

Core Competencies in Cancer Genetics for Advanced Practice Oncology Nurses

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Purpose/Objectives: To determine core competencies in cancer genetics for advanced practice nurses (APNs) in oncology.

Design: Survey.

Sample: Expert panel of 9 nursing educators or researchers, 9 general genetics experts, 9 genetics experts with specialties in oncology, and 10 oncology APN nurse consumers (N = 37).

Methods: Utilizing the Delphi Technique, two rounds of surveys were conducted. Round 1's survey required open-ended responses to identify skills, attitudes, and competencies specific to cancer genetics. Round 2 requested ranking of the importance of identified competencies.

Main Research Variables: Skills, attitudes, and competencies specific to cancer genetics.

Findings: Recommended genetics competencies and knowledge for oncology APNs were identified for the categories of direct caregiver (6 items), coordinator (6 items), consultant (7 items), educator (6 items), researcher (8 items), and professional attitudes (16 items).

Conclusions: Identified competencies provide a foundation and direction for development of the education curriculum recommended for all practicing oncology APNs.

Implications for Nursing: Integrating genetic concepts into clinical practice is essential. Oncology APNs must have an expanded knowledge base in genetics to enable them to incorporate advances in genetics into practice to ensure quality outcomes. Development of genetics education is crucial to ensure future competency. Research that determines the impact of such education is warranted.

Key Points . . .

- Genetics concepts must be integrated into clinical oncology practice.
- Most nurses have insufficient genetics knowledge to understand the implications for cancer care.
- Advanced practice nurses (APNs) in oncology must be able to translate genetics information to ensure future quality care.
- Identified competencies provide a foundation and direction for APN education.

of the literature and identified nine studies from 1976–1994 that support the proposition that nurses lack an adequate background in human genetics. The nursing profession has not included genetics concepts in its curriculum, which has resulted in one of the greatest challenges that the nursing community will face: Most nurses have insufficient genetics knowledge to understand the implications for their practice. A national survey conducted by Scanlon and Fibison (1995) for the American Nurses Association (ANA) revealed that the majority of nurses studied had little, if any, instruction in genetics or the unique implications of genetic information. Curriculum surveys by Hetteberg, Prows, Deets, Monsen, and Kenner (1999) similarly indicated little change in the inclusion of genetics content in the preparation of entry-level nurses over the course of 15 years. Other available resources for nurse preparation, such as continuing-education programs and nursing literature, also are limited in genetics content (Monsen & Anderson, 1999). However, a resource developed by the International Society of Nurses in Genetics, Inc. (ISONG), and ANA (1998) titled *Statement on the Scope and Standards of Genetics Clinical Nursing Practice* provides descriptions of human genetics and the role and standards of

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Genetics has moved into the forefront of health care, secondary to the discoveries generated by the Human Genome Project and other research efforts. This rapidly expanding wealth of genetic information has clinical implications that span the entire healthcare continuum, including cancer care. Cancer genetic information improves understanding about the biology of specific malignancies, helps to identify at-risk individuals, furthers the ability to characterize malignancies, establishes treatment tailored to the genetic features of the disease, and leads to the development of new therapeutic modalities. This genomic foundation of medical practice is anticipated to change the activities and functions of health care, including the care that nurses provide (Porter-O'Grady, 2001).

In general, nurses are unprepared to integrate this genomic foundation into practice. Anderson (1996) conducted a search

nursing practice in genetics and further delineates the scope of genetics clinical nursing practice. This document provides a starting point for the development of nursing education programs that offer genetics competence (ISONG & ANA).

Specialty practice nurses (e.g., oncology nurses) have reported limited knowledge about genetics and the implications of genetics for cancer care. In their study, Peterson, Rieger, Marani, deMoor, and Gritz (2001) evaluated oncology nurses' knowledge of cancer genetics and how cancer genetics is integrated into current practice. Higher knowledge scores across all categories (i.e., basic genetics, cancer biology, cancer genetics, and cell biology) were significantly associated with higher levels of nursing education, cancer genetics practice areas, and completion of genetics continuing education (except for cell biology). The oncology nurses surveyed viewed cancer genetics education as important and identified areas of knowledge deficits that indicated content areas to develop and target in specialty training for oncology nurses. Peterson et al. reported that nurses in advanced practice positions most likely provide genetics-related advanced practice nurse (APN) care, as well as consultation to other nurses. This research indicates that APNs in cancer genetics practices have greater genetics knowledge than basic prepared nurses. Whether general oncology APNs are sufficiently knowledgeable to provide leadership to other oncology nurses to assess, recognize, treat, or refer patients for genetics services has not been determined. The primary purpose of the current study was to determine the competencies expected of all practicing oncology APNs in the field of cancer genetics.

Background

To begin to address the concern that nurses are unprepared to integrate a genomic foundation into nursing practice, the National Human Genome Research Institute and the University of Pennsylvania Cancer Center sponsored a workshop in September 1995 for nurses about genetics education in nursing. Representatives from professional nursing specialty organizations convened to make recommendations regarding genetic discoveries and the impact of these discoveries on nursing practice and education. The workshop primarily focused on the assessment of the current state of nursing genetics knowledge and solicited ideas for various methods to develop a coordinated genetics educational effort for the nursing community. The primary recommendation from this workshop was a call for a core curriculum in genetics for practicing nurses. As a result, research was conducted to establish recommendations for curriculum content, including genetics, in the education of all nurses (Jenkins, Dimond, & Steinberg, 2001; Jenkins, Prows, Dimond, Monsen, & Williams, 2001). Tailoring this general content to specialty oncology nurses had not occurred at the time of the current study. Based on the core curriculum for all nurses, the University of Pennsylvania Cancer Center and the National Cancer Institute Genetics Branch at Navy designed a research project to establish a subspecialty core curriculum in cancer genetics for oncology APNs.

Study Purpose

The ultimate goal of this research was to develop a core curriculum in cancer genetics for oncology APNs. Competency-based education derives curricula from an analysis of a

potential role (Lenburg, 1999). Excellence is determined by progress on the basis of demonstrated performance in some or all aspects of the identified role. Competency-based education is outcomes-based and describes what learners must retain to demonstrate competency (Redman, Lenburg, & Hinton-Walker, 1999). Indicators that define these competencies and the most effective ways to achieve the practice-based competency outcomes will guide future curriculum development for cancer genetics.

This article reports on the first phase of this initiative (i.e., the establishment of the competencies in cancer genetics expected of APNs in practice). The focus of this study was not nurses with advanced training in genetics, but rather general oncology APNs. Based on the results of this study, phase two will determine the knowledge APNs must possess to demonstrate performance indicative of the required competency. A literature review found that no studies specifically examined the required competencies of oncology APNs regarding genetics. This lack of data motivated the current study's researchers to conduct a Delphi survey of genetics nurse experts and potential consumers of oncology genetics education.

Methods

The Delphi Technique was used to enhance the existing basic genetics competency material and target it toward oncology nursing practice. This technique is a mechanism of consensus-building that recruits a panel of experts in the specific field of study to respond to repeated questionnaires that build on the responses from a prior round until consensus is reached. This form of consensus-building enhances communication between different groups and facilitates thoughtful, honest responses to questions that are not subject to peer judgment. The approach is financially less expensive than a group meeting and avoids the bias that can result from meeting in person (Linstone & Turhoff, 1975). Ideally, a meeting of an expert panel allows for further refinement of the competencies that must be included in the oncology APN role. However, this flexible and inexpensive approach initially was used by the project team to develop a list of topics to form the basis for further investigation.

In this study, panel members were required to sign a consent form before participation. Panel members were asked to respond anonymously to a series of targeted questions in mailed surveys that then were submitted to the investigators for tabulation. Because a template existed in the form of the nurse generalist core curriculum in genetics from which to build the initial survey tool, the design for this study employed only two rounds. Results from each panel member were combined and collated by the investigators, and the entire panel's response set was forwarded to the expert panel to review, refine, and rank. Nonresponders to the mailed surveys were called to enhance the survey response rate. The process continued until consensus was achieved in the expert panel (Williams & Webb, 1994). These competencies of practicing oncology APNs were determined as important in achieving quality care in genetics, anticipating the fusion of genetic cancer care with general oncology services.

Sample

The expert panel consisted of nurses from four primary groups: 9 nursing educators or researchers, 9 general genetics

experts, 9 genetics experts with specialties in oncology, and 10 oncology APN nurse consumers. Members were selected based on the type and breadth of their professional experiences to meet the goal of including nurses with expertise in clinical practice, coordination, nursing research, education, administration, and health policy. Group members also were selected based on their clinical specialty, when applicable, as well as their geographic representation. The panel included members of ISONG, the Cancer Genetics Special Interest Group of the Oncology Nursing Society (ONS), and other genetic and academic experts. Nine group members (25%) were nurses who participated in the first basic core curriculum development meeting and the ONS Think Tank on Cancer Genetics held November 22–24, 1996. In addition, a group of oncology APN nurse consumers was included in the project. The consumer participants were graduates of the University of Pennsylvania's School of Nursing oncology APN degree program. They were selected to represent novices in genetics, thereby including those experienced in all aspects of oncology nursing care.

Delphi questionnaire measurements: The curriculum development process had two goals: to establish the skills and competencies in cancer genetics expected of practicing oncology APNs and, based on the skills and competencies, to determine the knowledge that practicing oncology APNs need to possess to demonstrate competency. This article addresses the first goal only. The Delphi questionnaires were designed as independent, self-contained tools that built on existing materials of the role of the nurse, which were established at the ONS Think Tank on Cancer Genetics (ONS, 2000). Participants in the Think Tank conceptualized the role of the oncology nurse incorporating genetics into practice at three different levels: general oncology nursing, the oncology APN, and the oncology APN with a genetics subspecialty. Each role level builds on the knowledge and expertise of the previous level. The major domains of competency established for the curriculum development process included direct caregiver, coordinator, consultant, educator, researcher, and administrator (ONS, 1990). Given the unique nature of genetic information, a final domain of competency associated with professional attitudes was included. All group members were asked to respond based on the skills, competencies, and attitudes specific to genetics and not covered in existing practice standards.

In round one, subjects received the first Delphi questionnaire accompanied by the *Standards of Advanced Practice in Oncology Nursing* (ONS, 1990). The questionnaire was divided into three parts: skills, attitudes, and other competencies. Part one contained six questions regarding the skills expected of practicing oncology APNs in the area of cancer genetics. Part two contained one question regarding the attitudes expected of practicing oncology APNs in the area of cancer genetics, and part three contained one question regarding any other areas of expected competency. The questions were open-ended, and respondents were asked to list the additional skills, attitudes, and competencies specific to cancer genetics they would expect of practicing oncology APNs.

The questionnaire in round two was a compilation of the competencies identified in round one without modification by the study investigators. This questionnaire was divided into two parts. In part one, respondents were asked to rank each competency identified on a scale of 1–4 (1 = least important,

2 = not very important, 3 = somewhat important, 4 = most important). Competencies were grouped according to the practice domains identified in the ONS standards (ONS, 1990): direct caregiver, coordinator, consultant, educator, researcher, and administrator. Knowledge items obtained in round one were organized in a similar fashion and ranked according to degree of importance on the same 1–4 scale. Part two asked the group members to further define what knowledge nurses must possess to be competent in the areas they ranked as important.

Results

The overall response rate in all four groups completing both questionnaires was 73% (n = 27). Nonresponders were equally distributed across all four groups.

Fifty-six competencies emerged. Table 1 summarizes the recommended competencies for all practicing oncology APNs as determined by the Delphi survey. Consistent with the Delphi Technique, competencies were worded precisely the way that the groups provided the information. Additionally, competencies were assigned to the practice domain designated by the expert groups. Skills were ranked according to the degree of importance assigned from highest to lowest. Only items ranked as greater than 3 (53 out of 56) are reported.

Discussion

As translation of basic cancer genetic discoveries to clinical care occurs, oncology nursing practice is affected. Because genetics is central to the understanding of the process of carcinogenesis and increasingly important to cancer therapeutics, a foundation in genetics is becoming key to the delivery of oncology nursing services across the entire cancer continuum. Patients are becoming proactive in seeking out individualized healthcare services, including cancer risk assessments, genetic counseling, and testing. The role of oncology APNs is expanding as a consequence of genetics technology and offers new opportunities for collaboration.

Genetics content and skill training must be integrated into curricula to prepare APNs to meet the needs of colleagues and patients with cancer and their families. The purpose of this study was to determine core competencies in cancer genetics for oncology APNs. This study is one of the first attempts by nurses to tailor education from an emerging scientific field of discovery to a specialty practice in oncology. The responses from the study delineate the skills and competencies for the scope of advanced nursing practice that integrate genetics into the domains of direct caregiver, coordinator, consultant, educator, researcher, and administrator. The Delphi survey findings also identify professional attitudes that are key for APNs to practice in this expanding clinical cancer genetics paradigm.

Responses to round one of the Delphi survey were extensive and comprehensive. The sheer volume of skills identified as specifically important to cancer genetics for oncology APNs was surprising. Participants identified 56 competency categories with a significant level of detail. Round two of the Delphi survey aimed to delineate those items believed to be the most important skills and competencies in genetics. Only 3 of the 56 categories were not classified as being somewhat to very important. This finding supports the Delphi Technique in forming consensus on the necessary competencies.

Table 1. Consensus of Skills in Cancer Genetics Required of Advanced Practice Oncology Nurses Already in Practice

Advanced Practice Role	Competency	\bar{X} Level of Importance
Direct caregiver	Facilitates informed decision making associated with genetic testing and/or therapeutics	3.87
	Facilitates genetic therapeutic options	3.84
	Performs a nursing assessment from a genetic perspective	3.80
	Provides support services specific to genetic issues	3.71
	Based on the genetic assessment, interprets the data and establishes a plan	3.70
	Provides genetic education about cancer genetics	3.68
Coordinator	Facilitates health promotion behaviors associated with genetic conditions	3.90
	Provides supportive care associated with the delivery of genetic services	3.90
	Creates communication links between oncology and genetic healthcare providers	3.84
	Provides coordination of care associated with the delivery of genetic services	3.69
	Refers patients to appropriate cancer genetic research studies	3.47
	Participates in genetic program development and monitoring	3.22
Consultant	Provides referral and resources information on where to obtain genetic services	4.00
	Incorporates genetics into oncology nursing care	3.78
	Collaborates and consults with all members of the genetic multidisciplinary team	3.71
	Facilitates the diffusion of genetic knowledge	3.53
	Assists and serves as a mentor in the provision of cancer genetic services	3.33
	Provides expert knowledge on cancer genetics	3.30
Educator	Provides input to committees or groups establishing policies regarding genetic services	3.14
	Identifies genetic learning needs for both patients and professionals	3.94
	Utilizes appropriate adult learning principles in the delivery of complicated genetic education	3.65
	Participates in cancer genetics related professional activities	3.50
	Provides education about cancer genetics	3.34
	Plans and implements genetic focused educational activities	3.29
Researcher	Evaluates effectiveness of genetic education provided	3.17
	Modifies practice based on current genetic research findings	3.91
	Collaborates with all members of the interdisciplinary team on cancer genetic research initiatives	3.67
	Recognizes the unique features of conducting genetics research	3.54
	Promotes participation in cancer genetics research	3.42
	Serves as a mentor to other nurses regarding the research process applied to cancer genetics	3.24
Administrator	Identifies research questions in cancer genetics	3.22
	Participates in and facilitates cancer genetics research initiatives	3.18
	Participates in establishing cancer genetic research priorities	3.10
	Participates in cancer genetic program planning	3.67
	Assures the competency of the staff delivering genetic services	3.44
	Evaluates the quality of cancer genetics care and provision of cancer genetic services	3.38
Professional attitudes	Participates in cancer genetic program implementation	3.29
	Respects autonomous genetic decision making	3.96
	Handles genetic information responsibly	3.96
	Recognition that genetics impacts the family and not just the individual	3.96
	Recognizes the advanced skills required to deliver cancer genetic services	3.92
	Pursues ongoing cancer genetics education	3.91
	Recognizes the uncertainty associated with genetic information	3.88
	Aware of the unique aspects of genetic information	3.88
	Sensitive to the complex psychosocial issues associated with genetic information	3.83
	Open and positive attitude regarding new ideas and information associated with genetics	3.83
	The APN in oncology is aware of their own beliefs, biases, and capabilities.	3.81
	Willing to collaborate with all members of the genetics healthcare team	3.77
	Values and maintains a research based practice associated with genetic services	3.70
	Avoids making assumptions about genetics without research findings	3.67
	Believes the nurse has a responsibility to advocate for the patient in regards to cancer genetics	3.67
	Views critical thinking as an essential component of cancer genetics practice	3.66
	Participates in professional activities that enhance genetic nursing	3.60

APN—Advanced practice nurse

Those rated less important (i.e., scored less than 3) include (a) coordinates genetic testing, (b) resource to other professional and lay groups regarding genetics, and (c) ability to identify and prepare research-funding requests. These competencies seem more appropriate for oncology APNs with a specialty in genetics.

Study results reported in this article focus on the results of phase one of the study (i.e., core competencies). The knowledge requirements for each competency are not reported here because further development and refinement of each of the categories is needed in phase two. The core competencies identified from this study can be used as a guide for education, practice, and research.

Implications for Education

Genetics education should provide a foundation of information from which oncology APNs can comprehend personal and professional implications of scientific advances in genetics. The responses related to skills, knowledge, and required competencies in genetics can provide direction for content to include as a foundation for continuing-education and academic courses. Using the competencies as a guide, educators can design programs that tailor information to oncology APNs. A variety of methods, such as modules, slides, computer instruction, or other formats, also can be developed to provide recommended content.

An application of the core competencies was demonstrated in a cancer genetic risk-counseling training program for APNs and bachelor-prepared nurses (Masny, 2000) that was developed at the Fox Chase Cancer Center in Philadelphia, PA. Faculty involved in the curriculum development of the course were members of the ONS Think Tank on Cancer Genetics and aware of the work on the core competencies. With the current study's investigators' permission, the faculty used an unpublished list of core competencies in the course design. The faculty reviewed and selected core competencies from each aspect in the scope of nursing practice (e.g., direct caregiver, coordinator, consultant) to serve as the basis for course objectives, respective content, and evaluation measures (see Table 2). The purpose of this five-day training was to enhance nursing proficiency in identifying and counseling patients at increased risk for cancer and strengthen nurses' counseling skills in preparing patients for receipt of genetic test information with emphasis on ethical, legal, and social issues; nursing management of high-risk populations; and the future impact of genetics in cancer care. Training activities (e.g., case presentations, videos) modeled the core competencies. Additionally, participants could apply the core competencies to case reviews and presentations and in counseling surrogate patients. The course evaluation included performance ratings, and faculty gave feedback on demonstrated skills and guided nurses in preparing an action plan for competencies that required further development. This course verified the usefulness of the core competencies to design measurable objectives and recommendations for continued professional development.

Education programs will enable oncology APNs to translate genetics knowledge and skills in their own nursing practices and settings. Quality cancer healthcare outcomes are influenced directly by the ability of nurses to provide guidance, offer information, and coordinate care that integrates genetic resources.

Implications for Research

Future research should investigate the influence of genetics education on proactive approaches of oncology APNs to address ethical, legal, psychological, and social issues associated with the inclusion of genetic technology in healthcare services. Research that determines the influence of genetics education to motivate oncology APNs to identify, address, or resolve potentially negative ethical, legal, or social outcomes of genetics would be beneficial in understanding the usefulness of genetics education in ensuring quality oncology healthcare outcomes.

If standardized genetics education programs are designed based on these competencies and offered through varied methods, evaluations should be used to measure the most effective method to offer nursing education. Assessment of resources, costs, and effectiveness and efficiency of reaching desired outcomes of genetics education also would provide a standardized approach for program evaluation.

Future Plans

During the final round of the Delphi survey, the expert groups were queried about the knowledge oncology APNs would need to meet the established competencies. Preliminary data on required knowledge have been collected and collated. Future plans include bringing the expert group together to refine the competencies and add the knowledge component to the curriculum. Several areas of overlap should be discussed and condensed prior to establishing educational strategies for imparting this cancer genetics knowledge to oncology APNs. Incorporation of these competencies in the Fox Chase Cancer Center cancer genetic risk-counseling training program for nurses is ongoing.

Limitations

These study results are limited by several factors. Because the number of nurses with knowledge about genetics and implications for oncology APNs is limited, access to a larger cohort of nurses for each expert group was not possible; this may have affected study recommendations. Despite this limitation, the subset of nurses selected to be panel members was the most knowledgeable about genetics and cancer genetics; even now, experts in this practice area remain limited to a small group of nurses.

Although the Delphi Technique provides the possibility of consensus-building among diverse participants about a specific issue, it also is a time-consuming and challenging method. Round one responses may have been confusing or interpreted incorrectly by other panel members. Because the design of the round two questionnaire was based on round one responses, the tool may have affected final study outcomes. Additionally, several respondents participated in round one but not round two. Getting respondents to return data is one of the biggest problems with a Delphi study when a limited number of qualified experts must be relied on for study result integrity. Furthermore, lack of response from some of the panel experts may have further influenced the established competencies.

Conclusion

The primary purpose of this study was to determine the competencies expected of all practicing oncology APNs in regard to cancer genetics. Unfortunately, very few nurses have received genetics education in their academic preparation and,

Table 2. Course Content Designed From Selected Competencies in Cancer Genetics

Competency	Course Objective	Content	Learning Strategy	Learning Activity
Direct caregiver: Based on genetic health assessment, interprets data and establishes a plan	Nurses suggest two likely cancer syndromes based on genetic health assessment.	Review of cancer syndromes 1. Known cancer syndromes 2. Rare and more recently identified cancer syndromes 3. Physical assessment: Relevant physical findings associated with cancer syndromes Other cancers in family or medical conditions suggestive of cancer	Small group work with case studies. Each nurse is given a pedigree with associated physical findings and family history information. The nurse develops a differential diagnosis list and presents the case, summarizes key family data, and gives the most likely diagnosis with rationale. The group gives feedback.	-
Coordinator: Facilitates health promotion behaviors associated with genetic conditions	Nurses discuss risk-reduction options based on patients' cancer-risk status.	Risk-reduction options 1. Screening and early detection 2. Lifestyle changes 3. Chemoprevention 4. Prophylactic surgery for following cancers: breast/ovarian, colon, prostate, skin, thyroid, and others	The medical oncologist presents case for each cancer type. 1. Nurses suggest risk-reduction options based on case information. 2. Nurses discuss current literature and accepted practice with and make recommendations to physicians.	-
Consultant: Collaborates and consults with all members of the genetic multidisciplinary team	Nurses provide rationale for risk-reduction options based on cancer-risk status	Risk-reduction options continue	Interactive dialogue between physicians and nurses on risk-reduction options	-
Education: Utilizes appropriate adult learning	Nurses apply adult-education methods to genetic education.	1. Review adult-education principles a. Build on learner's existing knowledge. b. Determine prior beliefs and knowledge. c. Tailor information. 2. Assess learning style: auditory, visual, or relational 3. Assess risk perception and barriers to learning.	-	Work in pairs. Each nurse assesses the partner's prior beliefs, learning style, and barriers to learning and uses this knowledge to explain a genetic concept (e.g., germline versus somatic mutation). • Two-hit theory • Dominant inheritance The faculty gives feedback on the nurse's ability to apply adult-education methods.
Professional researcher: Promotes participation in cancer genetics research	Nurses develop a plan of action to participate in cancer genetics. They design a plan of action to participate in the advanced practice role.	Plan of action: direct caregiver role, professional educator, professional networking or consulting, educator role, research role	-	Nurses submit an activity plan and review the plan with faculty.

(Continued on next page)

Note. Based on information from Fox Chase Cancer Center, 2000.

Table 2. Course Content Designed From Selected Competencies in Cancer Genetics (Continued)

Competency	Course Objective	Content	Learning Strategy	Learning Activity
Professional attitudes: Recognizes that genetics affects the family and not just individuals	Nurses evaluate at least three elements used in cancer genetic risk-counseling and discuss the role of the nurse in this process.	Overview of cancer genetic counseling skills 1. Balance of information-giving and addressing emotional affect of genetic information to individual and family 2. Directive versus nondirective counseling 3. Autonomous decision making 4. Assessment of psychosocial issues and coping strategies 5. Active listening	–	1. The faculty elicits elements of cancer genetic counseling from nurses and discusses the nursing role for each element. 2. The group views four videotaped counseling sessions and evaluates and critiques counseling styles.

Note. Based on information from Fox Chase Cancer Center, 2000.

therefore, are not currently prepared to understand the implications of cancer genetics or meet the needs of patients utilizing genetic services or therapeutics (Scanlon & Fibison, 1995). Clinical practice that integrates genetics concepts is essential. Genetics skills and knowledge must expand rapidly to ensure quality healthcare outcomes. Inclusion of genetics education is crucial to ensure the competency of oncology APNs for the future. The competencies identified in this study provide a valuable foundation and direction for the development of

continuing-education programs for practicing oncology APNs; they also provide a foundation of information that can be useful to academic nurse educators who need to integrate genetics into oncology APN curricula. Research that determines the impact of such education is warranted.

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For more information . . .

- American Journal of Human Genetics
www.journals.uchicago.edu/AJHG
- Office of Genetics and Disease Prevention
www.cdc.gov/genomics/default.htm
- Clinical Genetics: A Self Study for Health Care Providers
www.vh.org/Providers/Textbooks/ClinicalGenetics/Contents.html

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