INTEGRATED NETWORKS OF EMERGENCY CARE

(In a time of accelerated change in Health systems)

David A Petrie MD, FRCP
Professor Department of Emergency Medicine, Dalhousie University
Senior Medical Director Emergency Program of Care / NSHA
Potential Conflict of Interest

• 1996 Co-founder of PraxES inc.

• Potential Bias towards urban, physician-centric, and academic emergency medicine perspectives
Easteros: Thought Experiment

How do you optimize access to high quality Emergency Medicine in an evolving Health Care Eco-system?
911 call in Farsbororough

- Paramedics arrive on scene and patch in
- 32 year old male with penetrating trauma to the torso, vitals stable
- Should we go to the Farsbororough “ER”, the SanStephanie ED, or the bigger hospital in Sante Jean?
1. What is Emergency Medicine?
2. How does this impact Health System Design?
3. Nova Scotia provincial Emergency Program of Care - Goals and approach
4. EPoC 4 priority directions:
   - System Design and Integration
   - Quality, Standards, and Patient safety
   - Hospital / System Flow (efficiency and capacity)
   - Governance and accountability
What is Emergency Medicine?

“How you formulate a problem is far more essential than its solutions” Einstein
Historical Context

**Ancient:**

Modern:
- The era of public inquiries and coroners inquests
- Specialization

Integrated Networks of Emergency Care:
Historical Context

Ancient:

Modern:
- The era of public inquiries and coroners inquests
- Specialization

Integrated Networks of Emergency Care:

The ER, 50 Years On
Arthur L. Kellermann, M.D., M.P.H., and Ricardo Martinez, M.D.

Five decades ago, the Journal published an article by the leaders of Hartford Hospital in Hartford, Connecticut, about emergency-room use. Their study was prompted “by rising apprehensions about the adequacy of physical facilities and supervision of clinical work performed in the emergency unit.” Over the 11 pre-
Pre-1960s: Ancient history

1960s: CPR, out-of-hospital defibrillation

1968: American College of EPs

1972: Cincinnati, USC–LA EM residencies

1973: Accidental Death and Disability: The Neglected Disease of Modern Society

1977: Queens, McGill, Western EM residencies

1979: Canadian Association of Emergency Medicine

1980s: Royal College of Physicians and Surgeons & College of Family Physicians recognition

1998: Dal EM achieves full departmental status

2000s: Improved clinical quality/standards, increasing regionalization and increasing academic recognition (but also increasing overcrowding and rural ED closures)
What is EM? (and what it's not)

Definition

Unique content
Knowledge and Discipline

ERPs, BURPS, and other forms of eructation
Emergency medicine is the medical specialty dedicated to the diagnosis and treatment of unforeseen illness or injury. It encompasses a unique body of knowledge as set forth in the "Model of the Clinical Practice of Emergency Medicine." The practice of emergency medicine includes the initial evaluation, diagnosis, treatment, and disposition of any patient requiring expeditious medical, surgical, or psychiatric care.

An Emergency Physician is defined as being college/board certified (American College of Emergency Physicians).
CAEP Definition of Emergency Medicine

Emergency medicine is a field of medical practice comprised of a unique set of competencies required for the timely evaluation, diagnosis, treatment and disposition of all patients with injury, illness and/or behavioural disorders requiring expeditious care, 24/7/365. These conditions are often undifferentiated and include, but are not limited to those that are life threatening, acute and urgent. This care is typically delivered within a hospital setting, however the purview of emergency medicine extends beyond the emergency department.*

* Other knowledge, skills, attitudes and activities relevant to emergency medicine include, but are not limited to awareness of and participation in:

- The coordination of patient care across multiple healthcare venues and providers
- Health care promotion and injury prevention
- Leadership and administration: leading interdisciplinary patient care teams, medical management, policies & procedures, emergency equipment & design, physician staffing, budgets, medical management
- Medical systems
  - Within the emergency department: including patient triage, throughput and discharge
  - External to the emergency department: including but not limited to pre-hospital transport & care and disaster planning & management
- Teaching relevant emergency medicine skills, knowledge and attitudes to other physician and non-physician health care providers
- Generation of emergency medicine knowledge through research and knowledge translation
- Patient safety and quality improvement related to emergency medicine
EM Metaphors:
THE EVOLVING ROLES OF EMERGENCY DEPARTMENTS
The Future of Emergency Medicine:

Management consultant Peter Drucker once observed, “The best way to predict the future is to create it.” As physicians, we have power to determine what will be written about us 50 years from now. What future do we want for our patients? The choice is up to us.

Five years from now, I think emergency medicine will be known for three things.

1. the traditional: if you’re really sick or hurt, it’s the only place to go.

2. we will be noted to be the best acute care diagnosticians in the world.

3. I think we will be experts on transitions of care, particularly in those transitions not only into the hospital to decrease length of stay but also transitions into the community.

I think it’s a great future.

- ACEP forum on the future of EM 2015
Creating Integrated Networks Of Emergency Care: From Vision To Value

ABSTRACT Emergency care is an essential component of the care delivery system in the United States, but it received little attention during the debates about health care reform. As a result, US emergency care remains outdated and fragmented. We provide an overview of efforts to regionalize emergency care in the United States, and we both identify challenges to change and recommend next steps in five domains: people, quality and processes, technology, finances, and jurisdictional politics. We offer a commonsense approach to increasing the value of emergency care delivery by developing regionalized integrated networks of emergency care that take advantage of emerging changes in the health system and are designed to meet time-sensitive patient needs.
<table>
<thead>
<tr>
<th>Challenges</th>
<th>Urban</th>
<th>Rural</th>
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<tr>
<td><strong>Access</strong></td>
<td>• “Overcrowding”</td>
<td>• “ED closures”</td>
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<td>• Boarding → 75:20:5</td>
<td>• Primary care access</td>
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<td></td>
<td>• ED efficiencies</td>
<td>• Recruit/retain</td>
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<td><strong>Quality</strong></td>
<td>• Vertical integration</td>
<td>• Horizontal integration</td>
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<td>• Wait times</td>
<td>• Standards</td>
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<td>• CQI/research</td>
<td>• MoC</td>
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Persistent EM Myths impacting policy

1. Real life in the ED is about “real” emergencies
2. Waiting in the ED is just inconvenient
3. Overcrowding is caused by low acuity patients
4. EM is expensive
EM Myths # 1

1. **Real life in the ED is about “real” emergencies**

2. **Waiting in the ED is just inconvenient**

3. **Overcrowding is caused by low acuity patients**

4. **EM is expensive**
### What is Emergency Medicine?

#### Unforeseen Unscheduled
(ACEP definition of an Emergency)

<table>
<thead>
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<th>CTAS 1, 2, 3</th>
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<td>- Time Dependency of Diagnosis and Treatment: very high to possibly high</td>
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**Cohort A**
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| CTAS 4, 5                  | - Time Dependency of Diagnosis and Treatment: moderate  
   - When Did Symptoms Start?: < 1 hr, < 1 day, or < 1 week  
   - Examples: minor trauma (lacerations, extremity injuries), sore throat/fever, eye redness +/- discomfort, etc...  |
Comparison of Presenting Complaint vs Discharge Diagnosis for Identifying “Nonemergency” Emergency Department Visits

Maria C. Raven, MD, MPH, MSc
Robert A. Lowe, MD, MPH
Judith Maselli, MSPH
Renee Y. Hsia, MD, MSc

Importance Reduction in emergency department (ED) use is frequently viewed as a potential source for cost savings. One consideration has been to deny payment if the patient’s diagnosis upon ED discharge appears to reflect a “nonemergency” condition. This approach does not incorporate other clinical factors such as chief complaint that may inform necessity for ED care.

Conclusions and Relevance Among ED visits with the same presenting complaint as those ultimately given a primary care–treatable diagnosis based on ED discharge diagnosis, a substantial proportion required immediate emergency care or hospital admission. The limited concordance between presenting complaints and ED discharge diagnoses suggests that these discharge diagnoses are unable to accurately identify nonemergency ED visits.

JAMA. 2013;309(11):1145-1153
“Inappropriate visits to the ED”???
Signal and the Noise…

- Data
- Information
- Knowledge
- Wisdom

Everybody complains that they need more data but no one complains about their ability to make sense of the data in context…

Everyone complains of his memory, but no one complains of his judgment. (François de La Rochefoucauld)
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- Examples: major trauma, chest pain, suicidal thoughts, acute exacerbations of chronic disease, etc… | - Time Dependency of Diagnosis and Treatment: complex pt CTAS 3, but low time urgency to chief complaint  
- When Did Symptoms Start?: > 1 week to > 1 month  
- Examples: slow decline in frail elderly, incomplete out-pt work-up of “possible cancer”, feeding tube blockage, etc… |
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**Cohort A**  
**Cohort B**  
**Cohort C**
Should cohort C be in the ED? What are the alternatives?:

“When you have a serious chronic illness, like I do, you have to see specialists in isolation. They never seem to have the full picture and as a result I feel responsible for keeping my own record to carry to each of these appointments. They don’t trust the documents I carry but currently I am working with a family doctor, a rheumatologist, a respirologist, a gastroenterologist and a cardiologist. Yet, when I get into trouble, I end [up] in the emergency room and they always want to know why I did not go and see my own doctor…you can’t win as a patient. I wish they would all get in the same room at the same time, with me present, and talk about what is going on and what the best plan of care should be.”

UNLEASHING INNOVATION: Excellent Healthcare for Canada
Report of the Advisory Panel on Healthcare Innovation

Public Submission
The Evolution of the Master Diagnostician

Patients seek answers to 3 basic questions. What (if anything) is wrong with me? Is there any treatment that might make me better? Will I recover? A physician’s ability to answer these questions requires skills as a diagnostician, therapist, and prognosticator. Excellent performance across all 3 domains separates great physicians.

The Diagnostician of the Future

This mid-career physician works in the emergency department of an urban hospital. Like the master diagnostician of the past, he has extensive experience and attuned pattern recognition. Like the skilled diagnostician of today, he is adept at quickly searching for information and understanding probabilistic data. However, unlike his predecessors,
<table>
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<th>Emergency Patient Cohorts: (Column 2, not row 2, is the “problem” which requires improved system design in order to improve ED efficiency)</th>
<th>Unforeseen Unscheduled (ACEP definition of an Emergency)</th>
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<td><strong>Cohort B</strong></td>
<td><strong>Cohort D</strong></td>
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<td>Examples: prescription request, “2nd opinion” abd pain x 1 year, “safe sanctuary” for vulnerable pt population, etc...</td>
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What is Emergency Medicine?

1. Resuscitation and stabilization of the acutely ill and injured (cohort A)
2. Diagnosis and clinical decision making in the unexpected and undifferentiated health care event (cohort B+ anyone, anything, any time)
3. Designing integrated systems and coordinating transitions of care - pre-ED/inter-facility/post-ED.
EM Myths # 2

1. Real life in the ED is about “real” emergencies

2. Waiting in the ED is just inconvenient

3. Overcrowding is caused by low acuity patients

4. EM is expensive

Wait times and mortality…

…in a dose response relationship that suggests causality
EM Myths # 3

1. Real life in the ED is about “real” emergencies

2. Waiting in the ED is just inconvenient

3. Overcrowding is caused by low acuity patients

4. EM is expensive
Queuing theory:

\[ \text{Wait Time} = \frac{\% \text{ Busy}}{\% \text{ Idle}} \]
Total daily demand queue 1

Pour rate = speed and irregularity of patient arrivals

Capacity of ED

Effect of Boarding on ED
Inadequate EP staffing →

Adverse events
Mortality
Increased costs

Safe / Quality Care patient encounters
Sophie’s Choice (Who gets the next ED bed…)

Ambulance Hallway

1. 72 yo male with Chest Pain, cardiac risks (32 min)
2. 84 yo female fall, shortened rotated hip (1h 44 min)
3. 20 yo female post ictal sz pt (2h 04 min)
4. 87 yo male confused, lives alone (1h 51 min)
5. 35 yo male intoxicated (3h 36 min)

Awaiting transfer from another ED:

1. 66 yo female, COPD, rr 30, deteriorating (2h, 12m)
2. 32 yo female, medically cleared from overdose, still suicidal thoughts (6h, 44 min)

Waiting Room:

1. 22 yo female, first pregnancy, 12 wks, heavy PV bleeding (3h, 13 min)
2. 17 yo male, sore red swollen scrotum (45 min)
3. 55 yo male, Chief of Surgery’s husband, 2 day hx epigastric pain radiating to back (just triaged)

QUEUE # 1
EM Myths # 4

1. Real life in the ED is about “real” emergencies

2. Waiting in the ED is just inconvenient

3. Overcrowding is caused by low acuity patients

4. EM is expensive

**Commentary**

ED Care: Available, Competent, Affordable

- Majority of costs are **Fixed costs** (in relation to burden of acute illness/injury [cohort A] in the relative size of the catchment area)

- A large proportion of costs are **Transferred costs** (from programs or services unable to manage their own queues in a timely manor).

- A very small proportion is the **Marginal costs** (of low acuity pts)

- **Fixed + Transferred + Marginal costs / all pts = Average cost per pt**
Easteros: Thought Experiment

How do you optimize access to high quality Emergency Medicine in an evolving Health Care Eco-system?
Easteros:
Assumptions: you are the new Philosopher King Decision-maker

- No politics
- No historical precedent
- Good EMS system
Emergency Program of Care (EPoC) Health Services Planning

Overview / Update

David Petrie
Tanya Penney
Evolution of Emergency Care in Nova Scotia

Last Century
- Locally based “ERs”
- Back Door of Hospital

1996 - today
- Regional/District Based Programs
- Front Door of Hospital

Tomorrow…
- Integrated Networks of Emergency Care
- Keystone node in connected Health Ecosystem
Locally based “ERs”

Regional/District Based Programs

Integrated Networks of Emergency Care
Quality, Standards, and Pt Safety

System Design and Integration

Hospital and System Flow
1. System Design and Integration
   1. Categorization
   2. Horizontal Integration
   3. Vertical Integration
   4. Health Human Resources

2. Quality, Standards, and Patient Safety
   1. Q&S committee
   2. Quarterly reporting
   3. Standards (accountability and support)
   4. Maintenance of Competence

3. Hospital and System Flow
   1. CAEP wait times
   2. EDIS
   3. Same/next day 1* care
   4. Non-ED alternatives for complex social pts
• Stewardship of tangible assets (financial and legal obligations)
• Accountability to senior organizations, payers, partners, stakeholders
• Accountability to individual members and constituent interests

• Set the Unit/Dept’s course and priorities (Mission, Vision, Values)
• Deploy resources accordingly (trade-offs, incentives, sanctions)

Fiduciary

Strategic

Governance as Leadership

Generative

• Frame problems and make sense of ambiguous situations
• Evolve, adapt, respond to uncertainty and changing environments
1. System Design and Integration
   1. Categorization
   2. Horizontal Integration
   3. Vertical Integration
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   3. Same/next day 1\(^*\) care
   4. Non-ED alternatives for complex social pts
1.1: Categorization

Outcomes in relation to...

- Distance
- Volumes

**RESEARCH**

Association of delay of urgent or emergency surgery with mortality and use of health care resources: a propensity score–matched observational cohort study

Daniel I. McIsaac MD MPH, Karim Abdulla MD, Homer Yang MD, Sudhir Sundaresan MD, Paula Doering RN, Sandeep Green Vaswani MBA, Kednapa Thavorn MPPharm PhD, Alan J. Forster MD MSc

Open Access BMJ Open

Hospital volume and mortality for 25 types of inpatient treatment in German hospitals: observational study using complete national data from 2009 to 2014

Ulrike Nimptsch, Thomas Mansky

**ABSTRACT**

Objectives To explore the existence and strength of a relationship between hospital volume and mortality, to estimate minimum volume thresholds and to assess the potential benefit of centralisation of services.

Design Observational population-based study using complete German hospital discharge data (KiGGS).

**Strengths and limitations of this study**

- The strength of this study is the use of current and complete national hospital discharge data, covering virtually every patient who underwent one out of the studied types of treatment during the study period.
“There isn’t any question or interpretation about it; emergency room closures have increased every year since the Liberals/NDP/PCs came to power,” NDP/Liberal/PC Leader Joe Politician said.
Emergency room closures front and centre on Easteros campaign trail
By Alexa MacLean
Video Journalist  Global News

Rural areas deserve real emergency care, doctors say — and that could mean closing ERs
Frequently closed small-town hospitals could be reorganized by province
By Tessa Vanderhart, CBC News Posted: Apr 24, 2017

"So you could even flip that over and say, is it ethical to say I'm going to put an emergency department in your community but not be able to staff it, not be able to provide the things you need, but still try and call it an emergency department?" medical ethicist Dr Pauls said.
Categorization, Designation, and Regionalization of Emergency Care: Definitions, a Conceptual Framework, and Future Challenges

Keith E. Kocher, MD, MPH, MPhil, David P. Sklar, MD, Abhishek Mehrotra, MD, Vivek S. Tayal, MD, Marianne Gausche-Hill, MD, and R. Myles Riner, MD

Abstract

This article reflects the proceedings of a breakout session, “Beyond ED Categorization—Matching Networks to Patient Needs,” at the 2010 Academic Emergency Medicine consensus conference, “Beyond Regionalization: Integrated Networks of Emergency Care.” It is based on concepts and areas of priority identified and developed by the authors and participants at the conference. The paper first describes definitions fundamental to understanding the categorization, designation, and regionalization of emergency care and then considers a conceptual framework for this process. It also provides a justification for a categorization system being integrated into a regionalized emergency care system. Finally, it discusses potential challenges and barriers to the adoption of a categorization and designation system for emergency care and the opportunities for researchers to study the many issues associated with the implementation of such a system.

ACADEMIC EMERGENCY MEDICINE 2010; 17:1306-1311 © 2010 by the Society for Academic Emergency Medicine
1.2: Horizontal Integration

Integrated EMS / EM / primary care

Community | Hospital
---|---

No Response | Central Dispatch | 811 Nurse advice line

Ambulance

Transport | Facilitated Transport | Rx & Release | Assess and/or Rx & Release | Refuse

No Response | Central Dispatch | 811 Nurse advice line

ED visit

Extended Care Paramedic | CSD Followup | 811 Followup | Office/Clinic Followup

Primary Care / Health Care Home
1.3: Vertical Integration

Nova Scotia Ambulance Posts, Helicopter Pads and Hospital Locations
1.4: Human Resources
## STRATEGIC DIRECTION #1
### Network Design and Integration: Siting, Sizing, Synergizing and optimizing health human resources

<table>
<thead>
<tr>
<th>Goal #1</th>
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<th>Goal #4</th>
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<tbody>
<tr>
<td>Categorization (siting and sizing of EDs should be formalized with operational implications and system accountabilities in relation to all other system access points)</td>
<td>Better Horizontal integration of “the patient care journey” for the person with an unexpected illness of injury that does not require hospitalization</td>
<td>Better Vertical integration of “the patient care journey” for the person with an unexpected illness or injury that does require secondary, tertiary, or quaternary care/hospitalization</td>
<td>Optimize human resource utilization and integration of all health care professionals as part of the Emergency Medicine (EM) patient care team</td>
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### Actions

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<tr>
<td>1.1.1 Review the literature so that ED definitions can be based on a developing consensus and national guidelines</td>
<td>1.2.1 Improved the transitions/interfaces with primary care, the ED, and home/continuing care to improve patient outcomes</td>
<td>1.3.1 Improved planning of patient transitions/interfaces with other Programs of Care, and other specialist/sub-specialists.</td>
<td>1.4.1 RNs in EDs are prepared for the clinical responsibilities within the ED, and they are utilized to their full scope of practice.</td>
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<tr>
<td>1.1.2 Develop and integrate “virtual” &amp; electronic access points</td>
<td>1.2.2 In rural communities, the unique nature and potential system design solutions for Level 4 access points requires ongoing community “shaping” and primary care collaboration</td>
<td>1.3.2 Improved telemedicine links (i.e. Hub and spoke design with level 3/4s to closest level 2, and specialist/sub-specialty connections to the Level 1)</td>
<td>1.4.2 Paramedics, Nurse Practitioners and Physician Assistants are utilized/integrated where appropriate</td>
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<tr>
<td>1.1.3 Recommendations must involve hazard analysis methodology in determining proposed levels of care and mitigation strategies</td>
<td>1.2.3 Integrate with the strategic plans of EHSNS</td>
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<td>1.4.3 Physician Resource Plan should recognize board certification in EM (credentialing aligned with national recommendations and definitions)</td>
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<tr>
<td>1.1.4 Collaborate with key Programs of are to establish mutually supportive care delivery models</td>
<td>1.2.4 Partner with the Maritime SPOR support unit to evaluate effectiveness</td>
<td>1.3.4 Partner with the Maritime SPOR support unity to evaluate effectiveness</td>
<td>1.4.4 Strengthen inter-professional teams focusing on team work and culture</td>
</tr>
<tr>
<td>1.4.5 Creative hub and spoke partnering/supporting for staffing and scheduling</td>
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1. Q&S committee
2. Quarterly reporting
3. Standards (accountability and support)
4. Maintenance of Competence

1. CAEP wait times
2. EDIS
3. Same/next day 1* care
4. Non-ED alternatives for complex social pts

1. System Design and Integration
   1. Categorization
   2. Horizontal Integration
   3. Vertical Integration
   4. Health Human Resources

2. Quality, Standards, and Pt safety

3. Hospital and System Flow
Quality Measurement In The Emergency Department: Past And Future
2.2: Quarterly Reporting, Public Reporting

Ontario Wait Times
http://www.ontariowaittimes.com/er/

Select a search type to show your results:

- LHIN MAP
- CITY/TOWN OR POSTAL CODE
- HOSPITAL SITE NAME

To see the wait time in your area, click a location on the map below:

- CTAS Distribution
- Percentage Admits
- Discharge Distribution
2.3: Provincial ED standards

$ Saved are re-invested

Better Care Sooner
the plan to improve emergency care
2.4: Decision support + Maintenance of Competence

https://www.bcemergencynetwork.ca/clinical_resource/
Translating Emergency Knowledge for Kids

TREKK is a growing network of

Researchers
Clinicians
TREKK Partners
Patients and Families

who share the same goal - to improve emergency care for children across Canada.

Most Viewed Resources

Asthma
Bronchiolitis

Bottom Line Recommendations: Asthma
Bottom Line: Bottom Line
Recommendations: Bronchiolitis
| STRATEGIC DIRECTION #2  
Exceptional Emergency Care through Standardization, Monitoring, and Continuous Quality Improvement |
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<td>Provincial Emergency Quality and Standards Committee—Integrated with zonal operational structures to establish high quality standardized practices throughout the emergency care system</td>
<td>Quarterly reporting of key process indicators and outcomes (when available) for all sites and zones</td>
<td>Support the existing provincial ED standards and continue to evolve/modify/improved the standards</td>
<td>Establish a provincial strategy that supports maintenance of competence, and ongoing professional raining for front-line providers</td>
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<td>2.1.1 Establish TOR (stand up committee) that includes responsibility for the development of ED standards, indicators, and standardized clinical best practice guidelines, policies and procedures</td>
<td>2.2.1 Create a standard quarterly report templates based on national/international benchmarks</td>
<td>2.3.1 Review current standards (appendix 2) and determine which ones are true standards requiring monitoring and accountability, which ones require modification, and which ones are aspirational (with no specific accountably)</td>
<td>2.4.1 Define key areas of Emergency competencies in alignment with national colleges and standards.</td>
</tr>
<tr>
<td>2.1.2 Align operational work plan to the business planning cycle</td>
<td>2.2.2 Support development of data definitions, minimum data sets, and timely access to necessary databases for periodic reporting</td>
<td>2.3.2 Establish and enforce an accountability framework (including incentives and sanctions) for the EM standards</td>
<td>2.4.2 Describe standards for competence and establish a mix of training models</td>
</tr>
<tr>
<td>2.1.3 Create an up to date electronic dashboard of clinical practice guidelines (i.e. TREKK), polices, and procedures</td>
<td>2.2.3 Feedback re site and zone performance on KPIs informs system change and improvements</td>
<td>2.3.3 Publically report performance</td>
<td>2.4.3 Explore opportunities for expanded scopes of practice with requisite training and regulation/oversight</td>
</tr>
<tr>
<td>2.1.4 Procure necessary financial, technological implementation and on-going operations of an online repository/dashboard</td>
<td>2.2.4 Publically report performance</td>
<td>2.3.4 Publically report performance</td>
<td>2.4.4 Build upon growing simulation training expertise, and make available provincially</td>
</tr>
</tbody>
</table>
1. System Design and Integration
   1. Categorization
   2. Horizontal Integration
   3. Vertical Integration
   4. Health Human Resources

2. Quality, Standards, and Patient Safety
   1. Q&S committee
   2. Quarterly reporting
   3. Standards (accountability and support)
   4. Maintenance of Competence

3. Hospital and System Flow
   1. CAEP wait times
   2. EDIS
   3. Same/next day 1* care
   4. Non-ED alternatives for complex social pts
3.1: Patient wait times
Solutions To Emergency Department ‘Boarding’ And Crowding Are Underused And May Need To Be Legislated

**ABSTRACT** The practice of keeping admitted patients on stretchers in hospital emergency department hallways for hours or days, called “boarding,” causes emergency department crowding and can be harmful to patients. Boarding increases patients’ morbidity, lengths of hospital stay, and mortality. Strategies that optimize bed management reduce boarding by improving the efficiency of hospital patient flow, but these strategies are grossly underused. Convincing hospital leaders of the value of such solutions, and educating patients to advocate for such changes, may promote improvements. If these strategies do not work, legislation may be required to effect meaningful change.
3.2: ED Information Systems

QEI EDIS System
Daily Volume Frequency
Reporting Period: Sunday Dec 01, 2013 to: Tuesday Sep 30, 2014

(25% of days) (50% of days) (25% of days)

Costs of “overcapacity”

Costs of undercapacity

Min 109pt/day
Max 255pt/day
3.3: better same day / urgent access to primary care and specialists (including lab and DI)
3.4: non-ED alternatives for chronic complex, behavioral, and adult protection pts
### STRATEGIC DIRECTION #3
Hospital and System Patient Flow and Efficiency

<table>
<thead>
<tr>
<th>Goal #1</th>
<th>Goal #2</th>
<th>Goal #3</th>
<th>Goal #4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal #1</strong></td>
<td><strong>Goal #2</strong></td>
<td><strong>Goal #3</strong></td>
<td><strong>Goal #4</strong></td>
</tr>
<tr>
<td>Patient wait times are in the top third of performers of the nationally accepted CAEP benchmarks</td>
<td>An emergency department information system (EDIS) is available in all level 1 and 2 EDs to monitor patient flow and inform planning</td>
<td>Work with primary care and specialists to improve same day/urgent access alternatives for appropriate patients</td>
<td>Improve non-ED alternatives for the complex co-morbidity patient, the frail elderly, and long term care residents who do not have an acute worsening of their medical condition</td>
</tr>
</tbody>
</table>

**Actions**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>3.1.1 Reduce boarding in the ED through hospital flow efficiencies (see appendix 3)</td>
<td>3.2.1 Support the staged development and implementation of an information system</td>
<td>3.3.1 Explore “advanced access scheduling” for primary care and specialist clinics</td>
<td>3.4.1 Collaborate with the Continuing Care program to support expansion of the Care program to support expansion of the Care by Design/Expanded scope paramedics</td>
</tr>
<tr>
<td>3.1.2 A System and Hospital patient flow committee is empowered, with accountability, to make significant system wide changes</td>
<td>3.2.2 Align capability of the EDIS with functionality to improve patient care/flow and meet quality program and ED standards requirements</td>
<td>3.3.2 Explore electronic triage and specialist consult access for specialist to primary care</td>
<td>3.4.2 Explore the cost–benefit of discharge liaison coordinators in the ED setting with specific attention to high user group</td>
</tr>
<tr>
<td>3.1.3 Implement a provincial wide overcapacity policy and processes in all level 1 &amp; 2 EDs</td>
<td>3.2.3 Give front-line providers a voice in the design and implantation of the EDIS and future e-pcr</td>
<td>3.3.3 Explore increased evening and weekend primary care and specialist clinics</td>
<td>3.4.3 Provide non-ED alternative for adult protection cases awaiting full assessment and placement</td>
</tr>
<tr>
<td>3.1.4 ED LOS standard is emphasized and enforced with incentive/sanctions by senior leaders (culture change)</td>
<td>3.2.4 Feedback ED efficiency metrics to influence change/improvement</td>
<td>3.3.4 Explore increased evening and weekend access to diagnostic imaging and lab</td>
<td>3.4.4 Expand access through telemedicine technologies in long term care residences</td>
</tr>
</tbody>
</table>
1. System Design and Integration:
   1. Categorization
   2. Horizontal Integration
   3. Vertical Integration
   4. Health Human Resources

2. Quality, Standards, and Pt Safety:
   1. Q&S committee
   2. Quarterly reporting
   3. Standards (accountability and support)
   4. Maintenance of Competence

3. Hospital and System Flow:
   1. CAEP wait times
   2. EDIS
   3. Same/next day 1* care
   4. Non-ED alternatives for complex social pts
4.1: Think holistically, act locally, iterate together

Common purpose

Guiding principles

Subsidiarity of operational decision making
4.2: Provincial EPoC system design and integration committee

**TOP DOWN**
- Policy / Governance / Incentives / Strategy

**BOTTOM UP**
- Implementation / Adaptations / Front-line Ownership / Patient engagement

**Catalyzing System Change to Improve Health Outcomes**

- Evaluation / Quality improvement / Patient outcomes / Iterate
- Integrate / Coordinate / Stakeholder coalition building / Social accountability
4.3: leadership roles and responsibilities are clear (and flexible)

- Team of teams
4.4: Provider autonomy and accountability are balanced

They may call you Doctor / or they may call you Chief / But you’re still gonna have to serve somebody…
Trust and Engagement are two sides of the same coin

I'm concerned that my personal goals do not align with our corporate strategy.

For example, I would like to be happy.

What does the company want?

Well, nothing along those lines.
### STRATEGIC DIRECTION #4

Establish a provincial Emergency Program of Care with appropriate Leadership, Management and Infrastructure

<table>
<thead>
<tr>
<th>Goal #1</th>
<th>Goal #2</th>
<th>Goal #3</th>
<th>Goal #4</th>
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</thead>
<tbody>
<tr>
<td>EM care must be planned as a single Integrated Network, but will respect and enable local management</td>
<td>Have a Provincial Steering and Strategy Committee overseeing the implementation, evaluation, and iterative improvements of the EPoC strategic plan</td>
<td>Have a detailed leadership and accountability structure to support the Emergency Program of Care</td>
<td>Physicians are accountable through performance based service agreements and NSHA/ISK/DHW is accountable to maintain standards and support the necessary infrastructure</td>
</tr>
</tbody>
</table>

#### Actions

4.1.1 Align ED site/zone level planning/operations with zones, and cross cutting services (EHS, Emergency Preparedness, Trauma, etc) by standing up zone based operational committees  
4.1.2 Create a mechanism for providers and stakeholders to contribute their voice in planning and improvements of the system

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</thead>
<tbody>
<tr>
<td>4.2.1 Establish terms of reference (and stand up committee)</td>
<td>4.3.1 Clear roles and responsibilities shall be defined for Senior Co Leaders, Zone Co-Leaders and Site Chiefs</td>
<td>4.4.1 Support the development of appropriate letters of agreement and contractual rights and responsibilities of physicians to their zone chiefs</td>
<td>4.4.2 Create mechanisms for NSHA/IWK/DHW to understand and respond to ongoing operational pressures to improve patient outcomes</td>
</tr>
<tr>
<td>4.2.2 Align with other committees and overall governance structure in NSHA</td>
<td>4.3.2 Site, zone, provincial job descriptions, relationships, and accountabilities are described</td>
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<tr>
<td>4.2.3 Clearly articulate the budget and level of authority give to the EPoC leadership and steering committee, and the process through which ongoing decision-making and financial pressures are balanced</td>
<td>4.3.3 Establish a communication strategy between the leadership structure and all stakeholders</td>
<td></td>
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</tbody>
</table>
It's good to see the safety net still functioning.
Keystone Species

- A group of species whose impacts on a community are larger than they appear
- Not just top predators

Species are intricately connected in biological communities, so it is difficult to determine the essential key

Catalyst of change in evolving Health Care Eco-systems
Sizing and Siting Approach

Categorization, Designation, and Regionalization of Emergency Care: Definitions, a Conceptual Framework, and Future Challenges

Keith E. Kocher, MD, MPH, MPhil, David P. Sklar, MD, Abhishek Mehrotra, MD, Vivek S. Tayal, MD, Marianne Gausche-Hill, MD, and R. Myles Riner, MD

Abstract

This article reflects the proceedings of a breakout session, “Beyond ED Categorization—Matching Networks to Patient Needs,” at the 2010 Academic Emergency Medicine consensus conference, “Beyond Regionalization: Integrated Networks of Emergency Care.” It is based on concepts and areas of priority identified and developed by the authors and participants at the conference. The paper first describes definitions fundamental to understanding the categorization, designation, and regionalization of emergency care and then considers a conceptual framework for this process. It also provides a justification for a categorization system being integrated into a regionalized emergency care system. Finally, it discusses potential challenges and barriers to the adoption of a categorization and designation system for emergency care and the opportunities for researchers to study the many issues associated with the implementation of such a system.

ACADEMIC EMERGENCY MEDICINE 2010; 17:1306-1311 © 2010 by the Society for Academic Emergency Medicine
## Sizing and Siting Approach

<table>
<thead>
<tr>
<th>Category</th>
<th>Limited</th>
<th>Basic</th>
<th>Advanced</th>
<th>Comprehensive</th>
<th>Pediatric Critical Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED staffing</td>
<td>Physician</td>
<td>Physician</td>
<td>Any attending</td>
<td>BC/BE EP or any</td>
<td>BC/BE pediatric EP</td>
</tr>
<tr>
<td></td>
<td>available</td>
<td>available</td>
<td>attending</td>
<td>attending +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>from home/</td>
<td>from within</td>
<td>physician</td>
<td>pediatrics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>physician</td>
<td>hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT scanner</td>
<td>Sometimes</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>General surgery</td>
<td>N/A</td>
<td>Available</td>
<td>within 1 hour</td>
<td>within 1 hour</td>
<td>within 1 hour</td>
</tr>
<tr>
<td>Cardiac</td>
<td>N/A</td>
<td>Available</td>
<td>N/A</td>
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<td>N/A</td>
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<tr>
<td>catheterization</td>
<td></td>
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<tr>
<td>laboratory (PCI capable)</td>
<td></td>
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<tr>
<td>Available</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>ICU</td>
<td></td>
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<tr>
<td>Vascular surgeon</td>
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<tr>
<td>Interventional radiologist</td>
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<tr>
<td>Available</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Within 1 Hour</td>
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<tr>
<td>OR</td>
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<tr>
<td>Orthopedic surgery</td>
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<tr>
<td>Radiologist</td>
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</tr>
<tr>
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<tr>
<td>Neurosurgery</td>
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<tr>
<td>Neurology</td>
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<tr>
<td>Pediatric surgeon</td>
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<tr>
<td>Pediatric radiologist</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Available</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Pediatric anesthesiologist</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

BC/BE = board-certified/board-eligible; OR = operating room; PCI = percutaneous coronary intervention; N/A = not applicable.

*Survey responses included: never available, sometimes available, always available (not necessarily within 1 hour), and always available (within 1 hour).

†“Available” indicates always available (not necessarily within 1 hour).
## Categorization Definitions

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>ED services and personnel</th>
<th>ED equipment, DI and lab</th>
<th>Hosp services and personnel</th>
<th>Hosp equipment, DI and lab</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td>Comprehensive Full Service ED</td>
<td>BC EPs all, 24/7 EM RNs, paramed Spec RN, SW, etc</td>
<td>Full resus CT 24/7 XR/US 24/7 Comp lab*</td>
<td>Neurosurg/transplant Cardiac/Thor surg Level 1 ICU All subspecialties</td>
<td>Card cath IR Tertiary/quat level care</td>
<td>Very rare transfer out</td>
</tr>
<tr>
<td><strong>Level 2</strong></td>
<td>Advanced Full Service ED</td>
<td>BC EPs ratio, 24/7 EM RNs, paramed Access to spec RNs, SW, etc</td>
<td>Full resus CT 24/7 XR/US 24/7 Lab 24/7</td>
<td>Gen surg/anesthesia Level 2/3 ICU on site Gen med, obs/gyne, peds, psychiatry networked 1 hr</td>
<td>General OR 1hr available 24/7</td>
<td>Transfer major trauma, rescue PCI, occ sub-spec, limited other</td>
</tr>
<tr>
<td><strong>Level 3</strong></td>
<td>Full Service ED</td>
<td>MD 24/7 RNs</td>
<td>Xray, basic lab, night? Teledem**</td>
<td>Limited specialist No subspecialist No ICU</td>
<td>General in-pt</td>
<td>Transfer many/most admits</td>
</tr>
<tr>
<td><strong>Level 4</strong></td>
<td>Urgent Primary Care / “ER” / CEC</td>
<td>GP day/RN/PCP RN/ACP PA/RN Various models</td>
<td>Limited lab/XR (POC tests?) Teledem**</td>
<td>Local GP from home at HS? Limited admit</td>
<td>Limited</td>
<td>CEC vs CHC? Governance and operational DM and accountability?</td>
</tr>
</tbody>
</table>

*Community shaped, Primary Care governed*
## Hazard Analysis

<table>
<thead>
<tr>
<th>Severity</th>
<th>Higher</th>
<th>Lower</th>
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<tbody>
<tr>
<td>Likelihood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less</td>
<td></td>
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</tr>
</tbody>
</table>

- **Acceptable with Mitigation**
- **Acceptable**
- **Unacceptable**
Hazard Analysis of NS ED access:

<table>
<thead>
<tr>
<th>RISK = What is the likelihood of the event? What is the severity of the event?</th>
<th>CTAS 4,5</th>
<th>CTAS 3</th>
<th>CTAS 1,2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30%</td>
<td></td>
<td></td>
<td>Level 3</td>
</tr>
<tr>
<td>&gt;10%</td>
<td></td>
<td>Level 4</td>
<td></td>
</tr>
<tr>
<td>&gt;5%</td>
<td></td>
<td></td>
<td>Level 5*</td>
</tr>
<tr>
<td>Site</td>
<td>EMS System</td>
<td>PRP</td>
<td>PPR</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Colchester East Hunt HC</td>
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<td>Goldstream</td>
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<td>Northumberland</td>
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<td>South West</td>
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<td>Torbay</td>
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<td>Victoria</td>
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<td>Airedale</td>
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<td>St. Mary's</td>
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<td>Western</td>
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<td>Eastern</td>
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<td>Northern</td>
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<table>
<thead>
<tr>
<th>Site</th>
<th>EMS System</th>
<th>PRP</th>
<th>PPR</th>
<th>Day time</th>
<th>Night time</th>
<th>Over time</th>
<th>Overtime</th>
<th>MATA Support</th>
<th>90% Plan Schedule</th>
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<tbody>
<tr>
<td>Colchester East Hunt HC</td>
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<td>Goldstream</td>
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<td>South West</td>
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<td>Eastern</td>
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</table>
60 Minute Drive Time from Regional and Tertiary Care Facilities

92.5% of citizens

97% 1,2,3s / 87% 30 min
A National Evaluation of the Effect of Trauma-Center Care on Mortality

- 25% lower relative risk of death at one year in trauma centers

N=15,000 patients

EJ MacKenzie et al, 2006

The New England Journal of Medicine
VIEWPOINT AND COMMENTARY

ST-Segment Elevation Myocardial Infarction: Recommendations on Triage of Patients to Heart Attack Centers

Is it Time for a National Policy for the Treatment of ST-Segment Elevation Myocardial Infarction?

Timothy D. Henry, MD,* James M. Atkins, MD,† Michael S. Cunningham, MD,‡ Gary S. Francis, MD,§ William J. Groh, MD, MPH,‖ Robert A. Hong, MD,¶ Karl B. Kern, MD,# David M. Larson, MD,** Erik Magnus Ohman, MD,‖ Joseph P. Ornato, MD,‡ Mary Ann Peberdy, MD,‡ Michael J. Rosenberg, MD,§§ W. Douglas Weaver, MD∥∥

CARDIOLOGY/CONCEPTS

Regionalization of Care for ST-Segment Elevation Myocardial Infarction: Is It Too Soon?

Brent C. Pottenger, BS
Deborah B. Diercks, MD
Deepak L. Bhatt, MD

From the School of Policy, Planning, and Development, University of Southern California (Pottenger); the Department of Emergency Medicine, University of California, Davis Medical Center, Sacramento, CA (Diercks); and the VA Boston Healthcare System and Brigham and Women’s Hospital, Boston, MA (Bhatt).
Provincial Helipad Sites:

Trauma system Integration
EMS/Trauma System Integration

Identification ➔ Notification ➔ Field Stabilization ➔ Field Triage

Rural setting ➔ Transportation ➔ Primary resuscitation ➔ Transfer ➔ Resuscitation in Trauma Center

Urban Setting

“"If an injured patient dies at a non-trauma hospital, the trauma system has failed” Howard Champion MD

• Trauma Association of Canada Accreditation Guidelines
Measure vital signs and level of consciousness

**Step One**

Glasgow Coma Scale < 14
Systolic blood pressure (mmHg) < 90 mmHg
Respiratory rate < 10 or > 29 breaths per minute
(> 20 in infant aged < 1 year)*

Yes

Take to a trauma center.† Steps 1 and 2 attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the trauma system.

No

Assess anatomy of injury.

**Step Two**§

- All penetrating injuries to head, neck, torso, and extremities proximal to elbow and knee
- Flail chest
- Two or more proximal long-bone fractures
- Crushed, degloved, or mangled extremity

- Amputation proximal to wrist and ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

Yes

Take to a trauma center. Steps 1 and 2 attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the trauma system.

No

Assess mechanism of injury and evidence of high-energy impact.
Step Three

- Falls
  - Adults: >20 feet (one story is equal to 10 feet)
  - Children*: >10 feet or two or three times the height of the child
- High-risk auto crash
  - Intrusion**: >12 inches occupant site; >18 inches any site
  - Ejection (partial or complete) from automobile
  - Death in same passenger compartment
  - Vehicle telemetry data consistent with high risk of injury
- Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact††
- Motorcycle crash >20 mph

Yes

Transport to closest appropriate trauma center, which, depending on the trauma system, need not be the highest level trauma center.§§

No

Assess special patient or system considerations.
Step Four

- Age
  - Older adults**: Risk of injury/death increases after age 55 years
  - Children: Should be triaged preferentially to pediatric-capable trauma centers
- Anticoagulation and bleeding disorders
- Burns
  - Without other trauma mechanism: triage to burn facility***
  - With trauma mechanism: triage to trauma center***
- Time sensitive extremity injury****
- End-stage renal disease requiring dialysis
- Pregnancy >20 weeks
- EMS### provider judgment

Contact medical control and consider transport to a trauma center or a specific resource hospital.

When in doubt, transport to a trauma center
## London Major Trauma Decision Tool (ADULTS & CHILDREN 12–18 YEARS OLD)

### Step 1

**Assess vital signs and level of consciousness**

1A. Glasgow Coma Score of 13 or below
1B. Sustained systolic blood pressure less than 90mmHg
1C. Respiratory rate less than 10 or greater than 29/min

- **Yes to any one**
  - Convey to nearest Major Trauma Centre. Ensure pre-alert call is passed on PD09.

### Step 2

**Assess anatomy of injury**

2A. Chest injury with altered physiology
2B. Traumatic amputation/mangled extremity proximal to wrist/ankle
2C. Penetrating trauma below the head above the knees (not arms)
2D. Suspected open and/or depressed skull fracture
2E. Suspected pelvic fracture
2F. Spinal trauma suggested by abnormal neurology
2G. Open fracture of the lower limb proximal to the ankle
2H. Burns/scald greater than 30 percent
2I. Facial burns with complete skin loss to lower half of face
2J. Circumferential burns from a flame injury

- **Yes to any one**
  - Convey to nearest Major Trauma Centre. Ensure pre-alert call is passed on PD09.

### Step 3

**Assess mechanism of injury**

3A. Traumatic death in same passenger compartment
3B. Falls >20 ft (two storeys)
3C. Person trapped under vehicle or large object (including 'one unders')
3D. Bullseye to the windscreen and/or damage to the 'A' post of the vehicle caused by impact of individual outside of the vehicle

- **Yes to any one**
  - Convey to nearest Major Trauma Centre. Ensure pre-alert call is passed on PD09.

### Step 4

**Assess special patient consideration. Patients who have sustained trauma but do not fit any of the above criteria but are:**

4A. Older patients (>55 years)
4B. Pregnant (>20 weeks)
4C. Known to have bleeding disorder or receiving current anti-coagulation therapy e.g. warfarin or novel oral anticoagulant agent
4D. Morbidly obese

- **Yes to any one**
  - Patient may benefit from going to a Major Trauma Centre. Contact Clinical Hub on PD09.

### Step 5

**Assess system consideration. Patients who have sustained trauma but do not fit any of the above criteria but there is:**

5A. Significant crew concern only when discussed with a Trauma Paramedic within EOC

- **Yes to any one**
  - Patient may benefit from going to a Major Trauma Centre. Contact Clinical Hub on PD09.
A Spoonful of Math Helps the Medicine Go Down: An Illustration of How Healthcare can Benefit from Mathematical Modeling and Analysis

E Michael Foster¹, Michael R Hosking² and Serhan Ziya²

Abstract

Objectives: A recent joint report from the Institute of Medicine and the National Academy of Engineering, highlights the benefits of—and indeed, the need for—mathematical analysis of healthcare delivery. Tools for such analysis have been developed over decades by researchers in Operations Research (OR). An OR perspective typically frames a complex problem in terms of its essential mathematical structure. This article illustrates the use and value of the tools of operations research in healthcare. It reviews one OR tool, queueing theory, and provides an illustration involving a hypothetical drug treatment facility.
### Table 2. Program accountability for patient care

1. Timely assessment and disposition of patients referred for care
2. Budget, space, and nursing care to look after patients requiring their services
3. Contingency plans to address demand variability
4. Queue management strategies for patients awaiting admission to program care
The Accountability Crisis:
In the face of demand capacity mismatch a program / queue can:

1. Improve efficiency and appropriateness, and lobby for more resources (difficult) or…
2. Block inflow and leave pts in the queue (default response)
3. Solution for one program is a problem for another program
4. Shifts care to downstream programs less capable of providing it
5. Displaces consequences of access failure to remote parts of system
6. Leaders capable of assessing/addressing root causes are protected from having to do so
7. And leaders in impacted areas are incapable of doing (because they have no authority)
Practical Implications of Queuing Theory

1. Focus on real problem queue, bottlenecks
2. Small improvements can have big impacts
3. Safe redundancy surge capacity
4. High cost of planning for the average day

http://emergencymedicinecases.com/emergency-physician-speed-how-fast-is-fast-enough/

Preparing for the average day is like pitching your tent at the mid-tide line (and wondering why you are all wet...
Health Care systems are far less like a clock (mechanistic, clear cause and effect, predictable command and control – and therefore, effectively planned/“run” by centralized administrators) and more like a Complex Adaptive System

“Man-made systems become unstable, creating uncontrollable situations even when decision-makers are well-skilled, have all the data and technology at their disposal, and do their best”.
## 20th vs 21st Century Health Care

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<thead>
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System as machine vs ecoSystem
Health Care as a Complex Adaptive System

Interdependent Agents

Non-linear threshold effects

Dynamic Co-evolution

Self organization and Emergence

No single point of control

Hind sight does not give foresight
## 20th vs 21st Century Health Care

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Health Care as a Complex Adaptive System

• Composed of independent agents following their own physical, psychological, and/or social rules (not following rules of system)

• They are non-linear and dynamic and do not reach fixed equilibrium points. Negative and positive feedback loops abound. This may appear random and chaotic to the mechanistic, cause-effect, world view.

• Agent’s needs, and rules, may be in conflict (eg. access, quality, costs) depending on context, leading to co-evolution and interdependent adaptations. (collective interests vs individual interests)

• Agent’s are intelligent and learn and change behaviors over time, leading to threshold effects and tipping point system changes.

• Self organizing and emergent patterns of behaviours. Emergence = valuable innovations, De-mergence = crashes and crisis (when it starts to fall apart man it really falls apart)

• No single point of control, system behaviours are unpredictable, uncontrollable, and no-one is “in charge”. Agility is essential.
Reducing the total # of hospital beds is a laudable goal provided that:

1. Bed hour utilization (efficiency) has been optimized
2. Hospital occupancy (capacity) rates are between 85-90%
3. If beds are closed with occupancy rates >100%, or without optimizing efficiencies, then a public debate should occur about why we are rationing emergency care.