



GCHSE 2014



Global Conference on Healthcare Systems Engineering

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Republic of Turkey
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"Enhancing Competitiveness through Healthcare Systems Engineering"

*August 5-8, 2014
Istanbul, Turkey*





Conference Final Program

TUESDAY, 5th AUGUST

14:00 – 16:00 Registration

WEDNESDAY, 6th AUGUST (morning)

09:00 REGISTRATION

10:15 **Welcome address** by Fethi CALISIR

10:30 **Keynote Speech: "Data Models for Evaluation and Analysis of Hospital Operations Productivity", Sanchoy Das,**
F – 134 **New Jersey Institute of Technology, Newark, USA**

Hospitals typically evaluate performance in two dimensions: clinical outcomes (quality of care/process of care) and financial stability (reimbursement rates and profitability). In the face of both increased demand for hospital services and the increased cost of hospital care, there is now a third dimension which focusses on hospital operations, specifically the productivity by which patient care activities are executed. Classical systems engineering methods are now being widely used to develop performance metrics and related analytical models that study hospital operations. A key obstacle to such analysis is defining units of output for hospital operations, and creating datasets which provide reliable and multihospital data in a common format. Traditionally, Adjusted Patient Days (APD) has been used as a valid estimator of care activity, but APD assumes all patients are equivalent. Comparative assessments across hospitals can therefore not be made effectively. The most common and effective tool in hospital operations analysis today is Data Envelopment Analysis (DEA), and researchers have reported insightful studies using the APD base combined with other data collected for one or a group of hospitals.

To support future research there is a need for standardized hospital output measures. From a clinical perspective the output is clear, it is a patient that has received acceptable levels of care. Due to the variance in patient acuity and care paths for diagnosis groups the net hospital inputs are not equivalent to the patient output rate. The development of a hospital unit of care (HUC), defined as the resources required to provide one general medical/surgical inpatient day compensates for a significant part of the above variances. The HUC models hospitals as a series of patient centric activities designed to provide the needed quality of care. Five HUC components are proposed: (i) case-mix adjusted inpatient days (ii) intensive care (iv) nursery (v) outpatient care and (vi) ancillary services. The HUC is compatible with the Medicare Cost Report data format. Application to over a 1000 US hospitals shows that the HUC is better correlated than APD to hospital operating costs, and hence is a superior basis for analysis. Further, the HUC is drillable in that it provides data for every operational unit and sub-unit in the hospital. The HUC thus allows both detailed lateral and vertical analysis, and is easily integrated into existing approaches such as DEA.

Sessions

1

**IT and Information Systems
Management**

F-133

Chair: Selim Zaim

2

**Healthcare Engineering Education &
Training**

F-135

Chair: Levent Atahan

11:30 **A Mobile Asset Tracking System for Healthcare Facilities**
Cevikcan E., Istanbul Technical University, Turkey
Dumlupinar K., ITECH, Turkey
Ustundag A., Istanbul Technical University, Turkey

**Small Sized Knapsack Ventilator Bundle: Comparison of
Hospitals in Turkey and Implementation Ideas**
Cal M., TUBITAK - TUSSIDE, Turkey

12:00 LUNCH BREAK



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WEDNESDAY, 6th AUGUST (afternoon)

Sessions	3	Modeling, Simulation, and Optimization	4	Quality and Process Improvement in Healthcare
	F-133	Chair: Emre Cevikcan	F-135	Chair: Alp Ustundag
13:00	A Simulation Based Decision Support Tool for Hospital Bed Capacity Planning Sönmez V., Hacettepe University, Turkey Dasdemir E., Hacettepe University, Turkey Aydin O.M., Hacettepe University, Turkey Testik M.C., Hacettepe University, Turkey		How applicable are University College London Systems Engineering (UCLse) principles in Turkish healthcare system? Kaya G.K., University College London, UK Urcan E.K., Kingston University London, UK Kaya H.T., Necmettin Erbakan University, Turkey	
13:30	A System Dynamics Application to Resource Management in Neonatal Care Services Lebcir R., University of Hertfordshire, UK Demir E., University of Hertfordshire, UK		Global Health Systems: An African Case Study Gray J., University of Southern California, USA	
14:00	Classification of Parkinson's Disease Using Complex-Valued Neural Networks Peker M., Samandira EML, Turkey Sen B., Yildirim Beyazit University, Turkey Delen D., Oklahoma State University, USA		An Evaluation of Servqual and Customer Satisfaction in Health Care Industry Zaim S., Istanbul Technical University, Turkey Tarim M., Marmara University, Turkey Zaim H., Fatih University, Turkey	
14:30	BREAK			
Sessions	5	Human Factors and Ergonomics in Healthcare	6	e-Health and m-Health
	F-133	Chair: Mine Isik	F-134	Chair: Mehmet Gumus
15:00	Relative Importance of Usability and Functionality Factors for Computer-assisted Navigation System for Cryoablation of Kidney Tumors Calisir F., Istanbul Technical University, Turkey Basak E., Istanbul Technical University, Turkey Barkana D.E., Yeditepe University, Turkey		A Methodology to Compare Face-to-Face Learning and Distance Learning for Healthcare Tourism Continual Education Program Cebeci U., Istanbul Technical University, Turkey Dogan O., Istanbul Technical University, Turkey Calderone D.V., Istanbul Technical University, Turkey	
15:30	Ergonomic Analysis for Design of Medical Devices: Modeling and Simulation Durgun B., Cukurova University, Turkey		mHealth Projects in Developed and Resource-Limited Settings Brown S., Carnegie Mellon University, USA Umutoni V., Carnegie Mellon University, USA	
			Rapid Response System Ozturk K., TUBITAK - TUSSIDE, Turkey	
			Different Types of Moral Hazard in Health Insurance Ecer S. Istanbul Technical University, Turkey	

17:00 – 19:00 Welcome Reception – Management Faculty Garden

Scan QR Code for google maps location





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THURSDAY, 07th AUGUST (morning)

09:00 REGISTRATION

09:00 **Keynote Speech: "Current State-of-the-Art in Health Care Analytics: An Experiential Perspective", Dursun Delen,**
F – 134 **Oklahoma State University, USA**

Undoubtedly, analytics is one of the most popular information trends of the recent history, both in business and science; most particularly in the healthcare and medical field. A strong testament to the potential of healthcare analytics is the increasing emphasis given to this field by the top funding agencies in the U.S. and abroad. For instance, National Institute of Health (NIH) and the National Science Foundation (NSF) collaboratively created a series of multi-million-dollar funding opportunities under the name of "Smart and Connected Health." The main reasons for this popular adoption of analytics in health care include:

- ❖ Need – increasing demand and competition coupled with decreasing resources forcing health care organizations to do more with less (i.e., be both effective and efficient).
- ❖ Technology availability – software/algorithms are becoming more sophisticated while simultaneously the hardware and infrastructure continues to become better, faster and less expensive.
- ❖ Data availability – data is ubiquitous. As the saying goes "we are drowning in data but starving for knowledge." Organizations that are effective in converting data into information and knowledge are those most likely to survive and thrive in these difficult economic conditions.
- ❖ Cultural shift – the reliance on data driven, fact-based actionable information is becoming more prevalent in health care. The sole reliance on experience and intuition are finally giving way to data and analytics in decision-making processes.

Center for Health Systems Innovation at Oklahoma State University is blessed with numerous scholars who are well known in the field of analytics. Having worked on several large scale analytics projects, CHSI is well positioned to be a leader in the field of health innovation. This presentation will offer a broad experiential perspective to the current and future trends in health analytics, and will provide exemplary research projects to further motivate the increasing popularity of the field.

10:00 BREAK

Sessions

8

Poster Session

10:30 Early-Stage Dementia: Design of a Multi-Component Monitoring System for Patient Freedom of Movement

Rahimi M., University of Southern California, USA

Vaughn-Cooke M., University of Maryland, USA

Mayo Clinic Health Connection: Application of an m-Health tool to Support Clinical Practice Delivery

Cook D., Mayo Clinic, USA

Stress Relieving Technology Tools for Alzheimer's Patients

Rahimi M., University of Southern California, USA

Kelliher K., University of Southern California, USA

Clinical Process Improvement in Acute Myocardial Infarction

Sahin G.M., TUBITAK - TUSSIDE, Turkey

Quality Improvement to Prevent Venous Thromboembolism

Sahin G.M., TUBITAK - TUSSIDE, Turkey

Quality Improvement to Prevent Central Venous Catheter Infections

Sahin G.M., TUBITAK - TUSSIDE, Turkey

Emergency Medical Service Funding from Public Sources in the Czech Republic

Halajcuk T., University of Defense, Czech Republic

Jezek B., University of Defense, Czech Republic

Prochazka M., University of Defense, Czech Republic

Emergency Medical Service Coverage Evaluation Methods

Jezek B., University of Defense, Czech Republic

Prochazka M., University of Defense, Czech Republic

Halajcuk T., University of Defense, Czech Republic

Vanek J., University of Defense, Czech Republic

12:00 LUNCH BREAK



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THURSDAY, 07th AUGUST (afternoon)

13:00

F-134

Panel Discussion – "Applying Engineering Concepts to Hospitals"

Moderator: Kirstin Ozturk

14:30

BREAK

Sessions

9

Healthcare Operations Research

F-133

Chair: Behice Durgun

10

Engineering and Technology Management in Healthcare

F-135

Chair: Sencer Ecer

15:00

Territory Design for Family Doctors

Surer O., Istanbul Technical University, Turkey

Yanik S., Istanbul Technical University, Turkey

Multi Criteria Decision Making Problem for Selection of RTLS Technology for Hospitals

Budak A., Istanbul Technical University, Turkey

Ustundag A., Istanbul Technical University, Turkey

15:30

Medical Imaging System Selection Using Fuzzy Axiomatic Design Approach

Supciller A.A., Pamukkale University, Turkey

Kulak O., Pamukkale University, Turkey

Determining the Correct Diagnosis and Appropriate Treatment Method on Keratoconus: a 3D Decision Support Application

Kaya H., Ministry of National Education, Turkey

Cavusoglu A., TUBITAK, Turkey

Cakmak H.B., Yildirim Beyazit University, Turkey

Sen B., Yildirim Beyazit University, Turkey

Delen D., Oklahoma State University, USA

16:00

When is it Optimal to Prescribe Antihypertensive Medications? An MDP Analysis

Gumus M., McGill University, Canada

Zargoush M., McGill University, Canada

Verter V., McGill University, Canada

Daskalopoulou S., McGill University, Canada

Selecting the Best Flux Alternative by Using AHP, ANP, FAHP, and FANP with a Proposed Decision Support Software

Ozturk N., Marmara University, Turkey

Tozan H., Turkish Naval Academy, Turkey

17:00 – 21:00 Gala Dinner – Oba Restoran & Sultan Cafe

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FRIDAY, 08th AUGUST (morning)

09:00 REGISTRATION

09:00 **Keynote Speech: "Two Applied R&D Projects in Health Insurance Domain in Turkey", Ilker Kose, CompuGroup Medical (CGM), Istanbul, Turkey**
F – 134

The content of the speech will be as follows:

- CGM in Turkey
- The R&D Projects of CGM for the last 5 years
- The Collaborations with Universities
- More Details About Two R&D Projects:
 - ❖ Development of An Interactive Machine Learning Based Electronic Fraud and Abuse Detection System In Health Care Insurance
 - ❖ Dynamic Underwriting Management System in Health Care Insurance
- The Innovation Areas in Health Insurance Domain in Turkey
- Conclusion

Sessions **11** IT and Information Systems
Management

F-133 Chair: Evin Uzun Jacobson

12 Healthcare Safety, Security, Reliability,
and Risk Management

F-135 Chair: Mansour Rahimi

10:00 Examining the Factors Affecting PDA Acceptance among
Physicians: An Extended Technology Acceptance Model

Basak E., Istanbul Technical University, Turkey
Altin Gumussoy C., Istanbul Technical University, Turkey
Calisir F., Istanbul Technical University, Turkey

Electromagnetic Interference Power Level Measurements at
2.4 GHz ISM Band: Hospital Environment

Aki F., Istanbul Commerce University, Turkey
Yarkan S., Istanbul Commerce University, Turkey
Zaim A., Istanbul Commerce University, Turkey

10:30 BREAK

Sessions **13** Health Economics

F-133 Chair: Kirstin Ozturk

14 Modeling, Simulation, and Optimization

F-135 Chair: Suzana Brown

11:00 The Loss and Regain of Health. A View from Health
Economics for the Support of Public Policies

Sava D., Independent Consultant, Romania

Simulation Modeling of Hospital Emergency Departments:
Review of Literature During Normal and Disaster Times

Gul M., Yildiz Technical University, Turkey
Guner A.F., Yildiz Technical University, Turkey

11:30 Economic Impact of Unplanned School Closures on Student
Families in Harrison County School District, Mississippi,
November 2012

Uzun Jacobson E., Centers for Disease Control (CDC), USA
Adhikari B., Centers for Disease Control (CDC), USA
Zheteyeva Y., Centers for Disease Control (CDC), USA
Rainey J., Centers for Disease Control (CDC), USA
Shi J., Centers for Disease Control (CDC), USA
Gao H., Centers for Disease Control (CDC), USA
Johnson J., Centers for Disease Control (CDC), USA
Bhavnani D., New York City Health Department, USA
Dobbs T., Mississippi Department of Health, USA
Uzicanin A., Centers for Disease Control (CDC), USA

A New National Model for Hip Replacement Costs Under
Changing Demographics

Siegl W., Graz University of Technology, Austria
Lassnig A., Graz University of Technology, Austria
Herzog A., Graz University of Technology, Austria
Schröttner J., Graz University of Technology, Austria

12:00 LUNCH BREAK

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