



**ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL
COLLEGE UNDERGRADUATE STUDY PROGRAM**

**ASSESSMENT OF KNOWLEDGE AND PRACTICES OF
MEDICAL INTERNS IN PEDIATRIC ASTHMA CARE AT
SPHMMC**

SIHAM KAMIL HASSEN

ADDIS ABABA, ETHIOPIA

MARCH 2026



**ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL
COLLEGE UNDERGRADUATE STUDY PROGRAM**

**ASSESSMENT OF KNOWLEDGE AND PRACTICES OF
MEDICAL INTERNS IN PEDIATRIC ASTHMA CARE AT
SPHMMC**

SIHAM KAMIL HASSEN

ADVISOR- ABRHAM GETACHEW (MPH,MAPM)

CLINICAL ADVISOR-DR. AWOKECH BERIHUN (MD,PCCM)

**A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF **PUBLIC
HEALTH**; PRESENTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF **MD** IN **MEDICINE**; ST.
PAUL HOSPITAL MILLENNIUM MEDICAL COLLEGE**

ADDIS ABABA, ETHIOPIA

MARCH 2026

**St. Paul Hospital Millennium Medical
College Undergraduate Study Program**

Name of investigator	Siham Kamil Hassen
Full title of the research project	Assessment of Knowledge and Practices of Medical Interns in Pediatric Asthma Care at SPHMMC
Duration of the project	JULY 2025-MARCH 2026
Study Area	SPHMMC
Total Cost of the project	2000ETB
Source(s) of Funding	
	Cell phone: +251930624527
	Email: kamsis93@gmail.com
Name of Advisor(s)	Abrham Getachew (MPH,MAPM) Dr. Awokech Berihun (MD,PCCM)

Abstract

Background: Pediatric asthma is a major cause of morbidity among children in Ethiopia, particularly in urban settings like Addis Ababa. Healthcare providers' competence is vital for effective asthma control.

Objective: To assess the knowledge and clinical practice of medical interns regarding pediatric asthma care at St. Paul's Hospital Millennium Medical College.

Methods: A cross-sectional study was conducted among 91 medical interns using a structured self-administered questionnaire assessing asthma knowledge and clinical practice. Data were analyzed using logistic regression to identify factors associated with knowledge and practice.

Results: Overall, 74.4% of interns demonstrated good overall knowledge across all asthma-related domains. 59% demonstrated good clinical practice. Attendance of asthma-related seminars (AOR = 7.44; 95% CI: 2.36–23.47) and use of GINA guidelines (AOR = 14.65; 95% CI: 2.62–81.85) were significantly associated with better practice.

Conclusion: Majority of medical interns at SPHMMC demonstrated good knowledge of pediatric asthma, but a lower proportion reported good practice, indicating a knowledge–practice gap. Internship duration was associated with good knowledge, while seminar attendance and use of GINA guidelines were associated with good practice. Focused seminars and hands-on demonstrations, emphasis on the proper and consistent use of guidelines and patient education tools may improve quality of pediatric asthma care provided by medical interns.

Acknowledgements

First and foremost, I would like to thank St. Paul's Hospital Millennium Medical College (SPHMMC) and School of Public Health for providing the opportunity to conduct this study.

I would also like to express my sincere gratitude to my advisors, Abrham Getachew (Assistant Professor) and Dr. Awokech (MD) for their guidance and support throughout the development of this research thesis.

My appreciation also goes to the participants who contributed their time and perspectives to this research.

Table of Content

Abstract	4
Acknowledgements	5
Acronyms and Abbreviations	8
List of Tables.....	9
List of Figures	9
1 Introduction	10
1.1 Background	10
1.2 Statement of the Problem.....	11
1.3 Significance of the Study	11
2 Literature Review	12
3 Objectives.....	15
3.1 General Objective:	15
3.2 Specific Objectives	15
4 Methods.....	16
4.1 Study Setting.....	16
4.2 Study Design.....	16
4.3 Study Population	16
4.3.1 Inclusion Criteria	17
4.3.2 Exclusion Criteria	17
4.4 Sample Size.....	17
4.5 Sampling Procedures.....	17
4.6 Data Source	17
4.7 Data Collection Tool.....	18
4.8 Measurements	18
4.9 Data Collector	19
4.10 Data Collection Setting and Timing.....	19
4.11 Data Quality Control.....	19
4.12 Operational Definitions.....	19
4.13 Variables of the Study.....	20

4.13.1	Dependent Variables:	20
4.13.2	Independent Variables:.....	20
4.14	Data Management	20
4.15	Data Analysis	21
4.16	Ethical Considerations	21
4.17	Dissemination of Results	22
5	Results	23
5.1	Analysis of Sociodemographic Data and Background.....	23
5.2	Analysis of Asthma Knowledge	24
5.3	Analysis of Clinical Practice.....	25
5.4	Factors Associated with Knowledge.....	26
5.5	Factors Associated with Practice	27
6	Discussion	29
7	Strengths and Limitations.....	31
8	Conclusion.....	32
9	Recommendations	32
9.1	For Pediatrics and Child Health Department of SPHMMC.....	32
9.2	For future research:	33
10	References	34

Acronyms and Abbreviations

- **API**- Asthma Predictive Index
 - **GINA** – Global Initiative for Asthma
 - **LMICs** – Low- and Middle-Income Countries
 - **MDI** – Metered-Dose Inhaler
 - **OPD** – Outpatient Department
 - **SPHMMC** – St. Paul’s Hospital Millennium Medical College
 - **WHO** – World Health Organization
-

List of Tables

<u>Table 1: Socio-Demographic Characteristics of Medical Interns at St. Paul's Hospital Millennium Medical College (n = 78).....</u>	23
<u>Table 2: Factors Associated with Asthma Knowledge Among Medical Interns at St. Paul's Hospital Millennium Medical College.....</u>	26
<u>Table 3: Factors Associated with Clinical Practice in Asthma Management Among Medical Interns at St. Paul's Hospital Millennium Medical College.....</u>	28

List of Figures

<u>Figure 1: Level of Asthma Knowledge in Different Domains Among Medical Interns: St.Paul's Hospital Millennium Medical college; Ethiopia</u>	24
<u>Figure 2: Self-reported Practices of Medical Interns on Pediatric Asthma: St.Paul's Hospital Millennium Medical college; Ethiopia.....</u>	25

1 Introduction

1.1 Background

Asthma is one of the most common chronic illnesses affecting children worldwide. It is a complex respiratory condition characterized by recurrent episodes of wheezing, coughing, shortness of breath, and chest tightness. Effective control of asthma in children depends not only on the availability of medications and caregiver practices but also on the competence of healthcare providers in recognizing asthma, classifying severity, initiating appropriate treatment, and counseling caregivers on long-term management.(1,2) Medical interns, as one of the frontline providers in teaching hospitals such as St. Paul's Hospital Millennium Medical College (SPHMMC), frequently encounter pediatric patients with asthma and play a vital role in both acute care and caregiver education. However, gaps in knowledge and practices among health care workers —particularly regarding guideline-based management and correct demonstration of inhaler use—may contribute to inconsistent care and suboptimal asthma control. Addressing these gaps is essential to strengthen pediatric asthma management and improve outcomes for affected children.(3)

Globally, childhood asthma affects more than 100 million children and remains a leading cause of preventable hospital admissions and school absenteeism(1,4) The burden is increasing, especially in rapidly urbanizing areas where air pollution, overcrowding, and limited access to healthcare contribute to poor disease control.(5) In sub-Saharan Africa, the prevalence of asthma among children is on the rise, with estimates ranging from 10% to 20% depending on the country and urbanization level.(6) In Ethiopia, urban centers such as Addis Ababa report asthma prevalence rates of around 9% to 12% among children, with evidence suggesting that many children experience uncontrolled symptoms despite access to treatment (7)

1.2 Statement of the Problem

Although direct data on medical interns at SPHMMC is unavailable, reports across sub-Saharan Africa have flagged inadequate knowledge and skills among healthcare providers, including challenges with inhaler technique and limited asthma care training, as major barriers to optimal management(8). These findings suggest that trainees in similar LMIC contexts likely face parallel knowledge and practice gaps, especially in device use, trigger identification, and caregiver counseling.

Despite the high burden of pediatric asthma in Ethiopia, there is limited evidence regarding the preparedness of medical interns to manage this condition effectively. Existing studies primarily focus on caregiver knowledge or patient outcomes(9), with few assessing the knowledge and practices of interns who often serve as frontline providers. For instance, a study conducted at SPHMMC revealed that while a majority of healthcare providers had good knowledge of asthma and inhalation techniques, a significant proportion demonstrated suboptimal practices in metered-dose inhaler (MDI) use, highlighting a disconnect between theoretical knowledge and practical application. This prior research assesses only knowledge and practice of inhalational medications in caregivers and providers making their scopes narrower.

1.3 Significance of the Study

These findings underscore the need for targeted educational interventions to enhance interns' competencies in pediatric asthma management. This study aims to fill this evidence gap by systematically assessing the knowledge, and self-reported practices of medical interns at SPHMMC, providing data to guide curriculum improvements and training programs that can ultimately improve asthma care outcomes for children in Ethiopia.

2 Literature Review

Asthma in children is a chronic airway disease marked by variable respiratory symptoms (wheeze, dyspnea, chest tightness, cough) and variable expiratory airflow limitation, usually driven by airway inflammation.(1) Conceptually, pediatric asthma is an age-stratified entity in guidelines: GINA separates recommendations for children 6–11 years from adolescents/adults and highlights distinct diagnostic challenges and phenotype variability in those ≤ 5 years. Most guidelines describe asthma as a chronic airway disorder and anchor management to risk (exacerbations) and impairment (symptoms), but operational definitions (e.g., what counts as an “exacerbation” in studies) can vary across documents and trials.(10) While this general definition is accepted globally, diagnosing asthma in children, especially under the age of five, can be challenging. This is because young children often have symptoms that overlap with other respiratory illnesses, making it difficult to apply a clear-cut definition.(5)

Asthma is one of the most common chronic conditions worldwide, affecting an estimated 262 million people and causing over 450,000 deaths in 2019, many of which are preventable(4). Children are disproportionately affected, with asthma ranking among the leading causes of chronic disease-related morbidity, school absenteeism, and emergency visits in this age group (1,5) Globally, prevalence varies widely, with higher reported rates in high-income countries (up to 20%) but increasing recognition in low- and middle-income countries (LMICs), where underdiagnosis and undertreatment contribute to a greater burden of severe disease and mortality (1). In Africa, asthma prevalence is estimated at 7–10% in children, but with significant variability between countries and urban versus rural areas.(11) In children, the burden of asthma is growing, especially in rapidly urbanizing regions like sub-Saharan Africa, where environmental factors contribute to increased prevalence.(11)

In Ethiopia, a community-based survey in Addis Ababa found a 9.1% prevalence of wheezing symptoms among children aged 6–7 years, indicating a significant asthma burden in this urban population. (7) At St. Paul’s Hospital Millennium Medical College (SPHMMC), many outpatient visits are due to asthma, and many children continue to experience frequent symptoms, exacerbations, poor asthma control.(9) The pediatric chest clinic alone follows 80–

100 asthmatic children monthly, yet studies show major gaps in caregiver technique and outcomes. A 2023 SPHMMC study reported that only 53% of caregivers demonstrated correct inhalation practice, with less than half having accurate knowledge of essential steps despite routine follow-up(9). These findings underscore the urgent need to strengthen provider capacity, including medical interns, whose knowledge and practices directly shape caregiver education and asthma outcomes at SPHMMC.

Several risk factors determine the development and progression of pediatric asthma. Globally, genetic predisposition (family history of asthma or atopy), environmental exposures (allergens, air pollution, passive smoking, and viral respiratory infections), and socioeconomic status are consistently reported as key determinants (1). Children exposed to indoor air pollution, including biomass fuels, are particularly vulnerable in low- and middle-income countries.(4)

Another critical issue in asthma management is proper usage of MDIs (Metered-Dose Inhalers) and Spacers. MDI plus spacer is as effective as a nebulizer for treating mild to moderate acute asthma in children and adults and has the advantages of being quicker and associated with fewer side-effects (1). Spacers are included in the WHO list of essential technology but are rarely available due to obstacles to their manufacture or purchase, practical issues of cleaning, and inconvenience for ambulatory use. Effective spacers can be made at no cost from plastic drink bottles (1). This is usually done by first line providers, like interns.

Research across different regions consistently reveals a gap between physicians' knowledge of asthma and their actual clinical practice. Most physicians demonstrated generally good knowledge, their use of diagnostic tools and adherence to guideline-based management remained limited (3). This discrepancy is not confined to a single region but reflects a broader global pattern, as evidenced by studies from various contexts. For instance, a research done in Nigeria highlighted that knowledge alone did not guarantee high-quality care; inadequate access to spirometry and underuse of international guidelines contributed to persistent shortcomings in asthma management.(12) Similarly, a Jordanian study involving multiple health professions showed that even though healthcare workers recognized asthma symptoms accurately, awareness of updated GINA recommendations remained low, reinforcing the call for continuous education and better guideline dissemination (13) Similar

findings emerged among pediatric nurses, where deficits in inhaler technique knowledge and patient education practices limited the effectiveness of asthma care (14)

Guideline adherence in acute and emergency settings presents another area of concern. Research with emergency department professionals reported wide variability in applying pediatric asthma protocols, reflecting both attitudinal barriers and systemic limitations. (15) Likewise, pediatricians surveyed in earlier studies demonstrated knowledge gaps in both diagnosis and treatment of childhood asthma, suggesting that gaps persist even among specialists. (16) Studies from Brazil (17) and Iran (16) provide additional international evidence that these challenges are not confined to a single region but reflect a broader global pattern. These studies, like those from Nigeria and Jordan show that asthma care is hindered not only by gaps in physician knowledge but also by systemic, resource-related, and behavioral barriers that limit the translation of guidelines into routine clinical practice.

Despite asthma being one of the causes of pediatric morbidity and a priority condition in global health, there remains a clear knowledge-to-practice gap in its management, especially in low- and middle-income countries. Globally, guidelines such as GINA emphasize that effective care relies not only on access to medicines but also on provider competence in recognizing symptoms, guiding proper inhaler/spacer use, and counseling families (1). In Ethiopia, studies have highlighted frequent uncontrolled asthma, poor inhaler technique among caregivers, and underutilization of guideline-based management even at tertiary hospitals like SPHMMC (9)

However, while caregiver gaps are well documented, and studies have explored knowledge-practice gaps among various healthcare professionals (as seen in Nigeria, Jordan, Brazil, and Iran), little is known about the knowledge and practices of medical interns, who often serve as the first point of contact in pediatric care at teaching hospitals. This study addresses this critical research gap by evaluating the knowledge and self-reported practices of medical interns at SPHMMC, providing the necessary 'ground' to justify curriculum enhancements and targeted training programs in Ethiopia's healthcare system.

3 Objectives

3.1 General Objective:

To assess the knowledge and practices of medical interns in pediatric asthma care at St. Paul's Hospital Millennium Medical College (SPHMMC).

3.2 Specific Objectives

1. To assess the level of knowledge of medical interns regarding pediatric asthma diagnosis, management, and inhaler/spacer use.
 2. To determine the self-reported practices of medical interns in the management of pediatric asthma, including patient education and inhaler usage.
 3. To identify factors associated with variations in knowledge and practices among medical interns at SPHMMC.
-

4 Methods

4.1 Study Setting

This study was conducted at St. Pauls Hospital Millennium Medical College (SPHMMC), one of the largest referral and teaching hospitals in Ethiopia. Located in Addis Ababa, the capital city, SPHMMC serves a diverse patient population drawn not only from the city but also from various regions of the country. As a tertiary hospital, it provides specialized care in pediatrics, internal medicine, surgery, and other fields, while also functioning as a major training center for medical students, interns, and residents. The pediatric department, where the study focuses on, offers both outpatient and inpatient services and is a key site for practical training in childhood diseases, including asthma. There is also a specialized pediatric chest clinic which operates two days a week and provides care for children with chronic respiratory conditions, including asthma. The clinic's team consists of two pulmonary and critical care specialists, who are assisted by senior pediatric residents, nurses, and other support staff.

4.2 Study Design

This study employed an institution-based analytical cross-sectional design to assess knowledge and practices of medical interns on pediatric asthma care.

4.3 Study Population

The source population for this study was all medical interns at St. Paul's Hospital Millennium Medical College (SPHMMC) during the study period. These interns are in the final stage of undergraduate medical training and serve as first-line healthcare providers, actively involved in patient care under supervision.

The actual study population included medical interns who are either currently undertaking their pediatric rotation or have already completed their pediatric rotation

during the study year. This ensured that all participants have had relevant exposure to pediatric asthma care.

4.3.1 Inclusion Criteria

- All medical interns registered at SPHMMC during the study period who had completed or were undertaking pediatric rotation

4.3.2 Exclusion Criteria

- Interns who declined to participate in the study

4.4 Sample Size

Since the source population was small ($N=91$), all eligible interns were approached (attempted census). Of these, 78 completed the questionnaire, giving a response rate of 85.7%.

4.5 Sampling Procedures

Since the total population of medical interns at SPHMMC was small (91), the study used a census sampling approach, meaning all eligible interns were included.

Interns who were willing to participate and provide informed consent were invited to participate. This method ensured that the study captures a complete picture of the knowledge and practices of interns in pediatric asthma care without introducing sampling error.

4.6 Data Source

Data was collected directly from medical interns through a self-administered online questionnaire using Google Forms. The platform allowed convenient and timely data collection while minimizing physical contact and disruption of clinical duties.

4.7 Data Collection Tool

The questionnaire had three main sections:

1. Sociodemographic data
2. Knowledge – assessing understanding of pediatric asthma pathophysiology, diagnosis, and management
3. Practices – evaluating interns' reported clinical approaches in managing pediatric asthma

The questionnaire was prepared in English, adapted from tools used in previous similar studies. The knowledge and practice components were primarily adapted from a questionnaire used in a cross-sectional study conducted among healthcare professionals in Turkey(18) and Jordan assessing asthma knowledge and practice.(3)

In addition, inhaler technique and device-related practice items were adapted from the Inhaler Device Assessment Tool (IDAT), which was developed by the Nursing Best Practice Research Unit (NBPRU) to assess proper inhaler use and technique.(19)

The questionnaire was reviewed and approved by a pediatric pulmonologist (PCCM specialist). Cronbach's alpha coefficient was used to assess the internal consistency of the scale. The analysis yielded a value of 0.705 for the knowledge items and 0.862 for the practice items. These values indicate acceptable and good internal consistency, respectively.

4.8 Measurements

Knowledge was scored based on correct responses according to established pediatric asthma management guidelines, including recommendations from the Global Initiative for Asthma (GINA). Each correct response was assigned one point, and incorrect responses received zero points.

Practice was assessed based on self-reported adherence to standard clinical protocols.

Participants scoring $\geq 70\%$ of the total knowledge questions were categorized as

having good knowledge(20–23). Similarly, participants scoring $\geq 70\%$ on practice-related items were classified as demonstrating good practice.

4.9 Data Collector

The principal investigator oversaw the online data collection.

4.10 Data Collection Setting and Timing

Data was collected online, allowing interns to respond at convenient times. The data collection period was planned for 2 months, ensuring all eligible interns had sufficient opportunity to participate.

4.11 Data Quality Control

Responses were monitored daily to ensure completeness and accuracy. Any discrepancies were resolved through careful review of the dataset.

Data was downloaded and securely stored to prevent loss or unauthorized access.

4.12 Operational Definitions

- Medical Interns: Final-year medical students at SPHMMC who are undergoing practical clinical training and serve as first-line healthcare providers in patient care, including pediatrics
 - Pediatric Asthma Care: Activities related to the diagnosis, management, and follow-up of children with asthma according to standard clinical guidelines (e.g., GINA)
 - Knowledge: The level of understanding and awareness interns have about pediatric asthma, including etiology, signs and symptoms, diagnosis, and management. Measured by correct responses to knowledge-based questions
 - Practices: The self-reported actions of interns in managing pediatric asthma, including use of guidelines, proper MDI use and patient counselling
 - Good Knowledge: Scoring $\geq 70\%$ on the knowledge section of the questionnaire (threshold based on similar studies)
-

- Good Practice: Scoring $\geq 70\%$ on practice-related items, reflecting adherence to recommended pediatric asthma management protocols
- Internship duration was categorized into two groups: ≥ 12 months and < 12 months

4.13 Variables of the Study

4.13.1 Dependent Variables:

These are the outcomes that the study seeks to assess among medical interns regarding pediatric asthma care:

1. Knowledge – Level of understanding about pediatric asthma (diagnosis, management, and follow-up)
2. Practices – Self-reported clinical actions in managing pediatric asthma

4.13.2 Independent Variables:

These are factors that may influence the knowledge and practices of medical interns:

- Socio-demographic factors: Age, sex
- Professional factors: Duration of internship and participation in asthma-related training or workshops
- Institutional factors: Use of GINA guidelines.

4.14 Data Management

Data collected through Google Forms were securely exported to a password-protected spreadsheet for handling and analysis. The principal investigator oversaw the data entry, cleaning, and coding process to ensure accuracy and completeness. Each response was checked for missing or inconsistent values. After cleaning, the dataset was stored in a secure location with restricted access to maintain confidentiality and integrity throughout the analysis process.

4.15 Data Analysis

After data cleaning, the dataset was imported into Statistical Package for Social Sciences (SPSS) version 21 for analysis. Descriptive statistics were used to summarize the data: frequencies, percentages, means, and standard deviations were calculated for socio-demographic characteristics, knowledge, and practices. Knowledge and practice scores were categorized based on predefined cut-offs ($\geq 70\%$ as good knowledge, or good practice).

To identify factors associated with knowledge and practice, bivariate logistic regression analysis was initially performed for each independent variable against the dependent variables (knowledge and practice). Furthermore, the effect of knowledge on practice was specifically assessed using bivariate logistic regression to understand their direct relationship. Variables with a p-value of less than 0.25 in the bivariate analysis were then considered as candidates for multivariate logistic regression analysis to control for potential confounders and identify independent predictors. Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) were calculated, and a p-value of less than 0.05 was considered statistically significant in the multivariate model.

Results were presented in tables and graphs to facilitate interpretation, and findings were discussed in relation to existing literature and guidelines on pediatric asthma care.

4.16 Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College (SPHMMC-IRB) on the date 21/10/2025 with approval number SPHMMC-ERC-448/25.

Participation in the study was voluntary, and informed consent was obtained from all participants. The purpose of the study, the procedures involved, potential risks, and benefits was clearly explained. Participants had the right to withdraw at any time without any consequence to their training or professional evaluation.

To ensure confidentiality, all collected data was anonymized, and no identifying information was recorded in the dataset. Data was securely stored in password-protected files accessible only to the principal investigator.

4.17 Dissemination of Results

The findings of this study will be presented to the Department of Public Health and Department of Pediatrics and Child Health at St. Paul's Hospital Millennium Medical College (SPHMMC).

5 Results

5.1 Analysis of Sociodemographic Data and Background

The study included 78 medical interns with a near-equal gender distribution. Most participants were aged 25–26 years, and the majority had completed at least 12 months of internship. Over sixty percent had received asthma-related training.

Table 1: Socio-Demographic Characteristics of Medical Interns at St. Paul's Hospital Millennium Medical College (n = 78)

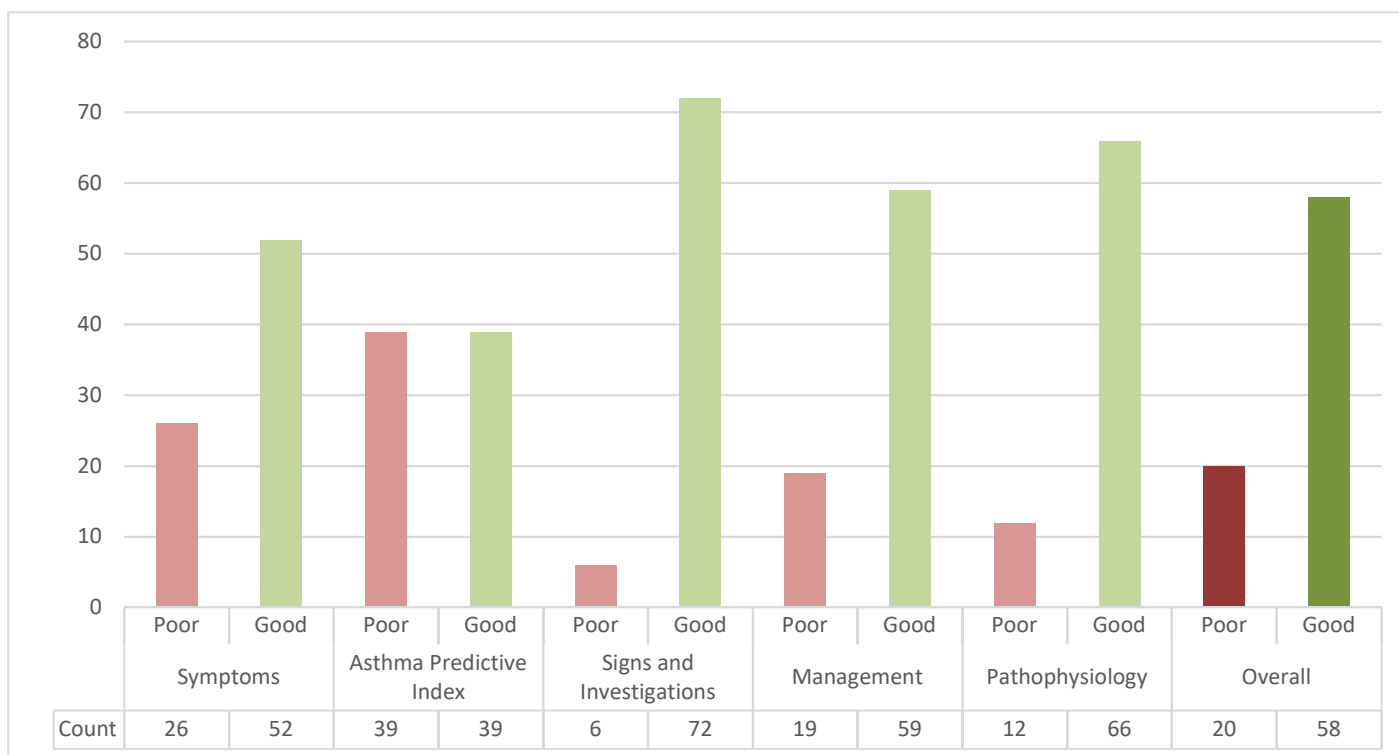
Variables	Category	Frequency	Percentage (%)
Age	24	8	10.3
	25	33	42.3
	26	35	44.9
	27	2	2.6
Gender	Male	41	52.6
	Female	37	47.4
Internship Length (in months)	<12	11	14.1
	>= 12	67	85.9
Attended seminar or training	Haven't attended	30	38.5
	Have attended	48	61.5

5.2 Analysis of Asthma Knowledge

Overall, 74.4% of interns demonstrated good overall knowledge across all asthma-related domains. Higher scores were observed in the domains of signs, investigations, and pathophysiology, while lower scores were noted in asthma symptoms and the Asthma Predictive Index.

A vast majority of participants had good knowledge in the domains of signs and investigations (92.3% of the participants) and pathophysiology (84.6% of the participants). 75.6% of the participants maintained a good level of knowledge on asthma management. In regard to knowledge of asthma symptoms, 66.7% of participants had good level of knowledge. Regarding Asthma Predictive Index, 50% of the participants demonstrated good knowledge.

Figure 1: Level of Asthma Knowledge in Different Domains Among Medical Interns: St.Paul's Hospital Millennium Medical college; Ethiopia



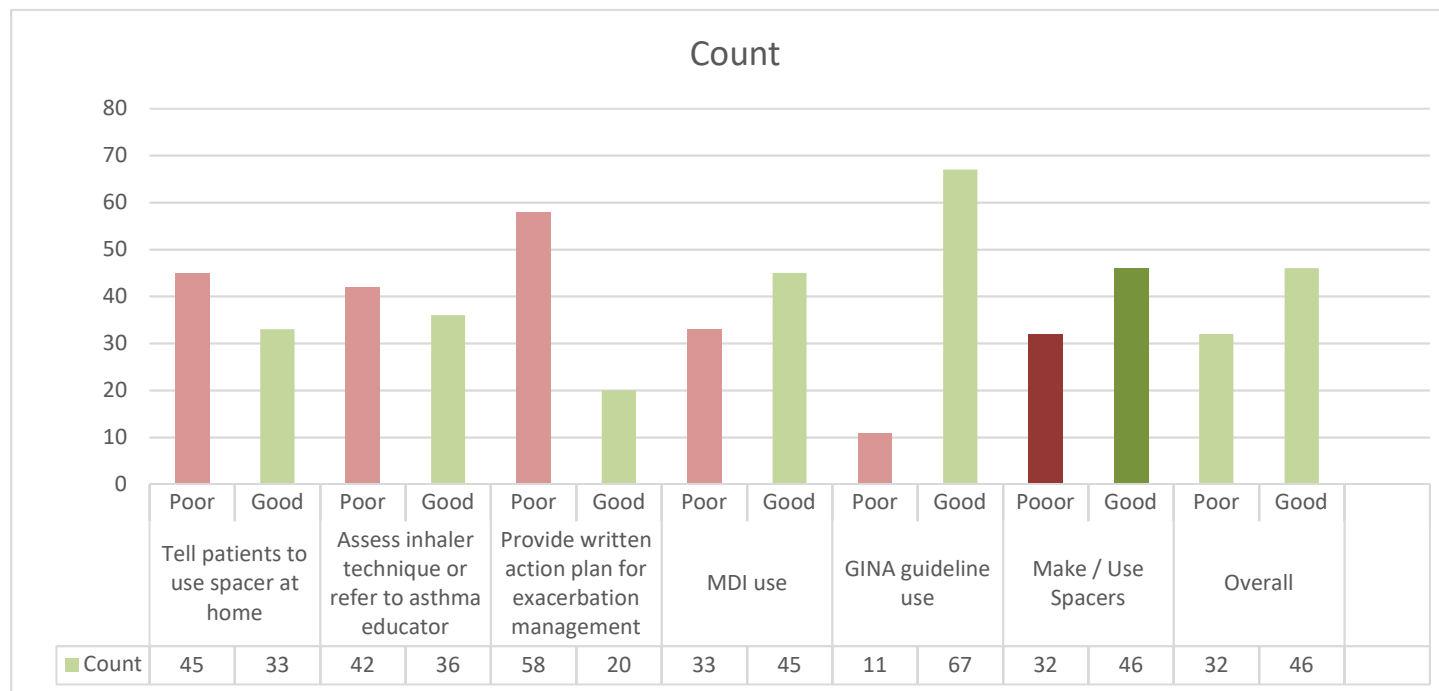
5.3 Analysis of Clinical Practice

Overall, 59.0% of interns demonstrated good clinical practice across the assessed asthma management components. Higher performance was reported in the use of guidelines and basic inhaler technique, while lower scores were noted in long-term management tools and patient counseling.

Most participants (85.9%) reported using the Global Initiative for Asthma (GINA) guidelines. Regarding specific technical skills, 57.7% of participants reported good practice in metered-dose inhaler (MDI) use.

In regard to patient counseling, 42.3% of participants demonstrated good practice in advising patients to use a spacer at home. 46.2% appropriately assessed inhaler technique or referred patients to an asthma educator. In the provision of written action plans, 25.6% of participants demonstrated good practice.

Figure 2: Self-reported Practices of Medical Interns on Pediatric Asthma: St.Paul's Hospital Millennium Medical college; Ethiopia



5.4 Factors Associated with Knowledge

The result of the multivariate binary logistic regression revealed that internship experience was the only factor found to be statistically significant in association with knowledge level.

The odds of having good knowledge were 8.8 times higher among interns with internship experience of 12 months or longer compared to those with shorter experience (<12 months) [AOR = 8.76; 95% CI: 1.82–42.12]. Similarly, the odds of good knowledge were 3.3 times higher among interns who had attended seminars compared to those who had not [AOR = 3.29; 95% CI: 0.97–11.14], though this association did not reach conventional statistical significance.

Table 2: Factors Associated with Asthma Knowledge Among Medical Interns at St. Paul's Hospital Millennium Medical College

		Knowledge		Bivariate analysis (COR)	P value	Multivariable logistic analysis (AOR)	P value
		Good	Poor				
Internship Duration	≥12 months	53	14	4.54 (1.21–17.09)	.025	8.76 (1.84–41.65)	.006
	<12 months	5	6	1			
Seminar	Attended	38	10	1.90 (0.68–5.32)	.222	3.29 (0.97–11.14)	.055
	Not Attended	20	10	1			
Use GINA	USE	48	19	0.25 (0.03–2.11)	.204	0.20 (0.02–2.18)	.156
	Don't Use	10	1	1			

5.5 Factors Associated with Practice

Seminar participation and GINA knowledge were found to be statistically significant in association with practice level. Interns who had attended seminars were 7.4 times more likely to demonstrate good practice compared to those who had not [AOR = 7.44; 95% CI: 2.36–23.47]. Likewise, interns with knowledge of the GINA guidelines were 14.6 times more likely to demonstrate good practice compared to those without [AOR = 14.65; 95% CI: 2.62–81.85].

The effect of overall knowledge on practice was examined using bivariate binary logistic regression. Knowledge scores were not significantly associated with good practice. Interns with higher knowledge levels were 0.94 times as likely to demonstrate good practice compared to those with lower knowledge [COR = 0.94; 95% CI: 0.33–2.72; $p = .914$].

Table 3: Factors Associated with Clinical Practice in Asthma Management Among Medical Interns at St. Paul's Hospital Millennium Medical College

		Practice		Bivariate analysis (COR)	P value	Multivariate analysis (AOR)	P value
		Good	Poor				
Internship Duration	≥12 months	38	29	0.49 (0.12–2.02)	.324	0.668 (0.111–4.024)	.660
	<12 months	8	3				
Seminar	Attended	36	12	6.00 (2.20–16.34)	<.001	7.440 (2.374–23.317)	.001
	Not Attended	10	20				
Use GINA	Use	44	23	8.61 (1.72–43.20)	.009	14.645 (2.491–86.093)	.003
	Don't Use	2	9				
Age (per year increase)				1.49 (0.78–2.87)	.228	1.341 (0.634–2.835)	.443
Knowledge	Good	34	24	0.94(0.33–2.72)	.914		
	Poor	12	8				

6 Discussion

The study aimed to assess the knowledge and clinical practice of medical interns at St. Paul's Hospital Millennium Medical College (SPHMMC) regarding pediatric asthma care and associated factors. 74.4% of interns demonstrated good overall knowledge, but only 59.0% exhibited good clinical practice across the assessed asthma management components. The overall findings reveal a disparity between theoretical knowledge and practical application, indicating that high theoretical knowledge does not fully translate into clinical proficiency. This knowledge-practice gap is consistent with the global patterns identified in the literature review, where healthcare providers in various contexts—from Nigeria to Jordan—demonstrate foundational knowledge that does not always translate into guideline-adherent clinical practice(3,12,13) .

The overall mean knowledge score of 68.47 ± 5.99 indicates a generally good level of theoretical understanding among interns, with 74.4% meeting the pre-set threshold. This level of knowledge is comparable to findings in other regions, such as a cross-sectional study in Jordan that assessed physicians' knowledge and practices regarding asthma (3). The high performance in domains such as signs, investigations (92.3%), and pathophysiology (84.6%) suggests that the undergraduate medical curriculum effectively covers the diagnostic and biological aspects of asthma.

However, a critical deficit was identified in the Asthma Predictive Index (API), where only 50% of participants demonstrated good knowledge. The API is a vital clinical tool used to predict which toddlers with wheezing will develop persistent asthma in later childhood (5). The lack of familiarity with this index among half of the interns is concerning, as it may lead to missed opportunities for early intervention and long-term management planning in pediatric patients. This finding aligns with broader challenges in asthma management in Africa, where specific clinical tools and guidelines are often underutilized(8).

Despite the high reported use of Global Initiative for Asthma (GINA) guidelines (85.9%) (1), only 59.0% of interns achieved a "good" score in different components of practice. It is critical to highlight that 42.3% of participants still exhibited poor MDI technique. While this does not represent the majority, it constitutes a substantial proportion of frontline providers

who may be incorrectly demonstrating or teaching essential inhaler skills to caregivers, potentially compromising patient outcomes.

The most pronounced gaps were observed in long-term management tools and patient counseling. Only 42.3% of interns demonstrated good practice in advising patients to use a spacer at home, and only 46.2% appropriately assessed inhaler technique at each visit or referred patients to an asthma educator. Most concerning, only 25.6% of participants provided written action plans for exacerbation management. These findings suggest that while interns are comfortable with acute diagnosis and basic device use, they struggle with the components of asthma care that ensure long-term control and patient self-management.

An unexpected finding from the knowledge model (Table 2) was the apparent higher proportion of good knowledge among the small subgroup of interns who reported not using GINA guidelines. This counter-intuitive observation is likely an artifact of sparse data bias. With only 11 participants in the 'Do not use GINA' category, and only one of these classified with poor knowledge, the statistical estimate for this subgroup is highly unstable. Furthermore, GINA use was self-reported, introducing the possibility of misclassification bias, as some interns may have reported using the guidelines without fully understanding or consistently applying them. These factors stated above make it difficult to draw firm conclusions about the relationship between GINA use and theoretical knowledge from this specific finding.

The multivariate analysis reinforces the importance of clinical exposure, as interns with 12 months or longer of experience were 8.8 times more likely to possess good level of knowledge (AOR = 8.76; 95% CI: 1.82–42.12). This is particularly relevant given that 85.9% of the study participants fell into this experienced category. However, the lack of a significant association between overall knowledge scores and practice levels (AOR = 0.94; 95% CI: 0.33–2.72; $p = .914$) suggests that good theoretical knowledge alone does not bridge the knowledge-practice gap.

Instead, the data points to the pivotal role of targeted, practical education. Interns who had attended seminars were 7.4 times more likely to demonstrate good practice (AOR = 7.44; 95% CI: 2.36–23.47), and those who used GINA guidelines were 14.6 times more likely to have good practice (AOR = 14.65; 95% CI: 2.62–81.85). This highlights that while all interns had completed or are undertaking pediatric rotation, additional seminars and workshops and

emphasis on practical guidelines, rather than mere exposure, are the true drivers of clinical competence.

It is important to note the presence of wide confidence intervals for several associations, such as for 'Use of GINA' in the knowledge model (95% CI: 0.02–2.18) and 'Internship Length' in the knowledge model (95% CI: 1.84–41.65), as well as for 'Use of GINA' in the practice model (95% CI: 2.491–86.093). These wide intervals are primarily attributable to the relatively small sample size ($n=78$) and sparse data within certain subgroups, particularly when examining less frequent events or categories with few observations. While these findings are indicative, they should be interpreted with caution, and larger studies are needed to provide more precise estimates of these associations.

7 Strengths and Limitations

This study possesses key strengths. Firstly, the study's focus on medical interns, who are at a critical stage of their training and have pediatric rotation exposure, provides valuable insights for medical education and curriculum development. Secondly, the use of a domain-specific knowledge assessment—such as pathophysiology, diagnosis, and the Asthma Predictive Index (API) provides a granular view of specific knowledge gaps. This is more useful than a single, homogenous score as it allows for the development of targeted educational interventions. Finally, the questionnaire utilized was adapted from a validated research tool(3,18) and aligned with Global Initiative for Asthma (GINA) guidelines, ensuring its relevance and credibility.

Despite these strengths, the study is subject to several limitations that warrant consideration. The primary limitation is its cross-sectional design limits the ability to establish causality or observe changes in knowledge and practice over time. A second limitation is the reliance on self-reported data for clinical practice introduces potential social desirability and misclassification bias as participants may not accurately report their practices or understanding. More objective measures such as direct observation of clinical encounters are needed for future research.

Thirdly, the study was conducted at a single institution, St. Paul's Hospital Millennium Medical College, limiting its generalizability to other healthcare settings in Ethiopia. The small sample size contributes to sparse data bias within certain subgroups and results in wide confidence intervals for some associations, indicating a lack of precision in estimates. Larger, multi-center studies are needed for more robust findings.

Lastly, while the questionnaire was based on existing literature, it was not formally validated for the specific context of medical interns in Ethiopia. A formal validation process would strengthen the reliability and accuracy of the data collection tool.

8 Conclusion

Majority of medical interns at SPHMMC demonstrated good knowledge of pediatric asthma, but a lower proportion reported good clinical practice, indicating a knowledge–practice gap. Internship duration was associated with good knowledge, while seminar attendance and use of GINA guidelines were associated with good practice. Focused seminars and hands-on demonstrations, emphasis on the proper and consistent use of guidelines and patient education tools may improve quality of pediatric asthma care provided by medical interns.

9 Recommendations

Based on the findings of the study, the following recommendations are forwarded.

9.1 For Pediatrics and Child Health Department of SPHMMC

1. Address the specific knowledge gap in the Asthma Predictive Index (API) through focused clinical seminars,
 2. Integrate the routine provision of written action plans and spacer counseling into the workflow
 3. Conduct hands-on MDI/spacer demonstration sessions.
 4. Ensure printed GINA quick-reference tools in pediatric OPD/emergency.
-

9.2 For future research:

- Employ multi-center designs with larger sample sizes to provide more precise estimates and establish causality.
 - Incorporate objective assessments such as direct observation or clinical simulations of intern-patient encounters.
 - Do Qualitative Research on Knowledge-Practice Gaps.
-

10References

1. Global Initiative for Asthma (GINA). Global Strategy for Asthma Management and Prevention. 2024.
 2. Kassa E, Kebede RA, Habte BM. Perceptions towards childhood asthma and barriers to its management among patients, caregivers and healthcare providers: a qualitative study from Ethiopia. *BMC Pulm Med*. 2022 Dec 1;22(1). doi:10.1186/s12890-022-01984-2 PubMed PMID: 35527248.
 3. Dahmash EZ. Physicians' Knowledge and Practices Regarding Asthma in Jordan: A Cross-Sectional Study. *Front Public Health*. 2021 Aug 31;9. doi:10.3389/fpubh.2021.712255 PubMed PMID: 34532307.
 4. World Health Organization. World Health Organization. 2024. Asthma [Fact sheet].
 5. Martinez FD, Wright AL, Taussig LM, Holberg CJ, Halonen M, Morgan WJ. Asthma and Wheezing in the First Six Years of Life. *New England Journal of Medicine*. 1995 Jan 19;332(3):133–8. doi:10.1056/NEJM199501193320301
 6. Mosler G, Oyenuga V, Addo-Yobo E, Adeyeye OO, Masekela R, Mujuru HA, et al. Achieving Control of Asthma in Children in Africa (ACACIA): protocol of an observational study of children's lung health in six sub-Saharan African countries. *BMJ Open*. 2020 Mar 18;10(3). doi:10.1136/bmjopen-2019-035885 PubMed PMID: 32193275.
 7. Demissie M, Kumie A. Prevalence of symptoms of asthma and associated factors among primary school children in Addis Ababa. *Ethiop Med J [Internet]*. 2018 [cited 2025 Sep 23];56(4):301–8. Available from: <https://emjema.org/index.php/EMJ/article/view/785>
 8. Faniyi AA, Okesanya OJ, Nukpezah RN, Ibiwoye DO, Eshun G, Adigun OA, et al. Addressing the asthma crisis in Africa: challenges, strategies, and recommendations for improved management. *Egypt J Intern Med*. 2024 Jul 29;36(1). doi:10.1186/s43162-024-00340-6
 9. Worku E. Caregivers' knowledge and practice of inhalation medications in asthmatic children in a tertiary center in Addis Ababa. *Scholarly Journal of SPHMMC [Internet]*. 2023;2(1). Available from: <http://sphmmc/mjh.edu.et>
 10. Cloutier MM, Baptist AP, Blake K V., Brooks EG, Bryant-Stephens T, DiMango E, et al. 2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert
-

Panel Working Group. *Journal of Allergy and Clinical Immunology*. 2020 Dec;146(6):1217–70. doi:10.1016/j.jaci.2020.10.003

11. Global Asthma Network. The Global Asthma Report [Internet]. 2018. Available from: www.globalasthmanetwork.org
 12. Adeniyi B, Ilesanmi O, Obaseki D, Desalu O, Betiku B, Erhabor G. Relationship between knowledge and quality of asthma care among physicians in South-West Nigeria. *Niger J Clin Pract*. 2017 May;20(5):566–72. doi:10.4103/1119-3077.206363 PubMed PMID: 28513515.
 13. Al-Hamaden RA, Abed A, Khader HA, Hasoun L, Al-Dulaimi AH, Alsayed AR. Knowledge and Practice of Healthcare Professionals in the Medical Care of Asthma Adult Patients in Jordan with a Particular Reference to Adherence to GINA Recommendations. *J Multidiscip Healthc*. 2024;17:391–404. doi:10.2147/JMDH.S433149
 14. Jamal Khadoura K, Mushtaha M, Mikki F, Ashraf Mesleh R, Asaad Altubji A, sameh Abed Al Hady A, et al. Knowledge, Attitudes, and Practice of Pediatric Nurses Regarding Asthmatic Patient-Care in Gaza. *Acta Scientifica Paediatrics*. 2022;5.2:45–56.
 15. Bhogal SK, Bourbeau J, McGillivray D, Benedetti A, Bartlett SJ, Ducharme FM. Adherence to Pediatric Asthma Guidelines in the Emergency Department: A Survey of Knowledge, Attitudes and Behaviour among Health Care Professionals. *Can Respir J*. 2010;17(4):175–82. doi:10.1155/2010/274865
 16. Gharagozlou M, Abdollahpour H, Moinfar Z, Bermanian MH, Sedaghat M. A survey of pediatricians' knowledge on asthma management in children. *Iran J Allergy Asthma Immunol*. 2008 Jun;7(2):85–90. PubMed PMID: 18552410.
 17. Lustosa GM de M, Britto MCA de, Bezerra PG de M. Manejo de crises asmáticas em crianças: conhecimento de profissionais de saúde quanto ao tópico em hospitais-escola do Recife (PE). *Jornal Brasileiro de Pneumologia*. 2011 Oct;37(5):584–8. doi:10.1590/S1806-37132011000500004
 18. KIRKGÖZ T, DOĞRU M, KIRKGÖZ H, ÇİÇEK F, SEZER R, BOZAYKUT A. Evaluation of Knowledge Among Pediatricians on Childhood Asthma and Asthma Attack. *Journal of Contemporary Medicine*. 2021 May 24;11(3):310–6. doi:10.16899/jcm.799961
 19. NURSING BEST PRACTICE GUIDELINES EVALUATION USER GUIDE. Inhaler Device Assessment Tool (IDAT) for Promoting Asthma Control in Children [Internet]. 2006. Available from: <http://www.nbpru.ca/>
-

20. Banhos CCD, Roncada C, Pinto LA, Pitrez PM. Assessment of theoretical and practical knowledge of asthma among guardians of children treated in primary care. *Jornal Brasileiro de Pneumologia*. 2020;46(1). doi:10.1590/1806-3713/e20190147
 21. Coelho ACC, Souza-Machado C de, Oliveira TS de, Santos TNN dos, Cruz ÁA, Souza-Machado A. Curricular intervention increases adolescents' knowledge about asthma: a randomized trial. *J Pediatr (Rio J)*. 2018 May;94(3):325–34. doi:10.1016/j.jped.2017.06.014
 22. Ali Alkhatiri S, Shamssain M. Knowledge and Awareness of Childhood Asthma in a Population in the United Arab Emirates. *Athens Journal of Health and Medical Sciences*. 2023 Feb 23;10(1):59–82. doi:10.30958/ajhms.10-1-4
 23. Wang Y, Sa R, Ren H, Du L, Wang B, Guo G, et al. Knowledge, attitudes, and practices of asthma patients in Inner Mongolia regarding differentiation between allergic rhinitis accompanied asthma and cough. *Front Public Health*. 2025 Dec 15;13. doi:10.3389/fpubh.2025.1624520
-

ANNEX

Questionnaire

A. SOCIODEMOGRAPHIC DATA

1. Age:
2. Gender:
3. How long have you been working as an intern?
4. Have you attached your pediatrics rotation?
5. Have you attended any training or seminar on pediatric asthma care?

B. KNOWLEDGE

1. Score the following parameters in the diagnosis of asthma (2: very important, 1: important, 0: unimportant).

Persistent dry cough

Continued wheezing

Dyspnoea

Post-exercise dyspnea

Increased symptoms at night

Obstruction in respiratory function testing

Reversibility in respiratory function test

Increased eosinophil count

Increased serum IgE level

Skin prick test or presence of specific IgE detected allergy

2. Without determining the severity of the asthma attack, score the following parameters (2: very important, 1: important, 0: not important)

General condition

Vital signs

Skin color

Retractions

Dyspnoea

Wheezing

Auscultation

Oxygen saturation

Blood gas

Respiratory function test

PA chest radiography

3. Score the following parameters according to their importance in the diagnosis of asthma (2: very important, 1: important, 0: not important).

A history of doctor-diagnosed asthma in the parent Doctor diagnosed atopic dermatitis

Doctor-diagnosed allergic rhinitis

Wheezing with common cold

Basophilia ($> = 4\%$)

4. Define the following treatments as true or false in asthma attack. (T: true P: partially true F: false)

Chest physiotherapy or broncholage

Starting antibiotics for each patient

Giving sedatives

Inhaled mucolytic drugs.

Use of antihistamines

Hydration with excessive amounts of liquid

Use of short acting beta agonists

Corticosteroid (I.V / P.O.) Use

5. Please write how much you agree or disagree with the following. (T: true P: partially true F: false)

Asthma is a systemic inflammatory disease.

Asthma in childhood is mostly allergic

Asthma progresses with recurrent and reversible symptoms

In addition to bronchial contraction, mucosal edema and inflammation also play a role in the pathogenesis of asthma.

Family history of asthma or allergic increases the risk of asthma

Having a pet increases the risk of asthma

Recurrent upper respiratory tract infections increase the risk of asthma Recurrent wheezing and chronic cough may be symptoms of asthma

Findings in asthma are reversible by bronchodilator

C. Practice Items (yes or no)

Confirm diagnosis by pulmonary function tests (either spirometry and bronchodilator reversibility or bronchoprovocation)

Provide a written action plan for exacerbation management

Assess inhaler technique (or refer to asthma educator) at each visit.

Identify environmental triggers/inducers

Shake MDI device before use.

Prime the device/spacer

Make sure that the patient exhales completely before putting the MDI into the mouth.

Make sure that the patient inhales appropriately for the device.

Make sure that the patient holds breath after inhaling.

Prescribe an inhaled corticosteroid (ICS) as initial maintenance therapy

Use/make a spacer for your patients, If not, why?

Tell your patients to use the spacer at home. If not, why?

Use the Global Initiative for Asthma (GINA) guidelines to assess patient's asthma control

Address patients' concerns about disease/treatment

Refer to a specialist because asthma is difficult to control

Refer to a specialist if the asthma diagnosis is uncertain

Schedule regular follow-up appointments

Consent Form**Assessment of Knowledge and Practices of Medical Interns in SPHMMC on Pediatric Asthma Care Consent Form****Introduction:**

You are invited to participate in a research study aimed at assessing medical interns' knowledge and practices regarding pediatric asthma care at SPHMMC. This study is being conducted by Siham Kamil, as part of requirements for the degree of MD in medicine.

Purpose of the Study:

The purpose of this study is to understand the current level of knowledge, and practices of medical interns in managing pediatric asthma. The findings will help improve training and clinical supervision for better patient care.

Procedures:

If you agree to participate, you will be asked to complete a self-administered online questionnaire via Google Forms. It will take approximately 15–20 minutes to complete.

Voluntary Participation:

Your participation is entirely voluntary. You may choose not to participate or withdraw at any time without any consequence to your medical training or evaluation.

Risks and Discomforts:

There are minimal risks involved. You may feel minor discomfort answering some questions, but you may skip any questions you do not wish to answer.

Benefits:

While you may not receive direct personal benefits, your participation will contribute to improving medical education and pediatric asthma care at SPHMMC.

Confidentiality:

All information collected will be kept confidential. Your responses will be anonymized, and no names or identifying information will be recorded. Data will be stored securely and accessed only by the research team.

Consent:

By clicking the “I agree” button below (or signing this form), you confirm that:

- You have read and understood the information above.
 - You have had a chance to ask questions and have them answered.
 - You voluntarily agree to participate in this study.
-

Declaration

I, the undersigned student, declare that this research project is my original work in partial fulfillment of the requirement for the **Degree of Doctor in Medicine, MD**. I also declare that it has never been presented in this or any other higher institution and that all resources and materials used in the research work have been duly acknowledged.

Name of the student: Siham Kamil Hassen

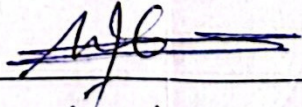
Signature: 

Date: 17/07/18 EC

Approval of Advisors

This research work has been submitted for examination with my approval.

Name of School of Public health advisor 1: Abraham Getachew

Signature: 

Date: 16/07/18 EC

Name of Clinical advisor 2: Dr. Awakech Berhane

Signature: 

Date: 14/7/18