Assessing The Relationship Between Individual Factors And Pediatric Nurses' Competence On Supplemental Oxygen Therapy In Kajiado County, Kenya

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Abstract:
Background: An estimated 15% of global under-five deaths result from respiratory infections, with most of these deaths being reported in under-developed and developing countries. The most common respiratory infection in children being hypoxaemia whose recommended treatment is oxygen therapy. This means that healthcare workers' competency is important so as to identify when oxygen is needed, the right quantity, the correct dispensing equipment and the best way to administer the oxygen to a specific patient. Based on previous researches, nurses' competency in oxygen therapy is determined by several factors such as individual and institutional factors. However, researches conducted in Kenya have been limited in this area. This study therefore explores the relationship between individual factors and competence of pediatric nurses on supplemental oxygen therapy in Kajiado County, Kenya.
Materials and Methods: The research design for the study was an analytical cross-sectional hospital based survey. The study was conducted in four select hospitals in Kajiado County, Kenya. The sample size for the study was 81 nurses. All the nurses working in pediatric wards of the four select hospitals in Kajiado County were selected. The study only included nurses registered by the Kenya Nursing Council and who had worked in pediatric wards of the four select hospitals for more than one month. Trainee nurses and nurses who had worked in the four select hospitals for less than one month were excluded in the study. A questionnaire was used in data collection. Data collected was cleaned, coded and entered into the Statistical Package for Social Scientists (SPSS) version 26.0 for analysis. Data was analyzed quantitatively through the use of descriptive statistics that comprised of frequencies and percentages. Inferential statistics comprising of Fisher's test was used in testing the relationship between the individual factors and nurses' competence in supplemental oxygen therapy.
Results: Supplemental oxygen therapy competency of pediatric nurses had a significant relationship with nurses' level of education (p-value=0.0129), employment status (p-value<0.0001), work experience (p-value=0.0001), additional training on oxygen therapy (p-value<0.0001) and nurses' access to oxygen therapy guidelines (p-value<0.0001).
Conclusion: Nurses' education level, employment status, and work experience, additional training on oxygen therapy and access to oxygen therapy guidelines have a significant influence on nurses' competency on supplemental oxygen therapy.
Key Words: supplemental oxygen therapy, pediatric, hypoxaemia, nurses' competence, individual factors
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I. Introduction

Close to 15% of the global under-five deaths are accounted for by respiratory infections, with majority of them being reported in under-developed and developing countries.[1] One of the most common respiratory infection in children is hypoxemia which when it is not detected early enough leads to delay in treatment, tissue hypoxia and consequently permanent organ damage.[2] A combination of clinical signs with pulse oximetry can be used in detecting hypoxaemia.[3]

The main treatment of hypoxaemia is oxygen therapy which needs to be delivered to the patient using the right dose and in the correct methodology.[4] Therefore, healthcare workers, specifically nurses, need to know when oxygen is needed, the right quantity, the correct dispensing equipment and the best way to administer the oxygen to a specific patient.[5] With the right competence in oxygen therapy administration, the consequence is that oxygen will be correctly administered thus resulting in faster recovery and reduced stay in hospital.[6] A study conducted in Rwanda demonstrated that nurses' competence comes with benefits such as avoidance of

under treatment and overtreatment of hypoxaemia leading to optimization of oxygen usage in hospitals.[4] In Ugandan hospitals, nurses competency in oxygen therapy in pediatric wards helps in enhancing efficiency in oxygen utilization which is vital in reducing the shortfall in oxygen supply in Ugandan hospitals.[7] Based on findings in [8], supplemental oxygen therapy competence is enhanced by several factors related to individual nurses and institutional characteristics. However, in Kenya, very few studies have been documented on competences on supplemental oxygen therapy among pediatric nurses. Therefore, the current study seeks to explore the relationship between individual factors and competence of pediatric nurses on supplemental oxygen therapy in Kajiado County, Kenya.

II. Materials and methods

Research design: The research design for the study was an analytical cross-sectional hospital based survey.

Study Location: The study was conducted in four select hospitals in Kajiado County, Kenya.

Sample Size: The sample size for the study was 81 nurses.

Sample size selection: All the nurses working in pediatric wards of the four select hospitals in Kajiado County were selected.

Inclusion criteria: The study only included nurses registered by the Kenya Nursing Council. Only nurses who had worked in pediatric wards of the four select hospitals for more than one month were included in the study.

Exclusion criteria: Trainee nurses and nurses who had worked in the four select hospitals for less than one month were excluded in the study.

Procedure methodology: A questionnaire was used in data collection. The questionnaire comprised of two sections. The first section comprised of items that measured the individual factors if the nurses while the second section comprised of items that measured the nurses' competence on supplemental oxygen therapy.

Statistical analysis: Data collected was cleaned, coded and entered into the Statistical Package for Social Scientists (SPSS) version 26.0 for analysis. Data was analyzed quantitatively through the use of descriptive statistics that comprised of frequencies and percentages. Inferential statistics comprising of Fisher's test was used in testing the relationship between the individual factors and nurses' competence in supplemental oxygen therapy.

III. Results

The individual factors of the nurses were categorized into two: socio-demographic characteristics and nurses' individual work characteristics such as work experience, training on oxygen therapy and access to guidelines. As part of socio-demographic data, information on respondents' as shown in Table 1, majority of the respondents were female (percent=92.6%, n=75). Most of the respondents (percent=83.9%, n=68) were aged between 21-40 years. The highest level of education among most of the respondents was a college diploma (percent=76.5%, n=62). Most (percent=80.2%, n=65) of the respondents were employed on a permanent basis.

Table 1 Showing the Socio-Demographic Characteristics of Nurses

	Variable	Frequency (n)	Percentage (%)
Age of the Respondents (years)	21-30	35	43.2
	31-40	33	40.7
	41-50	9	11.1
	51-60	4	4.9
Gender of the Respondents	Female	75	92.6
	Male	6	7.4
Level of Education of Respondents	College Certificate	7	8.6
	College Diploma	62	76.5
	Bachelors	12	14.8
Employment Status of the Respondents	Permanent	65	80.2
	Temporary	16	19.8

Results in Table 2 demonstrate that majority of the nurses had less than 2 years' experience (percent=61.7%, n=50). Slightly more than half of the paediatric nurses had acquired additional training on

oxygen therapy (percent=58.0%, n=47). Majority of the paediatric nurses had access to oxygen therapy guidelines (percent=61.7%, n=50).

Table 2 Showing the Work Experience, Training on Oxygen Therapy and access to Oxygen Therapy Guidelines by the Nurses

		Frequency (n)	Percentage (%)
Work Experience of the Respondents	Less than 2 years	50	61.7
	3-5 years	19	23.5
	More than 5 years	12	14.8
Additional Training on Oxygen Therapy	Got additional training on oxygen therapy	47	58.0
	No additional training on oxygen therapy	34	42.0
	Access to guidelines		
	Has access to oxygen therapy guidelines	50	61.7
	No access to oxygen therapy guidelines	31	38.3

Nurses' level of competence on supplemental oxygen therapy was also assessed. Nurses were asked a series of questions (20questions) to assess their knowledge, practice and attitude on supplemental oxygen therapy during practice. For each correct response, the participants were awarded one point and zero for incorrect responses. A total score was then obtained for each participant based on correct responses. Bloom's grading cut-offs were used to determine knowledge level and hence competence.[9] Nurses who scored an overall score of 60% were deemed to be very competent, nurses who scored between 50% to 59% were considered to be averagely competent while nurses who scored less than 50% were considered to less competent. Table 3 shows that majority of the nurses (percent=64.2%, n=52) of the respondents were graded as competent.

Table 3 Showing Proportion of Levels of Nurses' Competence

	Frequency	Percent (%)
Very Competent	52	64.2
Averagely Competent	14	17.3
Less Competent	15	18.5
Total	81	100.0

Fisher's exact test was used to measure associations between the dependent (supplemental oxygen therapy competence) and independent variables (individual factors). Fisher's test was used because at least one cell in the contingency tables for the variables of interest had an expected frequency of less than 5. The results in Table 1 demonstrate that supplemental oxygen therapy competency of pediatric nurses had a significant relationship with nurses' level of education (p-value=0.0129), employment status (p-value<0.0001), work experience (p-value=0.0001), additional training on oxygen therapy (p-value<0.0001) and nurses' access to oxygen therapy guidelines (p-value<0.0001).

Table 4 Showing Socio-Demographic Factors Associated with Supplemental Oxygen Therapy Competency Levels

Variable	Description	Supplemental Oxygen Therapy Competency Level			
		Very Competent	Averagely Competent	Less competent	p-Value
Age (years)	21-30	23	5	7	.1161
	31-40	20	7	6	
	41-50	7	1	1	
	51-60	2	1	1	
Gender	Female	49	13	13	.6148
	Male	3	1	2	
Level of Education	College Certificate	3	3	1	.0129
	College Diploma	44	10	8	
	Bachelors	5	1	6	
Employment Status	Permanent	50	7	8	.0000
	Temporary	2	7	7	
Work Experience	Less than 2 years	40	7	3	.0001
	3-5 years	10	2	7	

	More than 5 years	2	5	5	
Additional Oxygen Therapy Training	Trained	40	3	4	.0000
	Not Trained	12	11	11	
Access to Oxygen Therapy Guidelines	Has Access	40	8	2	.0000
	No Access	12	6	13	

IV. Discussion

The study found that nurses' competency on supplemental oxygen therapy had a significant relationship with education level, employment status, and work experience, additional training on oxygen therapy and access to oxygen therapy guidelines. The findings agree with [10] who found that education, experience and professional development of the nurses have a significant role in determining the competence level of nurses in Lithuania. However, the findings contrast the research by [11] who found that training of nurses had a low effect on the competence of nurses in Malawi. Further, [12] conducted a study in Ethiopia and found that nurses work experience is a significant predictor of nurses' performance. Nurses gain more knowledge as they practice the use of delivering oxygen thus becoming more competent with experience.

V. Conclusion

From the study, it can be concluded that nurses' education level, employment status, and work experience, additional training on oxygen therapy and access to oxygen therapy guidelines have a significant influence on nurses' competency on supplemental oxygen therapy. Based on the findings of the study, it can be recommended that nurses are trained on supplemental oxygen therapy and should also be exposed to the practices on supplemental oxygen therapy so as to improve their competency. The study suggests that future research should also focus on factors that are external to nurses, for instance institutional factors, and their influence on nurses' competency on supplemental oxygen therapy.

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