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Are genetics/genomics competencies essential for all clinical nurses?

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Clinical nurse work performance is typically evaluated using competencies, which compare nurses' current work performance with previously established performance standards.[1] In the past 40 years, the list of competencies RNs are expected to master in hospital settings has mushroomed. Donna Wright, who developed a practical theory of competency assessment for RNs, points out that competencies should be reflective of the current realities of practice, connected to performance improvement data, and dynamic.[2]

Clinical nurses are expected to master competencies that are related to their specific work environments. For instance, RNs practicing on an ICU are expected to know how to titrate multiple I.V. vasoactive drugs, whereas an RN working in a community vaccine clinic may be expected to demonstrate competent interpretation of vaccine schedules.

Some competencies are universal and apply to all work situations, regardless of practice setting or educational background. Clinical nurses

should be exposed to the knowledge required to master universal competencies in their prelicensure educational programs and have the opportunity to use the competencies in practice.[2]

Following the conclusion of the Human Genome Project, the American Nurses Association (ANA) partnered with the National Human Genome Research Institute, the National Cancer Institute, and the Office of Rare Diseases Research to create essential genetics/genomics (G/G) competencies for all RNs, regardless of academic preparation, practice setting, or specialty.[3] The ANA's rationale for creating this new set of essential G/G competencies was that all diseases and conditions have a G/G component.[3] The 2009 report *Essentials of Genetic and Genomic Nursing: Competencies, Curricula Guidelines, and Outcome indicators, 2nd Edition* also justified formal G/G competencies by noting that patient care will increasingly involve G/G information.[4]

The G/G competencies for all RNs have been included in the American Association of Colleges of Nursing's *The Essentials of Baccalaureate Education for Professional Nursing Practice*, ensuring that G/G content is included to some degree in basic nursing curricula.[5] However, clinical nurses who are age 34 and over, attended nursing school immediately after high school, or graduated before 2006 (when the first set of G/G competencies was published) received no education about the G/G competencies in their prelicensure programs. Because the average age of an RN in the US was 48.8 years in the latest reported national survey, more than half of the RNs practicing today received no prelicensure education on the G/G competencies.[6] Currently, there's a lack of empirical evidence that clinical nurses use the G/G competencies.

Publications about the G/G competencies began in 2003 during their development and continue today. A search of the Academic Search Ultimate, Medline, and CINAHL databases revealed 83 articles that speak to G/G competencies for RNs who aren't in advanced practice: 23 from 2003 to 2010 and 60 from 2011 to the present. Of the 83 articles, only 9 were published in general nursing journals from the US. Most G/G articles were published in specialty journals, journals published abroad, nursing scholarship/research journals, nursing education/staff development journals, or nursing administration journals. So, it's possible that clinical nurses may not have seen a G/G competency article in journals they read.

Clinical nurses tend to attend presentations about G/G competencies given at their hospitals, at local meetings, or via electronic media. Institutional funding for RNs to attend national conferences is often limited, if it exists at all. The G/G competencies may not be selected by hospital educators for work-related competency training and assessment because other competencies are considered a higher priority. Lack of expertise in G/G content may limit both hospital-based presentations and presentations at local programs or via electronic media. For these reasons, clinical nurses who didn't receive education about the G/G competencies in nursing school may have few opportunities to receive information about them.

The purposes of this study were to describe the current utilization of G/G nursing competencies in acute care hospitals and determine whether clinical nurses perceive the competencies as relevant. Hospital RNs were the target of the study because this group still constitutes the largest sector of nursing in US healthcare.[7] The hypothesis was that if G/G competencies for all RNs are essential, hospital RNs will perceive the competencies as

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relevant, perform them frequently, document their G/G-related activities in the electronic medical record (EMR), and produce G/G-related data to include in their evaluations.

Methods

This cross-sectional study surveyed clinical nurses over 4 weeks in 10 hospitals across north Texas. Participating hospitals included large- and medium-sized urban entities and small, rural entities, all of which served adults. All were private, nonprofit, nonteaching hospitals. A commercial program for electronic construction and distribution of questionnaires was used to deliver surveys with a letter explaining the study. Risks for breaches of confidentiality were minimized by using program settings to make questionnaires anonymous and collecting personal information as categorical data. Statistical software was used for analysis.

A convenience sample was comprised of clinical nurses from participating hospitals. The estimated pool of eligible respondents was 5,900; 797 RNs responded (14% response rate). The response rate was considered a marker of clinical nurses' interest in the subject. The total sample is described in *Table 1.* For regression modeling, incomplete surveys were removed, leaving a sample of 533 RN surveys.

Measures

A search of the literature revealed no existing tools to measure RNs' understanding and use of G/G competencies; therefore, the published competencies themselves were used to develop an instrument. This yielded a 38-item questionnaire, including 32 competency statements (from the published competency list) and 6 demographic items. Participants were directed to rate each competency statement on a scale of 1 to 7 for frequency of use in their practice. "Something I never do" was a 1 and "A daily activity" was a 7. Each item also had the following options: "I don't understand the statement" and "The competency doesn't apply to my practice."

Deriving the instrument items directly from the competencies helped ensure comprehensive coverage of the construct domain. Other measures included direct observation of the EMR to assess for evidence of RN documentation of G/G-related patient care activities. RN documentation generally reflects hospital or nursing requirements, reimbursements, and value systems. Review of written hospital policies from the lead hospital's healthcare network was used to gain an impression of written policies related to RN conduct of G/G competencies.

Table 1: Sample characteristics

Item	Number answering	Affirmative	Percent of total
Attended course/CE event about G/G in past 5 years	610	103	17%
Has a genetic disease or has a family member with a genetic disease	609	155	25%
Work position:	607		
Clinical nurse		516	85%
Manager/director		29	4.8%
Other		62	10.2%
Age:	603		
>50 years		246	40.8%
41–50 years		155	25.7%
31–40 years		132	21.9%
20–30 years		70	11.6%
Highest nursing degree:	603		
Associate degree		195	32.3%
Bachelor's degree		354	58.7%
Master's degree		54	9%
Specialty:	593		
Medical-surgical		200	33.7%
Newborn ICU		22	3.7%
Mother-baby		95	16%
(Inpatient) oncology		17	2.9%
Emergency services		43	7.3%
Hospital-based ambulatory clinic		34	5.7%
Surgical services		87	14.7%
Adult ICU		95	16%

Findings

Respondents tended to stop participating in the survey as length increased, which may indicate that they were working while completing the survey or lost interest. Because demographic

data were queried at the end of the survey, most missing data were demographic. Clinical nurses were the target population for this study, but a small group of nonclinical RNs, whose role included patient interaction, participated. Their responses were included in the descriptive statistics, and inferential analyses were conducted both with and without them. Results were virtually identical; therefore, results for the full sample are reported.

A small group of RNs with master's degrees responded to the survey; they were examined for incidental findings. After adjustment for multiple testing, RNs with master's degrees reported performing several competencies significantly more often than their bedside counterparts as shown in *Table 2.* Furthermore, RNs with master's degrees reported participating in continuing education (CE) regarding G/G significantly more often than other RNs ($X^2 = 40.06$, $P = .0001$).

Internal consistency reliability of the tool was strong (alpha = 0.98), reflecting the strong correlations between most items. This is also consistent with principal component analysis, which showed all items (competencies) loading on two factors, accounting for 70% of the variance in the response data. Items that loaded on the first factor were the more objective competencies, such as obtaining family histories or constructing pedigrees. Items that loaded on the second factor included those competencies describing reflection and self-assessment.

Responses to competency items used most and least frequently are listed in *Table 3.* The first item in the survey, "I incorporate G/G technologies and information into my own practice," was the item least understood, with 12% of respondents claiming not to understand the meaning of the statement. Rates of incomprehension of other items ranged from 0% to 10%. The mean frequency score of every competency was no higher than 2.5, indicating that, on average, the competencies were never or very seldom performed.

Only six competencies were performed by close to the majority of respondents. Two of these were concrete activities, including collecting health histories and conducting physical exams with G/G in mind. The other four competencies reflected cognitive activities that may

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Table 2: Nurses with master's degrees perform some G/G competencies more frequently

Competency	*t*-value	*P* value	Mean difference	Confidence interval
Identifying patients who may benefit from specific G/G information or services based on assessment data	2.730	.008	1.293	0.346 to 2.241
Advocating for patient access to desired G/G services or resources	2.713	.009	1.361	0.356 to 2.366
Developing care plans that incorporate G/G assessment information	2.765	.008	1.383	0.382 to 2.385
Providing patients with credible, accurate, appropriate, current G/G information, resources, services, and technology	3.113	.003	1.582	0.565 to 2.600
Critically analyzing patient history and physical assessment for G/G and environmental influences and risk factors	2.930	.005	1.410	0.447 to 2.373

Table 3: G/G competencies with the highest and lowest means

Competency	Mean frequency score (SD)	Never perform the competency	"Doesn't apply to my practice"
Conducting comprehensive health and physical assessments, including G/G and environmental influences and risk factors	2.5 (2)	41%	10%
Collecting personal, health, and developmental histories that include G/G and environmental influences and risk factors	2.4 (2)	41%	10%
Thinking about my beliefs and values about patient care that relate to G/G	2.4 (1.9)	37%	5%
Being aware of the potential impact of G/G information on patients or their family members	2.4 (1.9)	47%	0%
Collaborating with insurance providers/payors to facilitate reimbursement for G/G healthcare services	1.3 (0.9)	70%	16%
Knowing how to make referrals to G/G specialists in my practice area	1.4 (1)	65%	15%
Interpreting selective G/G information or services for patients	1.5 (1.2)	60%	14%
Constructing pedigrees from collected family history information using standardized symbols and terminology	1.5 (1.3)	63%	10%

support patient treatment, including understanding, thinking about, considering, and being aware of G/G aspects of patient care.

One of the G/G competencies—obtaining family histories—has been taught as a nursing fundamental for decades; however, obtaining a three-generation family history was rarely performed in this sample. Most respondents (59%) never obtained a three-generation family health history. Constructing pedigrees from family data was even less frequently used, with 73% of respondents stating that they never used it or it didn't apply to their practice.

Only cases with complete questionnaires were evaluated for regression modeling. Cases were evaluated without weighting. In a stepwise fashion, all demographic variables and competency ratings were regressed on the outcome *incorporation of G/G technologies and information into nursing practice* (item 1 on the competency list). The resulting model accounts for about 53% ($R^2 = 0.526$) of the variance in respondent claims that they incorporate G/G technologies and information into nursing practice.

Specific variables that were significantly associated with incorporating G/G into practice included showing the importance of tailoring G/G services to patients based on culture, religion, knowledge level, literacy, and preferred language; performing interventions and/or treatments appropriate to patients' G/G healthcare needs in the respondent's practice area; and recognizing when attitudes and values related to G/G science may be affecting patient care. Experiencing a course or CE event about G/G in the past 5 years was positively and significantly related to incorporating G/G technologies and information into nursing practice. Having an advanced degree didn't significantly relate to incorporating G/G competencies into practice.

This model provides a partial, but useful, profile of clinical nurse behavior related to incorporating G/G competencies into practice. Unstandardized coefficients and 95% confidence intervals are presented in *Table 4*.

EMR observations failed to demonstrate either opportunities for RNs to document activities specifically associated with G/G competencies or documentation by RNs of G/G content. A systematic search of the centralized policy database for the lead healthcare system using the search terms *genetic, genomic, hereditary, DNA, testing,* and *laboratory* found no policies associated with G/G nursing care.

Discussion

The results don't support the hypothesis that hospital RNs use the published G/G competencies

on a frequent basis. Nor do the data support the contention that G/G competencies are viewed as relevant to all areas of contemporary hospital nursing practice. Findings do support the argument that education about G/G can improve uptake of G/G competencies.

Universal competencies are those shared by all RNs and taught in prelicensure nursing programs because of the expectation that RNs will use them in practice. Findings of this study suggest that clinical nurses aren't expected to and don't have the opportunities to perform G/G competencies in the acute care hospital setting. Mandating skill in competencies that won't be used in practice creates unnecessary burdens on students, educators, clinical nurses, staff development specialists, and administrators. There may also be legal implications when required (essential) competencies can't be fulfilled. Previous researchers found that many RNs are undereducated to meet practice demands.[8] In this case, practice demands appear to be absent for G/G competencies in some settings. As a practical fact, many hospital RNs don't have the authority to perform some of the actions promoted in the competencies, such as G/G referrals, except in the most superficial sense.

Most clinical nurses are excellent collectors of individual patient data and could contribute substantially to family histories. Rarely, they may assist in the consent process for patients enrolling in research that employs G/G technologies. RNs are also the healthcare professionals most available to patients and may be asked to explain inheritance concepts and other genetic information. Does the fact that RNs rarely participate in these activities mean that they aren't essential for nursing practice? Does rare participation in these activities justify imposing a set of universal G/G competencies on all RNs?

This isn't to say that RNs shouldn't improve their understanding of G/G. The G/G competencies outline a skill set that can empower RNs to practice to the fullest extent of their educative and observational powers, given the opportunity to do so. Currently, advanced practice RNs (APRNs) are the clinical nurses most likely to have the opportunity to use the G/G competencies. Rather than identify APRNs as the target group

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Table 4: Variables associated with reported frequency of incorporating G/G information and technologies into practice

Variable	Unstandardized coefficients (B)	95% confidence interval around coefficient	Sig. (*P*)
Attending course/CE event about G/G in past 5 years	0.361	0.079 to 0.644	.012
Showing the importance of tailoring G/G information and services to patients based on their culture, religion, knowledge level, literacy, and preferred language	0.448	0.362 to 0.534	.0001
Performing interventions and/or treatments appropriate to patients' G/G healthcare needs	0.123	0.031 to 0.215	.009
Recognizing when my own attitudes and values related to G/G science may affect the care I provide to patients	0.170	0.084 to 0.257	.0001

for these competencies, another set of G/G competencies was developed for them.[9]

Neither the EMR nor hospital policies associated with this sample currently reflect a demand for G/G nursing activities. When hospitals expect RNs to demonstrate G/G competencies, evidence will then appear in EMRs and hospital policies. Before that, imposing these competencies on hospital RNs may have the consequence of setting RNs and hospitals up for a variety of failures, from frustration at the unit level to regulatory agency requests for evidence of compliance with hospital policies that can't be provided.

Limitations

The response rate for this survey was low, consistent with reported responses to other electronic surveys administered to RNs; however, representativeness is thought to be more important than absolute response rate in survey research.[10,11] This sample was representative of ages and education among hospital RNs in the study region, but it was biased toward RNs who read and respond to emails and who are interested enough in the topic of G/G competencies to complete a survey about them. Social desirability is a potential limitation of survey research, particularly among RNs who may not want to appear less than diligent in their professional responsibilities. In this case, the bias would be toward overreporting the usage of G/G competencies. Finally, hospital employers were nonprofit, private, and nonacademic. Thus, data from this sample may not be generalizable to other types of organizations.

Implications for practice

Dialogue regarding G/G competencies for all RNs may have closed prematurely. As in all aspects of science and healthcare, it's essential to have evidence underlying practice. To date, there's little but theory and opinion to support claims that G/G competencies are crucial for all RNs regardless of work circumstances or education. Any hospital that explicitly creates policy demanding mastery of G/G competencies will find regulatory agencies may assess these competencies. Thus, the issues for contemporary hospital RNs aren't whether it's good to understand G/G, but whether demonstrating formal G/G competencies is essential for acute care practice and whether claims for the essential nature of the competencies are accurate.

Cracking the human genome has created a new frontier in disease prevention, diagnosis, and treatment. However, translating that information into practice has been difficult. If national nursing organizations believe the G/G competencies are essential to all nurses, more work needs to be done to ensure that RNs have access to education about them. G/G competency publications in general nursing journals are desperately needed, and publications by advanced nursing journals need to increase. Hospital-based educators need further education about teaching the competencies so that in-hospital G/G programs can increase. No-cost and low-cost G/G presentations via electronic media are also needed.

There's an urgent need for similar studies to further evaluate the use, applicability, and relevance of G/G competencies for nurses. To our knowledge, this is the only research on clinical nurses' use of the G/G competencies. The nature of any set of competencies is dynamic, which means cycles of reflection on the utility of nursing competencies are appropriate and expected. As the world of precision medicine begins, it's important to accumulate empirical evidence

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Bonus content

To read the G/G competencies for RNs and nurses with graduate degrees, visit www.nursingmanagement.com and click on the Online Exclusives tab.

underpinning the need for G/G competencies for all RNs regardless of work circumstances or education. NM

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The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.

DOI-10.1097/01.NUMA.0000550445.94504.de