Nurse Education Today 44 (2016) 86–91

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/nedt

Review

Increasing importance of genetics in nursing☆

Deborah Jacks Camak

Dishman Department of Nursing, Lamar University, 4400 MLK Blvd, P.O. Box 10009, Beaumont, TX 77710, United States

ARTICLE INFO

Article history:
Received 26 February 2016
Accepted 20 May 2016
Available online xxxx

Keywords:
Genetic education
Nursing and genetics
Human Genome Project
Genetics in nursing education
Genetic counseling
Advocacy and genetic disorders

ABSTRACT

Objectives: To examine the empirical literature related to the incorporation of genetic research and genetic competency needed by the nurse in practice.
Design: Literature review.
Data Sources: This article will explore published research within the past seven years of 2008–2015 that address the need for the increased incorporation of genetic content in nursing practice in addition to the need for the nurse to effectively screen the patient at risk of a genetic disorder. This literature review specifically focuses on the inadequacy of nurses in addressing genomic health compromise and serving as advocates for patients and families facing genetic disorders.
Methods: A review of the literature published from 2008 to 2015 related to the incorporation of genetics in nursing practice and the role of the nurse as a patient advocate for families facing genetic disorders with resulting genomic health compromise.
Results: The research exposes the lack of adequate preparation of nurses to incorporate and utilize the recent advances in genomic healthcare. Practicing nurses lack understating and skill in the application of genetics and genomic technologies to patient care. The nursing profession, including nursing academia, need to enhance the integration of genetic and genomic content into nursing curriculum and practice.
Conclusion: Practicing nurses are inadequately prepared to apply genetic advancements in screening at risk patients and addressing the needs of the patient or family facing a genomic health compromise.

1. Introduction

In April 2003, the Human Genome Project (HGP) completed the mission of mapping the entire human genome (National Human Genome Research Institute, 2015). Led by Dr. Francis Collins, HGP was one of the most exciting and ambitious scientific projects ever attempted. The science of genetics, which fueled the Human Genome Project, actually dates back to the 1860s. Friedrich Miescher, a German medical researcher, in the 1860s discovered deoxyribonucleic acid (DNA) (The Royal Society of New Zealand, n.d.).

The evolution of medicine, led by the discoveries of DNA and genetic inheritance, has transformed health care and all biological science and altered how medical care is viewed. Currently, genetic research, which began less than 200 years ago, is changing the very landscape of health care world-wide leading to; new roles for nurses, the integration of genetics into pharmacotherapeutics, the integration of genetics and genomics into the treatment guidelines for many diseases and disorders, and has been the catalyst for the development of essential genetic and genomic competencies needed by all nurses (Calzone and Jenkins, 2011). Even though, the role of genetics within healthcare is still in its infancy, the information provided by the mapping of the human genome has resulted in overwhelming changes in medical care and a new responsibility for all nurses to be knowledgeable in regards to genomic health disorders.

According to Howington et al. (2011), genetics addresses the association between the genetic mutation and the disorder whereas, genomics addresses how the genetic mutation is expressed and the severity of expression with the resulting impact upon the individual's health. As the largest profession in the medical field, nurses have a responsibility to be knowledgeable of genetics and genomics and incorporate changes into their nursing practice. One of the many roles of nurses is the role of patient advocacy. In order to adequately facilitate advocacy for patients and families faced with a genomic health disorder, the nurse should be knowledgeable of the disorder and the physical and psychosocial issues that are consequentially related.

The American Association of Colleges of Nursing [AACN] asserts that the education of baccalaureate nurses prepares graduates to provide patient advocacy for patients and families facing genomic health compromise including the provision of genetic counseling ("Baccalaureate Nursing", 2015). In 2008, the AACN produced the *Essentials of Baccalaureate Education for Professional Nursing Practice* to delineate the outcomes expected of graduates of a baccalaureate nursing program.

☆ This is a literature review and has not received any sources of funding. The author declares that there are no conflicts of interest.
E-mail address: Deborah.camak@lamar.edu.

http://dx.doi.org/10.1016/j.nedt.2016.05.018
0260-6917/

Within *Essential IX: Baccalaureate Generalist Nursing Practice*, the AACN avows that baccalaureate nursing programs prepare graduates to, "recognize the relationship of genetics and genomics to health, prevention, screening, diagnostics, selection of treatment, and monitoring of treatment effectiveness, using a constructed pedigree from collected family history information as well as standardized symbols and terminology"(AACN, 2008). According to Anderson et al. (2015), "nurses lack genome literacy, skill, and self confidence in applying genomics to healthcare". Despite numerous demands for greater integration of genetic and genomic content in nursing education, there remains a deficit which is resulting in a lack of competency among practicing nurses addressing the needs of patients and families facing genomic health compromise. Therefore, it is important to address the inadequacy of the nursing profession to enhance genetic content within nursing education and the need for expanded preparation of nurses to become knowledgeable in translating genomic advancements into practice.

2. Methods

2.1. Aim

There is a lack of genomic literacy among nurses resulting in the inability to address the numerous issue faced by patient and families with genomic health compromise. A literature review was used as to explore the incompetency of nurses in integrating and using genomics in current practice.

2.2. Search Strategy

A literature review was conducted using the following terms: "nursing and genetics", "genetic education", "genetics in nursing education", "baccalaureate nursing and genetics", "genomics and nursing practice", "DNA", "Human Genome Project", "nursing and genetic disorders", "genetic counseling", "genetics in nursing", "advocacy and genetic disorders". The following databases were used: CINAHL, PubMED, American Association of Colleges of Nursing, NCHPEG, NCSBN, International Society of Genetic Nurses and ProQuest Nursing. A total of 39 articles published within the past seven years were retrieved with 20 published between the years of 2007 and 2015 selected for reference in this article. Of the 20 articles retrieved, 6 were research articles and 4 were published professional documents. Each article was evaluated for its contribution to the body of literature regarding the role and competency of registered nurses as patient advocates for patient and families affected by a genetic disorder. In the final count, 20 articles, 6 research studies, 4 professional documents and 10 information articles or reports were selected for inclusion.

2.3. Inclusion Criteria

1. Type of participants: practicing nurses, nursing professional organizations, nursing educators, nursing professional societies related to genetics, surveys of nurses treating patients and families affected by genomic based health issue.
2. Outcome data: educational needs and preparation of nurses to address the needs of patients and families affected by genomic disorders, competency of nurses to address and advocate for families affected by genomic disorders.
3. Publication language and date: published in English from 2007 to 2015.
4. Type of research: systematic reviews, longitudinal studies, mixed methods systematic review, interviews, screening tools, reports, information articles and professional documents.

2.4. Exclusion Criteria

Research that addressed: articles addressing genetic health disorders, legal and ethical articles related to genetics, and articles addressing gene based treatments.

3. Results

The contributions of the selected professional documents, reports, research studies, literature and systematic reviews are listed in Tables 1–3. The professional documents exposed the competency needs of nurses currently in practice, in addition to the importance of incorporating genetic content into the nursing curriculum. A theme that emerged from the literature was the lack of genetic and genomic literacy among nurses and the need to address this incompetence through further education with an emphasis upon augmenting genetic and genomic content within the nursing curriculum.

3.1. Core Competencies for Nurses

The role of nurses practicing today involves appropriate identification of patients at risk, interdisciplinary collaborative treatment and patient advocacy; yet with the evolution within medicine based in the discoveries in genetic research, the responsibilities of nurses involving patient advocacy have been revised. The AACN (2008) recognizing the impact of genetic discoveries upon the role of nurses added the expected outcome of graduates of baccalaureate nursing programs to be able to construct and utilize a genetic pedigree toward the development of a plan of care, patient education and potential genetic counseling

Table 1
Professional documents presenting core competencies required of registered nurses regarding genetics and genomics.

Author, year	Report title	Competency required
American Association of Colleges for Nursing (2008)	The essentials of baccalaureate education	Recognize the relationship of genetics and genomics to health, prevention, screening, diagnostics, selection of treatment, and monitoring of treatment effectiveness, using a constructed pedigree from collected family history information as well as standardized symbols and terminology.
American Association of Colleges of Nursing (2009)	The essentials of baccalaureate education for professional nursing practice faculty tool kit	Use a constructed genetic pedigree from collected family history information to identify a risk profile and develop a plan of care, including patient education and referral.
National Coalition for Health Professional Education in Genetics [NCHPEG] (2007)	Core competencies in genetics for health professionals.	At a minimum, each health-care professional should be able to: identify areas where professional development in genetic and genomic content is needed, understand health related genetic information and the impact upon the individual and family, know how and when to make a referral to a genetic professional.
National Council of State Boards of Nursing [NCSBN] (2013)	NCLEX-RN detailed test plan, 2013	Only evaluates nurses screening for genetic disorders and gathering a health history.