It's Not Just a Needlestick: Exploring Phlebotomists' Knowledge, Training, and Use of Comfort Measures in Pediatric Care to Improve the Patient Experience

Julie Piazza,1,2* Sandra Merkel,1 Harry Neusius,3 Susan Murphy,4 Joan Gargaro,1,2 Brooke Rothberg,5 and Kristin A. Kullgren1,6

Background: Blood draws are a routine element of the pediatric patient experience. They are also associated with the greatest fear and pain for a child. Because of the limited literature regarding phlebotomists' knowledge, experience, training, or stress related to their use of comfort techniques during pediatric blood draws, this study explored current practices and training methods. Phlebotomist training tends to focus on clinical technique rather than pediatric or patient comfort support. The study includes aims to develop a measurement for phlebotomists' use of comfort techniques for pediatric blood draws.

Method: Focus groups of parent advocates (n = 24) and pediatric phlebotomists (n = 11) reviewed the survey questionnaire, and it was revised before being e-mailed to hospital system phlebotomists (n = 128).

Results: Almost half of the sample group lacked training in child development. The most frequently used comfort measures were words of explanation and reassurance, positioning of the child, and distraction. Requesting child life specialist support and using pain management devices or topical anesthetics were used less often. Primary challenges to performing pediatric blood draws were anxious patients and parents.

Conclusion: Phlebotomists' use of available comfort measures occurs infrequently. Including child development and comfort techniques in training programs is essential to providing pediatric patients with a more satisfactory experience.

IMPACT STATEMENT

Past research determines that needle-related medical procedures often induce anxiety and pain. Behavioral strategies have proven to ease patients' anxiety. The overarching goal of our study was to reduce pediatric patient anxiety by identifying techniques phlebotomists can use to improve pediatric patients' experience. The primary objective was to first assess phlebotomists' self-reported knowledge, experience, training, and use of comfort techniques during pediatric blood draws. Phlebotomists, other medical professionals, and patients will benefit from the data, which identifies new areas of focus for phlebotomy training. These findings inform future research efforts and phlebotomist training, as well as improve knowledge about the patient experience.
Blood draws are more than a simple needlestick for many children and adults. They can be anxiety-producing and traumatic for many children (1). Minimizing distress associated with these procedures is essential, especially in preventing potentially long-term needle phobias that may lead to avoidance of necessary medical procedures and nonadherence to vaccination schedules (2). Medical procedures involving needles are among the most feared experiences reported by children (3, 4) and are also significant for their parents (5). Children with a history of negative medical experiences demonstrate highly anxious behaviors before a venipuncture and tend to be distressed and uncooperative during the procedure, creating added challenges for the phlebotomist (6). Additionally, childhood medical pain has been connected to future adulthood fear, pain, and avoidance of medical care (7). Studies have shown that young children and infants who experienced frequent painful medical events have escalated pain sensitivity, maladaptive pain responses, and needle phobias that persist into adolescence and adulthood (7, 8). Similarly, anxious children have, over time, become anxious adults and parents, contributing to an increasingly needle-phobic society (9).

There is strong support for cognitive behavioral strategies to counter the anxiety and pain associated with general medical procedures, especially needle-related pain (10). Anticipatory pain and fear of the unknown, such as first-time needle injections or venipunctures, have been shown to cause pediatric and adult anxiety and distress (11). Although topical anesthetics can help patients in special cases overcome the associated pain, cognitive behavioral techniques aid in reducing fear. Comfort techniques, such as distraction and hypnosis interventions, have also been shown to reduce children’s pain and anxiety with needlesticks (5). A Cochrane review of 39 trials with 3394 children revealed strong evidence to support the efficacy of distraction (i.e., auditory, visual, and sensory) as a method for reducing needle-related pain in children and adolescents (12). However, there is limited evidence as to which forms of distraction are most effective. Further research is needed to determine the optimal interventions for individual children with consideration for age, developmental stage, medical conditions and experiences, the healthcare setting, and specific needle procedure.

Additional evidence points to the benefits of providing children and adolescents, particularly those with chronic illnesses such as diabetes and cancer, with “preparatory information and psychological intervention” before undergoing a painful medical procedure (13). Moreover, a child’s capacity to deal with pain and anxiety is linked to their developmental age and experience (14). Use of pharmacological and nonpharmacological methods that are age and developmentally appropriate have also been shown to make a significant difference in minimizing and controlling a child’s potential negative experiences (14). Studies show that distressing procedures can place children at risk for impaired coping mechanisms for future medical procedures and vaccinations (15, 16). Unmitigated anxiety and pain associated with needlesticks and blood draws can set in motion long-term consequences for children as adults (17). Thus, first-time healthcare experiences are critical factors in a child’s future coping abilities and outcomes for medical procedures.
Another factor in the child’s pain response is the accompanying parent or caregiver during a needlestick procedure, yielding a positive or negative influence depending on the adult’s anxiety regarding the procedure and fear of pain inflicted upon their child (5). Parents may unintentionally contribute to a child’s anxiety through facial expressions or verbal reassurance (15). In turn, children often perceive parents as more worried when attempting to reassure (18). A child’s distress may cause feelings ofhelplessness and guilt in parents and healthcare providers, making the procedure more difficult (8).

Research shows that a phlebotomist’s stress level also affects the child’s experience, as children are influenced by parents’ and providers’ moods and feelings (1). Failed attempts at blood draws because of a child’s anxiety increases a provider’s use of resources (i.e., added personnel for patient support) and contributes to situational stress for all involved. Owing to lack of knowledge or training in providing developmentally appropriate comfort techniques, phlebotomists may be less prepared to handle difficult situations successfully. An excerpt from The Phlebotomy Standards of Practice states, “The ability to relate to people, a capacity for calm and reasoned judgment and a demonstration of commitment to the patient are essential qualities,” further highlighting the need for confidence, communication skills, and a calm demeanor in phlebotomy professionals (19). Limited research exists, however, on phlebotomists’ perceptions related to their knowledge and skills in using techniques that decrease anxiety and pain for pediatric patients.

Given phlebotomists’ frontline healthcare presence, they have a great need and potential benefit for use of comfort techniques in their daily work with children and families. Coaching parents and children through these procedures and using cognitive behavioral strategies and topical anesthetics has proven effective (20). However, training and implementation of these strategies with patients continues to be lacking because of barriers that include inconsistent application, additional time, costs, and lack of education (15). Much of the training for phlebotomists continues to be focused on clinical technique, rather than emphasizing knowledge and skills for providing comfort support based on child development and the impact of procedures on the pediatric patient.

There is a gap in the existing literature examining phlebotomists’ knowledge, experience, and training related to their use of comfort techniques when performing pediatric venipunctures and blood draws. Recent updates in 2017 to the Clinical and Laboratory Standards Institute Standard, GP41, Collection of Diagnostic Venous Blood Specimens (19) have included new recommendations related to pediatric blood draws. Incorporating strategies to reduce stress and anxiety in the pediatric patient by applying age-specific vocabulary to communicate, facilitating patient participation when possible, using age-appropriate distraction techniques and parents as coaches, as well as comfort positioning, are new additions. These standards are used by the laboratory community to enhance practices and reflect the importance of reducing pain and anxiety in the pediatric patient population during venipuncture.

Given the challenges and risks inherent in pediatric blood draws, an interdisciplinary study team was assembled at our institution to address patient concerns indicating a need for improving pediatric blood draws. Specifically, our institution’s patient satisfaction scores for controlling pediatric pain were declining, and inconsistencies of pediatric blood draws were reported. In response to these issues, a program was developed to support individualized comfort measures and document them in “Poke Plans,” linked to electronic health records, for pediatric patients. There was an additional identified need to focus on phlebotomists’ experience and training for pediatric blood draws. The purpose of this work was to develop and administer a survey to assess the self-reported
knowledge, experience, training, stress, and confidence related to performing pediatric venipuncture to design and optimize pediatric phlebotomy curriculum.

**METHODS**

Our institution is a tertiary care center located within a large academic medical center. Within the medical complex, there are >1000 inpatient beds with 348 beds at our children's and women's hospital and 215 general phlebotomists who perform approximately 25,200 inpatient and 46,800 outpatient pediatric blood draws annually. Supportive services within the children's hospital include 34 inpatient child life specialists and 3 on-call child life specialists who assist with high anxiety outpatients. An interdisciplinary team initiated research to study phlebotomists' perspectives, knowledge, experience, and training because of concerns regarding the pediatric patient experience. This study was approved by the Institutional Review Board.

Because there was no existing or standardized survey to assess phlebotomists' perceptions of their performance and practices, the study team engaged in several steps to develop the questionnaire. First, we reviewed the literature on phlebotomy practices in the pediatric setting, in addition to evaluating specific behavioral approaches to minimizing children's anxiety and pain during blood draws. Second, phlebotomists were observed in practice with pediatric patients to identify effective and ineffective comfort strategies that were being implemented. Finally, three 1-h focus groups were conducted to refine the survey questionnaire.

The survey tool developed by the study team sought to address inpatient and outpatient concerns that had been raised regarding experiences with hospital phlebotomists. Questions were designed to factor in the type of education and training that phlebotomists received, as well as their knowledge, stress level, and frequency of using comfort measures during venipuncture and blood draw procedures. Comfort measures that had been observed and researched were also introduced in the survey.

Before conducting the survey of phlebotomists, the questionnaire was tested with focus groups to gain both the practicing phlebotomist and patient perspectives. Focus groups consisted of a group of phlebotomists recruited by the phlebotomy department and a group of pediatric patient advocates (primarily parents of children treated within the hospital) recruited by the Patient Family-Centered Care Department. Participants provided feedback on survey readability, relevance to practice, specific patient/parent concerns, and wording of the final questions.

The final survey was designed to elicit phlebotomists' self-evaluation of their practice techniques, specifics of their training and education, stress level during procedures, source of stress, and use of comfort strategies. The survey was administered through Qualtrics, a web-based survey tool that is used to build, send, collect, and analyze research and online data quickly and in real time. The questionnaire was distributed via e-mail to 215 general and pediatric hospital phlebotomists. As an incentive to participate, respondents who submitted a completed questionnaire were entered in a raffle drawing to win 1 of 4 $25 Amazon gift cards.

**Focus group feedback**

Qualitative feedback on the questions was provided by 3 focus groups before conducting the survey of hospital phlebotomists. Initially, the phlebotomist questionnaire was reviewed by a 24-member parent family advisory council, consisting of 14 parents, 8 hospital staff members, and 2 graduate students from the medical and public health schools. Some changes after review included the following: (a) considering the child's age and quantifying the frequency of blood draws; (b) rephrasing “pain-relieving medication” to “topical anesthetic, or sucrose for <2 years”; (c) adding the word “coaching” under the comfort measures
category of words of explanation, support, and preparation; and (d) including the parental role during pediatric blood draw procedures.

In addition, 2 focus groups of phlebotomists (n = 11) from an outpatient hospital laboratory and an offsite clinic provided feedback on the questionnaire. The first group consisted of outpatient hospital phlebotomists (n = 2) who completed the survey in an average of 3 min. The second group, from offsite clinics (n = 9), completed the questionnaire in an average time of 5 min. Both groups agreed that child development coursework was important and suggested including an additional factor for consideration on how parents affect pediatric patients' anxiety during a blood draw.

Data analysis

Descriptive analyses (percentages, rankings, means, ranges, variances, and SDs) were performed via Qualtrics software for all participant responses to the survey to determine characteristics of phlebotomists (i.e., education, training, age, experience) and their knowledge and use of comfort measures.

RESULTS

The survey was distributed via e-mail to a list of 215 general phlebotomists in the hospital system; 128 completed surveys were submitted online for a 60% response rate.

Characteristics of survey participants

Most participants were female (80%) and worked in outpatient clinic settings (82%) vs inpatient (Table 1).

Education and training

More than half (54%) of the phlebotomists had attended a certificate or in-hospital training program, followed by nearly one-third (32%) obtaining a 2- to 4-year college degree, and the remaining 14% attended a technical school as their highest level of education. More than half (53%) had some educational background related to child development, ranging from 1 course in high school or college (39%), a continuing education program (8%), to the highest level, which was a college degree in a related child development field (5%) (Fig. 1).

Experience

Participants had an average of 8.6 years (SD = 5.4; range, 0–37 years) of experience with pediatric blood draws and 9.7 years (SD = 5.3; range,
0–38 years) of experience with adult blood draws. Respondents reported a wide range in time spent caring for pediatric patients, with an average of 35% (SD = 33.2), indicating that some devote most of their time to pediatrics whereas others were not caring for pediatric patients.

**Knowledge**

Self-ratings by phlebotomists of their knowledge related to providing comfort measures to pediatric patients during blood draws indicated that most (86%) believed they had a moderate to high level of knowledge (Fig. 2).

**Use of comfort techniques**

Responses show that using words of explanation or comfort was the most frequently used comfort technique (70%), followed by positioning options (67%) and distractions (e.g., bubbles, small toys, iPad) (43%). Calling for a child life specialist (18%) and offering a pain-minimizing, electronic numbing device such as “Buzzy” or another nonpharmacologic remedy, such as a topical anesthetic or sucrose for children <2 years of age, were used much less often (20%) (Fig. 3).

**Stress**

Participant phlebotomists denied experiencing high levels of stress when performing pediatric blood draws. Most (78%) reported little to no

**DISCUSSION**

This study sought to add to the literature by studying phlebotomists’ self-reported knowledge, experience, training, skill set, and stress levels related to their pediatric practice. Phlebotomists perform a crucial role in frontline pediatric medical
care; however, their education, practice, and skills may not reflect the importance of their role in minimizing distress and pain in young children receiving blood draws or venipunctures. Results of this study highlight several areas of opportunity for expansion of phlebotomy training and practice.

Performing a pediatric blood draw or venipuncture is not just about technique. Aspects of this interaction with the child can and have been demonstrated to affect the success of the blood draw and influence future experiences of the pediatric patient and family (2). Youth presenting to a tertiary care center, such as ours, have complex medical and developmental needs, particularly as the face of childhood chronic disease has changed with medical advances (21). Increasingly, phlebotomists will be faced with challenging developmental and behavioral issues in their patients, requiring higher levels of experience and education. Although most of the phlebotomists in this study have significant professional and technical experience, specific training in child development may be lacking, especially for children with special needs. Among those who had exposure to education involving child development, most of their education came in the form of a single class that may not have included special needs education.

Phlebotomists report having a strong knowledge base for comfort techniques; however, they tend to use tools and techniques that are immediately available (words, positioning) rather than distraction, topical anesthetics, or requesting child life specialist assistance. These additional supports, although readily available in our health system for phlebotomists’ access, do entail additional steps and time. Comfort techniques, such as distraction, also require more training and time to choose age-appropriate items.

Not all distraction techniques are equally useful; however, recent literature has found that combining techniques produces the greatest effect (22). Consulting or calling for a child life specialist to assist with a difficult situation may also require more information and experience to realize the benefits of collaboration. Although these interventions may increase the blood draw time, enhanced phlebotomist skill development will lead to more effective use of resources and improved patient satisfaction, thereby resulting in bottom-line improvements and justifying the costs of additional resources.

Highly anxious patients and/or parents are noted as the most common barriers to a successful pediatric blood draw. Little attention in the literature has been given to the partnership...
with patients and parents—the pillars of a patient–family-centered care approach—or how to work with healthcare assistance from child life specialists to achieve improved outcomes. Further study is needed to fully understand parents’ perceptions of a child’s blood draw experience and how it may affect phlebotomists’ practice.

With most phlebotomist certificate training focusing on technique, specific tools to treat and support children during blood draws may be lacking outside of on-the-job training. A phlebotomy training program that includes child development and comfort techniques is crucial to an optimal pediatric patient experience. Based on our results and literature review, pediatric phlebotomy training should encompass (a) general phlebotomy technical training, (b) specific pediatric phlebotomy technical training, (c) general and atypical child development education, (d) behavioral management strategies, including collaborating with child life specialists, and (e) specific cognitive behavioral techniques to use for pediatric blood draws.

This study represents an opportunity to develop an improved curriculum for pediatric phlebotomy training based on evidence-based practice, quality, safety, and the patient experience.

Limitations

There are several limitations to this study. First, the study relied on self-reported responses from phlebotomists evaluating their performance (i.e., knowledge, stress level, and use of comfort measures), which may not be an accurate assessment of actual knowledge and performance. Overstatement of knowledge and performance variables owing to employee status and perceived job expectations may have affected their answers. Objective observation of these variables would provide a more accurate picture of phlebotomy practices. Second, phlebotomists were encouraged by their supervisor to participate, potentially introducing response bias (i.e., self-reports of greater knowledge and skill levels than actual). Third, the survey did not capture the employee’s actual time working in our health system, making it difficult to measure their exposure to our institutional phlebotomy training programs. In addition, general phlebotomists were sampled as opposed to only pediatric phlebotomists. Finally, the sample for this study was recruited at a single large academic institution, which may limit generalizability to other types of healthcare institutions.

Future directions for clinical training, practice, and research

Based on the evidence from this study, the study team is now in the process of developing a phlebotomist education toolkit, which includes enhanced and relevant child development educational materials that address age-appropriate and special needs strategies (techniques and devices) for providing comfort measures. Immediate recommendations for new phlebotomists’ training include shadowing with a child life specialist and increasing support to address anxiety of family members and children, while building rapport and trust early in the encounter (Table 2).

Further study of phlebotomists during procedural practice is needed to support elements for an improved practice protocol. Including comparative observations from the perspectives of parent/caregivers and trained observers is expected to provide greater understanding of the pediatric blood draw experience. Additional recommendations to build into pediatric phlebotomists’ training involve (a) providing the opportunity to learn and practice the application of comfort measures and introductory questions that are appropriate for a child’s age, development, and medical condition; (b) incorporating quiet comfort spaces in the laboratory or clinic procedure areas; and (c) implementing frequent and ongoing patient/caregiver evaluations of phlebotomists’ performance in practice.
Evaluating phlebotomists’ performance in clinic and hospital settings after completing training programs, in conjunction with patient and provider feedback, will help determine the effectiveness of training. Expanding the study to various-sized hospital settings (i.e., smaller community vs large academic hospitals) and limiting study participants to pediatric phlebotomists are suggested directions for future research.

Table 2. Recommended curriculum for pediatric phlebotomy education and training.

| A. Objectives: On completion of the curriculum, the phlebotomist will be able to: |
|---|---|
| 1. Identify opportunities in their work flow to support comfort and manage anxiety and pain |
| 2. Apply developmentally appropriate strategies to mitigate anxiety, stress, and pain for pediatric patients |
| 3. Coach children and parents/caregivers during procedures |
| 4. Understand the benefits of partnership with child life specialists, patients, and caregivers to improve patient experience |

| B. Content: |
|---|---|
| 1. Needle phobia and its relationship to long-term anxiety/pain and avoidance of medical care |
| 2. Techniques to quickly establish a trusting patient relationship |
| 3. Strategies that are effective to reduce anxiety, stress, and pain |
| 4. Milestones of child development and their effects on pediatric healthcare experiences |
| 5. Considerations for special needs children |
| 6. Working as a team to create partnerships between patients, family, and caregivers |

| C. Learning experience: |
|---|---|
| 1. Reading, review, and discussion of practice guidelines and reference literature |
| 2. Slide and video demonstrations of patient experience scenarios of varied child developmental levels |
| 3. Demonstration and practice with hands-on role play, distraction tools, best words, Buzzy® and de-escalating stressful situations with children and parents/caregivers |
| 4. Discussion of effective partnership strategies to support procedural comfort |
| 5. Sharing personal experiences and stories related to phlebotomy work |

| D. Curriculum evaluation: |
|---|---|
| 1. Before and after education surveys of phlebotomists to evaluate learning and teaching methods |
| 2. Before and after education surveys of parent/caregiver satisfaction with blood draw experiences |
| 3. Review of organizational/departmental satisfaction scores with care related to blood draws and feedback related to phlebotomist performance and communication |

Author Contributions: All authors confirmed they have contributed to the intellectual content of this paper and have met the following 4 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; (c) final approval of the published article; and (d) agreement to be accountable for all aspects of the article thus ensuring that questions related to the accuracy or integrity of any part of the article are appropriately investigated and resolved.

Authors’ Disclosures or Potential Conflicts of Interest: Upon manuscript submission, all authors completed the author disclosure form. Employment or Leadership: J. Piazza, S. Murphy, and K.A. Kullgren, University of Michigan Medicine. Consultant or Advisory Role: None declared. Stock Ownership: None declared. Honoraria: None declared. Research Funding: This project was supported by grant number 2ULITR000433-06 from the National Center for Advancing Translational Sciences (NCATS) and grant number UL1TR002240 through the Practice-Oriented Research Training Program. Expert Testimony: None declared. Patents: None declared.

Role of Sponsor: The funding organizations played no role in the design of study, choice of enrolled patients, review and interpretation of data, preparation of manuscript, or final approval of manuscript.
Acknowledgments: The authors thank Corey Powell, Leah Webster, and Madison Wetecamp, all of the University of Michigan, and Nahid Keshvarzis from the Michigan Institute of Clinical and Translational Research.

REFERENCES


