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Pain Management Strategies for Children with Blood Diseases and Cancer During Venipuncture and IV Line Insertion: A Descriptive-Analytical Study on Nurses

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Abstract

Background: Children with blood diseases are frequently subjected to invasive treatments such as venipuncture and IV line insertion (V-IVLI). Pain from V-IVLI harms children. Nurses' efforts to relieve patients' pain is an important responsibility. Most studies have examined the effectiveness of various methods of pain relief during V-IVLI. However, it is also important to study how nurses deal in the situation. This study aimed to determine nurses' strategies for relieving pain in children with blood diseases and cancer while V-IVLI.

Methods: This study was conducted in a pediatric hospital in northeastern Iran in 2025. The study instrument was a semi-structured questionnaire that collected demographic information, data on nurses' V-IVLI skills, and nurses' relaxation strategies. Nurses from outpatient chemotherapy, and hematology departments were surveyed using a census method. Data were analyzed in SPSS 24.

Results: A total of 40 subjects (55% female) with a mean age of 30.80 years were studied. 80% of the nurses stated that they did not succeed in V-IVLI on the first attempt. Only 37.5% of the nurses believed that they had been adequately prepared for V-IVLI through the training system. Nurses described V-IVLI skills as poor in 20.5% of cases. Greeting with the child, using distraction techniques, verbally obtaining the child's consent, and changing the child's position were the most frequently used strategies.

Conclusions: This study showed that nurses use pain relief strategies well in children during V-IVLI; however, training was not sufficient to perform a successful V-IVLI and this skill needs to be strengthened.

Key Words: Intravenous injection, Onco-hematology, Pain.

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1- INTRODUCTION

Although cancer is a rare disease in children, it is the second most common cause of death in patients older than 1 year (1). Survival rates for cancer patients have increased in recent decades due to the use of more intensive chemotherapy and radiotherapy regimens, stem cell/bone marrow transplantation, and the introduction of new therapies (2).

However, these successes have also brought with them side effects of the treatments, which often require more intensive supportive care such as blood component infusions, apheresis, and long-term parenteral nutrition (2).

Frequent and painful venipuncture and routine blood sampling in children with onco-hematological diseases is associated with needle phobia, decreased pain tolerance, coagulation disorders, and the risk of progressive peripheral vein depletion (2).

Children with cancer undergo numerous painful procedures and constantly experience chronic pain from treatment (3). Recurrent pain can cause behavioral changes or disturbances such as loss of appetite, sleep problems, and aggression (4).

More than 90% of hospitalized children experience painful invasive procedures such as venipuncture (5). Fear of pain and injury is one of the most important problems of hospitalized children, and fear of painful procedures is greater in children than in adults (6).

Pain from injections is common in children of all ages (6). In one study, about 50% of hospitalized children considered the pain from needles and injections to be worse than other procedures (7).

Studies have shown that pain during venipuncture without intervention can be severe. If there are no interventions to reduce pain, the VAS pain score in children reaches 7 (severe pain) and the CHEOPS pain score reaches 9 (severe pain) (8, 9).

Pain from venipuncture can be a challenge for nurses to manage because they have to hold and immobilize the child. This can make the experience unpleasant for the child and negatively affect their response to subsequent procedures (10).

Pain relief is an important responsibility of nurses. The World Health Organization has recognized pain relief as a basic human right. Poor or no pain management in children can have various long-term negative consequences (11).

Nurses performing venipuncture or intravenous cannulation should use comforting strategies to reduce pain and discomfort associated with these procedures in children (12). Maintaining a friendly environment during painful procedures is essential (13).

Although there is increasing knowledge about non-pharmacological interventions to increase children's comfort during painful procedures (13), there is little information about their implementation in healthcare settings, especially in Iran.

The aim of the present study was to investigate nurses' strategies for pain relief during venipuncture in children with hematological and cancer diseases, in order to obtain information about nurses' common practices for managing children's pain during venipuncture.

2- MATERIALS AND METHODS

2-1. Study Design and Participants

This descriptive-analytical study was conducted cross-sectionally at a pediatric hospital in northeastern Iran in 2025. Sampling was done among nurses in hematology words 1 and 2, as well as in the chemotherapy word. Hematology ward number one is for patients with cancer who are undergoing chemotherapy, While

hematology ward number two serves as a hematology emergency room. Outpatient chemotherapy services are provided in the chemotherapy ward. Since only nurses from these three wards were included in the study, and their total number was approximately 60, an attempt was made to to prevent a reduction in the sample size, by including more nurses using the census sampling method. The inclusion criterion for the study was having at least one year of work experience in the pediatric ward.

2-2. Data Collection

The data collection tool was a semi-structured questionnaire, with items designed base on a similar study conducted by Katende and Mugabi in Uganda (11). These authors conducted a pilot study involving 10 healthcare providers (5 doctors and 5 nurses) from a nearby hospital to refine the questionnaire. Feedback from the pilot study was used to finalize the questionnaire, with adjustments made to improve clarity and relevance. Additionally, the questionnaire was reviewed by two pediatric IV line insertion experts, whose input was incorporated into the final version, supporting content validity. The questionnaire consisted of three sections and 16 questions. The first section, with 6 questions, was specific to demographic information. The second section had 3 questions about venipuncture and IV line insertion (V-IVLI) skills and training received, with participants choosing their answers from different options. Finally, 7 questions were asked to the nurses about relaxation and pain management strategies during V-IVLI. The answers to these questions were either yes or no, so if the nurses used a relaxation strategy, they would choose ‘yes’. The questionnaires were distributed to the other nurses by one of the trained chemotherapy nurses and were collected from them after completion.

2-3. Data Analysis

The collected data was entered into SPSS version 24 and analyzed using descriptive and analytical statistics at a significance level of 0.05. Frequency and percentage were used to describe qualitative data, while mean (standard deviation) was used to describe quantitative data. T-tests were used to examine the relationship between quantitative variables and two-state qualitative variables. One-way analysis of variance was also utilized to examine the relationship between quantitative variables and multi-state qualitative variables. The Chi-square test was used to examine the relationship between two-state qualitative variables.

3- RESULTS

3-1. Demographics

A total of 40 subjects were studied, 18 of whom were male (45%). Half of the subjects were single. In terms of employment status, 26 of the nurses (65%) were official, 2 (5%) were contract, 6 (15%) were corporate, and 6 (15%) were mandatory. The distribution of participants in the study across the chemotherapy, hematology 1, and hematology 2 departments was 23.7%, 34.2%, and 42.1%, respectively. The results of the quantitative variables are presented in Table 1. The mean (standard deviation) age of the participants in the study was 30.80 (2.614) years. Additionally, the nurses had an average of 4.53 years of work experience.

3-2. Skill Assessment

The results of nurses' opinions on V-IVLI skills are shown in Figures 1 to 3. According to Figure 1, 80% of nurses fail to V-IVLI on the first attempt. Also, Figure 2 shows that only 37.5% of nurses believed that they had been adequately prepared for V-IVLI through the educational system. According to Figure 3,

it can be seen that only 20.5% of nurses consider their V-IVLI skills to be poor, and the rest describe the skills as good to excellent.

Table 2 shows the frequency percentage of nurses' responses to questions about the use of pain relief strategies during V-IVLI. Accordingly, greeting the child and using distraction techniques were the strategies most frequently used by nurses, respectively.

3-3. Statistical Relationships

The results of examining the relationship between gender and preparation for V-IVLI through the educational system showed that 22.2% of men and 50% of women believed they were well prepared for V-IVLI through the educational system. The chi-square test did not show a significant relationship between gender and preparation for V-IVLI through the educational system (p-value: 0.069). The analysis of the relationship between gender and the number of V-IVLIs until success showed that 50% of male nurses were successful in these procedures on the third attempt or even later and 33.3% on the second attempt. Mean while 45.5% of female nurses were successful in V-IVLI on the second attempt, and 31.8% on the third attempt or later. However, the Cramer test did not show a significant relationship between sex and the number of V-IVLIs until success (p-value: 0.506). When examining the relationship between gender and personal scores on venipuncture skills, it was found that 23.5% of men and 18.2% of women assigned a poor score to this skill. Excellent, very good, and good scores for men on venipuncture skills were seen in 5.9%, 11.8%, and 58.8% of individuals, respectively. While in women, 13.6% gave an excellent score, 36.4% selected a very good score, and 31.8% specified a good score. According to the lambda test (p-value: 0.585), the relationship between gender and V-IVLI skills score was not significant.

According to the independent sample t-test, the relationship between age and work experience with being prepared for V-IVLI by the educational system was significant (P-value: 0.004 for the relationship between age and preparation and P-value: 0.017 for the relationship between work experience and preparation).

Table-1. Descriptive statistics of age and work experience of nurses participating in the study.

	Min	Max	Mean	Std
Age	25	36	30.80	2.614
Work experience years	1	10	4.53	2.112

Table-2. Frequency Percentage of use of relaxation and pain relief strategies by nurses.

Item	Yes %	No %
I greet the child.	100	0
I explain the procedure to the child and allow him/her to ask questions.	87.5	12.5
I verbally obtain the consent of the children or their parent.	90	10
I use techniques to distract the child during V-IVLI.	92.5	7.5
I change the child's position appropriately if needed.	90	10
I allow the child to be in a position that is most comfortable.	82.5	17.5
I provide the child with opportunities to play during the venipuncture, such as giving the child a doll.	35	65

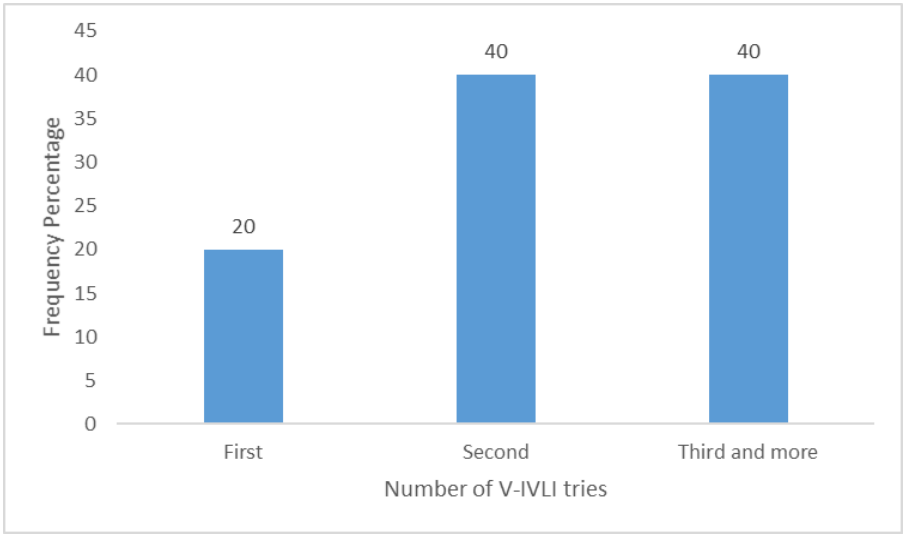

Figure-1: Frequency Percentage of V-IVLI attempts until successful completion.

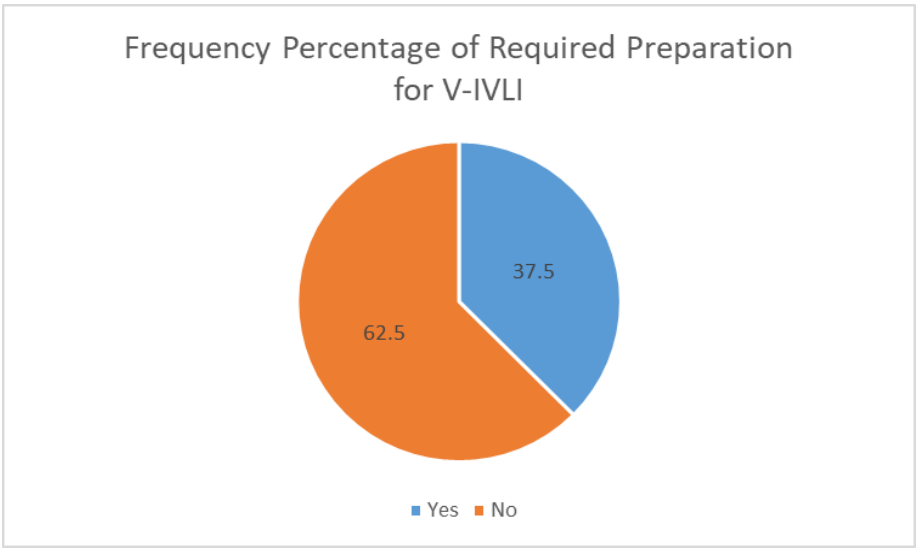

Figure-2: Frequency Percentage of nurses' opinions regarding obtaining the necessary preparation through the educational system for V-IVLI.

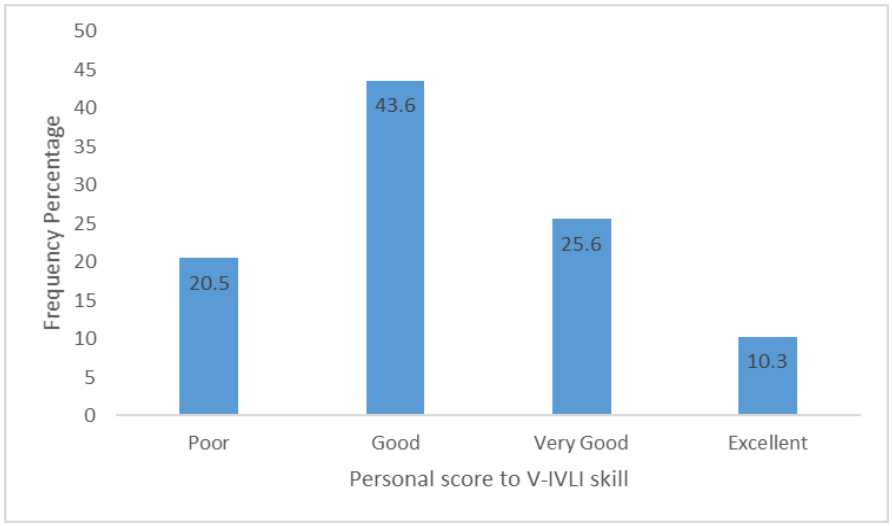

Figure-3: Frequency Percentage of nurses' opinions regarding their V-IVLI skills.

The mean (standard deviation) age of those who believed they were well prepared for V-IVLI by the educational system was 32.27 (2.82) years, while for nurses with the opposite opinion, it was 29.92 (2.43) years. The mean (standard deviation) work experience of nurses who had a positive opinion about the educational system was 5.53 (1.99) years and for others was 3.92 (1.97) years.

One-way analysis of variance was used to examine the relationship between age and work experience with the number of V-IVLIs until success and the personal score on these skills. Accordingly, the relationship between both variables of age and work experience with the number of V-IVLIs until success was significant (P-value: 0.001 for the relationship between age and number of venipunctures and P-value: 0.012 for the relationship between work experience and number of venipunctures). In such a way that the higher the average age and work experience of the individuals, the higher the chance of success in the first try for V-IVLI compared to the subsequent tries.

One-way analysis of variance was also used to examine the relationship between age and work experience with personal scores on V-IVLI skills, and a significant relationship was observed between age and skill scores (P-value: 0.004). The higher the average age of the study subjects, the higher the scores they gave to their personal skills in V-IVLI.

4- DISCUSSION

This cross-sectional study evaluated nurses' pain management practices during pediatric venipuncture in Iranian hematology/oncology wards, using census sampling of nurses to identify training gaps and implementation challenges. While greeting children and distraction were the most commonly reported strategies, their application remained inconsistent—a disconnect potentially explained by nurses' limited training, as only 37.5% felt adequately prepared. This training gap correlated with practical outcomes: 80% of nurses failed venipuncture on their first attempt, highlighting how unpreparedness may directly impact procedural success. Notably, experience mitigated these challenges; older nurses (avg. 32.3 years) and those with longer tenure (avg. 5.5 years) demonstrated significantly higher first-attempt success rates ($p<0.05$) and more confidence in their skills, suggesting that clinical exposure compensates for initial training deficits. Sex did not influence outcomes, emphasizing that systemic training improvements—rather than demographic factors—could universally enhance practice.

Nurses frequently perform medically necessary invasive procedures that cause pain, fear, distress, and anxiety. These negative experiences can be especially harmful for pediatric patients due to their developmental stage and limited ability to express needs (14).

Despite modern medical knowledge and available pain-relief interventions, many children still lack adequate comfort measures during painful procedures. Evidence shows this gap persists even when effective strategies could significantly reduce or prevent discomfort (15).

Clinical guidelines strongly recommend using comfort strategies for venous access procedures in children. However, real-world implementation of these evidence-based practices remains inconsistent (16).

Research reveals nurses often underestimate procedural pain severity (17). A notable mismatch exists between nurses' perceptions and patients' actual pain experiences, particularly during venipuncture (17, 18).

The knowledge available regarding pain management in adult patients has increased, but pain management in

children requires more attention from the medical staff to pain relief strategies, especially during painful procedures (14, 19). The present study examined the performance of nurses in using some pain relief methods during venipuncture and IV line insertion in children with blood diseases and cancer. According to the results, nurses working in onco-hematology departments pay special attention to relaxation and pain relief strategies during V-IVLI, although they may not have sufficient skills in performing these procedures and may not be successful on their first try.

According to the present study, nurses were not satisfied with their professional skills in V-IVLI and believed that they were not well prepared for these tasks due to the educational system. A study by Ahlin et al., which examined the knowledge and skills of nursing students in performing venipuncture, showed that assessing whether students at different levels of nursing education have achieved adequate levels of knowledge and skills in venipuncture and peripheral venous catheter placement procedures is important to prevent complications and support patient safety (20).

In a study by Hernon et al., aimed at evaluating the current training provided to nursing and midwifery students, students' knowledge, attitude, and performance were assessed regarding venipuncture and peripheral intravenous cannulation skills. According to this study, the average knowledge score was less than 50% of the total score and the average attitude score was 56.6% of the total score. The average performance score was 16.20 out of 28. The less than desirable levels of students' scores in knowledge, attitude, and performance indicate the importance of developing and improving evidence-based curricula (21).

A study conducted by Filbet et al. to investigate barriers to the prevention of pain from venipuncture in cancer patients showed that despite a strong professional nursing education program, this program was not sufficient to sensitize nursing staff to pain management (17). In a study by Clarke et al., which examined the effect of nurses' characteristics and education on their knowledge, attitude, and clinical practice in pain management, nurses did not show sufficient sensitivity to pain management (22).

The present study showed that nurses working in onco-hematology departments are highly interested in using relaxation strategies to manage pain during venipuncture and IV line insertion. Various studies have shown that professional experience, such as being a physician in the oncology department, can be a factor that influences the use of pain prevention strategies (17, 23).

In the present study, 100% of nurses used the greeting strategy during V-IVLI. Greeting the child and their relatives is an important aspect to increase communication and create a friendly environment, which has been reported as a comforting strategy for pain management during venous access procedures (11). Various studies recommend creating a friendly environment for painful procedures (11, 13).

5- CONCLUSION

According to the results of the present study, despite nurses' efforts to use relaxation and pain relief strategies to manage children's pain during venipuncture and IV line insertion, successful completion of the procedure is not guaranteed on the first attempt. Strengthening nurses' V-IVLI skills is particularly important in order to reduce the pain of performing the procedure in children. Hence, the study underscores a cyclical relationship between training, experience, and procedural success, advocating for structured education to

bridge the gap between known pain management strategies and their real-world application in pediatric care.

6- CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

7- REFERENCES

1. Ward E, DeSantis C, Robbins A, Kohler B, Jemal A. Childhood and adolescent cancer statistics, 2014. CA: a cancer journal for clinicians. 2014 Mar;64(2):83-103.

2. Crocoli A, Martucci C, Persano G, De Pasquale MD, Serra A, Accinni A, et al. Vascular access in pediatric oncology and hematology: state of the art. Children. 2022 Jan 5;9(1):70.

3. Khalili A, Ghaderi G. The relationship between chronic pain and quality of life children with cancer. Scientific Journal of Nursing, Midwifery and Paramedical Faculty. 2022;8(1):96-108.

4. Po' C, Benini F, Sainati L, Farina MI, Cesaro S, Agosto C. The management of procedural pain at the Italian Centers of Pediatric Hematology–Oncology: state-of-the-art and future directions. Supportive care in cancer. 2012 Oct;20(10):2407-14.

5. Allahyari I, Alhany F. Evaluation of the nurses' problems in using methods to reduce injection pain in children. 2007.

6. Mostafavian Z, Bazzazan S, Mokhtari H. Effect of pharmacological and non-pharmacological methods on reducing the severity of pain during injection in children: a systematic review study. 2020.

7. Foroutan R, SAADATI A, VAFAEI S, RAEISI F. A comparative study on impact of topical cooling and manual pressure before intramuscular injection on pain severity in 5-12 years old children.

8. Dalvandi A, Ranjbar H, Hatamizadeh M, Rahgoi A, Bernstein C. Comparing the effectiveness of vapocoolant spray and lidocaine/procaine cream in reducing pain of intravenous cannulation: a randomized clinical trial. The American Journal of Emergency Medicine. 2017 Aug 1;35(8):1064-8.

9. Sikorova L, Hrazdilova P. The effect of psychological intervention on perceived pain in children undergoing venipuncture. Biomedical Papers of the Medical Faculty of Palacky University in Olomouc. 2011 Jun 1;155(2).

10. Rastgarian A, Saniejahromi MS, Sadeghi SE, Kalani N, Eftekharian F, Damshenas MH, et al. The impact of different methods of distraction on pain of venipuncture: a case study in children 6-3 years old. medical journal of mashhad university of medical sciences. 2020 Jan 21;62(6):1812-22.

11. Katende G, Mugabi B. Comforting strategies and perceived barriers to pediatric pain management during IV line insertion procedure in Uganda's national referral hospital: A descriptive study. BMC pediatrics. 2015 Sep 16;15(1):122.

12. Care RP. Relief of Pain and Anxiety in Pediatric Patients in Emergency Medical Systems. Pediatrics. 2012 Nov;130(5):e1391.

13. Fernandes A, Campbell-Yeo M, Johnston CC. Procedural pain management for neonates using nonpharmacological strategies: Part 1: sensorial interventions. Advances in Neonatal Care. 2011 Aug 1;11(4):235-41.

14. American Pain Society Task Force on Pain in InfantsChildren AA. The assessment and management of acute pain in infants, children, and adolescents. PEDIATRICS-SPRINGFIELD-. 2001;108(3):793-7.

15. Bice AA, Hall J, Devereaux MJ. Exploring holistic comfort in children who experience a clinical venipuncture procedure. Journal of Holistic Nursing. 2018 Jun;36(2):108-22.

16. Zempsky WT. Optimizing the management of peripheral venous access pain in children: evidence, impact, and implementation. Pediatrics. 2008 Nov 1;122(Supplement_3):S121-4.

17. Filbet M, Larkin P, Chabloz C, Chirac A, Monsarrat L, Ruer M, et al. Barriers to venipuncture-induced pain prevention in cancer patients: a qualitative study. BMC palliative care. 2017 Jan 17;16(1):5.

18. Rhondali W, Hui D, Kim SH, Kilgore K, Kang JH, Nguyen L, et al. Association between patient-reported symptoms and nurses' clinical impressions in cancer patients admitted to an acute palliative care unit. Journal of palliative medicine. 2012 Mar 1;15(3):301-7.

19. Johnston CC, Fernandes AM, Campbell-Yeo M. Pain in neonates is different. Pain. 2011 Mar 1;152(3):S65-73.

20. Ahlin C, Klang-Söderkvist B, Johansson E, Björkholm M, Löfmark A. Assessing nursing students' knowledge and skills in performing venepuncture and inserting peripheral venous catheters. Nurse Education in Practice. 2017 Mar 1;23:8-14.

21. Hernon O, McSharry E, Simpkin AJ, MacLaren I, Carr PJ. Evaluating Nursing Students' Venipuncture and Peripheral Intravenous Cannulation Knowledge, Attitude, and Performance: A Two-Phase Evaluation Study. Journal of Infusion Nursing. 2024 Mar 1;47(2):108-19.

22. Clarke EB, French B, Bilodeau ML, Capasso VC, Edwards A, Empoliti J. Pain management knowledge, attitudes and clinical practice: the impact of nurses' characteristics and education. Journal of Pain and Symptom Management. 1996 Jan 1;11(1):18-31.

23. Dalton JA. Nurses' perceptions of their pain assessment skills, pain management practices, and attitudes toward pain. InOncology Nursing Forum 1989 Mar 1 (Vol. 16, No. 2, pp. 225-231).