

A Quantitative Study to Explore Clinical Competence of Newly Qualified Registered Nurses in Eastern Cape Province of South Africa

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Abstract

Newly qualified registered nurses (NQRNs) are expected to work independently and be competent in applying the decision-making and problem-solving skills gained during their training. However, there are certain factors in the clinical environment that hinder their clinical competence. The aim of this study was to explore and describe the relationship between clinical learning environmental factors and the clinical competence of NQRNs. Data were collected from 176 registered nurses working in the medical and surgical units of two public hospitals in the Eastern Cape Province, South Africa. These data were collected using an adapted version of a pre-existing structured questionnaire called the Competency Inventory for Registered Nurses (CIRN). Descriptive statistics and inferential statistics were used to analyse the data. The majority of participants were older registered nurses whose highest education was a diploma in nursing. This study showed that there is a significant association between clinical environmental factors and cognitive, affective and psychomotor competencies. The study also revealed that the development of clinical competence is reliant on both the individual and context. Our findings suggested that managers and educators should enhance the type of clinical training and support offered to improve clinical competence.

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Keywords: clinical competence; newly qualified registered nurses; clinical learning; environmental factors; public hospitals; South Africa

Introduction and Background

The clinical learning environment is increasingly changing and challenging. The changes are evident with new and emerging knowledge, technology and research. In order to meet these changes and diverse patient needs, there is a need for new skills and competence of healthcare providers (HCP), including registered nurses (Kavanagh and Sharpnack 2021; Rabie, Rabie, and Dinkelmann 2020). Registered nurses, particularly newly qualified registered nurses (NQRNs), are expected to be competent in a wide range of skills, which include decision-making, problem-solving skills, communication and psychomotor skills (Rabie et al. 2020; Willman, Bjuresäter, and Nilsson 2020). However, their clinical competence remains a matter of great concern based on the increased number of litigations.

NQRNs often report feelings of self-doubt and inadequacy as they enter the new work environment (Murray, Sundin, and Cope 2019). According to Niemeyer (2017), NQRNs, that is, those with fewer than two years' practice experience, have formal education but limited practical experience, with a notably higher risk of patient harm. Globally, it is estimated that one in 10 hospital patients suffers from preventable harm while receiving care (Lee and Dahinten 2020). In the United States, each year, approximately 44% of hospitalised patients experience one or more preventable medical errors resulting in harm that eventually leads to their death (Niemeyer 2017). Evidence suggests that patient mortality is highest among registered nurses with two or fewer years of experience (Niemeyer 2017).

Clinical competence is, therefore, crucial to providing safe, high-quality patient care (Willman et al. 2020). It refers to the ability to perform a task and achieve a desirable outcome under certain circumstances within a clinical context (Willman et al. 2020). Clinical competencies in this study thus referred to the ability of NQRNs to perform cognitive, affective and psychomotor skills with the necessary knowledge, skills and judgment that they acquired throughout their period of training (Fukada 2018; Nehrir et al. 2016). Miller (1990) distinguished several layers that represent a developmental sequence of stages of clinical competence (figure 1). These layers provided this study with a framework for clinical assessment (Khan and Ramachandran 2012).

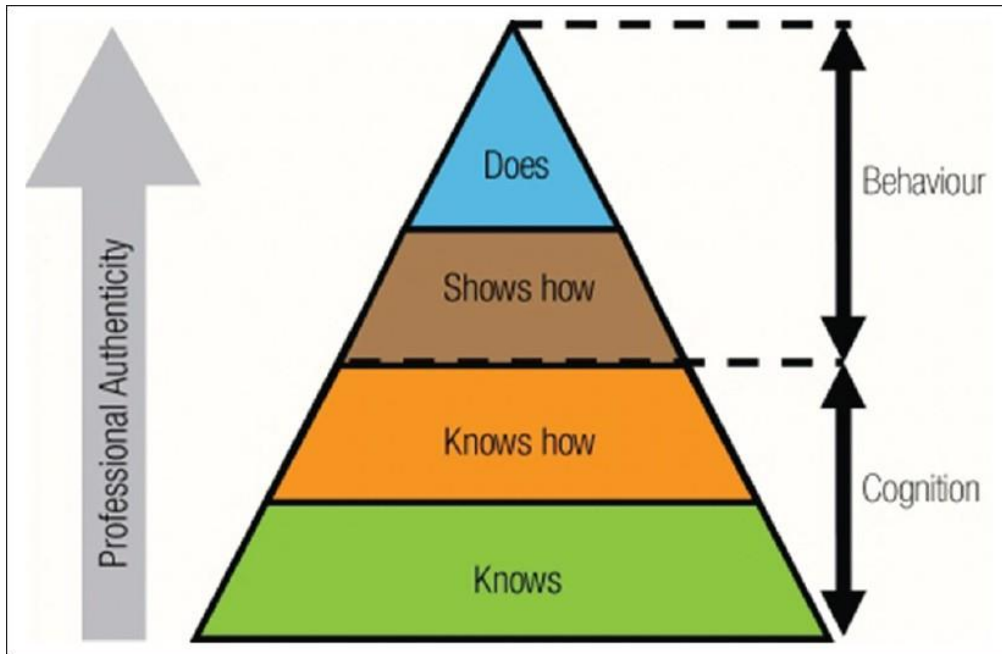


Figure 1: Miller’s framework for assessing competence (1990)

Source: Adapted from Ramani and Leinster (2008)

At the top of the pyramid is the actual “doing,” representing what the NQRN does day by day (i.e., daily patient care), assessed by direct observation in the clinical setting (Ramani and Leinster 2008). Alongside the educational institutions, through the preparation of student nurses for their new roles, healthcare providers working in clinical areas also need to foster a positive and supportive climate that will ensure that learning takes place. However, various environmental factors have been identified as influencing clinical competence (Rabie et al. 2020; Murray et al. 2018; 2019). These include staff shortages, lack of resources, the high burden of disease and the large number of people who depend on the public healthcare sector for medical assistance (Rabie et al. 2020). Learning opportunities challenge NQRNs’ abilities, allowing them to reflect on their strengths and weaknesses and, therefore, improve their clinical competence. Personal attributes, such as their eagerness and curiosity to learn, as well as being open to criticism and being motivated, are also essential elements in clinical competence development.

A clinical environment which is conducive to the development of nurses’ clinical competencies needs to be created in the different nursing units. Most studies describe the importance of a positive organisational climate in the development of nurses’ clinical competence (Rabie et al. 2020; Rizany, Tutik, and Sri Hariyati 2016). Hospitals with good morale, readily available medication and equipment, and with access to adequate technology are regarded as positive factors that influence the clinical

competence of NQRNs (Rizany et al. 2016). According to (Kreedi et al. 2021), a supportive, positive work environment and a welcoming attitude from team members are important in assisting NQRNs to develop clinical competence and become more self-confident. Lack of support and supervision increases the chance of an error occurring (Gardiner and Sheen 2016; Kreedi et al. 2021; Rabie et al. 2020). Therefore, staff in clinical areas should strive to generate a positive climate that will improve learning, and adequate time should be provided for discussion and feedback (Caka, Van Rooyen, and Jordan 2015; Henderson, Ossenberg, and Tyler 2015).

It is, therefore, evident that while NQRNs are expected to be competent, certain factors in the clinical environment hinder their clinical competence.

Research Problem

Most studies reveal that various factors in the clinical environment, such as lack of supervision, guidance and support from experienced HCPs, hinder the development of clinical competence of student nurses and thus that of NQRNs. These factors include personal factors such as a lack of confidence and independence associated with fear of making mistakes in the new role, workload associated with a shortage of staff members, and failure to communicate with experienced staff members (Kreedi et al. 2021; Murray et al. 2019). Inadequate supervision and support increase the chance of errors and thus litigations (Rabie et al. 2020). Approximately 55% of nurses with less than five years of experience have admitted to making a medical error (Murray et al. 2019). Based on this problem statement, there was a need to explore and describe the clinical environmental factors that enhance or hinder the clinical competence of NQRNs in public hospitals and to explore whether there is a relationship between these two variables.

Purpose of the Study

This study aimed to explore the association between the clinical learning environmental factors and the clinical competence of NQRNs in public hospitals.

Objective of the Study

The objective of the study was to explore and describe the relationship between clinical learning environmental factors and the clinical competence of NQRNs in public hospitals.

Research Hypotheses

In order to achieve the objective of the study, the following hypotheses were formulated:

H₀: the null hypothesis assumed that there were no relationships between clinical learning environmental factors and clinical competence of NQRNs; refer to figure 2 below:

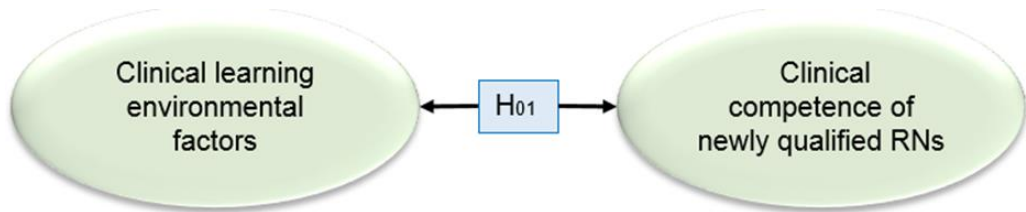


Figure 2: The hypothesis

H1: the alternative hypothesis assumed that there is a significant relationship between clinical learning environmental factors and clinical competence of NQRNs.

Research Methodology and Design

A quantitative, descriptive, explorative and contextual design was used to explore and describe the association between clinical learning environmental factors and the clinical competence of NQRNs in public hospitals.

Population and Sampling

The study population consisted of all the registered nurses (RNs) working in the medical and surgical units (including critical care, operating theatres, orthopaedic and paediatric units in public hospitals—termed Hospitals A and B within the Buffalo City Metropolitan Municipality [BCMM]). A situational analysis that was conducted in these hospitals revealed estimates of 129 professional nurses in Hospital A, and 98 professional nurses in Hospital B, with a total estimate of 227 professional nurses, which is dependent on staff turnover. The population of these units, as per situational analysis, is reflected in table 1 below:

Table 1: Population surveyed in the public hospitals

Hospital	Population size
Hospital A	129
Hospital B	98
Total	227

A sample is representative of the population that the researchers are interested in (Uakarn 2021). A good sample is one with complete important characteristics of the research population (Uakarn 2021). If a sample size is too small, even a well conducted study may lead to biased inference about the population (Divakar 2021). On the other hand, if a sample size is too large, the study may become more complex and yield an inaccurate result (Divakar 2021). For this study, the sample size was determined using Taro Yamane's statistical formula (Yamane 1973) as follows:

$$n = \frac{N}{1 + N e^2}$$

Where n = sample size, N = population size = 227, e = error (0.05) reliability level 95% or; e = level of precision always set the value of 0.05 (Uakarn 2021). Therefore, the sample size for this study was 145. A convenient sampling method was used, which allowed the distribution of questionnaires to all RNs ($N=227$) in the medical and surgical units of the two public hospitals with a minimum of two years of experience. For the scope of this study, psychiatry and midwifery units were not included. This was based on the fact that general nursing forms the greater part of the nursing qualification, that is, the R425 programme, a programme of education and training, leading to the obtaining of a qualification which confers on the holder thereof the right to registration as a nurse, General Nursing (Community, Psychiatry) and Midwifery. Anyone with less than two years' experience was considered to be a NQRN. Benner (1984) describes competent nurses as those who have worked in a speciality for a year and a half to two years (Murray and Cope 2018). Although other categories of nurses (namely enrolled nursing assistants and enrolled nurses) support and guide the NQRNs during training and when they take up their new roles as registered nurses, they are not responsible for supervising these NQRNs. Therefore, they were excluded from the study. Of the $N=227$ participants that were recruited to take part in the study, only $n=176$ accepted the invitation and participated in the study and were included in the sample. Some refused to give consent, and others were on leave.

Instrument and Data Collection

Questionnaires were used to collect data, which were numerically analysed using descriptive and inferential statistics methods of analysis. An adapted version of a pre-existing questionnaire, named, Competency Inventory for Registered Nurses (CIRN), that was used by Hansen-Salie and Martin (2014), was used to measure the variables. The CIRN was developed by Lui et al. (2007). Written permission to use the questionnaire was obtained from the original authors and from Hansen-Salie and Martin (2014). Amendments were made to the questionnaire, and some information was added to test the hypothesised relationships. The final questionnaire consisted of three sections with sub-sections.

- Section A: Demographic data; a self-structured 6-item measurement to assess the demographic profile of the participants.
- Section B: 42-items measuring nine dimensions of competencies, namely, **cognitive competencies** (including self-organisation and management competencies, decision-making and problem-solving); experience in nursing; effective use of science and technology; **affective competencies** (including communication competencies, interpersonal relationships); **caring and ethical competencies** (personal attributes; and psychomotor competencies).
- Section C: Factors influencing clinical competence.

A Likert scale was applied in the questionnaire, with responses ranging from strongly disagree to strongly agree.

After obtaining ethical approval from Nelson Mandela University, the two public hospitals within the BCMM and the Eastern Cape Department of Health (DoH), data were collected. There are four public hospitals within the BCMM. However, only two hospitals were included in this study, which is where the NQRNs are mainly allocated during and after their training for clinical practice. Private hospitals were also excluded for the same reason. The researcher prepared the participants before they signed consent by explaining in detail what the study was all about. The participants understood that their participation was voluntary, and they were free to withdraw from the study at any time. Once the written informed consent had been obtained, the researcher personally delivered the questionnaires to the participants. The unit managers were asked to act as gatekeepers and assisted in identifying NQRNs through community service records as they were not going to take part in the study. The completed questionnaires were placed in sealed envelopes to ensure privacy and anonymity. Unit managers were also asked to ensure that the sealed envelopes were safely locked away in their offices. The completed questionnaires in sealed envelopes were handled only by the researchers and the statistician who assisted with the data analysis.

Since the research study was conducted at the participants' workplace, there was no expenditure on their part in terms of transport. However, each participant was rewarded with a pen at the value of R25 only as a token of appreciation for their willingness to participate in the study and the time spent while taking part in the study.

Pilot Study

Eleven participants were selected to take part in the pilot study, which is 5% of the population ($N=227$). The questionnaires completed by the participants of the pilot study were assessed for format, answers to the responses, length of time the participants took to complete the questionnaire, and any clarifications to be made to the questions posed. No adjustments were made to the questionnaire following the pilot study as participants clearly understood the questions and easily completed them. The data collected from the pilot study were not included in the main study.

Data Analysis

Firstly, descriptive statistics were used to describe and summarise the data and present it in tables. Inferential statistics were used to infer that particular characteristics in a sample exist in the larger population. Chi-square analysis was used to calculate the probability of observing a relationship between two variables. Cramer's V, which is a measure of association related to the chi-square test, was used to determine how strong the relationship appears to be. The test is significant at $P \leq 0.005$ and the measure of association is $0 \leq x < 0.10$ very weak; $0.10 \leq x < 0.20$ weak; $0.20 \leq x < 0.30$ moderate; $x \geq 0.30$ strong.

Pearson's product moment correlation values ranged from +1 to -1. A value of zero indicates that there is no association between the two variables. A value greater than zero indicates a positive association; that is, as the value of one variable increases, so does the value of the other variable. A value of less than zero indicates a negative association; that is, as the value of one variable increases, the value of the other variable decreases.

One sample t-test is a statistical procedure used to determine whether a sample of observations could have been generated by a process with a specific mean.

Ethical Considerations

Permission to conduct the study and ethical clearance, with the clearance number H16-HEA-NUR017, was granted by the University Institutional Committee, and the Eastern Cape DoH with ethical clearance reference number EC_2016RP13_422. Ethical clearance was also obtained from the ethics committees of the respective public hospitals where the study was conducted.

Reliability

The CIRN has demonstrated evidence of reliability and its internal consistency. Cronbach's alpha coefficient was 0.908 for the overall scale and 0.718–0.903 for the subscales (Liu et al. 2007). Internal consistency of the amended questionnaire was tested statistically, using Cronbach's alpha coefficient, and the results are given in table 2.

Table 2: Cronbach's alpha coefficients

Nursing skills (Cognitive, affective and psychomotor competencies)	0.86
Cognitive competencies	0.86
Self-organisation/ management competencies	0.88
Decision-making and problem-solving competences	0.81
Experience in nursing	0.83
Effective use of science and technology	0.83
Affective competencies	0.85
Communication competencies	0.83
Interpersonal relationships	0.86
Caring and ethical competencies	0.85
Personal attributes	0.87
Performance of psychomotor skills	0.88
Clinical environmental factors that might influence NQRNs' "clinical competence"	0.64

The scores derived from the items on the questionnaire, as illustrated in table 2 above, proved to be reliable, with alpha values of more than 0.70, except for one item that scored 0.64, which can be regarded as acceptable for this study based on the interpretation intervals for Cronbach's alphas as follows: unacceptable <0.50; acceptable 0.50–0.69; good 0.70–0.79; and excellent 0.80+.

Validity

The results from the pilot study were used to ensure face validity. The supervisors, statistician and experts in the field of clinical practice and research were involved to ensure the content and face validity of the instrument.

Results

Demographic Data

A total of 176 questionnaires were returned, with certain sections deleted or left blank, and those sections could not be included in the study. The demographic data demonstrated that $n131(74\%)$ of the participants were RNs. According to age distribution, most of them were older, $n70(40\%)$, being between 50 and 59 years of age, followed by the age group 40 to 49, $n56(32\%)$, and 30 to 39 years, $n34(19\%)$, respectively. Very few participants, $n12(7\%)$, were between 20–29 years of age. Of the 176 participants, $n40(22\%)$ were in management positions, namely unit managers $n20(11\%)$ and shift leaders $n20(11\%)$. A gross shortage of clinical facilitators $n5(3\%)$ was also revealed. Most of the participants, $n134(76\%)$ held a diploma in nursing, while $n38(22\%)$ held a bachelor's degree and only $n3(2\%)$ held an honours degree. In summary, most of the participants were older RNs whose highest education was a diploma in nursing.

Descriptive Statistics for the Questionnaire Items

Even though a five-point Likert scale was used, the frequencies are reported for three categories, namely: 1) strongly disagree and disagree grouped together; 2) neutral; and 3) strongly agree and agree grouped together. The mean and standard deviation for each factor is indicated as measures of central tendency and dispersion. The mean values are as follows: 1.00 to 2.60 negative; 2.60 to 3.40 neutral; 3.40 to 5.00 positive.

Cognitive Competencies

Self-organisation/Management Competencies

NQRNs were viewed as able to identify a healthcare need of a patient $n133(76\%)$ and to ensure that the patient's healthcare needs are met $n135(78\%)$. A mean of 3.38 suggests that there is a positive relationship between self-organisation/management competencies and clinical learning environmental factors.

Decision-making and Problem-solving Competencies

Less than half of the participants $n84(49\%)$ indicated that the NQRNs assume responsibility and accountability for decisions made. While $n69(40\%)$ of the participants viewed them as able to make rational decisions, $n67(39\%)$ of the participants were opposed to this regard, which suggests that this competency may not be fully developed.

Experience in Nursing

Of the 176 participants, *n*120(68%) revealed that NQRNs show adequate theoretical knowledge, but only *n*69(39%) indicated that they show adequate practical skills. Less than half of the participants *n*72(41%) felt that these nurses integrate theory and practice.

Effective Use of Science and Technology to Conduct Research

Nurses in these units were not involved in the research due to limited technological resources and technological skills. As a result, only *n*62(35%) indicated that formal/informal research is conducted in the unit in order to improve the quality of care.

Affective Competencies

Communication Competencies

The results revealed that NQRNs display good communication skills, with scores ranging from *n*125(72%) to *n*141(81%) in items under this section.

Interpersonal Relationships

Interpersonal relationships amongst NQRNs, other team members and patients are well maintained in the units, as evidenced by high scores in all items under this section, ranging from *n*131(75%) to *n*141(81%).

Caring and Ethical Competencies

This section of the questionnaire was aimed at exploring whether the NQRNs practise within the legal framework and organisational policies. Results showed that they have limited knowledge of the legal and ethical framework of nursing *n*86(50%), which is a disadvantage to the development of clinical competence.

Personal Attributes

The majority *n*132(76%) of the participants revealed that the NQRNs are eager to learn. However, only *n*99(57%) of the participants felt that these NQRNs display confidence when performing duties.

Performance of Psychomotor Skills

While most participants agreed that some psychomotor skills are performed well, lower scores *n*98(56%) were reported for supervision and maintenance of fluid and electrolyte balance, and *n*105(60%) for the ability to efficiently prepare for assistance with operative and therapeutic procedures.

Clinical Environmental Factors that might Influence NQRNs' Clinical Competence

The participants were positive, with a mean score of 3.82, that the environment in the medical and surgical units is conducive to learning. Most of the participants revealed that there is adequate support $n133(76\%)$ and that an orientation programme is available $n150(86\%)$ to orientate them to the culture and norms of the units $n143(82\%)$. It was also clear that supportive supervision is prevalent in medical and surgical units. Most of the participants were positive in either strongly agreeing or agreeing with all items in this section, ranging from $n138(79\%)$ to $n159(91\%)$, with a mean score of 4.02.

There is an inadequate number of staff members in the medical and surgical units, as only 15% ($n=174$) of the participants felt that there is an adequate number of staff members to get the necessary work done in the unit, and 19% ($n=174$) to supervise the NQRNs. Shortage of staff members may be a hindering factor in the development of clinical competence. Despite the reported shortage of staff members, most of the participants ($n127(73\%)$) felt that the experienced staff members are supportive, caring and friendly towards the NQRNs.

Correlations

A Cronbach alpha of 0.83 was found for all the variables included in the correlation analysis. The correlation was used to determine the degree to which the two variables are linearly related and indicate a predictive relationship that can be exploited in practice. Correlations are statistically significant at the 0.05 level for $n=175$ if the absolute value is greater than or equal to 0.148, and practically significant if the absolute value is greater than or equal to 0.300. Thus, for this study, it will be both statistically and practically significant if the absolute value is greater than or equal to 0.300. The results for the correlations between the clinical learning environmental factors and clinical competence of the NQRNs are illustrated in table 3 below.

Table 3: Pearson Product moment correlations: clinical environmental factors and clinical competence

Clinical competencies	A conducive clinical environment	Clinical supervision	Shortage of staff members	Attitude of staff members	Clinical environmental factors
Self-organisation/management	.016	.019	.145	.107	.119
Decision-making and problem-solving	.099	.045	.165	.048	.137
Experience in nursing	.161	.031	.176	.105	.180
Effective use of science and technology	.224	.124	.171	.110	.223
Cognitive competencies	.151	.064	.195	.110	.197
Communication competencies	.257	.199	.071	.221	.234
Interpersonal relationships	.298	.162	.156	.264	.290
Caring and ethical competencies	.230	.177	.238	.137	.282
Personal attributes	.316	.148	.185	.252	.306
Affective competencies	.330	.205	.197	.263	.334
Psychomotor competencies	.102	.093	.281	.112	.238
Nursing skills	.202	.130	.258	.172	.282

From these results, it is clear that except for self-organisation/management, decision-making and problem-solving competencies, all the other competencies had positive relationships. The affective competencies ($r>.334$) and personal attributes ($r>.306$) have significant positive relationships to clinical learning environmental factors.

Chi-square Analysis

Chi-square analysis was performed to test for independence of association between the four main competencies (self-organisation/management competencies, decision-making and problem solving, experience in nursing and effective use of science and technology), and the main clinical environmental factors (a conducive clinical environment, clinical supervision, shortage of staff members and attitudes of staff members). The results are illustrated in table 4.

Table 4: Cognitive, affective and psychomotor competencies and clinical environmental factors

Clinical environmental factors								
Cognitive competencies	Lower [1.00 to 3.17]		Middle [3.17 to 3.77]		Higher [3.77 to 5.00]		Total	
	Lower [1.43 to 2.96]	17	39%	18	41%	9	20%	44
Middle [2.96 to 3.81]	18	21%	50	57%	19	22%	87	100%
Higher 3.81 to 4.96]	9	20%	18	41%	17	39%	44	100%
Total	44	25%	86	49%	45	26%	175	100%
Chi ² (d.f. = 4, n = 175) = 10.54; p = .032; V = 0.17 Small								
Clinical environmental factors								
Affective competencies	Lower [1.00 to 3.17]		Middle [3.17 to 3.77]		Higher [3.77 to 5.00]		Total	
	Lower [1.75 to 3.41]	18	41%	21	48%	5	11%	44
Middle [3.41 to 4.13]	21	24%	48	55%	18	21%	87	100%
Higher 4.13 to 4.96]	5	11%	17	39%	22	50%	44	100%
Total	44	25%	86	49%	45	26%	175	100%
Chi ² (d.f. = 4, n = 175) = 23.83; p < .0005; V = 0.26 Medium								
Clinical environmental factors								
Psychomotor competencies	Lower [1.00 to 3.17]		Middle [3.17 to 3.77]		Higher [3.77 to 5.00]		Total	
	Lower [1.00 to 3.25]	21	36%	27	46%	11	19%	59
Middle [3.25 to 4.25]	20	25%	41	51%	20	25%	81	100%
Higher [4.25 to 5.00]	3	9%	18	51%	14	40%	35	100%
Total	44	25%	86	49%	45	26%	175	100%
Chi ² (d.f. = 4, n = 175) = 10.56; p = .032; V = 0.17 Small								
Clinical environmental factors								
Nursing skills (cognitive, affective and psychomotor skills)	Lower [1.00 to 3.17]		Middle [3.17 to 3.77]		Higher [3.77 to 5.00]		Total	
	Lower [1.53 to 3.24]	16	36%	22	50%	6	14%	44
Middle [3.24 to 4.02]	22	25%	46	53%	19	22%	87	100%
Higher [4.02 to 4.90]	6	14%	18	41%	20	45%	44	100%
Total	44	25%	86	49%	45	26%	175	100%
Chi ² (d.f. = 4, n = 175) = 15.05; p = .005; V = 0.21 Medium								

The relevant quartiles 1 and 3 were used to split the sample into groups of approximately 25% with lower, 50% with middle, and 25% with higher factor scores. The V in the table is Cramer's V, the measure of practical significance (effect size) for contingency tables, also called measure of association.

A significant relationship was found between cognitive competencies and clinical environment factors p value 0.032 V 0.17 small. Affective competencies and clinical environmental factors showed a p value of 0.0005 and V 0.26 medium. Psychomotor competencies and clinical environmental factors showed a p value of 0.032 and V 0.17 small, and is a significant association between clinical environmental factors and the nursing skills (cognitive, affective and psychomotor competencies) (χ^2 (d.f. =4, n=175) =15.05; p=.005; V=0.21 medium).

One Sample t-test

In order to test for normal distribution of interval variables, one sample t-test is used to test whether the sample mean significantly differs from a hypothesised value. For this study, the test was conducted to verify the objective of the study, namely to explore and describe the association between clinical learning environmental factors and clinical competence of NQRNs. The following hypotheses were formulated:

H₀: the null hypothesis assumed that there were no relationships between clinical learning environmental factors and clinical competence of NQRNs.

H₁: the alternative hypothesis assumed that there is a significant relationship between clinical learning environmental factors and clinical competence of NQRNs.

H₀: $m = 3.40$

H₁: $m \neq 3.40$

A positive relationship was found between the clinical competencies, namely communication competencies, interpersonal relationships, caring and ethical competencies, personal attributes, psychomotor competencies, clinical environmental factors, nursing skills (cognitive, affective and psychomotor), a conducive clinical environment, clinical supervision, shortage of staff members and attitude of staff members. This can be justified by a positive mean score, which resulted in a significant $p < .05$ and $d > 0.20$ leading us to conclude that the t-test population mean value is probably positive (see table 5).

Table 5: One sample t-tests: factors

Variable	n	Mean	S.D.	H ₁ : μ	t	d.f.	p	Cohen's d
Self-organisation/ management competencies	175	3.38	0.71	$\neq 3.40$	-0.42	174	.677	n/a
Decision-making and problem-solving	175	3.50	0.69	$\neq 3.40$	1.93	174	.055	n/a
Experience in nursing	175	3.35	0.83	$\neq 3.40$	-0.85	174	.396	n/a
Effective use of science and technology	175	3.29	0.73	$\neq 3.40$	-1.97	174	.051	n/a
Cognitive competencies	175	3.38	0.62	$\neq 3.40$	-0.45	174	.657	n/a
Communication competencies	174	3.83	0.69	$\neq 3.40$	8.20	173	<.0005	0.62
Interpersonal relationships	175	3.74	0.61	$\neq 3.40$	7.36	174	<.0005	0.56
Caring and ethical competencies	174	3.71	0.66	$\neq 3.40$	6.13	173	<.0005	0.46
Personal attributes	174	3.64	0.81	$\neq 3.40$	3.87	173	<.0005	0.29
Affective competencies	175	3.73	0.58	$\neq 3.40$	7.45	174	<.0005	0.56
Psychomotor competencies	175	3.67	0.85	$\neq 3.40$	4.20	174	<.0005	0.32
Nursing skills (cognitive, affective and psychomotor)	175	3.59	0.62	$\neq 3.40$	4.14	174	<.0005	0.31
A conducive clinical environment	175	3.82	0.59	$\neq 3.40$	9.50	174	<.0005	0.72
Clinical supervision	175	4.02	0.63	$\neq 3.40$	13.14	174	<.0005	0.99
Shortage of staff members	174	2.31	1.07	$\neq 3.40$	-13.46	173	<.0005	1.02
Attitude of staff members	174	3.80	0.61	$\neq 3.40$	8.67	173	<.0005	0.66
Clinical environmental factors	175	3.49	0.52	$\neq 3.40$	2.32	174	.021	0.18

The p values of these mentioned factors were all less than 0.005 and all the Cohen's d >0.20; which leads us to conclude that there is a positive relationship between these factors.

Discussion

This study aimed to explore and describe the relationship between clinical learning environmental factors and clinical competence of NQRNs.

The chi-square test of independence of our study found a significant association between clinical environmental factors and nursing skills (cognitive, affective and psychomotor competencies) (χ^2 (d.f. =4, n=175) =15.05; p=.005; V=0.21 Medium). This is obvious

as NQRNs have a responsibility to coordinate services in the unit by ensuring that healthcare, and not merely nursing care, is rendered to the patients. This can be achieved through well-developed management skills. A study by Murray et al. (2019) revealed that NQRNs were incompetent in the critical thinking and the research aptitude dimension, as they rated lowest in health practice in terms of patient care, using a telephone and other electronic devices.

In this study, only a few participants indicated that NQRNs could make rational decisions. Furthermore, even fewer participants reported that NQRNs demonstrate effective leadership and management skills to coordinate activities in the unit. Therefore, there is a need for the improvement of self-organisation and management skills of these nurses to enhance clinical competence. Our findings are consistent with a study by Murray et al. (2019), which showed that in a quest to academically develop a competent nurse with problem-solving, decision-making and critical thinking, the opportunity to apply these skills in a clinical setting had been reduced due to limited exposure to clinical settings. In the study conducted by Willman et al. (2020), NQRNs were perceived as not being competent in the critical thinking dimension. Nurses are exposed to various complex issues in the healthcare setting and require critical thinking skills to be able to manage a broad range of these issues (Rizany et al. 2016). The ability to think critically, therefore, is regarded as a significant factor that contributes to the development of clinical competence of NQRNs (Rizany et al. 2016).

A positive relationship was found between the clinical competencies, namely communication competencies, interpersonal relationships, caring and ethical competencies, personal attributes, psychomotor competencies, clinical environmental factors, nursing skills (cognitive, affective and psychomotor), and a conducive clinical environment, clinical supervision, shortage of staff members and attitude of staff members. This can be justified by a positive mean score and significant $p < .05$ and $d > 0.20$, which leads us to conclude that the t-test population mean value is probably positive. The p value of these factors was $P < 0.005$ for all the mentioned clinical competencies, and Cohen's value was $d > 0.20$ (table 5).

In this study, NQRNs received average scores in decision-making and problem-solving competencies. Therefore, an assumption can be made that these competencies are not fully developed. Our study revealed that NQRNs show adequate theoretical knowledge, but fewer practical skills and are not quite able to integrate theory and practice correctly in understanding patients' conditions. These results are congruent with the findings of previous researchers who identified a theory-practice gap amongst NQRNs (Monaghan 2015; Murray et al. 2018; Niemeyer 2017).

Studies suggest hospitals that had adequate availability of technology showed increases in performance in all practices allied to patient care (Rizany et al. 2016; Swart, Pretorius, and Klopper 2015). Virtual reality and audio-visual simulation, for example, provide cost-effective user education that can be practised repeatedly without the need for an

onsite trainer (Niemeyer 2017). This method includes employing online case scenarios for training or demonstrating a proper technique of a special clinical skill (Niemeyer 2017). Therefore, nurses, as well as other HCPs, need to integrate research and practice to improve clinical competence. Contrary to this, our findings have indicated a limited use of technology by the NQRNs.

Excellent communication skills are essential in clinical practice, as the NQRNs need to communicate effectively with patients, relatives, and co-workers. They were viewed as having excellent communication skills by most participants based on, amongst other things, their ability to use the processes, channels and methods of communication effectively.

Our results are supported by the findings of Willman et al. (2020), who report that NQRNs were rated highest in terms of “consulting other professionals, cooperating with other professionals and acting ethically.”

Findings of a systematic review conducted in Indonesia by Rizany et al. (2016), suggested that NQRNs’ personal attributes, including attitudes, confidence and knowledge, influenced their development of professional competence. In this study, many participants reported that NQRNs in medical and surgical units are eager to learn new things. However, it was evident that these nurses lacked confidence when performing their duties. Confidence is viewed as important in the development of clinical competence (Aldosari, Prymachuk, and Cooke 2021; Angela 2013; Niemeyer 2017; Murray et al. 2019; Rabie et al. 2020). In support of our findings, studies conducted by Gardiner and Sheen (2016), Kreedi et al. (2021), and Murray et al. (2018) reveal that NQRNs have low levels of confidence, particularly during the early months of practice with limited knowledge about interactions between various medications and side effects, as well as managerial skills deficits.

Our study also revealed that NQRNs have a deficit in certain clinical skills, such as effectively supervising and maintaining fluid and electrolyte balance and efficiently preparing for assistance with operative and therapeutic procedures. With the increasing number of litigations in the country, their deficit in the performance of such skills becomes a matter of concern. Although clinical competence may be measured by the ability of NQRNs to integrate cognitive, affective and psychomotor competencies, there are factors in the clinical environment that might influence the development of their clinical competence. An understanding of these factors can help managers of the institutions to ascertain and implement strategies that can effectually boost the development of clinical competence and help the NQRNs to successfully continue with their careers (Kreedi et al. 2021).

According to Kreedi et al. (2021), developing relationships with colleagues, strengthening communication skills and supporting one another contribute towards creating a supportive work environment. A good learning workplace is believed to

satisfy self-actualisation and ambition to improve professionally. These were supported by the results in this study, which revealed that there is adequate support in the medical and surgical units. The results in this study also indicated that supportive clinical supervision is prevalent in the medical and surgical units. Contrary to these findings, a study by Caka et al. (2015) identified a lack of support for students from stakeholders involved in training.

According to Willman et al. (2020), the availability of experienced HCPs from whom NQRNs can gain clinical competence and learn from, is important. A shortage of experienced HCPs, on the other hand, can create a crisis for quality healthcare, as having adequate and competent HCPs can be seen as one of the best ways of ensuring quality healthcare (Aldosari et al. 2021). In this study, it emerged that there is a challenge of inadequate HCPs in the medical and surgical units. The causes and implications of the shortage of HCPs are alleged to be hiring freezes in seven provinces (Lopez Gonzalez 2016). The same report argues that, in the public sector, a shortage of HCPs has become increasingly common.

Limitations

This study has some limitations, as the views of the NQRNs and those of the patients were not tested regarding the clinical competence of these NQRNs from the onset of the study. Although the sample size was small, the relevant data could be elicited to answer the objectives of the study, and were statistically accepted as verified by the statistician.

Conclusions

The results from this study emphasised a shortage of experienced staff members to coach and mentor students and NQRNs, which could, in turn, impact the training and development of these nurses. Unavailability of clinical facilitators to do student accompaniment to prepare them for professional practice, unclear policies to guide them, and lack of material resources make it difficult for nurses to practise and develop their technical skills. These factors, as well as low confidence displayed by some of the NQRNs, all have an influence on the development of the clinical competence of these nurses. The results of this study will assist educators and managers in empowering students with decision-making and problem-solving skills by allowing them opportunities to take up a management role during their clinical exposure. This can be done by organising training sessions to assist in professional development, with continuing education through workshops and in-service training to stimulate critical thinking and reflective learning amongst NQRNs. This will boost their confidence and assist with the development of professional maturity of NQRNs towards nursing practice.

Key points for policy, practice and/or research:

- The shortage of healthcare providers and—based on the number of litigations—registered nurses’ clinical competence remain matters of great concern.
- There is a need for new skills among NQRNs, and they are expected to be competent in a wide range of skills, which include decision-making and problem-solving skills, communication skills, and psychomotor skills.
- Our study shows the relevance of educators and managers in empowering NQRNs. Workshops and in-service training should be undertaken continuously.

Declaration of Conflicting Interest

The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article. The study was self-funded.

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