

# Genomics Education

## Knowledge of nurses across the profession and integration into practice

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**BACKGROUND:** Since the completion of the Human Genome Project in 2003, the implications of genetics and genomics for health and illness have become clearer. All nurses, at all levels and across all specialties, must have a basic understanding of genetics and genomics to provide appropriate care.

**OBJECTIVES:** This article provides an overview of the integration of genetics and genomics into nursing education, as well as continued barriers to nursing knowledge of genetics and genomics.

**METHODS:** A literature review was conducted using CINAHL®, PubMed, ProQuest, and Google Scholar. Databases were reviewed for literature published from January 1962 to November 2017.

**FINDINGS:** Although genetic and genomic education has been integrated into undergraduate and graduate nursing curricula, a gap exists in this knowledge among student nurses, practicing nurses, and nursing faculty.

### KEYWORDS

genetics; genomics; nursing; competency; education

### DIGITAL OBJECT IDENTIFIER

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**GENETICS AND GENOMICS HAVE BECOME CENTRAL TO HEALTH CARE** in all areas, specialties, and settings, particularly oncology. In addition, genetics and genomics have implications across all areas of the healthcare continuum, as well as all aspects of patient care, including assessment, prevention, screening, diagnosis, prognosis, treatment, assessment of treatment effectiveness, and drug selection (Calzone et al., 2012; Calzone & Jenkins, 2012; Pestka, Burbank, & Junglen, 2010). This integration of genetics and genomics into health care requires that healthcare providers, including nurses, become educated and competent in genomic care.

### Background

The Human Genome Project (HGP) expanded the understanding of how genomes work and caused the rapid growth of genomic technology (Daack-Hirsch et al., 2013). Started in 1990 and completed in 2003, the HGP was an international research initiative with the goal of sequencing the entire human genome (National Human Genome Research Institute [NHGRI], 2016). This project identified the 20,500 genes in each human and their chromosomal locations, as well as provided information about the complete set of human genes and suggested that the focus of genetics (the study of single-gene disorders) should include genomics (the study of how genes interact with environmental, psychosocial-behavioral, and cultural factors). In addition, it identified the human blueprint for health (NHGRI, 2016). Subsequent research has suggested that genetics and genomics provide the basis for health, illness, disease risk, and treatment response (Clark, Adamian, & Taylor, 2013). Genetics and genomics have already moved into mainstream health care, as evidenced by the development of precision medicine and the National Cancer Moonshot Initiative.

Nurses are the largest healthcare profession, with 2.8 million RNs active in 2014 and a projection of 3.8 million RNs active in 2030 (U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis, 2017). Nurses practice in all healthcare settings and continue to be rated as the most honest and ethical professionals (American Nurses Association, 2016). Therefore, nurses must be at the forefront of the integration of genetics and genomics into clinical practice; however, to this point, nurses have had limited education in genetics and genomics care.