Medical Complexity: A Pragmatic Theory

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Main Thesis

We need to develop a rigorous scientific approach to understand and manage “medical complexity” if we hope to optimize outcomes for children with medical complexity and their families, and to do this, we need to develop a theory of “medical complexity”
Dino
What makes a complex patient "complex"?

1998 UW MPH Program
My first thesis idea:

Since then ...

• CHOP
• Integrated Care Service
• Palliative Care
• Colleagues:
  • Allison Ballantine, Tammy Kang, etc etc
  • Jay Berry, Jamie Feinstein, etc etc
  • Thane Blinman — particular focus on complexity as a medical problem

Also, I should note musical influences: Beethoven String Quartets and Bruckner Symphonies, Red Hot Chili Peppers (Flea rocks!) and Florence & The Machine, and etc etc
Why a Theory?

• Clarify concepts and terms
• Promote development of a common language
• Something to argue against
• Suggest useful areas to investigate or develop

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Develop the Science of Medical Complexity

My anxieties 😢😢😢

• Don’t want to come off as patronizing
• Don’t want to be too abstract or etherial
• I’m not sure what I am about to say is correct

But here I go, anyway …
Agenda

• Starters — Classification, Tools, Risk, Stratification
  — Opportunities & “Improvability Index”

• Complexity & Medical Complexity

• Problems and Problem Solving Difficulties

• Complex Medical Problems

• Complex Problem Solving Strategies and Tactics
  • *Suggestions and conjectures*
Starters
Classification Methods

- **Tools for a job**
  - Different people want to perform different jobs
  - The “job” needs to be clearly defined
  - Depending upon the job, the necessary performance characteristics of the tool will differ
Examples of Classification Methods

• Diagnosis based (procedure codes, too)
  • CRGs, Chronic Condition Indicator, CCCs, Patient Medical Complexity Algorithm

• Functionality based
  • CSHCN Screener, PEDI-CAT

• Other ways
  • Service use patterns or …

Berry et al, Ways to Identify Children with Medical Complexity and the Importance of Why, J Peds (2015)
Outpatient Polypharmacy

James Feinstein, MD MPH

Feinstein et al, The depth, duration, and degree of outpatient pediatric polypharmacy in Colorado fee-for-service Medicaid patients. Pharmacoepidemiol Drug Saf. 2015
Risk Stratification is a Specific Type of Classification

• The “job” is to group / classify kids into bins of increasing levels of “risk”

• But “risk of what?”
“Risk” is vague

- Risk of ____ needs to be spelled out

- _____ may be mortality (during what time frame?), readmission (when? what type?), preventable morbidity (what kind?), unmet needs (what needs count?), cost (to whom?), or many other undesired outcomes
“Risk stratification” is equally vague

- Risk of _____ needs to be spelled out
- Otherwise, risk of obfuscating or being disingenuous
- Risk stratification is a quantitative prediction:
  - Based on what we now about you now, you are at X% risk of Y at Z time in the future
These methods spot individual patients at “risk”

Are these the only foci?
How about spotting patients or clinical programs who have opportunities for improvement?
Improvability Index

• Can we imagine …

• A measure that would let us spot

• Groups of patients managed by a particular clinical team

• Whose outcomes are consistently worse

• Than similar groups of patients managed by other teams?
• Can we imagine …

• A measure that would let us spot

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Would a quality improvement framework of examining variance of outcomes across programs work?
Identification of High Improvability Index Programs

Cost of hospital care for a particular group of patients

23 Hospitals
Final Starting Thought:

Suppose you found a group of Medical Complex Patients at “risk” for high utilization … now what?
Final Starting Thought:

Suppose you found a group of Medical Complex Patients at “risk” for high utilization … now what?

If our interventions don’t work, will we be able to figure out why and decide - in a disciplined, methodical way - where to go next?
Complexity & Medical Complexity
There is no absolute definition of what complexity means; the only consensus among researchers is that there is no agreement about the specific definition of complexity. However, a characterization of what is complex is possible.[1]
Complexity

- Multiple components that interact with each other
- Both damping (negative) and amplifying (positive) feedback loops
- Potential for synergistic successes or cascading failures
- Relationships between X and Y are non-linear
- One set of relationships can be nested in a larger set
- Complexity requires systems thinking
All human beings are complex systems
Medical Complexity

• Medical complexity does not arise from patients, but rather from complex problems

• Complex problems do not emanate from or reside in just patients, but also in clinicians, teams, and systems of care
Medical Complexity

↓

Complex Medical Problems

↓

More than just patients’ pathophysiology
Problems, Problem Solving, & Problem Solving Difficulties
What is a “problem”? 

Current State \hspace{2cm} … Gap … \hspace{2cm} Desired State

This gap is the problem.
What makes problem solving difficult?
What makes problem solving difficult?

More Components

- “A long problem list”, multiple co-morbidities, polypharmacy
- This is a “complicated” patient (as opposed to a “simple” patient)
- If the components do not interact, complicated is not necessarily complex
- A “divide and conquer” problem solving strategy works for complicated patients
More Interactions Among Components

- Problems that affect each other, technology that both alters and creates problems, drug SE and drug-drug interactions
- Non-independence of components = complexity
- Complexity increases by a power law of interacting components
- The study of “outliers” is very important

What makes problem solving difficult?
What makes problem solving difficult?

Ignorance of Components or Interactions

• What we don’t know can be the missing key

• Hypothesizing the existence of an unknown component that would explain the problem can be a useful trick
Uncertainty about Components of the Problem or the Consequences of a “Solution”

- Uncertain makes finding a “solution” less certain or assured
- But uncertainty (which is always present, acknowledged or not) is handled differently by different people and can create conflict or decisional paralysis
- Making the “Management of Our Uncertainty” an explicit part of group problem solving can be helpful
What makes problem solving difficult?

Lack of Clarity or Agreement about What Problem to Solve

- Most problems are “open” & need to be defined
- Trying to solve a problem shrouded in the mist of disagreement or poor communication is foolish
- Job #1 is to define problems clearly
What makes problem solving difficult?

Multiple Objectives

• “Solutions” also need to be defined

• Trying to achieve more objectives with a single solution is more complex

• Job #2 is to clarify what “success” will look like for any given well-defined problem
What makes problem solving difficult?

Solutions Become Part of the Complex System

• Solutions interact with problem components, potentially adding to the complexity

• Avoid employing too many solutions simultaneously
What makes problem solving difficult?

Over time, Solutions Are Added (Solution Creep)

- The work of maintaining all the “Solutions” becomes itself a complex problem
- People are often reluctant to wind-down established solutions even if only partial solutions
- How can we simplify care?
What makes problem solving difficult?

Too many cooks in the kitchen

- Increased communication load ($n^2$ for $n$ clinicians)
- Differing goals or values
  - Consequently, different solutions for tradeoffs
- Reducing the N of clinicians may helpful
Too Little or Too Much Time

- Too little time constrains the search for solutions and causes pressure on human performance.
- Too much time results in entropy of shared understanding and poorer execution of solution plan.
- What is the optimal amount of time?
Complex Medical Problems
Present All the Difficulties Outlined Above

- Many components
- Many interactions
- Ignorance / neglect
- Uncertainty

- Problem clarity
- Multiple objectives
- Solutions as problems
- Cooks and time

Complex Medical Problems
Are in the Mind of the Beholder

- What is complex for one clinician might be clear for another
- Knowledge is one part of the reason this happens
- Different people use different problem solving strategies, and some strategies work better than others
- Is this the value of experts & inter-professional teams?
Complex Medical Problems

Are often Hierarchically Related

• Different hierarchical relationships
  • This *drives* that
  • This *depends upon* that
  • This *was due to* that
  • This *is part of* that

My usual focus

Leverage Points
Complex Medical Problems

Can be Nested in Other Problems

• Medical problems or service team performance problems or social circumstances

• “A car, a car! My kingdom for car!”

• The necessity of non-medical problem solutions
Are Family and Medical Team Dependent

- Complex medical problems require families and teams to confront adversity and work-load and be able to cope, adapt, problem-solve, execute
- Resilience and abilities in all these skills are key influencers on outcomes
- What interventions could increase these?
Complex Medical Problem Solving Strategies and Tactics
Care Coordination

- Care coordination can:
  - Speed up planning
  - Enhance execution
  - Lower total effort for given solution

But this is not all that complex medical problem solving requires
Focus on Leverage Points

• Organizing problems into hierarchical structures where “this drives that” can help identify high leverage points —

• Alter this problem and many other problems will become easier to solve

• Seek Positive Cascades
Seek to Simplify

- Reducing complexity makes problems more tractable
  - Practice The Art of Thoughtful Omission
- But not beyond a point of diminished effectiveness
Individualize via N=1

• N=1 trials may be necessary

• Need to identify how to conduct such trials effectively and efficiently
Manage Ad Hoc Teams

• Medical care for complex patients most often involves a group of clinicians to work together in an ad hoc manner

• The performance of this individualized ensemble is part of the complexity of the problem solving

• We need to develop training for this
Reduce the N of clinicians

• Bloated teams operate sluggishly
  • Communication load problems
  • Non-alliance of problem definition or goals

• What is the optimal N of clinicians for a given range of problems?
When getting involved in the care of medical complex patients I too often find leadership vacuums.

- “Who is in charge?” — “Well, not me …”

Ad hoc team leadership training
Complex Medical Problem Solving Strategies & Tactics

Spell Out the Problem(s)
Clarify Goals
Confront Tradeoffs
Manage Expectations
Emphasize Execution

- Execution not only of intervention but of teamwork, communication, etc.
- For the “n=1 trial” period
- For sustained adherence to solutions that are working
- The means to do this better need to be developed and studied
Questions to Pursue

- Theoretically, what do we want a program …
  - Medical home
  - Care coordination
  - Care navigator
    - … to do in order to manage the medical complexity in order to improve outcomes?
- How do we propose that these programs will do the job? What precise mechanisms?
Questions to Pursue

• Are differences in cognitive styles of complex problem solving something that we can accommodate with individualized decision support?

• Are some clinicians better at complex problem solving than others?

• Can we train clinicians to be better complex problem solvers?
Thank you

Questions? Concerns? Complaints?