A Comparison of Physicians' and Nurse Practitioners' Use of Race in Clinical Decision-Making

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Objective: The debate over use of race as a proxy for genetic risk of disease continues, but little is known about how primary care providers (nurse practitioners and general internal medicine physicians) currently use race in their clinical practice. Our study investigates primary care providers' use of race in clinical practice.

Methods: Survey data from three cross-sectional parent studies were used. A total of 178 nurse practitioners (NPs) and 759 general internal medicine physicians were included. The outcome of interest was the Racial Attributes in Clinical Evaluation (RACE) scale, which measures explicit use of race in clinical decision-making. Predictor variables included the Genetic Variation Knowledge Assessment Index (GKAI), which measures the providers' knowledge of human genetic variation.

Results: In the final multivariable model, NPs had an average RACE score that was 1.60 points higher than the physicians' score (P=.03). The GKAI score was not significantly associated with the RACE outcome in the final model (P=.67).

Conclusions: Physicians had more knowledge of genetic variation and used patients' race less in the clinical decision-making process than NPs. We speculate that these differences may be related to differences in discipline-specific clinical training and approaches to clinical care. Further exploration of these differences is needed, including examination of physicians' and NPs' beliefs about race, how they use race in disease screening and treatment, and if the use of race is contributing to health care disparities. *Ethn Dis.*2019;29(1):1-8; doi:10.18865/ed.29.1.1.

Keywords: Nurse Practitioners; Physicians; Clinical Decision-making; Race; Health Care Disparities; Genomics, RACE scale, GKAI scale

Introduction

Racial and ethnic health care disparities constitute a persistent reality in the United States health care system. As advances in genomic and precision medicine are integrated into clinical care, an important goal is to improve health outcomes for all. One issue linked with difference in treatment is providers' use of race in the clinical decision-making process. Specifically, race is used as a proxy for genetic variation and disease risk assessment. However, not every member of a racial group has the same alleles and genetic ancestral markers.[1-9] Moreover, race is a social construct that involves identity and self-perception, which are not always an accurate reflection of one's actual genetic background, disease risk, or course of illness.[10] This has led to the current controversy around the use of race in association with genetics.[11-12] From a clinical standpoint, some argue that race is possibly a good proxy for biogeographic ancestry and disease risk assessment, especially when considering recommendations for disease screening or treatment and in our quest to improve health outcomes related to race-specific disparities.[2,10,13,14] Others, however, suggest that using race can induce bias and stereotyping, and increase misdiagnoses.[1-5] They rely on decades worth of studies demonstrating that Blacks constantly receive lower quality medical care than Whites, even while adjusting for clinically relevant factors,[10,15] thus arguing that race impedes our ability to reduce health care disparities.[1-5]

In the wake of this debate, even

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as genomic and precision medicine pose a possible solution to use of race as a proxy, a basic understanding of how much knowledge primary care providers have about genetic variation and how they conceptualize and use race in clinical decisions remains important to study. Such an understanding is essential for health professional education. Thus, Bonham and Sellers[16] designed two scales to be used for these assessments. The Genetic Variation Knowledge Assessment Index (GKAI) and the Racial Attributes in Clinical Evaluation (RACE) scale were developed to measure providers' knowledge of genetic variation as it relates to race and providers' use of race in clinical decision-making, respectively. [16]

Simultaneously, meeting the primary care service needs of patients is increasingly shared by nurse practitioners (NPs) and physicians. Although clinical training differs, both health care disciplines offer similar services inclusive of providing direct care, prescribing medications, documenting care, and offering patient and family education.[17] Such responsibilities present opportunities for both NPs and physicians to integrate scientific advances into clinical care, particularly in the rapidly developing field of genomics and precision medicine.[18,19] For example, utilization of knowledge of genetic variation when assessing someone's risk for disease, diagnosing an illness, or prescribing a treatment may influence care outcomes.

As a class of health care providers, nurse practitioners (NPs) comprise a unique category that shares similarities with both registered nurses and physicians. Their training is like that of registered nurses. However, their clinical autonomy and advanced clinical patient care often render NPs more comparable to physicians.[20] According to the Institute of Medicine (IOM), the role of NPs should expand considerably in the coming years. More will be expected of NPs, including knowledge of scientific advances, particularly in the rapidly developing field of precision medicine and its incorporation into clinical care.[19]

This study compares the use of race in clinical decision-making using the RACE scale among NPs and general internal medicine physicians while adjusting for the GKAI as a clinically relevant predictor.

Methods

Outcome Measure: Use of Race in Clinical Decision-Making (RACE Scale)

The RACE scale was developed over three phases.[16] In phases I and II, the individual items in the scale were developed. In phase I, the individual scale items were developed using focus groups of general internists (n=90), and then reviewed by two panels of experts in genetics and survey methodology. In phase II, exploratory factor analysis was performed on pilot data (n=364 general internists), and three physicians conducted a review of the final scale items. Finally, in phase III, scale validation was conducted with data from the Health Professions' Genetics Education Needs Exploration (HP GENE) survey, administered to physicians. The HP GENE survey consisted of 81 questions, including the eight RACE scale items. Clinically active physicians with a primary care specialty and US mailing addresses were included in the study. In addition, Black and minority physicians were oversampled from historically Black medical schools. Of the 1738 eligible general internists identified in phase III, a total of 787 completed the surveys (45.3% response rate).

Further analysis to determine internal consistency was done to adjust the scale for nurses, including NPs, and to verify use of the scale for comparisons across different health professions. The original scale consisted of eight items for NPs; however, when comparing NPs to physicians, a seven-item scale was used. This was a concerted decision to limit the scale to seven items for NPs based on the instrument's performance where the final Cronbach's alphas were calculated, with physicians' alpha=.86, and NPs' alpha=.90. The scale is a sum of those

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seven items, ranging in score from 0 – 28, with higher scores indicating greater use of race in clinical decision-making.

Predictor Measure: Genetic Variation Knowledge Index (GKAI)

The methodology used to develop and validate the RACE scale was also utilized to develop and validate the GKAI measure.[16] Scale validation was conducted with data from 694 nurses, including 63 NPs, recruited through the American Nursing Association. The GKAI is an index with binary responses, set only to measure an individual's knowledge of the concept. Since it does not measure an underlying construct, a Cronbach's alpha was not generated. Additionally, though the GKAI consists of eight items, for the purposes of this study, when comparing NPs to physicians, a six-item scale was used to account for missing items in the nurses' study. Scores for the modified GKAI are calculated as the sum of those six items, ranging from 0 to 6, with higher combined scores indicating greater knowledge of genetic variation.

Covariates Measures

In addition to the RACE and GKAI responses, several demographic and clinical characteristics were collected. These include six total covariates that were adjusted for in our final model. The health professional's race was based on the self-categorized race/ethnicity of the participant, and divided into the following categories: American Indian or Alaska Native (non-Hispanic), Asian (non-Hispanic), African American (non-Hispanic), Native Hawaiian or Other Pacific Islander (non-Hispanic), White, (non-Hispanic), Other, (non-Hispanic), Multi-racial (non-Hispanic), and Hispanic. We also collected data on genetic training in coursework by asking physicians if they had genetics training in their primary specialty residency and asking nurse practitioners if their nursing curriculum included genetics content. Other questions relevant to genetics included the variable for participant's self-perception of knowledge of genetics, which utilizes a Likert scale to ask physicians: 'how would you rate your knowledge of genetics?', and to ask NPs; 'In describing your genetic/genomic knowledge, would you consider it to be Excellent, Very Good, Good, Fair, Poor?' The last two variables involved clinical experience and exposure, with years in practice asking physicians 'how many years have you been in practice, post training?' and asking NPs 'total number of years you have worked in nursing.' Finally, the variable for portion of time spent seeing patients asks both physicians and NPs 'what proportion (%) of your

Table 1. List of covariates for multivariable model

Covariate	Description/Survey Question
Race	
Minority vs White, only non-Hispanic	Self-categorized race of the study participant:
	American Indian or Alaska Native, only (non-Hispanic)
	Asian, only (non-Hispanic)
	African American, only (non-Hispanic)
	Native Hawaiian or Other Pacific Islander, only (non-Hispanic)
	White, only (non-Hispanic)
	Other, only (non-Hispanic)
	Multi (non-Hispanic)
	Hispanic
Genetic training in coursework	(Physician) Did you have genetics training in your primary specialty residency? (Yes or No)
	(Nurse Practitioner) Did your nursing curriculum include genetics content? (Yes or No)
Years in practice	(Physician) How many years have you been in practice, post training (post fellowship or post residency if you did not do a fellowship) as a physician?
	(Nurse Practitioner) Total number of years you have worked in Nursing:
Perceived knowledge of genetics	(Physician) How would you rate your knowledge of genetics? (Excellent=5, Very Good=4, Good=3, Fair=2, Poor=1)
	(Nurse Practitioner) In describing your genetic/genomic knowledge, would you consider it to be: (Excellent=5, Very Good=4, Good=3, Fair=2, Poor=1)
Portion of time spent seeing patients	(Physician and Nurse practitioner) What proportion (%) of your work-time is spent seeing patients?
Knowledge (GKAI) score	The GKAI scale is an index with binary responses, set to measure each individual's knowledge of genetic variation.

work-time is spent seeing patients?' The variables are presented in Table 1.

Data Collection

The data used for this study were combined from three different parent studies collected between 2009-2012 from one cohort of internal medicine physicians and two cohorts of nurse practitioners as described below.

Study Sample: Internal Medicine Physicians

The cross-sectional HP GENE survey was administered from April 2010 to December 2010 through the Internet and mail (n=787 physicians).[16] Participation was voluntary, and a monetary compensation of $50 was provided. Physicians who were not currently practicing general internists according to their office staff or did not have a current United States mail address were excluded from the sample. Of the 787 total completed surveys, 108 (13.8%) were completed and returned using the paper questionnaire. Analysis indicated no significant differences between mail and web respondents.

The study received approval from the IRB of the National Human Genome Research Institute (NHGRI). All procedures were in accordance with the ethical standards of the IRB and the Helsinki Declaration of 1975, revised in 2000.

Study Sample: Nurse Practitioners (NPs)

Our study sample of NPs includes data from two separate cohorts of registered nurses. The largest sample comprised nurses employed by Magnet® designated hospitals participating in the Method to Integrate a New Competency (MINC) genetic study.[21] MINC included nurses from 23 different hospitals using the American Nurses Credentialing Center designated Magnet Recognition Program® in 17 states across the United States. MINC institutions sent email announcements about the survey to their nursing staff. Some of the institutions employed additional methods to recruit participants, such as advertising, supervisor encouragement, and intranet postings. Data were collected between July and October 2012 (n=176 nurse practitioners), and the survey was open for completion for 28 days at each institution.[21]

The second cohort is a sample of nurses recruited by the American Nurses Association (ANA).[22] The ANA recruited study participants by posting announcements on the main ANA website and in *The American Nurse*, the official publication of the ANA.[22] Additionally, study announcements were sent out to subscribers of the ANA SmartBrief and eNewsletters. The survey was open for completion from October 2009 to January 2010 (n=63 NPs). No compensation was provided for participation. More information on sampling methodology was reported by Calzone et al.[22] Both the ANA and MINC studies were approved by the West Virginia Institutional Review Board, and in some instances, received further approvals at individual survey sites.

Data were collected in both nursing cohorts using online survey methods and convenience sampling. The nursing surveys integrated both the RACE scale and the GKAI measure into the Genetics and Genomics in Nursing Practice Survey.[23] The 20-minute survey was voluntary and did not collect any personal identifiers.

Statistical Analysis

The outcome of interest was the scale measuring use of race in clinical decision-making (RACE scale). The main covariate of interest was health profession (NPs vs physicians), while adjusting for demographic characteristics including age, sex, and race (White, non-Hispanic vs minority (all other races and ethnicities), GKAI score, years in practice, history of genetics training in program of study (yes vs no), portion of time spent seeing patients (%), and perception of genetic knowledge. For the purposes of our study, a few variables were modified. The race/ethnicity variable, for instance, was collapsed into two categories to increase the frequency of the categories since our White, non-Hispanic category was very predominant at 64% for the physicians and 88% for the NPs (Table 2). By collapsing the non-White and non-Hispanic categories, we aimed to increase the statistical power of our analysis while adjusting for a presumably important study factor. Additionally, the variable for examining perception of genetic knowledge was collapsed into excellent/very good (1), good/fair (2), and poor (3) to increase the frequency of each category.

Bivariate linear regression was used to ascertain the association between health profession and RACE. T-tests and chi-square tests were used to examine whether the individual covariates were associated with health profession. After determining that the RACE scale fit the assumptions of a normal linear regression model, multivariable regression analysis was used to adjust for the covariates of interest. Missing data were addressed using the dummy variable adjustment method.[24] Only data from participants who

Table 2. Demographic characteristics of the study population comparing nurse practitioners with physicians

Variable Responses	N	NPs	N	Physicians	P
RACE score, mean, SD (min, max)	178	15.1 (6.14) (2, 28)	759	13.5 (5.6) (0, 28)	<.001
GKAI score, mean, SD (min, max)	232	2.74 (1.5) (0, 6)	787	3.3 (1.2) (0, 6)	<.0001
Age-mean (SD)	219	48.1 (10.0)	767	48.6 (9.7)	0.49
Sex, %					<.0001
Male	8	3.4	509	65.3	
Female	229	96.6	271	34.74	
Race/ethnicity, %					<.0001
American Indian or Alaska Native	1	.4	1	.1	
Asian	8	3.5	149	19.4	
African American	10	4.3	45	5.9	
Native Hawaiian/Other Pacific Islander	0	0	2	.3	
White	203	87.9	490	63.9	
Other/Multi-racial	1	.4	53	6.9	
Latino or Hispanic	8	3.5	27	3.5	
Current primary functional area, %					
Administration	12	5.24	---	---	---
Education	8	3.5	---	---	
Research	4	1.8	---	---	
Patient care	203	88.6	---	---	
Student	1	.4	---	---	
Other	1	.4	---	---	
Genetic training in school, %					<.0001
Yes	134	56.9	87	11.3	
No	102	43.2	684	88.7	
Perceived knowledge of genetics, %					
Excellent/very good	29	13.9	40	5.2	.23
Good/fair	178	85.2	617	79.6	<0.01
Poor	2	1.0	118	15.2	<0.01
Proportion of time spent seeing patients, mean (SD)	232	78.7 (27.2)	772	85.0 (19.4)	<0.01
Highest education, %					
Master's degree in nursing	221	93.3	---	---	---
Doctorate degree in nursing	16	6.8	---	---	---
Years in practice, mean (SD)	198	22.4(10.3)	766	16.9 (9.8)	<.0001

SD, standard deviation.

completed the RACE scale were used in the final analysis. The final sample included 759 physicians and 178 NPs. Data were analyzed using SAS 9.3 (SAS Institute Inc., Cary, NC, USA).

Results

Sample/Descriptive Characteristics

Table 2 shows demographics of the NPs and physicians. Our results indicate that, similar to the sample of physicians,[16] the NPs in our study were predominantly White (88% vs 64% for physicians), but had proportionally less representation than physicians in other racial categories (P<.0001): Asian American (4% vs 19%), African Americans (4% vs 6%), Native Hawaiian or Other Pacific Islander (0% vs.3%), and other/multi-racial (.4% vs 7%). This study group had a similar number of Latino and/or Hispanic-identifying participants (4%). The NPs had a mean age of 48 years (vs 49 years for physicians) and spent a large, albeit lower than physicians, percent of their work time seeing patients (79% vs 85% for physicians, P<.01). Most NPs had received genetics training in their coursework (57% vs 11% for physicians, P<.0001), were female (97% vs 35% for physicians, P<.0001), and had a master's degree in nursing (93%).

In the bivariate analyses, the mean RACE score was significantly higher in NPs (M=15.09, SD=6.14) than in physicians (M=13.53, SD=5.57), P<.001. Within the NP study sample, those with doctorate de-

Table 3. Adjusted regression model predicting use of race in medical decision making (race) among health professionals[a]

Characteristic	Adjusted β[b]	P
Health profession		
NP vs physician	1.60	.03
Age	.03	.53
Sex		
Male vs female	.37	.41
Race		
Minority vs White, only non-Hispanic	.51	.23
Genetic training in coursework		
Yes vs No	.69	.19
Years in practice	.01	.82
Perceived knowledge of genetics		
Good/fair vs very good/excellent	.40	.61
Poor vs very good/excellent	.86	.36
Portion of time spent seeing patients	-.01	.48
Knowledge (GKAI) score	.07	.67

a. The predictor/covariate of interest for this model was type of health profession. All other variables were included to adjust for confounders.
b. β coefficient gives the change in the RACE score for every one-unit increase (eg, every additional year in age) or between the indicated group and reference group (eg, genetic training vs no genetic training).
R-squared for this model=.03; F-statistic=1.77; P=.051.

grees in nursing had higher average RACE scores (M=16.38, SD=4.59) than those with master's degrees (M=14.99, SD = 6.24). Compared with physicians' scores (M=13.53, SD=5.57), the RACE scores for NPs with doctorate degrees were marginally significantly higher (M=16.38, SD 4.59, P=.07), while those with master's degrees were significantly higher (M=14.99 SD= 6.24, P<.01).

Additionally, in the bivariate analyses, NPs had a significantly larger proportion of females than males when compared with physicians (P<0.001). The NP cohort also had significantly lower numbers of racial and ethnic minority NPs than the physician cohort (P<.0001). More NPs had received genetic training in their program of study than physicians (P<.0001) and had an overall higher average number of years in practice (P<.0001), but spent less of their work time seeing patients (78.69% vs 85.04% physicians, P=.09). The overall mean for the GKAI measure for NPs was lower than for physicians (2.74 [SD 1.50] vs 3.26 [SD 1.17], P<.0001). However, more NPs ranked their genetic knowledge as higher than physicians, with 13.9% perceiving their knowledge to be "Excellent/Very Good" compared with 5.2% in physicians (P=.23), 85.2% perceived their knowledge to be "Good/Fair" compared with 79.6% in physicians P<.01), and approximately 1.0% perceived their genetic knowledge to be 'Poor' compared with 15.2% in physicians (P<.01).

In the final multivariable linear regression model with health profession predicting RACE scores, the eight variables mentioned above were included as covariates (Table 3). Consistent with the findings from the bivariate analyses, RACE scores were significantly higher for NPs than physicians (β=1.60, P=.03).

Discussion

This study, to our knowledge, is the first examining the differential use of race in clinical decision-making between NPs and physicians. The main research finding from the final multivariable model found NPs reported significantly higher RACE scores than physicians, even after adjusting for certain clinical and demographic characteristics. Compared with physicians, NPs were more likely to consider the patient's race during the clinical decision-making process. Although the bivariate analysis indicated that physicians had higher knowledge of genetic variation but used race less in clinical decision-making, knowledge of genetic variation was not a significant predictor of the use of race in clinical decision-making in the final model. Additionally, all other covariates including age, sex, race, years in practice, perceived knowledge of genetics, and portion of time spent seeing patients were not significant predictors of RACE scores.

Because of the dearth of prior work comparing primary care physicians and NPs, it is difficult to explain the between-group differences in use of race in clinical decision-making. However these differences may be associated with cross-cultural or cultural competency training.[25,26] Cultural competency is often promoted as an educational paradigm that may reduce racial and ethnic health disparities and improve patient outcomes.[27] Cultural competency education, as a component of core curriculums, is an expectation in nursing schools that offer bachelor's degrees (BSN).[25] Thus, NPs receive this education early in their career training as health care providers, and they may continue to draw from it in their active use of race in clinical decision-making. As for physicians, cultural competency education is becoming more common in medical schools nationally. Many organizations, including the Association of American Medical Colleges, recommend its implementation in educational institutions.[28] Moreover, it is now a requirement in institutions and training programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) to ensure education on cultural competency for residents and faculty.[29] However, since there are no standard curricula, the degree to which residency programs are incorporating these mandates remains uncertain.[26,28,30]

Furthermore, results are consistent with those of prior studies that found physicians to be generally wary of using race in clinical decision-making.[31] In comparison, one study found that midlevel providers, such as NPs and physician assistants (PAs), adhere more to guidelines concerning possible genetic tests for diseases that are more strongly associated with certain racial groups, such as breast and prostate cancer screening, further shedding light on the results of this study.[32-34]

The strengths of our study include a large sample size, which allows cross-provider comparative analysis. Both the GKAI and the RACE scales are reliable and validated measures that assess two important areas in health, genetic knowledge and use of race in clinical decision-making, among health care providers. In addition, the study findings have important future implications that are discussed in the concluding section. In terms of the limitations, the NP sample size could be larger, especially if we want to more closely examine the role of education differences (doctorate vs master's). The inherent bias associated with self-report must also be considered when interpreting our findings. Additionally, this study involved secondary analyses on multiple sets of data that were collected with varying recruitment methods, including differences in incentives provided across the separate cohorts, which may introduce additional sample-based respondent bias into the study. Furthermore, this study was designed to be exploratory and cannot generalize beyond the groups of general internists and NPs that were surveyed. Other physician and NP specialties should also be examined, especially since the NP specialties are unknown for our cohort. The study also raises further questions that warrant closer examination. Likewise, we do not know if these findings apply to other health care practitioners, such as physician assistants and genetic counselors.

Conclusion

The role of race and its use in health care is being investigated in the context of precision medicine, which holds future promise to improve individual health outcomes.[35-37] However, we believe that while providers continue to rely on race as a proxy, the potential for genomics to advance personalized or precision health may be limited by the currently held beliefs and practices of providers. Accordingly, providers' use of race in clinical decision-making should change with increasing genomic knowledge. The results of this study can serve as a baseline understanding of some of these practices and their granular differentiation at the provider level as precision medicine advances are integrated in clinical practice. This study addresses a crucial gap in the literature on health care providers by assessing provider perceptions concerning race and genetics, and it can be used as a foundation for future studies examining clinical practice and use of race in clinical decision-making. It also provides empirical results on the explicit use of race in this context, which can be used to determine if clinical guidelines and policy changes are indicated and can assist in the development of educational interventions to modify healthcare providers' behaviors with the goal to improve treatment decisions.

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Conflict of Interest

No conflicts to report.

Author Contributions

Research concept and design: Bonham, Sellers, Calzone, Jenkins; Acquisition of data: Bonham, Sellers, Calzone, Jenkins; Data analysis and interpretation: Abdallah, Sellers, Bonham, Calzone, Jenkins, Moss; Manuscript draft: Abdallah, Calzone, Bonham, Sellers, Jenkins, Moss; Statistical expertise: Abdallah, Sellers; Acquisition of funding: Bonham, Calzone; Administrative support: Bonham, Calzone, Jenkins; Supervision: Bonham

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