Rapporteurs: Jacqueline Odgis
and Elian Silverman
Program Analysts, NHGRI

Genomic Medicine VIII: NHGRI's Genomic Medicine Portfolio
June 8-9, 2015, Rockville, MD
Executive Summary

The eighth Genomic Medicine Meeting convened leaders in Genomic Medicine to: 1) review NHGRI's genomic medicine portfolio and identify gaps and opportunities for collaborations among them; 2) identify related programs and opportunities for collaborations with NHGRI programs; 3) identify research needs in genomic medicine; 4) enhance approaches to capturing and disseminating best practices for genomic medicine; and 5) examine potential methods for assessing impact of programs.

The meeting focused on six research programs and two meeting-oriented activities of NHGRI, referred to as "Focus Programs": the Undiagnosed Disease Network (UDN), Newborn Sequencing in Genomic Medicine and Public Health (NSIGHT), Clinical Sequencing Exploratory Research Consortium (CSER), Electronic Medical Records and Genomics Network (eMERGE), Implementing Genomics in Practice Network (IGNITE), Clinical Genome Resource (ClinGen), NHGRI Genomic Medicine Meetings and Working Group (GM Mtgs), and the Global Genomic Medicine Collaborative (G2MC), These eight programs, and 22 "Related Programs" relevant to NHGRI's genomic medicine portfolio, were asked to prepare two page summaries of their objectives, organization, and barriers to implementation, available athttp://goo.gl/Td8U11.

Objectives and Barriers in Genomic Medicine
A matrix of objectives related to genomic medicine implementation across the 30 programs was compiled from the program summaries and is available at http://goo.gl/3rL24E. Five objectives were common to four or more Focus Programs: 1) integrating genomic data into patient care; 2) incorporating actionable variants into electronic medical records (EMRs) and developing genomic clinical decision support (CDS); 3) educating clinicians and patients; 4) assessing outcomes of using genomic information in clinical care; and 5) defining and sharing processes of implementation and sustainability.

A similar matrix of barriers (http://goo.gl/yzWkYn) identified four barriers shared by three or more Focus Programs: 1) unclear penetrance of actionable genes; 2) interpretation of variants in ancestrally diverse populations; 3) changes in evidence on importance of variants; and 4) regulations impeding return of results.

Objectives and barriers shared across the 30 programs may identify opportunities for collaborations. For example, several Related Programs share one or more of the five "most common" objectives above, particularly the Air Force Medical Service Personalized Medicine Program (AFMS) and the Institute of Medicine Genomic Roundtable (IOM). These two are in fact actively collaborating with Focus Programs already. Similarly, shared barriers may be best addressed by multi-program collaborations.

Recommendations for Research Needs to be Pursued
Most of the discussion centered on recommendations for research to address barriers and scientific opportunities. These were roughly grouped into six areas as shown below and will be sent to meeting participants to propose prioritization. Recommendations receiving repeated emphasis included:

- Generating evidence
  - Maximize sharing of quality improvement (QI) projects by engaging health systems
  - Establish and maintain a knowledgebase of ongoing genomic medicine studies

    - Measure outcomes of value to patients, clinicians, payers, healthcare delivery systems, providers, regulators, professional societies; involve them in design prior to launching studies
- Data sharing and improved phenotyping
    - Support standards for phenotype description that are common and comparable across model organisms to humans
    - Develop patient-oriented ontology and similar tools to facilitate patient-driven efforts
    - Expand, support, and expect common measures and other program-wide efforts as in IGNITE; include plans to produce program-wide data and common efforts in solicitations
- Identifying and carrying out innovative studies
    - Engage basic scientists more actively in planning of genomic medicine research programs
    - Add family history to large-scale sequencing effort to produce > 20K individuals with both, determine when family history adds to or is more useful than sequence information
    - Study impact and consequences of changes in variant annotation and duty to inform
- Facilitating genomic medicine implementation in the clinic
    - Create an implementation commons for sharing tools for implementing genomic medicine
    - Build tools for facilitating ClinVar submissions
    - Study effectiveness of various clinical reporting formats in improving clinician understanding
- Health disparities and patient engagement
    - Identify specific health disparities research questions related to genomics
    - Develop dedicated programs for non-EA populations to fill key gaps
    - Increase patient engagement in NHGRI genomic medicine programs
- Education and Training
    - Explore joint training opportunities in genomic medicine with other organizations
    - Identify and disseminate best practices for clinician education and guidance

Collaborations and Next Steps

In addition to recommendations for increased interactions among programs, including use of common elements, multi-program meetings, and involvement of basic scientists in study development and phenotyping ontologies, attendees identified the Patient-Centered Outcomes Research Institute (PCORI) and Genome Canada as key potential collaborators. PCORI would be an excellent partner in developing the patient-oriented ontology described above. Collaborations with Genome Canada and the Canadian Institute for Health Research (CIHR) could help to increase interactions with the Structural Genomics Consortium, GA4GH, and GAPH, perhaps in a joint scientific symposium.

Teri and Howard M. will continue communications with this group and will draft a short (~1,200 words) manuscript with panel members and moderators. Planning will begin for a spring 2016 GMIX meeting to engage basic scientists in functional characterization, nomenclature, phenotyping, and other topics. The possibility of a scientific meeting on genomic medicine implementation will be explored.

The Duke group will circulate the list of recommendations for GMVIII attendees to review and prioritize. Teri will redistribute the GMVIII matrices to the NHGRI genomic medicine programs for updating, to ensure all activities are accounted for and identify activities that are major program emphases.