Specialized Inserters and Pediatric Peripheral Intravenous Attempt Success: Prospective Cohort

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Leong, A.Y., Lee, J.B., Black, J., Kelly, L., Ragan, L., Spence, T., Wollny, K., & Lee, L.A. (2024). Specialized inserters and pediatric peripheral intravenous attempt success: Prospective cohort. *Pediatric Nursing, 50*(6), 293-302. https://doi.org/10.62116/PNJ.2024.50.6.293

Pediatric peripheral intravenous (PIV) insertion is one of the most stressful experiences of hospitalization and is associated with patients' anxiety and health care avoidance. The use of specialist inserters for PIV insertions may result in improved experiences for patients, including increased use of comfort measures and increased first-attempt success rates.

Keywords: Child, infant, adolescent, prospective studies, central venous, peripheral, catheterization, intravenous.

Peripheral intravenous (PIV) insertion is the most common invasive procedure performed in pediatric hospitals (Heckler-Medina, 2006). Children identify PIV insertion as one of the most painful and stressful experiences of hospitalization, which has been associated with anxiety, needle phobia, hyperalgesia, health care avoidance, and post-traumatic stress (Kennedy et al., 2008; Taddio et al., 2010). PIV insertion is particularly challenging in children due to younger age, small physical size, non-cooperative behaviors, and adiposity; thus, it is often associated with multiple attempts (Bennett & Cheung, 2020; Davis et al., 2020). First-attempt success rates of PIV insertion in children range between 64% to 95% (Choden et al., 2019; de Negri et al., 2012; Reigart et al., 2012). To minimize these painful procedures and traumatic experiences in children, understanding factors associated with PIV first-attempt success rates is essential.

Much of the pediatric literature is focused on the use of adjuncts, which are devices such as ultrasound or vein viewers that support PIV insertion. Ultrasound-guided PIV insertion improves first-attempt success rates in three distinct groups: 1) adults, 2) critically ill children, and 3) children who are previously identified as a "difficult PIV start" based on a screening tool or previous intravenous insertion experiences (Bhargava et al., 2022; Doniger et al., 2009; Franco-Sadud et al., 2019). Ultrasound-guided PIV insertion does not consistently improve first-attempt success rates in pediatric emergency or general pediatric patients (Anderson et al., 2022; Blick et al., 2021; Curtis et al., 2015; Kleidon et al., 2021; Vyas et al., 2021). Use of other adjunct devices (e.g., transillumination, vein viewers) have also shown inconsistent results (Peterson et al., 2012). Studies suggest that factors that influence pediatric first-

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Acknowledgments: *The authors would like to thank Dr. Jessalyn Holodinsky for her guidance and mentorship for data analysis.*

RESEARCH SUMMARY

Background

Pediatric peripheral intravenous (PIV) insertion is one of the most stressful experiences of hospitalization and is associated with patients' anxiety and health care avoidance. Pediatric PIV insertion is challenging and is often associated with multiple attempts.

Objective

The primary objective of this project was to describe the relationship between first-attempt success and PIV inserter specialization.

Methods

This secondary data analysis of a quality improvement project examined the association between expertise of the pediatric PIV inserter inserting the PIV (generalists vs. specialists) and first-attempt success in pediatric PIV insertion.

Results

Among 108 general pediatric patients and 192 PIV insertion attempts, the median age of children was 6.37 years (range: 4 days to 20.02 years) and 47% of providers were generalists. Among first insertion attempts, 46% were successful. Specialist inserters compared to generalists had more first-attempt success (51% vs 41%), tended to insert PIVs in younger patients (median age 3.69 years vs. 9.58 years), and used more comfort measures (72% vs. 58%). The first-attempt success rate among specialists had 1.58 higher odds compared to generalists (95% confidence interval: 0.82 to 3.21, $p = 0.15$) when adjusted for adjuncts and comfort measures.

Conclusion

The use of specialist inserters for PIV insertions may result in improved experiences for patients, including increased use of comfort measures and increased first-attempt success rates.

attempt success rates include malnourishment, age, lighter skin color, visibility of vein and insertion in hand, and history of difficult IV insertion (Choden et al., 2019; de Negri et al., 2012; Reigart et al., 2012).

Among adult patients, nurses who are specially trained in PIV insertion techniques report higher PIV first-attempt success rate, less pain, better patient experience, and significant cost savings (Bosma & Jewesson, 2002; Fujioka et al., 2020; Marsh et al., 2018; Steere et al., 2020). A survey of Canadian and American health care institutions reported that graduate nurses were expected to function at a novice level for PIV insertion (Vandenhouten et al., 2020). Yet only 57% of nurses report learning PIV insertion in school, and only 43% of Canadian and American health care institutions include PIV education in their nursing orientation (Vandenhouten et al., 2020). Specialized training for pediatric nurses increases confidence, knowledge, and skills in PIV insertion; however, evidence of improvements in first-attempt success rates are inconsistent (Goodfriend et al., 2020; Hartman et al., 2018; Hassanein et al., 2021; Keleekai et al., 2016; Kleidon et al., 2019; Larsen et al., 2010).

Although years of nursing experience were not associated with first-attempt success due to the number of first attempts by less-experienced nurses, experience impacts overall success of PIV insertion (Larsen et al., 2010). A survey among nurses regarding factors associated with PIV insertion identified that less experienced nurses are more likely to request for specialist help when there is limited time to perform the insertion (Sandström & Forsberg, 2018). Both clinical and research equipoise exists regarding the impact of adjuncts and PIV inserter specialization on first-attempt success rates in children (Kleidon et al., 2021).

We present a secondary data analysis of a multi-faceted quality improvement project that informed the development of a new PIV insertion process. Our analysis examines the association between expertise of the PIV inserter (generalists vs. specialists) and first-attempt success in PIV insertion ("first-attempt success"). The primary objective of this analysis was to measure the association between inserter specialization and first-attempt success. The secondary objective was to describe the characteristics of PIV insertion attempts within the PIV encounters (see Figure 1).

Methods

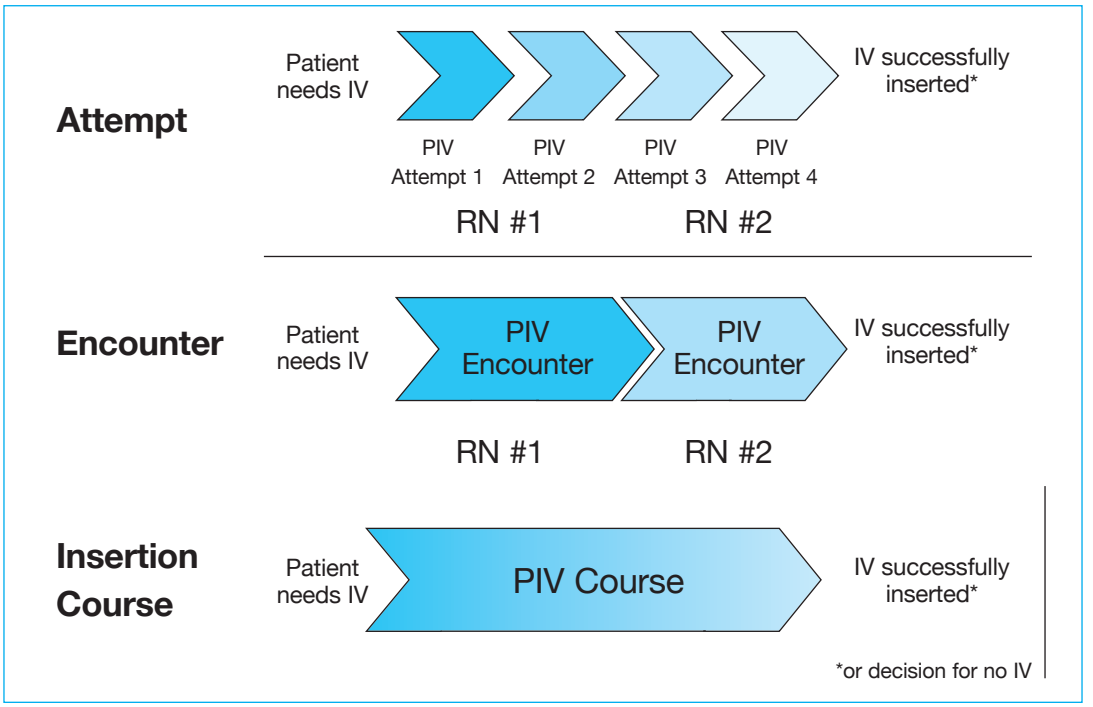
Population, Data Sources, and Data Collection

Data were collected from PIVs inserted on both medical and surgical inpatients at Alberta Children's Hospital (Calgary, Alberta) from July 9 to August 30, 2021. The Alberta Children's Hospital is a freestanding, 141-bed pediatric non-cardiac surgery tertiary hospital with a catchment population of 3 million people. This secondary data analysis was performed as part of a quality improvement project to inform the development of a new PIV insertion process at the Alberta Children's Hospital. Data were collected using a paper case report form that all inserters completed at the time of PIV insertion (see Appendix A). Data were entered by a research assistant into REDCap (Research Electronic Data Capture) hosted at Alberta Health Services. If a PIV encounter was not accompanied by a case report form, a research assistant contacted the PIV inserter to facilitate the completion of the case report form. Data were collected on all PIV insertion attempts (first and subsequent attempts).

Definitions

In partnership with the hospital PIV committee, multiple stages associated with PIV insertion were defined (see Figure 1). A PIV insertion course is initiated when a PIV is

Figure 1.
Peripheral Intravenous (PIV) Insertion process



Notes: IV = intravenous, RN = registered nurse.

deemed necessary and ends with successful insertion or a change in therapy no longer requiring a PIV. Within each insertion course, there are one or more encounters. An encounter begins when an inserter (e.g., registered nurse or physician) attempts to insert a PIV into a patient and ends when that inserter successfully inserts the PIV or stops attempting to allow another inserter to attempt. Attempts are the number of times an inserter breaks skin with a needle during an attempt to insert a PIV. A generalist inserter was defined as a unit nurse. A specialist inserter was defined as a transport nurse, emergency medicine nurse, intensive care unit nurse, medical or anaesthesia resident, emergency physician, or intensive care unit physician. Within our organisation, PIV education is not standardised and is provided experientially.

Eligibility Criteria

Inclusion and exclusion criteria were described using encounter data (see Figure 1). Encounters were included if the PIV insertion occurred on medical-surgical inpatient units at Alberta Children's Hospital. PIV insertion in the emergency department (ED), pediatric intensive care unit (ICU), operating room, and outpatient clinics were excluded.

Variables

Outcome Variable

First-attempt success was coded as a binary outcome: PIV insertion not successful on the first attempt, or PIV insertion successful on the first attempt.

Explanatory Variable

The PIV inserter variable was split into two groups based on specialist status: generalist or specialist. The level of PIV specialisation was defined based on the amount of pediatric PIV insertion training and the number of PIVs inserted per inserter in each group per year. This was consistent with the existing PIV insertion algorithm at Alberta Children's Hospital (see Appendix B).

Covariates

The following PIV insertion-related characteristics were considered as potential effect modifiers or confounders: 1) patient age (continuous), 2) use of adjuncts for PIV insertion attempts (yes/no), and 3) comfort measures used during PIV insertion attempts (yes/no). Age of pediatric patients was considered because anatomical and behavioral differences in children can make it harder to insert PIVs in younger age groups. Comfort measures may be provided to children during attempted PIV insertion with the goal of alleviating pain and distress, which include pharmacological measures (e.g., sucrose or topical freezing agents), non-pharmacological measures (e.g., being held by a parent), or others (e.g., oral or IV analgesics).

Statistical Analysis

Descriptive statistics on baseline characteristics were analyzed using frequency (*n*, %) for categorical variables and central tendency

Appendix A.
Data Collection Form

(Administration use only) PROS RETR

Complete this form once for every PIV encounter *(successful or unsuccessful)*.

Date of PIV Encounter: dd/mm/yyyy

Time of Encounter: dd/mm/yyyy

Unit Number the PIV is for (unit 1-4_): X

Name of Person Inserting the PIV: (First) (Last)

Inserting Clinician's Profession

☐ Unit Nurse
☐ ED Nurse
☐ Resident
☐ ED Physician
☐ ICU NP
☐ Transport Nurse
☐ Admitting NP
☐ Hospitalist
☐ Intensivist
☐ Other, please describe_____
☐ ICU Clinical Associate/Assistant
☐ Staff Physician, Non-Hospitalist
☐ Anesthesia Resident/Fellow
☐ ICU Nurse

Reason for IV Insertion

☐ IV fluid administration
☐ Blood product administration
☐ Diagnostic imaging
☐ IV medication administration
☐ Not currently needed insertion for safety
☐ Diagnostic imaging
☐ Other, please describe _____

Result of IV Start

☐ Successful
☐ Waiting for new encounter and attempts from another health care provider
☐ Changed to oral therapy, IV no longer needed
☐ Encounter ended to allow child to rest
☐ Encounter ended and permanent line placement planned
☐ Other, please describe _____

Dressing Border

☐ Border
☐ No border
☐ N/A no PIV placed

Definitions Quick Reference Guide

Attempt – Each time a needled punctures the skin. Re-direction of the needle does not count as a new attempt but if the cannula is removed from the patient and then re-inserted, it counts as a new attempt.

Encounter – One health care provider (HCP) IV insertion attempt. A PIV encounter ends with the PIV is either successfully placed, a new HCP takes over the attempt, the attempting HCP leaves the bedside to give the child a break.

Break – Defined by the clinician, where they have stopped trying with the intention of allowing the child to rest/have a break.

Dressing with a Border – A dressing that comes with a pre-made border included.

continued on next page

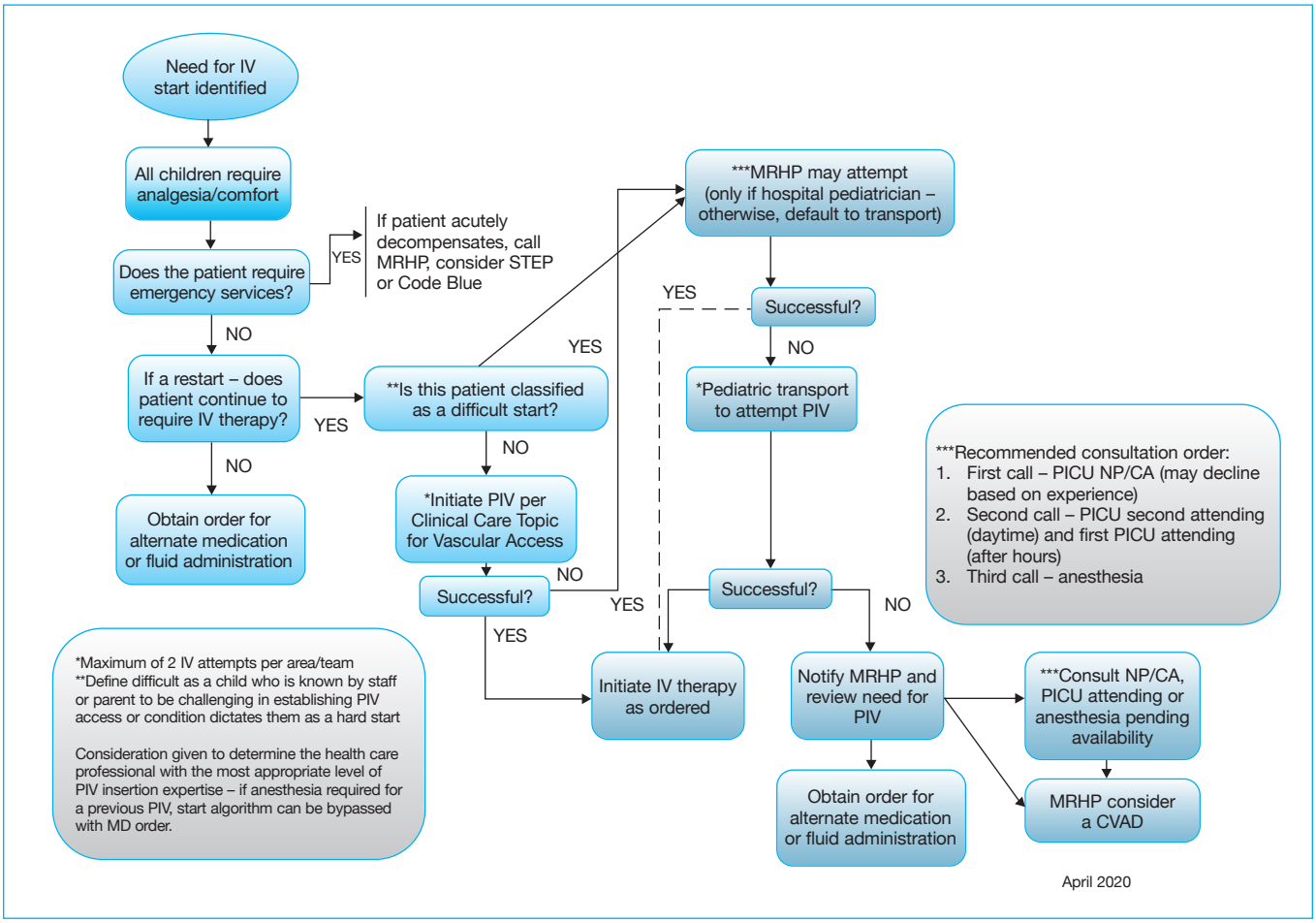
(median, range) for continuous variables. To address the primary objective, a multilevel logistic regression model quantified the association between first-attempt success (outcome variable) and PIV inserter specialist status (explanatory variable), while considering potential modifiers or confounders: patients' age (years), adjuncts (present or absent), and comfort measures (present or absent). A random intercept term was introduced to account for potential clustering of encounters within patients. Given the *a priori* concern regarding age and its linearity with the logit of the outcome, age was log transformed to allow the linearity assumption to be met. From the full model with all covariates and potential interaction terms (see Appendix C), terms were removed one at a time, starting with the most complex terms and highest *p*-value ($p > 0.05$). Any significant interaction terms ($p < 0.05$) were included in the final model to account for

Appendix A. (continued)
Data Collection Form

Attempt	1	2	3	4
SITE ATTEMPTED	1	2	3	4
Scalp				
Right AC				
Right forearm				
Right hand				
Left AC				
Left forearm				
Left hand				
Right saphenous				
Right foot				
Left saphenous				
Left foot				
Other, please describe				
GAUGE OF CANNULA USED	1	2	3	4
24				
22				
20				
18				
Other, please describe				
TYPE OF CANNULA USED	1	2	3	4
SMITH				
Winged Open Acuvance™				
Non-Winged Open Acuvance™				
Winged Open Protective Plus™				
Winged Closed Protective Plus™				
Non-Winged Protecive Plus™				
Non-Winged Closed Viavalve™				
Winged Closed Viavalve™				
BD				
Non-Winged Angiocath™				
Non-Winged Open System Insyte™ Autoguard™				
Winged Open Insyte™ Autoguard™				
Non-Winged Closed System Nexiva™ Diffusics™				
Non-Winged Closed Single Port Nexiva™ Diffusics™				
OTHER, PLEASE DESCRIVE BRAND AND MODEL				
Attempt 1 (please write brand and model)				
Attempt 2 (please write brand and model)				
Attempt 3 (please write brand and model)				
Attempt 4 (please write brand and model)				
ADJUNCTS FOR INSERTION	1	2	3	4
None				
IV light				
Ultrasound				
Other, please describe				
COMFORT MEASURE UTILIZED	1	2	3	4
None				
Topical numbing agent				
Oral sucrose				
Distraction				
Child Life Therapist present				
Comfort holding				
Procedural sedation (i.e., oral, IV, or intranasal Ativan, Midazolam)				
Procedural analgesic (i.e., oral, IV, or intranasal morphine, hydromorphine, fentanyl, ketamine, or dexmedetomidine)				
Other, please describe				
WAS THE ATTEMPT SUCCESSFUL?	Y N	Y N	Y N	Y N
Please check the box that applies				

Please put completed form in the red folder

Appendix B.
Peripheral Intravenous (PIV) Insertion Algorithm



modification of specialty status effect by covariates. There was no deviation from the *a priori* statistical analysis plan. Crude and adjusted associations were presented as adjusted odds ratios (OR; 95% confidence intervals [CI]) with corresponding *p*-values and percentile bootstrap CIs based on 500 replications (Dicicio & Romano, 1988). Bootstrap CIs were used because they do not require an assumption of normality for the sample distribution. There was only one missing data point for exposure and no missing data for explanatory or covariate data. Stata Statistical Software: Release 17 (StatCorp, 2021) was used to conduct the analysis.

Appendix C.
Model Fit Assessment

Full Model: log(p/1-p) = β0 + β1(inserter) + β2(log_age) + β3(comfort) + β4(adjunct) + β5(log_age*comfort) + β6(log_age *adjunct) + β7(comfort*adjunct) + β8(log_age*comfort*adjunct) + β9(inserter*log_age) + β10(inserter*adjunct) + β11(inserter*comfort) + β12(inserter*log_age*comfort) + β13(inserter*log_age*adjunct) + β14(inserter*adjunct*comfort) + β15(inserter*log_age*adjunct*comfort).

The model fit assessment of logistic regression models showed no effect modification and no joint confounding; thus, all interaction terms from the full model were excluded (β5 to β15).

Comparison of the exposure coefficient (β1) did not detect confounding by age and comfort measure. As these covariates (β2 and β3) are neither modifiers nor confounders, they were excluded from the model. The use of adjunct showed a confounding effect of the relationship between inserter specialty and first attempt success of PIV insertion. The final model used for the analysis was: log(p/1-p) = β0 + β1(inserter) + β4(adjunct)

Ethics Approval

Given the quality improvement nature of this project, the Conjoint Health Research Ethics Board of the University waived ethics approval. All data were anonymized, and stored on secured and password-protected servers in a locked office.

Results

Data were collected on 108 patients and 192 PIV encounters. Table 1 describes baseline characteristics of patients and PIV encounters. The median age was 6.37 years (range: 4 days to 20.02 years). Descriptive statistics of PIV encounters, by PIV inserter profession, can be found in Table 2. Based on 192 encounters, 47% of providers were generalists, and 66% had only one insertion attempt. Among these first insertion attempts, 46% were successful. The main reason for PIV insertion was intravenous medication administration (47%). The most common comfort measure used during PIV insertion attempts was topical analgesia (51%). Approximately one-third (34%) of PIV insertion attempts did not use comfort measures. Most PIV insertion attempts (83%) did not use an adjunct.

Specialist PIV inserters, compared to generalists, inserted PIVs in younger patients (median age 3.69 years vs. 9.58 years). Comfort measures were used more on first-attempt PIV insertions by specialists

Table 1.
Descriptive Statistics of Participants (*N* = 108)

Patient Characteristics	
Age in years, median (minimum to maximum)	6.37 (0.01 to 20.02)
Number of encounters, *n* (%)	
1	57 (53)
2	26 (24)
3	17 (16)
4	8 (7)

Table 2.
Descriptive Statistics of Peripheral Intravenous (PIV) Encounters, by PIV Inserter Profession

Encounter Characteristics	Overall (*n* = 192)	Generalist (*n* = 91)	Specialist (*n* = 101)
Age in years, median (minimum to maximum)	6.37 (0.01 to 20.02)	9.58 (0.01 to 20.02)	3.69 (0.01 to 16.96)
Number of PIV insertion attempts per encounter, *n* (%)			
1	127 (66)	65 (71)	62 (61)
2	60 (31)	23 (25)	37 (37)
3	4 (2)	3 (3)	1 (0.99)
4	1 (0.5)	0	1 (0.99)
Reason for IV insertion, *n* (%)[1]			
IV fluid	90 (47)	38 (42)	52 (51)
Blood product	9 (5)	4 (4)	5 (5)
Diagnostic imaging	9 (5)	3 (3)	6 (6)
IV medication	128 (67)	66 (73)	62 (61)
Other (e.g., safety, blood draws)	7 (4)	2 (2)	5 (5)
First-attempt comfort measure, *n* (%)[1]			
None	66 (34)	38 (42)	28 (28)
Topical	97 (51)	47 (52)	50 (50)
Sucrose	20 (10)	4 (4)	16 (16)
Distraction	32 (17)	13 (14)	19 (19)
Comfort holding	16 (8)	2 (2)	14 (14)
Other (e.g., oral or IV analgesics)	3 (2)	1 (1)	2 (2)
First-attempt adjunct for PIV insertion, *n* (%)[1]			
No adjunct	159 (83)	79 (87)	80 (79)
IV light	33 (17)	12 (13)	21 (21)
Ultrasound	9 (5)	3 (3)	6 (6)
Other (e.g., vein finder, flashlight)	2 (1)	0	2 (2)

[1]More than one item may be selected per attempt, thus total greater than 100%.
Note: IQR = interquartile range.

Table 3.
Association Between Specialty of PIV Inserters and First-Attempt PIV Success in Pediatrics[1]
(*N* = 108 Patients; *N* = 192 Encounters)

	Unadjusted OR (95% CI[3]; *p*-value)	Adjusted OR[2] (95% CI[2]; *p*-value)
Specialist inserter vs. generalist	1.60 (0.88 to 2.92; $p = 0.14$)	1.58 (0.82 to 3.21; $p = 0.15$)

[1]Final multilevel logistic regression model: $\log(p/1\text{-}p) = \beta_0 + \beta_1(\text{inserter}) + \beta_2(\text{comfort}) + \beta_3(\text{adjunct}) + u_{patient} = -0.71 + 0.46$ (inserter) + 0.75 (comfort) – 0.45 (adjunct) + $u_{patient}$ where $u_{patient}$ introduces a random intercept for each patient.
[2]Comfort and adjunct use are confounders and adjusted for in the model.
[3]Percentile bootstrapped confidence intervals based on 500 replications.

Notes: PIV = peripheral intravenous, OR = odds ratio, CI = confidence interval.

compared to generalists (72% vs. 58%). The specialist group had more first-attempt success compared to generalists (51% vs. 41%). Multilevel analysis revealed evidence of slight clustering of first-attempt success within patients (intraclass correlation coefficient: 0.037). Patient age did not modify or confound this relationship, and thus, was not included in the final model.

Although use of adjunct agents and comfort measures were not modifiers, they were found to confound the relationship between inserter specialty and first-attempt success, and thus, were included in the model (see Table 3). According to our final model, PIV encounters, when performed by specialists compared to generalists, had an adjusted OR of 1.58 (95% CI: 0.82 to 3.21, $p = 0.15$) for first-attempt success (adjusted for use of comfort measures and adjuncts).

Discussion

In the current paper, we considered PIV inserters' speciality in association with first-attempt success. We found that specialist inserters, compared to generalists, had a higher first-attempt success, and used more adjuncts and comfort measures. Given the point estimate and *p*-value approaching significance, there may be some association between inserter specialization and first-attempt success. This analysis should be viewed as evidence to support the need for a larger, more rigorous, study to investigate the association between inserter specialization and first-attempt success.

Though our data lack statistical significance, results were consistent with previous literature related to adult populations that specialty training of PIV inserters may contribute to first-attempt success and improved patient experience (Bosma & Jewesson, 2002; Fujioka et al., 2020; Marsh et al., 2018; O'Reilly-Shah et al., 2021; Steere et al., 2020). Current data are a valuable addition to the current pediatric literature, suggesting improvements in PIV first-attempt success rates among pediatric nurses with specialized training in the North American context (Goodfriend et al., 2020; Hartman et al., 2018; Hassanein et al., 2021; Kleidon et al., 2019; Larsen et al., 2010).

Our project highlights the need for skill competence in medical procedures in both training and frequency of procedure performance. Inconsistent training standards for PIV insertion may contribute to the lack of confidence in inserters and multiple attempts for PIV insertion, thus negatively impacting patient experience. PIV insertion training in nursing and medical education primarily occurs during undergraduate education (Engum et al., 2003). Many new graduate nurses and physicians lack the confidence and skill to insert PIVs in adults, let alone in children. Only 43% of health care institutions include PIV insertion training in nursing orientation. When less experienced nurses have limited time, they are more likely to request help from specialist trained nurses (Sandström & Forsberg, 2018). In a survey of adult health centers in Canada and the United States, despite over 90% of patients receiving PIV insertions, only 54% of institutions spent between one to five hours on PIV education, and 38% spent less than one hour on PIV insertion for their staff (Hunter et al., 2018). In contrast, specialist insertion teams receive annual dedicated PIV insertion training, which reduces the number of attempts required for successful PIV insertion (Engum et al., 2003; O'Reilly-Shah et al., 2021). Furthermore, when PIV insertion is done by specialists, the number insertions per year increases dramatically. In the literature on ultrasound-guided PIV insertion, first-attempt success rates are directly related to the number of ultrasound-guided insertions performed in the first months of practice (Anderson et al., 2022; Hackett et al., 2021; Kleidon et al., 2021). It is likely that with a larger number of PIV insertion encounters, specialist inserters gain more competence.

Training, ongoing education, and development of speciality PIV teams come with significant costs to the health care system. Without clear evidence of improved patient experience, decreased adverse events, and cost savings, implementation of these programs would be ill-advised. Because these data are likely underpowered, and our adjusted point estimate approaches significance, we suggest our results point to the need for a larger, more rigorous study to determine the true nature of this relationship.

To our knowledge, this is one of the first papers describing PIV insertion practices in general pediatric inpatient units. We directly examined the relationship between inserter specialization and first-attempt success in pediatric PIV

insertion. This analysis is strengthened by its prospective data collection and conduct at a tertiary pediatric hospital across multiple pediatric units. We used rigorous statistical methodology to assess potential modifiers and confounders in the complex relationship between specialist PIV inserter status and first-attempt success. Using a tailored case report form that PIV inserters filled out immediately after each encounter, we collected all potential data points that could impact PIV insertion success. Only one outcome data point was missing, with no other variables having missing data.

Limitations

Our study has some limitations. Given there were only 192 PIV encounters included in our data, it is likely we did not possess enough power to identify a significant relationship between specialist status and first-attempt success. A second limitation is the exclusion of an important confounder: evaluation of a PIV insertion to be of high difficulty. Children identified to have a difficult PIV insertion will increase the likelihood of a specialist inserter being asked to insert the PIV. It is likely that the specialist group, as compared to the generalist group, has a higher proportion of children who are difficult PIV insertions that may require multiple attempts. This unmeasured confounder would bias our estimate towards the null. As a result, our reported effect estimate of inserter status on first-attempt success is likely underestimated. We did not collect data on the number of specialist inserters available on-shift or the time they spend providing comfort measures. We also did not gather data on parental attitude(s) toward peripheral IV insertion. Future studies examining the relationship between inserter status and first-attempt success should include data on expected PIV insertion difficulty using validated tools (e.g., Difficult Intravenous Access [DIVA] tool), the number of specialists available on-shift, and parental attitudes.

Conclusion

At Alberta Children's Hospital, decreasing complications associated with PIVs are a point of priority to improve patient care. The impact on both inserters and patients of unsuccessful PIV insertions are becoming increasingly evident, including anxiety, health care avoidance, and post-traumatic stress (Kennedy et al., 2008; Taddio et al., 2010). A reduction in complications from PIVs can be achieved by improving first-attempt success rates. Although PIV insertion is the most common procedure that occurs to hospitalized children, the procedure itself is complicated, and its long-term impact to patients and health care systems are underestimated. Further research in this area is essential and must be adequately powered, adjust for all potential confounders, and include a rigorous analysis that accounts for multiple encounters and attempts during a PIV insertion course. Such research will further require complex statistical techniques that involve multiple levels, clusters, and potential for non-independence. Furthermore, implementation of specialist PIV insertion teams is not without cost to the health care system. Therefore, strong evidence to support the need for these teams is essential to provide evidence to support funding of such programs.

The use of specialist inserters for PIV insertions may result in improved experiences for patients, including increased use of comfort measures and increased first-attempt success rates. However, these teams are costly, and clear evidence is needed to guide implementation. It is imperative that the relationship between specialist inserters and first-attempt PIV success is elucidated to make evidence-informed decisions to improve patient care.

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