How Can Law Support Development of Genomics and Precision Medicine to Advance Health Equity and Reduce Disparities?

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There is growing recognition that the genomic and precision medicine revolution in health care can deepen health disparities. This has produced urgent calls to prioritize inclusion of historically underrepresented populations in research and to make genomic databases more inclusive. Answering the call to address health care disparities in the delivery of genomic and precision medicine requires a consideration of important, yet understudied, legal issues that have blocked progress. This article introduces a special issue of *Ethnicity & Disease*, which contains a series of articles that grew out of a public conference to investigate these legal issues and propose solutions.

This 2018 conference at Meharry Medical College was part of an NIH-funded project on "LawSeq℠" to evaluate and improve the law of genomics in order to support appropriate integration of genomics into clinical care. This conference was composed of presentations and interactive sessions designed to specify the top legal barriers to health equity in precision medicine and stimulate potential solutions. This article synthesizes the results of those discussions.

Multiple legal barriers limit broad inclusion in genomic research and the development of precision medicine to advance health equity. Problems include inadequate privacy and anti-discrimination protections for research participants, lack of health coverage and funding for follow-up care, failure to use law to ensure access to genomic medicine, and practices by research sponsors that tolerate and entrench disparities.

Analysis of the legal barriers to health equity in precision medicine is essential for progress. Progressive use of law is vital to avoid worsening of health care disparities. *Ethn Dis. 2019;*29(Suppl 3):623-628; doi:10.18865/ed.29.S3.623

Introduction

There is growing recognition in the scientific, legal, and ethics community that the genomic and precision medicine revolution in health care has the potential to deepen health disparities. This has produced urgent calls to prioritize inclusion of historically underrepresented populations in research and to make genomic databases more inclusive, among other scientific steps. However, the legal issues blocking progress have received very little attention and analysis.

In response to calls to advance health equity in genomic research and precision medicine, a 2018 conference at Meharry Medical College was convened as part of an NIH-funded project on "LawSeq℠: Building a Sound Legal Foundation for Translating Genomics into Clinical Application."[1] The conference, "How Can Law Support Development of Genomics and Precision Medicine to Advance Health Equity and Reduce Disparities?" brought together leading scholars in health disparities and legal studies, along with LawSeq℠ project members, to specify important legal issues and brainstorm about sustainable solutions.[2] This special issue of *Ethnicity & Disease* was a product of this work, and this article introduces and synthesizes discussion facilitated by the conference.

The analysis conducted by conference participants reveals multiple legal barriers to broad inclusion in genomic research and development of precision medicine to advance health equity. Identified problems include but are not limited to: a history and persistence of discrimination and bias, barriers to equitable participa-

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tion in research including inadequate privacy and anti-discrimination protections for research participants, lack of health coverage and funding for follow-up care, failure to use law to ensure access to genomic medicine, and practices by research sponsors that tolerate and entrench disparities.

To introduce this special issue of *Ethnicity & Disease,* we summarize conference discussions to open a field that has largely been ignored to date – systematic analysis of the legal barriers to health equity in precision medicine. Articles in this issue present in-depth consideration of particular legal problems as well as opportunities to advance health equity and reduce disparities in genomic and precision medicine by using law. The authors in this special issue address both health disparities and health care disparities.

To introduce this special issue of Ethnicity & Disease, we summarize conference discussions to open a field that has largely been ignored to date – systematic analysis of the legal barriers to health equity in precision medicine.

The range of law considered in this introductory article, as well as the articles that follow, is broad. At the federal level, it includes constitutional provisions, statutes, regulations, agency guidance, as well as the policies of federal funders. At the state level, it includes state constitutions, statutes, regulations, and agency actions and policies. At both the federal and state levels, law includes litigation. It also includes failures to deploy law to address disparities and failures of enforcement. Finally, law here includes the terms of federal state and municipal policies, contracts, and grants.

The Law, Genomic Medicine and Health Equity Conference

The LawSeq[SM] project convened a Working Group of 22 experts to analyze the law on genomics and recommend changes to support sound clinical deployment. Half of these experts were legal scholars and attorneys (some with non-law degrees as well) and half were experts in genomic sciences, clinical care, genetic counseling, laboratory sciences, informatics, and patient advocacy. As part of the project's work, the principal investigators partnered with: the Meharry-Vanderbilt Alliance; Vanderbilt University Medical Center; the University of Minnesota's (UMN) Consortium on Law and Values in Health, Environment & the Life Sciences; and the Minnesota Precision Medicine Collaborative at UMN to offer the November 2018 public conference and webcast on "Law, Genomic Medicine & Health Equity: How Can Law Support Genomics and Precision Medicine to Advance the Health of Underserved Populations?" Speakers were largely drawn from outside the project's Working Group, in order to promote collaboration. Speakers presented on topics listed in Table 1. The articles in this special issue are based on several of these presentations.

At the conclusion of the presentations, the public conference adjourned, and we transitioned to an invitational working session with conference speakers and project participants. That session featured a panel on "developing law and policy to promote access to the benefits of genomic & precision medicine," followed by a panel on "using law to protect individuals from discrimination and harm in genomic research, clinical care, and public health." At the end of the day, we held a group discussion on "what changes are needed in law and policy to advance the health of underserved and minority populations through precision medicine: consideration of next steps."

As part of the final group discussion, we invited each speaker and project member to articulate their top recommendation on changes needed in law and policy. Project research assistants took notes, which they typed up and shared with the project investigator team. Those notes serve as the basis for this article's synthesis of the legal issues threatening health equity in precision medicine and genomics, and the opportunities for progress through changes in law and policy.

The conference summarized here and represented in this special issue made it clear that analyzing law is crucial to making progress to advance health equity in genomics and preci-

Table 1. Presentations at the conference on "Law, Genomic Medicine & Health Equity: How Can Law Support Genomics and Precision Medicine to Advance the Health of Underserved Populations?"

Advancing the Health of Underserved Populations through Genomics and Precision Medicine: The Challenge for Law – Dayna Bowen Matthew, JD, PhD
Addressing Health Care Disparities: When Is Precision Medicine Helpful? Does Law Support or Hinder Progress? – Shawneequa Callier, JD, MA
How Can Law and Policy Support Work on Health Disparities & Health Care Disparities? – Wylie Burke, MD, PhD
How Can Precision Medicine Advance the Health of Underserved Populations? – Olveen Carasquillo, MD, MPH
Is Law a Help or a Threat to the Inclusion of Underserved and Immigrant Populations in Genomic Research? – Jennifer K. Wagner, JD, PhD
Legal & Policy Issues Raised by Genomic Research and Biobanking in Research with American Indian & Alaska Native Populations – Nanibaa' A. Garrison
Lessons from Other Health & Behavioral Research in American Indian & Alaska Native Populations -- Spero M. Manson, PhD
Pathways Toward Resolving Distrust Among Groups Negatively Impacted by Genomics – Consuelo Hopkins Wilkins, MD, MSCI

sion medicine. Conversely, ignoring law leaves deeply problematic structures and practices in place, while ignoring important opportunities. Progressive use of law is vital to including underrepresented populations in research, building genomic and precision medicine with the capacity to serve all individuals, and to avoid worsening of health disparities.

Issues and Opportunities for Law to Advance Health Equity in Genomics and Precision Medicine

Table 2 presents our synthesis of the issues raised by our project Working Group together with conference speakers in the final brainstorming session. When more than one individual endorsed a point, we have combined their perspectives. We have also modified and elaborated phrasing to present a coherent picture of the issues and opportunities articulated by this group. We have divided the legal issues into three areas: 1) Discrimination, bias, and human rights; 2) Barriers to equitable participation in research; and 3) Barriers to health care delivery.

This table presents a rich matrix of key issues that demand further work to ensure that genomics and precision medicine are inclusive and advance health equity. The individual articles that follow elaborate specific pieces of the puzzle. We briefly describe each article according to where it fits in this matrix.

1. Discrimination, Bias, and Human Rights

To provide an avenue for all to benefit from the fruits of biomedical research and the development of new technologies and treatments requires a legal foundation to advance global human rights and equitable access. A core value is addressing health inequities by utilizing legal advocacy to respond to the racism, sexism, and xenophobia that contribute to health care disparities. In this special issue, Dayna Bowen Matthew shows how the practice of precision medicine can concretize and deepen health inequities. According to Matthew, the development and implementation of precision medicine must be monitored and guided to ensure equity in health care.[16] Legal scholarship and advocacy are central in monitoring and addressing discriminatory policies and practices.

Jennifer Wagner identifies legal issues affecting the inclusion of immigrants in genomic research and precision health research initiatives. She asks "whether we collectively will prioritize authentic diversity and inclusion policies and also insist on compliance with the laws intended to ensure the human right of every individual – regardless of immigration status or national origin – to share in the advancement of science."[17] Wagner demonstrates that the regulation of biomedical research must consider those marginalized in our society. Scrutinizing the role of the law in facilitating or impeding access to the benefits of new technologies is essential.

2. Barriers to Equitable Participation in Research

There are many barriers to participation in genomic and precision medicine research for racial and ethnic minorities and populations that have historically been underrepresented. Core ethical principles for biomedical research emphasize

Table 2. Legal issues threatening health equity in precision medicine and genomics

Legal issue(s)	Relevant law(s)	Threat(s) posed
1. Discrimination, Bias, and Human Rights		
History of racism in research, clinical care, and public health screening; eugenic abuses under state law	Multiple laws historically, including state statutes allowing forced sterilization[3]	--Discouraging individuals and communities from participating in genomic and precision medicine research
Unscientific conflation of genetics with race	Failure of research funders to require rigorous and appropriate differentiation of racial categories, ethnic categories, and genetics	--Researchers using inconsistent and indefensible approaches to studying genetics with poorly defined racial and ethnic categories --Failure to require researchers to rigorously study and differentiate genetic from non-genetic contributors to a disease or condition
2. Barriers to Equitable Participation in Research		
Failure to design law & policy to include and protect populations historically underrepresented in research	Common Rule,[4] policy of funders including NIH	--Failure to penalize researchers for failure to meet their stated goals for enrollment of historically underserved populations, including by sex and race/ethnicity --NIH failure to require robust community engagement in research, including engagement and partnering with sovereign Tribal nations --NIH demand of social security numbers (SSNs) for participants who will be compensated for the time and burden of participating in research; this may exclude those who lack SSNs or prefer not to share their SSN --Barriers to inclusion of prisoners in genomic research
Inadequate privacy and data security protections for participants in genomic research	Common Rule, FDA regulations on human subjects research,[5] HIPAA,[6] 21st Century Cures Act,[7] state law,[8] dbGAP contract requirements on nondisclosure,[9] terms of data use agreements	--Lack of adequate penalties for researcher re-identification of deidentified data & specimens --Unclear enforceability and effect of Certificates of Confidentiality in NIH-funded research --Inconsistency between HIPAA, Common Rule, and FDA deidentification requirements --Inadequate protections against use of data for commercial sale, marketing, data mining, forensics, immigration, and border policing
Barriers to participant access to their own research data; obstacles to participant-led research	Researcher & Office for Civil Rights (OCR) failure to respect and enforce HIPAA right of data access, failure to alert research participants to this right, lack of individual cause of action under HIPAA	--Research participants may effectively lose their rights of access to their own data --This strips participants of rights to review data held on them to assess accuracy & risks --This also reduces participants' ability to contribute their data to research and form research communities
Limits on ability of federal agencies and research funders to obtain external advice	Federal law limiting creation of advisory committees (eg, E.O. 13875, June 14, 2019[10])	--Federal research funders (e.g., NIH) may be deprived of needed external advice on proper development of precision and genomic medicine to advance health equity
3. Barriers to Health Care Delivery		
Lack of universal access to health care in U.S.; states imposing barriers to Medicaid coverage (e.g., work requirements)	Medicaid, Medicare, Affordable Care Act,[11] other access statutes and programs	--Research participants unable to access care for clinical follow-up based on research results --Patients unable to access genomics and precision care, including patients with rare diseases & some families whose children test positive in newborn screening programs --No requirement that research studies enable follow-up care, including for those uninsured or under-insured
Lack of access to genomic health care and precision medicine; failure to include genomics in essential benefits packages	Same as immediately above	--Same as immediately above --Community health centers not prepared to offer genomic medicine --If precision medicine increases costs (eg, if pharmacogenomics segments the market for medications into smaller subgroups, or genomics leads to recognition of more rare diseases), barriers to access may rise
Inadequate protections against discriminatory and disadvantaging uses of genomic information	GINA,[12] ADA,[13] state anti-discrimination provisions[14]	--GINA offers protections only for genetic information before development of symptoms, and only protects against certain uses (eg, by health insurers) --ADA and state protections are also limited
Payers' denial of coverage for genomic health care and services	State and federal law on insurer coverage decisions[15]	--Inability to access genomic medicine for those who cannot pay out-of-pocket --Genetic counselors and other professionals unable to challenge all inappropriate denials --Individuals unable to challenge inappropriate denials

beneficence, non-maleficence, and equitable selection of research participants.[18] The adequacy of law and regulation to protect study participants, enable robust informed consent, and promote the information and data sharing allowing participants to benefit fully from their participation in research requires continuous monitoring and development.

An underlying assumption in laws for the protection of human participants in research is race neutrality. Indeed, the Common Law regulations protecting human participants trace their origin to reaction against the unethical practices used in the *U.S. Public Service Syphilis Study at Tuskegee*.[19] However, inappropriate use of racial categories in research continues. Shawneequa Callier's contribution to this special issue is an examination of the census categories promulgated by the federal Office of Management and Budget (OMB) and their implications for precision medicine research and practice. Callier argues that the pursuit of precision medicine requires health scientists and practitioners to reconsider how populations underrepresented in research are classified and how their data are presented and interpreted.[20] Serious consideration of these issues can represent a turning point in health research and the practice of medicine.

Nanibaa' Garrison and colleagues consider another barrier to equitable participation in research – the failure to manage data and biospecimens in keeping with the preferences of American Indian/Alaska Native/Native Hawaiian (AI/AN/NH) participants. Garrison and her co-authors present data from semi-structured interviews with tribal leaders, health professionals serving those communities, and policy experts on data sharing, access, oversight, and management.[21] Their findings suggest needed changes in policy and research practice.

3. Barriers to Health Care Delivery

As a country, we struggle with how to provide access to basic health care to more than 300 million people. Focusing on the integration of genomic and personalized medicine in health care requires caution to avoid overemphasizing the benefits of genomics and personalized medicine in reducing health care disparities. Overemphasis on genetics can detract from the collective responsibility to address fundamental causes of health care inequities and to use the law to promote conditions that support health. Wylie Burke and colleagues argue in their article that there are strong reasons to favor policy-related and community-level efforts that increase individual capability to implement lifestyle change. "Interventions that are integrated within broader initiatives to address root causes of health disparities (eg, early childhood education, housing, employment, and community development) may be the most successful."[22]

Conclusion

Precision medicine and genomic medicine represent significant advances in the practice of health care. However, the implications of these advances for health care disparities and health equity have yet to be determined. Results and conclusions presented in these symposium proceedings suggest that law can play a significant role in the development and implementation of precision or genomic medicine practice. It is our hope that the following articles stimulate discourse and scholarship that consider the crucial role of law in supporting the elimination of health care disparities and achievement of health equity.

Results and conclusions presented in these symposium proceedings suggest that law can play a significant role in the development and implementation of precision or genomic medicine practice.

We were honored to edit this special issue of symposium proceedings. We thank the participants in the conference who catalyzed preparation of this issue and the authors for submitting their groundbreaking work. Too little work in the past has considered how law can advance health equity in genomics and precision medicine. We are grateful to the editorial board, associate editors, editor-in-chief, and publishers of *Ethnicity & Disease* for the opportunity to assemble and present this research to the com-

munity of scholars interested in the advancement of precision medicine, genomic medicine, and health equity.

Acknowledgments

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Conflict of Interest

No conflicts of interest to report.

Author Contributions

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