2018

Meeting Report and Recommendations

Health In All Education Invitational Meeting

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June 15, 2018 | Atlanta, GA

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EXECUTIVE SUMMARY

PURPOSE

The purpose of the Health in All Education Invitational Meeting was to demonstrate the importance of integrating population health principles into higher education interdisciplinary education practices, to discuss examples of CDC's collaborations with non-traditional disciplines, and to explore opportunities to promote interdisciplinary learning to prepare for collaborative, interprofessional practice. Non-traditional disciplines in this case are defined as higher education disciplines outside of the traditional public health and clinical healthcare professions that have an important role to play in improving population health. The non-traditional disciplines represented at the meeting included economics, environmental engineering, informatics, law, social work, and liberal arts/general education.

BACKGROUND

The Association for Prevention Teaching and Research (APTR) and the Centers for Disease Control and Prevention (CDC) Surveillance, Epidemiology, and Laboratory Services (CSELS), Division of Scientific Education and Professional Development (DSEPD), Population Health Workforce Branch co-sponsored the first Health in All Education Invitational Meeting held at CDC Headquarters in Atlanta, GA on June 15, 2018. The meeting is part of the CDC Academic Partnerships to Improve Health Program, a multi-year collaboration between CDC and 4 national associations: APTR, Association of Schools and Programs of Public Health, American Association of Colleges of Nursing, and Association of American Medical Colleges. The one-day meeting examined the relationships between higher education and public health as well as the range of current and recent partnerships between CDC and the academic disciplines of law, economics, social work, environmental engineering, informatics, and liberal arts. Representatives shared with CDC and each other the role of health in their respective professions, examples of population health in their curriculum, and levels of student interest and engagement in health-related topics of national significance.

RECOMMENDATIONS

There is a lack of consistency and structure across the education programs represented about how and where to integrate population health content into the curriculum of non-traditional disciplines. Curriculum integration should focus on entry-level learning, particularly introductory courses that double as general education courses open to other disciplines. CDC should foster collaboration with multiple disciplines and develop training opportunities for recent graduates at CDC and state and local health departments for non-traditional disciplines.

NEXT STEPS
1. Each discipline should identify the areas in their respective curricula where population health exists and where it could be introduced.
2. Discuss what types of health problems we need to solve and how solutions should embrace other disciplines. Look for common areas of self-interest.
3. Explore the Clinical Prevention and Population Health Curriculum Framework and the Undergraduate Public Health Learning Outcomes and how the LEAP Outcomes were combined with public health. Consider a similar Health in All Education outcome framework for each discipline or intro course.
4. Identify cross-cutting topics and discuss how each association can work with their constituencies on awareness, education, and problem-solving. Activities might include presentations from CDC subject matter experts at national conferences or webinars, association leadership networking with CDC subject matter experts on topics of mutual concern, and developing training opportunities for non-traditional disciplines at CDC and state and local health departments.

HEALTH IN ALL EDUCATION INVITATIONAL MEETING PARTICIPANTS

A full directory of the meeting participants is available in Appendix A.

Participant Name	Representing Organization
Susan L. Albertine, MA, PhD	Association of American Colleges & Universities
Vera S. Cardinale, MPH	Association for Prevention Teaching and Research
KimMarie McGoldrick, MA, PhD	American Economic Association: Committee on Economic Education
Jo Ann Regan, PhD, MSW	Council on Social Work Education
Charity Scott, JD	American Association of Law, Medicine & Ethics
Linda K. Weavers, MS, PhD	Association of Environmental Engineering & Science Professors
Dawn M. Whitehead, MS, PhD	Association of American Colleges & Universities
Jeffrey Williamson, MEd	American Medical Informatics Association
Patricia Simone, MD, MPH	CDC/CSELS/Division of Scientific Education and Professional Dev
Eric J. Kasowski, DVM, MD, MPH	CDC/CSELS/DSEPD/Population Health Workforce Branch
LaVonne Ortega, MD, MPH	CDC/CSELS/DSEPD/PHWB/Academic Partnerships to Improve Health
Kurt Greenlund, PhD, MA	CDC/NCCPDHP/Division of Population Health
Adam Skelton, PhD, MPH	CDC/CSELS/DSEPD/PHWB/Prevention Effectiveness Fellowship
Montrece M. Ransom, JD, MPH	CDC/CSTLTS/Public Health Law Program
Brianne Yassine, MPH	CDC/CSTLTS/Public Health Law Program
Megan A. Kelly, JD, MPH	CDC/OADP/Policy Research, Analysis, and Development Office
Alexander Crosby, MD, MPH	CDC/CIPC/Division of Violence Prevention
Aleta Christensen, MPH	CDC/CIPC/Division of Unintentional Injury Prevention
Susie McCarthy, MPH	CDC/CSELS/Program Integration Unit
Tajean Crenshaw	CDC/CSELS/DSEPD

MEETING PURPOSE AND OVERVIEW

The purpose of the Health in All Education Invitational Meeting was to demonstrate the importance of integrating population health principles into higher education interdisciplinary education practices, to discuss examples of CDC's collaborations with non-traditional disciplines, and to explore opportunities to promote interdisciplinary learning to prepare for collaborative, interprofessional practice.

This report includes insights and recommendations from the meeting on how to integrate population health education into undergraduate and professional degree programs in a variety of non-clinical and non-public health disciplines. The recommendations consider changes in health care, technology, student preparation, and the environment in higher education in the following disciplines: law, economics, informatics, environmental engineering, social work, and liberal arts/general education.

SPONSOR

INTERDISCIPLINARY TRAINING AT CDC

The Division of Scientific and Professional Development
Patty Simone, MD, MPH, Director of the Division of Scientific and Professional Development, described the work of the Division, the multitude of fellowships and training programs at CDC, and the importance of preparing students for workplace training opportunities and public health practice. CDC has 200 fellows at any given time, 80 of which are in the Epidemic Intelligence Service. These training programs maintain a good track record of graduates staying in public health, many at CDC.

Dr. Simone explained that Public Health is the fastest growing undergraduate major, however health departments report that public health graduates are not equipped with the skills necessary for employment. Students and fellows lack important strategic, problem-solving, leadership, and communication skills (see DeBeaumont Foundation's Building Skills for a More Strategic Public Health Workforce: A Call to Action)[i], and CDC needs to use contemporary, evidence-based practices in their training programs to help develop these skills.

"The future is interdisciplinary"
Eric Kasowski, DVM, MD, MPH, Chief of the Population Health Workforce Branch, described the CDC Preventive Medicine Residency Program, Public Health Informatics training programs, and other experiential fellowships at CDC that have evolved into two to three-year training opportunities. Dr. Kasowski defined "Population Health" as the health of populations, contrasting it with health care, which represents a small sliver of health. He stated that we cannot afford independent silos as a society, and so for public health to focus on all issues that cause morbidity, many disciplines are needed to work together.

Dr. Kasowski described pilot programs in two state health departments, a project on opioids in Colorado, and a healthcare superutilization project in Utah, which both required fellows from informatics, prevention effectiveness and economics to work together. Dr. Kasowski stated that there is a need for public health practitioners to speak the language of other disciplines, to be able to meet other disciplines where they are, and to get real synergy across all aspects of society.

CDC COLLABORATION WITH NON-TRADITIONAL DISCIPLINES

Chronic Disease
Kurt Greenlund, PhD, MA, Acting Director of the Division of Population Health in the National Center for Chronic Disease Prevention and Health Promotion, described key programs in the Division of Population Health and discussed the value of multisectoral approaches. Chronic diseases account for 7 of the top 10 leading causes of death in the United States. The Center does a lot of work across the lifespan, healthy schools and youth, worksites, healthy aging and Alzheimer's disease, arthritis, epilepsy, COPD, alcohol, healthy sleep, and others.

They manage the phone-based Behavioral Risk Factor Surveillance System with 450,000 respondents annually. The Prevention Research Center Program funds 26 universities across the US who have an accredited school of public health or a school of medicine with a preventive medicine residency program, to attract other disciplines on their campus to prevention research. School health programs partner with non-traditional disciplines to support whole child, whole school, whole community efforts and provide tools to school systems, school health, and PTAs to support wellness efforts in the schools.

Policy

Megan Kelly, JD, MPH, Public Health Analyst in the Policy Research, Analysis, and Development Office of the Office of the Associate Director for Policy (OADP), discussed the policy work of the agency, which elevates data and summarizes evidence using policy. OADP is a cross-cutting office that sits in the Office of the Director and provides services across the agency.

Dr. Kelly described how the US health care system is experiencing unprecedented changes. Health care reimbursement systems are emphasizing value-based payment centered on patient outcomes over the previous fee-for-service reimbursement models. A growing number of accountable care organizations and patient-centered medical homes provide opportunities for public health to engage with the health system to address prevention and wellness. Hospitals and care providers are now incentivized to promote health in the communities they serve, not merely treat illness. It also requires public health to work in non-health sectors and speak their language. The "Three Buckets of Prevention"[ii] conceptual population health framework at CDC includes: 1. Traditional clinical preventive interventions; 2. Innovative preventive interventions that extend care outside the clinical setting; and 3. Total population or community-wide interventions. The third bucket is where the Health Impact in 5 Years (HI-5) initiative applies, community-wide prevention – improving population health by addressing the context that affects health decisions people make, and the social, economic and environmental risk factors where people live, learn, work, and play. The HI-5 initiative highlights non-clinical, community-wide approaches that have evidence reporting 1) positive health impacts, 2) results within five years, and 3) cost effectiveness and/or cost savings over the lifetime of the population or earlier. The development of HI-5 was sparked by public health department leaders who wanted solutions that were non-medical. It addresses cost-effectiveness in 14 interventions, many of which are non-health, but was started with a pool of 250 interventions. Examples include school-based programs to increase physical activity and public transportation expansion. The next phase is to conduct environmental scans of laws and policies and supporting Accountable Health Communities to address social determinants of health ("health-related social needs") in Medicare and Medicaid to reduce healthcare utilization.

Through a related program, the 6|18 Initiative, CDC is partnering with health care purchasers, payers, and providers to improve health and control health care costs. CDC provides these partners with rigorous evidence about six high-burden health conditions (tobacco use, high blood pressure, healthcare-associated infections, asthma, unintended pregnancies, and diabetes) and 18 associated interventions to inform their decisions to have the greatest health and cost impact. This initiative offers proven interventions that prevent chronic and infectious diseases by increasing their coverage, access, utilization and quality. Additionally, it aligns evidence-based preventive practices with emerging value-based payment and delivery models, taking data and turning it into information that can be implemented in programs and policy.

Informatics

Eric Kasowski, DVM, MD, MPH, of the Division of Scientific Education and Professional Development, spoke on behalf of the CDC Public Health Informatics Fellowship Program. He described the development of the HI-5 and 6|18 Initiatives by John Auerbach, MBA, CDC's Associate Director for Policy, saying he didn't speak the language of insurance companies and actuarial science, he needed to speak many languages. Likewise, we're in a data society now. We are awash in data – which can mean potential salvation in health but can also be a real sticking point for public health – to convert data to policy and implementation. Public health is woefully behind on informatics capacity and needs informatics training. There is also increasing importance for informaticians to be versed in other disciplines.

APTR

ASSOCIATION FOR PREVENTION TEACHING AND RESEARCH

Law

Montrece Ransom, JD, MPH, Team Lead for Training and Workforce Development in the Public Health Law Program, discussed the law discipline as integral to the practice of public health. Law creates the structure and is a great policy tool to change the context in the way individuals make decisions, often making individuals' default decisions easier. The vision of the Public Health Law Program is "a transdisciplinary public health workforce competent in the use and understanding of the role of law as a public health tool." The Public Health Law Program started in 2001 and is divided into three sections:

1. Legal epidemiology (10-12 staff attorneys),
2. Training and workforce development,
3. Partnerships and communication, including "Public Health Law News."

Figure 1: Health Impact Pyramid Framework

The office strives to apply the CDC Heath Impact Pyramid Framework to every public health challenge. The Public Health Law Program created competency models on public health law, developed the Public Health Law Academy, an online portal of in-demand trainings, hosts a webinar program, and sponsors internships and externships. The American Public Health Association (APHA) and the American Bar Association (ABA) collaborate to get the word out about cross-disciplinary training in public health law.

Economics

Adam Skelton, PhD, MPH, Lead for the CDC Steven M. Teutsch Prevention Effectiveness Fellowship in the Population Health Workforce Branch, discussed economics and decision science capacity-building at CDC. Decision Science is the collection of quantitative techniques used to inform decision-making at the individual and population levels. The Prevention Effectiveness Fellowship has 30 fellows at any given time consisting of health services researchers, economists, and others. Many economics fellows come from the best schools but often haven't been trained with a population-wide perspective. The Prevention Effectiveness fellowship employs an adaptive learning approach with mentoring to encourage the fellows to make mistakes so they become more resilient and can better work in uncertainty. The program brings in multi-disciplinary people beyond healthcare to discuss complex solutions to complex issues. The number of economists at CDC has steadily grown because of this program. CDC collaborates with the American Society of Health Economists (ASHEcon).

Opioid Epidemic

Aleta Christensen, MPH, Team Lead for the Division of Unintentional Injury Prevention in the Center for Injury Prevention and Control discussed the opioid epidemic. Drug overdose deaths continue to increase in the United States. From 1999 to 2016, more than 630,000 people died from a drug overdose and around 66% of the more than 63,600 drug overdose deaths in 2016 involved an opioid. In 2016, the number of overdose deaths involving opioids (including prescription opioids and illegal opioids like heroin and illicitly manufactured fentanyl) was five times higher than in 1999. On average, 115 Americans die every day from an opioid overdose.[iii] There is also increased risk of hepatitis and HIV from injection drug use, an increase in neonatal abstinence syndrome (NAS), and the epidemic is causing increased need in the foster care system.

CDC's goal is to reduce opioid-use deaths. CDC organizes its work around prevention, conducting surveillance and research, and providing technical assistance to promote interstate sharing and best practices. The work must address prescribing behavior and chronic pain, increase the capacity of state partners, and focus on planning and targeting research and partnerships. A Heroin Response Strategy aims to reduce overdose deaths in high-intensity drug-trafficking areas. This is a prototypical public health "outbreak." It began in clinical medicine due to the direct-to-consumer marketing of pharmaceuticals. The epidemic is disproportionately affecting middle age, rural men.

Opiate abuse campaign messages include:
- A prescription of opioid is addictive with one pill.
- Opioids react differently for each person.
- One pill can be dangerous.
- Try other forms of prescriptions to relieve pain.
- Opioids can rewire the brain and can affect one's ability to get through a day.

Opioids can be a convergence topic for interprofessional education. Consider a problem-based approach to future collaboration. Laws are needed for Naloxone administration and Good Samaritan protections for people who call 911 during overdoses. The American Board of Preventive Medicine (ABPM) has an Addiction Medicine Board which involves clinical informatics. The number of applications for Addiction Medicine in now more than all other preventive medicine subspecialties. Some applicants are adults with a past history of addiction who are transitioning into medical careers. More than 60 medical schools committed to align their curriculum to CDC Guidelines.

Firearm Injuries
Alexander Crosby, MD, MPH, Medical Epidemiologist in the Division of Violence Prevention at the Center for Injury Prevention and Control discussed firearm injury research at CDC. There are 105 firearm-related injuries or deaths per day, 743 per week. Suicides account for 59%, homicide 37%, and the remaining 4% are unintentional, police intervention. The economic burden to the United States is approximately $64 billion per year. Rates are highest among young adolescent males and elderly males. Congressional appropriations have limited firearms research making the evidence-base lacking in some areas. A recent issue of the CDC *Morbidity and Mortality Weekly Report* (MMWR) on suicide reported that the national level has increased since 2005 and 44 out of 51 state suicide rates have increased. The issues of the number of individuals with untreated mental illness coupled with a lack of firearm control is concerning. Opioids and firearm injuries are themes that can impact all disciplines. The best way to explain complex issues to students is through stories and problem-based learning. Because private academic institutions may have more flexibility in how they use their funds, those institutions should explore increasing research around firearms.

POPULATION HEALTH IN HIGHER EDUCATION

Susan L. Albertine, MA, PhD, Senior Scholar in the Office of Quality, Curriculum, and Assessment at the Association of American Colleges & Universities (AAC&U) described how population health can be integrated into general or liberal education requirements. Dr. Albertine described the core of general or liberal education as broad education that liberates the mind, gives one the capacity to deal with ambiguity, complexity, and to know truth from falsehood. The country's founders believed liberal education for all citizens was needed to have a democracy. Back then, colleges only offered liberal education, all blended, until the era of industrialization, post-Civil War, when the "major" was created. In the 20th century, students took a few general education (gen ed) courses plus their major, and disciplines eventually got stronger and gen ed got weaker. Distribution requirements have reduced liberal education in college, which has devolved into inoculation, i.e., little bits of exposure to liberal arts and getting gen ed courses "out of the way."

Students today need more exposure to liberal arts – critical thinking, problem solving, values formation, dealing with diversity, understanding equity. A consensus project asked what college education should be in the 21st century, which resulted in the development of the Essential Learning Outcomes Framework published by AAC&U in 2005 (Appendix B). The Liberal Education and America's Promise (LEAP) campaign was also launched in 2005 as a national public advocacy and campus action initiative to advance the goals of the Framework. The Framework is being used to develop gen ed that is integrative and problem-focused. It has four Essential Learning Outcomes:

1. Knowledge of human cultures and the physical and natural world
2. Intellectual and practical skills
3. Personal and social responsibility
4. Integrative and applied learning[iv]

The Institute of Medicine (IOM) issued a report in 2003 warning the challenges facing humanity in health and population are so great, that all undergraduate students should have access to education in public health. In response, with CDC support, APTR and AAC&U held a consensus meeting in Boston in 2006 with public health deans and arts and sciences deans, and they developed *Recommendations for Undergraduate Public Health Education*[v], which were followed by the *Undergraduate Public Health Learning Outcomes*[vi] (Appendix C) based on the Essential Learning Outcomes Framework. Undergraduate public health majors are now experiencing geometric growth. This is a good platform for interprofessional education. AAC&U published several articles on how you can offer integrative public health, which is health woven all around majors:

- Liberal Education and Undergraduate Public Health Studies
  (https://www.aacu.org/peerreview/2009/summer)
- Intentionality and Integration in Undergraduate Global Public Health Education
  (https://www.aacu.org/publications-research/periodicals/intentionality-and-integration-undergraduate-global-public-health)
- The STIRS Framework and Integrative Liberal Education
  (https://www.aacu.org/peerreview/2016/Fall/Riegelman)

The National Academies of Sciences (NAS) issued a new consensus study, *The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree*[vii] (Appendix D) which is full of examples of integrative learning approaches. There is enough evidence that integrative

approaches work, are more equitable, and will invite new populations into the practice of STEM and medicine. They observed that silos in institutions create barriers that are not good for our future. NAS has recommended that funders start pushing for integrative outcomes in grant RFPs.

Progress is being made across campuses and organizations. The Southern Association of Colleges and Schools (SACS), an accreditor, uses the LEAP outcomes, as do many countries around the world. The public health major components are aligned with LEAP, as are chemistry, engineering, history and others. The Council on Education for Public Health (CEPH) accreditation criteria also align with LEAP. Next steps for integrating population health across disciplines might include:

1. Aligning our outcomes and competency frameworks.
2. Aligning signature pedagogies such as community-engaged learning.
3. A "Grand Challenges" approach, using a wicked problem focus such as social determinants of health to learn from and across fields.
4. Speaking the language of other disciplines and understanding why problems arise.
5. Seeking facilitators that have dual degrees and cross the boundaries between disciplines.

Invited Discipline Perspectives

Association and faculty leaders representing the non-traditional disciplines provided insights into the education goals of their associations, the role of population health in their discipline, and thoughts on how they might partner with governmental public health to affect curricular change.

LIBERAL ARTS AND GLOBAL LEARNING
Dawn M. Whitehead, MS, PhD
Senior Director for Global Learning and Curricular Change
Association of American Colleges & Universities

AAC&U is a non-governmental organization (NGO) founded in 1915 dedicated to advancing the vitality and public standing of liberal education by making quality and equity the foundations for excellence in undergraduate education in service to democracy. AAC&U has 1,400 institutional members including accredited public and private colleges, community colleges, research universities, minority serving institutions, and open access institutions. They believe a strong liberal education foundation provides an opportunity to practice much-needed skills such as communication, problem solving, analytical skills, and working with people from diverse backgrounds. Integrative learning is an understanding and a disposition that a student builds over curricular, co-curricular, and community-based experiences. It involves learning with and across disciplines. Six practices that are important for integrative learning are:

1. Address complex issues through problem-based inquiry
2. Apply diverse perspectives
3. Connect curricular and co-curricular activities
4. Assessment and documentation of learning
5. Enhance learning through practical application
6. Promote equitable outcomes for students

The LEAP Challenge calls for all college students to pursue their own "signature work," integrating and applying their learning to complex problems and projects that are important to the student and important to society.

Typically, students have a semester to explore this project, building on what they've learned, and working with a faculty mentor. Signature work is a great way to integrate health perspectives. High impact practices that contribute to student success include:

1. Learning Communities
2. Writing-Intensive Courses
3. Collaborative Assignments and Projects
4. Undergraduate Research
5. Diversity/Global Learning
6. ePortfolios
7. Service Learning, Community-Based Learning
8. Internships
9. Capstone Courses and Projects

What can CDC learn from the liberal arts disciplines?
Recognize that knowledge will be obsolete in a few years. Students need to be applied and integrative thinkers, with intellectual skills and dispositions, and personal social responsibility. Project-centered approaches with open majors and project-based learning could help solve problems.

INFORMATICS
Jeffrey Williamson, MEd
Vice President of Education and Academic Affairs
American Medical Informatics Association

AMIA has 5,000 members including physicians, nurses, public health professionals, computer scientists and engineers. They work on five domains of health care that include translational bioinformatics and clinical research informatics (clinical, consumer health, and public health informatics). In higher education there is a need for basic informatics literacy, not just in health informatics. AMIA members draw strength from NIH success getting funding, but don't know how to partner with public health organizations like CDC to strengthen public health informatics. Electronic health record vendors are largely driving tool-based education and not education that's framed around the clinical intelligence of health professionals. AMIA developed a "Why Informatics" campaign on YouTube and is working on masters level accreditation. They want students to think of patient, payer, provider, and populations.

What can CDC learn from the informatics discipline?
AMIA is trying to characterize practice. They are conducting a clinical informatics practice analysis and a health informatics practice analysis. They will survey informaticians about what they do and overlay that with what's being taught. They will also look at whether core competencies line up with the practice of informatics. AMIA needs more population health subject matter experts and would benefit from networking and partnerships with CDC.

ECONOMICS
KimMarie McGoldrick, MA, PhD
Professor of Economics
University of Richmond
Committee Chair, AEA Committee on Economic Education
Co-Editor, Journal of Economic Education

The American Economics Association (AEA) is the main organization representing economics. The annual meeting brings together 13,000 members. The Committee on Economic Education promotes economics education in a variety of ways, including a conference, partnering with K-12 groups, and grant work. In economics, about 60-70% of undergraduate students take an economics class, but only 2% major in it. The field also attracts few women and underrepresented minorities, with the exception of labor, development, and health economics. Economics does not have a set of standardized national learning outcomes. Economics is notoriously siloed, not only from other disciplines, but even the fields within the discipline. There is a big methodological divide and not enough crosstalk within the fields. There are people trying to re-invigorate the introductory course but there can be resistance to change and to curricular innovations.

There is an organization teaching health economics, which is a subgroup of one of the health economics groups, but their primary focus is taking research in the field and bringing it into health economics courses, rather than distributing information more broadly in the curriculum.

What can CDC learn from the economics discipline?
There is an opportunity to bring population health issues into the introductory course in economics, which is either a required course or a possible gen ed course at most universities. Partner with fellows and the health economics group to impact the "Introduction to Economics" course and integrate population health concepts.

ENVIRONMENTAL ENGINEERING
Linda K. Weavers, MS, PhD
Professor and John C. Geupel Chair
Co-Director, Ohio Water Resources Center
Civil and Environmental Engineering and Geodetic Science
The Ohio State University
President, Association of Environmental Engineering & Science Professors (AEESP)

The Association of Environmental Engineering and Science Professors (AEESP) is made up of faculty/professors in academic programs throughout the world who provide education in the sciences and technologies of environmental protection. Some of the programs represented in AEESP include:
- water and wastewater treatment
- air pollution control
- water and air resource management
- industrial and hazardous waste management
- solid waste management
- contaminated site investigation and remediation
- waste repositories
- pollution prevention
- environmental chemistry
- aquatic ecology
- environmental toxicology
- public health engineering
- environmental policy management

AEESP was founded in 1963 to support environmental, not just sanitary, engineering, and worked closely with the US Public Health Service. They often deal in "end of pipe solutions" – cleaning up messes. Over time, their association with public health weakened, as they focused on the environment, and not just human health. But part of the mission of environmental engineering is the protection of human populations. There is a strong link to population health that is starting to be revisited in the field, albeit slowly. In most universities environmental engineering is housed in departments of civil and environmental engineering. One-third of those department chairs are environmental engineers, so they have that population health lens to impart on the civil engineers. Faculty are often there more for the research than teaching, so getting people to pay attention to the education side takes interest, meetings, learning each other's languages, and incentives. A lot of the programs are more interdisciplinary focused, which helps bring in research, but it should be connected to education earlier.

Environmental engineering wants depth in its core disciplines, but many people going into the field don't have strong skills in communication, critical thinking, etc. These are great opportunities where we can develop joint programs at those interfaces, and have gen ed courses focus on thematic ideas, but it has to be incentivized. The association has an education committee, a committee for program leaders. Members work through the EPA and National Science Foundation (NSF), but much less with NIH and NIEHS, and rarely with CDC. They are starting to think about local health departments for working on indoor air quality issues.

What can CDC learn from the environmental engineering discipline?

Environmental engineering is about prevention. Help civil engineering colleagues realize they influence population health with the built environment. Public health programs should be joined at the hip with environmental engineering. There is starting to be more joint hires (Johns Hopkins, Ohio State). The strongest connections are on air pollution, less on water. The group working to revise the 2009 Environmental Engineering Body of Knowledge[viii] curriculum guidance document would like CDC input and can take back information to help guide them. Input from the academic public health perspective would also be helpful.

SOCIAL WORK
Jo Ann Regan, PhD, MSW
Vice President of Education
Council on Social Work Education (CSWE)

The Council on Social Work Education (CSWE) is the national organization representing schools of social work and the faculty that teach in them. The social work profession is about promoting individual, family and community well-being, and social, economic and environmental justice. CSWE is the sole national accreditor for social work education. They also have research, advocacy and other priority areas of focus. Membership is all the accredited schools of social work, which is 25,000 faculty and 522 undergraduate BSW programs representing 63,000 students, 260 masters MSW programs representing 65,000 students, 74 PhD programs representing 2,300 students, and 13 emerging practice doctorate DSP programs representing 600 students. Of these, 42 are dual degree MSW/MPH programs, but most are sequential; there is not much convergence because of separate accreditation standards. HRSA once funded a "Leadership in Public Health Project" of integrated MSW/MPH degree track initiatives at University of Maryland, University of Pittsburgh, and UNC Chapel Hill, which provided good models of curricular integration, but the funding was not sustained.

Current accreditation standards are focused on competencies. Several are related to population health, such as social determinants of health (SDOH), health equity, evidence-based interventions, and intersectionality of

diversity factors. The association has recent involvement in interprofessional education and has joined the Interprofessional Education Collaborative (IPEC), but IPE is largely focused on healthcare. They are trying to expand that view, in part through their national conference theme of advancing IPE. The signature pedagogy is field internships, so they are seeing a lot more people working on public health issues in interprofessional teams.

What can CDC learn from the social work discipline?
Social work programs have been growing. The Bureau of Labor Statistics forecasted a 30% growth in social work jobs, but they are predominantly in health, so social work education programs are having to produce graduates with understanding of the health issues, because they know that's where the jobs are. CDC should recruit social workers for traineeships and job opportunities. It may happen because of opioids. CSWE can promote that pipeline.

LAW
Charity Scott, JD
Professor of Law
Georgia State University College of Law
Immediate Past President
American Association of Law, Medicine & Ethics

The American Association of Law, Medicine & Ethics (ASLME) was founded in 1911 as a nonprofit educational organization whose mission is to provide high-quality scholarship, debate, and critical thought for professionals at the intersection of law, medicine, and ethics. There is a desire to do interprofessional and community engaged education, but there can be resistance from the law schools and potential interdisciplinary collaborators. Law schools are very siloed, they have nothing to do with undergraduate education, and they rarely work with other professional schools. Georgia State has law dual degrees with business and public health and would like to have a dual degree with social work, which would be a natural partnership. Law education is evolving from an emphasis on knowledge, to an emphasis on skills, to now an emphasis on values, habits of mind, and mindsets.

The Public Health Law Program started after 9/11 with a preparedness/bioterrorism focus and grant funding. Scientists wanted to do outcomes-based projects (i.e., if you have a law that says X, what is the result), whereas the lawyers wanted to go macro, and discuss interesting policy questions. The law people and the scientists didn't speak the same language. After much resistance, Georgia State developed a broad health law program with groups on public health law, health care regulation, biotech, law and social welfare, liability and bioethics, and international health and human rights. Recently formed medical-legal partnerships are promising. They offer social determinants of health (SDOH) services: education, transportation, housing, financial support, etc. They formed after 14 years of resistance from hospital CEOs and lawyers who didn't want legal services offices.

Emory bioethics training brings law students and medical students together and gets them to appreciate that these professions have different starting points, different assumptions, and different ways of thinking through problems. Another successful project funded by RWJ was a faculty fellowship program in public health education, where 10 faculty (6 law, 1 public health, 1 social work, 1 medicine), from across the country came together to do innovative, community-based, interprofessional public health law education, which included a 10-day bootcamp and resulted in 10 different projects in 10 states, ranging from diversity in PH law, asthma, online learning resources, health department accreditation, regulation of tattoo parlors, and outcomes research.

One of the most underappreciated populations is the students. In law, they come in with high health measures and leave demoralized and depressed. Mindfulness training programs that teach resilience can help. They need to know themselves, their goals, and their values. Likewise, a law survey on curriculum found that employers wanted traits and skills in communication, writing, professionalism, etc. -- nothing that's taught in law school. Former "soft skills" are now "essential skills."

What can CDC learn from the law discipline?
Law has a long-time partnership with the public health law program at CDC. There are significant conferences. There is a movement in law education to add population health to the introductory course in law. This early introduction is in the first-year curriculum. Population health can also be integrated later in project-based learning.

Barriers to Integrating Population Health into Curricula
The group discussed barriers and opportunities for integrating population health into the curricula of the represented disciplines. Several barriers to curricular integration were identified.

Academic-Practice Disconnect
There is a disconnect between academia and practice. Faculty need to work on problems too, not just students. We need strategies to keep faculty connected to practice. Likewise, some faculty teach what they think students need to know without asking employers. Schools and/or national organizations should try to characterize practice. Survey employers about what they do and overlay that with what's being taught and determine whether core competencies line up with practice. Employer national survey data is valuable, but we need local employer opinions too. Finally, students are inspired by real-world, hand-on experience, but some disciplines are having trouble finding enough community placement sites for required internships. Not everyone can get an internship or fellowship at CDC.

Professional "Soft Skills" Expectations
Employers want traits and skills in communication, writing, professionalism, and other "soft skills," now considered "essential skills." Schools are having a problem with undergraduates who have difficulty with writing and communication. Development of "essential skills" is supposed to happen in childhood, in K-12 schools, then in undergraduate education if programs are not too constrained. Although it starts at K-12, we can't wait for K-12 reform. We need to own written communication ourselves. We need to teach to where students are, not where they should be.

The following list of top 10 skills desired for law graduates resonated deeply with the group as applicable across the disciplines. They noted they are all "soft skills":
1. Keep information confidential
2. Arrive on time for meetings, appointments and hearings
3. Honor commitments
4. Integrity and trustworthiness
5. Treat others with courtesy and respect
6. Listen attentively and respectfully
7. Promptly respond to inquiries and requests
8. Diligence

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9. Have a strong work ethic
10. Put forth best effort
11. Attention to detail

Fellows at CDC will figure out the science but need to learn how to be effective in government. It's about teamwork. You'll never be a single author on a paper. Likewise, CDC also has extreme pressure to communicate perfectly. People arrive at CDC expecting to be perfect at everything. They feel like they don't have permission to do a rough draft and may feel offended when their writing is edited or corrected. Yet email communication and business communication is getting worse. Writing for consensus/legislative style is different from more concise executive style. Data visualization is another sorely-needed skill. CDC has to do a lot of retooling of scientific writing style to meet CDC standards, even among PhDs, but they are not willing to own the day-to-day communication piece. People need to learn to be OK with edits and feedback, learn from it, and get better. Ultimately, students will not be made ready for us. We need to be ready for them and teach communication as needed.

Valuing Teaching
Teaching is undervalued in most professions, as faculty are often motivated by pressures to conduct research and publish. The macro-level vision needs departments to recognize and give credit for teaching. Some schools are giving teaching credit for tenure and promotion. Some research universities are seeing a shift in tenure and promotion requirements, adding public good and community engagement criteria. Changes require departmental buy-in and changes in attitudes. Co-teaching should be promoted, as well as faculty hires co-sponsored by various departments to be interdisciplinary. These changes can be influenced by student passion, university presidents, and individual faculty members as champions.

Opportunities and Promising Practices

Funding for interdisciplinary public health research and projects
- Federal agencies, foundations, and other funders are encouraged to draft Requests for Proposals (RFPs) with requirements for interdisciplinary collaboration.

On-Campus engagement
- We are starting to see scaffolding for this approach, especially at community colleges. Examples include inviting students to develop team Public Service Announcements (PSAs) on gun control, open carry, parking policies, where to smoke on campus, etc. Consider engagement in campus community itself. Offer better work-study opportunities.

Open Source Learning
- Open source learning modules can be used when there is a shortage of subject matter expert faculty to teach emerging interdisciplinary topics, particularly at undergraduate level (especially in informatics). We need blended, hybrid learning, with faculty that can guide the learning process and debrief. National organizations could develop these open educational resources.
- Health departments don't have money to buy content or time to buy degrees for their employees, but modules might help them retool their workforce.
- CSWE is doing work with CDC on fetal alcohol syndrome. They created a certificate program using high-quality CDC resources and are disseminating through national organization platforms.

Writing and Communication
- The Association of Schools and Programs of Public Health (ASPPH) has a new project on writing which engages public health faculty to teach writing, not just public health science. They work in different genres, such as policy briefs, blog posts, tweets, reports to supervisors, etc. Some MPH programs are developing writing programs that have peer writing projects, peer editing practices (peer tutors), and/or collaboration with English departments or writing centers at the university. There is a need to engage faculty in the disciplines on writing across the discipline, in different genres.
- The University of Richmond business school is taking students off campus, putting them in a conference-like setting with business professionals, and forcing them to have communication, 10-minute business-style conversations and dinner conversation. It's not one and done, it's a building process.

Multidisciplinary Teamwork
- The number one skill desired by employers in a survey conducted by AAC&U (96%) was students able to "solve problems in diverse settings."
- Medical and social work students have carried out "hot spotting" team projects in high utilization rate areas.
- CDC funded several projects with interdisciplinary teams of students and faculty. ASPPH had a team-based project with architecture and public health students at Drexel. MPH students took a portion of a design course and redesigned a grocery store. APTR funded academic faculty teams that completed dozens of interprofessional prevention projects and evaluated their ongoing impact at their institution and communities 10 years later.

Generating Interest in Population Health
- Anecdotal evidence and stories often drive policy, law, and personal behavior in population health, not data.
- Many students are motivated by cause-based opportunities. We need to reach people with a high sense of social mission. Build brand awareness through public relations, marketing and communications. For example, informatics might say, "Come be a data detective! Come use your skills to solve real world problems today."
- We need to communicate directly with the field and tell associations and faculty what you want. This has not been communicated effectively to faculty. We need to make pedagogy more applied and aligned.
- We should feed ideas for capstone projects and connect how computer science and data can help solve big problems.

RECOMMENDATIONS

Each of the disciplines represented at the Health In All Education meeting has a pivotal role in population health. CDC doesn't own it. The issues are much deeper than what public health can do on its own. We need to address problems in a different way. There is little consistency and structure among education programs on how and where to integrate population health content into the curriculum of non-traditional disciplines. Curriculum integration should focus on entry-level learning, especially introductory courses that double as general education courses open to other disciplines. Specific recommendations include:
- Examine what alignment there is between discipline-specific competencies and frameworks. Work to unify competencies across professions.
- Connect these issues to interprofessional education but beyond health care. IPEC has some IPE competencies but they are very clinical. What would they look like from a population health

perspective? Consider consensus-building as a follow-up activity. This could be weaved into accreditation standards.
- Pick a big problem and track people from across the different fields to work on it. Give a presentation on a problem, then unpack it to show all that disciplines and parties involved. Have students and fellows present coupled with subject matter experts.
- Work on the concept of signature pedagogies and addressing population health issues. People are hungry for models. Align frameworks and align signature pedagogies.
- CDC should foster collaboration with multiple disciplines and develop training opportunities for recent graduates at CDC and state and local health departments.

NEXT STEPS

1. Each discipline should identify and map the areas in their respective curricula where population health exists and where it could be introduced.
2. Discuss what types of health problems we need to solve and how solutions should embrace other disciplines. Look for common areas of self-interest.
3. Explore the Clinical Prevention and Population Health Curriculum Framework and the Undergraduate Public Health Learning Outcomes and how the LEAP Outcomes were combined with public health. Consider a similar Health in All Education outcome framework for each discipline or intro course.
4. Identify cross-cutting topics and discuss how each association can work with their constituencies on awareness, education, and problem-solving. Activities might include presentations from CDC subject matter experts at national conferences or webinars, association leadership networking with CDC subject matter experts on topics of mutual concern, and developing training opportunities for non-traditional disciplines at CDC and state and local health departments.

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