ACE Presidential Address:

Training Tomorrow's Epidemiologist

Ross C. Brownson, PhD, FACE
Washington University in St. Louis

“The times they are a-changin'”

--Bob Dylan

What is a macro-trend and why should we care?

- A macro trend
  - Trends that have a significant effect on a large scale with impacts short and long term
  - Think of Wayne Gretsky
- For strategic planning
  - analyze environmental challenges & opportunities
  - set goals and design competencies to move to our future

Previous ACE efforts

- Task force on innovation
  - Big data, team science (Hiatt, Sulsky, et al., Ann Epidemiol 2013)
- ACE doctoral competencies
  - More traditional core skills (Samet, Stoto, Arcari 2002)
- ACE survey regarding competencies
  - Ranked importance by type of graduate, PhD vs. all levels (Brunner Huber, Fennie, et al. 2009)

More recent backdrop

In our new Strategic Plan

Goal II. The College promotes the professional development of epidemiologists through educational initiatives.

Our effort

- ACE established an 11-person workgroup
  - Represented research, practice & a variety of settings
- Conducted 16 semi-structured interviews
  - Continued until saturation
  - Coded findings to identify trends

Our findings

- Macro trend 1: “Big Data”/ Informatics
  - Description
    - Rapid growth in the scope and ability to link many epidemiologic, healthcare, and other data sets
    - As data sets become increasingly larger and more complex, advanced skills are needed

Findings

- Macro trend 1: “Big Data”/ Informatics
  - Sample competencies
    - Identify challenges, principles, and key details for data sharing.
    - Demonstrate the ability to use complex, linked data sets from multiple sources and across levels of organization from the biology to society.

Findings

- Macro trend 2: Changing health communication environment
  - Description
    - Technology creating instant access
    - Large epidemiologic studies being published, may lead to confusion among decision makers and the public
    - New media (e.g., social media)

Findings

- Macro trend 2: Changing health communication environment
  - Sample competencies
    - Create brief and tailored reports and visual displays for non-scientific audiences (administrators, policy makers).
    - Use novel communication methods, such as mapping tools and social media.

Findings

- Macro trend 3: Affordable Care Act/health care system reform
  - Description
    - Increased access to health care for millions of Americans and also builds prevention and public health activities
    - Opportunities for funding certain types of epidemiologic studies and a significant need for involvement of epidemiologists in measuring the impact of the ACA

Findings

- Macro trend 3: Affordable Care Act/health care system reform
  - Sample competencies
    - Demonstrate skills in using data collected by evolving public health and healthcare (sometimes for administrative or billing purposes) and considering inherent limitations of such data.
    - Demonstrate skills in linking epidemiologic outcomes (e.g., variations in practice and health indicators) with economic outcomes (e.g., cost-effectiveness).

Findings

- Macro trend 4: Demographic shifts (aging, race/ethnicity)
  - Description
    - Changing demographics (aging, increased racial/ethnic diversity) present new challenges for epidemiology
    - Enlarging aging population may result in new areas of research being prioritized and funded, such as chronic disease prevention and health maintenance

Findings

- Macro trend 4: Demographic shifts (aging, race/ethnicity)
  - Sample competencies
    - Explain how the contexts of age, gender, race, poverty, history, migration, and culture are important in the design of interventions within health care and public health systems.
    - Demonstrate skills in developing survey instruments that are culturally relevant.

Findings

- Macro trend 5: Globalization
  - Description
    - Process that leads to increased interaction and integration of markets and systems (business, health, communication) of different countries
    - Globalization can contribute to spread of disease and risk factors, but can provide opportunities for epidemiologists to conduct cross-national studies

Findings

- Macro trend 5: Globalization
  - Sample competencies
    - Increase familiarity with global surveillance systems to monitor the geographic spread of disease.
    - Understand how culture contributes to disease (e.g., “western” lifestyle).

Findings

- Macro trend 6: Emerging high throughput technologies ("omics")
  - Description
    - The scope of genome-based research is expanding rapidly
    - Epidemiologic research now has the ability to use human and pathogen sequencing and other complex biomarkers
    - New "omic" discoveries are calling for new approaches for collaboration, analysis, data sharing and integration across platforms

Findings

- Macro trend 6: Emerging high throughput technologies ("omics")
  - Sample competencies
    - Explain how genetics and genomics affect disease processes and public health policy and practice.
    - Understand how "omic" tools can be integrated into an ecological model of health including social and environmental determinants.

Findings

- Macro trend 7: Focus on accountability
  - Description
    - Greater attention is being paid to accountability
    - This can take numerous forms including stewardship of funds, reporting epidemiologic findings back to stakeholders, and understanding the potential impacts of research

Findings

- Macro trend 7: Focus on accountability
  - Sample competencies
    - Apply new metrics to assess the impact of epidemiology on health care, public health practice and policy and ultimately on population health.
    - Describe cost-effectiveness and cost-benefit analysis and its place in the evaluation of interventions.

Findings

- Macro trend 8: Privacy changes
  - Description
    - Changes to privacy laws, notably HIPAA, have changed accessibility of certain health information vital to epidemiology research and practice
    - Epidemiologists need to understand the data that will be available, and be flexible with what they are able to do, given the limits to what data are available

Findings

- Macro trend 8: Privacy changes
  - Sample competencies
    - Demonstrate skills in how to leverage “meaningful use” to improve access to data.
    - Understand the definition of research versus public health and quality improvement.

Findings

- Macro trend 9: Societal expectations to get at root or "upstream" causes
  - Description
    - Increasing attention to moving up the causal chain to "upstream" risk factors that address, often via policy initiatives, underlying social/policy determinants of health (e.g., lack of education, lack of adequate housing)
    - In some cases, addressing these variables involves challenging well established "causes of causes" including some large and powerful industries (e.g., tobacco, firearms)

Findings

- Macro trend 9: Societal expectations to get at root or "upstream" causes
  - Sample competencies
    - Develop studies and variables that pay greater attention to social and economic policies that affect health.
    - Assess strengths and weaknesses of applying the systems approach to public health problem.

Findings

- Macro trend 10: Translational science
  - Description
    - Greater emphasis being placed on translational science (including dissemination and implementation research)
    - Epidemiology is a critical foundation for translational research

Findings

- Macro trend 10: Translational science
  - Sample competencies
    - Describe contextual variables (e.g., policy environment, organizational culture) that affect disease risk and intervention success.
    - Describe the role of epidemiology and the epidemiologist in the translation of knowledge.

Findings

- Macro trend 11: Team and transdisciplinary science
  - Description
    - Team science is a collaborative effort to address a scientific challenge that leverages the strengths and expertise of professionals trained in different fields
    - Transdisciplinary approach focuses teams from varied disciplinary backgrounds

Findings

- Macro trend 11: Team and transdisciplinary science
  - Sample competencies
    - Demonstrate skills in working across disciplines including those outside of the health sector.
    - Identify core variables for measuring progress in team and transdisciplinary science projects.

Findings

- Macro trend 12: Evolving funding environment
  - Description
    - Many epidemiologic research groups and centers have been based around federal funding (usually the R01 and other NIH mechanisms in the United States)
    - With NIH paylines at record lows and likely future restrictions on federal funding, there is a need for new and creative approaches for support

Findings

- Macro trend 12: Evolving funding environment
  - Sample competencies
    - Identify a broad set of funding sources for supporting epidemiologic studies.
    - Demonstrate skills in communicating about the need to fund epidemiologic research to diverse funders.

Next steps

- Write up findings
- Link and publicize with partners
  - CSTE, ASPPH, CTSAs, CDC
- Tailor to program needs
  - e.g., PhD vs. MPH vs. MS
- Give us your thoughts!!

Acknowledgement

Ross Brownson, co-chair	Washington Univ. in St. Louis
Jon Samet, co-chair	Univ. of Southern California
Megan Davis	NC Dept of Health
Gil Chavez	California Dept. of Public Health
Sandro Galea	Columbia Univ.
Robert Hiatt	Univ. of California, SF
Carlton Hornung	Univ. of Louisville School of Medicine
Muin Khoury	NCI/NIH and CDC
Denise Koo	CDC
Vickie Mays	UCLA
Pat Remington	Univ. of Wisconsin