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Assessment of Healthcare Quality Provided to Children with Malaria in Ghana

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ABSTRACT

Background: There is a growing concern regarding the quality of care received by patients with malaria. However, the quality of care provided to children under the age of five who have contracted the disease has yet to receive sufficient attention. Accordingly, we evaluated the quality of care provided to children under five diagnosed with malaria at Princess Marie Louis (PML) Children's Hospital in Accra, Ghana. **Methods:** The objective of this study was to evaluate the quality of care provided to children under 5 years of age diagnosed with malaria through a quantitative approach via a cross-sectional survey. The study randomly selected 74 staff members and 301 parents whose children received malaria treatment at the PML Children's Hospital. This research encompassed a descriptive statistical summary and regression analysis. **Results:** Healthcare professionals exhibited a relatively high adherence to standard protocols for malaria management. Patient satisfaction was moderate and lower than the national average. **Conclusion:** To improve patient satisfaction, an in-depth investigation of innovative and customer-oriented approaches should be conducted.

Keywords: Quality healthcare, pediatric healthcare, malaria management

INTRODUCTION

Malaria is a life-threatening illness caused by a parasite that invades the red blood cells. It is commonly spread through the bite of female Anopheles mosquitoes in tropical and subtropical areas. In 2015, nearly 95 countries reported malaria cases, putting a staggering 3.2 billion individuals at risk.[1]

Malaria is a prevalent disease, particularly in northern Ghana, where seasonal variations are more prominent. A staggering 24.2 million people in Ghana are at risk of infection, with young children and pregnant women being particularly vulnerable because of their compromised immune systems. In the third quarter of 2015, Ghana recorded approximately 2.7 million suspected cases of malaria among children under 5 years of age. The incidence rate varies significantly between rural and urban areas, with 80.2% of children with fever testing positive for malaria in rural areas compared to only 6.6% testing positive in cities such as Accra and Kumasi. According to available data from the district health information management systems (DHIMS 2), malaria accounted for 26% of all hospital attendance, 12% of admissions, and 4.6% of all deaths among children at Princess Marie Louis (PML) Children's Hospital in the first half of 2016.[2]

Healthcare quality is often measured based on predefined standards that ensure the administration of safe interventions capable of improving patients' health within the available resources.[3] This includes technical aspects and subjective factors such as patient satisfaction. Studies have shown that patients visiting health facilities are most satisfied when they receive consistent and necessary care from staff who maintain good interpersonal relationships with them.[4] Therefore, healthcare providers must improve their communication skills by showing compassion, being polite, actively listening to patients' concerns, ensuring essential drug availability, and advancing prescription skills.[5]

According to Fenny et al.[3], factors, such as interpersonal relations between healthcare providers and patients and the availability of logistics, medical equipment, drugs, and technical skills, greatly influence healthcare quality. For example, the introduction and distribution of rapid malaria diagnostic tests in 2005 significantly increased parasitological diagnostic capacity in facilities from 17% in 2004 to 73% in 2006.[6] Therefore, this study aims to assess the quality of healthcare provided to children with malaria under 5 years of age at PML Children's Hospital in Accra using Donabedian's quality of care model.[7,8]

METHODS

This study was conducted at PML Children's Hospital in Accra. Established in 1926 to treat malnourished children, the hospital has since expanded and has become the only pediatric hospital in Accra. The hospital has 74 beds and a staff of 81 nurses, five pediatricians, five medical officers, four physician assistants, three pharmacists, and two laboratory technicians.

This study was approved by the Ghanaian Health Service Ethics Review Board. In addition, local permission and support were obtained from the management of PML Children's Hospital. Before participation, all individuals involved in the study, including staff and parents of the children, provided explicit consent. Note that participation in the study was entirely voluntary, and respondents could withdraw at any time.

A cross-sectional survey assessed the quality of care provided to children under 5 years old with malaria treated at PML Children's Hospital in Accra, Ghana. The study was conducted based on a computer-generated random sample of 74 staff members (doctors, nurses, laboratory technicians, and pharmacy staff) working at the hospital and 301 parents. Staff participants were full-time employees who had worked for at least 6 months and directly cared for children diagnosed with malaria. Parental/caregiver participants were those with children aged 5 or younger who were admitted and treated for malaria at the PML Children's Hospital for more than 2 days.

Data were collected using an adapted standard questionnaire administered to the respondents. Contextual observations were made alongside the questionnaire data collection. The questionnaire comprised two sections: one tailored to staff members, and the other was administered to parents of children treated for malaria.

The first section of the questionnaire aimed to collect demographic information from the staff members and investigate the availability of resources (staffing levels and medication supply logistics) that contribute to providing quality care for children under 5 years of age diagnosed with malaria. We also compared the compliance with standard protocols for malaria case management with current practices implemented at the PML Children's Hospital. The second part of the questionnaire focused on gathering relevant demographic information from parents whose children underwent treatment for malaria to assess parental satisfaction with the quality of care provided.

Data Analysis

The data were analyzed using IBM SPSS (version 20). Descriptive statistics, such as mean, standard deviation (SD), percentages, and 95% confidence intervals (CIs) were used to summarize the data. A p-value < 0.05 was considered statistically significant. Survey responses were based on a 3- or 5-point scale, and the mean score, SD, and percentages were calculated. Inferential statistics were used to draw appropriate conclusions. Multiple regression analyses were employed to examine the relationship between parental satisfaction with care quality and the availability of resources for malaria care in children under 5 years of age, namely, staffing, medication supply logistics, and protocols.

RESULTS

A total of 71 (96%) survey responses were received from staff, and 296 (98%) responses were received from parents and caregivers. Results of the staff questionnaire are presented in Tables 1–3. Results of the parental questionnaire are presented in Tables 4 and 5.

Quality of Malaria Case Management

Staff members rated the accessibility of different service delivery supplies related to malaria case management (Table 1). The highest score (mean 4.44 out of 5 [88.8%], SD = 0.60, 95% CI: 4.30–4.58) was recorded for general supplies and logistics such as staff availability, triage, and essential equipment.

Laboratory capacity (i.e., functional microscopes, laboratory staff, rapid diagnostic tests, training, etc.) also had a high mean score of 4.23 (84.6%) (SD = 0.83, 95% CI: 4.14–4.34). Additionally, the availability of supportive medicines and supplies (e.g., blood for transfusion, infusions, oxygen, anti-pyrectics, gloves, syringes, and needles) had a mean score of 4.41 (88.1%) (SD = 0.55, 95% CI: 4.28–4.53). The availability of core anti-malaria medication had the lowest score among all evaluated supply dimensions (mean = 3.33 [66.6%], SD = 0.83, 95% CI: 3.14–3.52).

Compliance with Standard Malaria Management Protocols

Staff were asked to rate how often they followed or complied with various protocols for managing malaria cases in children under 5 years of age using a 3-point scale (Table 2). The overall compliance rate was 89.4% (mean score = 2.68 out of 3).

One of these parameters was general care provided to children with malaria in the outpatient department. This included mandatory testing before malaria treatment and only using artemisinin-based combination

Table 1. Availability of supplies for management of malaria

Supply Dimension	Mean Score (Scale of 1–5)	Mean (%)	SE	SD	95% CI Lower	95% CI Upper
General Supplies & Logistics	**4.44**	**88.8**	**0.07**	**0.60**	**4.30**	**4.58**
• Practice of Triaging	4.12	82.4	0.10	0.84	3.93	4.31
• Separate consulting rooms for severely ill children in the outpatient department	4.59	91.8	0.10	0.83	4.40	4.78
• Thermometers available	4.65	93.0	0.07	0.58	4.52	4.78
• Functional scale for weighing	4.64	92.8	0.07	0.63	4.50	4.78
• Required staff	4.43	88.6	0.07	0.63	4.29	4.57
• Cold box/fridge	4.32	86.4	0.09	0.80	4.14	4.50
Laboratory Capacity	**4.23**	**84.6**	**0.05**	**0.47**	**4.13**	**4.34**
• Medical laboratory staff	4.28	85.6	0.09	0.73	4.11	4.45
• Availability of functional microscope (from Laboratory Technician)	3.85	77.0	0.09	0.75	3.68	4.02
• Rapid diagnostic test (RDT) availability	4.58	91.6	0.07	0.60	4.44	4.72
• Staff trained to perform RDTs	4.27	85.4	0.09	0.73	4.10	4.44
• Malaria testing using functional microscopy	4.16	83.2	0.07	0.62	4.02	4.30
• Malaria testing using both microscopy and RTD	4.09	81.8	0.09	0.74	3.92	4.26
Core Malaria Medicine	**3.33**	**66.6**	**0.10**	**0.83**	**3.14**	**3.52**
• Artemisinin-based combination therapies (oral)	4.03	80.6	0.10	0.84	3.84	4.22
• Intravenous (IV) artesunate	3.92	78.4	0.11	0.92	3.71	4.13
• Artemisinin-based suppository	3.01	60.2	0.14	1.21	2.73	3.29
• Artemether injection	3.00	60.0	0.14	1.19	2.73	3.27
• Injection quinine	2.81	56.2	0.14	1.21	2.53	3.09
Supportive Medicine & Supplies	**4.41**	**88.1**	**0.06**	**0.55**	**4.28**	**4.53**
• 5% dextrose	4.27	85.4	0.10	0.83	4.08	4.46
• 50% dextrose	4.08	81.6	0.11	0.96	3.86	4.30
• Blood for transfusion	4.16	83.2	0.10	0.88	3.96	4.36
• Blood transfusion supplies	4.11	82.2	0.09	0.80	3.93	4.29
• IV supplies	4.30	86.0	0.08	0.68	4.15	4.45
• Oxygen availability	4.38	87.6	0.08	0.68	4.23	4.53
• Syringes and needles availability	4.65	93.0	0.07	0.63	4.51	4.79
• Gloves availability	4.64	92.8	0.07	0.61	4.50	4.78
• Thermometers availability	4.59	91.8	0.08	0.66	4.44	4.74
• Suction machine availability and functionality	4.15	83.0	0.09	0.79	3.97	4.33
Overall Supply Availability	**4.06**	**81.1**	**0.05**	**0.41**	**3.96**	**4.15**

SE: standard error; SD: standard deviation.

therapies (ACT). The results showed a compliance rate of 93% in this dimension (mean = 2.79, SD = 0.31).

Compliance with standard laboratory tests for children diagnosed with severe or complicated malaria was approximately 87.2%. These tests include bloodwork to assess the hemoglobin (Hb) levels and detect malarial parasites, grouping and cross-matching for possible transfusion when Hb level is less than 5gm/dL and hematocrit (HCT) level is 15%–20%, and blood glucose tests. For patients suffering from convulsions or coma, funduscopy prior to lumbar puncture was performed to rule out raised intracranial pressure. The compliance rates were approximately 90% for initiating and maintaining treatment and for monitoring patients during admission. During the recovery phase, compliance with standard protocols was 80.9%.

A hierarchical regression analysis was conducted to investigate the impact of various input factors on staff compliance with standard malaria case management protocols and guidelines. The dependent variable was the overall adherence to standard malaria case management protocols. The predictor variables were entered sequentially, including general supplies and logistics (model 1), laboratory capacity (model 2), availability of anti-malaria medicine (model 3), availability of supportive medicine and supplies (model 4), and the interaction between anti-malaria and supportive medicine availability (model 5). The results are presented in Table 3.

In model 1, general supply availability accounted for only 3.3% of the variation in staff compliance with standard malaria care protocols; however, this model did not accurately predict compliance with standard malaria treatment protocols ($R^2 = 0.033$, F (1, 73) = 2.450, $p = 0.122$). When laboratory capacity was added as a predictor in model 2, both predictors accounted for only 6.6% of the variance in staff compliance with standard malaria care protocols ($R^2 = 0.066$, F (2, 73) = 2.516, $p = 0.88$). Similarly, with the inclusion of anti-malaria medicine availability in model 3, the predictive power increased slightly to 7.2% ($R^2 = 0.072$, F (3, 73) = 1.823, $p = 0.151$). The inclusion of supportive medicine availability in the final regression model accounted for approximately 16% of the variation, significantly improving the models' ability to predict compliance with standard malaria care guidelines ($R^2 = 0.159$, F (4, 73) = 3.262, $p = 0.016$).

Table 2. Compliance with standard malaria case management protocols

	Compliance Rate			
	Mean Score (Scale: 1–3)	**SE**	**SD**	**Compliance (%)**
General Care of a Child With Malaria for Outpatients	**2.79**	**0.04**	**0.31**	**93.0**
Testing using rapid diagnostic test (RDT) or microscopy before malaria treatment	2.78	0.05	0.41	92.7
Use of only artemisinin-based combination therapies (ACT)	2.82	0.05	0.38	94.0
Initial Evaluation of Patient Admitted with Complicated Malaria	**2.79**	**0.04**	**0.32**	**93.1**
• Airways, breathing, and circulation	2.77	0.05	0.42	92.3
• Dehydration	2.89	0.04	0.31	96.3
• Repeated convulsions	2.90	0.03	0.29	96.7
• Signs of shock and collapse	2.84	0.04	0.37	94.7
• Anemia	2.82	0.05	0.42	94.0
• Pulmonary edema	2.71	0.05	0.45	90.3
• Level of consciousness using Glasgow or Blantyre coma scales	2.33	0.06	0.53	77.7
• Hyperpyrexia	2.90	0.03	0.29	96.7
• Urine output	2.79	0.05	0.44	93.0
Laboratory Evaluation	**2.62**	**0.03**	**0.27**	**87.2**
• Microscopy for malaria parasites- thick and thin blood films	2.73	0.06	0.48	91.0
• Hemoglobin (Hb) and/or Hematocrit (HCT)	2.82	0.05	0.38	94.0
• Grouping and cross-matching for possible transfusion where Hb < 5gm/dL and HCT<15–20%	2.76	0.06	0.49	92.0
• Lumbar puncture (LP) in patients with convulsions or coma	2.39	0.06	0.54	79.7
• Funduscopy to rule out raised intracranial pressure before LP	2.04	0.07	0.63	68.0
• Urea /creatinine, and electrolytes	2.28	0.06	0.51	76.0
• Blood glucose	2.82	0.05	0.42	94.0
• Full blood cell count, platelet count, clotting studies, blood culture, plasma bicarbonate, plasma lactate	2.85	0.05	0.40	95.0
Initiating and Maintaining Treatment	**2.69**	**0.03**	**0.23**	**89.6**
• Start treatment while waiting for laboratory results	2.80	0.05	0.47	93.3
• Secure the airway in an unconscious patient	2.77	0.05	0.46	92.3
• Intubate patient when appropriate	2.24	0.07	0.64	74.7
• Insert an intravenous cannula.	2.76	0.06	0.49	92.0
• Using body weight to calculate dosages of medicines & fluid	2.89	0.05	0.39	96.3
• Administer parenteral anti-malarial medications	2.76	0.05	0.46	92.0
• Provide additional supportive therapy	2.73	0.06	0.48	91.0
• Full parenteral course based on parasitological confirmation	2.69	0.06	0.50	89.7
• Order parenteral drug choice: Artesunate, Artemether and Quinine.	2.73	0.06	0.48	91.0
• Parenteral treatment continued until patient can wallow	2.69	0.06	0.52	89.7
• Parenteral treatment for at least 24 hours even if patient can swallow	2.70	0.06	0.54	90.0
• Treatment completed using full 3-day course of an oral ACTs	2.84	0.06	0.47	94.7
Monitoring During Admission	**2.70**	**0.01**	**0.11**	**89.9**
• Level of consciousness using Blantyre or Glasgow coma scale	2.31	0.06	0.50	77.0
• Vital signs taken at least every four hours	2.93	0.04	0.34	97.7
• Fluid intake/output, including the rate of infusion of fluids	2.91	0.04	0.34	97.0
• Urine volume monitored hourly	2.64	0.06	0.49	88.0
• Blood glucose checks every 4 hours while patient is unconscious	2.76	0.05	0.43	92.0
• Mandatory parasitemia obtained on admission	2.31	0.06	0.52	77.0
• Parasitemia while hospitalized - repeated at least every 6 hours	2.08	0.06	0.54	69.3
Assessment o Recovery	**2.43**	**0.03**	**0.26**	**80.9**
• Check for neurological sequelae (deficit)	2.09	0.05	0.44	69.7
• Assess vision and hearing and refer if deficits are found	2.36	0.06	0.51	78.7
• Assess neuro-motor functioning.	2.23	0.06	0.48	74.3
• Perform follow-up laboratory tests on the 7th and 14th days	2.74	0.06	0.47	91.3
Overall Compaliance with Protocols	**2.68**	**0.01**	**0.10**	**89.4**

SE: standard error; SD: standard deviation.

Availability of supportive medicines was the only significant predictor, contributing to 6% of the model's power. However, when the interaction effect of anti-malaria and supportive medicine availability were considered, the predictive power increased to approximately 22.6%.

Patient Satisfaction

Results of the parental/caregiver questionnaire are presented in Table 4. Overall, patient satisfaction with the quality of malaria care was moderate, with a mean score of 3.09 on a 5-point scale (61.8%). The analysis of

Table 3. Influence of supply availability on compliance with standard malaria care protocols

Model	Independent Variables/Predictors	Unstandardized Coefficients		Standardized Coefficients			95% CI	
		Beta	SE	Beta	*t*	*p*	Lower Bound	Upper Bound
1	Intercept	2.55	0.08		30.60	0.00	2.39	2.72
	General supplies and logistics	0.03	0.02	0.18	1.57	0.12	−0.01	0.07
	Summary: $R^2 = 0.033$, $F_{(1, 73)} = 2.450$, $p = 0.122$							
2	Intercept	2.45	0.11		23.35	0.00	2.24	2.66
	General supplies and logistics	0.01	0.02	0.05	0.36	0.72	−0.04	0.05
	Laboratory capacity	0.05	0.03	0.22	1.59	0.12	−0.01	0.10
	Summary: $R^2 = 0.066$, $F_{(2, 73)} = 2.516$, $p = 0.88$							
3	Intercept	2.45	0.11		23.27	0.00	2.24	2.66
	General supplies and logistics	0.01	0.02	0.04	0.29	0.78	−0.04	0.05
	Laboratory capacity	0.04	0.03	0.19	1.26	0.21	−0.02	0.10
	Anti-malaria medicines availability	0.01	0.02	0.09	0.69	0.49	−0.02	0.04
	Summary: $R^2 = 0.072$, $F_{(3, 73)} = 1.823$, $p = 0.151$							
4	Intercept	2.33	0.11		21.10	0.00	2.11	2.55
	General supplies and logistics	−0.01	0.02	−0.04	−0.26	0.79	−0.05	0.04
	Laboratory capacity	0.02	0.03	0.11	0.78	0.44	−0.04	0.08
	Anti-malaria medicines availability	0.01	0.02	0.05	0.37	0.71	−0.02	0.04
	Supportive medicine and supplies availability	0.06	0.02	0.34	2.67	0.01	0.02	0.10
	Summary: $R^2 = 0.159$, $F_{(4, 73)} = 3.262$, $p = 0.016$*							
5	Intercept	1.69	0.28		5.95	0.00	1.12	2.26
	General supplies and logistics	−0.01	0.02	−0.06	−0.43	0.67	−0.05	0.03
	Laboratory capacity	0.00	0.03	−0.01	−0.04	0.97	−0.06	0.06
	Anti-malaria medicines availability	0.26	0.11	2.23	2.46	0.02	0.05	0.47
	Supportive medicine and supplies availability	0.22	0.07	1.28	3.15	<0.001	0.08	0.36
	Interaction term: anti-malaria and supportive medicines/ supplies availability	0.06	0.02	2.57	2.43	0.02	0.01	0.10
	Summary: $R^2 = 0.226$, $F_{(5, 73)} = 3.977$, $p = 0.003$*							

Dependent variable: Overall compliance with malaria case management protocols.

specific dimensions revealed high satisfaction with the outpatient appointment processes and staff attitudes (mean scores of 3.77 [75.4%] and 3.88 [77.6%], respectively). However, staff communication was rated slightly lower (3.28, 65.6%).

An Ordinary least squares regression was conducted to assess the impact of technical quality indicators, such as structured processes, professionally defined practices, and care protocols, on patient satisfaction with malaria care (Table 5). The analysis showed that combining all technical quality indicators resulted in a weak and statistically insignificant model ($R^2 = 0.08$, F (7, 300) $= 0.291$, $p = 0.957$). As a result, none of the independent variables could predict patient satisfaction with malaria care. Each predictor variable was entered sequentially in a hierarchical manner but failed to produce a model with statistically significant predictive capability.

DISCUSSION

The findings of this study suggest that the PML Children's Hospital is comparatively better equipped than other hospitals in the country to care for children with malaria.[9] Some studies have attributed supply and logistical challenges to a lack of funding caused by delayed and erratic reimbursement from the National Health Insurance Authority (NHIA).[10–12]

In the current study, the availability of core anti-malaria medication was the lowest among all supply parameters evaluated (66.6%). This finding aligns with the study conducted by Khuluza et al. and Ghouth[9,13] in Yemen and Malawi, respectively, in which the availability of anti-malaria medication was only 38%, even after interventions were implemented to improve supplies from national medical stores. However, the GHS estimates that essential medicines are available in approximately 98% of health facilities in the Greater Accra region, where PML Hospital is located.[2] This suggests that there may be a more severe shortage of essential medication in hospitals than previously documented or anticipated, particularly regarding anti-malaria medication.

Adherence to standard protocols and guidelines is a crucial benchmark for healthcare delivery regarding technical and process quality. Our study's high compliance rates (89.4% and 93%) are consistent with other research, including a study conducted in Ghana, where curative regimens containing an artemisinin derivative were administered to 90.8% of patients under 5 years of age.[14–17] Dodoo et al.[15] emphasized how laboratory confirmation influenced the recommended anti-malaria therapy for children attending government facilities.

Table 4. Patient satisfaction with malaria care for children age 5 and under

Dimensions	Mean Score (Scale: 1–5)	SE	SD	95% CI	
				Lower	Upper
Patient Appointment	**3.77**	**0.04**	**0.74**	**3.68**	**3.85**
Making you feel at ease	4.09	0.10	1.81	3.89	4.29
Service available 24 hours to clients	4.29	0.04	0.75	4.21	4.37
Getting care as soon as you needed	3.83	0.04	0.70	3.75	3.91
Getting after-hours care when needed	3.76	0.04	0.71	3.68	3.84
Efficiency of check-in process	3.53	0.04	0.77	3.44	3.62
Waiting time in the doctor's room	3.27	0.05	0.82	3.18	3.36
Informing if appointment time was delayed	3.26	0.05	0.80	3.17	3.35
Ease of getting a referral when you needed	3.14	0.05	0.86	3.04	3.24
Staff Attitude	**3.88**	**0.02**	**0.43**	**3.83**	**3.93**
Courtesy of staff	3.05	0.02	0.41	3.00	3.10
Friendliness and courtesy of receptionist	3.72	0.04	0.64	3.65	3.79
Care and concern of nurses and doctors	3.72	0.04	0.61	3.65	3.79
Helpfulness of staff with billing or insurance	3.71	0.04	0.64	3.64	3.78
Professionalism of our laboratory other staff	3.69	0.03	0.59	3.62	3.76
Staff Communiction with Patient	**3.28**	**0.03**	**0.59**	**3.21**	**3.34**
Prompt attention & answered all questions	3.86	0.05	0.94	3.75	3.97
Getting advice or help when needed during	3.58	0.04	0.72	3.50	3.66
Staff explained treatment understandably	3.54	0.04	0.65	3.47	3.61
Test results reported in a reasonable time	3.66	0.14	2.38	3.39	3.93
Effectiveness of providing information	3.42	0.04	0.70	3.34	3.50
Staff ability to answer patient questions timely	3.38	0.11	1.90	3.17	3.59
Patients able to contact staff for attention	3.22	0.04	0.66	3.15	3.29
Patient obtains prescription refills by staff	2.98	0.05	0.82	2.89	3.07
Patient Visit with the Provider	**3.82**	**0.03**	**0.54**	**3.76**	**3.88**
Willingness to listen carefully to you	3.33	0.04	0.66	3.26	3.40
Taking time to answer your questions	3.70	0.04	0.63	3.63	3.77
Amount of time spent with you to attend to you	3.68	0.04	0.65	3.61	3.75
Explaining things without using medical terms	3.65	0.04	0.66	3.58	3.72
Instructions regarding medication/follow-up	3.69	0.04	0.65	3.62	3.76
The thoroughness of the examination	3.73	0.04	0.73	3.65	3.81
Referral to laboratory for malaria test	3.75	0.04	0.75	3.67	3.83
Advice given on home care	3.63	0.05	0.79	3.54	3.72
Princess Marie Louis Facility	**3.74**	**0.04**	**0.69**	**3.66**	**3.82**
Hours of operation convenient	3.45	0.04	0.77	3.36	3.54
Overall comfort	3.65	0.04	0.67	3.57	3.73
Adequate sitting and chairs at waiting room	3.76	0.04	0.70	3.68	3.84
Signpost/directional sign easy to follow	3.60	0.05	0.90	3.50	3.70
Overall Patient Satisfaction	**3.70**	**0.02**	**0.40**	**3.65**	**3.74**

The current study demonstrated 87.2% (SD = 0.27) compliance with standard laboratory investigations in children with severe or complicated malaria. Although high adherence rates to standard guidelines were observed in our study, Ghana lacks a benchmark for determining whether this adherence level is acceptable. Regardless, hospitals must strive for universal adherence to established protocols for malaria case management, especially when dealing with children under 5 years old.

The national malaria case management standards considered in this study primarily focused on managing complicated malaria cases in hospital settings.[8] In this context, supporting medication, such as 5% dextrose, 50% dextrose, blood for transfusion, blood transfusion supplies, intravenous supplies, oxygen, syringes, and needles are crucial in addition to core anti-malaria medication. According to Aponte et al.,[14] Ghanaian clinicians typically prescribe a median of two additional medications per patient (range 1–9) to treat malaria. The current study did not evaluate the specific types of prescriptions used as supportive medication for managing malaria or whether these prescriptions aligned with approved national guidelines. Further studies are required to address this knowledge gap.

Patient satisfaction surveys revealed that the overall satisfaction among parents and caregivers regarding managing and caring for children with malaria was moderate (61.8%). A study by Turkson[18] reported higher rates of patient satisfaction (70–90%) regarding the treatment and care provided; however, the study did not focus specifically on malaria or a specific age group. Despite this distinction, numerous studies in Ghana have reported patients satisfaction with malaria care, despite concerns about technical quality in certain health facilities.[10,11,19,20]

Table 5. Influence of technical quality indicators on patient satisfaction

	Unstandardized Coefficients		Standardized Coefficients		
Independent Variables/Predictors	**B**	**SE**	**Beta**	***t***	***p***
Intercept	2.85	1.66		1.72	0.09
General supplies and logistics	0.01	0.10	0.01	0.08	0.94
Laboratory capacity	−0.23	0.41	−0.26	−0.55	0.58
Anti-malaria medicines availability	0.30	0.63	0.62	0.48	0.63
Supportive medicines and supplies availability	0.03	0.45	0.05	0.08	0.94
Overall compliance with protocols for malaria case management	0.30	0.58	0.07	0.52	0.61
Interaction term: anti-malaria and supportive medicines availability	−0.12	0.22	−1.31	−0.54	0.59
Interaction term: medicines availability and laboratory capacity	0.02	0.03	0.81	0.58	0.57
Model Summary: (R^2 = 0.08, $F_{(7, 300)}$ = 0.291, p = 0.957)					

SE: standard error.

In our study, no technical quality indicator could significantly predict patient satisfaction with the quality of care. This suggests that what is considered technical quality may not necessarily meet the expectations or needs of patients in a hospital setting.[21] To bridge this gap, better communication between technical health staff and patients is needed. Other factors such as reducing patient waiting time, improving staff communication techniques, responding to emergency cases promptly, providing prompt treatment, having a positive staff attitude toward patients, and ensuring timely reporting to work may be crucial for enhancing patient satisfaction.[4] Relying solely on technical quality indicators can be misleading if the primary goal is to improve patient satisfaction. Therefore, hospital management must focus on improving technical quality indicators for effective healthcare delivery while addressing subjective service delivery aspects through customer-oriented innovations.

This study aimed to investigate the conditions and procedures for delivering high-quality healthcare to children under 5 years old with malaria at PML Children's Hospital in Accra. Consequently, the data analysis was confined to completed questionnaires obtained at a single institution.

CONCLUSION

PML Children's Hospital has sufficient resources to provide quality healthcare for children under 5 years old with malaria; however, the availability of anti-malaria medication was limited. The overall availability of resources for standard malaria care at the hospital was 81.1%. Staff compliance with GHS standard protocols for malaria case management was 89.4%. Parents or caregivers of children who received malaria treatment at the hospital expressed moderate satisfaction (61.8%), which falls below the average range of 70–90% reported in other studies and surveys conducted in Ghana. It is recommended that both the Ghana National Malaria Elimination Program and hospital management ensure adequate provision of supplies, such as anti-malaria drugs and supportive medication, which needs to be improved at the facility. Additionally, regular in-service training and supervision should be implemented so that service providers can fully adhere to treatment guidelines. Further investigation into the factors that would increase patient satisfaction is recommended. Finally, the authors suggest researching how protocol adherence affects outcomes in malaria patients under 5 years old.

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References

1. *World Malaria Report 2020*. World Health Organization, 2020.
2. District Health Management Information System, version 2 (DHIMS). Center for Health Information Management (CHIM), Ministry of Health; 2016.
3. Fenny AP, Enemark U, Asante FA, Hansen KS. Patient satisfaction with primary health care - a comparison between the insured and non-insured the National Health Insurance Policy in Ghana. *Glob J Health Sci*. 2014;6:9–21.
4. Ofosu-Kwarteng, J. *Healthcare delivery and customer satisfaction in ghana. A case study of the Koforidua Regional Hospital* [Master's Thesis]. Kwame Nkrumah University of Science and Technology; 2012.
5. Khamis K, Njau B. Patients' level of satisfaction on quality of health care at Mwananyamala hospital in Dar es Salaam, Tanzania. *BMC Health Serv Res*. 2014;14:400.
6. Hamer DH, Ndhlovu M, Zurovac D, et al. Improved diagnostic testing and malaria treatment practices in Zambia. *JAMA*. 2007;297:2227–2231.

7. Ayanian JZ, Markel H. Donabedian's Lasting Framework for Health Care Quality. *N Engl J Med*. 2016;375:205–207. doi:10.1056/NEJMp1605101
8. *Guidelines for Case Management of Malaria in Ghana* (3rd Edition). Ministry of Health, 2014.
9. Khuluza F, Kadammanja P, Simango C, Mukhuna M. Did drug availability in Malawian central hospitals improve after the conversion of central medical stores to a trust? *African J Pharm Pharmacol* 2016;10:145–150.
10. Abuosi AA, Atinga RA. Service quality in healthcare institutions: establishing the gaps for policy action. *Int J Health Care Qual Assur*. 2013;26:481–492.
11. Abekah-Nkrumah G, Manu A, Atinga RA. Assessing the implementation of Ghana's patient charter. *Health Educ*. 2010;110:169–185. doi:10.1108/09654281011038840
12. Avortri GS, Beke A, Abekah-Nkrumah G. Predictors of satisfaction with child birth services in public hospitals in Ghana. *Int J Health Care Qual Assur*. 2011;24:223–237.
13. Bin Ghouth AS. Availability and prescription practice of anti-malaria drugs in the private health sector in Yemen. *J Infect Dev Ctries*. 2013;7:404–412.
14. Aponte JJ, Schellenberg D, Egan A, et al. Efficacy and safety of intermittent preventive treatment with sulfadoxine-pyrimethamine for malaria in African infants: a pooled analysis of six randomised, placebo-controlled trials. *Lancet* 2009;374:1533–1542.
15. Dodoo ANO, Fogg C, Asiimwe A, et al. Pattern of drug utilization for treatment of uncomplicated malaria in urban Ghana following national treatment policy change to artemisinin-combination therapy. *Malar J*. 2009;8:2.
16. Achan J, Talisuna AO, Erhart A, et al. Quinine, an old anti-malarial drug in a modern world: role in the treatment of malaria. *Malar J*. 2011;10:144.
17. Mbacham WF, Mangham-Jefferies L, Cundill B, et al. Basic or enhanced clinician training to improve adherence to malaria treatment guidelines: a cluster-randomised trial in two areas of Cameroon. *Lancet Glob Health*. 2014;2:e346–e358.
18. Turkson PK. Perceived quality of healthcare delivery in a rural district of Ghana. *Ghana Med J*. 2009;43:65–70.
19. Essiam JO. Service quality and patients satisfaction with healthcare delivery: empirical evidence from patients of the out patient department of a public university hospital in Ghana. *Eur J Bus Manage*. 2013;5:1–9.
20. Nketiah-Amponsah E, Hiemenz U. Determinants of consumer satisfaction of health care in Ghana: does choice of health care provider matter? *Glob J Health Sci*. 2009;1:50–61.
21. Morris RK, Malin GL, Quinlan-Jones E, et al. The Percutaneous shunting in Lower Urinary Tract Obstruction (PLUTO) study and randomised controlled trial: evaluation of the effectiveness, cost-effectiveness and acceptability of percutaneous vesico amniotic shunting for lower urinary tract obstruction. *Health Technol Assess*. 2013;17:1–232.
22. Yahaya H. Assessment of the quality of health care rendered to children under five with malaria at the Princess Marie Louis Hospital, Accra [Master's Thesis]. University of Ghana School of Public Health, 2017.