Can Big Data Help Solve Our Biggest Problem?

Phillip D. Levy, MD, MPH, FACEP, FAHA, FACC
Professor and Associate Chair for Research
Department of Emergency Medicine
Assistant Vice President for Translational Science and Clinical Research Innovation
Wayne State University
Too Many People Die of Heart Disease!
Cause of Death Most Disproportionately Affecting Each State
(Top 10 Causes of Death Only)

Data source: Centers for Disease Control and Prevention. Map by Ben Blatt/Slate.
Driven by the Motor City...

Age-adjusted mortality rates per 100,000 for ten leading causes of death, Detroit, Michigan, and United States, 2014

Figure 2
Average BP by Census Tract

Race (group)
- (All)
- Black/African American
- Other Race
- Spanish/Hispanic
- White
Modifiable Risk Factors
- Diabetes Mellitus
- High Cholesterol
- Overweight/Obesity
- Physical Inactivity
- Unhealthy Diet

Relatively Fixed Risk Factors
- Psychosocial Stress
- Premature Birth
- Low Birth Weight
- Chronic Kidney Disease
- Family History
- Increased Age
- Low Socioeconomic Status
- Male Sex
- Obstructive Sleep Apnea
Convergence of biology and information → Health concept representation → functional imaging → healthcare → systems biology → omics & molecular biology → synthetic biology → brain mapping → information rich systems biology → genomics & phenome-gnome correlation → networks, models & complexity → new taxonomy → internet search → shared decision making → on-line patient communities → digitisation enabled democracy → crowd discovery → information commons & copetition → disruptive guideline development - wikimedicine

Biology → statistical thinking → dynamic modelling → information overload management → man-machine interface → big data analytics → complex clinical decision support → statistical thinking → dynamic modelling → openness, transparency & bias exposure → big data analytics → knowledge banks & mining → screening by questionnaire

Social → social networking → co-opetition → economic imperative → demand → capacity to pay

Technology → sensors, transducers, & devices → mobile computing → communications → cloud computing → gaming → three dimensional printing → biocomputers → on-line care provision → quality systems → integrated measurement → peer feedback → today embedded, guidelines and care plans → pay-for-success contracting

Prediction → prevention

Personalisation → self monitoring → personal health record

Participation → on-line patient communities → digitisation enabled democracy → crowd discovery → information commons & copetition → disruptive guideline development - wikimedicine