Summer Internship Program
Orientation 1
Healthcare Systems Engineering Institute
March 28, 2014

James C. Benneyan, PhD, Director
Healthcare Systems Engineering Institute
CMS Innovation Healthcare Systems Engineering Center
NSF Center for Health Organization Transformation
Northeastern University, Boston MA
www.HSyE.org
Outline

1. Welcome!
2. Who we are and why
3. Summer internship program
4. Logistics
5. Next steps, Calendar
6. Q & A
Welcome!
My hopes for you

• Contribute to our healthcare IE projects & our overall mission, team, internal operations.

• Learn about healthcare systems engineering

• Develop useful career experience and insight

• Grow personally and professionally

“It’s time for the science of health care to embrace systems engineering” (JAMA, 2012)
a bit about us
Us - snapshot

• Core staff
  o Dr. Benneyan, Director, NU-IE faculty; IHI fellow/faculty
  o 5 Faculty, 5 staff/engineers/advisors, 2 MDs, 2 office staff, 2 technical writers,
  o 5 post-docs, 24 graduate students, 10 undergrads

• 2,600 square foot institute space

• Summer internship program
  o Corey Balint, MSIE; Staff engineer, intern coordinator
  o Kendra Gray; office admin (hiring, paperwork, etc)
  o Graduate student mentors (1-to-1)
**Mission:** Broad measurable impact on healthcare, nationally, through research, education, and application of industrial and systems engineering

**Partnerships**

**Project Types**

- **Research**
  - *Discover*
  - “Developing what we don’t know”
  - 1 - 2 years

- **Applied**
  - *Impact*
  - “Doing what we know”
  - 3 - 9 months

- **Experiential**
  - *Education*
  - “Teaching others by doing”
  - 2 - 6 months

**Criteria**

**Primary Mechanism**

- **NSF Research Center**
- **CMS Application Center**

- **Mission:** Broad measureable impact on healthcare, nationally, through research, education, and application of industrial and systems engineering
Why

- National crisis
- CWF and WHO studies
- $3 trillion/year (~18%)
- 1/3 = pure waste
- Unsafe, unreliable
- Poor health, outcomes
- High variability
- Poor access, equity

Commonwealth Fund Study (2010)

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1 = best, 7 = worst
What matters → What we do

Safe
Effective
Patient centered
Timely
Efficient
Equitable

• Flow, waits, delays
• Logistics, capacity
• Quality, lean, six sigma
• Safety, reliability
• Treatment, medical decision making
• Policy
summer internship
Summer Internship Program
Healthcare Systems Engineering Institute – Northeastern University

Recruiting & Application
- Hiring
- Reading
- Reflection exercise
- Onboarding

Cohort Research Experience
- Mentoring
- 2 Research Projects
- Formal Report

Post REU Year
- Testing + Evaluation
- Reflection exercise
- Paper Preparation

Time
- Winter-Spring
- Summer
- Fall-Spring
Typical summer responsibilities

1. Two (ish) healthcare IE projects
   • Team structure (following slide)
   • Fluid over time, load balancing, help others as needed

2. One internal project team
   • Fill in ebb and flow of external projects
   • Ad hoc help as needed

3. Learning and growth
   • Guest lectures, summer course sit-ins, IHI Open School
   • Weekly mentor meeting
   • Reflection exercises (August)
   • Self-motivated
Project team structure
## Typical projects

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<tr>
<th>Delivery System Logistics</th>
<th>Patient Flow</th>
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<td>• Inventory</td>
<td>• Workflow smoothing</td>
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<td>• Supply chain and reusable equipment optimization</td>
<td>• Patient flow simulation models</td>
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<tr>
<td>• Regional network design</td>
<td>• Operating room logistics</td>
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<td>• Real time location systems and RFID</td>
<td>• Emergency department flow</td>
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<td>• Diagnostic test scheduling</td>
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<th>Workforce Planning</th>
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<td>• Capacity planning</td>
<td>• Reliable and consistent care</td>
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<tr>
<td>• Staff scheduling</td>
<td>• Harm and error reduction</td>
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<td>• Demand management</td>
<td>• Readmission reduction</td>
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<tr>
<td>• Operating room scheduling and turn-around</td>
<td>• Nurse knowledge exchange &amp; hand-off practices</td>
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<td>• Academic workforce logistics</td>
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## Project Status, June 2013

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<th>Course-based</th>
<th>Yes/No</th>
<th>Embedded</th>
<th>Stretch</th>
<th>Type</th>
<th>Implement</th>
<th>Status</th>
<th>Project Conducting</th>
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<td>Access, LOS</td>
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Note: ○ = Partial, ● = Completed, x = Not Applicable
A few examples – Range

**Aim:** Reduce CHF readmission costs 25% by increasing post-discharge follow-up appts ≤ 7 days

**Approach:** Basic process flow, data analysis, and CQI
Central line ICU infections

**Aim**
Reduce ICU CLABSI rate and associated costs by 50% within 9 months through implementation of “bundle”

**Approach**
- Process flow analysis
- Bundle implementation via reliability science and human factors models

**CLABSI Bundle**
1. Insertion technique, hand hygiene
2. Low risk site selection
3. Maintenance (sterile)
4. Daily removal assessment

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<th>Reliability tier</th>
<th>Strategies</th>
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<td>Mitigate</td>
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<td>Redesign</td>
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Peri-operative inventory

Aim

Reduce peri-operative supply costs by 20% via inventory methods, lean concepts, and preference card reduction

Approach

- Establish/revise PAR levels for 80% of “A” items
- Standardize & reduce preference cards
- 5S inventory areas
Room utilization/pooling

Aim
Consolidate low utilized patient rooms to eliminate ~$2m/yr overflow space costs by hybrid room pooling

Approach
• Room sharing simulation
• Open availability real-time RTLS tool
• Pareto/CQI of reasons new process not followed
Primary care continuity

Graduate research/optimization example

Primary care continuity coverage

- Better continuity → Better prevention, outcomes, re-visits
Results: ~20% improvement
logistics
next steps
Calendar

**Spring**
- March 28 – Orientation call 1
- April (date) – Orient. call 2
- Background reading assign
- Pre-onboarding, paperwork
- “Pre-flection” exercise (what you want to gain from this)

**Fall**
- Quarterly conference call
- Post-reflection
- Short writing assignment

**Summer**
- Week 1: May 27 2014
  - General orientation, onboarding
  - Project finalization

- June – Aug 14
  - Team projects, HSyE activities
  - Learn, grow, teach, contribute

- Weekly
  - Team meetings
  - Guest lectures, IHI Open school
  - Weekly meetings: mentor, me

- Aug 10 week
  - Reflection, report, presentation
Logistics

• Corey Balint, Kendra Gray
  o Rooming
  o Onboarding paperwork (computer accounts, hospital orientation, HIPPA online training, etc)

• Mid-April 2014
  o Circulate list of some of the potential projects
  o Solicit your interests (topics, research, etc)

• See you May 27 (8:30 am)!

• What else?
  o
  o
Questions

www.hsye.org

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