Staff Strengths, Determinants of Use of Simulations and Availability in Public and Private Nursing Educational Establishments in Fako Division, South West Region, Cameroon

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ABSTRACT

Public and Private institutions are found everywhere in Cameroon. These institutions train nurses, midwives, nurse-midwives, medical laboratory sciences, radiologist, and physiotherapists, among others. It was an innovation by the Ministry of Higher Education to allow the education and training in the hands of both public universities and private higher education establishments. The goal of this study was to demonstrate the role of simulations, in enhancing nursing education in Fako division since these are necessary tools that cannot be afforded by just any type of training institution but are very necessary for better learning outcomes. At a second thought, the staff strengths, determinants of the use of the simulations and their availability were considered vital as well. These then constituted the objectives of the study basing on nursing education and training. A cross-sectional descriptive study design was used in which data was collected using a structured questionnaire. A total of 89 nurse educators were sourced to participate in the study using a stratified sampling method. Data was analyzed using Epi Data version 3.1, and SPSS version 21.0. The results that showed the difference between the private and the public school were not statistically significant in all the elements of the objectives. Thus, it has been demonstrated that there is the need to increase staff strength, use of simulations and availability in both types of institutions (public and private).

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INTRODUCTION

Nursing education in modern times is characterized in part by technology and it is expected to be holistic. That is, it should involve the teaching of theory and practice [1]. Most nursing schools around the world are adopting technology such as simulation in their curriculum to overcome the constraints of graduating nurses who are highly knowledgeable but lack the practical skills [1]. This could be due to hospital shortages which have led to overcrowding of students at clinical sites, and/or the fact that patient's safety is considered paramount throughout the period of nursing training and beyond [1]. Different approaches have been used in the definition of simulation by different authors but one thing that these definitions have in common is that simulation is all about an artificial environment and so requires good staff strength. Simulation refers to the development of an imitated clinical setting in an artificial location[2]. Others define simulation as a method that is used to improve skills by learning these skills on mannequins, models or visual realities, video cameras and getting immediate feedback from observers, participants or peer[3, 4]. Gaba [5] also describes simulation as more of a 'strategy' than a 'technology' which permit interactions in learning through the use of tools that can mimic reality in a safe environment. Research carried out in the fields of nursing and medicine shows that there is an increase in the use of technology and simulation in these fields and this has been embraced in the effective acquisition of clinical knowledge and assessment of clinical skills[7].Higher educational institutions as well as the medical field, healthcare facilities, have embraced the use of simulation in their training. Simulation has been gaining grounds in the field of education, precisely nursing education, for the past 40 years and their determination of use and availability must not be disputed. Tanner[8] called for a transformation of clinical education based on increased in "patient acuity, decreased number of clinical sites, cost of clinical sites in some locations, inefficiency of students' time while at the clinical sites, and the faculty shortage, among other factors"[8]. This idea is supported by AACN [9] who stated that it is essential for the training program of baccalaureate nursing education to have a set of quality educators for clinical learning. NCSBN[1] identified the use of simulation in nursing education as a teaching strategy necessary for the acquisition of clinical competency. The use of simulation needs to be incorporated into the curriculum of nursing. Furthermore, all the necessary infrastructure needs to be in place in order to enhance its development because of its effectiveness in the teaching of clinical skills[10, 11].

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Ethical consideration: Due to the improvement in healthcare there has been higher acuity of patients and shorter hospital stays, giving student little opportunity to practice particular procedures on patients. This has left Decker[12] to question if a time will come when a student nurse will tell a patient that he or she is performing a procedure for the very first time on that patient. Patel and Gould[13] stated that the goal of simulation is to ensure that learners only practice on life patients when their skills are up to standard.

Technological advances: Nehring and Lashley[14] view technology to have a continuous evolvement in the field of health such as in areas like assessment, diagnosis, intervention, and evaluation requiring a constant change in the nursing curriculum. This can be seen in the use of computerized mannequins or simulation where students can study in-depth internal structures of the body at any time without direct access to live patients. Telemedicine is also an innovation in the health field and it is a technology which allows patients to be treated from thousand miles away. Hence one can conclude that simulations being one of these technologies need to be integrated into nursing education in order to drill student nurses on how to use and build clinical skills in a safe environment[14].

Professional shortages: According to Seropian, Brown, Gavilanes, and Drigges[15], in Nehring and Lashley[14], there is a need to increase the number of nurses due to their shortage. Also, faculty (staff) shortages have led to a lot of innovations in nursing education which has encouraged the inclusion of simulations in nursing education[14]. Furthermore, other authors [14] supports the fact that shortage of the nursing faculty is due to; "aging workforce, decreased interest in academia by young nurses largely due to its relatively low salaries, cost of higher education for achieving graduate degrees to meet criteria for faculty positions, decreased number of graduates from nursing graduate programs into faculty leaving their positions for retirement and other reasons,"[14]. They further identify the following as innovative solutions: use of simulation for the teaching of clinical skills, employing retired workers to serve as part time teachers and working together with hospitals for students to be followed-up during clinical exposure[15]. In addition to that, they think nursing shortage is not a problem that takes a short time to overcome and because of this it is advisable that schools (both public and private) start taking precautions now because, with above explanations, simulation use is forced to be limited since it requires classroom teaching before simulations.

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Knowledge (awareness): Teaching with simulation requires a whole new set of skills which most faculties (staff) do not have. This is because, besides the normal techniques in teaching, technology has to also be learned so as to adequately use it in teaching[16]. This issue has been resolved in some areas by the use of simulation technicians in running simulation laboratories. In another area, there are no technicians and teachers are expected to be called up to manage the laboratories[16]. With the above assertions, it is safe for one to say that knowledge in the effective management and use of simulation is a reason why most nursing institutions avoid using it since there are very few people who have been trained and can effectively use simulation in teaching. Those that are not aware or unable to use simulation will avoid using it.

Statement of problem

The ability to purchase store and use simulations differ with the capacity and means of institutions. Sometimes it is thought that public institutions should be in possession of all levels of simulations than private institutions because of the use of taxpayers money. This is usually not the case as the government serves an accreditation body and so will not disturb its own structures or institutions. By so doing, the public institutions will be lacking in many accreditation components which will be overlooked such as qualification of staff, staff strength, availability and use of simulations. On the hand, the private institution may acquire more due to the fear of closure following and accreditation visit but may not have the manpower to man. It was thus because of these dilemmas that the study on staff strength, determinants of simulation use and availability in public and private institutions was compared.

Research Questions

1. What is the state of the art between public and private institutions in Fako Division, South West Region, Cameroon?
2. What is qualification of staff between the two types of nursing training institutions?
3. What is the extent of use of simulation between the two types of institutions?
4. What type of simulations are available in the two type of institutions?

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Hypothesis

There is statistically significant difference between the use of simulation public and private nursing training institutions in Fako Division, South West Cameroon.

Specific objectives:

1. To determine the state of the art between public and private institutions that train nurses in Fako Division.

2. To assess the qualifications of staff between public and private nursing training institutions in Fako Division.

3. To determine the extent of use of simulations between the public and private training institutions.

4. To identify simulations available in the two types of training institutions.

Design

A quantitative cross-sectional descriptive design was used. The choice of the study site was led by the fact that most of the nursing schools in the south west region were clustered there. These schools are categorized into two main groups namely: Public and accredited private institutions.

Table 1: Distribution of all the Public and accredited Private nursing institutions in Fako Division

Accredited Private Nursing Institutions	Public Nursing Institutions
St Francis higher institute of nursing and midwifery, Buea	University of Buea, Buea
Redemption Medical Foundation, Muyuka	Training School for Health Personnel State Registered Nursing (TSHP-SRN), Limbe
St Francis School of Health Sciences, Buea Maflekumen Higher Institute of Health Sciences, Tiko	Nursing Assistant school Limbe
St Jude Higher Institute of Health	

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Sciences, Buea

Higher Institute of Applied Medical Sciences, Buea

St. Francis School of Nursing and Midwifery, Buea

Target Population composed of all nurse educators in public and accredited private nursing schools in Fako division, and the inclusion criteria was just that one was a teacher in any one of the schools listed above. However, nonconsenting lecturers were excluded to avoid reluctance and provision of inadequate responses.

The Instrument for data collection was a structured questionnaire made up of both open ended and closed ended questions. It was pretested in some schools in Meme division which are more that fifty kilometers away from validity. Corrections made in line with the study objectives before application.

This sample size calculation was based on estimating the proportion of nurse educators in Fako Division.

The minimum sample size needed for the calculation of the number of nurse educators in all the public and accredited private nursing schools in the Fako division was calculated using:

$$n_0 = z^2 pq/d^2$$

Where

n_0= minimum sample size required for infinite population

p= pre-study estimate of the proportion of nurse educators who use simulations in Fako division and it has a value of 50% or 0.5 (and since there was no pre-studied estimate from previous studies, 50% or 0.5 was used)

q= 1-p

d= the degree of precision or the accuracy (=5% or 0.05)

z= standard normal variant at confidence level of 95% (normal value is 1.96)

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Hence,

Sample size $(n_o) = (1.96)^2(0.5)(0.5)/(0.05)^2$

$= 0.9604/0.0025$

= **385 persons**

However, assuming the population of nurse educators, N is about 119.

Therefore the minimum sample size required for the finite population, n, was calculated as

$$n=\frac{n_0}{1+\frac{n_0}{N}}$$

n= 385/ (1+ 385/119)

      =385/4.23

= **91 persons**

Thus the study targeted about 95 nurse educators (though 89 were finally sourced and found to consenting with ease).

Since a stratified sampling method was used, a proportion of 80% was collected from both the private and public nursing institutions. This was because 80% is the most suitable proportion that could give the required sample size. This was distributed as can be seen in Table 2

Table 2: Distribution of respondents by required proportion of nurse educators by categories of nursing institution

Institution	Proportion	Number of nurse educators in each institution	Number of nurse educators required
		No (%)	No (%)
Private	80%	80(67.3)	64(67.4)
Public	80%	39(32.7)	31(32.6)
Total		119(100)	95(100)

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For the sampling techniques, a stratified sampling method was used to select the nursing institutions and a purposive sampling method to select eligible nurse educators from the institutions. Stratified sampling method was suitable because nursing schools in Fako Division already exist in two strata, namely: Public and Private Institutions. Hence, an equal proportion of participants (80%) were collected from each of these strata in order to have representation of minority groups. The purposive sampling method enabled the recruitment of all nurse educators who met the inclusion criteria.

For ethical approvals, administrative approval from the heads of the different nursing institutions in Fako division was obtained with an introduction from the research team that had te aim and objectives of the study.

An informed consent was sought before the filling of questionnaires. Participants received background information on the purpose of the research and how it was going to be done, and then they were allowed to decide whether or not to take part in the study. They were also made to understand that they were free to ask question and that they were free to withdraw at any point in course of the study if they changed their minds without any explanation or punishment. Only those who proved full understanding of the purpose of the study were recruited. Data was dehumanized using codes.

For data collection to be successful, repeated visits were made to each nursing institution to meet nurse educators. A brief explanation of the purpose of the study was made and clarifications did where needed. A signed consent form of those who were willing to participate was obtained after they had shown full understanding of the purpose of the study, then questionnaires were administered for them to fill. Those who refused to participate were also verbally appreciated for their time and attention. Questionnaires were filled by participants under supervision by the principal investigator to ensure accuracy of data obtained. Each participant had a maximum of 30 minutes to provide answers to the questions on the questionnaire.

Data collected was double checked to ensure accuracy. The data was entered into an electronic data set into EpiData software version 3.1 for analysis. The questionnaires were strictly anonymous without the use of participants' names.

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Data analysis

Open-ended questions were analyzed using the systematic process of thematic analysis where ideas were grouped under umbrella terms or keywords. A pre-designed EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) database which has inbuilt consistency and validation checks was used to enter the data. Consistency, data range and validation checks were also performed in SPSS version 21.0 (IBM Inc., 2012) to identify invalid codes. Data were made essentially of categorical variables and they were analyzed using frequencies, proportions and Multiple Response Analysis to aggregate responses within conceptual components. Chi-Square test of equality of proportion was used to compare proportions for significant difference as well as to measure the association between the study indicators and background information; relationship was also assessed using Spearman's Rho correlation test for ordinal by ordinal categorical variables. Data were presented using frequency table and charts. All statistics were presented at the 95% Confidence Level (CL), Alpha =0.05.

RESULTS

Demography

Ten health institutions were sampled for the study. Both private 69 (77.5%) and public 20 (22.5%) were represented. Out of the 89 nurse educators that participated in the study, 13(14.6%) were from redemption medical Foundation Muyuka; 10(11.2%) were from Higher Institute of Applied Medical Sciences Buea; 10(11.2%) from St Jude Higher Institute of Health Science Buea; 10(11.2%) from St Francis School of Health Sciences Buea; 9(10.1%) from Maflekumen Higher Institute of Health Sciences, Tiko; 9(10.1%) from St Francis School of Nursing and Midwifery Buea; 9(10.1%) were from Training school for health personnel State Registered Nursing (TSHP-SRN) Limbe; 8(9.0%) were from St Francis Higher Institute of Nursing and Midwifery Buea; 7(7.9%) from the University of Buea; 4(4.5%) were from Nursing Assistant School Limbe (Table 1)

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Table 3: Distribution of respondents by nursing institutions in Fako Division

Health institution	Estimated number of participants in each institution	Frequency	Percent (%)	95% CI
Maflekumen Higher Institute of Health Sciences, Tiko	10	9	10.1	5.05-17.7
Higher Institute of Applied Medical Sciences, Buea	11	10	11.2	5.9-19.1
Redemption Medical Foundation Muyuka	15	13	14.6	8.4-23.1
St Jude Higher Institute Of Health Sciences, Buea	10	10	11.2	5.9-19.1
St Francis School of Health Sciences Buea	11	10	11.2	5.9-19.1
St. Francis School of Nursing and Midwifery, Buea	12	9	10.1	5.05-17.7
St. Francis Higher Institute of Nursing and Midwifery, Buea	11	8	9.0	4.3-16.4
University of Buea	20	7	7.9	3.5-14.95
Nursing Assistant School, Limbe	8	4	4.5	1.4-10.5
Training School for Health Personnel State Registered Nursing (TSHP-SRN), Limbe	11	9	10.1	5.05-17.7
Total	119	89	100.0	

Distribution of respondents by qualification and type of institution

Table 4 below shows that out of the 89 participants, 69 were from private institutions, while 20 from public institutions. In private institutions, 3(4.3%) were Ph.D. holders, while in the public institutions, 4(20.0%) were Ph.D. holders; 22(31.9%) of participants were Master degree holders in private institutions while 6(30.0%) Masters holders participated in public institution; In

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private institutions, 40(58.0%) were holders of Bachelors degree while in public institution holders of Bachelors Degree had a frequency of 7(35.0%); finally, holders of State Diploma/HND had a frequency of 4(5.8%) in private institutions and 3(15.0%) in public institution. It was realized that majority of Nurse Educators in private institutions 40(58.0%) and public institution 7(35.0%) were Bachelors degree holders, while holders of Ph.D. 3(4.3%) were the lowest in private institution and State diploma/HND holders 3(15.0%) were the lowest in public institution.

Table 4: Distribution of respondents by qualification and categories of institution

Qualification	Institutions				χ^2-test	P-Value
	Private No(%)	(95% CI)	Public No(%)	(95% CI)		
Ph.D	3(4.3)	1.1-11.4%	4(20.0)	6.7-41.55%		
Masters Degree	22(31.9)	21.7-3.5%	6(30.0)	13.1-52.3%	8.066[a]	0.045
Bachelors Degree	40(58.0)	46.1-9.2%	7(35.0)	16.8-57.3%		
State Diploma/HND	4(5.8)	1.9-13.4%	3(15.0)	3.9-35.6%		
Total	69(100)	95.8-00%	20(100)	86.1-100%)		

Distribution of respondents by the determinant of the use of simulation and types of institution

As shown in table 5 below, both private and public schools, the use of simulation was considered to only be possible if it is required/recommended in the school curriculum with values of 40 (58.0%) and 11 (55.0%) respectively, or out of personal choice with values of 32 (46.4%) for private school and 13 (65.0%) for public school. The difference between public and private school was not statistically significant (χ^2=6.80; df=3; P=0.078). Among the respondents,

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4(5.8%) in private institution and 0(0.0%) in public institution stated that simulation is not applicable while 1(1.4%) in private institution and 0(0.0%) in public institutions preferred that the use of simulation should be determined by students' choice.

Table 5: Distribution of respondents by the determinants of the use of simulation and types of institution

Institution	Determinant to the use of simulation				Total	χ2-test	P-value
	It is required or recommended in the school curriculum	Students' choice	Personal choice	NA			
	No(%)	No(%)	No(%)	No(%)	No(%)		
Private	40(58)	1(1.4)	32(46.4)	4(5.8)	69(100)	**6.80**	**0.078**
Public	11(55)	0(0.0)	13(65)	0(0.0)	20(100)		
Total	51(57.3)	1(1.12)	45(50.6)	4(4.5)	89(100)		

NA= Not Applicable

Table 6 below shows that the private institutions had both low and moderate fidelity types of simulations, while the public institutions had only low fidelity types. Lecturers did not know that their simulations are in types as shown by 8.7% and 15.0 % in private and public institutions respectively. The total lack of simulations, 20% in public institutions and 10.1% in private institutions was also observed.

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Table 6: Distribution of respondents by types of simulation available in institutions

Institution	Types of simulation					Total	χ2-test	P-Value
	Low fidelity No(%)	Moderate fidelity No(%)	High fidelity No(%)	None No(%)	I don't know No(%)	No(%)		
Private	52(75.4)	11(15.9)	0(0)	7(10.1)	6(8.7)	69(100)	**17.9**	**0.001**
Public	13(65.0)	0(0.0)	0(0)	4(20.0)	3(15.0)	20(100)		
Total	65(73)	11(12.4)	0(0)	11(12.4)	9(10.1)	89(100)		

DISCUSSION

The distribution of nurse educators was found to be proportionate to the type of institution as there were more private institutions than public institutions. The worry was whether the public institutions could not be increased instead of accrediting private institutions. This worry could however to solved by the fact that government had decided to shift responsibility of certain functions to the private sector and secondly because training in public institutions was free but required a lot of resources which could be provided by the private better than government. It was very evident that simulations that were higher than the low-level ones were not available in public institutions but the private institution could afford the moderate level simulations. It must however not be overlooked that the low fidelity simulation does not seem to reflect any significant level of realism, meaning that a very low level of realism is provided as compared to high fidelity simulation. Lauren et al. in 2012[17] found out the design of simulation affects student's, performances or perceptions. Low-level simulations do not really lead to realism and so less performance or perception. The results indicated that candidates have more positive perceptions of high fidelity simulation due to the high level of realism they offer[111]. Another study that supports these findings was carried out in Uganda on the effect of using computerized simulation(high fidelity simulation) in teaching chemical bonding by John, Robert, Isreal[112]. The findings revealed that the experimental group performed better than the control group in the post test (P<0.05). They concluded that computer simulation provides outcomes that reduce abstractness and hence no gender discrimination amongst learner. Qualification and work

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experiences have also been found to strengthen staff strength of any training institutions. A good staff strength enhances learning. It has been observed here that majority of the private institutions had a better staff strength though all put together had three terminal degree holders in the public sector and four in the private. Generally, the private institutions had a better staff strength probably because of the requirement for accreditation by a government department and partly because they were many in number than the public institutions. The observation that both of them have staff at terminal degree, master level, bachelors and diploma is indicative of the fact that training in area is regulated somehow when it comes to who is qualified to teach. However, in talking on use of simulations, a certain level of staff was expected to use them which has been found to be the case. Hence, the study has demonstrated that qualification and work experience had a role to play in the awareness and use of simulation. This could be seen from the fact that most of those who used simulation were holders of the Master's degree 20(71.4%). This can be associated with the fact that these categories of individuals are considered as certified teachers. They are also considered to have acquired some advanced training on appropriate teaching strategies which has enhanced their level of competence. This is supported by a similar study which was carried out in Sweden by Eva and Monica [18] on both public and independent schools titled the impact of teachers' competence in public and independent schools. The study was focused on third grade students in both private and independent schools. Findings of the study revealed that teachers' certification and qualification had an important impact on students mean reading test score. For the other determinants of use of simulations, personal choice was found to be higher among private institutions teachers probably because they were more qualified than those in the public sector. Recruitment in the public sector is programmed and this could be a contributory factor to less staff in public sector than in the private. It must however be noted that the job security is also responsible for the less staff in the public sector as government tries to protect all her employees, while the private sector pays less and job security is less. Amazingly, another determining factor was students' choice observed in the private institution. Though very insignificant, one is left with a puzzle why a student in the private institution should choose the use of simulations. This could probably be due to the fact that they have teachers with a higher level of study, teachers discuss freely with them, or they are more inquisitive to learn as payments are made for their studies. Sometimes,

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when something is free it is considered very serious but when one has to pay it is considered as a pearl.

CONCLUSIONS

The distribution of nursing educators in Fako Divison, South West Region, Cameroon is not even. More nurse educators are found in the private probably because it is easier to get employed by the private sector than the public.

The private sector also has more qualified staff than the public sector and this is also in terms of staff strength though the use or nonuse of simulations amongst the two groups was not significant.

The availability of simulation was found to be better in the private institutions as they had low and moderate level simulations, as oppose to the public sector with low level simulations only. The lack of high level simulation noticed in both types of institutions is a worry but the unstable nature of power supply could also be a factor to cross check.

For other factors that determined the use of simulations, personal choice found in the private and public sector while students' choice was found in the private sector only. The personal choice could be as a result of the nurse educators training or the availability of the simulation, or self-discipline, while the students' choice could be from exposure to the available moderate level simulations.

Recommendations

1. The staff strength of institutions should be increased and an accreditation body set up to check the staff strength among other criteria for better training using simulators
2. Policies should be instituted by various stakeholders concerned to ensure that the use of simulation is incorporated in the curriculum of nursing and there should be followed up to ensure that nurse educators are using simulations.
3. Training institutions should develop well-equipped demonstration rooms (skills laboratories) or proprietors of accredited private institutions could partner and develop well-equipped simulation laboratories to supplement clinical teaching. This is in order to reduce cost.

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4. In case of lack of simulations, two things are important to note. These limited power supply and cost (high taxation) of importation. The state should reduce the taxes on the importation of simulators so that stakeholders can be able to afford.

5. Stakeholders involved in the training of nurses in Cameroon should employ competent nurse educators who are certified and can be able to use suitable teaching strategies so that graduates can be able to practice evident-based learning. By so doing, the use of simulations by personal choice will be increased.

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