The Role of Diagnostic Management Teams in Improving Personalized Medicine and Reducing Provider Burden

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Patient Care Begins With Diagnosis

• Have our efforts to harness the potential of HIT have fallen short of expectations? Consider:
  • Google has dissolved its healthcare division.
  • Apple has found healthcare challenging.
  • CMMI and PTAC results.

• As discussed in a prior talk to this group a major problem is that current policy assumptions prioritize “measurement” over correct diagnosis and information sharing. Further, policy makers have underestimated the clinical complexity of healthcare.
Current Health Policy Assumptions Ignore Diagnosis

• Reliance on centralized guidelines and clinical measures.
  • Emphasis on common diseases that greatly underestimates the importance of less common and rare diseases.
    • A 2009 publication authored by individuals at CMS found that “few primary care physician practices are large enough to reliably measure 10% relative differences in common measures of quality and cost performance among fee-for-service Medicare patients.”
    • In a 2018 review, conducted by the American College of Physicians, of 86 measures on the 2017 QPP list, 37% were valid, 35% were invalid, and 28% were of uncertain validity.
  • No incentive to share high quality data and knowledge across the healthcare system.
  • No incentive to prioritize correct diagnosis especially of complex patients.
The Challenges of Diagnosis

- Numerous disease categories (about 50 to 150 thousand codes depending on coding system).
- Less common to rare diseases in aggregate account for considerable proportion of the population and even more cost.
- Numerous disease combinations (co-morbidities) exist and present challenges.
- Scientific and diagnostic knowledge explosion.
The Correct Diagnosis of Complex Patients

- Two studies illustrate how complex healthcare is:
  - Medicare Disease Combination analysis. The most comorbid 33% of Medicare beneficiaries accounted for 79% of expenditures. Given 10 million beneficiaries and over 2 million combinations of 70 HCCs the average national cell size in this group is about 5.
    - 1,658,233 Unique DCs account for 5% of patients, 35% of expenditures (change annually).
  - Medicare Twin Study. MZ (identical) twins shared 6.5% more HCCs than their MZ-MCP (26.3% vs. 19.8%, P<0.001).
Phenotypic Disease Networks (PDNs)

Nodes are diseases; links are correlations. Node color identifies the ICD9 category; node size is proportional to disease prevalence. Link color indicates correlation strength. Figure A. PDN constructed using $RR$. Only statistically significant links with $RR_{ij}>20$ are shown. Figure B. PDN built using $\phi$-correlation. Here all statistically significant links where $\phi>0.06$ are shown.


http://www.ploscompbiol.org/article/info:doi/10.1371/journal.pcbi.1000353
Conclusion

• Medicare comorbidities is a “long tailed” distribution even with a coarse disease coding schema. There is no “average” or “typical” complex patient.
  • Concepts of a “normal distribution” including mean and variance do not apply.
  • Current quality measures based on prevalent diseases may yield benefits, but they will be very limited.
  • How do you train an AI given the small national cell sizes?

• It is common for comorbid patients to be rare even nationally. Very similar to patients with rare diseases.
  • May need to share information about a specific patient nationally across several patients/providers to inform care.

• Must prioritize high quality diagnostic data and correct diagnosis!
Long Term Goals

• Long term will require substantial changes to our HIT systems and payment models (e.g., see here). Specifically, we must evolve:
  • From centralized to data-driven crowd sourced decision making (not social media or internet search engines).
  • From Information Technology to Information and Communication Technology.
  • From data hoarding to data sharing.
  • From poor/uncertain diagnostic data quality to high diagnostic data quality.
  • From poorly curated problem lists to highly accurate problem lists.

• But is this too complex and unrealistic?
DMTs Can Be Done Now!

• Diagnostic Management Teams (DMTs) can be profitably implemented in the current payment and regulatory environment.
• Both the clinical (e.g., rare diseases) and geographic scope of DMTs can expand as future technologies and healthcare models evolve.
• DMTs provide a useful pathway for continued improvement of diagnostic workflows and specification development for new standards.
• Ultimately DMTs can help inform new payment models and information systems.