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Do professionals change their communication behaviours following a training in hypnosis-derived communication? A feasibility study in pediatric oncology

Jennifer Aramideh, M.Sc.[a,b], David Ogez, Ph.D. [a,b], Terry Mizrahi, M.D.[a], Marie-Claude Charest, M.Ps.[a], Caroline Plante, B.Sc.N.[a], Michel Duval, M.D.[a,c] & Serge Sultan, Ph.D.[a,b,c*]

[a] Department of Hematology-Oncology, CHU Sainte-Justine, 3175, Chemin de la Côte-Sainte-Catherine, Montréal, Québec, Canada, H3T 1C5

[b] Department of Psychology, Université de Montréal, Pavillon Marie-Victorin PO Box. 6128, Succursale Centre-ville, Montréal, Québec, Canada, H3C 3J7

[c] Department of Pediatrics, Université de Montréal, 3175, Chemin de la Côte-Sainte-Catherine, Montréal, Québec, Canada, H3T 1C5

***Corresponding author:**

Name: Serge Sultan, Ph.D.
Address: CHU Sainte-Justine, 3175 Chemin de la Côte-Sainte-Catherine, Montréal, Québec, Canada, H3T 1C5
Telephone: (514) 345-4931 #7068
Email: serge.sultan@umontreal.ca

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Abstract

Objectives: The purpose of this study was to test the feasibility of a training in hypnotic communication techniques (HCTech) for pediatric nurses to prevent procedural pain and distress in children during venipunctures. Specifically, this study aimed to (1) assess nurses' mastery of HCTech and (2) nurses' experience regarding the training program. **Methods**: Participants were 6 female pediatric nurses and 33 of their cancer patients. Nurses took part in a 4-day theoretical and practical training in HCTech. Venipuncture procedures were video-recorded and assessed to evaluate nurses' mastery of HCTech using a standardized scale. Pre-training use of HCTech was compared with post-training and follow-up for the entire nurse sample and across nurses with the same patients (109 nurse-patient interactions). After the follow-up, nurses were questioned about their experience in regards to the training and activities (themes and practice). **Results:** Results showed medium pre-post changes in hypnotic communication behaviours (pre-post d=0.74), with changes maintaining at follow-up (pre-follow-up d=0.97). Interviews transcripts' analyses revealed moderate levels of motivation and satisfaction regarding the training content and format. Nurses suggested to emphasize on the practice of HCTech in a noisy outpatient clinic as well as offer more practical exercises. **Conclusion:** A 4-day training in hypnotic communication techniques translated into the use of HCTech by nurses practicing in pediatric oncology when comparing the same dyads at baseline, post-training and follow-up. Results support further refinement and suggest nurses could be trained to prevent pain and distress with hypnosis-derived communication strategies.

Key words:

Hypnosis-derived communication, Healthcare professionals, Nurses, Pediatrics, Oncology, Venipunctures, Pain, Procedural distress

1. Introduction

Pediatric oncology patients undergo frequent painful needle procedures during the course of treatment, which are associated with important levels of pain and distress.[1] Unmanaged pain can result in several physiological and psychological negative long-term consequences in children.[2] Pediatric cancer survivors may develop long-term medical traumatic stress, partly caused by medical procedures.[3] It is therefore crucial to provide early pain and distress management in pediatric settings.

Latest developments in pediatric pain management have shown that different types of interventions are effective in decreasing children's pain and distress when undergoing various medical procedures: pharmacological interventions (e.g. local anesthetic such as EMLA cream®[4]) and non-pharmacological interventions (e.g. Buzzy®[5], distraction[6], hypnosis[1,7]). Among these, hypnotic communication involves the use of communication techniques derived from medical hypnosis. In healthcare, hypnotic communication techniques (HCTech) can be used as a single intervention or as an adjunct intervention with other physical and pharmacological pain management methods.[8] Several studies have shown that the use of hypnosis and hypnosis-derived communication, as a single or combined intervention, can be effective in decreasing pediatric cancer patients' procedural pain[9-19] and distress[9,12-17]. In these studies, healthcare professionals performed the medical procedure while another professional, a hypnotherapist, used hypnosis strategies with patients. For practical reasons and cost issues, it would be beneficial if nurses themselves used HCTech while performing medical procedures. Currently, hypnosis and HCTech applied by nurses are underutilized in the healthcare system, partially due to a lack of formalized professional training.[20] Notably, no study has yet systematically assessed the effects of HCTech training on actual practice.

This feasibility study aimed to assess a basic HCTech training for pediatric oncology

nurses. Specifically, this study aimed to assess (1) changes in nurses use of HCTech in clinical practice and (2) nurses' experience regarding the training program. It is essential to document how trainees' behaviours change following a training before studying possible translation to patient outcomes in order to link possible favorable changes with the effective use of HCTech.

2. Methods

The study was conducted at Sainte-Justine University Hospital Centre's (Sainte-Justine UHC) Hematology-Oncology daycare clinic (Montreal, Quebec, Canada). The study was approved by the Sainte-Justine UHC Research Ethics Committee and all participants, nurses and patients, provided written informed consent.

2.1. Inclusion and Exclusion Criteria

To be eligible, nurses had to work at the outpatient hematology-oncology daycare clinic, have previous experience performing venipunctures (VPs) in pediatrics and have no prior experience in hypnosis or hypnosis-derived communication. Patients had to be aged between 5 and 18 years old, have regular follow-ups at the clinic and understand French. Patients who had been previously exposed to hypnosis or hypnosis-derived communication were excluded, as were those who came at the clinic for an unexpected appointment (e.g. emergency) and those with a psychiatric disorder, as documented in medical charts.

2.2. Participants and Setting

Six nurses and 36 patients were solicited to participate in this study. During a meeting between the research team (JA and TM) and the Sainte-Justine UHC's oncology daycare clinic nursing staff, the study protocol was presented to all practicing nurses. Following this meeting, six nurses volunteered to develop their skills to reduce their patients' pain and distress using this program and were included in the study. Therefore, all nurses agreed to participate in this research

study. Using a convenience sampling method, each nurse was assigned 6 consecutive patients from the clinic's computer database by a research assistant with no prior selection. Once the first six patients meeting the criteria were identified, they were contacted by phone and given preliminary information on the study. Patients and their parent(s) subsequently met with a researcher (TM or JA) to receive additional information about the study and sign consent. Three patients and their parent(s) declined to participate. Following their inclusion, patients were received at the hematology-oncology daycare clinic by the nurses who performed VPs, which were video-recorded and assessed by the research team.

2.3. Hypnotic Communication Techniques Training

The training consisted in four sessions that were conducted at Sainte-Justine UHC's cancer care centre by a hypnosis-certified psychologist (MCC). The training and all communication techniques presented were adapted from a hypnotic suggestions reference guide[21] and a book on the practice of hypnosis in pediatrics[22]. Each session lasted approximately five hours and emphasized on theoretical components and practical exercises. Session 1 focused on the identification of pediatric pain and the use of hypnosis to manage procedural pain and distress, the basics of clinical hypnosis, the differences between Ericksonian and clinical hypnosis, and the use of hypnosis within the health field, including the ethical challenges of this practice with children. Session 2 focused on methods and techniques for pediatric pain management, highlighting the importance of the nurse-patient relationship, the language to use when accompanying patients during a hypnotic intervention, differences between distraction and clinical hypnosis-derived communication techniques. This session also included notions about the development of hypnotic state, pain-relief suggestions and post-hypnotic suggestions as well as concepts of basic pain/distress directed strategies. Nurses took part in practical exercises. In turns, they tried different techniques: deep breathing, conversational hypnosis, sensation changes suggestions (e.g. changes

in perception), the magic glove, etc.[21,22] Session 3 focused on practical exercises during which nurses role-played and received feedback from the trainer. Additional techniques were put into practice: the switch, pain transformation, the bubble, guided imagery (e.g. preferred place), etc.[21,22] Detailed definitions and examples of hypnotic techniques are available in a supplementary file. Session 4 focused on supervising the acquired techniques and improving their technical and relational skills. Nurses were supervised for two encounters and were given feedback. A final group session was organized to alleviate barriers and implementation difficulties (see [23] for additional details).

2.4. Assessments

Nurses' communication behaviours were assessed at four time-points with the same patient: two pre-training (T1 and T2 occurring in average respectively 148 and 119 days before the training) and two post-training (T3 and T4 occurring in average respectively 137 and 203 days after the training). The training occurred in September 2015 and data collection spanned from March 2015 to November 2016. Two pre-training assessments were included to control for natural evolution over time and measurement error. Although a number of three data points is usually recommended to determine the baseline[24], this was not organisable in practice and only two measures were taken.

2.5. Measures

Sainte-Justine Hypnotic Communication Assessment Scale (SJ-HCAS): This scale was used to assess communication behaviours in video-recorded nurse-patient encounters.[23] It is based on 11 core items of hypnosis-derived communication to prevent pain and distress in children. For each item, an independent rater evaluates whether the behaviour is present (1) or absent (0). Two count scores are computed, one on the quality of the relationship (subscore 0 to 5) and one on the quality of the communication technique (subscore 0 to 6). A total score is computed by adding all 11 items (range 0-11). For comparison purposes, each score was transformed to a percentage in the present

study. Previous analyses have demonstrated excellent inter-rater reliability for the total score and the two subscores (median ICC = 0.879), including when raters were blind of assessment time-points and when raters had different professional backgrounds.[23]

Interviews: At the end of the study, brief semi-structured interviews were conducted with each nurse to collect feedback on their: (1) initial reasons and levels of motivation to participate in the training (10-point Likert scale : 0 = not motivated - 10 = very motivated), (2) use of HCTech in daily practice, (3) perceived benefits of the training, (4) training satisfaction (10-point Likert scale : 0 = not satisfied - 10 = very satisfied), and training assessment (positive and negative components) and (5) recommendations on possible improvements for future training.

2.6. Statistical Analyses

To explore consistency within the two baseline time-points, paired sample t-tests and Pearson correlations for each score and subscore of the SJ-HCAS were used. Two-way random absolute stability ICCs were also computed and interpreted as 0-.40 = poor, .40-.59 = fair, .60-.74 = good, .75 to 1.0 = excellent.[25] As this supported minimal change and strong consistency, both pre-training time-points were averaged into a unique baseline value. To evaluate changes associated with the training, Wilcoxon signed-rank non-parametric tests were used. Difference effect sizes were also computed for pre-post and pre-follow-up comparisons (Cohen's *d*). A thematic analysis was performed on the qualitative data from satisfaction interviews.[26] All quantitative analyses were conducted using *IBM SPSS Statistics 24* and, where appropriate, a significance alpha threshold of 0.05 was used.

3. Results

3.1. Participants

Six female pediatric oncology nurses (aged 27-44), and 33 of their cancer patients (16 boys,

144 17 girls) aged 10 ± 4 years took part in this study. During the course of the feasibility study, 1 nurse
145 (Nurse E) went on maternity leave and was unable to complete the training as well as both post-
146 training time-points. Two patients passed away and 5 patients dropped out. For ethical reasons, we
147 offered Nurse E's 4 patients the hypnotic intervention as initially intended, but with the other nurses
148 being involved with them. However, as the research design is based on the follow-up of the same
149 nurse-patient dyads over time, these 4 patients were excluded from analysis. Across the four time-
150 points, 117 nurse-patient interactions were video-recorded and available for hypnotic
151 communication assessments. However, when accounting for dropouts and exclusions for analyses
152 purposes, pre-training use of HCTech was compared with post-training (5 nurses and 24 of their
153 patients) and follow-up (5 nurses and 22 of their patients) in 109 interactions (Flow chart on Figure
154 1).

155 ***3.2. Evolution of the use of HCTech across time-points***

156 *3.2.1. Baseline Levels*

157 Baseline measures were stable in regards to the total score as well as the relationship and
158 technique subscores (ICCs = 0.630-0.766, d = -0.141-0.167). Consequently, we averaged these
159 time-points into a baseline score for each quantitative measure.

160 *3.2.2. Nurses' mastery of hypnotic communication techniques*

161 In regards to the entire nurse sample, an increased use HCTech was found in post training (Z
162 = -3.138, p = 0.002, d = 0.74). This was reflected in an increased use of relationships strategies (Z
163 = -2.942, p= 0.003, d = 0.70) and techniques (Z = -2.710, p = 0.007, d = 0.61). For all measures,
164 the post-training levels maintained at follow-up. Pre-follow-up effect sizes were medium-large for
165 the SJ-HCAS total score (Z = -3.614, p<0.001, d = 0.97) and for both the relationship (Z = -3.235,
166 p=0.001, d = 0.92) and technique subscores (Z = -2.976, p=0.003, d = 0.80). (Table 1). A stability
167 between post and follow-up data points was observed for the entire nurse sample (total score: Z =

-0.309, p = 0.757, *d* = -0.06; relationship subscore: Z = -0.707, p = 0.480, *d* = -0.15; technique subscore: Z = -0.159, p = 0.873, *d* = 0.00).

However, it is probable that differential evolution across nurses were aggregated in this overall pattern. We used graphical displays illustrating pre-post-follow-up changes in hypnotic communication techniques across nurses to explore this further (Figure 2). The overall pattern visually emerging from these figures is that following the training, nurses mastered relational and technical hypnotic communication skills and that these competencies were maintained over time. However, nurses C and D experienced a larger increase in their hypnotic communication behaviours. To explore this phenomenon, *d* values were computed at the nurses level and represented graphically (Figure 3). The results were consistent with Figure 2 and suggested larger changes for nurses C and D while medium-small changes for nurses A, B and F. A supplementary table providing all Wilcoxon signed-rank non-parametric tests results and p values is available (Table S1).

3.3. Nurses' Experience

When describing quantitative scores of nurses' motivation and satisfaction, the nurses who participated in the training reported being moderately motivated to take part in the training (7.4/10 ± 2.07) and expressed two motivational aspects: to better help patients and a curiosity about the hypnotic technique (Table S2). Importantly, nurses were only moderately satisfied with the training (6/10 ± 1.41).

When exploring nurses' experience qualitatively, only 3/5 nurses reported observing changes in their practice after the training. Regarding the perceived benefits of using HCTech with patients, 4 nurses (A, C, D and F) reported less anxiety in children during the painful needle procedure. Two nurses (A and C) reported using more "distraction techniques" when performing

VPs. Nurse F expressed that the training showed her different ways to interact with patients. Nurse D specified that these benefits depended on the techniques used. In contrast to her colleagues, nurse B mentioned that HCTech finally did not interest her also stating that some patients are simply not sensitive to HCTech.

Personal benefits of using HCTech were only reported by one nurse (F) who experienced a decrease in stress when performing VPs as a result of the training. Overall, a mixed picture emerged, with all nurses reporting moderate levels of motivation and satisfaction with a significant subset experiencing changes in their practice.

Nurses' qualitative training assessment also highlighted positive and negative components (Table S2). Positive components can be summarized as: learning different types of techniques, practicing among participants (role-play) and using of concrete situations. Negative components were that some parts of the training seemed insufficiently articulated with practice or not representative of situations encountered in the hematology-oncology daycare clinic. For example, nurse B claimed that the daycare clinic's noisy environment was not conducive to this type of intervention (see Table S2 for a detailed account of verbal responses). Nurses proposed two main avenues to further refine this training. Firstly, the training should emphasize on more concrete situations that are encountered in a day-to-day clinical practice. They considered that it would be useful to produce video recordings more representative of outpatient clinics for modeling, rehearsing and practicing intensively the techniques as part of the training itself. These recordings would illustrate precisely how nurses use HCTech while performing medical procedures. Secondly, one nurse proposed to better target professionals sensitive to non-pharmacological interventions.

4. Discussion

This study aimed to test the feasibility of a training in hypnotic communication for pediatric

nurses, designed to prevent pain and distress in children undergoing painful procedures. The study aimed to assess changes in the use of hypnotic communication techniques as well as nurses' experience regarding the training program. The results showed for the first time that it is feasible to train pediatric nurses in hypnotic communication for procedural pain and distress management and that the training is acceptable and mostly positively assessed by nurses.

Results showed that after a brief training in hypnotic communication of approximately twenty hours, pediatric nurses had a good mastery of HCTech and that newly acquired skills were globally maintained over time.

Nurses' general mastery of HCTech can be understood at different levels, as these skills may be both relational and technical. In regards to relational skills, the study showed an overall increased use of relation strategies by nurses following the training. Considering that the establishment of a good therapeutic relationship with the patient is a prerequisite for the use of hypnosis-derived techniques in pediatrics[27], the training seemed to allow nurses to become sensitive to the importance of relational dimensions. It is also possible that nurses' previous professional experience caring for sick children facilitated the integration of these hypnotic relational skills in their daily practice. Concerning technical skills, the study equally showed an increased use of technical hypnotic components following the training as demonstrated by the objective assessments of communication behaviours. As the adaptation of the hypnotic technique to the child is the second prerequisite for the use of hypnosis in pediatrics[27], the training probably allowed nurses to integrate the acquired skills in practice and adapt the techniques to different children and contexts. As the training focused on simple HCTech, this allowed nurses to master many different techniques. These results are unique in pediatrics, and are in line with studies exploring prevention or alleviation of pain in adult patients that have used nurse-led hypnosis for burn-related pain[28] and gastrointestinal disorders[29,30].

When exploring differences between nurses, the study showed that two nurses (40%) demonstrated higher competencies in HCTech. Surprisingly, these differences were not associated with nurses' initial motivation to take part in the training. When looking at these nurses' scores, it would seem that the training has benefited them in different ways. Indeed, it seems as though the training allowed nurse C to learn multiple new skills. It is possible that she was searching for communication techniques prior to the study. On the other hand, it seems that the training allowed nurse D to confirm the methods she was already intuitively using in her practice.

Importantly, despite the absence of complementary supervisions following the training sessions, or further "booster" sessions, all newly acquired hypnotic communication skills (relational and technical) were maintained over time at follow-up. Indeed, no statistically significant difference was detected between post-training time-points and effect sizes were small. Although this was not measured here, this may be due to a continuous practice of the techniques learned. Continuous practice is an essential element of retention when acquiring new skills in nursing education.[31] This observation relates to what is observed in medical pedagogy, as noted by Taylor Sawyer et al.[32] It is possible that additional sessions may help participants improve competencies after the core training. Future studies should focus on the effects of complementary sessions or supervisions on learning and maintaining of hypnotic communication skills.

As for pertinence and acceptability, the feedback collected with nurses on this training showed a mixed pattern. Although nurses positively assessed multiple components of the training, such as role-play and the variety of techniques, participants highlighted limitations to the training. Consequently, nurses offered suggestions for improvement of the training content and format, including a more realistic setting. Such feedback is increasingly recognized as critical in the define-refine phase of a new non-pharmacological intervention.[33] Integrating these improvements in future trainings and trials may further positively influence nurses' mastery of HCTech.

We should recognize the limitations of this feasibility study. Firstly, the nurse sample was limited in size due to the feasibility nature of the current study. It is probable that a larger sample size would have allowed a greater variability in nurses' mastery of HCTech and offer more power for inferential statistics. To deal with this issue we focused on effect sizes, following guidelines on the development of non-pharmacological interventions.[33] Yet, we adopted a strict design with the same dyads being followed over time and the assessment of a high number (100+) of nurse-patient interactions. Secondly, although we included two baseline time-points, this was too limited to ascertain stability in the absence of training. Although this is improbable, changes over time in communication behaviours may be due to other unmeasured factors. Similarly, we did not compare changes with a control condition. Finally, sources of variance due to the different levels of data in assessed interactions, i.e. nurses and patients, could not be explored with a formal multilevel statistical design. Future studies should address these limitations including a control condition in a larger sample allowing systematic multilevel analyses.

5. Conclusion

This study is the first to evaluate the training of pediatric nurses to hypnotic communication techniques designed to manage pain and distress during medical procedures. Despite limitations, changes occurred in nurses' communication behaviours in post-training with a clear improvement in relational and technical skills, with changes being maintained over time. Participants offered new ideas to improve the training. The present study is particularly original as it explicitly evaluated change in nurses' practice. This opens a new field of research as future patient-level outcomes could be attributed to actual changes in nurses' behaviours. The use of hypnotic communication in hospital settings has the potential to benefit young patients' quality of life. Future studies should systematically explore behavioural changes as a result of training, and

hopefully demonstrate how this translates into patient-level outcomes such as procedural pain or distress.

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Declaration of interests

The authors declare no conflict of interests.

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Figure 1. Flow of participants throughout the study

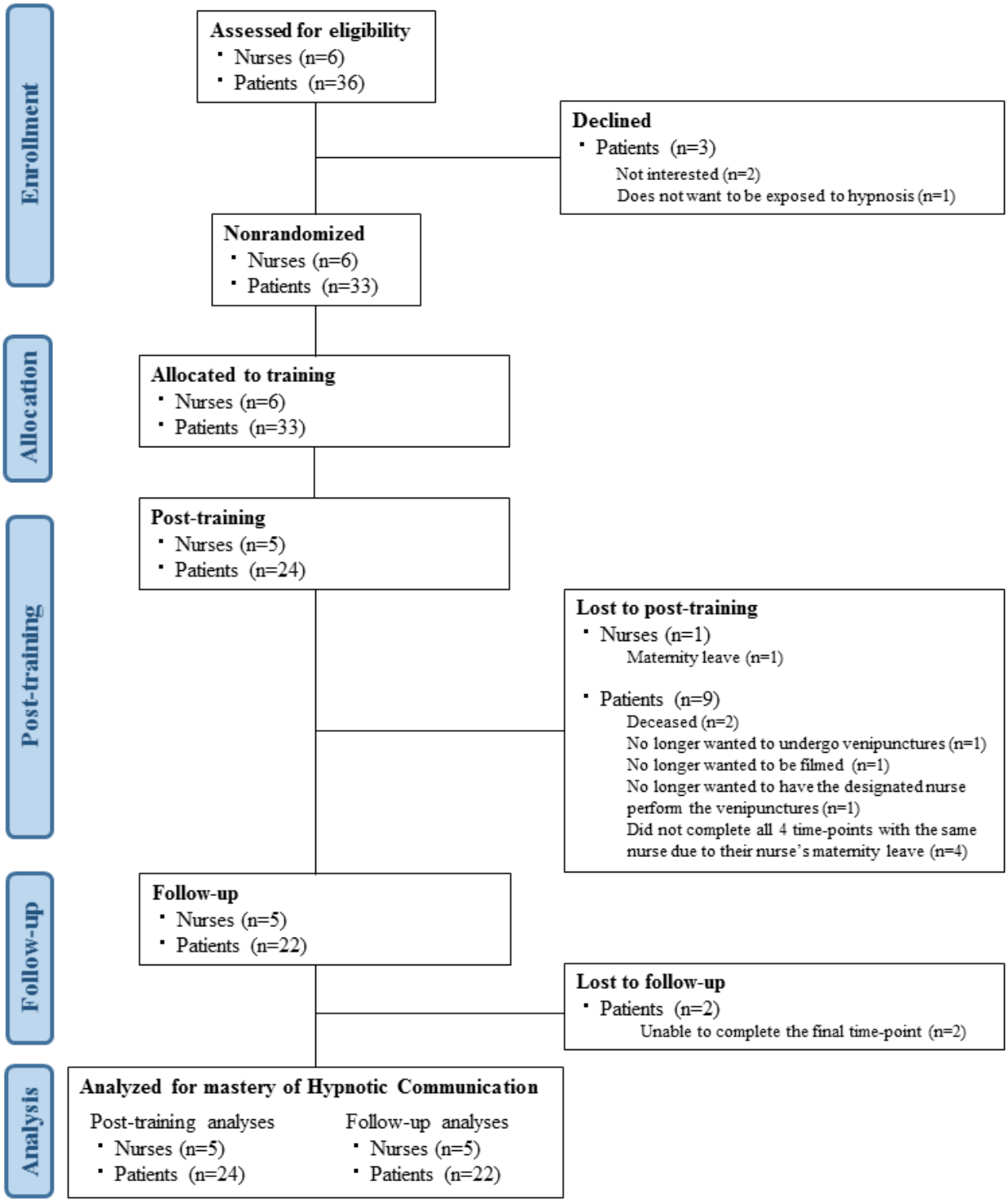


Table 1. Use of Hypnotic Communication Techniques by nurses performing venipunctures in a Hematology-Oncology daycare clinic, before and after training.

	Baseline[a]		Post-training[a]		Follow-up[a]	
	Nb of patients	**M(%) (SD)(%)**	**Nb of patients**	**M(%) (SD)(%)**	**Nb of patients**	**M(%) (SD)(%)**
All nurses[b]	N = 22		N = 22		N = 22	
Total score		45.87 (12.38)		59.92 (14.21)**		59.09 (13.67)***
Relationship subscore		65.00 (15.96)		77.27 (9.35)**		75.45 (10.57)**
Technique subscore		29.93 (12.51)		45.46 (23.11)**		45.46 (20.04)**
Nurse A	n = 5		n = 5		n = 5	
Total score		35.45 (7.47)		49.09 (13.79)		45.45 (14.37)
Relationship subscore		52.00 (14.83)		68.00 (17.89)		64.00 (16.73)
Technique subscore		21.67 (7.45)		33.33 (16.67)		30.00 (13.94)
Nurse B	n = 5		n = 5		n = 5	
Total score		50.00 (9.64)		54.55 (0.00)		56.36 (4.07)
Relationship subscore		72.00 (10.95)		80.00 (0.00)		80.00 (0.00)
Technique subscore		31.67 (13.69)		33.33 (0.00)		36.67 (7.45)
Nurse C	n = 3		n = 3		n = 3	
Total score		31.82 (9.09)		72.73 (18.18)		63.64 (15.75)
Relationship subscore		46.67 (11.55)		80.00 (0.00)		73.33 (11.55)
Technique subscore		19.45 (9.62)		66.67 (33.33)		55.56 (25.46)
Nurse D	n = 4		n = 4		n = 4	
Total score		55.68 (13.06)		72.73 (7.42)		75.00 (8.70)
Relationship subscore		70.00 (14.14)		80.00 (0.00)		80.00 (0.00)
Technique subscore		43.75 (12.50)		66.67 (13.61)		70.83 (15.96)
Nurse F	n = 5		n = 5		n = 5	
Total score		52.73 (5.18)		58.18 (13.79)		60.00 (8.13)
Relationship subscore		78.00 (4.47)		80.00 (0.00)		80.00 (0.00)
Technique subscore		31.67 (6.97)		40.00 (25.28)		43.33 (14.91)

[a.] Total score, Relationship and Technique subscores in percentage at Baseline, Post-training and Follow-up for nurses with patients who completed all time-points.

[b.] Nurse E was not included in this table as she did not complete the training due to her maternity leave.

**p<0.01 and ***p<0.001 for non-parametric comparisons using the Wilcoxon signed-rank test for Baseline-Post-training and Baseline-Follow-up comparisons. Detailed statistical comparisons for all nurses are available in supplementary material (Table S3).

Figure 2. Evolution of the use of hypnotic communication techniques over time and across nurses.

Fig. 2A. Total Score

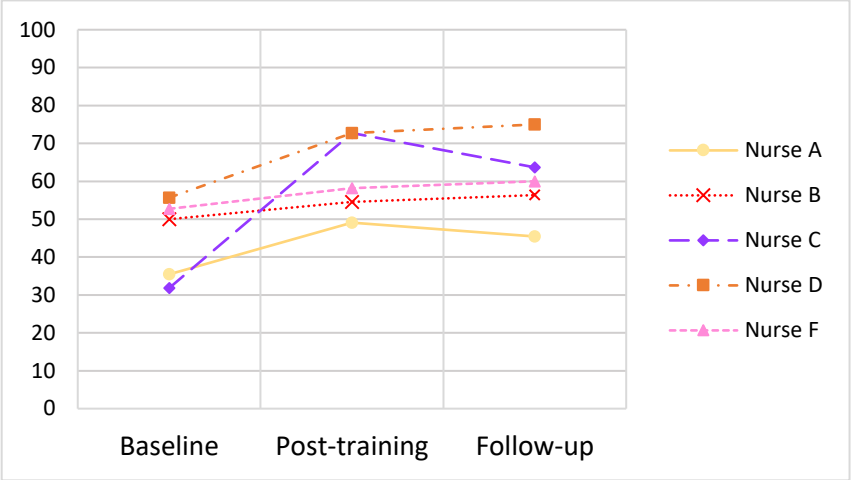


Fig. 2B. Relationship subscore

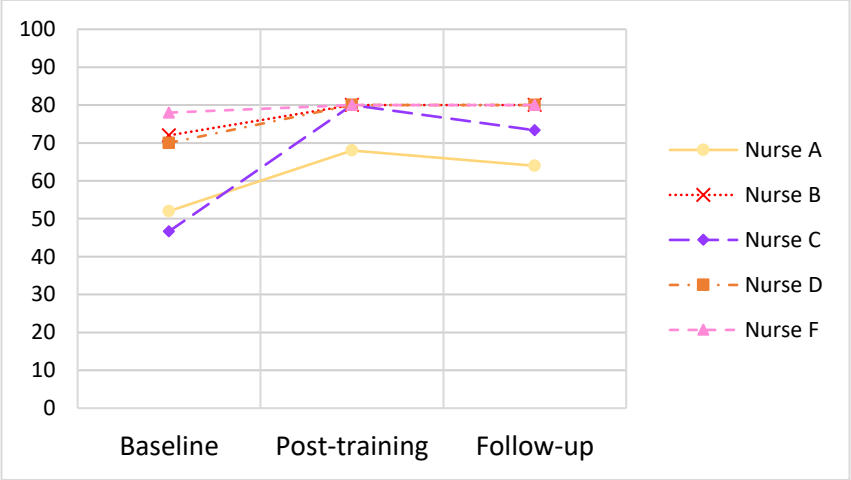


Fig. 2C. Technique subscore

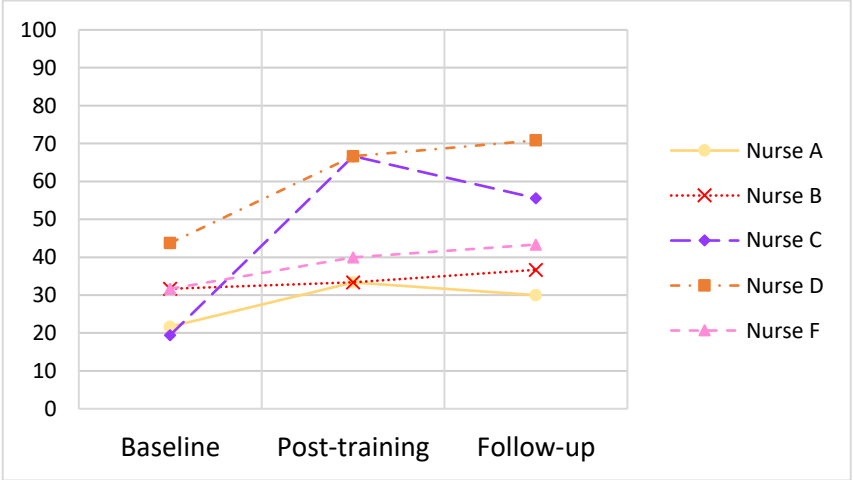
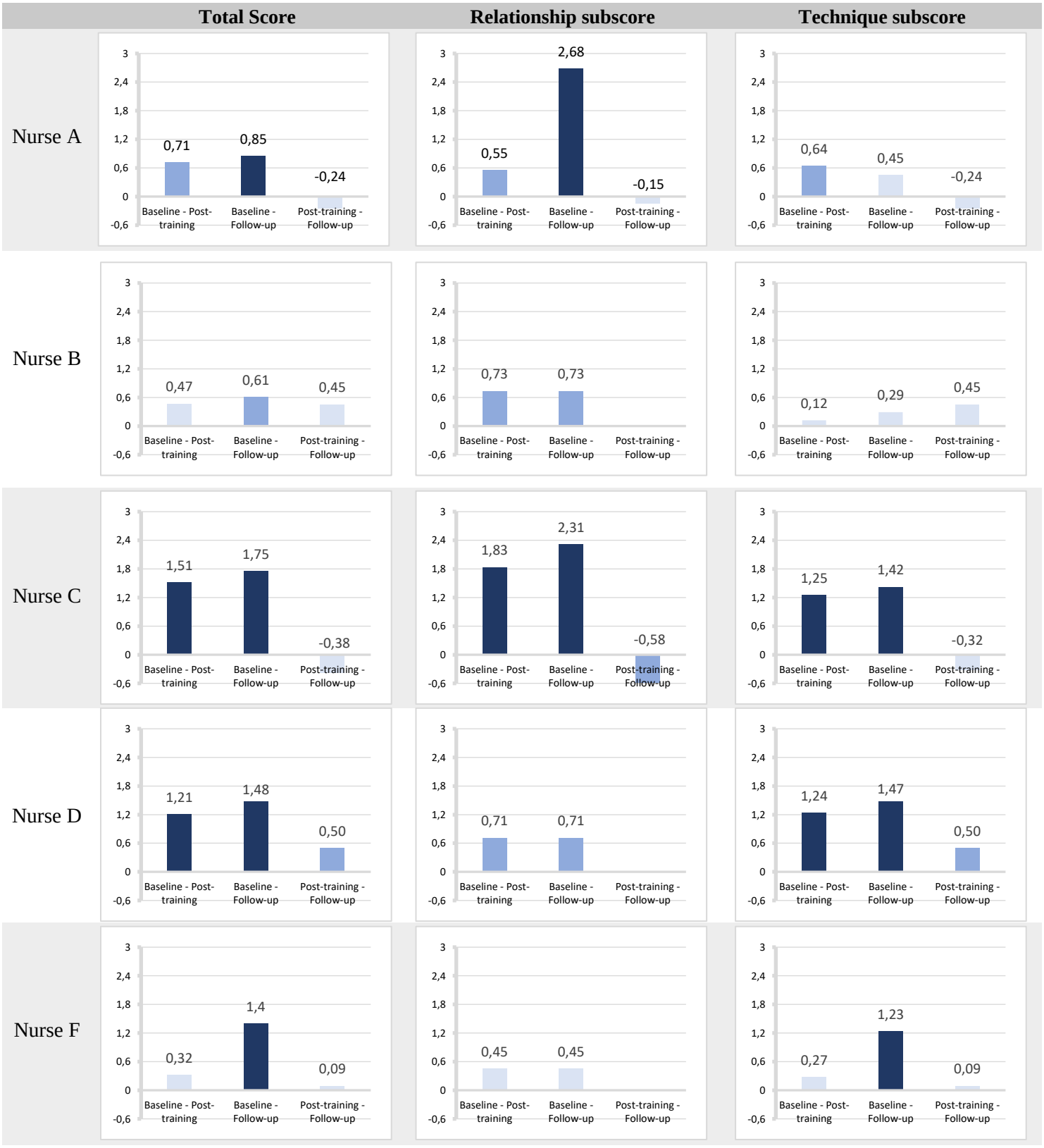


Figure 3. Cohen's *d* effect size for baseline - post-training, baseline - follow-up, and post-training - follow-up comparisons for hypnotic communication techniques scores across nurses



Effect sizes (*d*) interpretation: small (0.20 - 0.50), medium (0.50 - 0.80), and large (0.80 or higher)

Supplementary Table S1. Wilcoxon signed-rank non-parametric tests results and p values for the use of Hypnotic Communication Techniques by nurses performing venipunctures in a Hematology-Oncology clinic

	Baseline - Post-training	Baseline - Follow-up	Post-training - Follow-up
Nurses[a]			
Total score	Z = -3.138[b], p = 0.002	Z = -3.614[b], p = 0.000	Z = -0.309[c], p= 0.757
Relationship subscore	Z = -2.942[b], p = 0.003	Z = -3.235[b], p = 0.001	Z = -0.707[c], p = 0.480
Technique subscore	Z = -2.710[b], p = 0.007	Z = -2.976[b], p = 0.003	Z = -0.159[b], p = 0.873
Nurse A			
Total score	Z = -1.225[b], p = 0.221	Z = -1.625[b], p = 0.104	Z = -0.577[c], p = 0.564
Relationship subscore	Z = -1.219[b], p = 0.223	Z = -2.121[b], p = 0.034	Z = -0.378[c], p = 0.705
Technique subscore	Z = -1.342[b], p = 0.180	Z = -0.921[b], p = 0.357	Z = -0.577[c], p = 0.564
Nurse B			
Total score	Z = -0.962[b], p = 0.336	Z = -1.219[b], p = 0.223	Z = -1.000[b], p = 0.317
Relationship subscore	Z = -1.414[b], p = 0.157	Z = -1.414[b], p = 0.157	Z = 0.000[d], p = 1.000
Technique subscore	Z = -0.276[b], p = 0.783	Z = -0.680[b], p = 0.496	Z = -1.000[b], p = 0.317
Nurse C			
Total score	Z = -1.826[b], p = 0.068	Z = -1.604[b], p = 0.109	Z = -0.447[c], p = 0.655
Relationship subscore	Z = -1.841[b], p = 0.066	Z = -1.633[b], p = 0.102	Z = -1.000[c], p = 0.317
Technique subscore	Z = -1.826[b], p = 0.068	Z = -1.604[b], p = 0.109	Z = -0.477[c], p = 0.655
Nurse D			
Total score	Z = -1.826[b], p = 0.068	Z = -1.841[b], p = 0.066	Z = -1.000[b], p = 0.317
Relationship subscore	Z = -1.342[b], p = 0.180	Z = -1.342[b], p = 0.180	Z = 0.000[d], p = 1.000
Technique subscore	Z = -1.604[b], p = 0.109	Z = -1.633[b], p = 0.102	Z = -1.000[b], p = 0.317
Nurse F			
Total score	Z= -0.535[b], p = 0.593	Z= -1.841[b], p = 0.066	Z= -0.272[b], p = 0.785
Relationship subscore	Z = -1.000[b], p = 0.317	Z = -1.000[b], p = 0.317	Z = 0.000[d], p = 1.000
Technique subscore	Z = -0.535[b], p = 0.593	Z = -1.841[b], p = 0.066	Z = -0.272[b], p = 0.785

[a.] Includes nurses who took part in the training. [b.] Based on negative ranks; [c.] Based on positive ranks; [d.] The sum of the negative ranks is equal to the sum of the positive ranks.

Supplementary Table S2. Qualitative reporting of nurses' training assessment from semi-directive interviews

	Motivation to participate		Use of techniques in daily practice	Changes in practice	Patients' and/or families' benefits	Personal benefits	Training satisfaction (10-point Likert scale)	Training		Recommended changes
	Reasons	10-point Likert scale						Positive aspects	Negative aspects	
Nurse A	· Improve what she was doing with patients	7	· Yes	· Yes, use of «distraction». · Thinks about what to say.	· Yes, more pleasant and easier.	· No	5	· Think about a different approaches	· Very theoretical · Not clear how to apply in daily practice	· The training should be more concrete (e.g. a nurse with several people in a room).
Nurse B	· Help patients	5	· Yes	· Not really	· No, not the right environment (i.e. to noisy)	· No	5	· Good techniques	· Videos not representative of their reality · Targeting more sensitive people (nurses)	· The training should target the nurses.
Nurse C	· Curiosity to learn · Believes in hypnotic communication	10	· Yes	· Yes, realised she was already doing it. More «distraction»	· Yes, decreases anxiety.	· No	8	· Practice (in training and in the clinic)	· A lot of last minute changes · Videos were not related	· The training should include more targeted videos in a clinic illustrating the technique (e.g. the healthcare professional must use the techniques). · The training should focus more on hypnotic communication.
Nurse D	· Clinic needs · Learn how to improve pain management	6	·Sometimes	· No	· Yes, some techniques.	· No	5	· Tools and ideas	· Less feasible things (e.g. noisy environment)	· The training should better understand the clinical reality. · The training should be adapted to nurses' needs.
Nurse F	· Curiosity · Learn ways to help reduce pain	9	· Yes	· Yes, at times. Other ways to interact and change patients' focus.	· Yes, decreases anxiety.	· Yes, decreases stress.	7	· Role play and examples (provided documents)	· Videos not representative · Practice techniques with other medical procedures to considering a lot of concentration is needed for VPs	· The training should include videos that represent the clinical reality.

Supplementary Table S3. Full available data including drop-outs on the use of Hypnotic Communication Techniques by nurses performing venipunctures in a Hematology-Oncology clinic, before and after training.

	Baseline			Post-training			Follow-up		
	Nb of patients	**M(%)**	**(SD)(%)**	**Nb of patients[c]**	**M(%)**	**(SD)(%)**	**Nb of patients[d]**	**M(%)**	**(SD)(%)**
All nurses[a]	N = 33			N = 24			N = 22		
Total score		47.80	(11.87)		60.23	(13.88)		59.09	(13.67)
Relationship subscore		66.36	(16.74)		77.50	(8.97)		75.45	(10.57)
Technique subscore		32.32	(11.74)		45.83	(22.66)		45.46	(20.04)
Nurse A	n = 6			n = 6			n = 5		
Total score		38.64	(10.27)		50.00	(12.53)		45.45	(14.37)
Relationship subscore		56.67	(17.51)		70.00	(16.73)		64.00	(16.73)
Technique subscore		23.61	(8.19)		33.33	(14.91)		30.00	(13.94)
Nurse B	n = 5			n = 5			n = 5		
Total score		50.00	(9.64)		54.55	(0.00)		56.36	(4.07)
Relationship subscore		72.00	(10.95)		80.00	(0.00)		80.00	(0.00)
Technique subscore		31.67	(13.69)		33.33	(0.00)		36.67	(7.45)
Nurse C	n = 6			n = 4			n = 3		
Total score		35.61	(9.28)		72.73	(14.85)		63.64	(15.75)
Relationship subscore		48.33	(13.29)		80.00	(0.00)		73.33	(11.55)
Technique subscore		25.00	(9.13)		66.67	(27.22)		55.56	(25.46)
Nurse D	n = 5			n = 4			n = 4		
Total score		53.64	(12.20)		72.73	(7.42)		75.00	(8.70)
Relationship subscore		66.00	(15.17)		80.00	(0.00)		80.00	(0.00)
Technique subscore		43.44	(10.87)		66.67	(13.61)		70.83	(15.96)
Nurse E[b]	n = 5								
Total score		57.27	(4.07)						
Relationship subscore		80.00	(12.25)						
Technique subscore		38.33	(9.50)						
Nurse F	n = 6			n = 5			n = 5		
Total score		54.55	(6.43)		58.18	(13.79)		60.00	(8.13)
Relationship subscore		78.33	(4.08)		80.00	(0.00)		80.00	(0.00)
Technique subscore		34.72	(9.74)		40.00	(25.28)		43.44	(14.91)

[a.] Includes all nurses (Baseline – 6 nurses; Post-training – 5 nurses; Follow-up – 5 nurses). [b.] Nurse E did not take part in the training due to her maternity leave (no available data for post-training and follow-up). Since her patients did not complete all 4 time-points with the same nurse, they were excluded from all analysis [c.] Patients lost in post-training (n=5): deceased (n=2); no longer wanted to undergo venipunctures (n=1); no longer wanted to be filmed (n=1); no longer wanted to have the designated nurse perform the venipunctures (n=1). [d.] Patients lost in follow-up (n=2): unable to complete the final time-point (n=2).

Hypnotic communication techniques

This supplementary file is taken from: Aramideh, J., Mizrahi, T., Charest, M.-C., Plante, C., Duval, M., & Sultan, S. (2018). 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. *Complementary Therapies in Medicine, 37*, 178-184. https://doi.org/10.1016/j.ctim.2017.11.013

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	"***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) "***Topical anesthesia***": "Just imagine painting numbing medicine onto that part of your body. Tell me when you're finished doing that." (Kohen & Olness, 2011) "***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)
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)

Deep breathing: bubble, party blowers…	Example: Bubble • "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)
Conversational Hypnosis or Covert Hypnosis	"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) Examples from *Hypnosis and pain in children* (Wood & Bioy, 2008) • **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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