Regenstrief Center for Healthcare Engineering at Purdue University

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Regenstrief Center for Healthcare Engineering
At
Purdue University
Regenstrief Center for Healthcare Engineering

Mission

Catalyze transformation of healthcare delivery by applying principles of engineering, management and science.
RCHE’s Business Model for Engineering Interdisciplinary Solutions

Healthcare System (Strategic Partners)
- patient
- care team
- healthcare organization
- political & economic environment

RCHE

Healthcare Technical Assistance

Research

Knowledge Development

Implementation
- systems & process improvement
- alternative delivery
- new technology
- information and communication tech.
- education
- information for policy formation

Knowledge Dissemination

Evaluation of Demonstrable Improvement

Feedback

Purdue Discovery Park
Living Laboratories
University-Wide Effort

- College of Pharmacy, Nursing & Health Sciences
- College of Engineering
- College of Liberal Arts
- School of Management
- College of Consumer & Family Sciences
- College of Science
- College of Technology
Healthcare TAP

Integrated Services approach:

- Multi-discipline project team
Healthcare TAP

Short-term acute issues, approach:
- Performance improvement training
- Facility planning
- Financial services improvement
- Information technology
- Patient flow
- Process improvement
- Scheduling
Healthcare TAP

Completed and Active Projects by Location

Total = 31
RCHE Core Research

Efficiency and Effectiveness

Safety and Quality

Interoperability and Security
Efficiency and Effectiveness of Healthcare Delivery

Sample of Research
Communications

• Internal Communications
  – Information Foraging
  – Effectiveness of Information Exchange

• External Communications
  – Timeliness and Adequacy with Referring MDs
Ambulatory Clinic Patient Flow

- Open Access Scheduling
- Estimating ‘No-Shows’
- ‘Front Desk’ Work Re-Engineering
- Call Center Operations
Facilities Design for Optimum Care

- Patient-Centered Design
- Testing Design Concepts with Virtual Reality
- Safe Work Environments for Staff
- Design Based Upon System and Process Analyses
Operations Improvement in Hospitals

- Modeling Central Processing and Sterilization for Operating Rooms
Program and Outcomes Evaluation

• Medicaid Waiver Program for Older Adults with Dementia
Pandemic Influenza Gap Analysis

Principal Investigators

Mark Lawley, Ph.D.

Dave McKinnis, Ph.D.
Project Goal

- Identify local health department pandemic flu planning gaps

Deliverables

- 94 gap analyses
- State summary
Self-Assessment Averages

Dark shade = 0 – 0.2
(least items “in progress” or “completed”)

Medium shade = 0.21 – 0.99

Lightest shade = 1.0 – 2.0
(most items “in progress” or “completed”)
Six Priority Areas

- Alternate care site planning
- Volunteer management
- Mass fatality planning
- Public education
- Isolation/quarantine implementation
- State-level coordination
Coordination of Care for Pandemic Response

Mark Lawley, Principal Investigator
Project Goals

- Identify triggers for hospital preparedness stages
- Define individual hospital strategies
- Plan staffing levels
- Illustrate value of cooperation
Engineering Tools

- **Queuing Network Model**
  - Patient arrivals, transfers, and resource utilizations
  - Quick, aggregate estimations

- **Simulation Network Model**
  - Patient flow, waiting times
  - Highly detailed scenarios

- **System Hospital Dynamics Model**
  - Flow dynamics
  - Effects of staff attrition, resource consumption, disruption of infrastructure systems
Model Illustration: Two Hospitals
Actual # Patients in each Hospital over 100 days

<table>
<thead>
<tr>
<th>Hospital 3</th>
<th>Hospital 2</th>
<th>Hospital 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>400</td>
<td>300</td>
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<tr>
<td>300</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>200</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend:
- Hospital 3
- Hospital 2
- Hospital 1
Nurse Time and Motion (Multi-Site)

William Cleveland, Principal Investigator
Christopher Clifton, Professor
System Performance Measures
Telehome Health
Pamela Whitten, Principal Investigator
Alicia Bergman, Research Assistant
Personalized Healthcare

Cancer Care Engineering
Safety and Quality of Patient Care

Sample of Research
Patient Safety Analyses

- Process Improvement Training
- Multi-Industry System and Process Evaluation
- Systems and Process Engineering
Security and Interoperability of Patient Information

Sample Research
Knowledge Development

CEO Healthcare Summit

May 2006
Project Goal

- Design the healthcare-delivery system for the next generation

  . . . without regard to today’s
  
  - Technologies
  - Infrastructure
  - Financial systems
Outcomes

- Three distinct system characteristics
  - Access to “basic” healthcare for all
  - Consumer choice and responsibility, and
  - Personalized and coordinated continuum of care

... with associated innovations and enablers
Innovations

- Access to basic healthcare for all
  - A definition of “basic” healthcare coverage
  - New models for healthcare financing
Innovations

- **Consumer choice and responsibility**
  - Competition in the healthcare-delivery market
  - Provider/treatment options at points of care
  - Consumer access to performance metrics
  - Consumer decision-support system
Innovations

- Personalized and coordinated continuum of care
  - Personalized care technologies
  - Evidence-based clinical practice
  - Systems, protocols and administrative processes to facilitate secure information exchange
  - New provider business and professional models
Outcomes

- Three distinct system characteristics
  - Access to “basic” healthcare for all
  - Consumer choice and responsibility, and
  - Personalized and coordinated continuum of care

... with associated innovations and enablers
Innovations

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“... the Healthcare Summit ... was a stroke of genius to bring together such a diversity of disciplines who in the end achieved great synergy around the issue of next generation health care.”

Nancy Dickenson-Hazard
CEO, Sigma Theta Tau International
(Nursing Honor Society)
Fellow, American Academy of Nursing