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Title: Development and inter-rater reliability of a tool assessing hypnotic communication behaviours adopted by nurses caring for children with cancer:

The Sainte-Justine Hypnotic Communication Assessment Scale

Running head: Hypnotic Communication Assessment Scale

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1 **Abstract**

2 **Background:** Several studies in pediatric oncology have shown the successful effects of using
3 hypnotic communication techniques (HCTech) during painful medical procedures. Since no
4 studies assessed the precise use of these techniques with a validated tool, it is unsure that the
5 observed relationships involve the use of HCT. **Objectives:** To develop a scale evaluating
6 healthcare professionals' behaviours when using HCTech and to evaluate its inter-rater
7 reliability. **Methods:** This study involved the preliminary steps of the Sainte-Justine Hypnotic
8 Communication Assessment Scale (SJ-HCAS) development process. As part of a larger
9 intervention study, the SJ-HCAS was developed in three steps by five experts and four lay raters
10 using an iterative process applied to subsets of video-recorded nurse-patient interactions. The
11 development aimed to maximize clarity and precision of items as well as minimize redundancy
12 amongst items. Inter-rater reliability was assessed in a randomly selected sample of 1/3 of
13 collected video-recorded interactions (n=42). **Results:** The final version of the scale is composed
14 of 11 items categorized in two domains pertaining to Relationship and Technique. We found
15 excellent inter-rater reliability for both subscores and total score in two independent inter-rater
16 comparisons (median ICC = 0.879), with most items showing very good to perfect inter-rater
17 reliability (median Kappa = 0.847). **Conclusions:** The results support further work with the SJ-
18 HCAS. The scale has the potential to help ensure the integrity of hypnotic communication
19 training in children which could ultimately promote the dissemination of the practice of HCTech.

20 **Key words:** Hypnotic communication; healthcare professionals; assessment tool; pediatrics;
21 medical procedures; procedural pain and distress

22 **Introduction**

23 Along their cancer trajectory, children have to undergo many painful invasive medical
24 procedures which may affect them daily. It is well-known that children are greatly affected by
25 different types of pain, including pain caused by medical procedures.¹ Among them,
26 venipunctures are a common source of pain in hospitalized children.^{2,3} These needle procedures
27 are associated with a significant level of pain and distress for pediatric patients.⁴ In fact, patients
28 report that painful procedures represent one of the most difficult parts of cancer suffering.^{5,6}
29 Compared to adults, procedural pain is a greater source of anxiety and discomfort for children.⁷
30 Studies have even found long and lasting negative consequences years after the end of
31 treatment.^{8,9} Interestingly, previous medical experiences have been shown to be predictive of the
32 child's reaction to future medical procedures.¹⁰⁻¹²

33 It is thus of major importance for healthcare professionals to use appropriate pain and distress
34 management techniques. Different methods have been developed, including pharmacological
35 interventions and non-pharmacological interventions.¹³ In pediatric settings, hypnosis is often
36 used to relieve physical or emotional suffering.¹⁴ Clinical hypnosis and hypnosis-derived
37 communication techniques such as hypnoanalgesia (hypnotic suggestions to relieve pain¹⁵) have
38 great potential as children are easily absorbed in fantasy and imagination.¹⁶ In the Ericksonian
39 tradition, the induction of hypnotic states and phenomena appears to be primarily approached as
40 a matter of communication of ideas and the elicitation of trains of thought and associations
41 within the subject and consequent behavioral responses.¹⁷ Moreover, several studies in
42 neuroscience have shown that hypnosis modifies brain activity in the anterior cingulate cortex,
43 which plays an important role in pain modulation.^{18,19}

44 Previous studies in pediatric oncology have shown that HCTech not only decrease procedure

45 related pain^{5,20-29} and distress^{5,20,23-27} but also reduce anxiety^{5,20,21,23-27,29,30} and fear²². However,
46 all these reports call for an independent professional practising hypnosis while the medical
47 procedure is being performed by another health care professional (e.g. nurse). None of the
48 studies address the effect of hypnosis communication as used by the professionals (e.g. nurse)
49 themselves. This is a strong limitation to the dissemination of the intervention as it increases
50 costs and is often not feasible in the daily activity of an outpatient clinic. Interestingly, none of
51 the previous studies actually measures treatment integrity, i.e. to what extent the used
52 communication techniques were effectively altered by training and if professionals use HCTech.
53 Consequently, there is no guarantee that the observed relationships (e.g. pre-post differences on a
54 pain scale) actually involve hypnotic communication. In addition, we do not know which
55 components and what intensity in such communication could optimize improvements.

56

57 **Objectives**

58 The first objective of this study was to develop a scale assessing pediatric healthcare
59 professionals' behaviour when using HCTech. The second objective was to evaluate the inter-
60 rater reliability (IRR) of the communication scale. We focused on the level of agreement
61 between raters on scores derived from the scale as well as on individual items.

62

63 **Methods**

64 The scale was developed as part of a research project taking place in our cancer care
65 centre (CHU Sainte-Justine) aiming at evaluating the effects of training nurses to use HCTech in
66 clinical practice (see study protocol³¹). The purpose of the present scale is to assess pediatric

67 oncology nurses' behaviour when using HCTech to deal with patients' procedural pain and
68 distress during venipunctures.

69

70 *Participants*

71 To evaluate verbal and nonverbal communication during nurse-patient interactions,
72 venipuncture procedures performed at the CHU Sainte-Justine daycare hematology-oncology
73 clinic were video-recorded. Participant recruitment was completed by May 2015. Six female
74 oncology nurses took part in the study. Inclusion criteria for the nurses were (1) working in the
75 daycare clinic, (2) having experience performing venipunctures with children and (3) having no
76 prior experience in hypnosis. Six patients were assigned to each nurse, using a convenience
77 sampling method.

78 Eligible patients were identified from the clinic's computer database. Patients' inclusion
79 criteria involved (1) being aged between 5 and 18 years old, (2) having a good understanding of
80 French and (3) having excepted regular follow-up at the daycare hematology-oncology clinic.
81 Patients' exclusion criteria were (1) prior use of hypnoanalgesia, (2) having a psychiatric
82 disorder diagnosis and (3) coming for an emergency or an unscheduled appointment. The first
83 six identified patients for each nurse who met the criteria were then contacted by phone. On the
84 day of their first appointment, patients and their legal guardian met with a research assistant for a
85 short interview (10-15 minutes) to obtain detailed information about the study as well as consent.
86 A total of thirty-six patients were approached to take part in the study. Of these, three children
87 declined participation because of a lack of interest or not wanting to be exposed to
88 hypnoanalgesia. The final sample for the study consisted of 6 pediatric oncology nurses (6
89 women, aged: 33 ± 6 yrs) and 33 of their cancer patients (16 boys, 17 girls, aged 10 ± 4 yrs).

90 During the study period, 1 nurse went on maternity leave and 5 patients dropped out of the study.
91 Two patients passed away. Hence, a total of 5 nurses and 26 patients completed the study. All
92 interactions were video-recorded: 117 interactions across the 4-time points (2 pre- and 2 post-
93 training) were available to evaluate the use of HCTech. Patients as well as nurses provided
94 written informed consent. The study received ethical approval by the CHU Sainte-Justine
95 Research Ethics Committee.

96

97 *Development Process of the Scale*

98 The Sainte-Justine Hypnotic Communication Assessment Scale (SJ-HCAS) was
99 developed by a multidisciplinary team composed of 2 physicians, 1 nurse, 2 psychologists, and 1
100 psychology graduate student. We used an iterative process aiming to maximize clarity and
101 precision, as well as agreement between raters without redundancy amongst items. The chart
102 summarizing the developing steps is available in Figure 1.

103

104 Objective 1: Development of the SJ-HCAS

105 *Version 1*

106 First, we did an extended literature review to identify important components of hypnotic
107 communication. We collected domains and topics to be covered with researchers involved in the
108 project. This included an in-depth interview with MCC (psychologist and hypnotherapist) and
109 CP (nurse) who conceptualized the training designed for nurses. The training included key
110 elements of the practice of hypnoanalgesia to cover both relational and technical aspects. Key
111 behaviours assessed by the scale were selected from two sources providing details on the practice
112 of hypnosis with children^{32,33}, and a reference guide of hypnotic suggestions³⁴, which also were

113 the references used to design the nurses' training. Topics and domains were identified by the
114 team, in accordance with the assumption that the practice of basic hypnotic communication
115 requires both establishing a good rapport and using hypnotic techniques relevant to the child's
116 age and preferences.³³

117 The second step focused on generating a list of items, in which some evaluated
118 relationship abilities (or difficulties) and others the use of (or difficulty with) hypnotic
119 communication techniques. When using hypnotic communication, adapting the language to the
120 client, introducing a slower pace, closely adjusting to the child's rhythm, developing a
121 cooperative relationship as well as allowing patients to position themselves freely during
122 punctures are all elements reinforcing a trusting nurse-patient relationship. This reinforced
123 relationship will favour the effectiveness of hypnotic suggestions³⁴. Moreover, using a
124 multisensory stimulation and validating the child's experience is also common in pediatrics and
125 has been shown to allow a deepening of hypnotic induction³². Additionally, healthcare
126 professionals focusing their attention on the child as well as using comforting language adapted
127 to the child makes it possible to improve this client-centered approach and individualize the use
128 of hypnotic techniques³⁴. As changes in children's behaviours are related to hypnotic
129 communication style, healthcare professionals' abilities to use adequate techniques and create a
130 hypnotic bubble are pivotal. For each item, one or two examples of behaviours were elaborated
131 to illustrate typical behaviours exemplifying hypnotic communication. To ensure maximum
132 clarity, once each item and example had been chosen by the lead researchers (MCC and SS), we
133 refined the wording by a set of common team discussions (TM, CP, MCC, MD). Clarity was also
134 tested within the team. Following these steps, the Version 1 of the scale was finalized (N=10
135 items).

136 In order to evaluate the clarity of Version 1, a pre-test was conducted. Ten nurse-patient
137 interactions were randomly selected across the 4-time points (pre- and post-training) and
138 analyzed by two raters (psychology graduate students, JA and MPB, see acknowledgements)
139 who did not have prior experience with hypnosis at that time. Raters qualitatively reported on the
140 clarity and face validity of the scale items. Using the same sample of interactions, we compared
141 how raters understood each item and if they were easy to rate. Modifications were expected
142 following this process. The pre-test shed light on several issues with the first version. Raters
143 mentioned having difficulty assigning scores because some of the items were designed to assess
144 more than one behaviour and examples were not sufficiently explicit. Moreover, one difficulty
145 with this version was that items could assess both positive (desirable) and negative (non-
146 desirable) behaviours. This explained why disagreements often occurred between raters,
147 considering one would focus more on desirable behaviours and the other on non-desirable ones.

148

149 ***Version 2***

150 The research team addressed these problems in a new version of the scale. The scoring
151 system was modified so that the items would only refer to the use of one well-defined skill. Each
152 item would also be scored based on skill implementation versus absence of skill. In behavioural
153 sciences, the use of a present or absent coding format is fairly common in both pediatric³⁵ and
154 adult evaluations³⁶, especially when the respondent is asked to report on another's status. One
155 item was removed, as we were unable to assess it from the available video recordings (*how the*
156 *nurses came into contact with patients was absent from our recordings*). Moreover, two
157 ambiguous items were each subdivided in two. Item descriptions and behaviour examples were
158 further revised and simplified to ensure maximum clarity. The order of items was also rearranged

159 to be more consistent with the timeline of the encounters. Instructions on the use of the scale
160 were also developed as well as an additional document describing the targeted hypnotic
161 communication techniques, so that a lay rater could use the scale without prior knowledge of
162 hypnosis. These changes led to a second version of the scale (N = 11 items). Before proceeding
163 to the next step, the scale was reviewed by the team and feedback as well as minor formulation
164 edits were done.

165 This Version 2 was applied by the same raters used for Version 1 (JA and MPB), using
166 the interactions previously selected to evaluate clarity, usability and understandability and
167 remaining issues were raised. Three items needed additional specification (labelled Synchrony,
168 Nurse's attention and Hypnotic bubble). Raters had difficulty assigning the appropriate score,
169 because items were still ambiguous and required too much personal interpretation to yield
170 appropriate reliability. For example, to rate the nurses' attention or synchrony, one rater focused
171 more on specific behaviours while the other rater took into account a global impression of the
172 entire encounter.

173

174 ***Version 3***

175 The three items' descriptions and examples were further adjusted in order to maximize
176 clarity and minimize subjective interpretation as well as focus raters' attention on observable
177 behaviours. Following these modifications, the test version was finalized (N = 11 items). Five
178 items dealt with the nurse-patient relationship, while six items dealt with the use of specific
179 communication skills and techniques. We created two count subscores to reflect the number of
180 positive items for each category and a total count score to reflect the number of hypnosis-based
181 communication behaviours. As these variables were count scores, it was not necessary to

182 ascertain internal consistency.³⁷ Before completing the second objective of the study, a final pre-
183 test was performed using the same 10 interactions. Raters' and the research team's judgment on
184 clarity, non-ambiguity, and usability, was positive and we decided to proceed with further
185 analyses.

186

187 Objective 2: Inter-rater reliability of the final test version (Version 3)

188 IRR coefficients were computed in a randomly selected portion of the videos. Time
189 points before and after training were available for this study. For this purpose, one third of the
190 intervention study's videos (n=42) that had not been previously used for Objective 1 were
191 selected and rated. A proportion of 25-50% is considered sufficient in psychological
192 assessment.^{38,39} An online random number generator was used to randomly select the videos
193 allocated across the 4-time points.

194 In order to study reliability, we lead two studies involving the same raters as in Objective
195 1 (Study 1) and untrained fully independent raters (Study 2). The second study was led to check
196 for dissemination capacity of the scale in other independent teams and with raters with a nursing
197 training naive to hypnosis. In IRR Study 1, raters were two female psychology graduate students
198 (ages 22 and 24). In IRR Study 2, raters were one female nurse and one male nurse (ages 50 and
199 47, with 15 and 25 years of experience, respectively).

200

201 *Statistical Analysis*

202 All analyses were conducted using IBM SPSS Statistics 24. IRR was computed at score
203 and subscore level as well as for each item. Intra-class correlation coefficient (ICC) analyses
204 were conducted to quantify the level of agreement between raters for scores. For Study 1, a two-

205 way mixed single measure (absolute agreement) ICC was used while a two-way random single
206 measure (absolute agreement) ICC was used for Study 2. The confidence interval was set at
207 95%. The following guidelines were used to interpret ICC values: 0-.40 = poor, .40-.59 = fair,
208 .60-.74 = good, .75 to 1.0 = excellent.⁴⁰ Cohen's Kappa was used to assess each item's chance
209 corrected inter-rater agreement.^{41,42} The kappa values were interpreted as follows : 0-.20 = no
210 agreement, .21-.39 = minimal, .40-.59 = weak, .60-.79 = moderate, .80-.90 = strong, above .90 =
211 almost perfect agreement.⁴² Percent agreement was also computed for each item.

212 For informative purposes, additional analyses were performed to establish repeatability.
213 The means and standard deviations of the differences in total score and subscores attributions for
214 Study 1 (Rater A - Rater B) and Study 2 (Rater C - Rater D) were computed in order to
215 determine the limits of agreement. Bland-Altman graphs⁴³ as well as Kendall correlation
216 coefficient were used to determine the magnitude of differences in score attributions. The
217 measurement error and the error range (i.e. above and below the actual measurement) were also
218 calculated.

219

220 **Results**

221 Objective 1

222 Following the steps detailed in the methods, a final version of the Sainte-Justine Hypnotic
223 Communication Assessment Scale was elaborated (Appendix). The final version is composed of
224 two categories of behaviours classified on the basis of theory. The scale includes 11 items
225 pertaining to relationship or technical skills. The "Relationship" category consists of 5 items
226 dealing with (1) the adjustment of the nurse's language to the child's age, (2) the verbal pace
227 adopted by the nurse, (3) whether the nurse and the patient are attuned (synchrony), (4) the

228 development of a cooperative relationship between the nurse and the patient as well as (5) the
229 child's position during the medical procedure. The "Technique" category refers to the use of
230 hypnotic communication per se and is made of six items : (1) the use of the child's different
231 senses in the nurse's verbal behaviours (i.e. VAKOG, or children's visual, auditory, kinesthetic,
232 olfactory and gustatory senses), (2) the nurse's attention focus on the child, (3) behaviours used
233 to support the child, (4) the use of comforting language, (5) the identification of the use of a
234 technique taught during the training and (6) whether the child's behaviours suggest the
235 experience of a hypnotic bubble.

236 For each item, positivity is determined as the use of one skill as reflected by specific
237 observable behaviours. Raters should make a decision on the presence (=1) or the absence (=0)
238 of these behaviours. A "Not applicable" or don't know score (NA) is also available if a score
239 cannot be decided upon. As detailed in the methods, count scores are computed by adding the
240 number of positive scores reflecting the number of favourable behaviours. Subscores are
241 computed separately for the Relationship and Technique categories and a total score is computed
242 from the eleven items (Appendix).

243

244 Objective 2

245 *Study 1*

246 When a randomly selected sample of 42 nurse-patient interactions were rated by
247 psychology graduate students (raters A and B), ICCs level reflected excellent reliability for the
248 total score (ICC=0.924, 95% CI=0.864-0.958) as well as for the Relationship subscore
249 (ICC=0.955, 95% CI=0.916-0.975) and Technique subscore (ICC=0.888, 95% CI=0.802-0.938)
250 (Table 1). When exploring reliability at the item level, we found that nine out of eleven items

251 had either high or perfect agreement, with Kappa values ranging from 0.844 to 1.00. For two
252 items, reliability was moderate with Kappa values of 0.656 (Pace) and 0.725 (Nurse's attention).
253 Although these values were lower than those for the other items, they indicated adequate
254 agreement between raters.⁴² Notably, percent agreements for items ranged from 93% to 100%
255 (Table 1).

256 Detailed results are available for repeatability analyses in supplementary figures (Figure
257 S1). These indicate that a uniformity of variance in the repeated measurements was present for
258 the total score ($\tau = -0.051$, $p = 0.691$) and for both the Relationship ($\tau = 0.019$, $p = 0.894$) and the
259 Technique subscores ($\tau = -0.147$, $p = 0.263$). The error range indicated a 0.995 above or below
260 the actual measurement for the total score as well as 0.361 and 0.887 above or below the actual
261 measurement for the Relationship and Technique subscores, respectively.

262

263 *Study 2*

264 When nurses (raters C and D) rated the same sample of nurse-patient interactions, ICCs
265 also demonstrated excellent IRR for the total score (ICC=0.869, 95% CI=0.769-0.927) and for
266 both the Relationship (ICC=0.844, 95% CI=0.728-0.913) and the Technique subscores
267 (ICC=0.868, 95% CI=0.765-0.927) (Table 2). As for the reliability at the item level, we found
268 that nine of the eleven items had a high or almost perfect agreement, with Kappa values ranging
269 from 0.806 to 0.901. Inter-rater agreement was weak for two items, with Kappa values of 0.489
270 (Language) and 0.581 (Support of the child). Percent agreement for each item ranged from 81%
271 to 95% (Table 2).

272 Detailed results are also available for repeatability analyses in supplementary figures
273 (Figure S2). For the total score, a significant correlation between differences and means was

274 found ($\tau = 0.260$, $p = 0.035$), suggesting that higher the scores, larger were the differences. A
275 uniformity of variance in the repeated measurements is noted for the Relationship ($\tau = 0.247$, $p =$
276 0.068) and the Technique subscores ($\tau = 0.190$, $p = 0.142$). The error range indicates a 2.945
277 above or below the actual measurement for the total score as well as 1.626 and 1.581 above or
278 below the actual measurement for the Relationship and Technique subscores, respectively.

279

280 **Discussion**

281 The aims of this study were to develop a scale assessing healthcare professionals'
282 behaviour when using HCTech and to evaluate its IRR. The SJ-HCAS was developed by a
283 multidisciplinary team (physicians, psychologists, nurse, psychology graduate student) based on
284 key elements of the practice identified in the literature and the nurses' training, as well as
285 experts' opinions on hypnotic communication. Members were all involved in the scale
286 development and agreed on items' descriptions as well as examples.

287 To our knowledge, the SJ-HCAS is the first tool to assess pediatric healthcare
288 professionals' behaviours when using hypnotic communication techniques. Other measurement
289 tools assessing nurse-patient interactions (Child-Adult Medical Procedure Interaction Scale⁴⁴ and
290 Measure of Adult and Infant Soothing and Distress⁴⁵) are available in the literature. Several
291 studies have used video-recordings for the purpose of training and assessing communication
292 skills in oncology nurses.^{46,47} This study not only shows that video-based skill implementation
293 assessments are feasible, but also that absence of skills is identifiable. This observation is
294 consistent with the study by Birnbach et al.⁴⁸ who showed that video technology helps identify
295 inadequately learned skills and can lead to more in-depth training. The SJ-HCAS can be used as
296 a teaching tool as it allows raters to evaluate the presence or absence of a skill. This could serve

297 to identify teaching opportunities for hypnosis communication trainers.

298 Overall IRR for quantitative scores (total score and subscores), for both psychology
299 graduate students and independent nurses, was excellent. The ICCs in Studies 1 and 2 were not
300 significantly different (overlapping CIs). Thus, an excellent inter-rater agreement was replicated
301 in Study 2, suggesting that the SJ-HCAS has good dissemination abilities. When looking at IRR
302 at the item level, nine of the eleven items in both studies had a high or perfect agreement,
303 indicating that the items' description and examples were clear and non-ambiguous for
304 psychology students as well as practising nurses. However, between both studies, four items had
305 a lower agreement, suggesting some items might be reworded or clarified for independent lay
306 users.

307 In Study 1, the "Pace" item had a moderate agreement. This might be due to the raters'
308 difficulty in distinguishing between nurses who spoke slowly spontaneously and those who
309 spoke quietly deliberately in order to comfort the patients. This created confusion when
310 evaluating this behaviour. Regarding the "Nurses' attention", this item also had a moderate
311 agreement. Studies have shown that nurses are frequently disturbed by different sources and
312 types of interruptions when performing daily tasks.^{49,50} To score this item, raters had to take into
313 account disruptions that occurred in the interactions (e.g. answering doctors or parents' questions
314 during the medical procedure) and the nurses' reactions to these disruptions. Raters had to
315 evaluate the nurses' attention behaviours only based on the item's description and examples
316 provided. This may have created disrupting noise and may explain differences between raters.

317 In Study 2, we found a lower agreement for the "Language" item. When evaluating the
318 nurses' sensitivity to language, raters had to evaluate if the language was both appropriate to the
319 child's age, but also to his or her context of life. In pediatrics, jargon along with medical

320 terminology can be frightening and confusing for children.⁵¹ A factor that could account for this
321 observation is that the independent nurses who participated in this study did not have previous
322 experience with children while the raters in Study 1 specialized in pediatrics. As a result, these
323 nurses may not have had the knowledge to assess whether the language was adapted to the child.
324 This could also explain why this item obtained excellent agreement in Study 1 but a weak
325 agreement in Study 2. In regards to the "Support of the child", this item also had a lower
326 agreement. When treating patients, communication can be done with or without words by using
327 gestures and facial expressions⁵²: verbally supporting the child versus touching the patient. One
328 rater may have focused on the verbal support while the other focused on the non-verbal.

329 Although limited, it is possible that differences in IRR between Study 1 and Study 2 may
330 relate to differences in professional background (psychologists versus nurses). In fact, nurses had
331 a personal experience of venipuncture which could serve as a basis for their judgment and
332 consequently increase inter-rater discrepancies. If this is true, it seems all the more important to
333 prompt raters to assess observed behaviours without referring to their own experience or history.
334 It also underscores a certain degree of naivety or ingeniousness that is probably necessary to
335 reliably rate the scale.

336 Repeatability analyses showed larger error ranges and limits of agreement when nurses
337 assessed hypnotic communication rather than psychology graduate students. This variability may
338 have occurred because raters from Study 1 were involved in the scale development process.
339 Perhaps their involvement facilitated the ease of use of the scale and allowed higher
340 measurement accuracy. Although a limited systematic bias was found for Study 2's total score
341 repeatability analysis, in general, the SJ-HCAS can be considered as providing repeatable results.

342 We should recognize limitations to this study. First, due to feasibility constraints in the
343 outpatient pediatric oncology clinic, the sample of nurses was limited in size and selection biases
344 may have occurred. It is possible that including a larger sample of nurses would have increased
345 behavioural variability and thus would have provided a more realistic test of IRR. Second,
346 although we used extant literature on developing topics and domains to target, the scale was
347 designed to fit primarily with the content of the training that was offered in our site. The scale
348 was developed to assess nurses' hypnoanalgesia communication skills. Thus, other types of
349 hypnotic communication elements are not covered by this instrument. This scale bears limited
350 external validity and should not be used to assess alternative protocols of hypnotic
351 communication other than the one based on hypnoanalgesia³³. Additionally, the use of the scale
352 should be restricted to research as its validity remains to be studied. It is also important to
353 mention that as various elements may participate to the process of induction⁵³, interventions that
354 strays from the protocol presented in this study do not constitute a poorer implementation of
355 techniques. It is also possible that other rating format would be appropriate, including calling for
356 Likert-type rating scales making it possible to express a more nuanced view on what raters will
357 report. Finally, the scale is limited to the coding of desired behaviors. Although undesirable
358 behaviours may have a strong impact (e.g. "well there, it won't hurt much"), the definition and
359 scope of these "negative" behaviours are yet to be determined. It is probable that future efficacy
360 studies will prompt the coding of such undesirable attitudes or behaviours. Despite these
361 limitations, this study is the first to address the important issue of objectively evaluating
362 hypnosis-derived communication. It also used an iterative process to warrant clear definition and
363 limit overlapping of items and yield a reasonable IRR. Future research should address other

364 properties including validity. If it is further supported, the scale could be used to evaluate the
365 effect of training in this field.

366

367 **Conclusion**

368 We developed the first scale to rate and score hypnotic communication in nurse-patient
369 interactions. The development followed an iterative process and yielded an 11-item scale to
370 assess relationship quality and technique use. The results from the IRR studies support further
371 use of the scale to evaluate hypnotic communication. The use of such an instrument bears an
372 important impact as it could help to demonstrate that observable effects of training are associated
373 with outcomes in professionals and patients by assessing integrity. This could promote the use of
374 hypnosis-derived techniques in daily care. Pediatric nurses have an important role in cancer
375 treatment and their abilities to use hypnotic communication during painful procedures has the
376 potential to greatly diminish children's pain and distress.

377

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382

383 **Declaration of interests**

384 The authors declare no conflict of interests.

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Figure 1. Development process of the Sainte-Justine Hypnotic Communication Assessment scale and inter-rater reliability study

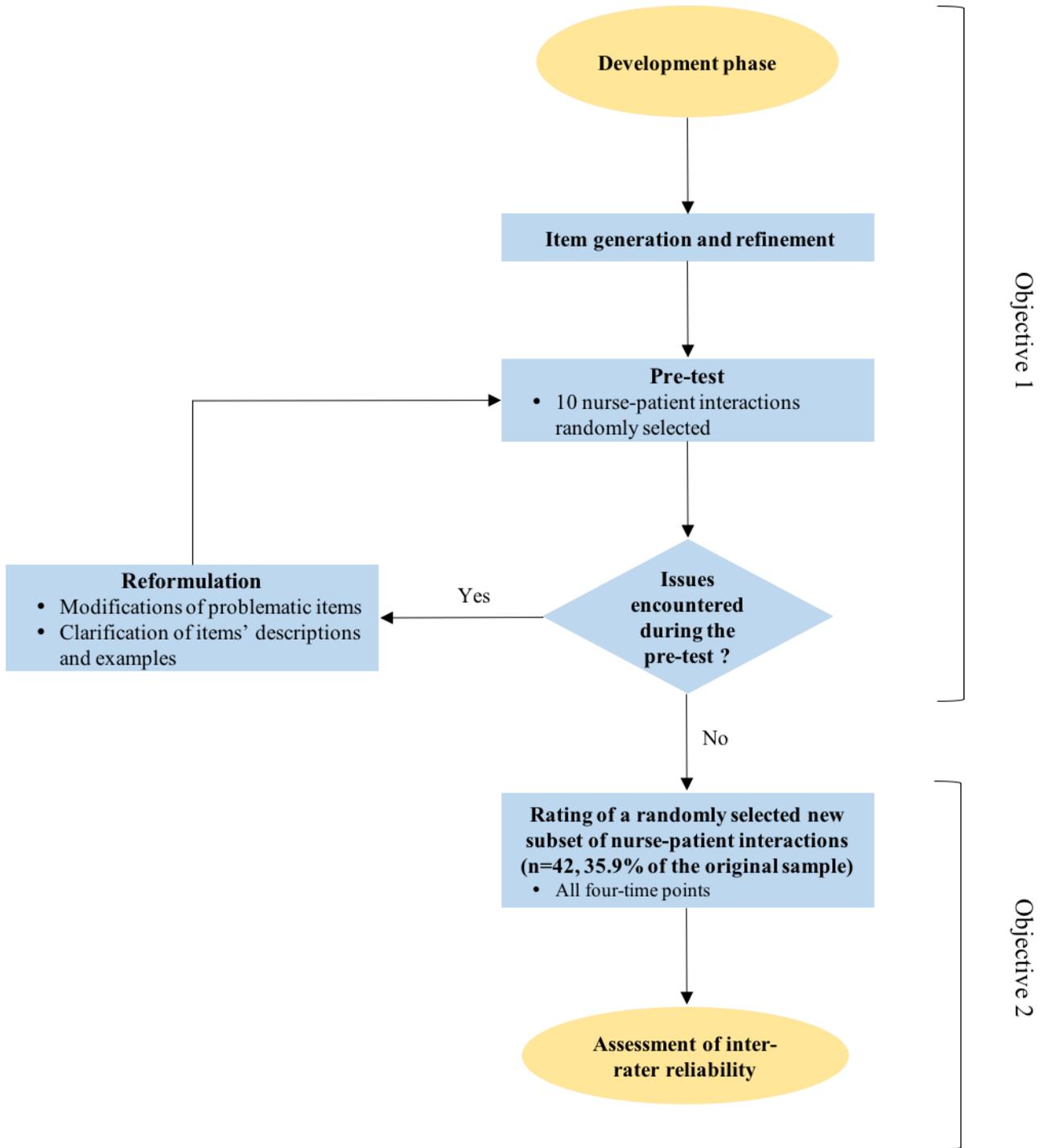


Table 1. Inter-rater reliability analyses of 42 randomly selected nurse-patient interactions. (Raters: psychology graduate students)

Relationship items				Technique items				Total score
Items	ICC	Kappa (κ)	Percent agreement (%)	Items	ICC	Kappa (κ)	Percent agreement (%)	ICC
Language	-	0.876	97.62	VAKOG ^a	-	0.844	97.62	
Pace	-	0.656	97.62	Nurse's attention	-	0.725	95.24	
Synchrony	-	0.947	97.62	Support of the child	-	0.847	92.86	
Cooperation	-	1.000	100	Comforting language	-	0.847	92.86	
Child's position	-	1.000	100	Use of a technique	-	0.869	95.24	
				Hypnotic bubble		0.846	95.24	
Relationship subscore	0.955	-	-	Technique subscore	0.888	-	-	0.924

a. VAKOG = The use of the child's visual, auditory, kinesthetic, olfactory and gustatory senses. ICC = Intraclass Correlation Coefficient.

Table 2 . Inter-rater reliability analyses of 42 randomly selected nurse-patient interactions. (Raters: nurses)

Relationship items				Technique items				Total score
Items	ICC	Kappa (κ)	Percent agreement (%)	Items	ICC	Kappa (κ)	Percent agreement (%)	ICC
Language	-	0.489	80.95	VAKOG ^a	-	0.808	90.48	
Pace	-	0.901	95.24	Nurse's attention	-	0.806	90.48	
Synchrony	-	0.901	95.24	Support of the child	-	0.581	80.95	
Cooperation	-	0.856	92.86	Comforting language	-	0.836	92.86	
Child's position	-	0.893	95.24	Use of a technique	-	0.897	95.24	
				Hypnotic bubble		0.847	92.86	
Relationship subscore	0.844	-	-	Technique subscore	0.868	-	-	0.869

a. VAKOG = The use of the child's visual, auditory, kinesthetic, olfactory and gustatory senses

Supplementary Figure S1. Bland-Altman plots displaying the difference in score attributions between two psychology graduate students (raters A & B) for the test version (V3) against the mean scores (V3) for each rater.

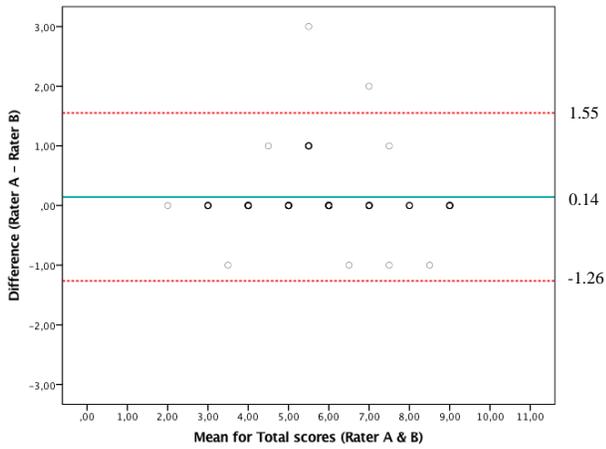


Figure S1A. Total score

Measurement error = 0.508
 Error range = 0.995
 Kendall's $\tau = -0.051$
 ICC = 0.924

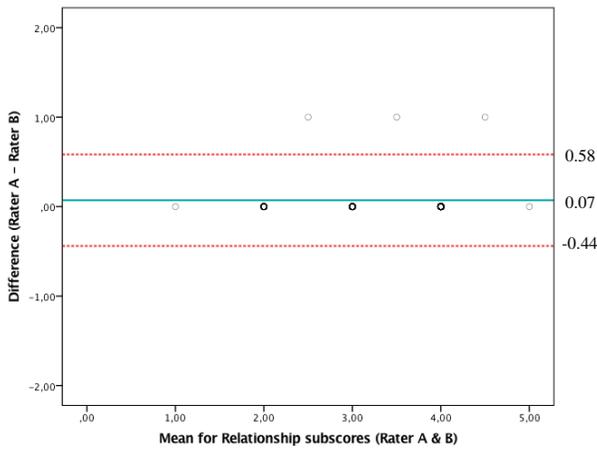


Figure S1B. Relationship subscore

Measurement error = 0.184
 Error range = 0.361
 Kendall's $\tau = 0.019$
 ICC = 0.955

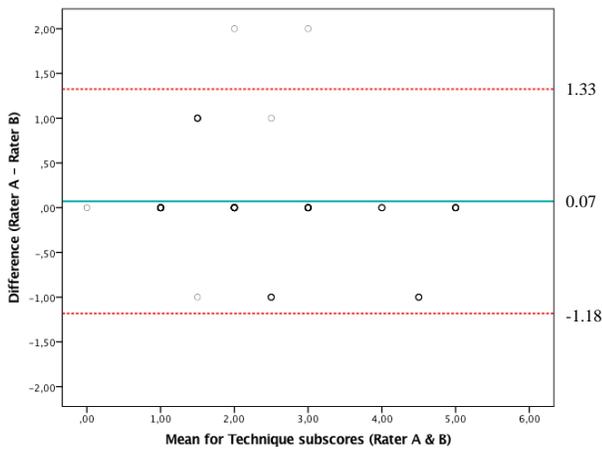


Figure S1C. Technique subscore

Measurement error = 0.452
 Error range = 0.887
 Kendall's $\tau = -0.147$
 ICC = 0.888

Notes. Solid line represents the mean; dashed lines indicate the limits of agreement for each measure ($M \pm 1.96 * SD$), with 95% CI.

Supplementary Figure S2. Bland-Altman plots displaying the difference in score attributions between two professional nurses (raters C & D) for the test version (V3) against the mean scores (V3) for each rater.

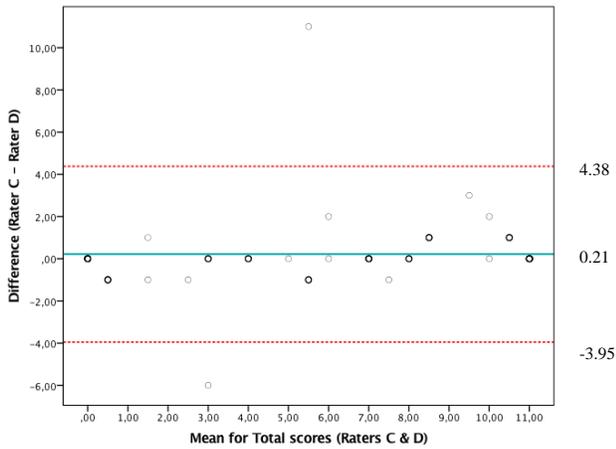


Figure S2A. Total score

Measurement error = 1.502
 Error range = 2.945
 Kendall's $\tau = 0.260^*$
 ICC = 0.869

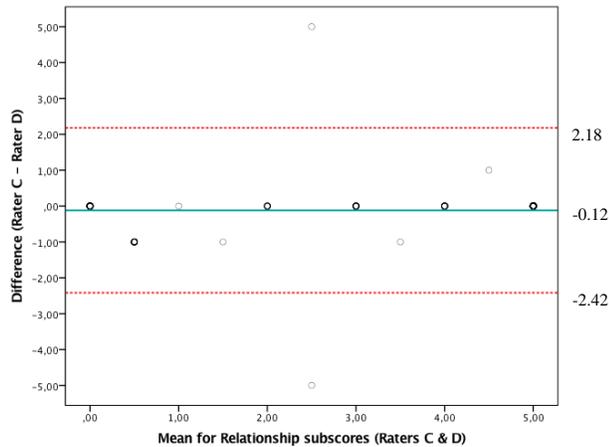


Figure S2B. Relationship subscore

Measurement error = 0.829
 Error range = 1.626
 Kendall's $\tau = 0.247$
 ICC = 0.844

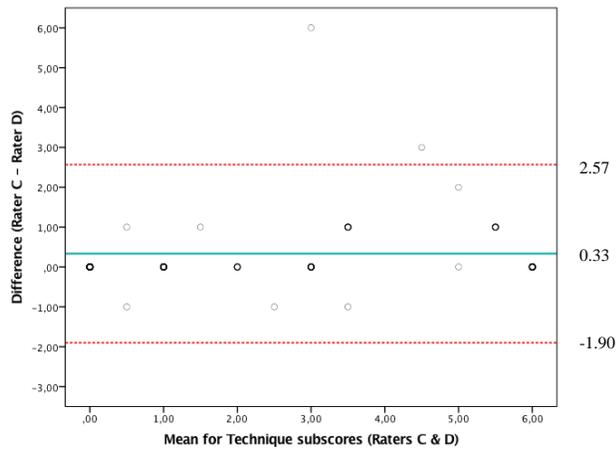


Figure S2C. Technique subscore

Measurement error = 0.806
 Error range = 1.581
 Kendall's $\tau = 0.190$
 ICC = 0.868

Notes. Solid line represents the mean; dashed lines indicate the limits of agreement for each measure ($M \pm 1.96 * SD$), with 95% CI.

* $p < 0.05$

Sainte-Justine Hypnotic Communication Assessment Scale

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Instructions

Each item on the scale must be evaluated independently. The evaluation of the use of hypnotic communication techniques is carried out by assessing the presence or absence of a competency. Each item can receive a score of:

+1 (presence)

0 (absence)

NA (Not Applicable), if the theme studied cannot be scored

The scoring of the different items must be done according to what you observe. Do not try to interpret what the healthcare professional is doing; simply indicate whether or not you observe the behaviour in question. If this behaviour is observed, score +1. If the behaviour is absent, score 0. In the rare cases in which you are unable to decide, select NA.

First part: Relationship

The aim of this first part of the scale, which comprises five items, is to evaluate the way in which the healthcare professional establishes a trusting relationship with the patient. You are asked to rate the following items:

- A) **Language:** Does the healthcare professional make an effort to adapt his/her language to the child?
- B) **Pace:** Does the healthcare professional introduce a slower pace during the medical procedure?
- C) **Synchrony:** Does the healthcare professional adjust to the child's rhythm?
- D) **Cooperation:** Does the healthcare professional attempt to collaborate with the child by seeking his/her approval, by asking him/her questions, knowing that the answers will be positive ("yes set")?
- E) **The child's position:** Does the healthcare professional allow the child to position him/herself freely during venipuncture without any constraints?

Second part: Technique

The aim of this second part of the scale, which comprises six items, is to evaluate the quality with which one or several techniques from the hypnoanalgesia repertoire are applied by the healthcare professional with the patient.

Technique used: Please refer to the appendix "*Hypnoanalgesia techniques*" to determine which technique is used by the nurse during the nurse-patient interaction. It is possible that no technique is used in the video. In this case, the items still have to be rated, as some desired behaviours might still be present. In any case, rate what you see based on the examples provided in each item.

- A) **VAKOG:** Does the healthcare professional use several of the child's senses (VAKOG: Visual, Auditory, Kinaesthetic, Olfactory, and Gustatory) and imagery techniques to facilitate absorption into the imaginary?
- B) **Nurse's attention:** Is the healthcare professional's attention centered on the child while providing care?
- C) **Support of the child:** Does the healthcare professional support the child in what he/she is currently experiencing and is the child's experience being validated?
- D) **Comforting language:** Does the healthcare professional use language or discuss a topic that promotes a sense of security for the child?
- E) **Use of a technique:** Does the healthcare professional use a learned hypnoanalgesic technique (regardless of its success with the child)?
- F) **Hypnotic bubble:** Does the healthcare professional's hypnoanalgesic communication style have a visible effect on the child's behaviour?

Scores

To calculate the subscores and the total score of the scale, write in the boxes on page 4 the number of items that received +1, 0 or NA. Then, enter the number of items with a +1 in the Total box. Do this separately for the two groups "Relationship" and "Technique". Then, add the two subscores "Relationship" and "Technique" to calculate the "Total Score".

Scale

Date _____
ID _____

Rate each item independently when observing the behaviours in the video:

First part: RELATIONSHIP

The aim of these items is to identify the way in which the healthcare professional establishes a trusting relationship with the patient.

A) Language

- +1 Makes an effort to use appropriate language according to the child or adolescent's level and life context (E.g., "I'm going to apply a butterfly valve to help me draw some of your blood.")
- 0 Does not make an effort to use appropriate language according to the child or adolescent's level and life context
- NA Not applicable

B) Pace

- +1 Introduces a slower pace (E.g., Introducing pauses in her/his speech, "You're well set up... Now stretch your arm ... That's right ... I'm going lightly stroke your arm ...")
- 0 Does not introduce a slower pace
- NA Not applicable

C) Synchrony

- +1 The healthcare professional adjusts, both verbally and non-verbally, to the patient's rhythm. (E.g., The rhythm of the patient's breath, his/her emotional tone, his/her tone of voice, lets the child express him/herself freely, etc.)
- 0 Does not make a clear effort to adapt to the patient's rhythm (verbal/non verbal)
- NA Not applicable

D) Cooperation

- +1 Uses language and displays behaviours (verbal/non verbal) that seek the child's approval ("yes set"), and tries to develop a sense of collaboration with the child (E.g., Raises topics she knows the child is competent in. "Hey, is this your doll? Is it one of your favourites? Did you help mommy hold the umbrella? Push the stroller? ...")
- 0 Uses language or displays behaviours (verbal/non verbal) that do not seek the child's approval
- NA Not applicable

E) The position of the child during venipuncture

- +1 The nurse lets the child decide how to position him/herself comfortably during venipuncture, without any constraints. (E.g., on his/her parents' lap, sitting on a chair for PAC, lying on the bed in a relaxed position)
- 0 The nurse does not let the child decide.
- NA Not applicable

Second part: TECHNIQUE USED

The aim of these items is to evaluate the quality with which a technique from the hypnoanalgesia repertoire is applied. The choice of the technique used is left to the healthcare professional's discretion.

Please circle the letter that corresponds to the technique that was used. To help you, refer to the presentation of techniques in the Appendix.

- a. Magic glove
- b. Switch
- c. Numbness and changes in perception
- d. Guided imagery: Travel
- e. Deep breathing: bubble, party blowers
- f. Conversational hypnosis
- g. No technique was applied

A) Use of VAKOG (using multiple senses)

- +1 Uses multisensory descriptions and images specific to the technique
(E.g., "Tell me all the colours in your room. When you touch your bedspread, how does it feel? Do you put perfume in your room so that it smells good? Music? What does it feel like when you twirl?")
- 0 No multisensory stimulation
- NA Not applicable

B) Nurse's attention

- +1 The healthcare professional's attention is centered on the child and on the care provided.
(E.g., The professional tries to establish a direct relationship with the child and to include him/her in the conversation. If he/she is interrupted by a parent or another professional, he/she tries to re-establish contact with the child. When possible, the professional speaks directly to the child, not the parent. The professional waits for the child to finish speaking before responding to others present.)
- 0 The healthcare professional is paying attention to something else, such as the environment or a conversation with someone else.
- NA Not applicable

C) Support of the child

- +1 Provides positive support of the child and validates his/her experience
(E.g., "Oh, that's excellent. Your arm is nice and relaxed. Great job.")
- 0 Does not validate or hardly validates the child's experience
- NA Not applicable

D) Use of comforting language

- +1 Uses language or discusses a topic that promotes a sense of security for the child or repeats certain comforting words
(E.g., "I'm going to touch your arm. I'll stroke it lightly. It'll feel like a mosquito, it pinches a little. Just like tweezers.")
- 0 Uses language or discusses a topic that does not promote an encouraging experience
- NA Not applicable

- E) Use of a technique: the nurse uses one of the techniques to induce/promote the hypnotic bubble with the child.**
- +1 The nurse uses one of the learned techniques (regardless of its success with the child). The nurse tries to adapt to the situation.
 - 0 No learned technique is applied or tried with the child.
 - NA Not applicable

- F) Hypnotic bubble: given the initial state of the child, how much is the healthcare professional able to create a hypnotic bubble.**
- +1 The healthcare professional's hypnoanalgesic communication style has a visible effect on the child's behaviour.
(E.g., The child is more focused on what the professional is saying. The child is absorbed by his/her imagination. He/she displays a more settled and still behaviour. There may be a longer delay in the child's responses to the professional and maybe even a slowing down in the child's breathing and speech.)
 - 0 There are no visible effects of the healthcare professional's hypnoanalgesic communication style on the child's behaviour.
 - NA Not applicable

Relationship	+1	0	NA	Relationship Sub-total
Number				

Technique	+1	0	NA	Technique Sub-total
Number				

Total = Relationship + Technique	+1	0	NA	Total
Number				

Appendix

Hypnoanalgesia techniques

Techniques	Definitions and Examples
Glove anesthesia	"First, pay attention to your hand. Notice how you can feel tingling feelings in that hand. Then let it become numb. When it is very numb, touch that hand to your jaw (or other body part) and let the numb feeling transfer from the hand to the jaw." (Kohen & Olness, 2011)
Switch box	"The therapist explains the idea that pain is transmitted by nerves from various parts of the body to the brain, which then sends a pain message back to the body. The therapist can describe nerves and their pathways or can ask the child to provide a colour for nerves. The importance of accuracy varies with the age and needs of the child. The child is then asked to choose some sort of switch that can turn off incoming nerve signals. The therapist can describe various kinds of switches, such as flip, dimmer, pull or even a television computer push-button panel or control panel of lights. Having chosen a switch, the child is asked to begin practicing turning off the switches or the lights that connect the brain and certain areas of the body. It is useful to ask the child to turn off the incoming nerve signals for defined periods of time (e.g., 10 minutes, 15 minutes, 90 minutes). The success of the exercise is judged by touching the child with a small-gauge needle or some other sharp object and asking for a comparison with feelings on the other side where the nerve signals are unchanged." (Kohen & Olness, 2011)
Numbness and Changes in Perception	<p>"Request for numbness": "You know what a numb feeling is. How does numbness feel to you?" Child responds. "Good, just let that part of your body get numb now. Numb like a block of ice (or whatever image the child has used)." (Kohen & Olness, 2011)</p> <p>"Topical anesthesia": "Just imagine painting numbing medicine onto that part of your body. Tell me when you're finished doing that." (Kohen & Olness, 2011)</p> <p>"Local anesthesia": "Imagine putting an anesthetic into that part of your body. Feel it flow into your body and notice the change in feeling as the area becomes numb." (Kohen & Olness, 2011)</p>
Guided Imagery	"Cognitive-behavioural intervention defined as concentrated focusing on images formed in the mind, through which the patient is helped to relax, focus, and develop mental images that result in the alteration of perceived pain or distress." (Kohen & Olness, 2011)

<p>Deep breathing: bubble, party blowers...</p>	<p>Example: Bubble</p> <ul style="list-style-type: none"> • "Capturing the attention of a small child, offering him to blow bubbles. The child applies himself to blow, to make the bubble travel; the breathing exercise brings him relaxation, the bubble's travel takes him away from the unpleasant act that we are doing to him and distracts him, he forgets that we are pricking him and that we are restraining him." (AREMIG, 2014)
<p>Conversational Hypnosis or Covert Hypnosis</p>	<p>"Conversational hypnosis, also known as covert hypnosis, is a way of communicating with patients' unconscious without informing them. In this approach, the hypnotherapist slowly sends hypnotic messages to the patient and reduces the patient's resistance to alter his/ her thoughts, emotions, and beliefs." (Izanloo & al., 2015)</p> <p>Examples from <i>Hypnosis and pain in children</i> (Wood & Bioy, 2008)</p> <ul style="list-style-type: none"> • Projecting the patient into the future of a procedure: "How happy you will be once I finish my clinical exam when you can watch the TV." • When writing the medical prescription: "I'm going to prescribe this drug for you...and you will be surprised to notice that not only your pain is improved...but that your sleep is getting better."

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