowledge of AAC, and factors such as educational and literacy level, which would affect the suitability of the training methods employed.

By providing information on factors affecting communication that arise from people who use AAC, their communication partners and the environments in which they communicate, researchers and clinicians will be able to reduce the impact of confounding variables and demonstrate the effects of an intervention. At present it is unclear from research which factors have the greatest impact on AAC interventions, and what level of detail should be provided in the information in research reports. Consensus on the range of factors affecting AAC interventions is needed, along with guidelines on the information which should be reported in AAC research. Adopting such guidelines would standardize data reported and, if sufficiently broad in content, would allow researchers and clinicians to identify characteristics of users which are critical to intervention success. Furthermore, this systematic approach would provide feedback to researchers allowing them to work systematically through stages from modelling to testing the efficacy of interventions^{23,24}. This paper reports a study to develop initial guidelines on the description of people who use AAC, their communication partners and the environments in which they communicate.

Methods

A modified Nominal Group Technique²⁵ was used to develop the guidelines. As a basis for the Group a review of the information contained in published research reports was undertaken to determine the information typically provided on research participants who use AAC (henceforth “participants”), their communication environments and their communication partners. The information contained in published reports was used to generate the factors to be included in the guidelines.

Review of previous research

Method

Medline, Embase, CINAHL, PsychInfo, Web of Science, ERIC and Language, Linguistics and Behavior Abstracts electronic databases were searched for papers published between 1st January 1990 and 31st December 2004 that reported AAC interventions. To be included in the review studies could report direct (focusing on people who use AAC) or indirect AAC interventions (training for conversation partners) to enhance individuals’ face to face communication; be published in books or journals, but not theses; written in English; and include people of all ages, with any type of disability and who used any type of supplementary communication system. Reports focusing on developing literacy through AAC, drawing by people with aphasia, positioning for AAC, or attitudes towards or by AAC users were not included as they were judged not to be interventions to facilitate face to face communication using a supplementary mode of communication. Studies were also excluded if they reported long term interventions that were not experimentally manipulated, as individuals’ responses may have been affected by a myriad of factors over the extended course of the

observations, or if they were concerned with signing by the Deaf community, as this group were not seen to be using sign as AAC but as a primary mode of communication. Search terms included AAC, augmentative and alternative communication, total communication, manual communication, communication aids for the disabled, augmentative communication, nonverbal communication, speech synthesizers, “NOT hearing impaired or deafness”.

Abstracts of reports identified by the searches were reviewed by one reviewer for inclusion. A second reviewer independently checked the reliability of the inclusion decisions on 25% of the abstracts. Reviewers disagreed on 8 (2.6%) of the abstracts. Full texts of all reports identified as possibly fitting the inclusion criteria (by one or more reviewer) were obtained and reviewed for eligibility. Two reviewers independently checked the eligibility of each full text retrieved. Reviewers disagreed on ten (8%) of the identified papers. Agreement on these ten papers was reached following discussion with the third reviewer.

Reports meeting the inclusion criteria were reviewed in detail and the presence and type of data contained in the reports on participants and the environments in which intervention took place, were extracted from each. Information about the conversation partners was also extracted from reports of indirect interventions focusing on training for others. The percentage of reports containing information on each factor was calculated.

Results

307 reports were identified from the electronic searches. Abstracts of all 307 were read. 125 met the inclusion criteria and were reviewed for this paper (a full list of the papers included in the review is available from the authors). The table shows the variables or characteristics of participants, the communication environment and, where relevant,

communication partners, reported on in the reports reviewed and the percentage of reports containing information on each. It should be noted that rating some of the factors was not clear cut, either because data were provided on some but not all participants or because the nature of the data were, themselves, less than specific. Many of the reports reviewed contain biographical information such as gender and age of participants, but there was limited information on the factors directly affecting AAC use, such as intellectual, motor, sensory and language functioning, and features of the conversation partners and the environment in which people interact. Furthermore, where data are most frequently provided, the nature of the data is neither transparent nor consistent across studies. For example, hearing loss may be described as “moderate” rather than given as dB loss across a defined frequency range. Descriptors also sometimes depend on implicit information that is not internationally transparent, such as school grade or socio-economic status.

Development of guidelines for participant description

Method

Data extracted from the papers in the above review, previous research on communication development and the functioning of people with complex disabilities were used to derive a set of variables and characteristics, described hereafter as “*factors*”, thought to influence the acquisition and use of AAC (see Appendix). These were grouped into biographical, health/medical, mental, emotional, communication, AAC use, communication partners and environmental factors. The factors were presented to an international group of five AAC researchers, four clinicians and one user (who comprised the Nominal Group) at the eighth biennial conference of the International Society of

Augmentative and Alternative Communication (ISAAC) held in Natal, Brazil, in October 2004. Members of the group worked in North America, Northern Europe, the Middle East, South Africa and Australia. The Group had experience of providing and evaluating the success of both high and light tech AAC systems to children and adults with a wide range of needs. At the meeting the Group discussed the overall concept of the guidelines and the factor groupings. The Group then discussed individual factors' validity, measurement, transparency across countries, and whether each factor should be obligatory in research reports. Unlike traditional nominal groups, participants gave their decisions verbally or via email on whether factors should be included in the final guidelines.

After discussion and some modification, the expert group at the conference agreed in principle to the factors presented, but was keen for the guidelines to link more closely with the ICF¹. The classification is now beginning to be used widely across many areas of rehabilitation²⁶⁻³⁴, and it was felt important that the guidelines on AAC participant description should complement systems already in use. It was therefore decided that, wherever possible, a link should be made between the factors in the guidelines and the ICF. It was intended that the guidelines would allow adequate description of AAC users and the coding of relevant factors in the ICF, thus addressing both research and clinical needs. In fact the WHO¹ states that ICF 'assists in scientific research by providing a framework or structure for interdisciplinary research in disability and for making results of research comparable' (p8).

The body functions classified by ICF that relate to communication, and which affect the use of AAC, include mental functions (which comprise functions that are classified as intellectual, attention, memory, perceptual and language functions); sensory

functions of seeing and hearing, touch and pain; voice and speech functions; and movement-related functions. Structures relating to these functions include the eye, the ear, the vocal tract, the upper limbs and the head and neck. ICF has a “Communication” domain in which receiving and producing communication and conversation, including the use of AAC (“communication devices and techniques”) is classified. The framework also allows the classification of limitations in activity domains such as “interpersonal relationships and interactions”, “learning and applying knowledge”, “major life areas” of education and work and “community and civic life”, which could all affect and be affected by the introduction and use of AAC. Environmental factors included in ICF that have relevance to AAC include “products and technology for communication”; “support and relationships”; “attitudes and services” and “systems and policies”. Environmental factors in ICF are coded for each domain and will therefore relate to the functions of voice, articulation and fluency/rhythm, but can also be applied to activity and participation codes.

Following the initial discussion of the guidelines at ISAAC in 2004, links were added to the ICF domains described above, as well as to the categories within them, in order to expand the factors relating to upper and lower limb structure and function and the attitude and support of others in the environment (see table). The guidelines were distributed to members of the Nominal Group and members responded in writing and in private, giving their decisions on whether or not factors should be included in the guidelines.

Results

[Insert table about here]

All group members agreed that the factors to be contained in the guidelines were necessary for adequate description of AAC research participants and their environments. No additional factors were suggested. However, broader reasons why it may not be feasible or ethical to obtain all data are considered in the discussion below. The type of information required on each factor (measure or description) was also agreed unanimously. Factors are presented in the table. It was agreed that when describing participants in AAC research and interventions information should be given on all of the factors contained in the guidelines, in the format suggested (a measure or a description). It should be noted, however, that the means of measurement (i.e. named tests) are not specified in the guidelines to allow for international application, for example, the use of assessments standardized in the participant's language and country. The information collected on participants should then allow the coding of the linked domains, chapters and individual categories in ICF.

Within each area of the guidelines, if a participant has no limitations this is coded as "no problem" and sub-categories of factors are not described further or classified (in ICF this corresponds to a chapter and the second, third and fourth level categories within it). If there is a limitation in an area of function, activity or participation the extent of the limitation should be measured or described for each variable within that area, and then the categories coded in ICF. For example, if a person had impaired motor function, the extent and type of that impairment would be given according to the place in the body affected and the impact on mobility, ability to shift position and ability to produce fine hand movements. The limitations would be described or measured (for example using the Gross Motor Function Measure³⁵) and then the corresponding items in ICF body structure, body function, activity and participation would be coded.

As can be seen from the table, most of the factors relating to people who use AAC themselves are contained within ICF. Factors relating directly to users that are not contained in the classification as published can be added as “other specified”. For example, it is suggested that receptive vocabulary should be coded as “communication - receiving, other specified”.

Attitudes and support of people within the environment of individuals who use AAC would be described if the guidelines were adopted. As ICF allows the attitudes and support provided by specified persons to be coded as facilitators or barriers to function, activity and participation, this information could be coded for each function, activity or participation category relating to communication. This dual description/coding of components will enable researchers and clinicians to describe the extent to which other people have a positive or negative impact on the communication of people who use AAC and the success of the AAC intervention. Thus, for someone who has been taught how to use their new AAC system, coding of the attitudes and support of close friends, family and support workers to his or her communication via communication devices would show if this area was a barrier and would help indicate successful intervention if codes changed. ICF does not, however, facilitate description of communication partners and this information would remain supplementary to ICF.

Discussion

The review undertaken here, and those of Udwin⁶ and Bedrosian⁴, have shown that participants in AAC research have been poorly described. Guidelines have been developed to facilitate detailed description of people using AAC and other factors that

may affect users' communication, including the skills and attitudes of their conversation partners and the physical environments in which interaction takes place. In addition to standardizing and enhancing participant description, the guidelines should also allow coding using the ICF and hence increase the transparency of data. The guidelines proposed have applications in both research and clinical arenas, as both depend on detailed information when evaluating intervention success. It is hoped that by following the guidelines clinicians will be better equipped to select interventions that closely match the characteristics of their clients and that researchers will provide sufficient information to reduce or make explicit the possible impact of confounding variables and demonstrate the effectiveness of new interventions. A further possible outcome of the implementation of the guidelines may be the emergence of sub-groups of AAC users who respond similarly to individual interventions, leading to the possibility of mapping interventions to clients, as suggested by Sevcik, Ronski and Adamson ². However, as the guidelines in their current format entail a change in reporting practice they should be debated in terms of their validity and utility.

The factors used in the proposed guidelines are taken directly from published research and from expert clinical opinion in a range of countries. Thus, they can be expected to reflect the current state of knowledge regarding factors affecting the learning and use of AAC and, as such, to have some validity. Nevertheless it must be acknowledged that future research may change our understanding of these characteristics and to remain valid, the proposed framework must be open to adaptation in the light of future knowledge.

Threats to guideline adoption

As can be seen from the review of previous research undertaken as part of this study, many of the factors in the guidelines are not regularly reported in published AAC intervention studies and the adoption of the guidelines would often entail the collection of extra data and have associated costs. It might be the case that the data required have been collected by other members of the AAC team, in which case minimal costs would be involved in their collation. However, in some countries the sharing of information may be prohibited (O. Hetztroni, personal communication, October 5, 2004). Alternatively, with the move towards a social model of service provision where data are collected on an 'as needed' basis, it might be that the data have not been collected. Any additional assessments would require additional resources, making AAC research more expensive and potentially less appealing to research funders. The need for extra data for a limited use puts additional time demands on participants and professionals. This may increase stress on participants as well as having resource implications for already overstretched services. Thus it may be considered to be ethically questionable. Furthermore, such additional assessments and observations may affect recruitment. For these reasons (as mentioned briefly above) it was thus agreed that some factors in the guidelines should be optional and would be collected according to the aim of the study and the type of participants. The discussion as to which factors may in some instances be omitted will continue to require discussion and refinement. Additionally to reduce unnecessary data collection, parent codes can be coded as 'no problem'.

A further issue to be considered here is one of privacy. As the numbers of people who use AAC are relatively small, detailed information on participants may make them identifiable to others. The need to protect participants' anonymity would be a valid reason for data to be limited. For example, only the name of the country should be given, with

pertinent information given on the languages and ethnic background factors, rather than naming the setting of the study. Anonymity could also be protected by judicious acknowledgements in published reports. This may, however, be a problem for some clinical researchers who are employed in one small setting. The issue of privacy and level of description to be given in published reports must be fully discussed with participants and or carers prior to them joining a study, so that consent is truly informed.

A final threat to guideline implementation is that the guidelines are long, and will take time to complete, especially for new users. As with any new practice it is likely that time taken to complete the guidelines will decrease as users become familiar and data collection becomes more routine.

Benefits of guideline adoption

Although there are potential threats to the implementation of the guidelines there are benefits associated with their introduction for both research and clinical practice. As stated above, full description of participants, conversation partners, and the environments in which communication takes place minimizes the effects of confounding variables and will allow researchers and clinicians to observe if people sharing characteristics respond similarly to intervention. Also, as suggested by Light, Roberts, DiMarco and Greiner³⁶, detailed description can allow researchers to demonstrate the ecological validity of interventions, showing the extent to which they can be generalised to clinical settings. In addition to these beneficial outcomes, the guidelines presented here also have the advantage of linking closely with ICF, facilitating discussion between researchers and clinicians across different disciplines, working in different types of services, in different countries. The coding of ICF from the data collected using the guidelines may in time

come to constitute an ICF core set for AAC^{1,37-39}, which can be used to code the functioning and health of people who use AAC. The importance of AAC and its place in rehabilitation may be enhanced by the use of the guidelines and their use of the ICF for coding, as the ICF is used widely in different areas of rehabilitation^{26,28,33,40,41}. By speaking the same language as researchers and clinicians from other disciplines and other areas of rehabilitation, AAC clinicians and researchers could influence wider research and clinical agendas and promote the use of AAC³⁸. Furthermore, ICF is seen as having the potential to be used by funders of services as an outcome measure^{42,43}. The link to the framework and its coding from the guidelines may then further strengthen the argument for the guidelines' implementation.

The guidelines presented here promote the consideration of factors associated with the skills of people using AAC and their communicative involvement in activities in many areas of their daily lives. They also consider the effect of individuals' communicative partners and communicative environments. The guidelines in their current form stress the importance of seeing the whole person and considering their needs as an individual, who has individual circumstances, rather than focusing on an impairment and its remediation. Through their emphasis on activity and participation the guidelines may lead to the development of new assessments and measures. Most measures currently available in speech and language pathology are measures of function. Very few concentrate on the extent to which people use their skills to communicate in different situations and the outcome of their communication in terms of people's involvement in life situations. As the end goal of AAC is for people to communicate appropriately in all their communicative environments, measures of activity and participation are now needed for people of different ages. Some generic measures of

activity and participation may include sections relating to communication, for example the FIM⁴⁴, WeeFIM⁴⁵, Life H²⁷, but they are too broad for the evaluations of AAC interventions, and specific measures would be beneficial.

Future developments

It has been suggested here that the current guidelines can permit the coding of categories in ICF relating to communication for AAC users, and that the use of ICF should be strongly encouraged. However, in order to embed the guidelines and ICF in AAC research and clinical practice consensus is needed in three main areas. Firstly, the coding of activity, participation and environment is currently not regulated by WHO. Several options are available for coding these domains according to the ICF: coding some categories as activity and the rest as participation (with no overlap), allowing partial overlap between categories classed as activity and those coded as participation (some classed as both activity and participation, some as activity and some as participation), using broad categories as participation and their subcategories as activity, or coding all domains as activity and participation (total overlap). Debate is necessary to decide which of the options would be most useful if the current or similar guidelines are adopted. Secondly, consensus is also needed on the coding of environmental factors. The current guidelines suggest that the extent to which the attitudes and support given by different individuals and groups of individuals facilitate or limit the function, activity and participation of a person using AAC should be coded where relevant to the intervention. This option was chosen as it would seem to capture the influences of different people in different communicative environments, and their influences on different aspects of communication. For example, one person may be very conscientious about providing a piece of communication equipment for a user, but may provide very little opportunity in a

conversation for the user to use a full range of communicative functions or take an equal role in the conversation. A second partner may not often provide the equipment, but does structure conversation to allow the person using AAC time and opportunity to take an equal role. The other options for coding the effect of the environment include coding the environment separately, without relating to body functions or structures, or to activity or participation; or coding capacity and performance qualifiers of activity and participation domains. Trials of adopting different options of coding activity, participation and environment may be necessary prior to the full implementation of the guidelines. Finally, the current guidelines have been developed for linkage with the adult version of the ICF. The ICF Children and Youth is under development and consensus on additional links may be needed for the two schemes to be fully compatible.

Conclusion

AAC is used by people who vary widely in their skills, personal circumstances and needs. We have suggested guidelines on the types of information needed to evaluate the outcome of AAC interventions. The proposed guidelines link with ICF and should facilitate full description of AAC users, their conversation partners and environments. The possible outcomes of adopting such guidelines include comparison of studies and their interventions, demonstration of the effects of AAC and easier links between AAC researchers and clinicians and those from other areas of rehabilitation. The validity and the utility of the guidelines should now be debated, along with the preferred options of coding the information obtained in ICF.

The authors hope that this debate will be carried forward within ISAAC, firstly by taking this debate to a seminar within the ISAAC congress in August 2006, in the UK chapter of ISAAC (Communication Matters) in September 2006 and then by writing to ISAAC to

ask them to consider including the guidelines in the 'Guidelines for Authors' of the *Augmentative and Alternative Communication* journal. If successful, the authors wish to introduce consideration of these guidelines to other fields of communication disorder.

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Appendix: List of factors presented to expert group

1. Selection criteria for participants
2. ***Biographical/demographic information***
 - Age of participants
 - Gender of participants
 - Participants' ethnic background
 - Socio-economic status of participants/families
 - Educational level experience of participants
 - Previous intervention
 - Languages used
3. ***Health/physical status***
 - Overall health
 - Medical diagnosis
 - Time post onset
 - Epilepsy
 - Vision
 - Hearing
 - Gross motor function
 - Upper limb function
 - Medication
 - Pain
4. ***Cognition:***
 - Intellectual functioning
 - Cause and effect

- Classification skills
- Attention
- Working memory
- Semantic memory
- Play
- Symbolic functioning

5. Behaviour

6. Communication:

- Key word / communication diagnosis / status
- Language comprehension
- Expressive language
- Preverbal skills (where applicable)
- Motor speech skills
- Phonology
- Intelligibility / comprehensibility
- Receptive vocabulary/semantics
- Expressive vocabulary/semantics
- Pragmatics
- Voice
- Fluency

7. AAC use

- Modes of communication – (include their availability)
- Communication aids/equipment
- Input/access methods
- Positioning and seating
- instruction/history of AC use

8. *Communication partners*

- Number of partners/ participants
- Age
- Gender
- Ethnic background and languages used by partners
- Relationship to users
- Educational level /relevant experience of participants
- Prior exposure to /experience of AAC
- Prior training about AAC

9. *Environment factors:*

- Location of study (country)
- Environment of study (eg: home/school/clinic etc)
- Educational /work/home setting (where the person spends the majority of their days)
- Physical environment
- Residence, social and communicative context of participants. Exposure to bilingual co-workers / personal facilitator
- Exposure to languages and other communication modes

Factors relating to participants, partners and environments in AAC intervention research

Factor/characteristic	Comments and information to be included	Type of info	ICF function code	ICF activity or participation code	Support of others	Attitude of others	
Selection criteria for participants	Describe for all types of studies	D					
<i>Biographical/demographic information</i>							
Age of participants	Years, months; Mean, SD; Median, range	D					
Gender of participants		D					
Participants' ethnic background	Give country of origin and/or residence, languages spoken at home is most appropriate non political term in some settings. Needs contextualising information.	D					
Socio-economic status of participants/families	Usually defined in terms of 'occupation /income /qualification'. Important to structure data on SES relevant to context of study. Make explicit.	D					
Educational experience of participants Literacy level	For adults use highest level achieved. For children use current level. Country of study should be included with brief information on educational system, to explain levels	D		d140(learning to read)			
Previous intervention	Focus of intervention Duration of intervention	D					
Languages used		D					
<i>Health/ physical status</i>							
Medical diagnosis	Add ICD10 code if possible	D	ICD10 code				
Epilepsy Time post onset	Participants with acquired conditions only	D					

Overall health Medication		D					
Vision	Give code for specific impairment (eg b2100 visual acuity function, b2102 quality of vision) and severity of impairment. State if measurement not possible	M D	b210 (seeing functions)	d110 (watching)	e310 (immediate family) e320 (friends) e325(peers etc) e340 (personal assistants and care providers) e355 (health professionals) e360 (other professionals)	e410 (immediate family members) e420 (friends), e425 (peers etc), e440 (care providers), e450 (health professionals) , e455 (other professionals)	
Hearing	State if measurement not possible	M	b230 (hearing functions)	d115 (listening)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Pain	Include location, severity and frequency of pain	D	b280-289 (pain)		e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Motor function Neuromusculoskeletal functions: code impairments of: joints, muscle power muscle tone involuntary movements control of voluntary movement Mobility	If functioning at appropriate developmental level mark this section as no impairment / no difficulty. If no difficulty code b7, d4 only Code capacity and performance	D	b7 (movement related function) b710 (joints) b730 (power) b735 (tone) b765 (involuntary) b760 (voluntary control)	d4 (mobility)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	

Changing and maintaining body position Lifting and carrying Fine motor Walking Moving around using equipment				d410 (position) d430 (lifting) d440 (fine hand) d450 (walking) d465 (moving using equipment)			
<i>Mental functions</i>	If adult and no difficulty code b1, d1 only		b1	d1			
Intellectual functioning Cause and effect Classification skills Symbolic functioning Play	General mental functions Describe intellectual development	M D D D D	b117 (general mental functions)	d 155 (acquiring skills) d163 (thinking), d175 (solving problems)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Attention	Sustaining, shifting, sharing attention, concentration, distractibility	D	b140 (attention functions)	d160 (focusing attention)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Memory Working memory Semantic memory		D D	b144 (memory functions)	d 198 (learning and applying knowledge, other specified)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
<i>Emotional functions</i>	Regulation and appropriateness of emotion		b152		e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
<i>Communication</i>							
Key word / communication diagnosis / status	Key word/s e.g. Primary Progressive Aphasia, global aphasia, specific language impairment OR descriptive statement.						
Language comprehension	Recommend some standardised tests to be used. If informal measures used, must be described. Recommend providing a language age level for	M	b1670 (reception of language)	d310 (comprehending spoken messages)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	

	children as well as standard score. Specify any adaptations to test.						
Receptive vocabulary/semantics	Recommend some standardised tests to be used. If informal measures used, must be described. Recommend providing a language age level for children as well as standard score. Specify any adaptations to test.	M	b 16708 (reception of language, other specified)		e310, e320, e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Expressive language	Recommend some standardised tests to be used. If informal measures used, must be described. Recommend providing a language age level for children as well as standard score. Specify any adaptations to test.	D	b1671 (expression of language)		e310, e320, e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Expressive vocabulary/semantics	Recommend some standardised tests to be used. If informal measures used, must be described. Recommend providing a language age level for children as well as standard score. Specify any adaptations to test.	M	b 16718 (expression of language, other specified)		e310, e320, e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Pre-linguistic skills	Where applicable	D		d 3150 (communicating with – receiving – body gestures) d 3350 (producing body language)	e310, e320, e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Speech	Type of disorder, indication of severity Includes phonology	M D	b320 (articulation functions)	d330 (speaking)	e310, e320, e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Voice		D	b310 (voice functions)		e310, e320, e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Fluency		D	b330 (fluency of speech functions)				
Intelligibility	Listener dependent, need to comment on partner	M					

Pragmatics	Functions of communication used Roles adopted in conversation	D		d350 (conversation)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
AAC use							
Modes of communication	Describe modes used, include availability of modes						
Communication aids/equipment	Specify which systems provided	D	e 1251(assistive products and technology for communication)		e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Input/access methods		D					
Positioning and seating	Include mounting (where applicable). Need to be able to inter-relate the sections within this factor.	D					
History of AAC use	Include intervention received	D					
Current use of AAC	Describe types of messages produced, relate back to expressive language and pragmatics	D		d3351(communica ting via signs) d36008(using communication devices and techniques, other specified) d 3601 (using writing machines) d 3602 (using communication techniques)	e310, e320 e325, e340, e355, e360	e410, e420, e425, e440, e450, e455	
Comprehensibility	Rate comprehensibility: capacity and performance	M					
Communication partners	Information needed only if the research involves intervention for partners.						
Selection criteria							
Number of partner		D					

participants							
Age		D					
Gender		D					
Ethnic background and languages used by partner participants		D					
Relationship to users		D					
Educational and literacy level		D					
Relevant experience of participants		D					
Prior exposure to / experience of AAC		D					
Prior training in AAC		D					
Attitude to user	Rate as facilitator/barrier	D		e410-499 (attitudes of individuals)			
<i>Environment factors</i>	Very dependent on the nature of the study						
Location of study (country)		D					
Environment of study (eg: home/school/clinic etc)		D					
Educational /work/home setting (where the person spends the majority of their days)	Describe and rate extent to which environment is facilitator or barrier to activity and participation	D		e150 (public building) e155 (home)			
Residence, social and communicative context of participants. Exposure to bilingual co-workers. Personal assistance / facilitator		D					
Attitudes of others	Specify "others"	D					
Support of others	Specify "others"	D					
Relationships with others	Specify "others" and any relevant limitations	D		Chapter 7			

Exposure to languages and other communication modes		D					
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Type of information: D = description, M = measure

* n = 125. Where factors were not applicable for all papers the number of papers for which each factor did apply is given in brackets