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INTRODUCTION

Hypoxemia is a major cause of morbidity and mortality in children globally, particularly in developing countries (1). It is defined as a low oxygen concentration in the arterial blood and is recognized as a constant factor in the process that culminates in mortality in pulmonary pathologies (1). It has been reported to increase the adjusted odds of death six-fold in neonates and seven-fold in children (2). Oxygen is an essential life-saving medicine crucial for treating numerous common childhood conditions (3). As the primary treatment for hypoxemia, oxygen therapy is indispensable in the emergency room for a variety of conditions, including pneumonia, sepsis, malaria, trauma,

and neonatal diseases such as respiratory distress syndrome, asphyxia, and neonatal sepsis (1).

Notwithstanding the overwhelming evidence of the role of oxygen in critically ill children, the uptake of intranasal oxygen has not been without hitches. Some authors reported instances where caregivers in developing countries refused oxygen therapy for children (4-6). In a study evaluating factors influencing the acceptance or rejection of oxygen therapy for children in Malawi, Stevenson and colleagues noted that the majority of participants were reluctant to accept oxygen for their child's care. Aliyu and colleagues in Nigeria similarly documented this finding (5,6).

Awareness and acceptance of oxygen therapy among caregivers of patients attending children's emergency rooms of three tertiary hospitals in Southeastern Nigeria

Abstract

Aim: Oxygen is a life-saving essential medicine that is crucial for the treatment of many common childhood conditions. Despite the overwhelming evidence of the role of oxygen in critically ill children, refusal of oxygen therapy by caregivers has been reported in developing countries.

Materials and Methods: This multicentre cross-sectional study was conducted among the caregivers of children admitted to the Children's Emergency Rooms of three tertiary hospitals in Southeastern Nigeria. Data were collected to assess awareness and acceptance of oxygen therapy using researcher-administered semi-structured questionnaires.

Results: Out of the 571 respondents, 450 (78.8%) were aware of oxygen therapy, with hospitals (79.0%) being the most common source of awareness. The acceptance rate of oxygen therapy among the respondents was 94.9%. No significant association was found between socio-demographic factors and acceptance of oxygen therapy.

Conclusion: Although awareness of oxygen therapy is high in Southeastern Nigeria, there is still a need for continued education of caregivers on the benefits and mechanisms of this life-saving treatment.

Keywords: Oxygen therapy, acceptance, awareness, caregivers, children's emergency

Several reasons have been identified that influence the acceptance of oxygen therapy. Stevenson and colleagues (6) highlighted that fear among caregivers was a major contributor to the refusal of oxygen. These fears were intensified by previous experiences of the death of someone on oxygen, unfamiliarity with oxygen delivery equipment, and distrust of health workers and the health system, among other factors (6). Ignorance has also been reported to influence the acceptance of oxygen therapy (5,7). Aliyu and colleagues (5) similarly reported that the belief among participants that oxygen could result in the death of the child was a major factor associated with the refusal of oxygen therapy (5).

Although parental rights over children are well recognized in pediatrics (8), conflicts between beneficence and autonomy frequently arise. The refusal of vital therapies such as oxygen by caregivers is particularly concerning, regardless of the reasons, especially in the 21st century. This study aimed to determine the awareness and acceptance of oxygen therapy among caregivers of patients attending children's emergency rooms in three tertiary hospitals in Southeastern Nigeria.

MATERIALS AND METHODS

Setting

This institution-based cross-sectional study was conducted among caregivers of children attending the Children's Emergency Room (CHER) of three tertiary hospitals in Southeastern Nigeria, namely: Enugu State University Teaching Hospital, Parklane, Enugu (ESUT-TH); Nnamdi Azikiwe University Teaching Hospital, Nnewi (NAUTH); and Federal Teaching Hospital, Owerri (FTH).

Data Collection

Semi-structured questionnaires were administered to primary caregivers who consented to participate in the study. One questionnaire was completed for each patient admitted to CHER during the study period from January 1st to June 30th, 2023. Study variables were collected in relevant sections of the questionnaire. The first section contained sociodemographic variables (age, gender, religion, level of education, occupation, tribe, and relationship to the patient) and the child's admission status (admitted or not admitted). The level of education and occupation were used to calculate the socioeconomic class according to Ogunlesi et al. (9).

The second section assessed awareness of oxygen therapy, including the following parameters: whether the respondent had heard of oxygen therapy (categorized as yes or no), the source of information for those who answered "yes," the reasons the respondent thought oxygen is given, whether the respondent thought there are alternatives to oxygen therapy (categorized as yes or no), and the alternatives for those who answered "yes."

The third section assessed acceptance based on the following parameters: whether the caregiver would likely consent to

oxygen therapy if indicated for the child (categorized as yes or no), reasons for not likely consenting for those who answered "no," any previous experience with oxygen therapy (categorized as yes or no), and the outcome of such previous experience (categorized as alive, alive with complications, or dead).

Data Management and Analyses

The data were analyzed using IBM SPSS version 25 (Chicago, IL). Descriptive statistics, such as frequency, percent, mean, and standard deviation, were used to summarize categorical and continuous variables. A chi-square statistical test was employed to test for associations between categorical variables at a significance level of 5%. Normally distributed data were compared using independent t-test.

Ethical Considerations

Ethical approval was obtained from the Ethics and Research Committee of ESUTH, Enugu with reference number: ESUTHP/C-MAC/RA/034/VOL.3/137 and dated 23/10/2022.

RESULTS

Of the 571 respondents, 425 (74.4%) were females with a mean age of 34.37±9.64 years. The majority were Christians and of the Igbo tribe, accounting for 98.9% and 96.5%, respectively. More than half of the participants (54.1%) belonged to the upper socioeconomic class (Class I & II), while 37.1% and 8.8% were from the middle (Class III) and lower socioeconomic class (Class IV and V), respectively as shown in Table 1

Table 1. Socio-demographic characteristics of the study participants

Variables	Frequency (%)	Mean (SD)
Age (years)		34.37 (9.64)
Gender		
Male	146 (25.6)	
Female	425 (74.4)	
Religion		
Christianity	555 (98.9)	
Others	6 (1.1)	
Socio-economic class		
Very rich	36 (6.2)	
Rich	278 (47.9)	
Neither rich nor poor	215 (37.1)	
Poor	43 (7.4)	
Very poor	8 (1.4)	
Tribe		
Igbo	555 (96.5)	
Others	20 (3.5)	

Awareness

Table 2 demonstrates that awareness of oxygen therapy was high (78.8%) among the respondents, with hospitals (79.0%) being the most common source of awareness.

Table 2. Awareness of oxygen therapy and source of awareness

Reasons	Frequency (%)
Awareness (n=577)	
Yes	458 (78.8)
No	119 (20.5)
Source of awareness (n=458)	
Hospital	362 (79.0)
Friends	131 (28.6)
Internet	75 (16.4)
Radio	63 (13.8)
Billboard	18 (3.9)
Others	25 (5.5)

507 respondents answered the reasons for oxygen therapy. Table 3 shows the reasons given by the respondents.

Table 3. Reasons for oxygen therapy

Reasons	
Emergency situations/last option for survival	184 (36.3)
Breathing difficulties	182 (35.9)
If the doctor says it is good	113 (22.3)
Coma/unconscious	18 (3.6)
No idea	10 (1.9)

There was a high {545 (95% CI: 92.8% - 96.6%)} acceptance rate of oxygen therapy among the respondents.

Among the respondents that would not accept oxygen therapy (N=29), past negative experiences were the commonest factor (28.6%) that would influence their decision. Other reasons as shown in Figure 1 include cost, preference for any possible alternatives, “don’t believe in oxygen therapy.”

Table 4 shows that there is no significant association between the socio-demographics, awareness of oxygen therapy, source of awareness and acceptance of oxygen therapy. However, there was a significant association between reasons for oxygen therapy and acceptance of oxygen therapy ($t=30.53$, $p<0.001$)

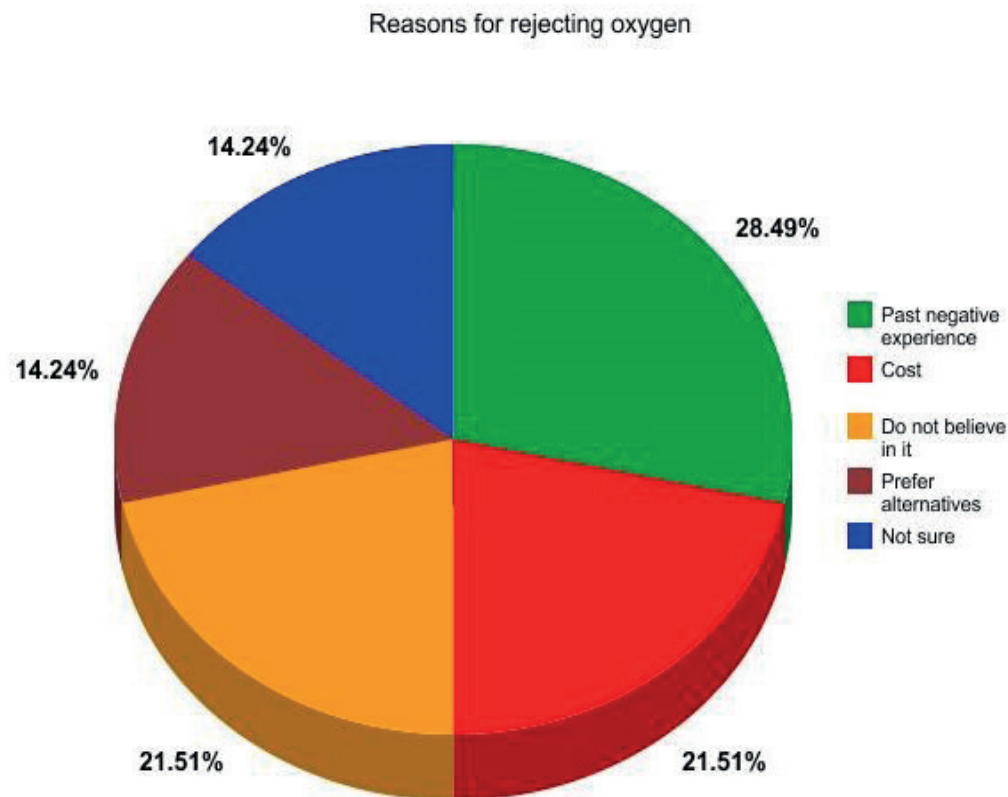


Figure 1. Top reasons for rejecting oxygen among the participants that said “No” (N=29)

Table 4. Factor associated with acceptance of oxygen.

Variables	Acceptance rate				
	Yes n (%)	No n (%)	N	χ^2	p-value
Gender					
Male	139 (95.9)	6 (4.1)	145	0.18	0.67
Female	398 (95.0)	21 (5.0)	419		
Religion					
Christianity	522 (95.3)	26 (4.7)	548	1.82	0.17
Others	5 (83.3)	1 (16.7)	6		
Tribe					
Igbo	520 (94.9)	28 (5.1)	548	0.00	0.98
Others	19 (95.0)	1 (5.0)	20		
Previous outcome					
Alive	182 (97.3)	5 (2.7)	187	3.11	0.21
Alive with complication	3 (100.0)	0 (0.0)	3		
Dead	18 (75.0)	2 (25.0)	20		
Admission status					
Admitted	253 (95.1)	13 (4.9)	266	0.01	0.91
Not Admitted	167 (94.9)	9 (5.1)	167		
Awareness					
Yes	436 (80.3)	19 (65.5)		3.69	0.05
No	107 (19.7)	10 (34.5)			
Source of awareness					
Hospital	3 (1.0)	0 (0.0)		3.40	0.48*
Friends	124 (42.3)	7 (58.3)			
Radio	60 (20.5)	3 (25.0)			
Internet	73 (24.9)	2 (16.7)			
Billboard	18 (6.1)	0 (0.0)			
Others	18 (6.1)	0 (0.0)			
Reason for oxygen acceptance					
Emergency situations	176 (95.7)	8 (4.3)	184	30.53	<0.001**
For specific symptoms	175 (96.2)	7 (3.8)	182		
If doctor says so	113 (100.0)	0 (0.0)	113		
In specific conditions	18 (100.0)	0 (0.0)	18		
No idea	7 (70.0)	3 (30.0)	10		
Mean age (SD)	34.25 (9.62)	36.31 (10.42)		t=-1.11	0.26
SD: standard deviation, *Fisher’s exact test, **Fisher’s exact test and significant p-value					

SD: standard deviation, *Fisher's exact test, **Fisher's exact test and significant p-value

DISCUSSION

Oxygen therapy is an essential component in the appropriate management of a wide range of clinical conditions in children, including pneumonia, sepsis, malaria, trauma, and neonatal diseases. Often, the availability and administration of oxygen can be a major determinant of outcome in critically ill children. Understanding caregivers' level of awareness and willingness to accept this life-saving treatment is crucial. It informs policymakers, health workers, and social mobilizers about critical areas to focus efforts on.

The majority (74%) of the respondents in this study were females, predominantly from the upper socioeconomic class. Previous similar studies have also reported a predominance of females among caregivers (5, 10-12), which could possibly be attributed to their perceived domestic abilities.

The awareness level of oxygen therapy among caregivers of children in this study is high (78.8%). More than three-quarters of the caregivers had knowledge of oxygen therapy, which is commendable. This high level of awareness may be attributed to the socioeconomic distribution of the study participants. Specifically, the high and middle socioeconomic strata contributed 54% and 37% of the study population, respectively. Fareed et al. (13), in their pooled analysis of the Health Information National Trends Survey over a ten-year period, noted a significant association between socioeconomic class and the odds of seeking health information, indicating that the higher the socioeconomic class, the higher the odds of seeking health information. The major source of information among respondents in our study was healthcare providers. This could be attributed to caregivers trusting health professionals and relying on them for verifiable health information (14). Therefore, encouraging healthcare workers to integrate messages about life-saving medical interventions such as oxygen therapy, alongside other health promotion messages, at both facility and community levels is crucial.

Emergency situations, breathing difficulties, and doctor's opinions were the most common indications of oxygen therapy reported by the respondents, often seen as a last option for survival. This finding aligns with earlier reports by Adeoti et al. (10) in Ado Ekiti, Southwestern Nigeria, who observed that participants believed oxygen was prescribed in emergencies to revive dying patients. Similarly, Stevenson et al. (6) noted in Malawi that respondents understood oxygen is used for breathing problems, illness, and low oxygen levels, and caregivers accepted it based on medical advice. Despite the majority of caregivers having appropriate knowledge of oxygen therapy indications, 22.3% cited doctors' opinion/advice as reasons for oxygen therapy, and some caregivers had no idea of the indications. This finding is consistent with reports by Aliyu et al. (5) and Stevenson et al. (6) that some caregivers accepted oxygen therapy based on medical advice, highlighting the importance of adequate counseling and education of patients

and caregivers by health workers before commencing medical intervention.

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While the World Health Organization (WHO) reports refusal of oxygen therapy as a barrier to its use in low- and middle-income countries (4), this study recorded a high acceptance rate of oxygen therapy among the respondents at 94.9%. This finding is consistent with previous observations by Adeoti et al. (10) and Aliyu et al. (5) in Nigeria. The high acceptance rate may reflect the proper knowledge of indications for oxygen therapy demonstrated by the majority of the respondents and an increased awareness of the benefits of oxygen therapy.

Approximately 1 in 20 of the respondents reported unacceptance of oxygen therapy. While this figure is low, it remains significant considering the potential harm that may result from such a decision. Reluctance to accept oxygen therapy was mostly related to past negative experiences (28.6%). Similar findings of previous negative experiences as a limitation to oxygen therapy acceptance were reported in Nigeria and Malawi (5,6,10). Oxygen is frequently administered to very ill patients, and if a death occurs during the process, it is often wrongly attributed to oxygen therapy. The cost was another reason cited by caregivers for refusing oxygen therapy, a finding consistent with Adeoti et al. (10) in Southwestern Nigeria. Access to healthcare services is still significantly hampered by financial difficulties in Nigeria (15). A negligible percentage of the population has access to insurance, and the majority pay for healthcare out of pocket (15). This is compounded by the high poverty rate and economic instability in the country (15). Some respondents reported a preference for other possible alternatives such as natural air and medications as reasons for refusing oxygen therapy. Unfortunately, there are no documented evidence-based alternatives to oxygen therapy in cases of hypoxemia. Hence, there is a critical need for increased awareness and education on the benefits and mechanisms of oxygen therapy.

Age, gender, religion, and tribe had no influence on the acceptance of oxygen therapy in our study, which is consistent with the findings of Aliyu et al. (5). Respondents in our study share similar characteristics with those in Aliyu et al.'s study. Both groups of caregivers are from the upper and middle socioeconomic class and reside in urban areas, which may have contributed to their level of awareness, regardless of the aforementioned socio-demographic variables.

There was no significant association between previous outcomes, admission status, caregiver's relationship with the patient, awareness of oxygen therapy, source of awareness and acceptance of oxygen therapy. These observations, especially the finding of no significant association between previous outcome/experience and acceptance of oxygen therapy, are rather interesting because previous negative experiences were the most common reasons cited for refusal by some of our respondents and in previous studies (6,7). This may be explained by the high acceptance rate of oxygen therapy in our study, thus emphasizing the importance of promoting the uptake of this life-saving intervention through community mobilization strategies, health subsidies, and education.

Our study found a significant association between reasons for oxygen therapy and acceptance. This would like have been influenced by the high awareness of oxygen therapy in the region. Having the correct knowledge enabled by evidence-based information has been noted as key in informed decision-making (16).

CONCLUSION

In conclusion, while awareness of oxygen therapy is high in Southeastern Nigeria, there is still a need for continued education of caregivers on the benefits and mechanisms of this life-saving treatment. Healthcare providers in hospitals were the most common source of knowledge about oxygen therapy. Thus, health promotional messages should continue to be routinely provided by healthcare workers. Cost was one of the reasons cited for the refusal to accept this intervention, highlighting the need to improve healthcare funding, subsidize healthcare costs, and implement universal health insurance. Despite no significant relationship between previous negative outcomes and acceptance of oxygen therapy, healthcare workers should not fail to educate and offer oxygen therapy when needed.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

Ethical approval was obtained from the Ethics and Research Committee of ESUTH, Enugu with reference number: ESUTHP/C-MAC/RA/034/VOL.3/137 and dated 23/10/2022.

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