



## Differences in the child, mother, and nurses' pain score measurements during pediatric venipuncture

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### ABSTRACT

**Background:** Self-reporting is the gold standard for measuring pain in adult pain management; however, this issue is unique and different in children. Accurate pain assessment for the appropriate management of children's pain is important.

**Purpose:** This study was conducted to assess the pain level by the child, mother, and nurse during intravenous line insertion in preschool children, candidates for surgery in Tabriz Children's Hospital.

**Design and methods:** This is descriptive observational study. A total of 140 eligible children were included in the study using convenience and sequential methods. The intravenous line was inserted by an experienced nurse and pain assessment was performed by the child, mother, and nurse immediately after procedure, using the Wong-Baker face scale (WBFS). The data were analyzed through descriptive statistics and repeated measures ANOVA test using SPSS version 13 software.

**Results:** The difference between child-mother and nurse-mother mean scores was not statistically significant; however, there was a statistically significant difference between the score measured by the child and the nurse ( $P = 0.017$ ).

**Conclusion:** The children's pain assessment score during venipuncture was higher than that of mothers and nurses. The mothers' score was more closely related to the children's score. As a result, a mother's assessment can be considered a reliable estimation of proper pain management in young children and mothers can act as a moderator and actualize the nurses' score. Consequently, establishing a three-way communication between mother, child, and nurses is necessary to precisely estimate the child's actual pain and take appropriate measures to reduce it.

### Introduction

Uncontrolled pain in children causes changes in the function of the pain processing system and sensitivity to pain in the future (Noel et al., 2017). Pain management is one of the most important aspects of health care (Hockenberry & Wilson, 2018). Proper pain assessment is an essential part of pain management (Palomaa et al., 2023), which is necessary to ensure optimal comfort for children during hospitalization (Hockenberry & Wilson, 2018; Trottier et al., 2022).

Self-reporting of pain is the gold standard for measuring pain in adult pain management; however, it is unique and distinct in children and infants. The core problem in children's pain assessment is the possible difference between perception, experience, and expression (Davidson et al., 2016; Hockenberry & Wilson, 2018). Some children are not able to

explain their pain or understand the underlying cause of it; therefore, when assessing pain, it is necessary to consider age (Göthesson et al., 2023), developmental and cognitive level (Lotan & Icht, 2023), communication skills (Payson et al., 2022), and previous experiences of pain (Kahsay, 2017). Accordingly, the pain assessment involves children, parents, and healthcare providers. It should also be integrated into all clinical care (Palomaa et al., 2023; Vakili et al., 2015). Thus, if a child is unable to report their pain or concerns persist about the validity of the pain score, parents and nurses play a critical role in diagnosing and evaluating the child's pain (Hockenberry & Wilson, 2018).

In preverbal children, nurses usually use their previous experiences to interpret the child's and parents' observations and information (Andersen et al., 2019). Therefore, the role of the children's nurse is key to pain assessment and control and ensuring a regular, objective, and

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reliable pain assessment (da Cunha Batalha & Sousa, 2018; Mahon et al., 2023). However, there is a striking inability of the medical community to recognize and quantify pediatric pain. Misperceptions of children's pain are mainly attributed to pain assessment with qualitative nature (Manocha & Taneja, 2016). Although an alternative measure in children unable to self-report pain is assessing and reporting pain by parents or primary caregivers (Herr et al., 2019; Murgia et al., 2019), the validity of this approach is still undefined. Some researchers have found that parent-reported pain scores have a good (Khin Hla et al., 2014; Lifland et al., 2018) or moderate correlation with their child's scores (Andersen et al., 2019; da Cunha Batalha & Sousa, 2018), while a systematic review conducted in this regard show no strong correlation between the child's self-report and parent scores. The authors state that children often experience pain not reported by their parents, which leads to poor agreement between pain reports from two sources; therefore, it is impossible to recognize the more valid report (Kamper et al., 2016). On the other hand, some researchers believe parents tend to overestimate the severity of their child's pain (Ndengeyngoma et al., 2023).

In order to make effective decisions for pain management, it is essential to understand how close the nurses' assessment is to the child's self-report of pain (Andersen et al., 2019). However, regarding the agreement between the pain ratings by children, parents, and nurses, the results are contradictory (Kamper et al., 2016; Zontag et al., 2022). Furthermore, there is no conclusive evidence regarding the ability of healthcare professionals to reliably understand pain when they independently evaluate a child's pain (Crellin et al., 2018). A study conducted in Canada showed that half to three-quarters of infants and children experience moderate to severe pain during hospitalization in a level 3 hospital; however, the maximum pain score determined by the healthcare providers is significantly lower than the children's experience (Senger et al., 2021). Therefore, nurses must avoid relying solely on parents' interpretations or their own perceptions when assessing children's pain (Eull et al., 2023; Rybojad et al., 2022). This study was conducted to investigate the agreement between pain reported by the child, parents, and nurse during venipuncture.

## Materials and methods

This descriptive observational study was conducted in Tabriz Children's Hospital from June 2020 to February 2021. The aim of the study was to investigate the agreement of the pain report between children, parents, and nurses (Registration number 183–95 and Ethic code: IR.TBZMED.REC.1395.134). Inclusion criteria included 3–6 years of age, full consciousness and physiological stability, no intellectual disability, no pain caused by any other problem or disease during line insertion, and no consumption of painkillers, sedatives, muscle relaxants, or corticosteroids. The exclusion criterion included failure to insert a venous line at the first attempt and the child's refusal to select a face after the procedure. Mothers' inclusion criteria included the lack of mental disorders and the ability to evaluate the child's pain. The inclusion criterion for nurses was at least 6 months of work experience in pediatric wards. All children's pain was evaluated by an expert pediatric nurse as a co-researcher. To determine the sample size, G Power software was used (F test, ANOVA: One-way), considering the Effect size = 0.25,  $\alpha$  = 0.05, and Power = 80%, and 156 children were entered into the study. Since the gold standard for pain intensity is self-reporting, the study sample size was determined for children, and each child's mother was present by them. There were 16 nurses working in the ward, and each nurse performed an average of 7–8 children's pain assessments.

Sampling was performed using the convenience method. In order to access the samples, the researcher attended the surgery department at the end of the morning shifts and selected children who met the inclusion criteria, those who were candidates for surgery the following day, and had the physician's order to receive an intravenous line. All eligible children were placed on the line insertion bed in the presence of their mother, and the venous line was placed on the peripheral vessels of the

non-dominant hand by a trained nurse colleague using Angioket number 22 made by Bıçakçılar company. The pain was assessed by the child, the mother, and the co-researcher nurse using the Wong-Baker Faces Scale (WBFS). To this end, six different faces were shown to the child, the mother, and the nurse, immediately after the IV insertion, and they were asked to assign a score between 0 and 10 according to the child's facial expression. The validity and reliability of this tool have already been confirmed in patients in emergency departments and other wards (Garra et al., 2010; Savino et al., 2013; Tomlinson et al., 2010). The data were analyzed using descriptive statistics (mean, standard deviation, frequency, and percentage) and Repeated-measures ANOVA after confirming their normality through the Kolmogorov-Smirnov test. P-Value <0.05 was considered statistically significant.

## Ethical considerations

The researcher explained the study objectives and its implementation to the participants. Afterward, written informed consent was obtained from the parents and nurses, and oral consent from the children. To ensure participants' comfort and privacy, the procedure was performed in the working room of the ward, where the noise, light, and temperature were in a safe and non-harmful range. Moreover, in all cases, the mother was sitting in an armchair and was present next to the child during the venipuncture. In order to maintain confidentiality, all children's demographic information form was anonymous and identified with a code. Routine pain control measures, such as talking to the child and mental occupation, were performed by the staff and the mother during the procedure for all children. Except for the researcher, no one had access to the collected data, which were stored on the researcher's personal computer.

## Results

A total of 156 eligible children (their mothers and nurses) were included in the study, sixteen of whom were excluded due to the failure of venipuncture at the first attempt or refusing to select a face. Ultimately, the data of 140 children, their mothers, and nurses were analyzed. The demographic characteristics of the children, mothers, and nurses participating in the study are shown in Table 1.

**Table 1**  
Demographic characteristics of participating children, Mothers and nurses.

Variable		N (%)	Mean $\pm$ std	Max	Min
Children	Sex	87 (61.2%)			
	Male	53 (37.9%)			
	Female				
	Age	–	4.50 $\pm$ 1.05	6	3
Weight (kg)	–	17.9 $\pm$ 3.58	27	10	
Nurses	Sex	–			
	Male				
	Female	–140 (100%)			
	Age	–	34.36 $\pm$ 6.83	48	22
Work experiences	1-5 year 5 (31.2%) 6-10 year 7 (43.7%) 11-15 year 3 (18.8%) $\geq$ 16 year 1 (6.3%)	–	29.35 $\pm$ 6.24	39	20
Mothers	Age	–			
	Education level	High school (31.1%) School diploma (58.2%) Higher than Diploma (10.7%)			

The mean and standard deviation of pain score measured by the child, mother, and nurse were  $7.36 \pm 0.19$ ,  $7.21 \pm 0.21$ , and  $7.03 \pm 0.24$ , respectively (Table 2).

Repeated-measures ANOVA showed a significant difference in the pain score assessed by the child, mother, and nurse ( $p = 0.021$ ). In the pairwise comparison of the pain scores measured by the child, mother, and nurse, the mean score given by the child and mother did not have a statistically significant difference; however, there was a statistically significant difference between the score measured by the child and the nurse ( $P = 0.017$ ) (Table 3).

## Discussion

The aim of this study was to investigate the agreement between the report of pain intensity by the child, parent, and nurse during the insertion of a peripheral venous line. The results showed that the pain score assessed by young children during venipuncture was higher than that scored by the mother and the nurse, which was statistically significant. In line with our study, Rybojad's study showed that compared to the children themselves and their parents, nurses tended to assign lower pain scores for children (Rybojad et al., 2022). In contrast to our study, in Lifland's study conducted in the United States from 2012 to 2015 in children and adolescents aged 8–18 years, there was a high agreement between the pain severity reported by the child and that assessed by the parents (Lifland et al., 2018). In the study by da Cunha, in which the pain severity in 64 children aged 5 to 17 years was assessed by parents and nurses, there was a moderate correlation between pain ratings reported by children and parents and between children and nurses (da Cunha Batalha & Sousa, 2018). In Kamper's study, conducted on 10 to 14-year-old children, although parent reports of child pain intensity did not correlate well with child self-reports, the authors stated that it was not far-fetched to expect that if the pain was more severe and lasted longer, parents and children's scores could be in better agreement. However, it is not acceptable to consider the two reports of pain (by the child and the parents) instead of each other (Kamper et al., 2016). Therefore, healthcare providers should not rely only on their own or parents' assessments when managing pain. Parents' and nurses' understanding of children's pain should only be considered as an estimation rather than expression of pain experienced by children (Rybojad et al., 2022).

In our study, the difference in the scores reported by the mother and the child was slight, and there was no statistically significant difference between the two. However, the score reported by the nurse had a statistically significant difference from the child's score. A similar result was obtained in a study conducted by Rybojad on children and adolescents aged six months to 18 years in the Netherlands, in which pain assessment by parents and the children was close to each other; however, nurses reported a lower pain score compared to the children and their parents (Rybojad et al., 2022). In Walther-Larsen's study, it is shown that despite the high prevalence of pain in hospitalized children, it is not continuously assessed by physicians, and when it is done, rated pain scores are often lower than the scores of children and their parents (Walther-Larsen et al., 2017).

Similar results were obtained in Khin's study conducted in Australia to investigate the difference in pain assessment between children, parents, and nurses in the immediate postoperative period. In this study, 307 children aged 1–13 participated, of whom 207 were able to express

**Table 2**

Mean and SD of pain scores measured by the child, mother, and the nurse.

Wong score	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Child	7.364	0.19	6.97	7.75
Mother	7.214	0.21	6.79	7.63
Nurse	7.036	0.24	6.55	7.51

**Table 3**

Pairwise comparison of pain scores measured by the child, mother, and the nurse.

Wong Pain score		Mean Difference	Std. Error	P Value	95% Confidence Interval	
					Lower Bound	Upper Bound
Child	Mother	0.15	0.09	0.3	-0.07	0.37
	Nurse	0.32	0.11	0.01	0.04	0.61
Mother	Child	-0.15	0.09	0.3	-0.37	0.07
	Nurse	0.17	0.1	0.28	-0.07	0.43
Nurse	Child	-0.32	0.11	0.01	-0.61	-0.04
	Mother	-0.17	0.1	0.28	-0.43	0.07

their pain, and 100 were not; the nurses reported a lower pain score than the parents and the children. Pain scores reported by children who were able to rate pain were well correlated with scores assigned by parents (Khin Hla et al., 2014). When there was no possibility of self-evaluation for the child, the evaluations recorded by the parents could be preferred due to their similarity to the children's assessment (Zontag et al., 2022). In other words, children's self-report of pain should be used for pain management wherever possible (Khin Hla et al., 2014). However, in situations such as pain assessment after receiving painkillers (Zontag et al., 2022) and in children who are not yet able to determine their pain score, the score determined by parents can be used as an alternative and reliable measure (Khin Hla et al., 2014).

Another important finding of our study was that the pain score evaluated by the mother and the nurse were not too dissimilar to create a statistically significant difference. Therefore, the mother's assessment can act as a mediator, confirm the child's score, adjust the nurse's score, and bring it closer to reality. On the other hand, this finding shows that cooperation between healthcare professionals, parents, and sick children is necessary for better pain assessment. It should also be considered that children's self-reports and parents' assessments are of particular importance in pain management (Palomaa et al., 2023; Rybojad et al., 2022). In this regard, in Jordan's study, the "pain talk" process was introduced to promote the cooperation and participation of children and their parents in discussing and making decisions about pain management using informational support. This process includes nurses talking with children and parents about previous pain experiences and current concerns and creating interaction opportunities for children and parents (Jordan et al., 2021).

On the other hand, the new model for pain management in children transforms the nurse's role from gatekeeper to the facilitator, shifting the process from nurse-driven to patient-centered (Eull et al., 2023). Consequently, discomfort and probable adverse effects are minimized, and optimal pain management is promoted (Jordan et al., 2021). In his qualitative study on postoperative pain management in 6–11-year-old children, Bakir showed the complexity and multidimensionality of child-parent interactions. He stated that parents had an interpersonal interaction with their children without nurses being part of it. They also had another personal interaction with nurses in which their children were not included, which indicated that parents had a fundamental communication role in the interaction between the nurse and child (Bakir et al., 2022). Therefore, although it is essential to fully consider parents' assessment in the children's pain assessment, the possibility of parents' tendency to overestimate their child's pain should also be taken into account. As in Kang's study, the agreement in pain severity assessment between children and parents was high (Kang et al., 2020), while it was underestimated by doctors and nurses (Brudvik et al., 2017; Kang et al., 2020), leading to poor pain treatment in children (Khin Hla et al., 2014).

## Limitations

Factors such as ward overcrowding, extra noise, and the child's mood, which were beyond the researcher's control, are considered

limitations of this study. Another limitation is related to the sample size, which may weaken the generalizability of the results; however, the sample size was sufficient to perform statistical analysis.

### Implications for practice

In the present study, the pain score self-reported by the child was higher than that reported by parents and nurses; however, the agreement between parents and children's assessment was high. As a result, parents' assessment can be considered a reliable evaluation for properly managing pain in children. Moreover, since the score obtained from the mothers' assessment was not significantly different from that of the nurse, the mother can act as a mediator, adjust the nurse's score, and bring it closer to reality. The results of this study highlighted the need for cooperation between nurses, mothers, and children for better pain management in children. Therefore, by establishing close and trust-based relationships with mothers, nurses can have a correct estimate of children's pain and take appropriate measures to control it.

### Conclusion

A minor difference was observed between the pain measurement of preschool children and their mothers; therefore, in cases where children's self-report is not feasible or reliable for any reason, the mother's assessment, along with nurse's measurement and experience, are reliable and helpful for better pain management in children. Consequently, establishing three-way communication between mother, child, and nurses is necessary to precisely estimate the child's actual pain and take appropriate measures to reduce it.

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### Declaration of Competing Interest

The authors declare no conflict of interest.

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