Individualized Health Initiative
Research Opportunities:
Statistical Designs, Models, and Analyses

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Top 10 Individualized Health Research Opportunities: Designs, Models and Analyses

10. Population health models – decision support analyses and tools for population health management team of employees, management and experts

   What causes US to pay nearly twice as much per person for poorer health outcomes? Which conditions and treatment? What is the low hanging fruit to improve health at more affordable costs?

9. Genomic/epigenomic prediction models for disease detection and treatment selection
   • cancer screening
   • frailty measures to classify surgery candidates

8. Causal inference from mixed observational and experimental data
   • estimates of modifier functions to individualize treatment assessment
   • feedback of intervention effects to propensity score function
   • estimates of intervention effects for entire population
7. Experimental design for “health learning community”
   • informed consent
   • who should be enrolled into embedded RCTs
   • which protocols?

6. Effective communication of health information to
   • public
   • health care providers
   • individuals

5. Dynamic decision support - real-time Bayes estimation and visualization to guide medical decisions
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4. Big data analysis systems design and implementation – systems of systems approach

3. Training for masters and doctoral graduates who can work on teams and as leaders at the interface of statistics, computer science, bioethics, medicine, and public health

2. New businesses who want to do good and do well by eliminating part of the $1 trillion of waste

1. Hopkins inHealth blog brings sensible analysis and commentary to the health care discussion, for ordinary people and policy makers – make even Rafael Irizarry forget Nate Silver
Statistical Formulation of the Health Learning Community

\[ \gamma_\pi \]

\[ \hat{\pi}(X, S) \]

\[ \pi(X, S) \]

\[ \mu(X, S) \]

\[ \mu(X, S) \]

\[ \hat{\mu}(X, S) \]

\[ \beta \]

\[ \zeta \mu(X, S) \]

\[ Y \]

X – individual characteristics
S - system (e.g. doctor) characteristics
\( \pi(X) \) – propensity score
\( \mu(X) \) – effect modifier score (ems)
\( Z \) – intervention indicator (0, 1)
Y – health outcome