Merging Holistic, Community, and Informatics Nursing Knowledge to Move Population Health Forward:

Wrap Up with Case Studies

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SINI 2017 Deep Dive

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Warm greetings

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Objectives of this Wrap Up

- ✓ Define social determinants of health (SDOH).
- ✓ Reflect on contributions of SDOH to health.
- ✓ Update on federal push towards inclusion of SDOH.
- ✓ Determine best method to include SDOH.
- ✓ Review SDOH and Big Data
- ✓ Present Case Studies

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Define Social Determinants of Health

- Complex, integrated, and overlapping social structures and economic systems that are responsible for most health inequities.
- These determinants include social environment, physical environment, health services, and structural and societal factors.

www.cdc.gov/nchhstp/socialdeterminants/definitions.html

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What are the social determinants of health?

Income and Income Distribution	Stress
Education	Social Exclusion
Unemployment and Job Security	Safety
Food Insecurity/Security	Domestic Violence
Housing	Incarceration
Health Services	Race and Ethnicity
Transportation	Veteran Status
Environment	Refugee Status

World Health Organization and Institute of Medicine

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Influences on Health

Influences on Health: Broadening the Focus

Health is shaped by many influences, including age, sex, genetic make-up, medical care, individual behaviors and other factors not shown in this diagram. Behaviors, as well as receipt of medical care, are shaped by living and working conditions, which in turn are shaped by economic and social opportunities and resources.

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Contributors to Health

Creative Commons: http://www.goinvo.com/features/determinants-of-health/

Federal Push towards Inclusion of SDOH in an EHR

- Two Phase Process
  - Public workshops
  - Candidate domains identified
  - Released report in 2014
  - Review of domain measure
  - Selection of panel

Institute of Medicine:
http://nationalacademies.org/HMD/Activities/PublicHealth/SocialDeterminantsEHR.aspx

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Capturing Measures: Two Phases

- Committee asked to:
  - Identify domains for consideration by ONC
  - Determine criteria for selection
  - Identify domains and measures for inclusion in EHRs
  - Consider implications
  - Identify issues

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Impacts of SDOH

- Individual
- Population
- Research

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IOM Potential Domains

SOCIODEMOGRAPHIC DOMAINS
Sexual orientation
Race/ethnicity
Country of origin/U.S. born or non-U.S. born
Education
Employment
Financial resource strain
   (Food and housing insecurity)

PSYCHOLOGICAL DOMAINS
Health literacy
Stress
Negative mood and affect
   (Depression, anxiety)
Psychological assets
   (Conscientiousness, patient engagement/
   activation, optimism, self-efficacy)

BEHAVIORAL DOMAINS
Dietary patterns
Physical activity
Tobacco use and exposure
Alcohol use

INDIVIDUAL-LEVEL SOCIAL RELATIONSHIPS & LIVING CONDITIONS
Social connections and social isolation
Exposure to violence

NEIGHBORHOODS & COMMUNITIES
Compositional characteristics

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IOM Criteria for Measure Selection

- Reliable and valid
- Feasible to collect
- Sensitive to measurement
- Accessible to collect

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Some Sources for Most Useful Measures

- **Race/Ethnicity**: U.S. Census (2 Q)
- Education: Educational Attainment (2 Q)
- Physical Activity: Exercise Vital Signs (2 Q)
- **Tobacco Use**: NHIS (2 Q)
- Social Connection and Isolation: NHANES III (4 Q)
- Neighborhood and Community Compositional Characteristic: **Residential address** (1 Q)
- Financial Strain: Overall Financial Resource Strain (1 Q)
- Stress: Elo et al. (2003) (1 Q)
- Depression: PHQ-2 (2 Q)
- **Alcohol Use**: AUDIT-C (3 Q)
- Neighborhood and Community Compositional Characteristic: Census Tract-Median Income
- Exposure to Violence: Intimate Partner Violence: HARK (4 Q)

IOM Recommendations to ONC and CMS

- The Office of the National Coordinator for Health Information Technology and the Centers for Medicare & Medicaid Services should include in the certification and meaningful use regulations addition of standard measures recommended by this committee for eight social and behavioral domains: **educational attainment, financial resource strain, stress, depression, physical activity, social isolation, intimate partner violence (for women of reproductive age), and neighborhood median-household income.**

Potential Benefits for this Effort

- More effective treatments
- More effective population health management
- Discovery of linkages

Implementation Issues

- Self reported data
- Lack of harmonized standards
- Linking existing data (Data Science/Big Data)
  - Acquire, Store, Transmit and Download
- Privacy
- Resources

Why invest the energy?

- Affects patient-reported outcomes
  - Disability, welfare associated with lower patient rating of care
- Lower SES and certain SDOH are associated with hospital outcomes
- Lower SES patients more likely to require post hospital care
  - Associated with limited resources and support, including transportation and family support in the home

Incorporating SDOH in an EHR

- Add data elements into the HER
- Add self reported data through PHR
- Create big data repository and bring in from external sources

SDOH and Big Data/Data Science

- Utilize EHR data and External data and Claims data
- Clearly describe at risk population and sub populations
- Create algorithms to predict clinical outcomes and utilization
- Develop and prescribe interventions geared at individuals and populations

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Approach

- Incorporate standard measures of SDOH as recommended by the IOM into EHRs
- Include public health surveillance data
- Add environmental, economic, health services, and geographic data
- Expand to include genomic data

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Challenges to SDOH in Big Data

- Standardization of determinants
- Privacy, security concerns – Big Brother issue
- Develop robust data sharing strategies
- Promote data science training
  - These are not traditional research techniques
  - Predictive analytics, data mining, business intelligence
- Training and education of health care professionals

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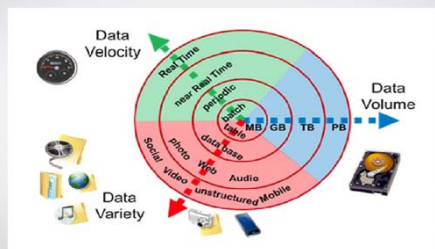
Big Data and Data Science review

- Since 2009, has been use by business sectors
  - Data mining
  - Predictive analytics
  - Machine learning
  - Visual analytics
- Characteristics
  - Volume, velocity, variety, variability, veracity

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The Velocity. Variety, and Volume of Big Data

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Layers to Support Big Data

- Data Aggregation – responsible for handling data from multiple sources (Hadoop, Cloudera, Mongo, DataCleaner, OpenRefine)
- Analytics – responsible for processing data that has been aggregated, cleaned, and prepared for use (RapidMiner, Oracle Data Mining, Statwing)
- Information exploration – generates outputs such a visualization reports (Tableau, Silk, Plot.ly, CartoDB)

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Cases

- University of North Carolina at Charlotte uses big data and analytics to incorporate SDOH in addressing primary care needs of immigrants to reduce unnecessary ED use.
- Oregon Primary Care Association address SDOH of patients in over 200 sites with key partners and collaboration

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Additional

- 2017 Datapalooza focuses on SDOH and machine learning
  - https://www.healthcare-informatics.com/blogs/david-raths/interoperability/day-2-datapalooza-more-providers-seeking-social-determinants-data
- Robert Wood Johnson: Using Social Determinants of Health to Improve Health Care and Health:
  - https://healthleadsusa.org/wp-content/uploads/2016/06/RWJF-SDOH-Learning-Report.pdf

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Training Resources

- PRAPARE http://www.nachc.org/research-and-data/prapare/toolkit/
- HRSA https://www.hrsa.gov/advisorycommittees/bhpradvisory/actpcmd/actpcmd_13th_report_sdh_final.pdf
- National Academies of Sciences, Engineering, and Medicine, A Framework for Educating Health Professionals to Address Social Determinants of Health. https://www.nap.edu/catalog/21923/a-framework-for-educating-health-professionals-to-address-the-social-determinants-of-health

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