Region Sjælland – Boston Study Visit
March 6-10, 2011

Program Overview and Introduction to the Department of Emergency Medicine at BIDMC
Welcome to Boston!

- Capital of Massachusetts
- Oldest U.S. cities
- Historic landmarks
- Center for medical education, biomedical research
Agenda: Themes

• **Hospital-based Emergency Care Delivery**
  – Strategies for delivering higher quality care; reducing resource utilization
  – Central role of the ED in for improving quality and cost containment
  – Emergency Medicine Specialty Training (physicians, nurses)
  – Emergency Department design concepts that support flow
  – EM specific Informatics Technologies that support clinical decision making and patient flow

• **Pre-hospital Emergency Care Delivery**
  – Paramedic-based advanced prehospital care
  – EM physician role for insuring patient safety and high quality care
Agenda: Themes

• Regional Care Networks
  – Leveraging advantages of small and large hospitals to provide high quality, safe emergency care at lower cost
  – Strategies for specialty care delivery:
    • Telemedicine (neurology, radiology)
    • Specialty hospital models (Cancer care)
  – Strategies for vertical integration of hospital care and primary care delivery

• Healthcare Quality Improvement
  – Department, Hospital, Regional strategies
  – Role of Healthcare Data Systems and Medical Informatics Technologies in promoting HQI
Agenda: Institutions

- Beth Israel Deaconess Medical Center (BIDMC)
- Beth Israel Deaconess Hospital, Needham (BIDHN)
- Dana Farber Cancer Institute (DFCI)
- Institute for Healthcare Improvement (IHI)
- Veteran’s Administration Boston Healthcare System (VA)
Agenda: Faculty

- Philip D. Anderson, MD
  - Director, International Emergency Medicine, Department of Emergency Medicine, BIDMC

- Shelley Calder, RN
  - Director of ED Nursing Education, Department of Emergency Medicine, BIDMC

- Richard E. Wolfe, MD
  - Chair, Department of Emergency Medicine, BIDMC

- Maureen Bisognano
  - President and CEO, Institute for Healthcare Improvement (IHI)

- Jason Tracy, MD
  - Director of Emergency Medicine, Whidden Memorial Hospital, Cambridge Healthcare Alliance

- Kenneth Sands, MD, MPH
  - Vice President for Healthcare Quality, BIDMC

- John D. Halamka, MD, MS
  - Chief Informatics Officer, BIDMC and Harvard Medical School

- Scott Murray, MD
  - Medical Director for EMS, Harvard Medical Faculty Physicians

- Robert Freitas, MHA
  - Director, Emergency Medicine Consulting

- Marcie Rubin, MD
  - Director of Emergency Medicine, Beth Israel Deaconess Hospital, Needham

- Susan Pacheco, RN
  - Emergency Nursing Director, Beth Israel Deaconess Hospital, Needham

- Michael E. Charness, MD
  - Chief of Staff, VA Boston Healthcare System

- Sharon F. Lane RN, MSN
  - Senior Director Patient Safety, Dana-Farber Cancer Institute

- Saul Weingart, MD, PhD
  - Vice President for Quality Improvement and Patient Safety, Dana-Farber Cancer Institute
Thanks to our Administrative Personnel:

- Meaghan Cussen (HMFP)
- Sheldon Mohammed (HMFP)
- Dan Souw (IHI)
- Mary Morgan (VA)
- Laura Zubris (VA)
- Marisel Trotman (DFCI)
Longwood Medical and Academic Area

- Harvard Medical School
- Harvard Dental School
- Harvard School of Public Health
- Beth Israel Deaconess Medical Center
- Brigham & Women’s Hospital
- Children’s Hospital
- Dana Farber Cancer Institute
- Joslin Diabetes Center
- Massachusetts College of Pharmacy and Health Sciences

Over 20 hospitals, schools, and biomedical research centers
Beth Israel Deaconess Medical Center

A major teaching hospital of Harvard Medical School
- Second largest hospital in New England
- 600 inpatient beds
- 40,000 inpatient admissions annually
- 1200 attending physician staff

Graduate Medical Education
- 650 physicians-in-training
- Residency and Fellowship programs in over 50 specialty and sub-specialty disciplines

Biomedical Research
- 3rd largest recipient of NIH grant funding
- More than 1000 active sponsored projects and 200 clinical trials
Harvard-Affiliated Teaching Hospitals

Harvard Medical School
Boston, Massachusetts

HMS Emergency Medicine Community
Emergency Medicine at Harvard Medical Faculty Physicians (HMFP)

HMFP:

• 750 physician multi-specialty group practice based at BIDMC
  – Salary, benefits
  – Billing, reimbursement

• Contracts with CareGroup to provide physician services at BIDMC

• Contracts with other hospitals to provide physician services

HMFP Emergency Medicine Group:

• > 70 physicians; HMS faculty

• 6 clinical sites
  – Main University site (BIDMC)
  – 3 small community hospitals
  – 2 large community hospitals

• > 200,000 combined ED patient volume
## HMFP Emergency Medicine Network

<table>
<thead>
<tr>
<th>Site</th>
<th>Hospital beds</th>
<th>Hospital discharges</th>
<th>ED volume</th>
</tr>
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<tbody>
<tr>
<td>BIDMC</td>
<td>600</td>
<td>42,000</td>
<td>50,000</td>
</tr>
<tr>
<td>BIDN</td>
<td>42</td>
<td>2,400</td>
<td>12,500</td>
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<tr>
<td>SVH</td>
<td>285</td>
<td>16,000</td>
<td>48,000</td>
</tr>
<tr>
<td>NVMC</td>
<td>57</td>
<td>1,700</td>
<td>16,000</td>
</tr>
<tr>
<td>LMC</td>
<td>150</td>
<td>9,000</td>
<td>48,000</td>
</tr>
<tr>
<td>Milton</td>
<td>80</td>
<td>4,500</td>
<td>26,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>****</td>
<td><strong>200,500</strong></td>
<td>****</td>
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Overview of Emergency Care Delivery in the U.S.
URGENCES
General Model of Emergency Care Delivery
Boston Model - United States

Prehospital EMS
15% of ED arrivals
Full term pregnant, STEMI, etc.
< 1% admitted directly to hospital

Emergency Department
40%-50% of ED arrivals (?)

General Practitioners & Outpatient Specialists

Inpatient Hospital Wards & Units
< 1% admitted directly to hospital
Acute conditions

Tertiary Care Referral Center:

- 55,000 patient visits per year
  - Adult population (> 15 years)

Mode of arrival
- 30% arrive ground ambulance
- 65% arrive private transportation
- < 1% arrive helicopter

Disposition
- 10% observation (< 24 hours)
- 65% discharged
- 35% admitted
  - 15% ICU
  - 85% wards
# Sources Of Hospital Admissions
## United States (2005)

<table>
<thead>
<tr>
<th>Source</th>
<th>Total admissions (1000)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician referral</td>
<td>13,728</td>
<td>39.5</td>
</tr>
<tr>
<td><strong>Emergency department</strong></td>
<td>14,177</td>
<td><strong>40.8</strong></td>
</tr>
<tr>
<td>Transfer from a hospital</td>
<td>1,071</td>
<td>3.1</td>
</tr>
<tr>
<td>Transfer from other health facility</td>
<td>634</td>
<td>1.8</td>
</tr>
<tr>
<td>Other sources</td>
<td>664</td>
<td>1.9</td>
</tr>
<tr>
<td>Item not available</td>
<td>4,464</td>
<td>12.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34,738</strong></td>
<td><strong>100.0</strong></td>
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</table>

ED = Single Point of Entry to Hospital

High volume, acute diagnostic & treatment center:
- Evaluate, stabilize, diagnose, treat
- Access to diagnostic, therapeutic resources,
- High level expertise at front door

Clinical Decision Unit:
- Extended observation for selected patients requiring more extensive diagnostic evaluation or treatment (< 24 hours)
- Manage uncomplicated cases cost-effectively
- Temporary buffer capacity during high census periods
ED Physician Staffing at BIDMC

• 24/7/365 staffing by senior physicians board-certified in Emergency Medicine (EM)

• 40 attending (senior) physician group

• 36 EM residents (trainees in 3-year program)

• 40 hours of attending coverage daily (8 hour shifts)

• 120 hours of resident coverage daily (8-12 hour shifts)
  – 60% EM resident coverage
  – 40% Internal Medicine, Surgery, OB/GYN, Pediatric EM
Emergency Dept Patient Population

• Highly diverse group:
  – Age, Gender
  – Race, ethnicity, language
  – Types of clinical problems
    • 1293 ICD-9 codes admitted
    • 2096 ICD-9 codes overall
  – Acuity

• Unscheduled arrival times
  – Many referrals from other hospitals, primary sector

• Few arrive with diagnoses; most are undifferentiated

Patient Flow through the ED

Emergency Department

- Wait Room
- Triage “1-5”
- Trauma/Resusc
- Acute
- Non-acute

1. Trauma/Resusc to Acute
2-3. Triage “1-5” to Acute
3-5. Triage “1-5” to Non-acute

OBSERVATION

- Hospital
- Intermediate care facilities
- Home
Phases of ED Patient Management

“Process Flow”

- Triage
  - Emergency Stabilization
  - Focused History & Physical Exam
  - Diagnostic Studies & Diagnosis
  - Therapeutic Interventions & Pharmacotherapy
  - Consultation
  - Observation & Reassessment
  - Disposition
  - Prevention & Education
  - Documentation

How do we measure performance and quality in the ED?

- **Standardized operational metrics, measures and definitions**
  - *Welch et al. Second Performance and Benchmarking Summit, Ann Emerg Med 2010*

- **Emergency Medicine Informatics Technologies**
  - Electronic timestamp data
  - Routine workflow processes

- **CMS Quality Measures**
  - “Market basket” approach
  - Process and outcome measures
  - Representative conditions
    - Acute myocardial infarction
    - Pneumonia
BIDMC ED Peer Review Process

Flags from ED Dashboard

Referrals from other departments

Screening Criteria:
- 72-hr returns with admission
- Mortality < 72 hrs
- Transfer from floor to ICU < 24 hrs
- Etc.

QA Committee**

HCQ concerns

HCQ concerns

Patient complaints

ED Operations Management Team**

EM Residency Leadership Team

EM Chief

CRICO / RMF

QI Directors

AE Reporting System

BIDMC HCQ

ED Nursing & Ancillary Staff

EM Residents

EM Attending staff

Other BIDMC Depts

BIDMC BOD

**Emergency Department Chief, ED Director of Operations and ED Nursing Director are ex officio members of these committees.
How do we measure resource utilization in the ED?

- Supplies, equipment
- Diagnostic imaging, labs
- Procedures
- Length of Stay (hourly basis)
  - “per hour patient-bed cost”
  - the cost of a patient occupying a bed for one hour on this unit
    - All direct and indirect costs:
      - Facilities overhead
      - Staffing (professional, ancillary, support)
- ED-based care more cost-effective than inpatient ward-based care:
  - Lower per hour costs
  - Faster turnaround time for same care
Cost of U.S. Emergency Dept. Care

<table>
<thead>
<tr>
<th>Category</th>
<th>Billions USD$</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Hospital Inpatient Services</td>
<td>305.1</td>
<td>35%</td>
</tr>
<tr>
<td>Office-based Medical Provider Services</td>
<td>180.7</td>
<td>20%</td>
</tr>
<tr>
<td>Prescription Medicines</td>
<td>177.7</td>
<td>20%</td>
</tr>
<tr>
<td>Hospital Outpatient Services</td>
<td>88.0</td>
<td>10%</td>
</tr>
<tr>
<td>Dental Services</td>
<td>67.0</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Emergency Department Services</strong></td>
<td><strong>29.3</strong></td>
<td><strong>3%</strong></td>
</tr>
<tr>
<td>Home Health Services</td>
<td>28.4</td>
<td>3%</td>
</tr>
<tr>
<td>Other medical equipment and services</td>
<td>19.5</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total Health Expenditures</strong></td>
<td><strong>895.5</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

A Brief History of Emergency Medicine
U.S. Emergency Care in the 1950’s

- **“Triage to Service” model of care**
  - No dedicated physician staffing in ED
  - All care provided by physicians from other departments in hospital

- **Emergency Departments run by Nurses:**
  - Evaluate patients on arrival
  - Call appropriate physician from hospital
  - Physician may or may not respond

- **Generally poor emergency care**
  - ED viewed as a distraction by physicians
  - Predictably poor patient outcomes
  - Widespread dissatisfaction among patients and providers

- **Hospitals began hiring physicians to staff EDs**
  - Physicians without better opportunities
  - Trainees & medical students
  - No specialty training programs

ED Visits to U.S. Hospitals

Fewer U.S. doctors in general practice per capita:
- 1940: 108/100,000
- 1957: 91/100,000
- Increasing specialization
- Increasing academic focus

Belief that better care is available in the hospital:
- Advances of Academic Medicine and Biomedical Research
- Diagnostic technology
- Therapeutic interventions

“… the weakest link in the chain of hospital care in most hospitals in this country is the emergency room’s attention to the injured.”

-- Dr. Robert H. Kennedy

“Oration on Trauma” (1954)
American College of Surgeons Clinical Congress
Atlantic City, New Jersey
Advances in Resuscitation Science

• Chief of Anesthesiology, Hvidovre Hospital, Copenhagen

• Professor of Anesthesiology, Copenhagen University

• 1953: non-rebreathing anesthesia valve (*Ruben valve*)

• 1957: self-inflating ventilation device (*AMBU bag*)

Henning Ruben  
(1914 – 2004)

Advances in Resuscitation Science

- 1956: (Zoll) AC defibrillation
- 1958: (Safar) airway maneuvers, mouth-to-mouth ventilation
- 1961: (Kouwenhoven & Jude) closed chest cardiac massage
- 1961: (Safar) CPR, ABC’s

“Hearts and brains too good to die”


The early evaluation of mouth to mouth ventilation by Peter Safar in 1957.
Vietnam War (1954-1975)

Mortality rates for U.S. soldiers wounded on battle field:

- WWI: > 8%
- WWII: 4.5%
- Korea: 2.5%
- Vietnam: < 2%
  - Initiate resuscitation in field
  - Rapid evacuation to hospital

“Expert consultants returning from both Korea and Vietnam have publicly asserted that, if seriously wounded, their chances of survival would be better in the zone of combat than on the average city street.”


National Academy of Sciences / National Research Council
Washington, D.C.
Early Milestones in the Development of EM in the USA

- **1966**: American College of Emergency Physicians formed
- **1970**: First Academic Department of Emergency Medicine at the University of Southern California
- **1971**: First EM physician training program at University of Cincinnati
- **1973**: Federal EMS Act provides funding for EMS system development
- **1976**: Health Professions Educational Assistance Act provides funding to train emergency medicine physicians
- **1979**: EM recognized as 23rd medical specialty in US
A Recognized Medical Specialty

31,797 emergency physicians in clinical practice (2000)
  - 62% board-certified or residency trained
  - 22,376 Board-certified EM physicians in 2005

135 EM physician training programs
  - Total EM residency positions: 4868
  - Annual EM graduates: ~1500
  - Board examination process

Many indexed peer-reviewed EM journals:
  - Annals of Emergency Medicine
  - Journal of Emergency Medicine
  - Academic Emergency Medicine
  - American Journal of Emergency Medicine
A Recognized Medical Discipline

- 72/126 (57%) of U.S. Medical Schools have Academic Departments of Emergency Medicine (1999)

- Scope of clinical practice defined in EM Core Content since 1975

OVERVIEW

Emergency medicine is the only medical specialty that has a scientifically derived and commonly accepted description of the domain of its clinical practice. That document, The Model of the Clinical Practice of Emergency Medicine (EM Model), was developed through the collaboration of six organizations: the American Board of Emergency Medicine (ABEM), the administrative organization for the project, the American College of Emergency Physicians (ACEP), the Council of 2 years to assess the success of the document in accomplishing its objective of supporting the ongoing development of the specialty of EM, to consider alterations to the EM Model suggested by the collaborating organizations, and to recommend changes to the six sponsoring organizations.

The initial 2-year review occurred in 2003 with representatives from each of the six organizations suggesting changes and reporting how their respective organizations had used the document. This initial 2-year update was published in Annals of Emergency Medicine and
The EM Model of Care Delivery

- ED = primary portal of entry to hospital for acute patients
  - High volume, diagnostic and treatment center
  - Extended observation of selected patients

- Scope of care in the ED is clearly defined
  - Initial management of acutely ill and injured patients

- ED is operated as an independent department with its own physician and nursing staff

- ED physician and nursing staff possess the specific knowledge and skills to perform their roles at the highest level
  - Specialty training
Global Shift to the EM Model of Care

Worldwide Growth of Emergency Medicine as a Recognized Medical Specialty

Source: Philip D. Anderson, (manuscript in press)
EM model = an Organizational Strategy for Improving Health Care Quality:

• Single point of entry for acute patients through the ED
  – Opportunities for standardizing initial management

• Senior level physicians with job-specific specialty training
  – Recognition of time sensitive emergency conditions
  – Implement appropriate diagnostic workup
  – Initiate appropriate treatments; involve appropriate specialists

• Direct supervision of trainees;
  – Defined EM specialty curriculum
  – Graduated responsibility

• Responsibility – Authority – Accountability
  – Defined area of clinical practice; job-specific knowledge & skills
  – Strong ED leadership
  – ED physicians report to ED leadership
EM model = an Organizational Strategy for Reducing Health Care Costs:

• Appropriate, thorough evaluation and treatment up front
  – Fewer unnecessary hospital admissions
  – Low rates of unscheduled returns, complications from “misses”

• Admitted patients stabilized, initial workup completed, treatments initiated
  – Fewer disruptions of routine work on inpatient wards

• Recognize and treat time-sensitive conditions sooner
  – Decrease morbidity (shorter hospital stays)
  – Decrease disabilities (shorter outpatient rehab; return to work sooner)

• Specialty trained EM physicians / nurses
  – Job-specific training = faster, more accurate
  – Higher job satisfaction = stable departments; less turnover
Summary

• **Central Role of the ED in Healthcare Delivery System:**
  – Primary Portal of Entry to hospital system for acute patients
  – Early recognition of time sensitive emergencies
  – Opportunities for standardizing the initial care = Quality
  – Control hospital admission; the *most expensive* intervention
  – Down stream effects of initial ED care (Quality & Cost)

• **Central Importance of Competencies of Personnel Staffing the ED**
  – Highly specific job description (physicians & nurses)
  – High stakes for patients & rest of healthcare system
  – Specific knowledge and skills *are* necessary to do job well
  – Recognized medical discipline & specialty
  – Level of training for ED personnel → outcomes (quality, cost)