Laurie M. Connors
RN

TIGER

Translation and Integration of Genomics is Essential to Doctoral NuRsing

Pedagogy for Infusing Genomics in Nursing

Video: Envato

The journey…

AAS, RN, BSN, MSN, FNP-BC, RNFA, DNP, APNG, AGN-BC, AOCNP, FAANP, FAAN

RN – 1992
FNP - 1997
DNP (Doctorate of Nursing Practice) 2012
APNG (Advanced Practice Nurse in Genetics) 2013
AGN-BC (Advanced Genetic Nurse-Board Certified)
Summer Genetic Institute, NIH/NINR 2015

Taking a different path… to Vanderbilt 2016
Advanced Oncology Certified Nurse Practitioner 2018
Fellow
- American Association of Nurse Practitioners 2019
- Fellow in the American Academy of Nursing 2022

… and hopefully, PhD 2023 ~or 2024

Background

Implementation of personalized health care →
nurses must understand principles of genetics and genomics
(Anderson et al., 2015)

Access entails competent workforce (Green et al., 2020)

Health care providers not prepared to implement genomics into practice (Rehm, 2017)

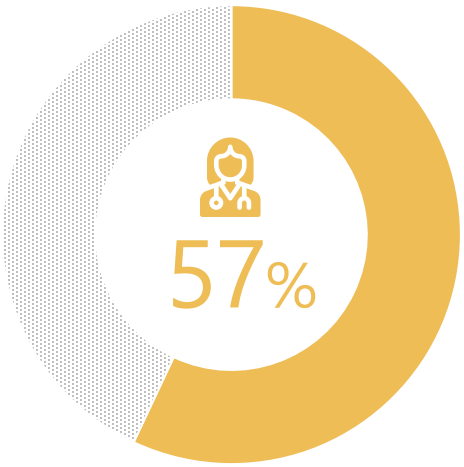
Anderson, G., Alt-White, A. C., Schaa, K. I., Boyd, A. M., & Kasper, C. E. (2015). Genomic for nursing education and practice: measuring competency. *Worldviews Evidence Based Nursing, 12*(3), 165-175. https://doi.org/10.1111/wvn.12096

Green, E.D., Gunter, C., Biesecker, L. G., Di Francesco, V., Easter, C. L., Feingold, E. A., Felsenfeld, A. L., Kaufman, D. K., Ostrander, E. A., Pavan, W. J., Phillippy, A. M., Wise, A. L., Dayal, J. G., Kish, B. J., Mandich, A. … …Teri A. Manolio (2020). Strategic vision for improving human health at the forefront of genomics. *Nature,* 586, 683–692. https://doi.org/10.1038/s41586-020-2817-4

Rehm H. L. (2017). Evolving health care through personal genomics. *Nature reviews. Genetics*, *18*(4), 259–267. https://doi.org/10.1038/nrg.2016.162

NURSING WORKFORCE

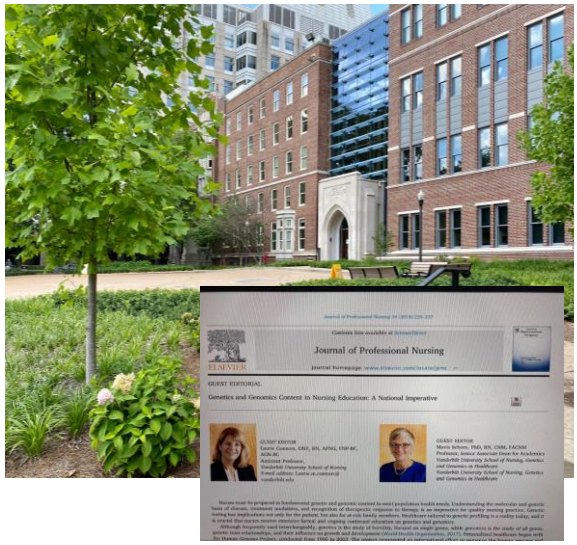
- A national survey of US nursing workforce reported **over half of nurses, 57%,** believed their genomic knowledge base was **fair or poor**.



Calzone, K. A., Jenkins, J., Culp, S., Bonhamm, V. L. Jr, & Badzek, L. (2013). National nursing workforce survey of nursing attitudes, knowledge and practice in genomics. *Per Med.*10(7):10.2217/pme.13.64. doi:10.2217/pme.13.64

VANDERBILT'S ADVANCED NURSING PRACTICE SPECIALTIES

- Family Nurse Practitioner
- Pediatric Nurse Practitioner
- Psychiatric Mental Health Nurse Practitioner
- Adult Gerontology Nurse Practitioner
- Emergency Nurse Practitioner
- Neonatal Nurse Practitioner
- Women's Health Nurse Practitioner
- Nurse Midwifery



Connors, L. M. & Schorn, M. (2018). Genetics and Genomics Content in Nursing Education: A National Imperative. *Journal of Professional Nursing: Official journal of the American Association of Colleges of Nursing*, *34*(4), 235–237. https://doi.org/10.1016/j.profnurs.2018.06.003

METHODS

- Demographic Questionnaire
  - genomic education and training
  - self-perceived level of genomic competency
- Genetic Nursing Concept Inventory GNCI (Ward et al., 2014)
- Electronic version of the GNCI© created in Research Electronic Data Capture (REDCap™), a web-based platform to support data collection for research
- IRB approval
- Email with secure link to access the online survey in REDCap™ was sent via university-based listserv to

236 faculty and 831 students at VUSN

- Participants to complete the entire survey in ≤ 30 minutes
- Data collected over 4-weeks

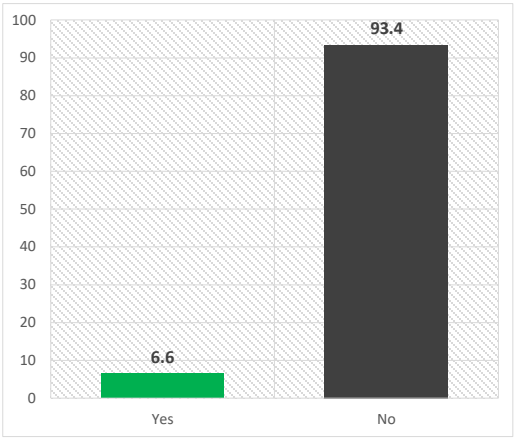
Harris, R., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap): A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics, 42*(2), 377-381.

Ward, L. D., Haberman, M., & Barbosa-Leiker, C. (2014). Development and psychometric evaluation of the genomic nursing concept inventory (GNCI). *Journal of Nursing Education*, *53*, 511-518.

GENOMIC CONTINUING EDUCATION

Q: **Have you completed continuing education programs on genetics and genomic topics?**

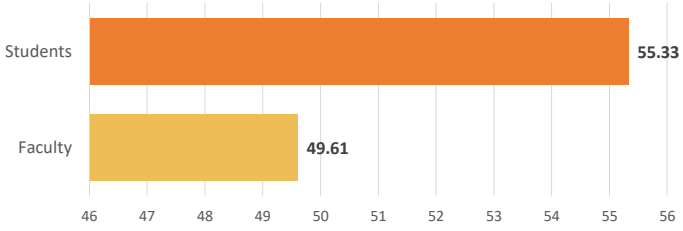
Illustration: KTSDesign / Science Photo Library



Yes: 8/121 **No:** 113/121

**Missing data on 1*

GNCI© RESULTS



Students' mean score of 55.33 was higher than the **faculty's mean score of 49.61**

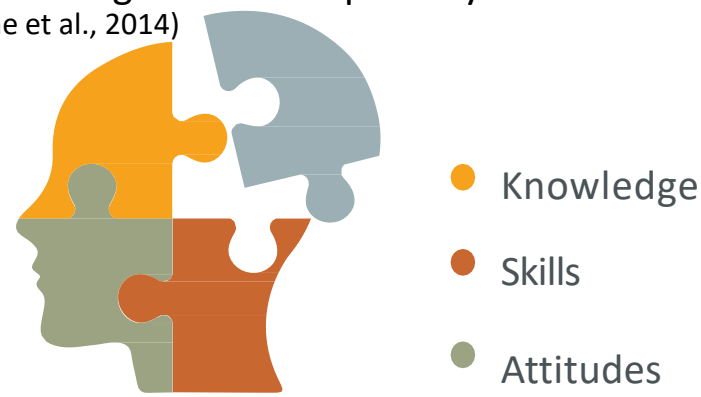
ADDRESSING THE GAP AT VUSN – ACADEMIC COURSES

- **NURS8073 Genetics in Clinical Practice**
  Elective course focuses on the genetic basis of disease, genetic risk assessment and counseling, clinical genetics and management guidelines. The course will serve as the basis for the health care professional to holistically integrate genetic/genomics, epigenetics, and scientific concepts into personalized health care.
- **NURS8074 Foundations of Genetics/Genomics in Health Care**
  Elective course focuses on the molecular basis of genetic disease, inheritance of disease and distribution of genetic diseases in populations. The course aims to expose students in the health sciences to genetic/genomic concepts for integration in clinical care and research endeavors. The ethical, legal and social implications of genetic testing will be addressed along with the available technology and applications of data science.
- **NURS8077 Cancer and Implications for Care**
  This course provides a comprehensive overview of cancer to include screening, diagnosis, staging, treatment and social determinants of care. Genomic applications in oncology are incorporated throughout the course to include diagnostic, prognostic, and therapeutic implications. Integration of palliative care and cancer survivorship are addressed. The focus of the course is clinical oncology within a personalized health care environment. D
- Delivery Method: Asynchronous and online

Competency

Limited progress on integration of genomics into nursing practice
(Calzone et al., 2013)

Nurses lack genomic competency in academics/research/practice
(Calzone et al., 2014)



The Essentials: Core Competencies for Professional Nursing Education

Published by the American Association of Colleges of Nursing (AACN) provide an educational framework for the nursing discipline

Based on principles of competency-based education, sought to bridge the gap between education and practice**.**

- **Domain 1: Knowledge for Nursing Practice**
- **Domain 2: Person-Centered Care**
  - 2.2 Communicate effectively with individuals,
    - 2.2i "Apply individual information, such as genetic/genomic, pharmacogenetic, and environmental exposure information in the delivery of personalized health care" (AACN, 2021, p. 30).
- **Domain 3: Population Health**

Person-Centered Care

"Nurses have the skills and experience communicating complicated medical information to patients and their families in ways they understand."

Decision Making After *BRCA* Genetic Testing: Down the Road of Transition


Decision Making After *BRCA* Genetic Testing: Down the Road of Transition

Purpose: Evaluate individuals who have completed hereditary cancer risk assessment and *BRCA* genetic testing

Preparation for Decision Making & Decisional Conflict Scales

- Scores c/w high levels of preparation for decision making
  - and low decisional conflict
- Subgroup analysis demonstrated difference in the measured objectives based on cancer status, but not based on BRCA status.

TABLE 2. Subgroup Analysis of Decisional Conflict Scale (DCS) and Preparation for Decision-Making Scale (PDM)

		Instruments			
Group	n	PDM	p	DCS	p
Aged 50 years or younger	16	77.5	0.52	21	0.442
Aged older than 50 years	11	80		17.3	
Married	18	77.5	0.624	18.6	0.698
Not married	9	80.6		21.4	
BRCA positive	6	77.9	0.861	23.7	0.446
BRCA negative	2	78.7		18.3	
No cancer	2	76.2	0.096	21.7	0.187
Cancer	6	86.7		12.04	

Connors, L. M., Voian, N., Shi, Y., Lally, R. M., & Edge, S. (2014). Decision making after *BRCA* genetic testing. Down the road of transition. *Clinical Journal of Oncology Nursing, 18*(3), E58–E63. https://doi.org/10.1188/14.CJON.E58-E63

Person-Centered Care

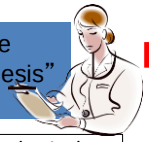
Persons engaged in decision-making about cancer screening and treatment had better outcomes in regards to quality of life, and physical and social functioning.

Hack, T. F., Degner, L. F., Watson, P., & Sinha, L . (2006). Do patients benefit from participating in medical decision making? Longitudinal follow-up of women with breast cancer. *Psycho-Oncology 15*, 9-19. doi: 10.1002/pon.907

Paradigm Shift

Conventional Clinical Practice Paradigm

figure out possible diagnosis"hypothesis" and order test(s)



Gather history and physical exam to generate a differential diagnosis

Order appropriate test(s) based on "hypothesis"

Receive result and refine differential diagnosis

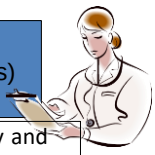
Includes interpreting results and determining additional testing or course of treatment

"Predictive" Healthcare Paradigm

"test first"

Obtain Broad Consent for testing (prior to Exome/ Genome sequencing)

Generate result and then test hypothesis (diagnosis) based on results



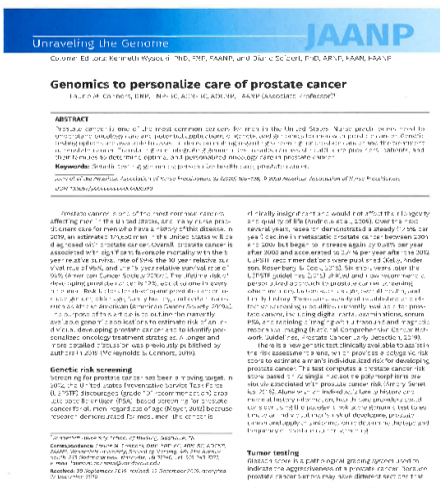
Collect/verify detailed history and physical in the context of the test results to confirm diagnosis

Precision Oncology
Emerging Model of Cancer Treatment

Tumor tissue routinely acquired for molecular diagnostics

All actionable mutations assessed

Therapy selected based on molecular characteristics


Unraveling the Genome JAANP

Genomics to personalize care of prostate cancer

ABSTRACT

Genetic risk screening

Tumor testing

Connors, L. M. (2020). Genomics to personalize care of prostate cancer. *Journal of the American Association of Nurse Practitioners*, *32*(2), 106-108.

Genomic-based health care for All

Near universal testing after a cancer diagnosis

Disparities in testing access and care

Precision Medicine Testing and Disparities in Health Care for Individuals With Non-Small Cell Lung Cancer: A Narrative Review

Received less genetic testing and targeted therapy if they were of a

- **lower socioeconomic status,**
- **had public health insurance or no health insurance,**
- **were Black,**
- **or lived in rural communities**

Curtin, M., Somayajii, D. & Dickerson, S. S. (2022*) Oncology Nursing Forum*, *49*(3):257-272. doi: 10.1188/22.ONF.257-272.

Population Health

Globally

- Nursing is extremely important to the health of the world's population.
- 59% of all healthcare professionals are nurses
- workforce of nurses is currently around **28 million**

Nationally

- Nursing is the nation's largest healthcare profession,

nearly **4.2 million registered nurses** (RNs).

Advanced practice nurses- Nurse Practitioners (NPs) 355,500

American Association of Nurse Practitioners. (2022)

World Health Organization (2020). State of the World's Nursing Report – 2020

https://www.who.int/publications/i/item/nursing-report-2020

TIGER

Translation and Integration of Genomics is Essential to Doctoral NuRsing

Two Parts:

1

Conference:
Workshop at the American Association of Colleges of Nursing (AACN) January Doctoral Education conference.

2

Webinars/Web conferences: February-December
Monthly webinars and web conferencing sessions

This program is supported by the National Human Genome Research Institute of the National Institutes of Health under award number R25HG011018 (PI: Connors). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Primary Aims

1: Develop and implement educational programs to achieve competency in genomics for doctoral nurses.

2: Prepare doctoral nurses to integrate genetic and genomic content into academics and clinical practice.

3: Determine areas of strengths and weaknesses of doctoral nurses in foundational genomic concepts to inform future educational planning.

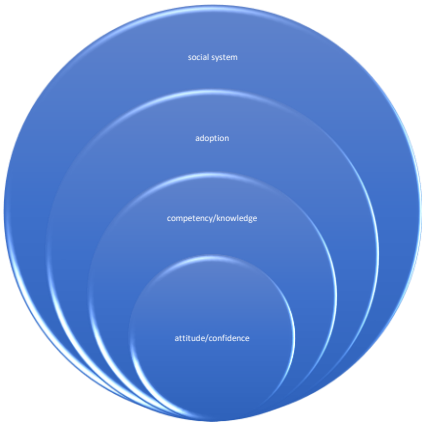
Application Criteria

- Hold a DNP, PhD, DNSc, DNS, EdD degree
- Teach at least 1 course in the DNP or nursing PhD program
- Active member of a professional nursing organization
- Actively mentoring DNP or nursing PhD students

Rogers' Diffusion of Innovations Theoretical Framework

Innovation describes as "an idea, practice, or project that is perceived as new by an individual" (Rogers, 2003, p.12).

Genomics is innovation that continues to evolve over time



Teaching philosophy

Reflected in the quote in *The Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity* (2021, page 189):

"You cannot transmit wisdom and insight to another person. The seed is already there. A good teacher touches the seed, allowing it to wake up, to sprout, and to grow".

—Thich Nhat Hanh, global spiritual leader and peace activist

Educational programs

Instructional activities

- interactive
- apply a variety of instructional techniques
- include multiple exposures to the content material

Post-Training Expectations

- Able to integrate key principles of TIGER into doctoral nursing curriculum, scholarship or practice within one-year post- course
- Complete 6 and 12-month post-course goal updates

SMART Goals

frontiers in Genetics

BRIEF RESEARCH REPORT
published: 17 December 2019
doi: 10.3389/fgene.2019.01265

Using the Findings of a National Survey to Inform the Work of England's Genomics Education Programme

*Siobhan Simpson, Anneke Seller and Michelle Bishop**

Genomics Education Programme, Health Education England, Birmingham, United Kingdom

A national coordinated approach to workforce education and training in genomics is essential for the successful implementation of whole genome sequencing and, more broadly, genomic medicine within the National Health Service (NHS) in England. However, there have been no workforce wide assessments of genomics education and training needs that can be used to inform the strategic approach to be taken. In order to assess these needs the Genomics Education Programme (GEP) undertook a cross-professional training needs analysis. Responses from 2,814 individuals allowed the identification of four themes related to NHS staff's perceived education and training needs in genomics, those who: a) have a role in genomics and are competent; b) have a role in genomics but identified a specific learning need; c) could not identify whether genomics is relevant, but want to know more, and; d) do not see genomics as relevant to their role and do not believe they need to learn about it. Individuals are motivated to undertake training for their own continuing professional development and if they perceive training to have a direct impact on patient care. Overall, online learning is the preferred mode of delivery, but there are still many individuals who value face-to-face teaching. This paper demonstrates how the GEP has used these findings to provide an evidence base to inform the ongoing strategy for genomics education and training in the NHS, including the development of competency frameworks and a range of resources to address the diverse genomics learning needs of the healthcare workforce.

Keywords: training needs assessment, genomics education, genomic medicine, survey, education strategy, multidisciplinary

OPEN ACCESS

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Responsible Conduct of Research

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Ethical, Legal and Social Issues/Responsible Conduct of Research

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Jean Jenkins PhD, RN, FAAN
Professional Role and Future Directions

TIGER
Translation and Integration of Genomics is Essential to Doctoral NuRsing

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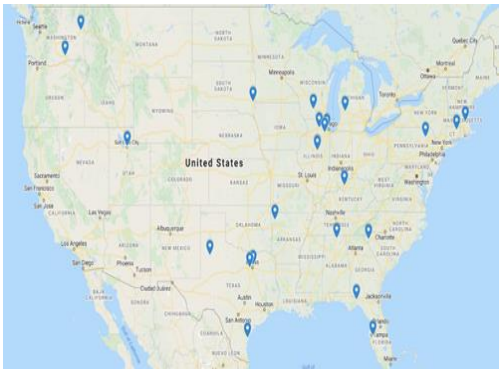


TIGER
Translation and Integration of Genomics is Essential to Doctoral NuRsing

Sample
- 25 doctoral nurses: PhD (n=15) , DNP (n=9), and PhD/DNP (n=1) representing 14 different states

Procedures: January genomics workshop at annual doctoral education conference followed by 11 months of learning activities.

Measures: Repeated measures utilizing the Genomic Nursing Concept Inventory (GNCI), demographic questionnaire, and program evaluation survey.

Data Analysis:
Demographics and GNCI survey response reported as frequencies for overall sample with aggregate data results.
Age range 36 to 69 years
Majority had not completed a previous genomics course (71.43%, 15/21)
Baseline perceived genomic proficiency Poor 4/21 or Fair 8/21 in >50% of participants

GNCI group mean
pretest 60.58% and increased to 77.41% on posttest
- *pretest range of scores=32-90%*
- Diverse range in genomic knowledge- challenging to scale content to engage and benefit entire group

TIGER Alumni

2pm	**Integrating TIGER into the Nurse Anesthesiology Curriculum** Jeanne Antolchick, Ph.D., APRN, CRNA Barry University, College of Nursing & Health Sciences
2:30pm	**Developing and evaluating a simulation for nursing genomics competencies** Andrew A. Dwyer PhD, Christine Repsha, Cassandra Buck Boston College, William F. Connell School of Nursing
3pm Break	
3:20pm	**Genomics to Nursing and Nursing to Genomics: A Review** Anitha Saravanan PhD, RN, ANP-BC School of Nursing, College of Health and Human Sciences, Northern Illinois University
3:50pm	**Assessing and Addressing Genetics and Genomics Curricular Gaps in a Family Nurse Practitioner Program** Jessica Sullivan, DNP, APRN-FPA, FNP-BC, CNE Kirsten Clerkin, DNP, APRN, FNP-BC Seon Yoon Chung, PhD, RN, CNE, CHSE
4:20pm	**TIGER results/TIGER faculty**
4:50-5pm	Wrap up /conclusion

GOING FORWARD

- Let's build nursing capacity to translate and integrate genomics in clinical care, education, and research

ISONG
INTERNATIONAL SOCIETY OF NURSES IN GENETICS

- Build our community
- It's in our nursing DNA

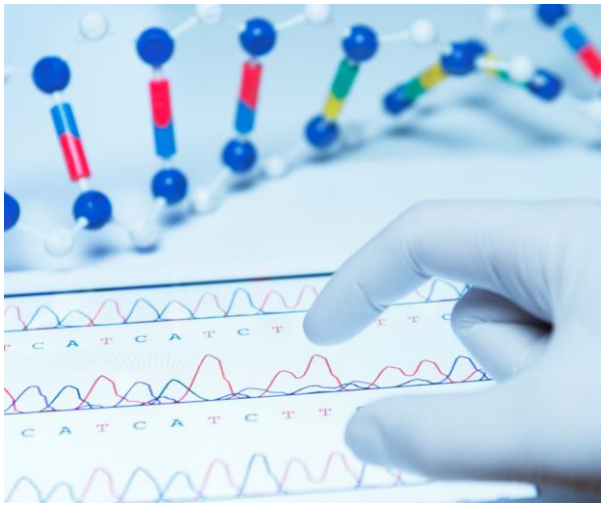
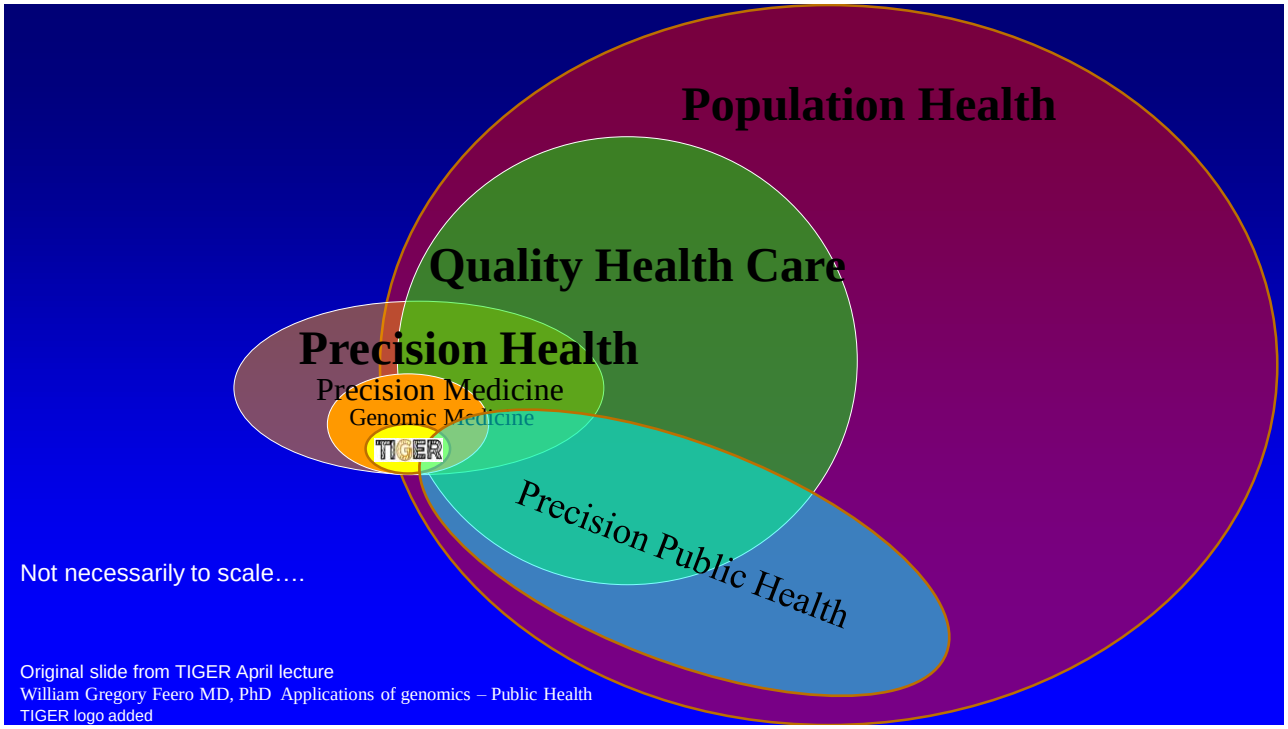


Photo: Turtle Rock Scientific/Science Source/Science Photo Library


Population Health
Quality Health Care
Precision Health
Precision Medicine
Genomic Medicine
TIGER
Precision Public Health
Not necessarily to scale….
Original slide from TIGER April lecture
William Gregory Feero MD, PhD Applications of genomics – Public Health
TIGER logo added