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# A taxonomy to assess the interaction between nurses and children: Development and reliability

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## Abstract

**Aims and objectives:** The aim of this study was to develop a valid and reliable instrument to assess the nurse-child interaction during medical or nursing interventions.

**Background:** Communication is an important competency for the professional practice of nurses and physicians. The nurse-patient relationship is fundamental for high-quality care. It has been suggested that if nurses have more skills to interact with children, care will be less distressing and less painful for the children.

**Design:** A qualitative observational psychometric study; the GRRAS checklist was used.

**Methods:** In-depth video-analyses, taxonomy development (19 videos) and testing it is psychometric properties (10 videos). Three observers micro-analysed video recordings of experienced nurses changing children's wound dressing in a specialised Burn Centre.

**Results:** The nurse-child interaction taxonomy (NCIT) was developed to observe and score the interactional behaviour between nurse and child. The taxonomy has three main patterns: being considerate, attuning oneself, and procedural interventions, subdivided in eight dimensions. These dimensions contain 16 elements that can be observed and scored on a 7-point scale. Intra-rater, inter-rater reliability and agreement were good.

**Conclusions:** This study shows that interaction between nurses and children can be assessed reliably with the NCIT by an experienced observer or alternatively, scoring by two observers is recommended.

**Relevance to clinical practice:** The development of the taxonomy is an important step to find evidence for the best way for nurses to interact with children during nursing interventions or medical events and as such, ultimately, contributes to providing the best care possible.

## KEYWORDS

behaviour, child, classification, communication, nurse-patient relationship, nurses, nursing, observation, psychometrics, validity

## 1 | INTRODUCTION

Effective nursing is based on relationships and the ability of the nurse to establish a relationship with the patient (Wiechula et al., 2016). Therefore, when nursing very young patients, whose verbal and cognitive skills are less developed, nonverbal communication skills of nurses are of utmost importance. It has been suggested that if nurses have more skills to interact with children, care will be less distressing and less painful for the children (Nilsson, Hallqvist, Sidenvall, & Enskär, 2011). At our specialised burn care centre, burn wound dressings have to be changed frequently, if not daily. Dressing changes thus are a frequently recurring nursing intervention that is painful and stressful (Thurber, Martin-Herz, & Patterson, 2000) and therefore a challenging task for nurses. To optimise the interaction skills of nurses with children during wound dressing changes video interaction guidance (VIG) is applied. As the aim of applying VIG in our centre is to improve quality of care, we want to evaluate the effectiveness of VIG. At this moment, however, no suitable instrument is available. Therefore, the aim of this study was (a) to develop a valid instrument to assess the interaction between nurse and child during medical events or nursing interventions, in this case wound dressing changes in children with burns, and (b) to test the instrument's reliability.

## 2 | BACKGROUND

In daily practice, the nursing profession has been criticised for the inability to attend to basic care needs (Francis, 2010, 2013). However, it is unclear how nurses construct their daily interactions with their patients (Kitson, 2018). The fundamentals of care (FOC) framework was developed to capture the complexity and multidimensionality of nursing practice (Kitson, Conroy, Kuluski, Locock, & Lyons, 2013). It describes three domains that are important for nursing: (a) the nurse-patient relationship, (b) the interdependency of physical, psychosocial and relational elements of fundamental care, and (c) the context in which care is delivered as the systems and organisations in which nurses work can be facilitators or barriers to deliver fundamental care. To establish a positive nurse-patient relationship, five elements are required: developing trust with the patient, focusing and giving the patient (and their family) undivided attention, anticipating the patient's needs, knowing enough about the patient to act appropriately and evaluating the quality of the relationship. The Royal College of Physicians and Surgeons of Canada stated that the role of communicator is essential for clinicians to form relationships with patients and their families as it facilitates the gathering and sharing of necessary information for effective health care (Neville et al., 2015).

Communication is an important competency for the professional practice of nurses and physicians. It can be divided in a verbal part in which information is provided and checked whether this information is understood by the patient and a second nonverbal part: engaging with patients. In professional education, however, the focus

### What does this paper contribute to the wider global clinical community?

- A valid taxonomy (NCIT) is developed and described.
- After training the NCIT can be used reliably in nursing to measure nurse-child interaction.
- The NCIT can be used to investigate how to improve care.

is on verbal communication, overlooking the essential role of nonverbal signals (Riess & Kraft-Todd, 2014). Behaviour and elements of speech, aside from the words themselves, transmit meaning. Nonverbal communication includes pitch, speed, tone and volume of voice, gestures and facial expressions, body posture, stance, and proximity to the listener, eye movements and contact, and dress and appearance. Attending to these signs has significant effects on patient satisfaction, health outcomes and malpractice claims. Moreover, according to Riess and Kraft-Todd (2014) clinicians need to succeed in nonverbal communication, as it is essential to communicate caring and create a positive patient experience. At our burn centre, as in those of many others in developed countries, approximately 25% of patients are young children (0–4 years; Scholten-Jeagers et al., 2017). To optimise the interaction skills of nurses with children during wound dressing changes video interaction guidance (VIG) is applied. To provide VIG, adult-child interactions are filmed and edited to produce a short film with moments of communication. In subsequent video review sessions, the interactive moments are discussed and positive feedback is provided. Effects of video-feedback on change in behaviour have been described (Caris-Verhallen, Kerkstra, Bensing, & Grypdonck, 2000; Fukkink & Tavecchio, 2010; Fukkink, Trienekens, & Kramer, 2011). However, so far, there is no research showing objective change in interactional behaviour of nurses during medical events or nursing interventions due to guidance by VIG.

To assess whether VIG can be effectively used as method to change interactive behaviour of nurses at the point-of-care, a valid and reliable measurement instrument is needed. Unfortunately, no valid measurement seems to be available for our purpose. Existing observation scales of parent and child behaviours describe individual behaviours, but do not include the interaction between persons (e.g., CAMPIS-R by Blount et al., 1989; GRIDS by Wolff et al., 2009). Moreover, their focus is mainly on verbal actions. In the Burns-CAMPIS (B-CAMPIS; Brown, De Young, Kimble, & Kenardy, 2019), an adaptation of the CAMPIS-R was made especially for children with burns, and nonverbal interaction was added. However, in the B-CAMPIS the focus is on parent-child interaction, or better: the interactional actions of parents and the interactional actions of the child. We feel that a nurse needs specific skills to successfully interact with a child, to establish relationships. These skills differ from those of parents or caregivers in a nursery as the situation is

influenced by the necessary procedural actions that need to be performed concerning wound care.

### 3 | METHODS

A qualitative observational study was conducted to develop a systematic observation instrument, a taxonomy, to assess the interaction between nurse and child during wound dressing changes. For this purpose, nurses and children, in the age of 0–4 years, were recorded on video during wound dressing changes. Both clinical and outpatient wound dressing changes were filmed, to ensure large variation in interactional behaviour. The duration of such nurse-child encounters ranged approximately from 15 min till one hour. Filming started at the moment the nurse could build up a rapport with the child and ended after they had said goodbye to each other. Filming was done by either a nurse practitioner or a child life specialist. Both had extensive experience in burn care and filming of interaction between persons for video interaction guidance.

Written informed consent to participate was obtained from parents or caregivers prior to filming. In addition, nurses were asked to participate and give oral informed consent. The challenge for nurses is to have confidence and competence to manage the fundamental care needs of the patient (Kitson, 2018). In this study, nurses were eligible to participate, if they were working at the burn centre for at least one year, so they had enough experience to do the technical part of wound dressing changes easily.

This study was approved by the local Medical Ethics Committee (no: 2011-28). The guidelines for reporting reliability and agreement studies (GRRAS; Kottner et al., 2011) were used (see File S1).

### 3.1 | Development of the taxonomy

First, for the development of the taxonomy for the nurse-child interaction, the observation scheme developed by Dekker and Biemans (1994) was used. In the eighties, they developed VIG to guide mothers with their infant. Trevarthen (1979) provided the central theoretical core of this VIG method and was involved from the start. They systematically observed the mother and infant on several clusters and registered them in a diagram. For this study, two main patterns of interactional behaviour mentioned in the diagram were used: Being considerate (dimensions postures, face and voice) and attuning oneself (reacting, and taking initiative; see Table 1). Ten recordings of wound dressing changes performed by nurses were micro-analysed, and all interactional actions of nurse and child were categorised using this diagram. In this phase of the study, two certified video interaction guiders participated: a nurse practitioner and a child life specialist who is a certified VIG-instructor as well. Both had significant experience (over 15 years) in burn care.

An iterative process was started in which adjustments were made to the elements of Dekker and Biemans' (1994) diagram. While watching the behaviour of the healthcare professionals, first of all it became apparent that two of the original elements were not observed due to the use of personal protective equipment (facial mask) by the nurse during clinical wound dressing changes. Secondly, we felt that "persevere in making contact if the child is in distress/upset" should be registered as a new element within the pattern attuning oneself. Furthermore, actions were observed that did not fit the elements of the diagram. Thus, a completely new pattern "Procedural intervention" was added to capture the interactional actions of nurses that were related to the technical part of the wound dressing

**TABLE 1** Diagram basic communication, cluster 1: initiative and reception (0–6 years) (Dekker & Biemans, 1994) and adaptation

Pattern	Elements	Adaptation of elements
Being considerate	Friendly posture	Adopting lower or same height as child/patient
	Turning towards the other (follow the initiative)	Directing towards the child
	Looking at the other	Looking at the child/eye contact
	Eye contact	
	Friendly tone	Voice directed to child (high and variable pitch)
	Friendly facial expression	Cannot be seen due to facial mask (protective equipment)
Attuning oneself	Receiving the others' initiative	Receiving the child's initiative
	In approval naming: <ul style="list-style-type: none"> <li>• Action of the child</li> <li>• One's own action</li> <li>• Things happening around you</li> </ul>	Naming initiative of the child
	Acknowledgement	Reacting to initiative of child
	Participating	Taking initiative on the right moment
	Nodding yes	Perceiving child's reactions
	Saying yes	
	Reception	Perceiving child's reactions
	Babbling	Can be part of Taking initiative on the right moment

change. This third pattern contains three dimensions: “verbal preparation,” “child participates/in control” and “in sync with others” within total five elements (see Table 2). When no new elements were found after observing the 10 videos several times, the concept-taxonomy was finalised.

Second, this concept-taxonomy was used while observing four additional videos using a 7-point scale to rate each element (never <10%/seldom 10%–30%/sometimes 30%–45%/50–50; 45%–55%/regular 55%–70%/often 70%–90%/always >90%). Three persons scored these videos independently: the two persons involved in the development of the concept-taxonomy and a psychologist/researcher. Based on these observations, the possibility to score “inapplicable” was added for the element “persevere in making contact if child is in distress/upset”. Furthermore, the definitions of elements (e.g., scoring time or frequency) were clarified.

Third, the taxonomy was tested using five additional videos. This iterative process showed the taxonomy to be valid, and the nurse-child interaction taxonomy (NCIT) was finalised.

### 3.2 | Agreement and reliability of the taxonomy

To determine the intra- and inter-rater reliability of the NCIT taxonomy, 10 new videos were made of random outpatient encounters for wound dressing change with all different nurse-child combinations. The sample was a convenience sample depending on availability of the camera operator and written informed consent before the encounter. Two persons involved in the development of the taxonomy

(the nurse practitioner and the psychologist/researcher) assessed the interaction between nurses and children with the final taxonomy. The agreement and intra-rater reliability were determined for each observer. For this purpose, both observers independently analysed all 10 videos twice with a 2-month interval. The second time they analysed the video's they were blind for earlier scores. Besides the percentage absolute agreement, the percentage of elements in which the scores differed 1 point or less was calculated. The latter was calculated as only agreement differences of more than 1 point were deemed to be clinically relevant. To establish intra-rater and inter-rater reliability, intraclass correlation coefficients (ICCs) were calculated based on a 2-way mixed model, absolute type since two fixed observers were used (Shrout & Fleiss, 1979). An 80% agreement or an ICC higher than 0.60 was considered good (Landis & Koch, 1977).

## 4 | RESULTS

### 4.1 | The taxonomy (nurse-child interaction taxonomy; NCIT)

The final taxonomy is shown in Table 2. The taxonomy consists of three main patterns: being considerate, attuning oneself and procedural intervention. These three patterns contain eight dimensions with in total 16 elements. Each element can be observed and scored on a 7-point scale (1 = never; 7 = always). It is also possible to score an element as “inapplicable.”

**TABLE 2** The nurse-child interaction taxonomy (NCIT)

Pattern	Dimension	Elements	Rating in
Being considerate	Posture	Adopting lower or same height as child	% of total time
		Directing towards the child	% of total time
	Face	Looking at the child	Frequency of looking at the child
	Voice	Tempo of speech is low	% time of speech
Voice directed to child (high and variable pitch)		% time of speech	
Attuning oneself	Initiative contact by child	Receiving the child's initiative/following gaze	% of seen initiatives
		Naming initiative of the child	% naming, without questioning
		Reacting to initiative of child	% of reaction on seen initiatives
	Initiative contact by nurse	Taking initiative on right moment	% of initiative on the right moment
		Persevere in making contact if child is in distress/upset	% of time child was distressed or upset Possibility of inapplicable if child is not distress/upset at all
	Perceiving child's reactions	% of opportunities for the child to react	
Procedural intervention	Verbal preparation	Introducing what they are going to do	% of total time
	Child participates/in control	Letting child participate in decision making	Frequently of offering the child to participate
		Restricting movements as little as possible	% of total time
		Attuning speed to child	% of total time
	In sync with others	Attuning medical procedures to other persons around	% of total time

## 4.2 | Reliability and agreement of the taxonomy

In total 10 different nurse-child combinations were filmed, resulting in 2.5 hr film showing nurse-child interaction. These films were scored with the NCIT taxonomy twice by two observers with different expertise in burn wound care.

### 4.2.1 | Intra-rater reliability

Table 3 provides the intra-rater ICC-scores and percentage of agreement of one observer, the nurse practitioner, for each element of the taxonomy. In 15 of the 16 elements, the ICC or % agreement was good. For the other observer, only 6 of the 16 element were found to be reliable (not shown).

### 4.2.2 | Inter-rater reliability

For most elements, the ICC-scores were higher when the scores of the second observations were used, indicating a learning effect for

one of the observers. Only "Letting the child participate in decision making" had a higher ICC-score (0.80) if the first observations were used. Table 3 shows the ICC between the scores of both observers after examining the videos twice with the taxonomy. In 11 of the 16 elements, ICC or % agreement is considered good. In addition, the median scores on elements are provided in Table 3 and show that none of the elements is scored solely 7.

## 5 | DISCUSSION

To assess the interaction between nurse and child during medical events or nursing interventions a taxonomy was developed. The taxonomy has high face validity, as experts on VIG adapted the principles of Dekker and Biemans (1994) to fit the interactional behaviour of nurses during wound dressing changes. For this purpose, the original diagram by Dekker and Biemans was adapted to be valid for the nursing situation. A third pattern was added that includes observed elements that were related to the procedural intervention. It is widely recognised that it is important to inform the patient. Therefore, it was deemed important to tell what is going to happen. For example,

**TABLE 3** ICC and percentage agreement for two measurements

Nurse-Child Interaction Taxonomy-element	Intra-rater (one person; nurse)			Inter-rater (two persons; nurse's first & researcher's second)			Median score (range) nurse
	ICC	% absolute agreement	% agreement with 1 point difference	ICC	% absolute agreement	% agreement with 1 point difference	
<b>Being considerate</b>							
Adopting lower or same height as child	0.97	80	100	0.90	30	100	3 (2-6)
Directing towards the child	0.64	80	100	0.45	60	90	6 (5-7)
Looking at the child	–	90	100	0.11	30	60	5 (5-6)
Tempo of speech is low	0.76	90	100	0.06	30	90	7 (6-7)
Voice directed to child (high and variable pitch)	0.94	80	100	0.67	20	90	5.5 (3-7)
<b>Attuning oneself</b>							
Receiving the child's initiative/following gaze	0.82	70	100	0.13	20	50	5 (3-5)
Naming initiative of the child	0.49	70	100	0.12	70	90	1 (1-3)
Reacting to initiative of child	0.57	70	90 <sup>a</sup>	0.05	20	50	5.5 (3-6)
Taking initiative on right moment	0.91	90	100	-0.05	20	80	5 (3-5)
Persevere in making contact if child is in distress/upset	0.98	70	100	0.53	50	60	5 (3-5); n = 5
Perceiving child's reactions	0.66	90	90 <sup>a</sup>	0.38	20	50	6 (3-6)
<b>Procedural intervention</b>							
Introducing what they are going to do	0.33	50	100	0.15	30	70	3 (2-4)
Letting child participate in decision making	0.64	90	100	0.84	90	100	1 (1-2)
Restricting movements as little as possible	1	100	100	0.19	20	80	7 (6-7)
Attuning speed to child	0.46	40	100	0.42	40	90	6 (4-7)
Attuning medical procedures to other persons around	0.49	70	100	0.14	50	100	6 (6-7)

<sup>a</sup>Max 2 point difference observed.

touching the child and cutting the bandage without telling distresses the child. Likewise, if the speed of the nursing actions is not attuned to the child. The elements in the third pattern reflect establishing trust during procedures, which is necessary for a fruitful relationship (Kitson, 2018). Moreover, letting the child participate in decision making, for example “Which arm are we going to do first?” or “Do you want to hold the bandage for me?”, can give the child the feeling of being in control which is necessary to cope with the situation (Thurber et al., 2000). Although it might feel that these actions of the nurse take more nursing time, they also win time as the child is more cooperative.

Regarding its reliability, it was found that one of the observers, a nurse with much experience in burn care and also video interaction guider, was able to achieve substantial reliability and absolute agreement with the taxonomy. However, the other observer, with less experience in burn care, scored only six out of 16 elements satisfactorily. These six all contained observable behaviour (e.g., adopting lower or same height as child) or a verbal part (e.g., explaining what they are going to do). Most difficulty was experienced scoring elements regarding the pattern “Attuning oneself” (e.g., reacting to the initiative of the child). So, the nonverbal interaction was more difficult to score. Training was needed, and a learning effect was observed for this less experienced observer. Nevertheless, the inter-rater reliability between both observers shows that with proper training, the NCIT is a reliable instrument. Moreover, the range of scores shows that there is room to improve the interaction skills of nurses.

In this study, we included nurses with at least one year experience in burn care. In contrast to nurses new at our burn centre, the focus of the participating nurses did not need to be on the wound dressing procedure, but could be on the interaction with the child. According to the FOC theoretical framework, focusing on who is in front of the nurse is integral, not optional (Kitson et al., 2013). Kitson et al. (2013) state that the ability to engage, focus on the other person, and see their needs is an essential skill. The results of our study show that the interactional skills of our nurses can be improved. However, we do not know whether the skills of our nurses are too low, or are high enough to build relationships that are essential to provide high-quality care. More research is necessary to answer this question.

In addition, in this study, all participating children were between 0–4 years old. Their language development is still at its infancy, and therefore the communication is obviously mainly nonverbal. Others also acknowledge the importance of interaction with children (Blount et al., 1989; Wolff et al., 2009). Some focus on parents, others on medical staff or on both. Often they pay attention to verbal communication, although most human interaction and communication is nonverbal (Riess & Kraft-Todd, 2014). As communication is largely nonverbal, it is likely that the NCIT taxonomy can be used in older patients as well. In addition, although the NCIT was developed at a burn centre, the elements in the NCIT taxonomy are not burn specific. Therefore, it is likely that the taxonomy can be applied also in other settings. This needs to be confirmed by future studies.

## 6 | CONCLUSION

This study shows that interaction between nurses and children can be assessed reliably with the NCIT taxonomy by an experienced observer and alternatively scoring by two observers is recommended. The development of the taxonomy is an important step to find evidence for the best way for nurses to interact with children during nursing interventions or medical events and as such, ultimately, contributes to providing the best care possible.

## 7 | RELEVANCE TO CLINICAL PRACTICE

The NCIT taxonomy provides a way to systematically document what happens when nurses and patients interact. Kitson (2018) mentions that good relationships are essential, not only for the patient, but also for the nurse. She refers to the fact that nursing burnout and reasons to leave the profession are often due to nurses feeling to be unable to provide personalised care. The taxonomy developed in this study is a way to check effectiveness of interventions, like VIG, to improve the nurses skills to interact with patients and to build relationships. And, the NCIT can be used to investigate whether care is less distressing and less painful for the children if nurses have more skills to interact with children.


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### CONFLICT OF INTEREST

None of the authors have conflicts of interest regarding this study. All authors confirm their agreement with the final statement.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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