

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

ESD.00 Project Schedule

Modifying the Stroke Care Pathway to Improve Length and Quality of Life

Spring 2011

Project

Instructor: Dr. Stan Finkelstein

Project

Assistants: Abby Horn
Amparo Canaveras
Kenneth Gotlieb

Description:

Students will be introduced to the physiology of stroke, the current stroke care pathway, and relevant technologies. They will work with an existing system dynamics model to implement adjustments to scenarios in which an innovative technology is utilized, and be given the opportunity to introduce new scenarios for changing the stroke care pathway under new social or management practices. They will determine which scenarios deliver the greater benefits in terms of survival, impact on health care system, and cost-effectiveness, based on their consideration of the uncertainties within the system and networks of service deployment.

Due dates to note: Preliminary – subject to change

R6: Project assignment #1 due (Understanding to SD model)

R7: Project midterm presentations

R8: Project assignment #2 due (Implementing new policies and practices)

R9: Project assignment #3 due (Building uncertainty into the model))

R11: Draft of project paper due (5-pg draft, including preliminary quantitative analysis)

L12: Class presentations

After L12: Final written report due

Project Schedule

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#	Topic	Readings	Assignments
R1	<p><u>Project Motivation and Background:</u> Introduction to stroke care pathway:</p> <ul style="list-style-type: none"> • Medical and economic impact of stroke • Stroke care procedures and methodologies: technologies and care providers <ul style="list-style-type: none"> ○ Overview on stroke care pathway ○ Overview on stakeholders • New trends in treatments <p>Course objectives</p> <ul style="list-style-type: none"> • Changing the care pathway – health and economic benefits • Deliverables 	<p><u>Required:</u></p> <ul style="list-style-type: none"> • Improving Ischemic Stroke Care in the US and UK: Current State (sections 1-4) • Introduction to stroke and care pathway: http://stroke.ahajournals.org/cgi/reprint/STROKEAHA.109.192362 <ul style="list-style-type: none"> - 1st 3 pages - p. 2916, “The First 24 Hours” and “Brain Imaging” 	
R2	<p><u>System Dynamics Model – Understanding the Model</u></p> <ul style="list-style-type: none"> • Discussion on future state of stroke system care, including scenarios modeled and model behavior • Modeling stroke care pathway: Stocks and flows – creating causal loop diagrams • Quantifying stocks and flows: Data <ul style="list-style-type: none"> ○ Extract patterns from other countries – How do care pathway scenarios differ? 	<p><u>Required:</u></p> <ul style="list-style-type: none"> • Improving Ischemic Stroke Care in the US and UK: Future State, Systems Dynamics Model (sections 5-8) • Summary of variables used and scenarios modeled in US and UK treatments <p><u>Suggested:</u> “Cost-Effectiveness of Thrombolysis With Recombinant Tissue Plasminogen Activator for Acute Ischemic Stroke Assessed by a Model Based on UK NHS Costs”</p>	Project Assignment 1 given

R3	<u>Full Class Recitation:</u> <ul style="list-style-type: none"> Tutorial on Vensim 		
R4	<u>Systems Dynamics Model: Applying Regulatory Policies</u> Introduction to vensim model <ul style="list-style-type: none"> Given data from stroke care pathway in US and UK, change inputs in existing systems dynamics model and explain correlating outputs. Draw conclusions on system behavior. (finishing this and write up will be Assignment 1) Policies and Practices <ul style="list-style-type: none"> Implementing changes in clinical practices and policies Measuring results and outcomes Sizing and controlling policy change side effects PROJECT ASSIGNMENT 2 Impact measurement of changing clinical practices: Incrementing awareness of stroke symptoms	<u>Required:</u> <ul style="list-style-type: none"> Slides: Stroke Care Systems Comparison: US and UK (Finkelstein/Feldman) Paper on care pathway in US/UK National Stroke Strategy: Chapter 1 	Project Assignment 2 given
R5	<u>Full-Class Recitation:</u> <ul style="list-style-type: none"> Introduction to Random Variables, Probability and Statistics 		

R6	<p><u>Uncertainty and Impact</u></p> <ul style="list-style-type: none"> ○ Uncertainty in model <ul style="list-style-type: none"> ○ Discussion on limits to the model – uncertainty, variability, and probabilities in variability ○ Quantifying uncertainty: Identify range of probability and impact for given variables ○ Diagnostic Uncertainty: <ul style="list-style-type: none"> ○ Discussion of advantages of different imaging techniques, best therapeutic decision-making process, and moral implications of errors ○ Introduction to sensitivity, specificity, and different possible types of diagnostic mistakes ○ Quantifying sensitivity: Identify parameters to which the model is sensitive <p>PROJECT ASSIGNMENT 3</p> <ul style="list-style-type: none"> ○ Build the accuracies of CT and ultrasound into simulation. How does this affect outcomes? 	<p><u>Required:</u></p> <ul style="list-style-type: none"> • TBD paper on stroke care pathway in NZ • "Cranial Computed Tomography Interpretation in Acute Stroke" • "Distinguishing between Ischemic and Hemorrhagic Strokes by Transcranial Ultrasonography: Systematic Review" 	<p>Project Assignment 3 given</p> <p>Project Assignment 1 DUE</p>
	Spring Break: No Recitation		
R7	<p><u>Full-Class Recitation:</u></p> <ul style="list-style-type: none"> • Mid-Term Project Presentations 		

R8	<u>Networks and Uncertainty</u> <ul style="list-style-type: none"> • Introduction to topology of care accessibility • Mathematical optimization of provider locations (using location theory) • Discussion of other factors available to optimization and the ultimate goals of the optimization problem in terms of health and costs 	<u>Required:</u> <ul style="list-style-type: none"> • TBD reading on triage location theory • TBD source of data 	Project Assignment 2 DUE
R9	<u>Project Feedback and Discussion:</u> <ul style="list-style-type: none"> • Feedback on Preliminary Project Assignment #1. • Project discussion. • Guest lecture. 	<u>Required:</u> TBD news article	Project Assignment 3 DUE
R10	<u>Project Feedback and Discussion:</u> <ul style="list-style-type: none"> • Feedback on Preliminary Project Assignment #2. • Discussion on stakeholders 	<u>Required:</u> TBD news article	
R11	<u>Project Lab Hours:</u> Open lab time for students to work on projects.		Project Paper Draft DUE
R12	<u>Project Lab Hours:</u> Open lab time for students to work on projects.		

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