Inter-Society Coordinating Committee for Practitioner Education in Genomics (ISCC) Meeting Minutes

January 24, 2017

Bethesda, MD

Meeting Format

This meeting focused on the genomics education activities of ISCC members. All member organizations were invited to give a succinct presentation covering their experiences or perspective related to practitioner education in genomics. Many chose to present, and others participated through discussion. The agenda comprised ten-minute member presentation slots, in groups of three to four, each followed by a prolonged discussion period. There was additional dedicated time for strategies discussions at the end of the day.

Three presentation models were suggested for societies to follow:

1. "We have active programs addressing provider genomic literacy – here's what's working"
2. "We are developing and planning programs addressing provider genomic literacy – Here's what we are doing and what we need," and
3. "We are not addressing provider genomic literacy or practice – here's why, and what, if anything, we plan to do about it."

Some ISCC members participated remotely via a WebEx electronic screen sharing session, which suffered technical difficulties at the outset, but were soon resolved.

Welcome, Introductions, and Framing - Ann Karty, MD, FAAFP

Dr. Ann Karty, of the American Academy of Family Physicians and external co-chair for ISCC, opened the meeting. She reviewed the ISCC's progress in the past year. Originally, the committee had only four working groups; the number of working groups has now expanded to five. The focus of this meeting was to share activities, needs, and interests among member organizations, and to learn about opportunities and needs for funding provider education activities.

Accreditation Council for Continuing Medical Education (ACCME) – Steve Singer, PhD

The Accreditation Council for Continuing Medical Education (ACCME) is the accreditor of the national Continuing Medical Education (CME) system. ACCME accredits 700 healthcare-focused organizations that provide CME to a national audience and also oversees the recognition of 41 state medical society accreditors who, in turn, accredit local organizations—primarily community hospitals and health systems—that provide CME within their state. Together with the American Nursing

Credentialing Center and the Accreditation Council for Pharmacy Education, ACCME also oversees *Joint Accreditation for Interprofessional Continuing Education* for healthcare organizations that provide interprofessional continuing education (IPCE) for, and by, the healthcare team

Dr. Singer shared data from the 2015 ACCME Annual Report, including the number of CME activities and hours of instruction. Dr. Singer also provided multiple types of educational activity formats. He noted that nearly 40 percent of CME learning occurs in institutions providing CME courses to their staff through regularly-scheduled, in-person series, such as tumor boards and grand rounds. Another interesting trend to note is that nearly half of the 25 million interactions between learners and CME occurs with non-physician/other health professionals—evidence that CME is inclusive of a number of professional audiences. Data from ACCME's Program and Activity Reporting System (PARS) shows that in 2015, 30 percent of national providers and 20 percent of local providers offered at least one course related to genetics and genomics.

It is important to understand that immediate "questions in practice" are what will motivate health care providers to seek continuing education in genetics and genomics. CMEs that are relevant, efficient, effective, rewarding, and personalized attract more participation. CME approaches are evolving with learners' changing needs. Today, education is continuous, integrative, and team-based. Given these considerations, what is the best approach to integrate genomics into practice? Although it is important to provide undergraduate and graduate (resident) medical students to become competent in genomic medicine, this approach will not address the current crisis—that practicing clinicians are ill-prepared to address their practice gaps related to genetics and genomics.

As an accreditor, Dr. Singer suggested the best thing that ACCME can do is create a supportive, nurturing environment that allows educators to serve the needs of their learners. Clearly, there are a number of public health and practice-based imperatives that compete for attention. However, the ISCC community can substantially advance the closing of this gap if it directs its attention toward addressing the local, practice-based needs of healthcare providers where, and how, they work.

Educating Future Physicians in an Era of Genomic Medicine – Shoumita Dasgupta, PhD

Dr. Dasgupta is a member of the Association of Professors of Human and Medical Genetics (APHMG). The mission of this organization is to promote human and medical genetics educational programs in North American medical and graduate schools. Allopathic medical schools, osteopathic medical schools, and academic medical centers participate in APHMG as institutional members. APHMG's focus is on the post-baccalaureate level (residency, lab fellowships, medical school), more so than at the undergraduate level. NHGRI's online factsheet on Genetic Testing aligns with APHMG's idea of what medical students should know about genetic tests. NHGRI and APHMG have shared goals in education.

APHMG conducted a study of the state of genetics education in medical schools that was published in *Genetics in Medicine*: "Training future physicians in the era of genomic medicine: trends in undergraduate medical genetics education." The study found that most people who teach genetics courses in medical school are individuals with an MD or PhD who specialize in genetics, but there are also a good number of educators who teach genetics but are experts in a non-genetics discipline.

Genetics is usually taught in the preclinical years, the first and second years of medical school. This could be a lost opportunity of the translational aspect of genetics. The study also asked how genetics information is presented to students. It found that more institutions are teaching genetics through an integrated curriculum, which puts genetics at risk of becoming "diluted". The study concluded that genomics educators should advocate for curricula to continue to evolve alongside genomic science to avoid diluting genetics curricula, and to provide resources for training in genetics and genomics during the clinical years of medical school.

APHMG curates a "Genetics Education Resource Exchange" with question banks, lab reports, cases, and video reviews for educators to use in their courses. At meetings, APHMG hosts sessions to share best practices in medical genetics education with participants. APHMG has been talking to ClinGen, an NIH Common Fund project, to look for collaborations. The organization is also collaborating with the Association of Biochemistry Educators (ABE). APHMG and ABE are having a joint meeting in May 2017 in Clearwater Beach, FL to develop cases and assessments for integrated biochemistry and genetics/genomics curricula. Other collaborating groups include the International Association of Medical Science Educators (IAMSE) and the Undergraduate Training Residents in Genomics (UTRIG) working group of the Association of Pathology Chairs.

Future directions for APHMG include trying to incorporate genetics/genomics curricula in the clinical years of medical school, developing materials with collaborators, and applying EPAs to competencies and creating associated assessments.

The TRIG Approach: Progress and Potential – Richard Haspel, MD, PhD

Dr. Haspel leads the Training Residents in Genomics (TRIG) Working Group of the Association of Pathology Chairs. TRIG takes a structured approach to teaching; aside from forming a national working group, it develops curricula, implements workshops, creates tools for others to implement such as online resources and Train the Trainer sessions, evaluates the provider workforce for its level of genomics competency, and disseminates its findings through publications. TRIG obtained $1.3 million in funding from the National Cancer Institute (NCI) to support the development of cancer genomics material.

Dr. Haspel shared an example exercise that TRIG developed for a breast cancer patient case study. This case introduces trainees to single gene testing, prognostic gene panel testing, designing a cancer gene panel, and to whole-exome sequencing.

To decrease barriers to information dissemination, TRIG developed a tool kit to help institutions teach the TRIG curriculum at their own sites. This toolkit includes an instructor handbook, workshop lectures, and handouts and references. TRIG peer-reviewed the curriculum with experts around the country and conducted a downloaders survey to assess how people have used the tool kit. That survey had a 20 percent (n=67) response rate and found that the toolkit was used in teaching for more than 1,100 trainees. All of the respondents said they would recommend the toolkit to a colleague.

Dr. Haspel spotlighted the "Online Genomic Pathology Modules", which are the TRIG's curricular resources that can be viewed here: www.pathologylearning.org/trig. TRIG is piloting these video modules at 11 residency programs. These modules show people how to use other genetics/genomics

web resources and also test students' knowledge. ISCC's Innovative Approaches Working Group developed "Universal Modules" by adapting TRIG curriculum to create universal teaching material that is appropriate across specialties.

A $100,000 supplement from NHGRI allowed TRIG to develop non-cancer related tools. TRIG welcomes collaboration with other specialty areas and has already held workshops at the American Academy of Neurology, American Academy of Ophthalmology, and American Heart Association meetings. TRIG has also started a new initiative called the Undergraduate Training in Genomics (UTRIG) Working Group. The goal is to adapt the TRIG curriculum to teach genetics and genomics to medical students. Additional funding could help advance TRIG's activities.

American College of Medical Genetics and Genomics (ACMG) and Global Genomic Medicine Collaborative (G2MC) – Bruce Korf, MD, PhD

Dr. Korf presented the medical genomics education efforts undertaken by the ISCC, the American College of Genetics and Genomics (ACMG), and the Global Genomic Medicine Collaborative (G2MC). He reviewed the ISCC Competencies in Genomic Medicine that the group developed and published in *Genetics and Medicine* in 2014. The framework that ISCC developed does not fulfill core competencies because not all components would apply to all physicians, but the authors of the framework intended to make it as broad as possible. It would be interesting to see how broadly the Competencies in Genomic Medicine have been implemented.

ACMG is a professional society with members that include medical geneticists, laboratory geneticists, and genetic counselors. To further medical genomics education, ACMG has held annual meetings, case conferences, and genetics/genomics review courses. The organization also supports a summer genetics scholars program.

The purpose of G2MC is to encourage professionals from around the world to implement genomic medicine. G2MC has an Education/Workforce Working Group that Dr. Korf co-leads with Vajira Dissanayake (Sri Lanka). The next G2MC meeting is in Athens, Greece in April 2017. The Education/Workforce Working Group is interested in developing case studies that work in an international context. For example, these international case studies would take into account genetic disorders that are more common in certain populations and would also account for different cultural contexts. G2MC hosts Grand Rounds via WebEx every month and uploads these videos to YouTube.

Dr. Korf's home institution is the University of Alabama at Birmingham (UAB). UAB has a T32 in Genomic Medicine to support postdoctoral training for MDs and PhDs. UAB also has an immersion, research-oriented course in Genetics & Genomics in Clinical Research that includes lectures, demonstrations, and an introduction to bioinformatics. UAB has an undergraduate major in genetics and genomics, a graduate and post-doctoral residency and fellowship program, and a Program in Precision Medicine.

American Association for Clinical Chemistry- Nguyen Nguyen, PhD

Nguyen Nguyen of the American Association for Clinical Chemistry (AACC) provided an overview of the AACC's goals and membership, followed by a summary of its educational programs, including those relevant to genomics. The AACC's vision is to enable better health through laboratory medicine and to provide global leadership to advance the profession of clinical laboratory science and medicine. The group has a global membership of 8,000 members, and 29 percent of these members are international.

The AACC employs a number of educational activities, including an annual scientific meeting and clinical lab expo; certificate programs such as in fundamentals of molecular pathology; webinars, including an upcoming webinar on "Cell-free DNA-based Prenatal Screening in the General Pregnancy Population;" ACCENT credits to document continuing education activities; and CME credits. Lastly, AACC has a Clinical Chemistry Trainee Council (CCTC), which is a free web-based educational resource that includes a question bank and other content.

American College of Clinical Pharmacy- Samuel Johnson, PharmD, FCCP, BCPS, and Chris Aquilante, PharmD, FCCP

Christina Aquilante and Samuel Johnson of the American College of Clinical Pharmacy (ACCP) presented about this group's efforts to address genomic literacy in providers. The group advocates for residency programs and certification for its members that can provide them with more in-depth knowledge. ACCP has developed a pharmacogenomics textbook, has a separate research institute that does practice-based research that is looking at ways to implement pharmacogenomics in the clinic.

Aquilante talked about her experience working with a certificate program at the University of Colorado to teach pharmacogenomics as well as her work in the international realm. She described AACP's push to encourage implementation of genomic medicine and noted that there are now three residency programs in pharmacogenomics.

Geisinger Health System: A Clinical Genomics Educational Opportunity: Monthly GenomeFIRST Case Conference- Murugu Manickam, MD

Dr. Murugu Manickam, of the Geisinger Health System provided information about their efforts in genomics and genomics education. He noted that Geisinger is the largest health care provider for Central and Eastern Pennsylvania and New Jersey and that its population tends to stay within the health system for many years, providing Geisinger with many unique opportunities. Geisinger has a MyCode program that returns clinically actionable genomic results in a population-based study of >125,000 participants.

They also have a GenomeFirst Medicine program that focuses on using genomic screening to improve healthcare. Geisinger has created a GenomeFirst Case conference series that is offered via Skype on the 2nd Thursday of each month at 8am. This series is aimed at non-experts and covers various genomics topics through case studies. Themes from presentations include value of screening and identification of early onset cancer disorders; cardiac cases with and without striking family histories;

psychosocial aspects of returning results to patients; and the importance of cascade testing. This series allows trainees to think about these topics within the frame of a modern, integrated health system.

During the discussion, many members expressed interest in Geisinger's educational program and the potential that Geisinger has because of the low migration rate out of the health system (~1%) and number of relatives in the system. Someone also inquired about how to have educational efforts come to fruition; discussions emphasized the importance of having a champion in an organization who takes the reins and makes it happen. In addition, collaboration is useful. For example, if an organization wants to launch an educational web resource and another group already has a working web site, then the groups can collaborate to expend less money on more infrastructure and instead use resources to work on the content.

Attendees noted that they have made many of their educational connections at previous ISCC meetings, and that having these meetings and posting rosters is very helpful for promoting first contacts and collaborations.

American Society of Human Genetics - Karen Hanson- MS, MBA, CGC

Karen Hanson, Health Professional Education Programs Manager with the American Society of Human Genetics (ASHG), provided background information on ASHG. With 8000 members worldwide, the mission and vision is to promote human genetics education. ASHG's programming goals are to improve clinical practice and patient outcomes. Healthcare professional education is a new programmatic goal started in 2014. ASHG uses the same best practices developed by colleagues and time proven including:

- Engaging partners who can assist with reaching the target audience
- Finding champions with those organizations
- Forming an advisory committee of content experts with members of the target audience
- Developing measurable learning objectives and assessment tools
- Developing content and disseminating and evaluating resources

Some of the healthcare professional education programs focus on cancer genomics for primary care in collaboration with Jackson Labs, next generation sequencing webinars with the Food and Drug Administration (FDA), and prenatal cfDNA screening hybrid online video series with the Mayo Clinic and Kaiser California.

ASHG has been able to actively engage advisory and work groups, utilize in-house education and genomics expertise, and use needs assessments to drive content. Their programs have received positive evaluations overall.

Ongoing challenges including reaching and engaging their target audience and evaluating programs to determine if they actually change clinical practice. One method they use to reach pediatricians and primary care physicians is to purchase mailing lists. It was noted that they are always seeking better and innovative ways to target and market to their audience. There is also a need to develop tools such as apps, for healthcare providers and evaluation tools that determine if ASHG is reaching its goals.

American Academy of Family Physicians – Ann Karty, MD, FAAFP

Dr. Ann Karty, American Academy of Family Physicians (AAFP), profiled the AAFP. AAFP is a member organizations for family physicians and has over 125,500 members of which 70,000 are active. AAFP has a rich history of genetics/genomics strategic planning, influencing at least two programs including the 1998 genetic primary care initiative and the 2005 AAFP annual clinic focus. Genomics has had a sporadic presence in the governance structure of the academy for over a decade. Primary care is uniquely position to lead and identify those actions that will assist patients most, assure the public health safety, and support AAFP members.

AAFP does not have a specific genomics program, which may be an area for improvement. Ongoing current educational genomic activities include:

- CME programs
- AAFP articles
- Policies and recommendations
- Committees

AAFP goals and strategies include a genomics work group to do the following:

- Assess the knowledge of genomics for AAFP members
- Study current administrative trends related to genomics
- Evidence-based clinical recommendations including ELSI
- Genetic testing considerations

Future considerations for AAFP include:

- Ongoing ISCC participation
- Inter-organization collaboration
- Family medicine relevant to pharmacogenetics research findings, evidence based information and education

During the discussion, it was asked: “if there was a course on pharmacogenetics, how would it change practice.” The response was it would not change practices because there are no embedded systems that make it feasible to do pharmacogenetics testing. This creates an opportunity for conversation with the health system to learn what the knowledge needs are and what systems are in place that prevent implementation.

Dr. Steve Singer pointed out that system issues can be an education target, where CMEs can be offered for teaching healthcare professionals how to make change happen in their current systems. Any implementation would have to happen at the local level though, based on what is feasible now. With education, healthcare professionals can be provided with the tools to think about what pieces need to come together. Ultimately, education has to be linked to action, it’s useless to keep teaching and doing the same thing over and over if healthcare professionals do not see the value in it.

There was some discussion about which group to introduce to change, one suggestion was trainees and medical students, which was countered with the suggestion that older physicians not be overlooked. Some suggestions for encouraging education include requirements for Maintenance of

Certification (MOC), ongoing professional practice evaluations, for instance The Center for Medicare and Medicaid (CMS) just released information about MIPS and MACRA incentive programs' clinical performance activities. These types of activities can be integrated into systems and healthcare professionals are learning how to approach genetics issues.

The Jackson Laboratory- Kate Reed, MPH, ScM, CGC

The Jackson Laboratory's purpose is to discover precise genomic solutions for disease and empower the global biomedical community in their shared quest to improve human health. Kate Reed's presentation informed attendees how The Jackson Laboratory uses clinical education to integrate genomics into healthcare. Currently, The Jackson Laboratory promotes health professional education, partners with clinical communities, facilitates collaborations and creates programs and resources. They offer a variety of programs which are available online, via E-books, and live and blended workshops. Program topics focus on clinical skills, cancer genomics, personalized medicine, and genetic testing technologies.

An evaluation of continued engagement has led to interactive workshops, monthly reinforcement, and longer term evaluation, with needs of the organization focusing on collaboration and support through identifying and targeting educational needs, engagement and dissemination and real world evaluation.

American Medical Association- Katherine Johansen Taber, PhD

Dr. Katherine Johansen Taber of the American Medical Association (AMA), provided an overview of the AMA and the broad constituency of members the organization represents. Dr. Taber discussed the type of courses offered to members: online, interactive, case-based and self-learning. The AMA's education center webpage was displayed and Dr. Taber pointed out that the education center has 807 CME offerings. Through collaboration with Scripps Translational Science Institute and The Jackson Laboratory, CME and CNE modules focus on the clinical application of genetic testing, which include the following topics: Somatic Cancer Panel Testing, Prenatal Cell-Free DNA Testing, and Prenatal Expanded Carrier Screening.

Dr. Taber concluded by discussing The Precision Medicine Initiative as a "game changer" and how the AMA can actively prepare providers. She also asked others to share how they are thinking about the Precision Medicine Initiatives and to keep it in mind while developing educational products for providers.

Heather Junkins, MS, Program Director, Division of Genomic Medicine, NHGRI: "Extramural Training Team Interactive Needs Assessment"

Heather Junkins provided an overview of the following NHGRI training programs and led discussions about how genomic literacy training needs might intersect with them. NHGRI currently offers the following categories of training grants:

- F series fellowships: awarded to individuals, not institutions

- K awards: career awards, 3-5 years, for developing genomic medicine researchers
- T32 awards: 5 year awards, programs are awarded funds and then the program selects the person for the slot. NHGRI has a specific training grant (T32) in genomic science; another in ELSI Research; another is the postdoctoral training program which focuses on genomic medicine and teaching students to interpret variants.
- The R25 mechanism is for a one-time course, or a workshop.

The NHGRI Diversity Action Plan is another program that exposes underrepresented minorities to a career in biomedical sciences. There are additional education activities occurring across the NHGRI and NIH genomic medicine granting programs. For example, CSER supports methods for bringing sequencing into the clinic, while eMERGE works with vendors and the Institute of Medicine to prioritize genomic information in usable ways. ClinGen is working on figuring out which variants are actionable. IGNITE is finding methods for incorporating patient's genomic findings into clinical care. For example, IGNITE-SPARK is a library of resources for clinicians, researchers, and educators.

NHGRI TRAINING PROGRAMS EXPLORATION

NHGRI's Extramural Research training program is seeking input on the best ways to expand and meet emerging needs of genomic medicine. ISCC meeting participants provided input on key questions of **who** needs training, **how** to train, how to address core genomic **competencies** and specific needed skill sets, what **formats** for training are best, what to require in **proposals**, and what is the **purpose of the training**.

WHO? There was general agreement that primary care providers, not just physicians, need training which will be especially effective if within the context of "team medicine", including physicians, nurses, pharmacists, and genetic counselors. Further, governance and leadership need to be included in educational efforts because of the important role they play in healthcare systems, communication, and strategic vision. Education needs to help each individual on the team become equipped with genomics knowledge and understand the role they play within the team, allowing the amplification of their value by working collaboratively. Different communities, for example, academic versus community hospitals, have very different needs.

HOW? Training can be best disseminated by finding the "distribution stream", specifically, by finding ways to tap into educational networks that are already working doing "change processing". Genomics is just a new curriculum/content. Quality programs and evaluations take effort and money and well-designed educational programs require rigorous design and evaluation. External funding is on the "push" side of non-genetic health professionals (funding exists for content creation and accessibility). However, for true penetration, we need a "pull," meaning those groups that want and request the education. The system needs to do things to generate "pull." For example, after NCHPEG received ELSI funding, they issued Request for Proposals (RFPs) to their member organizations. NCHPEG then received proposals to develop small targeted education projects. After creating the resource, the specialty organization marketed the resource. The recommendation was made to have both educational

and clinical expertise on a project to ensure optimal dissemination. In addition, having Maintenance of Certification ("MOC") requirements will encourage practice-based implementation.

WHAT ARE CORE COMPETENCIES AND SPECIFIC SKILL SETS? The participants discussed what knowledge a practitioner needs to meet a genomic competency. For example, for physicians to use radiology, they don't need to know physics, only basic anatomy. We need to understand what knowledge is needed by a practitioner to make sense of genomics. The most important concept may be how variation plays out in the patient's phenotype. Perhaps trainees could teach this foundational knowledge of genomics to those in practice, reversing the traditional model.

The scalability of the process of variant interpretation by providers was also discussed. There is a huge need for understanding because the numbers of genetic counselors to handle this need is lacking. New models of education and healthcare are needed to pave the way for the future.

WHAT FORMAT FOR TRAINING? Participants explained that a Genetics 101 course is *not* a prerequisite for practice-based genomics training. Case-based teaching approaches are good, but many different formats can work. The rich literature in adult education should be utilized. Practitioners should be ordering a genetic test in the same way as ordering any other test. Training can tap into the personal-learning approaches or hybrid courses that have both online and in-person components. Different methods work best for different people.

WHAT TO REQUIRE IN PROPOSALS? All proposals should include a needs assessment and rigorous evaluations, including specific evidence for "why their target audience needs genomics." It's important to look for innovation in how you apply adult learning principles, but not require it if the proposal is solid. The field of continuing professional education includes evidence about best approaches. Gaining buy-in from more than one instructor at the school should be encouraged or required.

WHY HAVE THIS TRAINING? Busy practitioners need quick references, for example, "just-in-time", fifteen minute bits of information to apply during patient care. Some funding could be used to examine practice-based questions that are critical for a new trainees' knowledge base. Even a small first step may be significant to create more capacity across this complex, large, and diverse community. Trainings can expand knowledge obtained at regional professional medical meetings. Ask what the practitioner can do with that knowledge and how that knowledge will impact their practice of medicine. If the needs of the target audience are focused and the training fits those needs, then the practitioner will be happy!

Heather Junkins told ISCC members of preliminary plans to have a workshop in the summer or fall to see what kind of program is best. If you are interested, please reach her by email at junkinsh@mail.nih.gov.

College of Family Physicians of Canada/Genetics Education Canada- June Carroll, MD,

Dr. June Carroll of College of Family Physicians of Canada discussed the educational efforts of GEC-KO, The Genetics Education Canada Knowledge Organization. GEC-KO aims to increase genetic literacy in healthcare professionals and enhance the quality of genomic care in order to optimize the health and well-being of Canadians. During Dr. Carroll's presentation she discussed GEC-KO's organization, development, purpose and funding, which is provided by Mount Sinai Hospital and Children's Hospital of Eastern Ontario (CHEO).

To aid in the development of products, GEC-KO conducted a needs assessment using qualitative methods and surveys. The survey asked providers questions regarding usefulness of different educational resources, and preferred learning methods. Eighty-nine percent of genomic primary care providers surveyed selected "a list of genetics clinics and their contact details." When surveyed about educational resources, 63 percent selected in person; seminar, workshop or lecture as their preferred method of learning about genomic medicine.

Survey and qualitative research methods resulted in multiple educational products. The GEC-KO website, www.geneticseducation.ca, contains point of care tools which include a family health history tool, and Hypertrophic Cardiomyopathy and hereditary cancer tools, for example. GEC-KO On the Run, an educational resource for providers, was developed to provide concise summaries for healthcare providers on a genetic disorder, technology or topic. GEC-KO Messenger was developed to provide comprehensive summaries for healthcare providers on genetic disorders, technologies, or topics. The information provided on GEC-KO Messenger is composed by a team of genetic counselors, geneticists and genetic researchers.

In addition to the online educational products GEC-KO provides, they also produce in-person seminars with topics that include prenatal and pre-conception Genetics, Adult Genetics, Pediatric Genetics, and general Genetic Counseling. In person seminars are 60 to 90 minutes long and cover several topics during one session through case-based learning, basic genetics, red flags for genetics referrals, screening and surveillance, and "pearls".

Centre for Genetics Education, NSW Health- Kate Dunlop, DipEd, MPH

Kate Dunlop of Centre for Genetics Education, NSW Health informed ISCC members about The Centre for Genetics Education NSW Health, an Australian state-wide government education program of the NSW Genetics Service that provides genetic information and education to a wide range of audiences, with the purpose of assisting non-genetic health professionals gain the skills and knowledge to manage the impact of genetic and genomic technologies on their practice. To aid in achieving those program goals through continuing professional development and point of care tools, NSW has used a needs based approach and plans to develop resources to provide a foundation for further educational strategies in 2017 with hope of implementing in 2018.

NSW partnered with Garvin Institute of Medical Research, one of Australia's leading biomedical research institutes, to determine practitioner needs around genetic testing. They used qualitative semi-

structured interviews from fifteen clinical geneticists and fifteen medical specialists ordering testing. Their interviews revealed that there was a unanimous agreement with a need for education, and that it should occur through a number of avenues, involve a spectrum of educational needs, and that it should address the challenge of interpreting genetic variants. Through the Australian Genomic Health Alliance (AGHA), a national network, diagnosticians and researchers are being funded to develop a roadmap for the integration of genomics into clinical care.

American Pharmacists Association- Kristin Weitzel, PharmD

Dr. Kristin Weitzel, PharmD, gave an overview of The American Pharmacist Association (APhA) which has over 63,000 members including pharmacists, pharmaceutical scientists, student pharmacists, pharmacy technicians, and others interested in improving medication use and advancing patient care. The APhA members practice in a variety of settings such as community pharmacies, physician offices, and community health centers. As a national organization, the APhA monitors and identifies legislative and regulatory efforts that are related to genomics. In regard to awareness and education, APhA aims to inform members about the pharmacist role in genomics, innovative care models and emerging research.

Current educational initiatives include live-, webinar-, and home-based continuing education. "RxGenomix" is a sixteen-hour live continuing education course that was created through collaboration between RxGenomix and Manchester University. It addresses ACPE standards and Pharmacist Educational Competencies developed in collaboration with NHGRI. "Rapid Rx: Innovative Practices in Pharmacogenetics" is another live continuing education course focusing on pharmacogenomics tests, including strategies to integrate pharmacogenetics into treatment paradigms, electronic health records, and collaborate with other members of the health care team.

"Pharmacogenomics: When MTM Gets Personal" and "The APhA Quick Quiz: Pharmacogenomics" are webinar programs that focus on general and pharmacogenomic implementation strategies and develop recommendations for medication therapy management and care coordination based on pharmacogenomics data.

National Human Genome Research Institute GLEE Initiative- Beth Tuck, MA

Beth Tuck of the National Human Genome Research Institute discussed The Genomic Literacy, Education, and Engagement (GLEE) Initiative, a fledgling national campaign to enhance genomic literacy. GLEE is envisioned as a highly collaborative national campaign to coordinate and augment ongoing genomics education and outreach efforts in K-16 students and educators, public and community audiences, and healthcare professionals.

American Heart Association- Kiran Musunuru, MD, PhD, MPH

Dr. Kiran Musunuru of the American Heart Association, the nation's oldest and largest voluntary organization dedicated to fighting heart disease and stroke, provided information on the American Heart Association's active programs that aim to address provider genomic literacy. The programs are titled "Scientific Statements" addressing genomics education and literacy. An online "Basic Concepts" genetics and genomics course and "Clinical Genomics Bootcamp" was held at annual AHA Scientific

Sessions in 2015 and 2016. Both of these courses have documents for self-learning, 16 on-line modules, YouTube videos, and live workshops at annual conferences. Throughout each course genetic expertise is provided by AHA volunteers, who are content experts and the information is offered through a variety of educational avenues such as published documents, online educational materials, and live classroom workshops with peer instruction.

Question and Answers:

Dr. Bob Wildin asked Kate Dunlop, an international ISCC presenter, what the best methods for engagement are. She responded that in Australia they have the same issue finding the best methods for engagement, however, you do need specific approaches for specific groups. She also believes that the clinical genetics community should speak to the needs of particular populations. Dr. June Carroll of Canada agreed and stated that professionals' groups should be a part of the needs assessments and include champions that are well informed. This helps champions provide information to providers when their patients ask questions.

Strategies Discussion- ISCC Members

A broad discussion was held about ways to facilitate genomics education. Ideas included having genomics education workshops "piggybacking" on professional conferences; emphasizing case studies; including the professional group as part of needs assessment and development; having local champions who know about the local resources; preparing physicians to answer patients' questions about genomic data; setting up a buddy system with a genetic counselor; trying an electronic consultation service; integrating patient communication in all CMEs (with comments about medical ethics); fostering collaboration among societies through engagement of member leaders; and ensuring that continuing education efforts are sustainable. Participants discussed how some education initiatives are implemented because the institution recognizes that it *needs* the education and seeks it ("the pull"), and others are put into place because they are *required* for various reasons ("the push"). The question was raised about how to adjust the system of healthcare related to genomics, specifically, what is the benefit for the whole community, which includes the private sector, industry, pharmaceuticals, genetic testing companies, healthcare organizations, payers/insurers, patients, government, and academia. The questions of whether private industry could possibly partner with ISCC, and whether foundations are a step in the right direction were raised and discussed. By identifying where the gaps are, then the next steps of utility can be put into place, and this understanding will drive the use of genomics.

Ideas for new ISCC Working Groups were discussed, including an Evaluations Working Group to determine what approaches work well and those that don't work well, including producing innovative evaluation tools, and approaches to deal with system changes. Another idea was including greater attention to adult learning strategies where that is lacking. Goals for new Working Groups will need to be carefully defined.

The challenges of producing genomic reports that are easily understood was also discussed. The design and layout is important to carefully consider, using good quality design principles and research

about what providers versus patients need. Perhaps rubrics could be set up to evaluate and help with the grading of reports. The CSER Practitioner Education Working Group has created a “Genomic Report Toolkit” to improve understanding of reports by non-genetics practitioners.

OTHER DISCUSSION:

Dr. Ann Karty will leave her position as non-NIH ISCC Co-Chair at the end of this year. Dr. Ostrander will represent the AAFP, and the next co-Chair will be chosen from active members.