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Original Article

Confidence Among Pediatricians in Managing Infantile Hemangioma With Propranolol

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Abstract

Background: Infantile hemangioma (IH) is the most common benign vascular tumor in children. Although several medical societies have published clinical practice guidelines for diagnosis and treatment of IH, delays in treatment or referral still occur, leading to potential sequelae.

Objectives: To explore pediatricians' confidence and practices related to diagnosing and managing IH with propranolol.

Methods: A nationwide online survey was conducted from October 2021 to October 2022, among Thai pediatricians, excluding pediatric dermatologists. Participation was voluntary, and the survey was distributed via QR codes at national pediatric meetings and through social media and email. A 46-item investigator-developed questionnaire assessed experience, practice, and confidence in IH management. Data were analyzed and a *P* value < .05 was considered statistically significant.

Results: A total of 247 responses were analyzed, most respondents were female (83.8%), worked in government-based settings (39.3%), and were pediatric specialists (59.1%). Although 76.1% had received training on IH diagnosis and treatment, only 21.9% were confident in initiating propranolol independently, a gap likely driven by concerns about medication side effects, dosing, and limited hands-on experience. Confidence increased to 45.3% when expert consultation was available, while 32.8% remained unconfident regardless. General pediatricians reported higher confidence (30.7%) than subspecialists (15.8%), and those with recent IH training were significantly more confident.

Conclusions: Thai pediatricians reported limited confidence in independently initiating propranolol for IH. Confidence was higher among general pediatricians, respondents with recent IH training, and those with access to expert consultation. Structured training and access to expert consultation may help strengthen confidence in IH management.

Keywords: Infantile hemangioma, Propranolol, Pediatricians, Confidence, Education

Citation: Wittayakormrerk S, Lekwuttikarn R. Confidence among pediatricians in managing infantile hemangioma with propranolol. *Res Med J*. 20XX; XX(X):e278283. doi:10.33165/rmj.2027.e278283

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Received: 14 October 2025
Revised: 10 September 2026
Accepted: 14 September 2026
Published Online: 21 September 2026

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Introduction

Infantile hemangioma (IH) is the most common benign vascular tumor in children. Preterm birth, low birth weight, White race, multiple gestation, progesterone therapy, family history, and female gender all showed statistically significant differences in a meta-analysis of possible risk factors for IH.[1, 2] According to the natural history of IH, infants develop IH within the first few weeks of life and proliferate quickly in the first few months before slowly involuting until the age of 4.[3, 4] IH sequelae are common even though the majority of cases spontaneously resolve. The reported risk of sequelae

without therapy ranges from 54.9% to 69.0% in different studies.[5-7] The most common sequelae after involution were telangiectasias, fibrofatty tissue, and anetodermic skin.[5]

Pediatricians, especially in Thailand, are the frontline clinicians who encounter IH and play a pivotal role in improving treatment outcomes by identifying potentially high-risk IH (lesions with risk of functional impairment, ulceration, or permanent disfigurement) and complicated IH (lesions associated with ulceration, bleeding, or impingement on vital structures) and determining when intervention is warranted. Propranolol, a nonselective β-blocker, is now established as the first-line systemic treatment for IH, demonstrating superior efficacy and an acceptable safety profile compared with previous options such as systemic corticosteroids. Updates on IH[8] and clinical practice guidelines for the diagnosis and treatment of IH have been recently published by several medical societies, including the American Academy of Pediatrics,[2] and the Pediatric Dermatological Society of Thailand.[9] The Thai guideline, published in 2019 by the Pediatric Dermatological Society of Thailand and freely accessible online, is intended for use by all practicing pediatricians in Thailand. These guidelines suggest that general pediatricians should be able to treat IH and refer to pediatric dermatologists or IH specialists in cases of complicated IH or medication failure. However, delayed or inappropriate treatment continues to occur in current clinical practice. Previous studies showed that delayed referral may be due to physicians' lack of knowledge about IHs and/or propranolol.[10]

The primary objective of this study was to assess pediatricians' confidence in independently initiating and managing IH treatment with propranolol. Secondary objectives included describing current practice patterns in IH diagnosis and management and identifying barriers to confidence. This study hypothesized that a pediatrician's professional status, workplace setting, and recency of IH training could influence their confidence in managing infants with IH. This assessment can help identify gaps and areas for improvement in clinical decision-making and contribute to enhancing patient care and outcomes.

Methods

This study performed a nationwide online survey of Thai pediatricians from October 2021 to October 2022. The inclusion criteria were pediatricians currently practicing in Thailand; pediatric dermatologists were excluded, as this study aimed to assess nonspecialist pediatricians. The investigators developed a 46-item questionnaire based on a review of the relevant literature and clinical practice guidelines. The questionnaire collected demographic and professional information and included clinical case scenarios assessing respondents' diagnostic assessments and treatment decisions regarding IH. It also assessed their previous experience, current practices, and confidence in IH management. Confidence was assessed using a single question with 3 predefined responses: 1) able to manage IH independently, classified as "confident"; 2) able to manage IH only with specialist guidance or consultation, classified as "confident with expert consultation"; and 3) unable to manage IH independently, classified as "not confident". No composite score or cutoff value was used. Prior to the main survey, the questionnaire was piloted with 10 pediatricians to assess clarity and feasibility; internal consistency was evaluated using Cronbach α, which was 0.80. The survey was advertised using a QR code at national pediatric meetings, such as the conference of the Pediatric Dermatological Society of Thailand and institutional conferences and was also distributed via social media platforms and electronic mail during the study period. Participation was voluntary and confidential. Before responding to the survey, participants were required to electronically complete the informed consent form.

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Following the pediatricians' responses, the data were rechecked to ensure no duplicates. As the survey was distributed through an open QR code at national conferences, social media platforms, and electronic mailing lists rather than to a closed, enumerated sampling frame, the exact number of pediatricians who received the invitation could not be ascertained, and a precise response rate could not be calculated. Given the exploratory nature of the study, a formal a priori sample size calculation was not performed; instead, this study aimed to recruit as many respondents as feasible during the one-year study period from among the approximately 7250 pediatricians registered with the Pediatric Society of Thailand.

Statistical analysis was performed using Stata, version 15.0 (StataCorp LLC). Descriptive statistics were used to summarize the demographic characteristics of the participants. Categorical variables were presented as frequencies and percentages. Comparisons between groups (general vs subspecialty pediatricians; time since training) were performed using the chi-square test or Fisher exact test, as appropriate. A *P* value of < .05 was considered statistically significant.

Results

Two hundred and forty-seven questionnaires were received, the majority were female (83.8%), with 39.3% working in government-based settings and 49.1% being pediatric specialists. In this study, government hospitals included district, provincial, and tertiary referral hospitals under the Ministry of Public Health, whereas medical schools referred to university-affiliated hospitals. Most participants (76.1%) had received training on IH diagnosis and treatment, with 28.3% updating their knowledge within the past 2 years, according to the 2019 clinical practice guideline from the Pediatric Dermatological Society of Thailand (Table 1).

Among all pediatric specialties in our study, general pediatricians managed the highest proportion of IH patients (44.3%), followed by neonatologists (17.4%) and pediatric allergists (12.1%). Only 21.9% of pediatricians reported confidence in initiating IH therapy independently. However, 45.3% reported increased confidence when consulting IH experts before initiating treatment, while 32.8% lacked confidence in managing IH independently.

The most commonly reported reasons for low confidence in managing IH ranked from highest to the lowest response from participants, including concerns about the side effects of propranolol, uncertainty about the duration of treatment, indications for propranolol and the diagnosis, lack of propranolol solution in their hospital, and uncertainty about the appropriate dosage of propranolol, and, with the lowest response, the lack of a proper sphygmomanometer in their workplace (Table 2).

Confidence in managing IH was compared between general and subspecialty pediatricians (Table 3). Approximately 30.7% of general pediatricians reported confidence in independently managing IH, compared to only 15.8% of subspecialty pediatricians. Consultation with IH experts significantly boosted confidence in both groups.

To assess the impact of training recency, pediatricians were categorized into 3 groups based on the 2019 Thai clinical practice guideline for IH: those trained within the past 2 years, those trained more than 2 years ago, and those with no formal training in IH (Table 3). This study observed that recently trained pediatricians were more likely to exhibit high confidence in managing IH. Regardless of training recency, consultation with IH experts significantly enhanced pediatricians' confidence in IH management.

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Table 1. Demographic and Baseline Data of Pediatricians Responding to the Survey

Characteristic	No. (%)
Sex	
Female	207 (83.8)
Male	40 (16.2)
Current work settings	
Government hospital	97 (39.3)
Private hospital	70 (28.3)
Medical school	74 (30)
Other settings	6 (2.4)
Current work status	
General pediatricians	101 (40.9)
Pediatric specialists	146 (59.1)
Neonatologists	31 (12.6)
Allergists and immunologists	23 (9.3)
Other specialists	92 (37.2)
Acquired IH management knowledge, y	
No	59 (23.8)
≤ 2	70 (28.3)
> 2	118 (47.8)

Abbreviation: IH, infantile hemangioma.

Table 2. Reasons for Low Confidence in Managing Infantile Hemangioma

Reason	No. (%)
Concerns about the side effects of propranolol	128 (51.8)
Uncertainty about the duration of treatment	109 (44.0)
Uncertainty about indications for propranolol	101 (40.9)
Uncertainty about the diagnosis of IH	65 (26.3)
Lack of propranolol solution in their hospital	63 (25.5)
Uncertainty about the appropriate dosage of propranolol	46 (18.6)
Lack of a proper sphygmomanometer	10 (4.0)

Abbreviation: IH, infantile hemangioma.

Table 3. Confidence level of Pediatricians in Infantile Hemangioma Management

Variable	No. (%)			*P* Value
	Confidence	Enhanced Confidence With IH Expert Consultation	No Confidence	
General vs subspecialist pediatricians				
General pediatricians	31 (30.7)	41 (40.6)	29 (28.7)	.020
Subspecialist pediatricians	23 (15.8)	71 (48.6)	52 (35.6)	
After training of IH, y				
Never	6 (10.2)	28 (47.5)	25 (42.4)	.004
≤ 2	24 (34.3)	33 (47.1)	13 (18.6)	
> 2	24 (20.3)	51 (43.2)	43 (36.4)	

Abbreviation: IH, infantile hemangioma.

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Discussion

Overall, confidence in independently initiating IH treatment was limited among respondents. This finding is clinically relevant because delayed recognition and referral of high-risk IH may postpone treatment during the period of rapid growth. Previous studies have similarly identified limited physician knowledge of IH and propranolol as contributors to delayed referral.[10-12] The IH Referral Score and screening approaches designed for primary care physicians may help identify patients who require timely treatment or specialist evaluation.[12-14]

A notable finding was the discrepancy between previous training and clinical confidence: although 76.1% of respondents had received training on IH diagnosis and treatment, only 21.9% felt confident enough to initiate propranolol independently. Concern about propranolol-related adverse effects was the most frequently reported barrier to independent initiation (51.8%). Although propranolol is generally well tolerated when appropriate pretreatment assessment and monitoring are performed,[2, 8] initiating treatment requires multiple practical competencies, including patient selection, identification of contraindications, dose adjustment, caregiver counseling, and adverse-effect monitoring. Previous training may therefore not have provided sufficient practical or supervised experience to support independent treatment initiation. In addition, confidence may diminish when pediatricians encounter patients requiring propranolol infrequently. Because the questionnaire did not assess the content, format, or intensity of previous training or the frequency of clinical exposure, these explanations remain hypotheses.

Pediatricians who had received IH training within the previous 2 years reported greater confidence than those trained earlier. This association may reflect more current knowledge, greater retention of training, or more recent clinical exposure; however, the cross-sectional design does not establish a causal effect of training. The increased confidence reported when expert consultation was available suggests that specialist support may complement training, particularly for pediatricians who manage IH infrequently. Implementing clinical practice guidelines from major societies has been associated with earlier referral of high-risk IH patients,[15] and similar benefits may be achieved by embedding guideline-based, case-oriented training into the Royal College of Pediatricians of Thailand's continuing education framework.

General pediatricians reported greater confidence in independently managing IH than nondermatologist subspecialists (30.7% vs 15.8%). This difference may reflect more frequent exposure to common dermatologic conditions in general pediatric practice, although clinical exposure was not objectively measured. Practical education, simplified decision-support tools, and clearly defined referral pathways may help pediatricians translate guideline recommendations into clinical practice.

This study has several limitations. Convenience sampling through national meetings, social media, and email prevented calculation of a response rate and may have introduced selection bias. The relatively high proportion of respondents working in government-based settings may limit generalizability to private and community practices. Multivariable logistic regression was not performed to identify independent predictors of confidence. In addition, confidence was self-reported and may not reflect actual clinical competence. The questionnaire did not assess the duration, format, or content of previous training, limiting our ability to determine why training did not consistently translate into confidence.

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Conclusions

Although evidence-based IH management has advanced considerably at the specialist level, this knowledge has not yet translated into confident, independent practice among frontline pediatricians. Consequently, delays in referral and treatment remain common. Confidence is only one of several barriers; uncertainty about treatment indications and duration, concerns about propranolol adverse effects, and limited medication availability also contribute to suboptimal management. Given the limited number of IH specialists, the most practical and scalable approach is to strengthen pediatricians' confidence in guideline-based management through case-based training integrated into pediatric residency and continuing medical education, supported by standardized referral pathways and simplified clinical decision-support tools, rather than relying primarily on expert consultation. Progress could be monitored through periodic confidence surveys, referral rate tracking, and time-to-treatment audits as measurable outcome indicators.

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Additional Information

Acknowledgments: We thank Yukuntorn Nattaporn for assistance with data collection.

Ethics Approval: The study was approved by the institutional review board, Human Research Ethics Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University (MURA2021/861) on 11 October 2021.

Clinical Trial Consideration: This study does not report on a clinical trial.

Financial Support: No financial support was provided for this study.

Conflict of Interest: The authors declare no conflict of interest.

Author Contributions:
Conceptualization: All authors
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Investigation: All authors
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