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To cite this article: Gunilla Thunberg, Carl-Johan Törnhage & Stefan Nilsson (2016) Evaluating the Impact of AAC Interventions in Reducing Hospitalization-related Stress: Challenges and Possibilities, Augmentative and Alternative Communication, 32:2, 143-150, DOI: 10.3109/07434618.2016.1157703

To link to this article: http://dx.doi.org/10.3109/07434618.2016.1157703

Published online: 26 Apr 2016.

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Evaluating the Impact of AAC Interventions in Reducing Hospitalization-related Stress: Challenges and Possibilities

Gunilla Thunberg, Carl-Johan Törnhage, and Stefan Nilsson

DART Center for AAC and AT, Sahlgrenska University Hospital, Gothenburg, Sweden; Department of Pediatrics, Skaraborg’s Hospital, Skövde, Sweden; Sahlgrenska Academy, University of Gothenburg, Sweden; Institute of Health and Care Sciences, University of Gothenburg, Sweden

ABSTRACT
Hospitalization is a stressful context for all children and their families, but especially for children with communication difficulties. Effective communication using augmentative and alternative communication (AAC) strategies can play a critical role in preparing and supporting everyone involved in such situations to have discussions that minimize insecurity, allow children to express their concerns, and so decrease negative stress and anxiety. However, there is a critical need to identify robust and reliable ways of evaluating the effectiveness of interventions that seek to achieve this aim. This research note illustrates some of the challenges and problems that require attention and suggests possible new research tools, for example, the use of physiological measures. The evaluation of an AAC intervention on a day surgery ward is described and used to illustrate one potential physiological measure for evaluating the impact of an intervention.

Introduction

Many children with communication disabilities are frequent consumers of hospital care. The United Nations Convention on the Rights of People with Disabilities (CRPD) and the Child Convention guarantee the rights of children to be informed, to communicate, and to express opinions using their preferred means of communication, including augmentative and alternative forms (United Nations, 2006). Even so, hospital staff often rely on parents to act as interpreters and frequently have little or no knowledge about communication disabilities and AAC (Hemsley et al., 2014; Hemsley, Kuek, Bastock, Scarinci, & Davidson, 2013; Thunberg, Buchholz, & Nilsson, 2015).

Communication is important for all children in pediatric care. When staff and parents have difficulty explaining what is going to happen and calming a frightened child, it may be necessary to restrain and hold the child during treatment (Darby & Cardwell, 2011). Occasionally, treatments and operations may have to be cancelled. Nursing research has also shown that problems in communicating feelings of distress or pain might cause unnecessary suffering (de Freitas, de Castro, Castro, & Heineck, 2014). From a medical perspective, it is important to be able to decrease levels of stress and anxiety in children requiring hospitalization because doing so has been associated with more successful rehabilitation (Kain, Mayes, Caldwell-Andrews, Karas, & McClain, 2006; Litman, 2011). This knowledge, and new guidelines and trends regarding hospital care and nursing, has led to an increased interest in improving information procedures and communication within clinical nursing (Chiang, Chan, Klainin-Yobas, & He, 2013). AAC strategies are a potentially valuable resource in this regard (Blackstone, 2009).

Research on the potential value of AAC in supporting hospital care is emerging in many countries; however, evidence of the effects of such interventions is limited. The majority of published studies focus on interventions with adult patients in intensive care units (ICUs) and the use of AAC to support patients with a temporary loss of speech (Hemsley & Balandin, 2014). At least two studies involving children in hospital care have been reported. Costello (2000) reviewed the impact of proactive AAC intervention for children who were expected to experience loss of speech after surgery. The evaluation indicated that almost all study participants used the communication aids they had chosen prior to surgery, and that loss of speech was not seen as a significant issue, contrary to most evaluations of ICU care where loss of speech is perceived as a major problem (Costello, 2000). In the second study, a picture board was provided as a means to answer questions about pain after surgery. The children’s answers were more precise when they used AAC, and in subsequent surveys, their parents showed a high degree of satisfaction with care (Mesko, Eliades, Christ-Libertin, & Shelestak, 2011).

When it comes to hospital care of individuals with long-term communication disabilities, almost all research focuses on the experiences of these individuals rather than on evaluation of AAC interventions and outcomes (Finke, Light, & Kitko, 2008; Hemsley & Balandin, 2014; Shilling, Edwards, Rogers, & Morris, 2012). Furthermore, almost all studies involve adults. Of the 18 studies that were included in the...
metasynthesis by Hemsley and Balandin (2014), only two involved children. These studies (Hemsley et al., 2013, 2014; Thunberg et al., 2015), reach similar conclusions, namely that there is a need for more information about communication disabilities and a universal approach to the application of AAC strategies within health care settings (Hemsley et al., 2013; Thunberg et al., 2015).

Two recently published studies report results from interventions promoting use of AAC strategies. Both report positive results from piloting the use of pictorial supports for children with autism in medical settings (Chebuha, McCarthy, Bosch, & Baker, 2013; Thunberg, Johansson, & Wikholm, 2015), and both were described as scientifically preliminary and used survey and/or interview data from parents and/or staff to evaluate the impact of the AAC strategies. According to Hemsley and Balandin, the lack of evaluations of AAC interventions in hospital environments represents:

...a serious gap in AAC research, which will inevitably be reflected in practice. Strategies that clinicians recommend, but which have not been evaluated or validated, risk expenditure on resources that may or may not provide a material benefit to patient care, safety, or satisfaction. (Hemsley & Balandin, 2014, p. 339)

This research note explores some of the challenges and options that can arise in identifying valid and reliable approaches for measuring the effects of AAC interventions in health-care settings. A pilot evaluation of the KomHIT model (communication in care settings using communicative support and IT) is described, as implemented at a day-surgery ward. The purpose of this evaluation was to study the effects of the KomHIT AAC intervention on stress and anxiety in children with communication disabilities and their parents through the use of a modified version of the State–Trait Anxiety Inventory (STAI) survey (Nilsson, Buchholz, & Thunberg, 2012) and by checking records of premedication. A further specific aim was to see if changes in stress could be assessed using a physiological measure, namely salivary cortisol. The intervention is first described, followed by the evaluation. Preliminary findings are discussed mainly with regard to methodological issues rather than the effects of intervention. (The complete results of all cortisol tests will be regarded to methodological issues rather than the effects of intervention. (Hemsley & Balandin, 2014, p. 339)

This research note explores some of the challenges and options that can arise in identifying valid and reliable approaches for measuring the effects of AAC interventions in health-care settings. A pilot evaluation of the KomHIT model (communication in care settings using communicative support and IT) is described, as implemented at a day-surgery ward. The purpose of this evaluation was to study the effects of the KomHIT AAC intervention on stress and anxiety in children with communication disabilities and their parents through the use of a modified version of the State–Trait Anxiety Inventory (STAI) survey (Nilsson, Buchholz, & Thunberg, 2012) and by checking records of premedication. A further specific aim was to see if changes in stress could be assessed using a physiological measure, namely salivary cortisol. The intervention is first described, followed by the evaluation. Preliminary findings are discussed mainly with regard to methodological issues rather than the effects of intervention. (The complete results of all cortisol tests will be regarded to methodological issues rather than the effects of intervention.

Method

KomHIT Intervention: Materials and Procedures

This evaluation was conducted on a day surgery ward at a children’s university hospital. The KomHIT intervention has the overall purpose of supporting the communicative rights of children during pediatric or dental care situations in line with the Child Convention and the CRPD. AAC was used within the context of the principles of Universal Design (Articles 2 and 3, CRPD, United Nations, 2006), that is, when care staff have better knowledge about communication and routinely use AAC strategies to assist children who have communication disabilities, communication and quality of care are increased for all children, and anxiety and stress can be reduced. Therefore, KomHIT aims to promote generalized use of AAC strategies, mainly in the form of pictorial supports, as a routine element of pediatric health care and dentistry. The KomHIT intervention consists of both educational resources and easily available communicative tools and materials. A web tool has been created where pictorial communication material can be created, stored, and searched by both professionals and parents (www.bildstod.se). Another web resource (www.kom-hit.se) shares information about communicative rights according to the UN conventions on the rights of the child and on persons with disabilities, project work, methods, and relevant research; provides a video bank of illustrative video examples; and offers educational resources and information about web-based and campus-based courses. Two basic packages for education have been developed: one to educate KomHIT communication mentors, and the other to be used as a resource by communication mentors to guide and educate their colleagues.

A month before the planned intervention period started, all 20 members of the nursing staff were included in a one-day education program on communication, communication disabilities, AAC, and communicative rights as defined by the UN conventions. They also had the opportunity to meet with and listen to a person who used AAC, who shared her experiences of hospital care, in line with the recommendations by Shakespeare, lezzenoi, and Groce (2009). A set-up of AAC materials (outlined in the next section) to suit the ward’s procedures and routines was presented and their use was demonstrated through video clips, followed by roleplays during which staff practiced using the materials. Responsive strategies and point talking (supporting speech by pointing to pictures, persons, or objects) were taught (Jonsson, Kristofferson, Fern, & Thunberg, 2011).

The AAC materials that were used (both during the educational activities and the intervention) encompassed a set of materials sent by mail to each family before the hospital visit, and materials that were used at the day surgery ward. The package that was sent home included (a) an invitation letter with structured information and pictorial support, (b) a visual schedule with six pictures of the main events, (c) a communication board with 30 symbols to enable conversation on the topic of day surgery (Figure 1b), and (d) a letter providing information about the KomHIT project and the use of the material. The parents were instructed to point to the pictures (on all materials) while explaining and talking to the child about the hospital visit, and to bring the visual schedule to the hospital. They were also encouraged to use the material to facilitate the child to express himself or herself both before and after the surgery.

Upon arrival at the surgery ward the nurse presented a six-page visual schedule book comprised of a vertical column of five photos/symbols on each page depicting details of the procedures during the visit (Figure 1a). The nurse used point talking with the pictures in the schedule book to explain the procedures of the day and invited the child to ask questions or make comments. The child was instructed to bring the book along during the day and to remove the pictures one by one after finishing the different steps. Each nurse had access to the same day-surgery communication board that
Figure 1. (a) A visual schedule book of six pages depicting a vertical column of five photos on each side. The child removes the pictures one-by-one after finishing the different steps. This book was used for all children 2–8 years old and for older children with disability or language problems and/or who were tense or anxious. (b) A communication board that was used with children who needed more support during information and conversation.
All materials are displayed at http://http://www.dart-gbg.org/tips_material/tm_bild_symbolmaterial/tm_bild_symbolmaterial_komhit/dagkirurgi. Anecdotal information from the staff was that the schedule book was the most-used material during the hospital stay and that it was used to support comprehension and expression across a range of communication purposes (e.g., to provide information, ask questions, request, reflect and share experiences).

**Evaluation: Participants, Materials, Procedure, Analyses**

**Participants**

In all, 25 children with communication disabilities who underwent day-surgery of different types, and their parents, participated in the study. Ethical approval had been awarded by the regional ethical review board. All parents were present during all phases of their children’s wakefulness at the hospital. Of the families, 18 were included before intervention had been implemented on the ward and seven were included after the KomHIT AAC intervention had been implemented. The families were recruited at the time of referral to the day-surgery, through the use of a screening protocol with questions about the child’s communication and language development.

Information was collected (on a voluntary basis) about the children’s sex, age, diagnoses, language, and communication difficulties using a written form. Some parents did not fill out the forms. The children were aged between 3 and 15 years, with a median of 8 years. The form did not include a specific question about AAC use, but based on parents’ written description of their child’s communication and on clinical experience of Swedish practice, there is good reason to assume that the majority of the families had some experience with AAC (manual signing and/or pictures). Two parents also stated that their children were dependent on AAC to communicate (C12 and C13 in Table 1).

**Samples of Saliva**

Salivary cortisol sampling is a simple, non-painful, well-validated, and reliable method to measure the hypothalamic-pituitary-adrenal axis function and changes, and has been used since the late 1980s (Törnhage, 2009; Törnhage & Alfvén, 2006). More recent studies have shown that free biologically active cortisol, such as that found in saliva, increases much more than total cortisol in blood in situations of stress, such as being in intensive care (Törnhage, 2002). Therefore, salivary cortisol sampling was considered to be an

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<th>Table 1. Control group: presentation of participant information, cortisol levels in nmol/l, STAI score, and premedication.</th>
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PDD, pervasive developmental disorder; SLI, specific language impairment; ADHD, attention deficit hyperactivity disorder; ID, intellectual disability; PMF, parent gender, M, male, F, female; P, parent; C, child; I, test taken on attending the ward; II, test taken after surgery; Pre-med X, Premedication given.

*Measure showing morning cortisol arousal not included in statistics.

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<th>Table 2. AAC intervention group: presentation of participant information, cortisol levels in nmol/l, STAI score, and premedication.</th>
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SLI, specific language impairment; ADHD, attention deficit hyperactivity disorder; DS, Down syndrome; HI, hearing impairment; ID, intellectual disability; ASD, autism spectrum disorder; PMF, parent gender, M, male, F, female; P, parent; C, child; I, test taken on attending the ward; II, test taken after surgery; Pre-med X, Premedication given.

*Measure showing morning cortisol arousal not included in statistics.

was sent to the family (Figure 1b). All materials are displayed at http://http://www.dart-gbg.org/tips_material/tm_bild_symbolmaterial/tm_bild_symbolmaterial_komhit/dagkirurgi.

Anecdotal information from the staff was that the schedule book was the most-used material during the hospital stay and that it was used to support comprehension and expression across a range of communication purposes (e.g., to provide information, ask questions, request, reflect and share experiences).

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appropriate choice of a simple yet potentially reliable and objective measure of physiological stress. Furthermore, comparison data was available. A study of 93 children with typical development aged 5- to 11-years-old, carried out during day surgery at a nearby hospital, showed a median salivary cortisol level of 7.9 nmol before day surgery (Wennström, Törnhage, Nasic, Hedelin, & Bergh, 2011), providing a potential reference data set.

The samples of saliva that were used in our study were collected during the in-patient registration procedure. A cotton-based neutral swab was chewed for 2 min and placed in a plastic double lumen tube. To inform the child how the salivary cortisol test would be carried out, a visual schedule with five photos demonstrating the procedure was used. More cortisol samples were collected during the day of the surgery and follow-up at home. The tubes were stored in a refrigerator and sent to the laboratory, where all were centrifuged at 3000 rpm for 10 min at room temperature and then frozen at −80 °C until assays were carried out. A commercial RIA-based technique for measurement of salivary cortisol was used (Törnhage, 2002, 2009; Törnhage & Alfvén, 2006). Some samples that showed very high levels of cortisol (marked with * in Tables 1 and 2) were not included in the statistical analyses, as these values indicated the effect of morning cortisol arousal (naturally occurring high levels of cortisol after sleep alerting the body and brain). Due to the few remaining approved values of cortisol (n = 4) for the intervention group, only descriptive statistics can be used for group comparisons of cortisol levels; this research note focuses primarily on the potential of using this technique as one possible objective measure of stress rather than the impact of the intervention. As a complement to the objective physiological measure of salivary cortisol, it was considered important to collect the children’s and parent’s subjective opinions about their mental state. Therefore the STAI was used.

**STAI**
The State-Trait Anxiety Inventory State form (STAI-S) was developed by Spielberger and colleagues and contains 20 items (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The STAI-S is one of the most frequently used self-reporting instruments for evaluating anxiety in pediatric care and offers high reliability and validity. However, shorter and more easily completed instruments for assessment of anxiety are preferred. The short form of STAI (usually referred to as “STAI” or “short STAI”) is easy to use and may be preferred to STAI-S. The range is 6 to 24 points, 6 points signifying no anxiety and 24 points signifying the highest level of anxiety (Marteau & Bekker, 1992). The short STAI has demonstrated validity (Kruyen, Emons, & Sijtsma, 2013; Li & Lopez, 2007; Nilsson, Kokinsky, Nilsson, Sidenvall, & Enskar, 2009).

To enable the children in this study to answer the questions in the short STAI, otherwise only presented orally, a modified and validated version was used (Nilsson et al., 2012). In the modified short form, the six statements from the short STAI are transformed into four faces using Widgit symbols (Widgit Software, 2002–2015). Two of the faces demonstrate negative feelings: tension and fear. The other two faces demonstrate positive feelings: calm and happiness. The child places each of these four faces on a mat using a modified Talking Mats™ framework (Murphy & Cameron, 2005). Three circles of different sizes (small, medium, and large) are used to signify not at all, moderately, and very much (ranked 1–3 where 3 signifies very much). The child is given the facial expression cards one at a time and is then instructed to place each one according to his or her preference. The range for this instrument is 4–12 points with 4 points signifying no anxiety and 12 points signifying the highest level of anxiety (Nilsson et al., 2012). The validation study of the modified STAI was completed with 42 children aged 3 to 9 years at the same surgery ward as described here and so also provided some comparison data. The median values of the children with typical development were 5 before surgery and 5 after surgery (maximum of 12). The STAI by proxy values for the parents of the children with typical development in the validation study were 11 before surgery and 9 after surgery (maximum of 24). In the pilot study reported here, the STAI by proxy (filled out by parents) and the modified STAI (for children) were administered during the initial registration and information procedure (I in Tables 1 and 2) and at discharge (II in Tables 1 and 2) to see if these children and parents followed the typical pattern of decreased postoperative anxiety.

The statistics were calculated using IBM SPSS Statistics for Windows (IBM, 2013). The STAI scores and the modified STAI scores before and after each surgery were compared using a Wilcoxon signed rank test. The Mann-Whitney U test was chosen to analyse differences between the study groups.

**Premedication**
The medical records of all children were checked for premedication. Premedication was only given to children whom the health care staff identified as being anxious and/or tense. Towards the end of the intervention data collection process, the staff ran out of schedule books and reported observing that the need for premedication immediately increased. In their reports, staff attributed this long period of reduced demand for premedication to the implementation of the KomHT AAC intervention. This is also why it was considered relevant to check and include this data in the study as yet another indicator of stress and anxiety. Thus, the checking of medical records was done retrospectively.

**Results**

**Salivary Cortisol**

It was possible to collect saliva samples from the majority of the children included in the study (15 out of 25). Informal reports from care staff were that the specific picture schedule provided for the saliva test procedure was of great help. Compared to the children undergoing day surgery in the reference study by Wennström et al. (2011), the children with communication disabilities in this study seemed to have higher levels of stress, indicated by their higher mean level of salivary cortisol: 14.4 nmol/l for all children in this study.
compared to 7.9 nmol/l in the study of children with typical development (Wennström et al., 2011).

A comparison of the groups in this study showed that the levels of morning cortisol for the two groups of parents (comparison versus intervention parents) were very similar, while there were some differences between the corresponding groups of children (Tables 1 and 2). However, several of the children’s salivary cortisol samples could not be taken into account because the high levels of cortisol indicated the effect of morning cortisol arousal. In the intervention group, the samples for three out of the seven children had to be excluded. The remaining four children in the AAC intervention group showed somewhat lower levels of cortisol in the morning samples taken upon arrival at the hospital ($Mdn= 11.4$ nmol/l compared to 17.3 nmol/l for the comparison group, Tables 1 and 2).

**STAI**

All seven parents and seven children in the intervention group reported anxiety before and after surgery, compared to 16 parents (89%) and 13 children (72%) in the comparison group. The median parent anxiety score across both groups was 11 (out of 24) before their child’s surgery. A Wilcoxon Signed-rank test indicated scores decreased significantly after their child’s surgery to 8 ($Z = -2.504; p < .05$). The median child anxiety score was 6.5 (out of 12) before surgery, which also decreased significantly to 5 ($Z = -2.462; p < .05$) after surgery. However, three children in the comparison group reported higher anxiety scores after surgery. The children with a communicative disability reported a slightly higher level of anxiety before surgery compared to the children with typical development in the reference study by Nilsson et al. (2012) ($Mdn = 6.5$ compared to $Mdn = 5$). No statistically significant differences were found between the KomHIT AAC intervention group (Table 2) and the comparison group (Table 1) of parents and children. However, it is noteworthy that the parents that received the preparatory pictorial supports had a lower median score on the STAI upon arrival at the hospital (a score of 9 compared to 11 in the comparison group, Tables 1 and 2).

**Premedication**

All but two of the children’s medical records could be checked for premedication. One belonged to a child without a Swedish social security number; the other lacked the necessary notes on premedication. Premedication of clonidine 2–5 μg/kg or midazolam 0.3 mg/kg was given orally to five of the 18 children in the comparison group and to none of the children in the intervention group (Tables 1 and 2). No other complementary or alternative therapy (such as music or tablet play) was provided.

**Discussion**

The pilot evaluation of an AAC intervention implemented on a day surgery ward described here had few participants and many variables that could not be controlled; however, the results do offer potential avenues for future studies. The discussion that follows is aimed at moving the research forward, by focusing on factors related to the hospital environment and the measures that were used, specifically the measure of saliva cortisol.

Because this project took place at a hospital where staff routinely collected samples of different kinds for research purposes, measuring of saliva cortisol seemed to be viable; however, it was not easy to find families willing to take part in the research. Many families hesitated or declined because they thought that dealing with the surgery was enough and were reluctant to burden their child with salivary sampling. Our experience is that the staff members who recruit participants and manage the saliva tests should be well acquainted with all procedures, both the potential physiological measures that are used (in this case the saliva testing) and the communication supports. The pictorial support that was so successfully used to guide children, parents, and staff in managing the saliva tests, should probably have been provided during the information process to support both parents and staff in this situation.

Another problem was that some parents were unwilling to fill out the screening form because they were worried that their answers might affect insurance coverage and future care, despite guarantees in the written information that this would not happen. Although parents must reserve the right to decline to take part in research, our suggestion is that invitations to participate in research should become a Universal Design feature of all proposed communication interventions. If such invitations were routinely directed to all families of children in a health-care setting, rather than a specific target group that may feel vulnerable, parents might be less concerned about their child being selected for particular attention and therefore more open to participating in research.

The material on cortisol samples taken from parents and children with communicative disabilities is unique and will be described in more detail in a later publication. With respect to the findings reported here and the possible sensitivity and relevance of a saliva test to measure the impact of AAC interventions on stress levels, it is difficult to say more than that additional research is needed because so few individuals were involved, especially in the intervention group. As noted previously, the samples for three out of the seven children in the AAC intervention group had to be excluded. This points to a possible weakness in this measure and may reflect a limitation common to other physiological tests. It illustrates the importance of working together with clinicians who are experts in the measures and/or techniques that are used so the possible influence of other factors can be controlled and discussed.

The salivary cortisol levels were compared to reports of anxiety using the STAI (in the children’s case adapted to a visual format). The lower level of cortisol in the morning test of the children in the intervention group was not reflected in a lowered STAI score for this group. Instead, the children in the comparison group, despite their higher level of salivary cortisol, reported a slightly lower STAI score. As mentioned previously, the combination of the limited
number of items on the adapted STAI and the small group size make it difficult to interpret the results. Another problem is that the STAI, even with the inclusion of pictorial support, might be difficult for children at lower cognitive levels to understand (Nilsson et al., 2012). The lack of correspondence between cortisol level and STAI score in this study may also be an indication that the level of 17.3 nmol/l did not correspond to a perception of elevated stress by the children. More research is needed before we can say that salivary cortisol is a valid measure in children with communication disabilities. Other indicators of stress levels, such as the amount of premedication required or the number of operations/examinations that have to be cancelled (due to misunderstanding of instructions or refusal to participate) may be more relevant and valid, and perhaps also cheaper and easier to carry out, compared to physiological tests such as reported here.

On the other hand, cortisol sampling itself turned out to be a feasible option for most families and, given that earlier studies provide some comparison data, the level of salivary cortisol may well be a measure that can be added to other measurement tools within AAC research, especially for studies that are undertaken in a hospital setting. Ongoing technological development provides many new and exciting possibilities for measuring physiological changes that should be explored within AAC research in the pursuit of more objective measures of the impact of interventions.

Limitations and Future Research

The evaluation of KomHIT presented here had many limitations, a key one being the small number of participants, specifically in the AAC intervention group, making it difficult to draw any conclusions. A suggestion for future research is to explore the possibility of adopting a philosophy of Universal Design in recruitment. Instead of attempting to identify and recruit children with disabilities, future studies could aim to recruit children on a broader basis, which would provide results from children with and without disabilities. Preliminary research on KomHIT suggests that children without disabilities benefit more easily from the KomHIT AAC intervention compared to children with communication disabilities (Thunberg et al., 2015). Nonetheless, increased knowledge about communication and the use of AAC while providing pediatric care may be more crucial or critical for the child with a communication disability and his or her family compared to a child with typical development who can immediately make use of all AAC supports provided, but who perhaps would have coped without those supports. Another recommendation for future research is to try to identify potentially important factors related to care of the child and family, such as the apparent impact on the need for premedication that was found in this study. Having access to medical records is helpful in this respect. Working with a broader base of children will also make it easier to create designs where different variables in an AAC intervention could be studied in isolation, for example the amount or type of staff training that is provided or which communicative supports are most important: preparatory materials used at home, materials used on the ward, or a combination of both.

Conclusion

This study explored the use of AAC strategies as universal design in health care situations, and illustrated how measures and instruments that are routinely used in health care, (e.g., the STAI and salivary cortisol as a physiological indicator of stress), could be adapted and used to evaluate the effects of access to AAC strategies on children with communication disabilities. However, adapted methods also must be appropriately validated and studies to this effect should be carried out as joint projects involving researchers from the AAC field and medical experts. A recommendation of this study is to analyze what are often well-controlled processes within health care to identify possible outcome measures that are relevant and easily checked, such as the need to premedicate. Lastly, we recommend the use of universal design principles both for intervention and research, so that children with and without communication disabilities have access to AAC strategies to support communication and that the impact of such interventions can be evaluated with all children.

Acknowledgements

This research was supported by grants from Sunnerdahl Disability Foundation, Lundgren Foundation, and the Disability Committee of West Gotaland. Parts of the study were presented at the biennial conference of the International Society for Augmentative and Alternative Communication in Lisbon, July 2014. Thanks to all children, parents, and hospital staff who took part in this study.

Disclosure statement

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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