

The Children's Action-Reaction Assessment Tool (CARAT) as an observational technique for assessing symptom management: An initial validation study with children aged 3–7 years undergoing needle procedures

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Abstract

Purpose: For many children, needle procedures are fearful events that are often painful. The first step in symptom management is to assess the child's pain and fear, and the next step is to use coping strategies to provide symptom relief for children who experience or feel pain and fear during procedures. The Children's Action-Reaction Assessment Tool (CARAT) is built on action-reaction strategies. This study aimed to determine the inter-rater reliability of the CARAT when used during needle procedures with 3- to 7-year-old children.

Design and Methods: We used a quantitative approach in which 21 children were observed by two independent observers during needle procedures to evaluate the inter-rater reliability of the CARAT. Data were analysed with descriptive statistics, and the observation scores were calculated with an intraclass correlation coefficient (ICC) test on SPSS for Windows, version 25.

Results: The completed CARAT indicated the use of action-reaction strategies. Neither action nor reaction strategies were frequently used. The parents were seldom involved in the procedure. The inter-rater reliability showed a sufficient correlation between the observers.

Practice Implications: This study showed promising results for the inter-rater reliability of the CARAT, which can be used to facilitate care for children. The observational tool can be used to assess the use of action-reaction strategies in conjunction with needle procedures in children aged 3–7 years.

KEYWORDS

children, needle procedure, observational tool, symptom management

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1 | WHAT IS CURRENTLY KNOWN?

Different strategies have been confirmed to be effective for many children who undergo needle procedures, such as breathing exercises, hypnosis, cognitive behavioural therapies, and distraction strategies (action strategies). Children's experiences during medical procedures may lead to feelings of fear, anger, confusion, and emotional stress, especially if the child is restrained (reaction strategies).

2 | WHAT DOES THIS ARTICLE ADD?

It is valuable to observe behavioural strategies of pain management in clinical practice. An observational tool, the Children's Action-Reaction Assessment Tool (CARAT), can be used to assess action-reaction strategies in conjunction with needle procedures in 3- to 7-year-old children. This observational tool could also be an excellent vehicle for educating children, parents, and health-care professionals about action-reaction techniques. The observations of action-reaction strategies in pain management highlight the need to involve parents in their child's pain management.

3 | INTRODUCTION

Children's experiences with needle procedures can set the stage for lifelong fearful and emotional reactions (Nunns et al., 2018). Contributing factors that can affect children becoming stressed during medical procedures (i.e., needle procedures) include unfamiliar health-care environments and difficulty understanding and accommodating to health-care routines and norms (Salmela et al., 2011). Needle procedures are common in the life of children (McMurtry et al., 2015), and coping with these experiences is therefore essential (Karlsson, Rydström, et al., 2014). If needle procedures are not performed in a way that is well managed by the child, the risk that the child will avoid care and treatments later in life increases (Nunns et al., 2018). One way to address the problem is to develop interventions to help the child cope with pain and fear. The CARAT is a way to assess children's coping behaviours and caregiver responses that has the potential to lead to effective interventions. The CARAT is a new tool and the study aimed to determine the inter-rater reliability of the CARAT when used during needle procedures with 3- to 7-year-old children.

4 | BACKGROUND

Research has shown that children often experience pain and fear when undergoing needle procedures (McLenon & Rogers, 2019). A single-day, cross-sectional survey showed that pain was the worst symptom triggered by needle procedures in children (Friedrichsdorf et al., 2015). However, fear is also a significant part of a needle procedure experience, especially for younger children, and it could be related to their fear of experiencing pain during the procedure

(Karlsson, Rydström, et al., 2016). There is a correlation between pain and fear in children. Children who are more anxious about needle procedures probably feel more pain. This may be due to previous experiences of needle procedures that could influence their memories of pain and fear (Johnson, 2020). Distress increases over time as children remember more pain and fear when they have to undergo needle procedures (McMurtry et al., 2015). Research also shows that children can express fear and pain as two detached events (Hedén et al., 2009; Kleye et al., 2020). The first step in symptom management is to assess the child's pain and fear (Eccleston et al., 2021). Based on the available evidence, assessment tools (e.g., the Numeric Rating Scale-11, the Faces Pain Scale-Revised and the Coloured Analogue Scale) can be recommended for self-reports of procedural pain and fear (e.g., the Children's Fear Scale and the Facial Affective Scale). Younger children (i.e., 0–5 years of age) may find it difficult to use self-reports (Birnie et al., 2019); therefore, an observational tool, such as the Face, Legs, Activity, Cry, and Consolability tool (Crellin et al., 2018), could be used by health-care professionals or parents. The next step in symptom management is to facilitate symptom relief in children who experience pain and fear (Eccleston et al., 2021). Several symptom relief strategies are available that have been shown to reduce the needle-related pain and fear experienced by children. Coping strategies, such as breathing exercises, hypnosis, distraction, and cognitive behavioural therapy, have been confirmed to be effective for many children who undergo needle procedures (Birnie et al., 2018). These coping strategies can be successfully combined with local anaesthesia, such as EMLA® (lidocaine/prilocaine) cream (Abuelkheir et al., 2014) and/or nitrous oxide (N₂O) (Zier et al., 2010). Physical interventions can also be used to promote symptom relief. The Buzzy® Pain Relief Device is an example of a physical intervention that has been reported to have had various results; this device has a battery-operated vibrating motor attached to removable ice wings that are used to create a cold sensation (Ballard et al., 2019).

Offering effective symptom management is an important aspect of the health-care professional's role and responsibility (Alotaibi et al., 2018), which is something children are entitled to when they receive health-care services, according to the United Nations Convention on the Rights of the Child (UNCRC, 1989). According to the UNCRC (1989) and the United Nations Sustainable Development Goals (2015), children and adolescents have the right to the best possible health care. Children receive health-care services in different ways and during various stages of their lives. In January 2020, the UNCRC became a Swedish law (UN Convention on the Rights of the Child to become law in Sweden, 2018). A needle procedure is the most common medical procedure children experience during their upbringing (McMurtry et al., 2016). For many children, this procedure is the most painful and fearful experience of their lives (McMurtry et al., 2015). This is especially true when younger children need to undergo these procedures (Birnie et al., 2018). Research has shown that if younger children do not handle the procedure in a good way, nearly 63% of them may develop a fear of needle procedures (McMurtry et al., 2015; Taddio et al., 2012).

Needle procedures can lead to negative memories, and these memories could influence children through childhood and into adulthood when they undergo other needle procedures (Jenkins, 2014; McMurtry et al., 2015). Besides needle procedures, it could also affect general care for 20%–50% of teenagers and 20%–30% of younger adults (McLenon & Rogers, 2019). Research also shows an enlarged risk of long-lasting problems after needle procedures for children with intellectual disability, which is linked to their experience of more fear and pain than typically developing children (Pascolo et al., 2018). This can lead to avoidance of health-care services later in life for children in general (Nunns et al., 2018). Therefore, children's fear of needle procedures can also be seen as an obstacle to their well-being, as it is important for children to cope with these procedures to maintain their health.

The Knowing-Doing conceptual framework identifies five domains for participation: availability, accessibility, affordability, accommodability, and acceptability (Adolfsson et al., 2018). Availability refers to whether the treatment or information exists in a situation. Accessibility concerns whether one can obtain access to the treatment or information. Affordability means the financial constraints to receiving treatment or information as well as whether the amount of time and energy required to engage in the situation is worth the return. Accommodability refers to whether a treatment or information can be adapted. Acceptability denotes the acceptance of a treatment or information in a situation. The individual's values and common beliefs influence whether the treatment or information is acceptable (Maxwell, 2012).

In the Knowing-Doing conceptual framework, knowing is based on availability and accessibility (i.e., the health-care professionals' knowledge and access to a range of symptom management strategies). Doing is based on affordability, accommodability, and acceptability (i.e., the health-care professionals' belief that symptom management strategies are valuable to use in clinical practice). Doing is divided into actions (strategies to prevent children's pain and fear) and reactions (strategies to intervene when children are already experiencing pain and fear) (Adolfsson et al., 2018). In clinical practice, the Knowing-Doing conceptual framework is operationalised by action–reaction strategies (Figure 1).

It is not always possible to fully obtain the child's view of the situation, especially if they have difficulty communicating (Stans et al., 2013). This may be due to difficulty talking about their illness, disability, age, or if the conversation is not in their mother tongue (Blackstone & Pressman, 2016). In these cases, an observational tool is a valuable option for evaluating the coping strategies children use for symptom relief during needle procedures. To the best of our knowledge, there is a lack of existing observational tools to evaluate symptom management strategies in conjunction with needle procedures. From the Knowing-Doing conceptual framework, we have developed an observational tool, the CARAT (Table 1), to evaluate children's, parents', and health-care professionals' action–reaction strategies when children undergo needle procedures. The CARAT is based on existing knowledge of evidence-based, nonpharmacological action strategies (i.e., the Cochrane report of psychological interventions

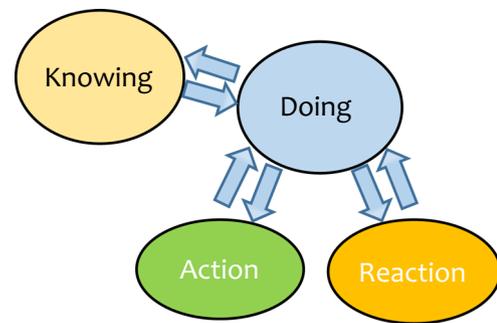


FIGURE 1 The Knowing-Doing conceptual framework is operationalised in clinical practice by action–reaction strategies

for needle-related procedural pain and distress) (Birnie et al., 2018). The order of items of the action strategies mainly follows the caring process. The CARAT also contains items of reaction strategies, which are based on knowledge of nonrecommended activities (Coyne & Scott, 2014; Karlsson, Dalheim Englund, et al., 2016; Salmela et al., 2011). However, not all of the reaction strategies are negative. Some of these activities are actually recommended if the action strategies fail (i.e., comfort). The CARAT evaluates behavioural strategies before, during, and after the procedure. The aim of this study was to determine the inter-rater reliability of the CARAT when used during needle procedures with 3- to 7-year-old children.

5 | MATERIALS AND METHODS

5.1 | CARAT

The theoretical framework of the CARAT (Table 1) is based on the assumption that symptom management is primarily built on action and reaction strategies (Adolfsson et al., 2018). The assessment tool contains 10 items related to action strategies (e.g., the child is distracted, health-care professionals ask the child about their current condition, parents ask the child about their current condition) (Birnie et al., 2018), and 10 items related to reaction strategies (e.g., health-care professionals restrain the child, health-care professionals comfort the child, parents comfort the child) (Coyne & Scott, 2014; Karlsson, Dalheim Englund, et al., 2016; Salmela et al., 2011). The CARAT is an observational tool, and the observer notes the number of behavioural strategies that health-care professionals, the child and the parent implement during the needle procedure. Note that the behavioural strategies do not have to be in a specific order as listed in the CARAT. Finally, the observer grades the number of activities using a 4-step scale: “1 = Not at all,” “2 = To a small extent,” “3 = To a large extent,” “4 = Completely,” or “0 = Not Applicable.” We suggest that this 20-item tool be presented at the item level to best determine the level of symptom management during the needle procedure. The reaction strategies contain both negative and positive activities (i.e., a high total score cannot be interpreted as either a good or a bad outcome) (Table 1).

TABLE 1 The Children's Action-Reaction Assessment Tool (CARAT)

Please assess the following 20 items about caring activities that are identified as action or reaction responses by a healthcare professional (HCP). Check the appropriate box with an (X) to indicate how the caring activities are conducted during the procedure.

An observer/researcher observes the caring activities and checks the appropriate boxes.

Procedure:

To what extent do the following statements comply with the selected procedure?		0 = Not applicable	1 = Not at all	2 = To a small extent	3 = To a large extent	4 = Completely
Action						
1.	HCP asks the child about the current condition.					
2.	HCP uses an assessment tool.					
3.	HCP tries to provide the child with knowledge of what will happen.					
4.	HCP listens to the child's response.					
5.	The child is distracted.					
6.	The child uses breathing exercises.					
7.	The child uses control exercises.					
8.	Parent asks the child about the current condition.					
9.	Parent tries to provide the child with knowledge of what will happen.					
10.	Parent listens to the child's response.					
Reaction						
11.	HCP asks the child directly after he/she complains about the current situation.					
12.	HCP comforts the child.					
13.	HCP restrains the child.					
14.	HCP tells the child directly afterwards what has happened.					
15.	HCP tries to calm the child.					
16.	Parent is engaged in the child's situation after he/she complains.					
17.	Parent comforts the child.					
18.	Parent restrains the child.					
19.	Parent tells the child directly afterwards what has happened.					
20.	Parent tries to calm the child.					
Pharmacology						
		Yes	No			
21.	Provides the child with sedative medication (such as midazolam)					
22.	Provides the child with local anaesthesia (lidocaine or cooling spray)					
23.	Provides the child with analgesics					
24.	Provides the child with nitrous oxide					

Abbreviation: HCP, health-care professional.

5.2 | Participants

Twenty-one children ranging in age from 3 to 7 who had to undergo a needle procedure participated in the study. The data sample has previously been used as a part of a doctoral dissertation (Karlsson, 2015). The children had to understand and speak Swedish. Children with an acute or life-threatening illness at the time of the needle procedure were excluded from the study. The children varied in age, diagnosis, and gender, and they all had a variety of previous experiences related to needle procedures.

Twenty-one parents also participated in the original study. The parents had to understand and speak Swedish. The selection was based on their child's participation in the study and that the child did not have an acute or life-threatening illness at the time of the procedure. The parents varied in age as well as occupations. During most procedures, the mother participated (on 14 occasions, the mother was present; on three occasions, the father was present; on four occasions, both parents were present).

In the original study, 14 nurses participated, and out of these, six nurses participated twice. Inclusion criteria were that the nurses had to participate in one or two needle procedures where the child did not have an acute or life-threatening illness at the time of the procedure. The education levels varied among the nurses who participated (11 paediatric nurses, 2 general nurses, and 1 nurse with a specialised education other than paediatric nursing). There was also variability in the number of years in the profession as nurses (mean of 18 years).

Data collection only began after verbal and written informed consent was received from the parents and nurses, and after obtaining the children's verbal assent of the situation. Video recordings were made once the child entered the room; the recording ended when the needle procedure was finished, and the child left the room.

5.3 | Data collection

The first and last authors individually analysed the video recordings of the 3- to 7-year-old children ($N = 21$) undergoing needle procedures to observe and evaluate the action–reaction strategies of the health-care professionals, children, and parents. The first author also participated in the original study. The observers independently conducted the grading using the CARAT as the observation tool when watching and analysing the video recordings. When the needle procedure on the video recording was finished, each observer graded each item using the CARAT.

5.4 | Analysis

5.4.1 | Inter-rater reliability

The observation scores from the first and last authors were calculated with an intraclass correlation coefficient (ICC) test on SPSS for Windows, version 25. A sufficient ICC score should range between

0.60 and 0.74. The inter-rater reliability score demonstrated whether each item was clear and could be interpreted equally between the two independent observers.

5.5 | Ethical considerations

The ethical considerations of the World Medical Association (WMA) (2018) were followed. Ethics approval was obtained from the Regional Ethical Review Board of Gothenburg (Dnr 724–10; T099–12). Additional ethics approval was also obtained (Dnr 2019-03623) to perform the video-recorded observations to validate the CARAT.

6 | RESULTS

6.1 | Frequency of use of the action–reaction strategies

The completed CARAT indicated the use of action–reaction strategies (Table 2). The order of these descriptive statistics is as follows: the first part presents the action strategies (current condition, assessment tool, provide knowledge, listen to the response, distraction, breathing exercise, and the use of control), and the second part outlines the reaction strategies (complains, comforting, restraint, telling what has happened, and calming).

In 67% of the needle procedures (14 of the 21), the health-care professionals did not ask the child about their current condition (daily well-being). In 95% of the needle procedures (20 of the 21), the health-care professionals did not ask the children about their experiences or observe their behaviour by using an assessment tool before the procedure. Furthermore, 29% of health-care professionals (6 of the 21) did not provide the children with knowledge about the upcoming procedure or, when giving knowledge, 29% (6 of the 21) did not listen to the children's response before the procedure. In 33% of the needle procedures (7 of the 21), the children were not distracted. Those who were distracted ($n = 14$; 67%) used distraction strategies, such as looking at a book or blowing soap bubbles. Control strategies (such as carefully looking at the procedure to cope with their experience) were not performed by the children in 48% of cases (10 of the 21); none of the children used breathing exercises. In 81% of the needle procedures (17 of the 21), the parents did not ask their child about their current condition. In 86% of the needle procedures (18 of the 21), the parents did not provide their child with knowledge about what would happen to them. In 62% of the procedures (13 of the 21), the parents did not listen to their child's response.

In 86% of the needle procedures (18 of the 21), the health-care professionals did not ask or inform the children about the procedure afterwards or tried to calm them. In 76% of needle procedures (16 of the 21), the health-care professionals did not try to comfort the children afterwards.

In 71% (15 of the 21) of the needle procedures, the parents were not engaged with their children after they complained, and in 67%

TABLE 2 The results of the behavioural observations assessed using CARAT

Item = n	0 = not applicable	1 = not at all	2 = to a small extent	3 = to a large extent	4 = completely	Total	Intraclass correlation coefficient
<i>ACTION</i>							
HCP asks the child about the current condition.	0	14	3	4	0	21	0.96
HCP uses an assessment tool.	0	20	0	0	1	21	1.0
HCP tries to provide the child with knowledge of what will happen.	0	6	9	6	0	21	1.0
HCP listens to the child's response.	0	6	9	5	1	21	0.98
The child is distracted.	0	7	5	9	0	21	1.0
The child uses breathing exercises.	0	21	0	0	0	21	-
The child uses control.	0	10	4	6	1	21	0.99
Parent asks the child about the current condition.	0	17	3	1	0	21	1.0
Parent tries to provide the child with knowledge of what will happen.	0	18	2	1	0	21	1.0
Parent listens to the child's response.	0	13	3	5	0	21	1.0
<i>REACTION</i>							
HCP asks the child directly after he/she complains.	0	18	2	1	0	21	1.0
HCP comforts the child.	0	16	5	0	0	21	1.0
HCP restrains the child.	0	17	2	2	0	21	1.0
HCP tells the child directly afterwards what has happened.	0	18	1	2	0	21	1.0
HCP tries to calm the child.	0	18	2	1	0	21	1.0
Parent is engaged with the child after he/she complains.	0	15	3	3	0	21	1.0
Parent comforts the child.	0	14	4	3	0	21	0.95
Parent restrains the child.	0	18	1	1	1	21	0.98
Parent tells the child directly afterwards what has happened.	0	21	0	0	0	21	-
Parent tries to calm the child.	0	18	2	1	0	21	0.96

Abbreviation: HCP, health-care professional.

(14 of the 21) parents did not comfort their child afterwards. None of the parents ($n = 21$) told their child what had happened directly afterwards, and most of them ($n = 18$; 86%) did not try to calm their child after the procedure. Moreover, 81% of health-care professionals (17 of the 21) and 86% of parents (18 of the 21) did not restrain the children during the needle procedure.

6.2 | Correlation between the observers

The results present the observations of the first author. The last author's observations were used to test the inter-rater reliability

with an ICC test. The authors' scores showed a high degree of correlation, and the ICC coefficients showed sufficient inter-rater reliability (Table 2), where the lowest ICC was 0.95 on one occasion and ICC 1.0 on 14 occasions.

7 | DISCUSSION

This study was undertaken to determine the inter-rater reliability of the CARAT when used during needle procedures with 3- to 7-year-old children. The observational tool, the CARAT, is built on the Knowing-Doing conceptual framework, which strives to increase the use of

symptom management strategies in clinical practice (Adolfsson et al., 2018). The CARAT can be used to evaluate whether children, parents, and health-care professionals use action–reaction strategies during needle procedures. When possible, this evaluation should be combined with self-reports from children. Furthermore, it is possible to observe the frequency of the action and reaction strategies using the CARAT when children undergo needle procedures, but the CARAT score should not replace the child's own expressions of the situation (Nilsson et al., 2015). The CARAT is used to map the use of action–reaction strategies rather than to provide advice about how to implement these strategies in clinical practice. However, in the literature, other models have described the process of implementing evidence-based strategies for needle procedures. One example of such an implementation strategy in needle procedures is the CARD™ System (C–Comfort, A–Ask, R–Relax, D–Distract), which addresses symptom relief in conjunction with vaccination-associated pain and fear (Taddio et al., 2019). The items in the CARAT are built on evidence-based recommendations from the review by Birnie et al. (2018) and confirmed by the report by Eccleston et al. (2021). This study reveals that an observational tool (i.e., the CARAT) could evaluate the frequency of action–reaction strategies when children undergo needle procedures, and the following discussion will focus on some of these strategies.

Two of the items in the CARAT's action strategies show that the adults (health-care professionals and parents) to a large extent did not ask the child about their current condition or provide the child with knowledge before the needle procedure. Children want to be involved in the needle procedure (Coyné & Kirwan, 2012; Karlsson, Dalheim Englund, et al., 2016). Involving children in decisions regarding their care facilitates the situation. It is about the child feeling safe and listened to, so they can handle the needle procedure based on their own chosen strategies (Kleye et al., 2020). Children's participation in health care is something that is also noted in the UNCRC (1989) and in the Swedish Health Care Act (SFS, 1982, p. 763). To clarify the patient's position in care, the new Patient Act (SFS, 2014, p. 821) was implemented in Sweden in 2015, with the aim of supporting the patient's integrity and the possibility of parents participating in their children's care. This Act also draws attention to the child's participation.

Another item in the CARAT's action strategies is the frequency of distraction, which is evidence-based as a tool that can be used for children undergoing different procedures (Asvanund et al., 2015; Koller & Goldman, 2012; Taddio & McMurtry, 2015). The goal with distraction is to let the child focus on something other than the needle procedure; it is one way for children to control the procedure (Karlsson, Rydström, et al., 2016). Karlsson, Dalheim Englund, et al. (2016) showed that distraction is usually perceived as being supportive. For distraction to work well, the child should perceive it as being voluntary, harmless, and safe.

In contrast to distraction, another strategy is to let the child gain control over the situation. In this coping strategy, the child focuses on the needle procedure; this approach has been described as a successful symptom-relief strategy. Control during needle procedures occurs when children focus on what is happening around them, follow the nurse's movement and/or ask for information

(Karlsson, Rydström, et al., 2016). The benefits of taking control over the situation also emerged in a study conducted by Salmela et al. (2010). In this study, the CARAT showed that some children used control as a strategy during the needle procedures.

Another item in the CARAT assesses the frequency of using breathing exercises. However, none of the children in this study used breathing exercises. This may be due to the fact that the health-care professionals did not provide the children with a breathing exercise coping strategy before they underwent the needle procedure.

The CARAT also includes items related to reaction strategies, such as restraints. However, few of the needle procedures involved restraints in this study. While, for the most part, the use of reaction strategies should be avoided, they are sometimes necessary to resolve a challenging situation (Adolfsson et al., 2018). During needle procedures, children can experience negative consequences, for example, if they fail in their attempt to seek security from their parents, causing them to lose control over the one thing they can control, which is their behaviour. This may make it challenging for a child to participate in the upcoming needle procedure; in turn, this can lead to panic and the risk of being restrained by the adult during the procedure increases (Bray et al., 2019; Karlsson, Rydström, et al., 2016). Research shows that nurses sometimes restrain a child so the needle procedure can be performed (Karlsson, Rydström, et al., 2014), and that parents, to some extent, assist the nurses during these restraints (Karlsson, Dalheim Englund, et al., 2014). Nurses claim that, in some situations, restraining a child can be supportive, for example, with children who feel stress due to fear (Karlsson, Rydström, et al., 2014). This is also verified in studies where health-care professionals believe it may be better to restrain a child during the needle procedure so the procedure will not be delayed (Cummings, 2015; Söderbäck, 2013). However, Karlsson, Dalheim Englund, et al. (2016) found no evidence that younger children experience restraint as being supportive.

Health-care professionals, children, and parents should strive to use action strategies to reduce the negative consequences experienced by children undergoing health-care procedures (Adolfsson et al., 2018). If this is not possible, children's experiences during medical procedures may lead to feelings of fear, anger, confusion, and emotional stress (Coyné & Scott, 2014; Karlsson, Rydström, et al., 2016). If this happens, there is an increased risk that children will experience what Eriksson (1994) found as suffering due to care, that is, suffering that comes from either the care the child receives or if the care is not provided.

Restraining children during needle procedures can also be understood as associating caring actions with ethical acts (Arman, 2015). It is about using soft hands and compassion to care for a suffering child ethically. Thus, the child should perceive the caring act as being comfortable, leading to well-being; this can be difficult to experience if the child is being restrained. Lacking an ethical approach, there is the risk that children will perceive the act of caring as instrumental in their suffering. Children maintain that they must be able to trust adults during the needle procedure to handle the procedure (Karlsson, Dalheim Englund, et al., 2016; Karlsson, Rydström, et al., 2016).

Furthermore, the results from this study show that, in most cases, the parents were not involved in their child's needle procedure. When children are afraid during medical procedures, parents play an important role in helping them experience a sense of security (Darcy et al., 2014; Salmela et al., 2011). The child's reaction towards needle procedures could arise when he or she tries to seek security in the situation and realises that the adult holds all the power. This can be understood from Bowlby's (1988) attachment theory, where the child's need for parental care is described as searching for a safe base and safe harbour. When a child feels fear and wants to avoid the needle procedure, it is usually not possible. The child understands that the needle procedure is not negotiable; the decision is made by the adult, and the procedure will be conducted regardless of whether the child wants it to happen (Karlsson, Rydström, et al., 2016). In this case, the child realises the power of the adult to enforce the procedure (Karlsson, Rydström, et al., 2016), and, based on Bowlby's (1988) attachment theory, he/she can question whether the parent is a safe base and safe harbour. This may mean that the child then needs to seek comfort elsewhere rather than with the parents during the needle procedure, for example, with a cuddly toy (Kleye et al., 2020).

This study has some limitations. It did not evaluate the validity and reliability of all the CARAT dimensions. This study should be replicated in other studies that could further evaluate the reliability and validity of all the CARAT dimensions. Another limitation is the high level of agreement in the ICC test. An explanation for this could be that the researchers who developed the CARAT were too familiar with the assessment tool. Thus, a suggestion for a future study is to evaluate the reliability and validity of the CARAT with observers who are not as familiar with the tool and may need some training to become acquainted with the items in the tool. Furthermore, the CARAT also needs to be tested in age groups other than 3- to 7-year-old children.

8 | PRACTICE IMPLICATIONS AND CONCLUSION

This initial validation study showed promising results for the inter-rater reliability of the proposed assessment tool, the CARAT, which can be used to facilitate care for children. This observational tool can be used for the education and evaluation of the child's pain and fear. In addition, studies can be done to evaluate parents' and children's education of action–reaction strategies. The observational tool can be employed to assess the use of action–reaction strategies in conjunction with needle procedures in children aged 3–7 years.

9 | HOW MIGHT THIS INFORMATION AFFECT NURSING PRACTICE?

Knowledge about children's experiences of fear and pain is fundamental for health-care professionals when caring for children, especially during procedures involving needles (e.g., immunisations, blood draws, and intravenous infusions). The CARAT is a new

observational technique for assessing symptom management for children, and hopefully, it will be of interest to health-care professionals who are seeking to evaluate how children are handling different needle procedures. Action strategies aim to prevent children's pain and fear, and reaction strategies aim to intervene when children are already experiencing pain and fear. This study provides an understanding of action–reaction strategies, which we believe will be of interest to those working with children. In some way, the observations provide an opportunity to improve clinical practice, and they can also be used to evaluate whether guidelines are followed.

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CONFLICTS OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

Study design: Katarina Karlsson and Stefan Nilsson. *Data collection:* Katarina Karlsson. *Analysis:* Katarina Karlsson and Stefan Nilsson. *Manuscript preparation:* Katarina Karlsson, Ensa Johnson, Stefan Nilsson.

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