

Research Article

Nurse Educators' Perceptions about Introduction of Genetics and Genomics in the Curricula of Nursing Programmes in Ibadan, South West, Nigeria

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Keywords

- Nursing programme
- Nurse educator
- Genetics
- Genomics

Abstract

Purpose: Nurses constitute an important cadre of health workers especially involved in counseling of individuals with genetic diseases and their families. Additionally, with the advances in genomics where genetic variants have been identified and genetic testing is now available for many diseases, genetics services will become more relevant for many other diseases in the future. The recent advances in genomics suggest an urgent need to improve on the existing genetics content of the nursing curriculum particularly in developing countries. The objective of this study is to determine the genetic and genomic content of the courses taught by nurse educators to provide a theoretical basis for students in six Schools of Nursing in Ibadan, Nigeria. This is with the view of a proposed intervention study for Nurse Educators in selected nursing programmes.

Methods: This qualitative study was conducted using Focus group discussions and In-depth interviews were conducted among nurse educators in Schools of Nursing in Ibadan, southwest Nigeria. Data were collected on knowledge about genetics and genomics, genetics content of existing curriculum, and perceptions about modes of integration of genetics and genomics in existing nursing curriculum. Data were analysed using thematic analysis.

Results: The overall impression among study participants is paucity of genetics content in the current nursing programme curricula. Nurse educators expressed a high level of enthusiasm about training in genetics and genomics. However, there were contrasting opinions about the changes to be made to the current nursing curriculum, with educators favouring embedding genetics content into the already existing courses while others preferred a separate genetics course, because they felt the existing curriculum is overloaded. However, respondents expressed a high level of enthusiasm about a training in genetics and genomic.

Conclusion: Nurse educators were enthusiastic about inclusion of genetics in the curricula. There is need for active engagement of the Nursing and Midwifery Council to facilitate the prompt revision of the current nursing curriculum and its adoption by nursing schools in Nigeria.

INTRODUCTION

Background

In the last couple of years, there have been considerable advances in the field of genomics with wide applications in risk assessment, diagnosis, treatment and prognosis for several diseases [1-4]. In the same period, there has been increasing awareness especially in developing countries about the potential role that genomics can play in the fight against the huge burden of communicable diseases and the rising incidence of non-communicable diseases [5-7].

In order to realize the dream of genetics revolution in healthcare in developing countries, an important area of need is

education of the population in general and of health care workers in particular about genetics and genomics. Currently there is a low level of knowledge about genetics and genomics in Nigeria among health workers, and the general population [8] and the role of genetics education cannot therefore be overemphasized. There is an urgent need for education of all categories of health workers in developing countries in spite of their academic background and role preparation.

Nurses constitute an important cadre of health workers especially involved in counseling of individuals with genetic diseases and their families. Additionally, with the advances in genomics where genetic variants have been identified and genetic testing now available for many diseases, genetics

services will become more relevant for many other diseases in the future. Genetics has become an important science for all aspects of nursing practice in the 21st century [6,9], however a recent systematic review demonstrated a low level of nursing competencies in genetics [10]. Hence, there is an urgent need for nurses to understand the basic skills needed in genetic counselling, and the ethical and legal issues related to genetics and genetic testing [11]. Moreover, at the bedside, the use of genetic information by nurses holds great promise for improving patient outcomes [9-12].

Studies from other developing countries reveal a low level of genetics knowledge among nurses and low exposure to courses on genetics in their training. For example, in a Turkish study among registered nurses in a teaching hospital, about four in five stated they were not taught genetics during their degree programme, and their mean genetics knowledge score was 6.9 out of a total obtainable score of 11 [13]. Another study among Filipino American nurses found that 41% reported good understanding of the genetics of common diseases, while about three quarters stated that genetic courses were not available [14]. A similar low level of knowledge about genetics has been reported among Taiwanese [15] and African-American nurses [16] as well as in a systematic review undertaken at University of New York [10].

Little is known about the content of the genetics curriculum in medical and nursing schools in many developing countries including Nigeria, although qualified nurses reveal minimal instruction in genetics. When the basics of genetics and genomics are incorporated into the nursing curriculum, it is believed that Nurse Educators can improve their knowledge base and skills in genomics-based [17-19]. Studies in the United States have reported efforts by nursing schools at including genetics and genomics into the nursing curriculum [20]. Some of the strategies suggested for teaching genomics to nurses include clinical application through case studies, storytelling, online genomics resources, student self-assessment, guest lecturers, and a genetics focus group [21]. It should be noted that few studies have actually examined the content of the nursing schools curricula for genetics content and the possible areas needing update and improvements in developing countries such as Nigeria. Genetic studies among nurses in Nigeria as at the time of this write up is almost non-existent and there is dearth of genomics nursing literature in Nigeria. There are few only on Sickle Cell Disease which is suggestive of either none involvement of Nurses in other patient care with genetic predisposition or lack of research in this area. This makes the present study a vital contribution to local data. The objective of this study therefore is to determine the genetic content of the courses taught as reported by nurse educators in selected nursing programmes in Ibadan, Southwest Nigeria and their perceptions about incorporating genetics and genomics in the nursing curriculum.

Justification

Nursing is an evolving discipline with need for continued growth, professional leadership and advocacy (Sharoff; 2016). The changing healthcare landscape towards genetics/genomics suggest and urgent need to integrate the basic knowledge and skills of genetics /genomic into nursing curricular to develop the

required competencies. It follows that Nurses should be adept in integrating this new knowledge into mainstream education and practice. This can be fully achieved when teachers of Nurses are fully engaged, with positive attitude about the subject. The perspective of teachers of nurses on the subject is not known in Nigeria. This is the thrust of this current study.

METHODS

Study design, area and setting

A cross sectional study using qualitative method was conducted among nurse educators in the six nursing programmes in Ibadan, Nigeria: School of Nursing, School of Perioperative Nursing, and School of Occupational Health Nursing, all three in the University College Hospital Ibadan; Oyo state College of Nursing and midwifery, Eleyele, Ibadan (2 programmes, nursing and midwifery), and Department of Nursing, University of Ibadan, Ibadan.

The University College Hospital (UCH) School of Nursing (SON) was founded in July, 1957 as one of the foremost Schools of Nursing in Nigeria. It runs a 3-calendar year diploma nursing programme with a capacity of 350 students. From inception, 5,200 professional nurses have graduated from the school and licensed by the Nursing and Midwifery Council of Nigeria (NMCN). The school has a staff strength of 18 full time academic staff. All the educators possess a minimum of Bachelors degree in Nursing. The College of Nursing and Midwifery, Eleyele, Ibadan was established in 2014, though it started in 1949 as a school of nursing, but was upgraded to College status in 2014. It runs a 3-calendar year basic Nursing program with a capacity of 32 staff, 225 students and a one and half year post basic Midwifery with a capacity of 92 students. From inception, about 3,550 professional nurses and 1890 midwives all licensed by the NMCN have been produced.

On the other hand, the Perioperative Nursing School (PON) is one of the seven post basic schools for Perioperative Nursing in Nigeria. The school was established in June 1990, and runs a 12-calendar month programme. The teaching staff is made up of four Nurse Educators, one Clinical Instructor and Guest Lecturers. Since inception the school has graduated 873 Perioperative Nurses, who are also licensed to practice by NMCN. The School of Occupational Health Nursing, UCH Ibadan (SOHN), the first in the West Africa sub-region started in 2005. The teaching staff is made up of four Nurse Educators, two Clinical Instructors and other Guest Lecturers. Till date, 163 Occupational Health Nurses have graduated and licensed by the NMCN.

The Department of Nursing, University of Ibadan was established in 1965 as the first in Africa, South of the Sahara, for a three-year post-basic B.Sc. degree programme. Currently the programme runs as a five-year BNSc degree, in response to global nursing education trends, and has graduated over 2500 nurses who are licensed to practice by the NMCN. The staff strength as at the time of study consists of 13 Lecturers with 3 at professorial level and other academic staff with PhD nursing degrees.

The curricula for the UCH and Oyo State schools of Nursing and Midwifery are similar and the courses taught include anatomy and physiology, medical and surgical nursing, midwifery

etc. Genetics is not taught as a separate course but mentioned in some of the courses such as anatomy and physiology, mental health and sociology.

Eligibility criteria

All participating Nurse Educators were those with at least a baccalaureate degree in Nursing and have been lecturing in any of the Nursing training institution for at least 5 years (least was 6 years, highest was 20 years). They were also willing to participate by signing the informed consent document.

Sample

Four Focus Group Discussions (FGDs) were conducted: two in the Oyo State College of Nursing and one each among staff of the UCH SON and staff of the PON and SOHN. Additionally, five in-depth interviews (IDIs) were conducted among heads of Midwifery and Nursing schools in the Oyo state College of Nursing and Midwifery, head of Perioperative Nursing and academic staff of the Occupational health nursing schools, and the Department of Nursing. There were no refusals as all the individuals approached agreed to participate. See details in Table 1.

Data collection and analysis

The guides for both FGDs and IDIs were prepared by the authors and each included questions on the specific genetic content of the nursing lectures, knowledge about genetics and genomics and the recent advances in genomics such as the Human Genome Project, genetic testing for non-communicable diseases, application of genomics in healthcare, and personalized medicine. Other variables of interest were respondents' attitude to the inclusion of genetics and genomics in the nursing curriculum, extent of genetics/genomics content that can be introduced and the level of nursing education (undergraduate or diploma nursing program). The authors had training sessions on the instruments before study implementation. During the training, role-play sessions were conducted to improve the flow of questions, content and develop probing questions. To ensure consistency, the same team of authors conducted all the interviews and responses were tape recorded and later

transcribed and analyzed with NVIVO software using thematic analysis.

Ethical considerations

Voluntary informed consent was obtained from participants before participation. They were also informed about their right to withdraw consent at any time. Confidentiality was maintained throughout the study duration. Ethical approval was obtained from the UI/UCH Ethical Review Committee.

RESULTS

Demographic characteristics of participants

A form capturing salient sociodemographic characteristics of the participants was filled. The 26 participants in the FGD were aged between 35 and 58 years (mean age = 45.6 years, SD = 5.4), and there were 24 females. All respondents held a minimum of a Bachelor's degree in nursing, while 8 had Masters degrees (7 in Nursing and 1 in Public Health).

Taught courses

The nurse educators taught a wide range of courses such as human anatomy and physiology, applied anatomy and physiology, medical-surgical nursing, nutrition, primary health care, foundation of nursing, and psychology. Other courses taught include principles of management, fundamentals of midwifery, complicated midwifery, community midwifery, sociology in nursing, mental health and psychiatric nursing, the abnormal infant, nursing research, occupational health, first aid and emergencies, nursing management and administration, nursing education, principles and practice of perioperative nursing, maternal and child health nursing, and behavioral sciences.

Genetics was not listed as a stand-alone subject but was however taught as part of human anatomy under cell division, chromosomes and genes, and genetic material (DNA and RNA). The participants stated they do mention genetic considerations in some of their courses, particularly with hereditary diseases in mental and psychiatric nursing. For example, in maternal and child health nursing, genetics was usually discussed under congenital

Table 1: Summary of Participating Nursing Programmes and Lecturers.

Schools of Nursing	Current number of students	Number of teachers	Certificate the school awards	Number of FGDs participants	Number of IDI Participants
1. School of Nursing, UCH	350	18	Diploma in Nursing	7	1 IDI (Head of school)
2. School of Occupational Health Nursing, UCH	Currently, there was no students at the of study due to an industrial dispute. But previously, 25 students yearly	6	Diploma in Occupational Health Nursing	3 Lecturers in combination with Lecturers from Perioperative School of Nursing	None
3. School of Perioperative Nursing	30	4	Diploma in Peri-operative Nursing	2 Lectures in combination with Lecturers from School of Occupational Health Nursing	1 IDI (Head of school)
4. Oyo State College of Nursing and Midwifery	225	32	Diploma in Nursing and Midwifery	14 Lecturers	2 IDI (Head of Nursing & Head of Midwifery)
5. Department of Nursing, University of Ibadan	150	11	Bachelor Degree in Nursing		2 IDI (1 MCH Lecturer & 1 CHN Lecturer)

abnormalities. In occupational health nursing, respondents noted that the genetic component has been included as part of curriculum review, but this was still under consideration for ratification by the board of Nursing in Nigeria.

Clarifications of concepts

When asked about the meaning of genetics and genomics, most of the respondents had an idea about genetics but only one could correctly explain genomics and what it involves, neither could they differentiate between genetics and genomics. Some respondents felt that genetics and genomics meant the same thing. Concerning the Human Genome Project, none of the nurses knew about the project, when it was done or the objective.

On personalized medicine, the responses generally indicated lack of familiarity with the subject. A common misconception was that personalized medicine was medicine for familial or hereditary conditions. Few respondents however correctly identified personalized medicine as 'individualized medicine' or 'medicine targeted to an individual' 'customized medical care' and 'targeted therapy.' Nevertheless, among those participants in the latter category, few mentioned that therapy or healthcare would depend on the genetic variants of an individual.

All participants agreed that though genetics is not currently taught as a separate course or subject, it is now being mentioned more frequently compared to how they were taught during their nursing diploma and undergraduate training days. Below is the statement of one of the participants, a 43-year-old female:

"...actually even the curriculum has changed. It wasn't what it used to be when we were in school of nursing that we have now, because of the developments and technologies.....we have so many things included in the curriculum..."

All participants were favorably disposed to the introduction of genetics into the curriculum, although there were concerns about whether the current three-year duration of the training could accommodate extra courses.

"For now even with the curriculum, what we have in the curriculum to complete it in 3 years is not really feasible. So if this particular topic or particular course will be included into the curriculum. I don't know, maybe ... I don't see how it will accommodate it fully"

Contrarily, one of the participants (a 38 year old female) expressed the urgent need for genetics training in the curriculum with the following statement:

"...with what is happening these days with rising incidence of cancers, we need to make any needed adjustments to accommodate genetics into nursing training..."

There were contrasting opinions about how genetics should be introduced though more participants seemed to agree with genetics being taught as a distinct course on its own. Among some participants, there was emphasis on the significant role of the NMCN in developing the curriculum and ensure its speedy adoption. Some others suggested it could be taught as part of already existing courses with more of a practical approach where examples of genetic considerations and applications for

different diseases are given and used to explain genetics. Below are comments from two participants.

"...I think it should be integrated into the course so that the students don't learn in isolation so that they don't just learn genomics as one entity. So if you are teaching a particular subject for instance, or a particular topic, the genomics aspect of the topic should be taken alongside with it so that they don't learn in isolation..."

"...if it can be incorporated into the standard courses that we already have. So probably they should just develop a curriculum, develop a content curriculum for it and then take it into some of the courses like medical surgical nursing and foundations of nursing especially..."

The discussions were not solely about building students' knowledge about genetics. Some participants raised concerns about providing an opportunity for genetics and genomics training for all nurses (in school or post-training) and made suggestions about how to build the capacity of practicing nurses who had completed their nursing training. A 50-year-old female said the following:

"...for those people who are already on the field, let me just put it that way.... on the field they have already gone through whether BSc nursing or school of nursing before, they too will need that training. ...there is a mandatory continuing education program that is usually done before license renewal for nurses so the study of genomics can be made as part of the modules so that those ones that didn't get to do it in the school of nursing or elsewhere can partake before renewal of their licenses..."

Additionally, they stated that genetics training for working nurses as in-service education could be more effective than the continuing education program. However some participants argued that the advantage of the continuing education program being available to nurses in every institution (including nurses in private hospitals) gives it an edge over in-service training. Furthermore, the continuing education program is a prerequisite for the renewal of nursing practice license, which may serve as an incentive for more nurses to participate.

The educators also recommended that the full complement of genetics and genomics should be introduced into the diploma nursing programs. They argued that whatever the students learn could be reinforced during the nursing degree programs, especially for those who intend to pursue their degree program after an initial nursing diploma.

Another related concern includes the need to build capacity of nurse educators before introduction of genetics as they mentioned that knowledge levels were generally low. The participants expressed a great deal of enthusiasm in training in genetics and genomics. Below are comments from two participants (2 females aged 45 and 48 years old) to support their enthusiasm:

"...We need training as educators on this particular issue whatever, genetic and genomics; we need training to improve our knowledge and skills....to update our knowledge apart from the baseline that we know, so that we will be vast in genetic counseling and genomics. So we need training..."

“...I think everyone should be interested and everybody should partake in the training because we are all involved in training the students. So every teacher should be involved in the training so that everybody will be updated...”

The participants also discussed the preferred level of study that genetics classes could be introduced. More participants suggested that it should be introduced in the second year of the training, however some argued that genetics should be introduced from the first year and should be taught throughout the period of the training. The nurse educators generally agreed that genetics should be included in both diploma and degree nursing programs.

About the scope of genetics that should be taught, some felt they (nurse educators) would be able to make appropriate suggestions after their own training.

DISCUSSION

The recent explosion in the discipline of genetics and genomics in developing countries demands that nurses in developing countries build the necessary capacity to assume their significant roles. Capacity building for nurses to enable them provide genetic counselling for genetic diseases, participate in community based genetic screening services and serve multiple roles in genomics research is an urgent need and nursing education needs to rise to these demands [11]. In this study, nurse educators have expressed generally favorable attitudes to the introduction of genetics and genomics in the nursing curriculum though they expressed an urgent need for training of educators.

The poor knowledge about genetics and genomics and poor awareness about key developments in the field such as the complete sequencing of the Human genome and personalized medicine found in our study has been reported in other studies [10,13,14,16] Capacity building in genetics and genomics has been advocated for all cadres of health workers, however the multiple roles that nurses could play in genomics applications in healthcare, community genetic services and research underscores the need for an active capacity building and engagement for nurses [22]. Nurses are the largest health care workforce in contact with patients and their families and continue to occupy a key position in clinical and psychosocial care. Additionally, in several rural communities in developing countries like Nigeria, there may be no doctor; and in such settings nurses provide basic services. Hence any investment in genetics capacity building for nurses is likely to have a much greater impact on health care especially at the grassroots. Nurse educators in our study expressed a high level of enthusiasm towards participating in training in genetics and genomics. This unmet need should be addressed by organizing trainings for nurse educators in the various nursing schools including diploma and degree awarding schools.

The low genetics component of the current nursing curriculum is not peculiar to nursing training alone. Currently, the curriculum of medical students has elements of genetics but does not involve genomics and its applications such as personalized medicine. The inclusion of genetics and genomics in the curricula of nursing and medical schools in Nigeria and other developing countries should

be a key priority. Our participants suggested greater dedication by the Nigeria Nursing and Midwifery Council, however advocacy groups that will engage the council and fast track the inclusion and implantation of curriculum with genetics and genomics content are also needed. One area needing deliberations and discussion include innovative ways of including genetics content in the curriculum without considerable extension of the duration of training. Insufficient curriculum space for genetics or genomics content has been identified as a key barrier to genomics teaching for nurses [10,21]. However there have been suggestions to overcome this barrier such as self-directed tutorials [23,24] and online genetics resources [25,26]. Additionally, some authors have highlighted online genetics resources for undergraduate nurses that could facilitate self-learning [27]. The downside of the latter approaches in a low resource setting such as Nigeria are challenges such as poor internet connectivity and use, unstable power supply and the very low level of knowledge about genetics and genomics that may make self-learning difficult for nursing students or trained nurses. Training using innovative approaches such as edutainment could serve as effective health education approaches in the Nigerian setting and deserves investigation.

Another area needing discussion with the nursing council is the minimum competencies to include in the curriculum and this issue has been highlighted in previous studies [17,23]. Other studies have discussed the minimum competencies in the developed nations like the United States [28-31]. However, this may differ in developing countries. The advances in genetics and genomics have been tremendous over the last couple of years, and apart from the basics, there are areas such as genetic counseling, ethical and legal issues, genetic screening and genetic testing, and personalized medicine that are important for modern clinical practice. Nursing experts need to carefully deliberate and identify minimum competencies to include in the nursing programmes curricula.

There is the need to develop resources for nurse educators and practicing nurses especially with a focus on the more important genetic diseases in Nigeria and similar low-income countries. A similar resource by [18,32] describes a genetics curriculum for practicing nurses in the United States.

Some of the nurse educators studied suggested that introducing genetics lectures as part of the courses currently being taught would prevent extension of the training period. A trial of alternative approaches for teaching genetics courses should be considered by the NMCN and could be tested in selected nursing programs in Nigeria prior to adoption by all nursing programs. An important requirement prior to adoption of genetics in nursing curricula is the provision of genetics training to nurse educators and should be given utmost priority. Our respondents suggested the nursing continuing education program and in service trainings as a veritable means of building nurse educator capacity. Such trainings should be regular, participatory and innovative such as using drama and videos especially since there is a general low level of awareness about genetics and genomics. Other teaching strategies such as clinical application through case studies, storytelling, online genomics resources, student self-assessment, guest lecturers, and a genetics focus group have been reported [21] and should be considered for training nurses

in Nigeria. A training of trainers approach could also be beneficial where a selected group of nurses in states or major cities are trained and they can then step- down the training to other nurses in their locality. This approach will contribute to sustainability of the genetics capacity building efforts.

The study involved mainly Nurse Educators in Diploma Nursing Programmers (DNPs). However, to avoid ascertainment bias, all respondents who were Heads of Schools were selected for the IDI in all the settings. The FGD was moderated by the authors and the participants did not have prior knowledge of the content of the discussion. It is also important to note that majority of the practicing Nurses in Nigeria are diploma qualified, thus making Nurse Educators in DNPs important personnel for any capacity building efforts.

CONCLUSION

In conclusion, the Nurse Educators studied expressed a great level of enthusiasm in learning genetics and genomics and would want the curriculum to include courses in genetics and genomics, since a paucity of genetic content of the curricula was established. Despite contrasting opinions about the changes to be made to the current curriculum, some educators seemed to favor embedding genetics content into the already existing courses. Others however would prefer a separate course and an extension of the training period. This suggests a need for active engagement of the nursing regulatory body to facilitate prompt revision of the current nursing curriculum and adoption by nursing programmes in Nigeria.

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Clinical Relevance

Study findings will guide the development of genetics and genomics content in nursing curricula for the training of nurses in Nigeria.

Clinical Resources

- National Human Genome Research Institute (NHGRI) Health Professional Genetics Resources Online
- Webpage: <https://www.genome.gov/11510371/health-professional-genetics-resources-online/>

International Society of Nurses in Genetics (ISONG) Educational resources webpage: http://www.isong.org/ISONG_educational_resources.php

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