

Nursing experiences and knowledge of paediatric delirium: Analysing knowledge-practice gaps

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Abstract

Background: Delirium commonly occurs in paediatric patients with acute critical illness and negatively affects clinical outcomes. Variations in delirium knowledge levels and its management have been noted among nurses.

Aims: This study investigated nurses' experiences and knowledge levels regarding paediatric delirium. Additionally, we aimed to assess the gap between knowledge levels and practical experiences with paediatric delirium.

Study Design: This cross-sectional descriptive study conveniently sampled paediatric nurses from a university hospital in South Korea between September 2022 and March 2023. Nursing experiences with paediatric delirium and delirium knowledge levels were measured using structured survey questionnaires. Delirium knowledge was scored 0 to 47, and higher scores indicated higher levels of delirium-related knowledge. Data were analysed using descriptive statistics and presented as mean, standard deviation, frequency and percentage.

Results: A total of 127 paediatric nurses participated in this study; 40.2% had experience with 1–5 delirium cases in the previous year, and 86.6% ($n = 110$) had never used assessment tools for paediatric delirium assessment. The mean total delirium knowledge score was 34.45 ± 5.4 ; the mean scores of knowledge regarding aetiology, signs and symptoms and nursing management of delirium were 8.93 ± 1.31 , 13.24 ± 2.81 and 12.3 ± 2.7 , respectively. Interventions associated with a lower level of delirium-related knowledge and a lower performance rate included avoiding restraint use and maintaining hydration and electrolyte levels. Interventions associated with a higher level of delirium-related knowledge but a lower rate of performance comprised providing orientation, offering emotional support, allowing participants to stay with family members and administering medications to manage delirium.

Conclusions: Although nurses working in paediatric units exhibited high rate of delirium nursing care, there was the gap between their delirium-related knowledge and

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practice. Nurses need to be aware of the insufficient part of delirium care, and paediatric delirium education should be reinforced.

Relevance to Clinical Practice: Preventing, assessing and systematically managing paediatric delirium is crucial, and considering the study results, delirium education among nurses is needed.

KEYWORDS

knowledge, neonate, nurse, paediatric delirium, performance

1 | INTRODUCTION

Delirium is the acute onset of disturbances in attention, awareness, cognition and consciousness resulting from an underlying medical condition.¹ Delirium is categorized into hyperactive, hypoactive and mixed types.² Hyperactive delirium is more common in adult patients and is characterized by restlessness, agitation, and increased psychomotor activity.² Paediatric delirium has been reported not only in toddlers, pre-schoolers and older children but also in neonates and infants and is recognized as a potentially significant factor in child development.^{3,4} In children, hypoactive delirium, characterized by slow speech, psychomotor retardation, somnolence and mixed delirium, is more commonly observed than hyperactive delirium.⁵ Infantile delirium can include characteristics related to arching, agitation, inattention, inconsolability, insomnia, lack of recognition of familiar individuals, restlessness, climbing, self-extubation, unplanned removal of lines, sleep-wake cycle reversal and wiggling.⁶

A recent systematic review indicated that paediatric delirium occurs in approximately 34% of critical care admissions,⁷ impacting an estimated 10%–44% of hospitalized paediatric patients.⁸ Additionally, approximately 22.4% of infants exhibit positive results in delirium screening, with a higher prevalence observed among children undergoing invasive mechanical ventilation and those with underlying neurological disorders.⁹ The prevalence and presentation of delirium in children can vary based on underlying causes, such as illnesses, infections, or exposure to certain medications. This is associated with the cumulative doses of benzodiazepines and opioids, number of sedatives used, sedation, and cardiothoracic surgery.¹⁰ Environmental factors such as light and sound, use of restraints and absence of family members can affect paediatric delirium.³ Paediatric delirium leads to prolonged mechanical ventilation, extended hospital stay, increased mortality and health care costs, decreased quality of life and post-traumatic stress disorder after discharge.^{7,11,12}

Hence, the recognition and diagnosis of delirium in children require careful assessment by health care professionals experienced in paediatrics. To assess paediatric delirium, several tools such as the Paediatric or preschool Confusion Assessment Method for the intensive care unit (pCAM-ICU or psCAM-ICU, respectively); Cornell Assessment of Paediatric Delirium (CAPD); Paediatric Anaesthesia Emergence Delirium (PAED); and Sophia Observation Withdrawal

What is known about the topic

- Paediatric delirium is a severe neuropsychiatric condition that can acutely manifest in individuals of all age groups, including infants, children and adolescents, and has characteristics that are distinct from those of adult delirium.
- Hypoactive and mixed delirium types are more common in children.

What this paper adds

- Paediatric nurses reported the importance of paediatric delirium management; however, they had limited experience using paediatric delirium assessment tools, and their knowledge levels regarding environmental management and pharmacological management were low.

Symptoms – Paediatric Delirium (SOS-PD) scales have been developed.^{13,14} However, the rate of paediatric delirium screening varies, and nurses report difficulty completing delirium assessments and a lack of knowledge regarding screening infants and children with developmental delays or mechanical ventilation.^{15–17} Given that these issues constitute critical aspects of paediatric delirium management, assessing the knowledge and proficiency of paediatric health care teams is important for establishing effective interventions in paediatric care.

Therefore, it is essential to explore how paediatric nurses perceive and address these issues and identify gaps between knowledge and practice. This groundwork is necessary for the prevention of paediatric delirium and development of interventions.

2 | AIM AND OBJECTIVES OF THE STUDY

This study aimed to investigate nurses' experiences with paediatric delirium, focusing on assessments and interventions and examining their perceptions and levels of knowledge about delirium. Additionally, we analysed the knowledge levels and performance rates of delirium management to identify the priorities for nursing paediatric delirium.

3 | DESIGN AND METHODS

3.1 | Setting and participants

This cross-sectional descriptive study used a convenience sample of nurses working in paediatric units recruited from a university hospital (1104 beds) in a metropolitan city in South Korea between September 2022 and March 2023. The paediatric units admit children with acute illnesses who need treatment, provide perioperative care for emergency and cardiac surgery, and manage exacerbation of chronic conditions in children. Nurses working in general wards also often care for severely ill paediatric patients requiring critical care. At the university hospital, information on delirium assessment tools is provided in the electronic record system for nurses and irregular education for delirium management would be provided by nurse educators and physicians. Newly graduated nurses with less than 6 months of clinical experience were excluded. The research was advertised through the hospital's online bulletin board and paediatric ward announcements.

The nurses were informed of the study purpose and methods, and those who provided informed consent to participate could access a link to an online survey (Google survey). Participants were informed that their participation was voluntary and confidential. The participants could withdraw from the study at any time without any consequences. All questions in the online survey were set as mandatory to minimize non-response errors. Moreover, we did not allow duplicate participation in the survey. We collected e-mail addresses and phone numbers for compensation purposes and for verifying duplicate entries, and they were promptly deleted thereafter. A total of 137 respondents participated, but after excluding those who did not meet the inclusion criteria, 127 nurses working in paediatric units, including wards, intensive care units, emergency departments and outpatient clinics were included in the analysis.

3.2 | Data collection tools and methods

The general characteristics included age, sex, educational level, total years of clinical experience, years of specific clinical experience in a paediatric unit and present working unit. Paediatric delirium-related nursing experiences included the presence of delirium nursing experience (yes/no), experience with delirium cases in the previous year (number of cases), nursing interventions and medications used for delirium, delirium assessment experience using assessment tools and the name of tools used to assess delirium. Additionally, participants were asked about their perceptions of and thoughts on delirium, such as its preventability, treatability and importance as a nursing problem. The survey questions were validated by a paediatrician with over 10 years of experience and two paediatric nurses with doctoral degrees, all of whom were experts in paediatric delirium.

Delirium knowledge levels were measured using the delirium knowledge questionnaire, which was first developed by Lee et al.¹⁸ to

measure knowledge regarding delirium among Korean nurses caring for older adults and then modified by Lim and Park¹⁹ to measure knowledge among nurses working in neonatal intensive care units. The questionnaire comprises 47 items that can be categorized into three domains: aetiology, signs and symptoms and nursing management of delirium. Each item is scored as 0 (incorrect or unsure answer) or 1 (correct answer), with higher scores indicating greater levels of knowledge regarding delirium. The content validity index (CVI) for items ranged from 0.67 to 1.0, and the CVI for the scale was 0.96.¹⁹ Cronbach's alpha was 0.74 in the study by Lim and Park¹⁹ and was 0.70 in this study.

3.3 | Data analysis

Descriptive statistics (means, standard deviations, frequencies and percentages) were used to summarize the general characteristics, paediatric delirium-related nursing experiences and nurses' perceptions and knowledge levels of delirium. A contingency table was used to analyse infrequently performed nursing interventions and related knowledge levels regarding delirium to identify target priorities for paediatric delirium management. In addition, the Shapiro-Wilk test was performed to evaluate the distribution of continuous variables, such as years of clinical experience and scores of delirium-related knowledge. The Mann-Whitney *U* and Spearman's rank correlation tests were employed to identify the association of nurses' education level or years of total clinical experience with delirium-related knowledge level. Data were analysed using IBM SPSS Statistics (version 25.0; IBM Corp., Armonk, NY, USA).

3.4 | Ethical and institutional approvals

This study was approved by the Institutional Review Board of the university (No. 40525-202 103-HR-001-04).

4 | RESULTS

4.1 | General characteristics of study participants

The general characteristics of the participating nurses are summarized in Table 1. The mean age of the nurses was 33.8 ± 7.2 years, and all nurses were women. The majority had bachelor's degrees (74%, $n = 94$), and all nurses had an average of 9.1 ± 7.2 years of clinical experience. In particular, nurses had an average of 6.2 ± 4.8 years of clinical experience in a paediatric unit. Of the nurses, 38.6% ($n = 49$) worked in paediatric wards, 22% ($n = 28$) worked in neonatal intensive care units, and 11.8% ($n = 15$) worked in paediatric intensive care units. Furthermore, 18.9% ($n = 24$) of the nurses worked in two or more units including paediatric and neonatal intensive care units, general wards and emergency departments.

TABLE 1 General characteristics of participants (N = 127).

Variables	Category	N (%)	M ± SD
Age (years)			33.8 ± 7.17
	≤29	54 (42.5)	
	30–39	52 (41.0)	
	≥40	21 (16.5)	
Education level	Bachelor	94 (74.0)	
	Master or higher	33 (26.0)	
Total clinical experience(years)			9.05 ± 7.23
	<3	18 (14.2)	
	3–4	20 (15.7)	
	5–9	53 (41.7)	
	>10	36 (28.3)	
Clinical experience in a paediatric unit (year)			6.15 ± 4.81
	<3	18 (14.2)	
	3–4	20 (15.7)	
	5–9	53 (41.8)	
	>10	36 (28.3)	
Working units	PICU	15 (11.8)	
	NICU	28 (22.0)	
	Ward	49 (38.6)	
	PED	5 (3.9)	
	Outpatient clinic	6 (4.7)	
	Two or more units above	24 (18.9)	

Abbreviations: M, mean; NICU, neonatal intensive care unit; PED, paediatric emergency department; PICU, paediatric intensive care unit; SD, standard deviation.

4.2 | Experiences of nurses with paediatric delirium

Data on the nurses' experiences with paediatric delirium are presented in Table 2. A total of 71.1% of the nurses ($n = 91$) had experience with caring for cases with paediatric delirium, and 40.2% ($n = 51$) had nursing experience with 1–5 delirium cases in the previous year. The most frequently performed nursing interventions for paediatric delirium were maintaining a safe environment (66.9%, $n = 85$), creating a quiet and comfortable environment (66.1%, $n = 81$) and eliminating unnecessary stimulation (63%, $n = 80$). In contrast, the interventions that were performed less frequently included maintaining hydration and electrolyte levels (26.8%, $n = 34$) and providing orientation (32.3%, $n = 41$). The most commonly used medication for paediatric delirium was lorazepam (72.4%, $n = 92$), followed by haloperidol (62.2%, $n = 79$). The majority had no experience with paediatric delirium assessments (86.6%, $n = 110$), and some nurses (20.4%, $n = 26$) had experience using the CAM-ICU, pCAM-ICU, or the delirium rating scale. Nevertheless, 98.4% of the nurses ($n = 125$) perceived the importance of paediatric delirium as a nursing problem, and most believed that paediatric delirium was preventable and treatable (62.2% and 91.3%, respectively).

4.3 | Knowledge regarding delirium

Knowledge levels of nurses regarding delirium are presented in Table 3. The mean total score was 34.45 ± 5.4 ; the mean scores of knowledge regarding aetiology, signs and symptoms and nursing management of delirium were 8.93 ± 1.31 , 13.24 ± 2.81 and 12.28 ± 2.70 , respectively. The specific questions and correct answer rates are presented in Supplementary Tables 1–3. Total delirium-related knowledge scores were greater in the master's degree or higher group (35.1 ± 5.1) than in the bachelor's degree group (34.2 ± 5.5); however, a significant difference was not found ($Z = -.727$, $p = .467$). Moreover, delirium-related knowledge was not significantly associated with years of total clinical experience (Spearman's $\rho = .082$, $p = .360$).

Additional analyses were conducted to examine the interventions that were performed less frequently and related knowledge levels regarding delirium (Table 4). For example, the performance/non-performance rates of 'avoiding restraint use' and the correct/incorrect answer rates of a related question, 'physical restraint can be applied in controlling delirium symptoms', which are included in the delirium knowledge questionnaire under the nursing management for delirium category, were compared. The results showed that interventions with a lower level of related knowledge and a lower rate of performance included 'avoiding restraint use' and 'maintaining hydration

TABLE 2 Experience of nurses with paediatric delirium (N = 127).

Variables	Category	N (%)
Delirium nursing experiences	Yes	91 (71.7)
	No	36 (28.3)
Number of delirium nursing experiences in last 1 year	None	64 (50.4)
	1–5	51 (40.2)
	6–10	5 (3.9)
	11–15	7 (5.5)
Nursing interventions used for delirium ^a	Avoided restraint use	61 (48.0)
	Created a quiet and comfortable environment	84 (66.1)
	Provided orientations	41 (32.3)
	Eliminated unnecessary stimulation	80 (63.0)
	Provided emotional supports	65 (51.2)
	Allowed to stay with family members	64 (50.4)
	Maintained a safe environment	85 (66.9)
	Kept hydration and electrolyte levels	34 (26.8)
	Administered medications	62 (48.8)
	Medications used for delirium ^a	Haloperidol
Olanzapine		21 (16.5)
Midazolam		42 (33.9)
Lorazepam		92 (72.4)
Chlorpromazine		17 (13.4)
Risperidone		47 (37.0)
Delirium assessment using assessment tools	Fentanyl	40 (31.5)
	Yes	17 (13.4)
Assessment tools used for delirium ^a	No	110 (86.6)
	CAM-ICU, pCAM-ICU	13 (10.2)
	Delirium rating scale	13 (10.2)
	CAPD	9 (7.1)
Delirium importance as a nursing problem	PAED	8 (6.3)
	Very important	50 (39.4)
	Moderately important	75 (59.0)
Preventability of delirium	Not important	2 (1.6)
	Preventable	79 (62.2)
Treatability of delirium	Non-preventable	48 (37.8)
	Treatable	116 (91.3)
	Non-treatable	11 (8.7)

Abbreviations: CAM-ICU, confusion assessment method for the intensive care unit; CAPD, Cornell assessment of paediatric delirium; M, mean; PAED, paediatric anaesthesia emergence delirium scale; pCAM-ICU, paediatric confusion assessment method for the intensive care unit; SD, standard deviation.

^aDuplicate response questions.

TABLE 3 Knowledge levels of nurses (N = 127) regarding delirium.

Variables	Median	IQR	M ± SD	Min-Max
Aetiology	9	2	8.93 ± 1.31	5–10
Signs and symptoms	14	3	13.24 ± 2.81	4–20
Nursing management	13	3	12.28 ± 2.70	4–16
Total	36	7	34.45 ± 5.40	15–45

Abbreviations: IQR, interquartile range; M, mean; SD, standard deviation.

and electrolyte levels'. In addition, interventions that had a higher level of related knowledge but a lower rate of performance included 'providing orientation and emotional support', 'allowing participants to stay with family members' and 'appropriate medication administration for safety'.

5 | DISCUSSION

This study explored nurses' experiences with managing paediatric delirium and examined their knowledge levels regarding the condition. Furthermore, an analysis was conducted to assess the gap between knowledge levels and management experience. We found that interventions with a lower related knowledge level and performance rate included avoiding restraint use and maintaining hydration and electrolyte levels. Interventions with a higher level of related knowledge but a lower rate of performance comprised providing orientation and emotional support, allowing participants to stay with family members and administering medication.

Approximately, half of paediatric nurses reported no experience with delirium in children in the past year, with 40.2% reporting limited exposure (five times or less). However, according to previous studies, paediatric delirium has a prevalence rate as high as 10%–44%,^{7,8,20} indicating a significant disparity between nurses' perceptions and the actual occurrence of delirium in paediatric patients. These findings may reflect the lack of active screening for paediatric delirium. In total, 86.6% of the participants responded that they had never conducted a paediatric delirium assessment. Staveski et al. reported that 61% of medical staff had no experience receiving delirium education.¹⁵ Paediatric delirium assessment tools, such as the CAPD, SOS-PD, pCAM-ICU and psCAM-ICU, have >79% specificity and >83% sensitivity for detecting delirium.^{21,22} PAED can also be used to assess postoperative emergence delirium.¹⁴ The Korean version of the CAPD has been validated,²³ and programs for intervening in paediatric delirium have been developed and introduced for the South Korean setting.²⁴ However, the guidelines vary depending on the hospitals, and efforts required for intervening in paediatric delirium compared with those for adult delirium management are still in the early stages. Considering the importance of early detection in the initiation of intervention,^{8,25} the awareness of nurses regarding paediatric delirium should be heightened, and education enabling early assessments should be prioritized.

TABLE 4 Nursing interventions and knowledge.

Nursing interventions		Related knowledge	
		Known N (%)	Unknown N (%)
Avoiding restraint use	Performed	30 (23.6)	31 (24.4)
	Not-performed	23 (18.1)	43 (33.9)
Provided orientations	Performed	35 (27.6)	6 (4.7)
	Not-performed	73 (57.5)	13 (10.2)
Provided emotional supports	Performed	62 (48.8)	3 (2.4)
	Not-performed	58 (45.7)	4 (3.1)
Allowed to stay with family members	Performed	64 (50.4)	0 (0)
	Not-performed	62 (48.8)	1 (0.8)
Kept hydration and electrolyte levels	Performed	29 (22.8)	5 (3.9)
	Not-performed	60 (47.3)	33 (26.0)
Appropriate medication administration for safety	Performed	61 (48.0)	1 (0.8)
	Not-performed	62 (48.8)	3 (2.4)

A previous study has shown providing orientation as an item with a high level of knowledge and performance in adult delirium.²⁶ However, this study showed this to be an item with a high level of knowledge and a low level of performance. Nurses caring for children should provide frequent age-appropriate reorientation and engage in proactive communication with the child to reduce paediatric delirium.²⁷ 'Providing emotional support' and 'allowing family members to stay with children' are important management methods for family-centred care. Facilitating families to stay with children in critical care requires systematic support, and caring for critically ill children can be highly traumatic for families,²⁸ necessitating a careful approach and preparation. In South Korea, parent visitations in the neonatal and paediatric intensive care unit are often restricted, and the number of family members permitted to stay with patients in the general ward is also limited to one or two. However, experts recommend the presence of parents with critically ill paediatric patients,²⁹ and a study reported that having parents with children during the perioperative stage can reduce delirium.³⁰ Therefore, a systematic approach to family engagement may help prevent and reduce the incidence of paediatric delirium and enhance parenting competence.³¹

A total of 52% of the participants reported using physical restraints for managing paediatric delirium, and the accuracy rate, even regarding knowledge about 'avoiding the use of restraints,' remained low. In a previous study, the most frequently mentioned method of physical restraints during procedures and treatments in critical and acute care for children involved physical contact (person-to-person), along with practices such as splinting, swaddling, the use of straps and the utilization of commercial devices.³² Parents and health care professionals have conveyed concerns regarding the use of physical restraints on children during procedures, expressing feelings of moral distress characterized by uncertainty, guilt and emotional upset.³² Additionally, physical restraint use may induce paediatric delirium and exacerbate agitation and behavioural

dysregulation if delirium is present.³³ Therefore, the use of physical restraints in children should be considered carefully.

The item with the lowest performance for paediatric delirium was 'maintaining hydration and electrolyte levels'. Dehydration can lead to electrolyte imbalance, which is associated with paediatric delirium.³⁴ Although nurses are not directly responsible for maintaining hydration and electrolyte levels, they carefully monitor hydration status, electrolyte balance, and its related-symptoms for paediatric care. Therefore, paediatric nurses caring for children should pay more attention to patients' blood test levels, hydration status, dehydration symptoms and electrolyte imbalances to prevent paediatric delirium.

The management of paediatric delirium involves both pharmacological and non-pharmacological interventions. Haloperidol and lorazepam are used more frequently than olanzapine or risperidone in the management of paediatric delirium. Haloperidol can alleviate hallucinations, address disorganized thoughts, induce anxiolysis or sedation, and restore attention³⁵; thus, it is useful for the treatment of hyperactive delirium. However, it has more side effects, such as extrapyramidal symptoms, than atypical antipsychotics such as risperidone, quetiapine and olanzapine.^{36,37} Evidence recommending the routine use of pharmacological agents in the treatment of paediatric delirium is lacking.²¹ However, their use is advised for situations where signs and symptoms in children pose a risk to their safety.⁸ In particular, paediatric nurses demonstrated a knowledge level in environmental management similar to that of adult intensive care nurses^{26,38}; however, their knowledge level regarding appropriate pharmacological management was low, similar to the results of previous studies.^{26,39} Therefore, education regarding the non-pharmacological management of paediatric delirium and appropriate medication use is needed.

In a previous study, a multidisciplinary team implemented an intensive care unit bundle comprising three clinical protocols targeting delirium, sedation and early mobilization. These findings suggest that

the implementation of strategies for assessing, preventing and intervening in delirium, along with regular case conferences, is effective in mitigating morbidity in paediatric patients.⁴⁰ However, the management of delirium in newborns and infants remains under-recognized, highlighting the need for increased attention in the field of neonatal intensive care.³ Identifying and managing delirium in neonates is crucial for providing appropriate medical care and ensuring optimal outcomes in vulnerable infants.

6 | LIMITATIONS

This study presented preliminary findings on the level of knowledge regarding paediatric delirium care among paediatric nurses in South Korea. The utilization of a self-reported online survey could potentially constrain the results owing to social desirability and recruitment biases. Furthermore, because the majority of nurses in our study had no experience using assessment tools for paediatric delirium assessment, they evaluated delirium by identifying evident signs of delirium and based on their knowledge and clinical experience, which might have led to the underestimation or overestimation of their assessment findings. This study included nurses from all units responsible for paediatric care; however, the heterogeneous characteristics of nurses from various settings where paediatric delirium management may not be a priority may have been a limitation. Last, unconsidered factors influencing paediatric delirium may remain, which may contribute to the lack of comprehensive assessment in evaluating knowledge levels.

7 | IMPLICATIONS FOR PRACTICE

The development of tailored interventions for paediatric delirium management, considering developmental stages such as neonates, infants, early childhood and adolescents, is necessary. To ensure the quality of paediatric delirium care education in neonatal and paediatric critical care settings, the development of educational modules within a bundled program may be helpful. In addition, implementing train-the-trainer programs is recommended.

8 | CONCLUSION

Herein, we explored the knowledge and performance levels of paediatric nurses regarding paediatric delirium and identified the gaps between these aspects. This study found that interventions with limited knowledge and lower performance rates included avoiding restraint use and maintaining hydration and electrolyte levels. Conversely, interventions with enhanced knowledge but lower performance rates included providing orientation, providing emotional support, allowing patients to stay with family members, and administering medication. Educational programs for nurses are crucial for

enhancing their knowledge and competencies in managing paediatric delirium. In addition, a systemic approach is necessary for interventions in paediatric delirium.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

PATIENT CONSENT STATEMENT

Patients were not contacted nor were they participants in this study.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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