

Implementation of Genetics course for Nursing Students and Clinical Nurses

Meira Erawati, Niken Safitri Dyan Kusumaningtyas, Fatikhu Yatuni Asmara
School of Nursing, Faculty of Medicine, Diponegoro University
Email : azysofyan@gmail.com

Abstract

Nowadays science of genetics has grown rapidly especially in the field of health. This condition makes all health care providers must be prepared to follow these developments in order to provide better service to clients. Nurses as one part of the health services, are also required to be able to apply these genetics into nursing services to their clients. But in reality, based on a survey conducted in 2013 about knowledge and readiness of nursing students and clinical nurses to genetics shows the results that their knowledge are still lacking. Therefore, it is necessary to provide effective courses to increase knowledge of nursing students and clinical nurses about genetics.

The purpose of this study is to describe the implementation of genetic course that has been given to nursing students and clinical nurses.

The study involved two groups of respondents that are comprised of a group of nursing students and clinical nurses group. Each group consisted of 30 members of the group. Each group received genetic course for 36 hours taken within 6 days. The level of knowledge about genetics is measured before and after course using a questionnaire that has been developed by Maradigue in 2005.

The results of this study showed significant changes in knowledge before and after the implementation of the course among nursing students with $p = 0,000$. Similarly, the clinical nurses group also showed significant changes in the knowledge with $p = 0.000$. However, changes in the knowledge of the two treatment groups was also significantly different, with increased knowledge of nursing students better than the improvement of knowledge clinical nurses ($p = 0.033$).

This study showed that nursing students or nurses will have better understanding about genetics if they were introduced from the beginning.

Keyword: genetics course, nursing students, clinical nurses

Introduction

Nowadays, the development of genetics in the field of nursing moving rapidly. At first the implications of genetic science in nursing start from the community nursing through maternal and child care programs. The program is done through individual, family and community (American Nurses Association, 2007). At later times genetics nursing is growing and can be compared with other specialist nursing such as and maternity nursing and pediatric nursing (Cook, 2003). Even the study of genetics is also needed in critical nursing (Howington, 2011) and malignancy (Calzone, 2004). Knowledge of genetics is becoming important in the nursing process as an impact on the delivery of health services, health services shift from diagnosis and treatment toward prevention and anticipation (International Council of Nurses, 2005).

Adequacy of this genetics in nursing practice is not supported by nurses' knowledge about genetics itself. This is caused by genetics discussion is not included in the core competencies of nursing education and nurses who are interested to explore the science of genetics is only slightly (Thompson, 2011). In general, nurses who are interested in or are conducting research related to genetics showed a very small, ie 8 of total 47 nurses who conducted the survey (Thompson, 2011). Nurses' knowledge about specific topics in the study of genetic material is still too low. In Turkey, more than 90% of nurses have inadequate knowledge about genetics (Tomatir, 2006). Preliminary studies conducted in clinical nurses and nursing students in Semarang in 2013 which then also shows the lack of knowledge about the genetics of this in nursing.

Various basic knowledge of genetics is needed and should be controlled by the nurses include genetics referral indications, basic knowledge of human genetics, social issues and ethics in genetics, identification of sources of information are reliable, the psychological impact of genetics, genetic evaluation and counseling, relevance genetics is practice, awareness of the latest genetic developments, cultural diversity and awareness of the values and behaviors of self. Based on these needs, then comes the recommendation of nursing geneticists to include these studies in the

nursing curriculum (Jenkins, 2001). Based on the conditions it is essential to study the genetics for nurses is about to begin.

Nursing profession is a profession that is very close to the patient. Over 24 hours nurses are near the patient to carry out nursing care. With the development of various discoveries in the field of medical genetics, requires nurses to be able to integrate knowledge of genetics in the execution of their daily duties. Nurses are expected to know exactly how the relationship between the occurrence of a genetic disease, which in turn can clearly identify the state of the client and present it to the client (Jenkins, 2001). It may not be possible if the nurse does not begin to equip themselves with sufficient knowledge of genetics. If this requirement is not immediately recognized by the nursing learners, it is not impossible that the nurse will be missed by other health professionals in the 21st century (Jenkins, 2001)

Various ways can be done to improve nurses' knowledge about genetics. Basic topics in genetics that covers the basics of biology in genetic diversity and technological aspects in the assessment of the diversity of bacteria and viruses can be studied as studying microbiology (Grossel MJ, 2011). Another way that can support the learning process of genetics for nurses include skills-based training, the use of clinical scenarios, as well as the importance of assessment (Burke S, 2006). Assignment of making portfolios for students also can enhance the ability of self-reflection (S Buckley, 2009).

Learning model with common method implemented courses for students and nurses in adding science and knowledge they need. One of the methods used in the course are lectures, discussions and question and answer that is often referred to as traditional learning methods. Implementation of the learning model with lectures on the topic of genetics clinical nursing students and nurses provide an overview of how successful this method to improve the knowledge of genetics for students and clinical nurses.

In connection with the background described above, this study aims to determine the implementation of genetics to traditional methods of training for nursing students and clinical nurses.

Theoretical Framework

Genetic nursing is a nursing specialty that focuses on genetic health services to patients. Integration of genetics into nursing began in the 1980s despite the slow but important process in improving the quality of healthcare for patients who receive treatment based on the genetic and genomic nursing. In the United Kingdom and the United States set a series of critically important competencies as a set of guidelines for a nurse. Through a consensus process essential competencies created by the committee, and provide minimal competence and scope of practice for nurses who provide health care services to patients genetically. Nursing Code of Ethics and organizations dealing with the problem are also established in the field of genetics nursing to provide rules and guidelines when developing ethical issues.

Genetic and genomic competencies is essential to good nursing practice related to academic study, clinical practice, role, or even specializes in service. Competence is a significant component that required a set of guidelines for nursing personnel in understanding genetics. To initiate the development of competence, the initial strategy of the US National Human Genome Research Institute (NHGRI) and the National Cancer Institute (NCI) of the National Institutes of Health (NIH) is formed Steering Committee. The Steering Committee is composed of nurse leaders from various professional nursing organizations, education, and organization. The basic function of this committee is to produce a mechanism for determining competency to identify, analyze, and compare the existing competence.

Achievement of competence can be done through structured steps in both the formal and informal learning processes. One method that is often used to increase the knowledge is through training. Lecture learning model is the traditional way of learning is used as a means to convey information orally or given subject (Roestyah, 2001). Someone who knows better role as a transmitter of information and other people who do not know the role as receiver of information. Both sides are usually at the same place during this lecture takes place. Reciprocal communication both parties might be able to happen but more dominated by the messenger.

The goal of the lecture is usually a learning model study participants with a large amount. Limitation of large numbers here when participants learned to reach

more than 15 people (Notoatmojo, 2007). The learning process carried out in a room that is usually referred to as a class. Or class room is a room that is large enough to accommodate the number of participants can learn at a time. In the implementation of learning lecture method requires various teaching aids, such as short papers, slides, transparent and sound system (Notoatmojo, 2007). In today's modern era of learning media is used more varied and high-tech, such as the use of video, computer and LCD. Assistive devices as mentioned above, is a tool to convey information or messages to be conveyed by messenger to the message recipient. In addition to messenger tool, study participants also require other infrastructure that support the learning process, such as tables and chairs to sit.

Learning methods lectures, discussions and question and answer proven to increase participants' knowledge of learning. In the previous studies that apply the lecture method and the use of health education leaflets about drug use itself is proven to increase the knowledge of the respondents (Supardi, 2002). Similar results were obtained in studies on the application of the lecture method in health education activities on HIV AIDS at SMAN 4 South Tangerang. Students' knowledge increased significantly after receiving health education on HIV AIDS (Saputra, 2011). Along with both of the above results is the research conducted in Texas in 2010 ago. Traditional teaching methods (lectures, discussions, question and answer in the class) more effective in improving student knowledge with a high level of learning ability compared with active learning methods (active learning). Meanwhile, for students with low skill levels are even more effective learning with learning active method compared with traditional methods (Weltman, 2010)

Materials and Methods

Design

This study used a descriptive research design with cross sectional approach. This approach allows the researcher describes the initial knowledge of nursing students and clinical nurses as respondents before training and after training genetics. In addition it can also increase knowledge known differences between nursing students and clinical nurses who have been trained.

Sample

Respondents who are involved in this study consisted of two treatment groups. The first group is a group of nursing students. Nursing students were involved as respondents are all students of Nursing Science Faculty of Medicine, Diponegoro University, amounting to 30 people. To obtain the respondents in this study the researchers invited the participation of students through training registration opening with quota restrictions. Students who are interested to become participants enrolled through the committee. Students who enroll then selected based on predefined inclusion criteria. Criteria for inclusion in this study include (1) Noted as an active student in Nursing Science Faculty of Medicine Diponegoro University in 2014, (2) Willing to participate in training for 6 consecutive days without interruption, (3) There are never received training prior genetics. After the selection of the applicants training, then assigned 30 students who qualify for genetics training.

The second group is the group of respondents who nurse clinic. Nurses involved in this study were nurses who served in the hospital clinical services and community health centers rose. The respondents of this study consisted of 26 nurses from the hospital and 4 nurses from health centers, bringing the total respondents in this group were 30. Inclusion criteria for this group of respondents is (1) Noted as a nurse in one of the health care center, (2) formally assigned by the sending institution, (3) Following a series of training without interruption, (4) Have not been previously trained genetics.

Instrument

This study uses a research instrument questionair. Questionair is used to determine the level of knowledge about the topic of genetics prior to training and after training. The instrument used in this study is an instrument adopted and adapted from "The Genetic Needs Assessment Survey" of Maradiegue et.al. (2005) to make use permit. The survey consisted of 59 questions in the form of stuffing, as well as answer choices appropriate to the circumstances of the respondents. The questions are broken down into three questions about the sociodemographic characteristics of the respondents, 44 questions about respondents 'knowledge of concepts in genetics,

6 questions about the respondents' comfort genetics, and 6 questions about the form of learning activities that can be related to genetics.

Interventions were given to both groups of respondents genetic form of training carried out within 40 hours. Topics given in the training include Fundamentals of molecular biology, research in genetics, molecular genetics and cytogenetics, interpretation and recurrent risk, genetic counseling, clinical management, Ethical, Legal and Social Implications (ELSI).

Data collection

Knowledge is measured by the questionnaire respondents knowledge twice: before and after training. In an effort to gain knowledge of data valid respondents, the researchers urge that all respondents fill in the questionnaire statement honestly according to her condition, and the contents were not working together. In this questionnaire respondents were given a maximum of 15 minutes, and the implementation of all respondents can complete the questionnaire less than 15 minutes.

Genetics training interventions conducted with traditional learning methods, ie all material delivered by lecture, discussion and question and answer. As a training guide, the researchers have prepared a set of training materials in the form of a book that contains all the topics in the training. However, participants are encouraged to enrich the training remains a source of knowledge through various other learning resource.

Ethical Consideration

Researchers propose ethical clearance to the hospital ethics committee Dr. Kariadi- Faculty of Medicine Diponegoro University before starting the study. After obtaining approval from the ethics committee, then immediately begin data collection. Informed consent was also made to each of the respondents involved in this research. Each respondent to get an explanation about the picture of the research conducted, given the form of participation as well as gains and losses when they are involved in this research. After respondents understand what has been delivered by the researcher, the respondents were asked to sign a willingness to engage in a

research format. The involvement of the respondents in this study is voluntary and without coercion from any party. The data obtained from this study only used for research purposes.

Data Analysis

The data obtained from respondents in the form of the value of the level of knowledge about the topic of genetics before and after training. This data group respondents distinguished between groups of nursing students and clinical nurses group. The data obtained from the respondents viewed one by one to ensure that all statements contained in the questionnaires filled completely. In this process the consistency of the answers are also considered. Once the data is certainly complete, the next step is done coding. In this step the answers given were coded with numbers to simplify and speed up the data entry process.

The next process in the analysis of this data is the test to determine the normality of the data distribution with kolmogorof Smirnov test. From this test it is known that all of the data, both groups of respondents, the data knowledge of nursing students and clinical nurses are both normally distributed. The next step is testing the difference in the level of knowledge before and after training in each group. Statistical tests performed in this study was to test Paired sample t test with a significance value of $P < 0.05$. Analysis of these data also continued to test the level of knowledge the difference between the group of nursing students and clinical nurses group. For this purpose the statistical analysis performed using independent sample t test with a significance value of $P < 0.05$.

Results

The data obtained in this study is shown in table 1 and table 2.

Table 1. Everage value of respondents before and after finished genetic course (n=60)

	Before	After	P value	n
Nursing students	96.5667	171.4000	0.000	30
Clinical nurses	82.6429	143.6071	0.000	30

The average value of knowledge respondents group consisting of nursing students was 96.5667 before training and after training was 171.4000 (Table. 1). While the average value of knowledge of the respondent group consisting of clinic nurses before training was 82.6429 and after training was 143.6071 (Table 1). The level of knowledge about the topic of genetics nursing students before and after training were significantly different with $p = 0.000$ (Table 1). Similar results were also shown by a clinical nurse respondent group with $p = 0.000$ (Table 1). Both of these results indicate that $p < 0.05$, so it can be concluded that genetics training is effective for improving knowledge of both nursing students and clinical nurses.

Table 2. Comparison value of knowledge between nursing students and clinical nurses after finished genetic course (n=60)

	Average value	Std. Deviation	N	P value
Nursing students	74.83	25.804	30	0.033
Clinical nuseses	61.81	18.478	30	

Furthermore, changes in knowledge between respondent groups of nursing students and clinical nurses was compared. From the results of this comparison showed that there were significant differences between the two groups with $p = 0.033$. This value shows that the increase in knowledge before and after training experienced by nursing students better than the clinical nurses (Table 2).

Discussion

Average respondent nursing students' prior knowledge about the topic of genetics at the level that was low with an average value is 96.5667. During the study in nursing, the students have not received the material on genetics as required in the inclusion criteria. Thus, the student's initial knowledge acquired during their education at upper secondary school level. However, the initial value is still higher when compared with the average value of a clinical nurse before training, which is an average 82.6429. In the last decade is the low level of knowledge of nurses on genetics topics is still going on in various parts of the world, as was the case in Korea (Kim, 2003), Turkey (Tomatir, 2006), Jordan (Gharaibeh, 2010), Italy (Godino ,

2013), and could be a similar thing happens in many other countries. Even nurses who often encounter cases of health problems are closely related to genetics though often unaware of the huge role of genetics in the occurrence of health problems. Such as the high incidence of hemoglobinopathies carrier as the cause of thalassemia in Turkey are implementing some people marriage with close family (Tomatir, 2006).

Lack of knowledge of nursing students and clinical nurses amid topic due to many factors. One of them is due to the inclusion of a discussion of genetics is not yet into the nursing curriculum as it should (Kim, 2003). Another factor is that because of the nurses themselves perceived that the discussion of genetics in health care is the duty of other professions (Gharaibeh, 2010) and nurses do not have a role in it (Godino, 2013). Slightly different conditions occur in countries that have been introduced in the genetic learning process for prospective nurses and nurse clinics. As in Taiwan, 66% of the total number of nurses who filled out a questionnaire survey of nurses' knowledge about genetics, have mastered the basics of genetics as genotype, cancer genetics, and genetic terms. Even so it was only a nurse who knows the truth about Mendelian Inheritance is also the basis of genetics (Lee, 2012).

In this study illustrated that increased knowledge of nursing students and clinical nurses about genetics topic after training can be increased significantly. In Korea the doctors and other health workers who followed the genetic counseling training for 3 days showed significant changes in knowledge between before and after training. Likewise, the level of awareness and confidence on the implementation of genetic counseling also increased significantly. The doctors and other participants in the training are just a few years of work can show good test results. Previous educational experience is associated with increased confidence and skills counseling (Lee J, 2013). After training, primary health care providers also showed an increase in knowledge and self-confidence and realize that the competencies required of genetics in primary health care (Carroll, 2009). Studies that have been conducted by Tomatir, 2006 shows that the genetic learning resources by nurses can be done through a variety of sources. Learning resources is the most widely used books (n = 43). Followed is the training organized by the school or college (n = 40).

Genetic learning for nursing students and clinical nurses need to be designed in a more structured and focused. One of the recommendations that should be considered is to integrate genetic material into the nursing curriculum so that it becomes an intrinsic part of the nursing services (Godino, 2012). Other recommendations that can be used to increase nurses' knowledge about the topic of genetics is through the following steps: (1) add a discussion of genetics and genomic existing learning, (2) Integrate some exam questions and the questions relating to genetics and genomic in the eyes of existing teaching, (3) Incorporate genetics achievement in each of the learning objectives on an existing lesson, (4) Creating a new curriculum that focuses on genetic and genomic, (5) Making genetics as one of the elective subjects, (6) In collaboration with colleagues from various other disciplines to develop curriculum and learning strategies (Consensus panel, 2006)

Conclusion

Implementation of proven genetics training can effectively improve the knowledge of nursing students and clinical nurses about genetics. Students show increase in knowledge about the genetics better than the clinic nurse. Forward genetics lesson plan needs to be made more structured both for students and clinical nurses. Therefore, the earlier study of genetics is introduced to prospective nurses then the result will be even better.

References

1. American Nurses Association (ANA) and International Society of Nurses in Genetics (ISONG). Genetics/Genomics Nursing: Scope and standards of Practice. Maryland, Nursesbook.Org. 2007
2. Buckley S, Coleman J, Davidson I, Khan K S, Zamora J, Malick S, et al. The educational effects of portfolios on undergraduate student learning: a best evidence medical education (BEME) systematic review. BEME Guide No. 11. Med Teach. 2009; 31(4):282-98
3. Burke S, Kirk M. Genetics education in the nursing profession: literature review. J Adv Nurs. 2006; 54(2):228-37

4. Calzone K A, Masny A. Genetics and Oncology Nursing. *Seminars in Oncology Nursing*, Vol 20, No 3 (August), 2004: pp 178-185
5. Carroll J C, Rdeout A L, Wilson B J, Blaine S M, Epslen M J, Farrell S A, et al. Genetic education for primary care providers: improving attitudes, knowledge and confidence. *Can Fam Physician*. 2009;55(12):e92-9.
6. Consensus panel. Essentials of genetic and genomic nursing: competencies, curricula guidelines, and outcome indicators 2nd edition. American Nurses Association, Maryland: 2006
7. Cook SS. Deconstructing DNA: Understanding genetic implications on nursing care. Association of Women's Health, Obstetric and Neonatal Nurses. 2003; 7(2): 140-144.
8. Gharaibeh H, Oweis A, Hamad K H. Nurses' and midwives' knowledge and perceptions of their role in genetic teaching. *Int Nurs Rev*. 2010 Dec;57(4):435-42.
9. Godino L, Skirton H. A systematic review of nurses' knowledge of genetics. *Journal of Nursing Education and Practice*, August 2012, Vol. 2, No. 3
10. Godino L, Turchetti D, Skirton H. Genetic counseling: a survey to explore knowledge and attitudes of Italian nurses and midwives. *Nurs Health Sci*. 2013 Mar;15(1):15-21.
11. Grossel M J. Can genetics and genomics nursing competencies be successfully taught in a prenursing microbiology course?. *CBE Life Sci Educ*. 2011 Summer, 10(2): 216-221
12. Howington L, Riddlesperger K, Cheek D J. Essential Nursing Competencies for Genetics and Genomics: Implications for Critical Care. *Critical Care Nurse*. 2011;31(5):e1-e7
13. Jenkins J, Prows C, Dimond E, Monsen R, Williams J. Recommendations for educating nurses in genetics. *J Prof Nurs*. 2001: 17(6):283-90
14. Jenkins, J., Dimond, E., & Steinberg, S. (2001). Preparing for the future through genetics nursing education. *Journal of Nursing Scholarship*, 33, 191-195, 33, 191-195.
15. Kim M Y. The Nurses' Knowledge and Perception of Their Role in Genetics. *Journal of Korean Academy of Nursing*. 2003: 33; 8

16. Lee J, Cho H J, Yoo H W, Park S K, Yang J J, Kim S W, et.al. The effects of a genetic counseling educational program on hereditary breast cancer for Korean healthcare provoders. *J Breast Cancer*. 2013; 16(3):335-341
17. Lee T Y, Sung L W, Hsu S S, Liaw J J. A Pilot Study on Genetic Knowledge of Maternity and Pediatric Nurses. *J Med Sci* 2012;32(3):109-119
18. Maradiegue, A., Edwards, Q.T., Seibert, D., Macri, C., Sitzer, L., 2005. Knowledge, perceptions, and attitudes of advanced practice nursing students regarding medical genetics. *Journal of the American Academy of Nurse Practitioners* 17, 472–479
19. Notoatmojo, S., 2007., *Kesehatan masyarakat ilmu dan seni.*, Jakarta: Rineka Cipta
20. Roestyah., 2001., *Strategi belajar mengajar .*, Jakarta: Rineka Cipta
21. Saputra, N., 2011., *Perbedaan pengaruh pendidikan kesehatan HIV AIDS dengan metode curah pendapat dan ceramah menggunakan media audio visual terhadap pengetahuan SMA 4 Tangerang Selatan.*, [skripsi]., tidak dipublikasi
22. Supardi, S., Sampurno, O.D., Notosiswoyo, M., 2002., *Pengaruh metode ceramah dan media leaflet terhadap perilaku pengobatan sendiri yang sesuai dengan aturan.*, *Bul. Penel. Kes.*, 30(3): 128-38
23. Thompson H J, Brooks M V. Genetics and genomics in nursing: Evaluating Essentials implementation. *Nurse Education Today* 31 (2011) 623–627
24. Tomatir A G, Sorkun A C, Demirhan H, Akdag B. Nurses' Professed Knowledge of Genetics and Genetic Counseling. *Tohoku J. Exp. Med.*, 2006, 210: 321-332
25. Tomatir A G, Sorkun H C, Demirhan H, Akdag B. Nurses' professed knowledge of genetics and genetic counseling. *J. Exp. Med.* 2006. 210:321-332
26. Weltman, D., Whiteside, M., 2010., *Comparing the effectiveness of traditional and active learning methods in business statistic: convergence to the mean.*, *Journal of Statistic Education.*, 18(1)