The Importance of Genetics Education for Undergraduate and Graduate Nursing Programs

Recently, a faculty member (and nurse practitioner colleague) stated that she attended a genetic learning institute to "learn the language of genetics." She was finding that critically evaluating and clinically applying information from journal articles in her specialty area was becoming increasingly difficult without basic knowledge of genetic terms, such as risk allele and genetic expression. We nurses can appreciate her dilemma as we try to update our own genetic vocabulary and concepts. For example, nurses who teach or practice in the area of cardiovascular disease, diabetes, or cancer have seen tremendous expansion in the literature related to genetic risk prediction and disease management.

In the past 15 years, a compelling case has been made for expanding genetics and genomics information and its potential affect on clinical practice. These findings indicate that changes in nursing curricula were needed to enhance the genetic competencies of the nursing workforce. In this issue of the *Journal of Nursing Education*, the article by Greco and Salveson, "Identifying Genetics and Genomics Nursing Competencies Common Among Published Recommendations", provides an excellent synthesis of recommendations of key genetic competencies for nurses from the past 10 years. General acknowledgment of the acceptance of these key competencies by nursing faculty has resulted in their integration into three (essentials I, VII, IX) of the nine AACN Essentials of Baccalaureate Education (American Association of Colleges of Nursing, 2008).

Several factors have been important in influencing the expansion of genetics and genomics competencies into nursing curricula, including the changing concept of genetics. Twenty years ago, we thought of genetics in terms of single-gene disorders, such as cystic fibrosis and sickle cell disease, which were inherited in known patterns (i.e., autosomal recessive, autosomal dominant, sex-linked). This genetic knowledge was most applicable to nurses practicing in the areas of pediatrics and women’s health. That has changed. Now, genetics and genomics have a broader application because they are being applied to individuals with common, chronic diseases such as diabetes, cardiovascular disease, and cancer. When we think of genomics, we now think of how multiple genes interact with our environment to produce a phenotype or clinical conditions such as Type 2 diabetes. But is this any different from what nursing has always done? Historically, nursing has recognized the importance of environmental influences, such as diet and activity, when managing patient care.

Another factor encouraging integration of genetics and genomics study into curricula is the increase in the number and types of genetic tests available and their potential application in pharmacogenomics and personalized health care (i.e., the right treatment for the right person at the right time). Hundreds of genetic tests are available that can be used to identify and diagnose at-risk groups or guide treatment for more than 1,650 diseases (a 275% increase in the number of testable diseases in the past 10 years). The emergence of direct-to-consumer availability of genetic tests is another related factor. Companies such as 23andMe (https://www.23andme.com) and deCODE genetics™ (http://www.decode.com) offer personalized genome-wide screening by analyzing thousands of single-gene nuclear polymorphisms to determine an individual’s genetic risk for disease through services that can be purchased online.

Although controversial, direct marketing has increased the public’s ability to learn about their genetic makeup. The success of online genetic testing sites indicates that individuals are curious about their genetic profile and creates a group of health care consumers who are more aware of current genetic tests and their applications. However, the validity and clinical relevance of the information, how individuals will use it, and how it will affect health care is still unknown. Nurses need to be knowledgeable and prepared to provide education that meets the genetics and genomics educational needs of clients.

I would be remiss if I did not acknowledge that, although genetics and genomics has been touted as having great potential, the development of actual clinical applications for individuals or populations is just beginning and therefore, has been minimal. Gene variants associated
with common diseases such as diabetes and cardiovascular disease have been identified, yet, in most cases, these variants provide little—if any—information about risk beyond the traditional risk indicators (e.g., body mass index and blood glucose levels). To date, the primary usefulness of genomic research has been to elucidate the underlying biology of disease, which can then be translated into new therapeutics. In the area of oncology, health care providers and consumers are seeing the greatest benefits as genetic applications are being used to determine an individual’s responsiveness to cancer therapies, such as chemotherapy. These applications are continuing to be developed for other conditions.

Nursing is fortunate because its early innovators recognized the need to incorporate genetics and genomics education into nursing curricula. Because of key programs, such as the Genetics Program for Nursing Faculty at the Cincinnati Children’s Hospital Medical Center and the Summer Genetic Institute at the National Institute of Nursing Research at the National Institutes of Health, the nursing profession has a cohort of faculty who have been incorporating genetics and genomics content into curricula for more than 10 years. However, many challenges remain and continued funding and support to offer these and other programs to faculty is needed.

As genetics and genomics knowledge continues to expand, we need an informed workforce who not only understands basic genetic concepts and therapeutics, but who can also provide patient education and make genetic referrals when appropriate. The successful incorporation of genetics and genomics in health care also necessitates an ability to work within an interprofessional team (i.e., genetic counselors, physicians, other providers). There are still many issues and implications of the translation of personalized health care to practice, but nursing is providing leadership in this area as we educate our students to meet the new genetics and genomics competencies.

Reference

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