


# Collaborating with the College of Engineering: *Initial Strategies and Early Outcomes*



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# Collaboration Across Disciplines



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Human Factors Engineering

- Applies human factors engineering principles to the design of complex systems
- Courses
  - Engineering Health Systems
  - Human Factors in Virtual Environments



# Overview

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- Current Projects
  - First Case FIX Initiative
  - Surgical Unit Layout Analysis
  - Modeling of Telemedicine System
  - Development of Virtual Patients
- Grant Proposals
  - Integration of Simulation and Virtual Patient Experiences for Surgical Education
  - Developing IT Communication Models in Perioperative Cancer Care



# First Case FIX Initiative

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- Objectives

- To identify and analyze sources of delays in first surgical cases
- To enhance the capabilities of the surgical services department in order to launch a greater percentage of first cases on time
- To start the first case of the day at 7:30am instead of 7:45am



# First Case FIX Initiative

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- Methods

- Process flow analysis: Observation, interviews, analyzing existing VA data on delays
- Analyze preparations taking place with patients in clinics that have low number of delays
  - Orthopedic Surgery identified as a best practice
  - Reviewing computer support systems
  - Improve screens for antibiotic ordering and other tasks
  - Reminders sent to physicians to complete medication orders, consents



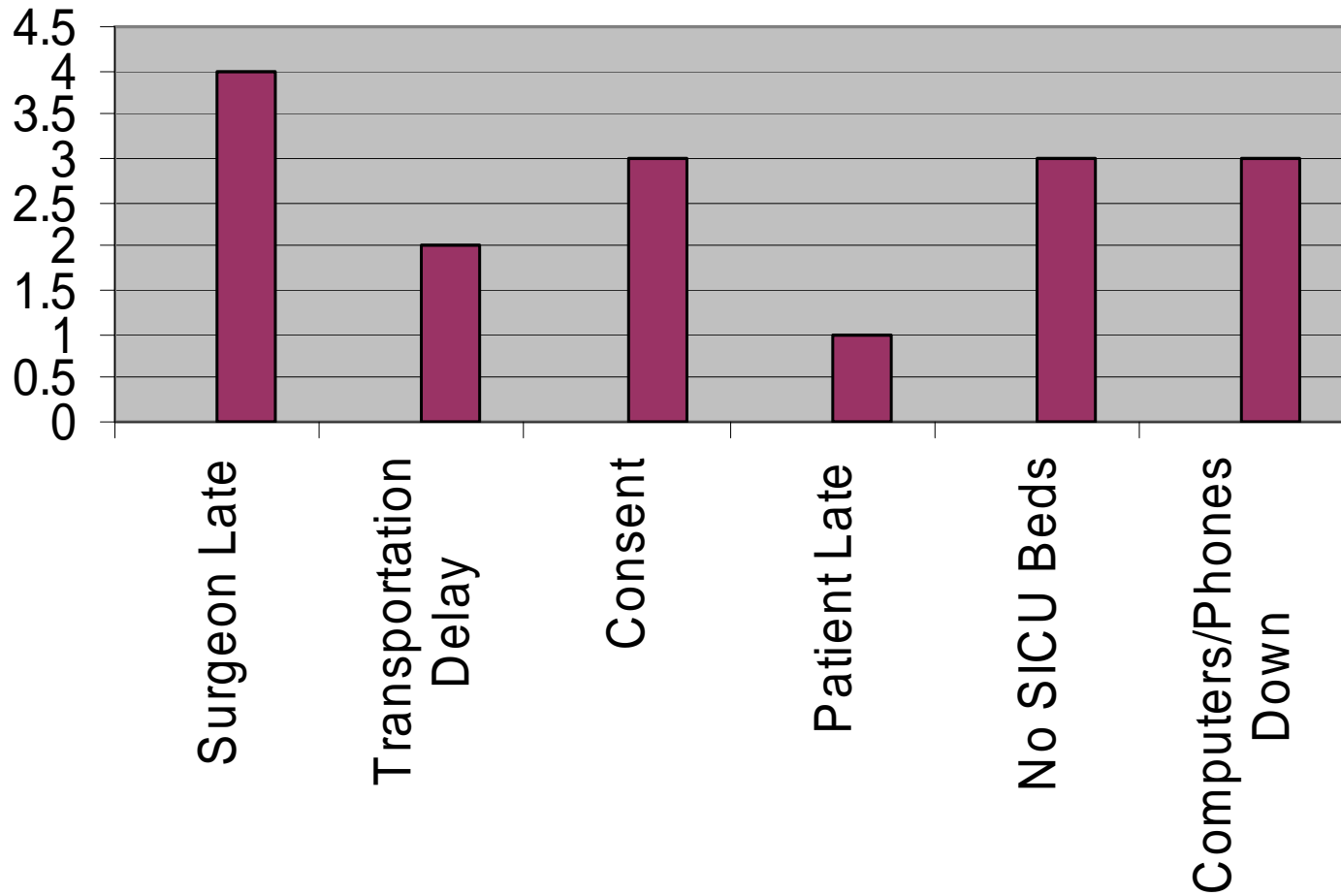
# First Case FIX Initiative

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- Changes Implemented
  - Additional surgery tech (total = 2)  
support morning nurse
  - Patient arrives in Pre-op area by 7:00 AM
  - Shaving takes place in Same Day before  
sending to Pre-Op



# 1<sup>st</sup> Case Delays in 16 of 30 Cases





# Surgical Unit Layout Analysis

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- Class project of WSU Engineering Graduate students
- Objectives
  - Analyze current storage solutions
  - Analyze current unit layout
  - Propose changes based on analysis
    - Improve the efficiency of the workplace
    - Identify areas for further evaluation



# Surgical Unit Layout Analysis

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- Methods
  - Observe daily situations
  - Interview staff
  - Create list of recommendations
    - Short term: i.e. Reallocation of current space
    - Long term: i.e. Renovation of unit and implementation of electronic storage systems

# Example of Project Focus: Storage

- Current:
  - Inadequate space for equipment
  - Supply storage not centralized
- Proposed:
  - Reallocation of space to allow for large equipment
  - Centralized supply locations
  - Implement electronic storage system for inventory and ordering





# Development of Virtual Patient

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- Objectives
  - To develop a computer-based **interactive** virtual patient for teaching clinical care and communication skills to learners
  - To evaluate effectiveness of interactive computer-based virtual patient compared to static (non-interactive) and human standardized patients
- Submitted Major Collaboration Grant to WSU.
  - Integration of Virtual Patients into High Fidelity Simulation Strategies for Medical Training and Competency Assessment



# Development of Virtual Patient

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- Methods
  - Literature Review
  - Interviews with experts in teaching communication to medical students and/or using virtual patients
  - Observation of training and interactions with standardized patients
  - Applying existing models of communication



# WSU SOM Grant

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- WSU SOM Medical Education Grant Proposal, submitted March, 2009
- Title: Integration of Task Training and Human Patient Simulation Strategies into Virtual Patient Experiences for Surgical Education of Medical Students and Residents



# WSU SOM Grant

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- Objectives:
  - Develop interactive avatar-rich virtual patients with surgical disease in Second Life
  - Demonstrate the feasibility of integrating virtual patient scenarios into high fidelity simulation for the student and resident in surgery
  - Create a learning environment that allows testing of both cognitive and task oriented skills



# WSU SOM Grant

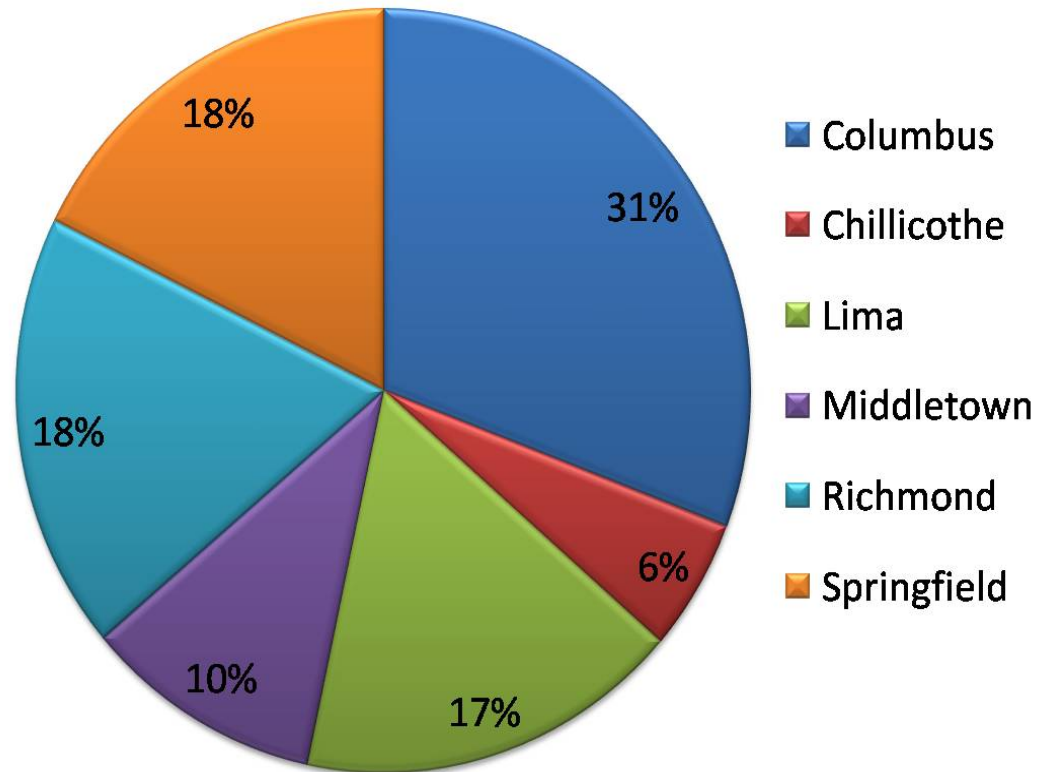
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- Methods

- Clinical cases developed around colon cancer, cholelithiasis and lung cancer
- Cases include diagnosis, preoperative care, surgery and postoperative care
- Patient scenarios programmed into Second Life
- Each scenario contains at least one task-simulation and possible high-stakes event to be managed on human patient simulator at Dayton VAMC
- Medical student and resident versions

# Telemedicine

FY 2007  
Consultation  
Requests from  
Outside  
Dayton VAMC





# Travel to Dayton VAMC

	<b>Miles from Dayton VAMC</b>	<b>Travel Time</b>
Chillicothe	81	1:22
Columbus	79	1:20
<b><i>CBOC's</i></b>		
Lima	76	1:15
Richmond, IN	38	0:48
Springfield	36	0:43
Middletown	19	0:32



# Modeling of Telemedicine System

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- Student Computer Simulation Project
  - Model levels of telemedicine utilization and patient wait times.
- Input variables
  - Referral rates (Columbus and Chillicothe)
  - Shared resource
  - Length of in-person consultations
  - Length of telemedicine consultations
  - Percentages of appointments that went directly to consult vs. those that had some extended delay to wait on tests
  - Frequency of physicians needing to cancel appt's



# Modeling of Telemedicine System

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- Results based on theoretical system indicated that factors that must be considered are:
  - Mismatch between referral and specialty availability leads to long patient times.
  - However, patients are waiting near their homes rather than traveling long distances so time may be equal.
- Additional factors to add to the model
  - Change in resource utilization compared to face to face
  - Difference in time spent with patient
  - Patient satisfaction



# NIH Grant

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- Invited to resubmit March, 2009
- Title: Developing Best Practice IT Communication Models in Perioperative Cancer Care
- Objective: To enhance cancer patient care through the development of models for incorporating IT to improve communication and teamwork among providers and between providers and patients



# NIH Grant

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- Phase I Aims:
  - Establish benchmarks of current system
  - Evaluate patient and provider needs and expectations
  - Evaluate current teleconsultation model
  - Develop IT use model for pre- and post-surgical care



# NIH Grant

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- Phase II Aims:
  - Set up IT systems based on model
  - Measure system effectiveness and compare to benchmarks
  - Update model and re-evaluate



# Expanded Collaboration and Student Involvement

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- April Barnes, PhD Candidate in College of Engineering, will work with human factors in development of virtual patients as her dissertation
- Offer MPH Student Culminating Experience and Practice Placement Opportunities associated with our work