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?

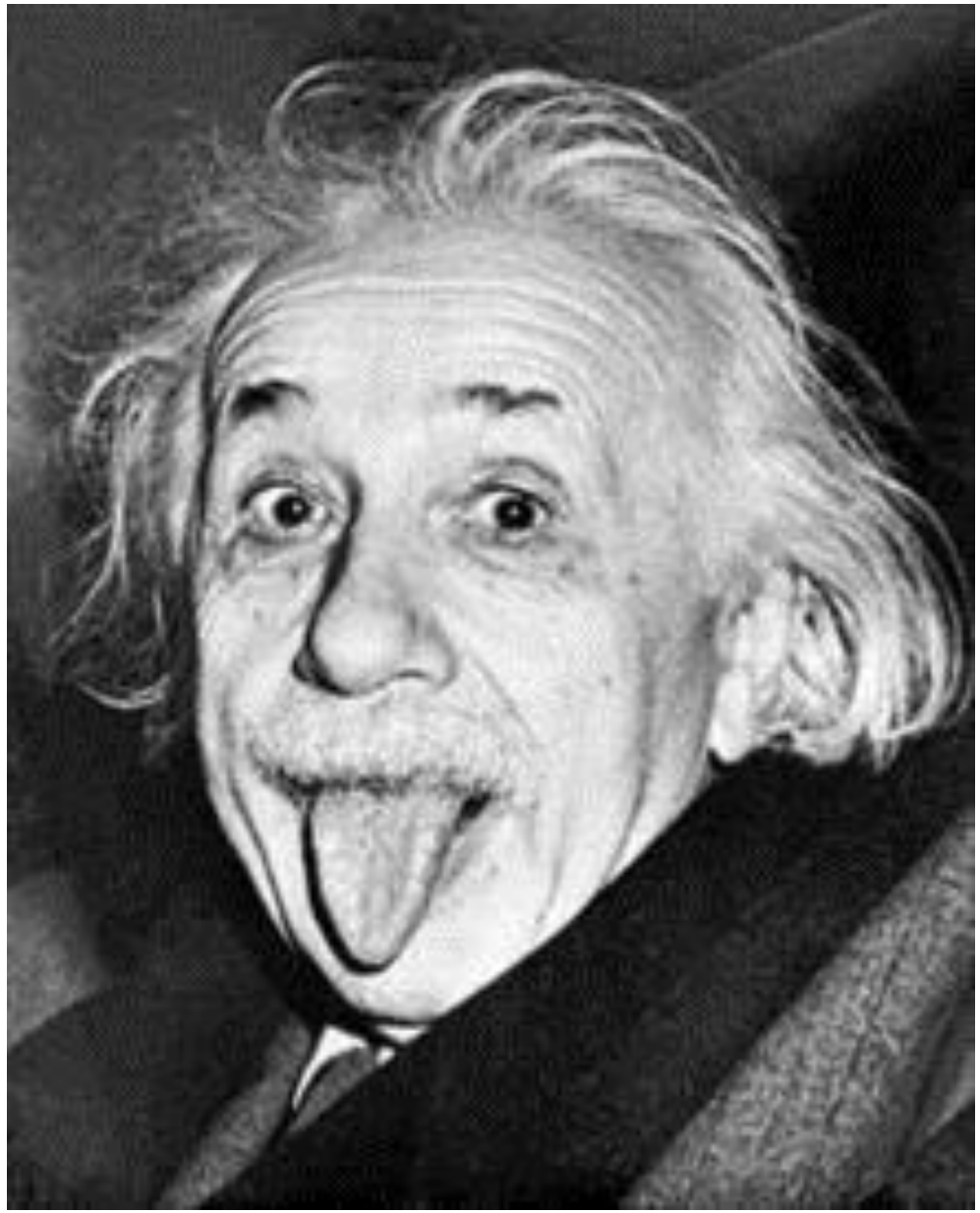
911 call in Farsborrough

- Paramedics arrive on scene and patch in
- 32 year old male with penetrating trauma to the torso, vitals stable
- Should we go to the Farsborrough “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:

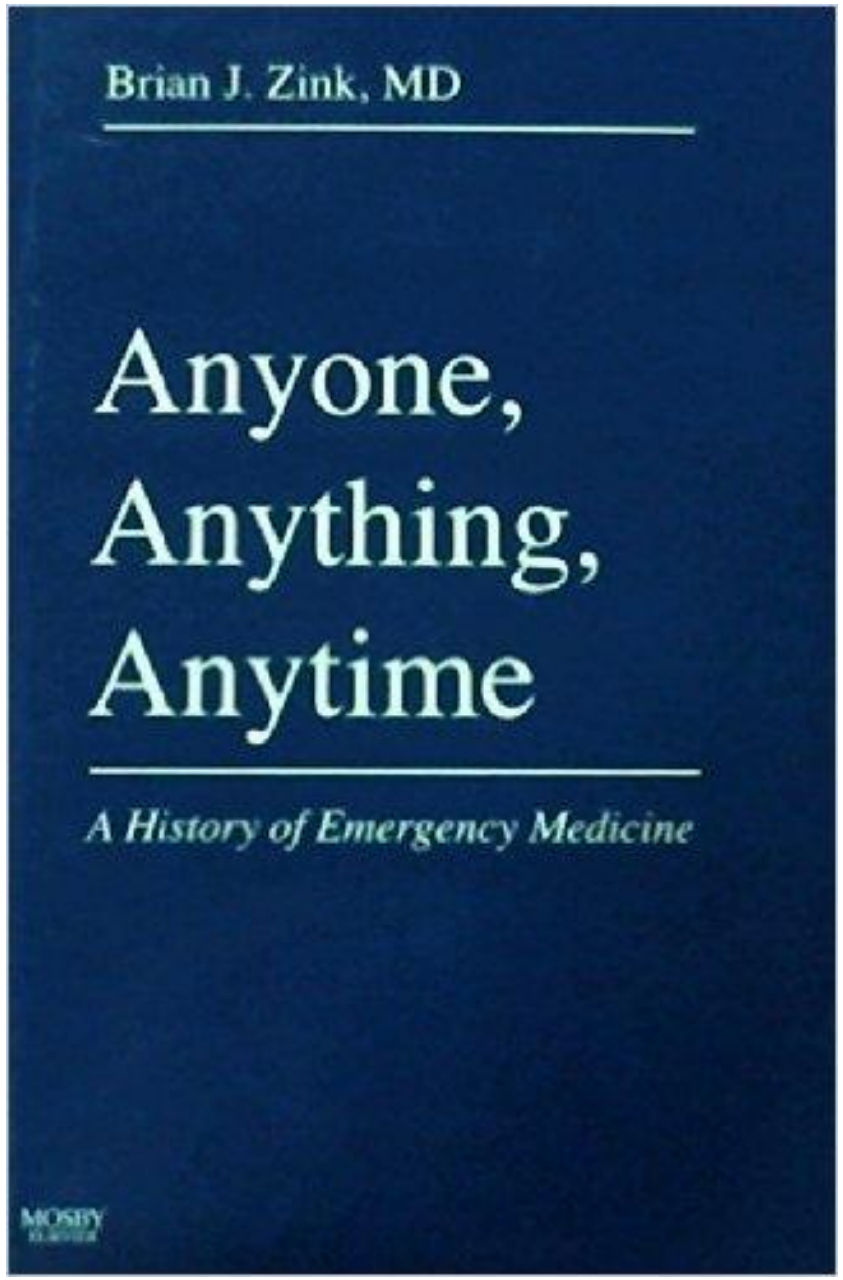
PERSPECTIVE

The NEW ENGLAND JOURNAL of MEDICINE

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."[1] Over the 11 pre-


Brian J. Zink, MD
Anyone,
Anything,
Anytime
A History of Emergency Medicine
MOSBY


ARCADE
FIRE
EVERYTHING NOW
LIVE
Watch the Performance July 27
8:30 p.m. ET/5:30 p.m. PT
Only on
MUSIC

What is EM?
(and what its not)

Definition

Unique content Knowledge and Discipline

ERPs, BURPS, and other forms of eructation

What is EM?
(and what its not)

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."1 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 | Canadian Association of Emergency Physicians
ACMU | Association canadienne des médecins d'urgence

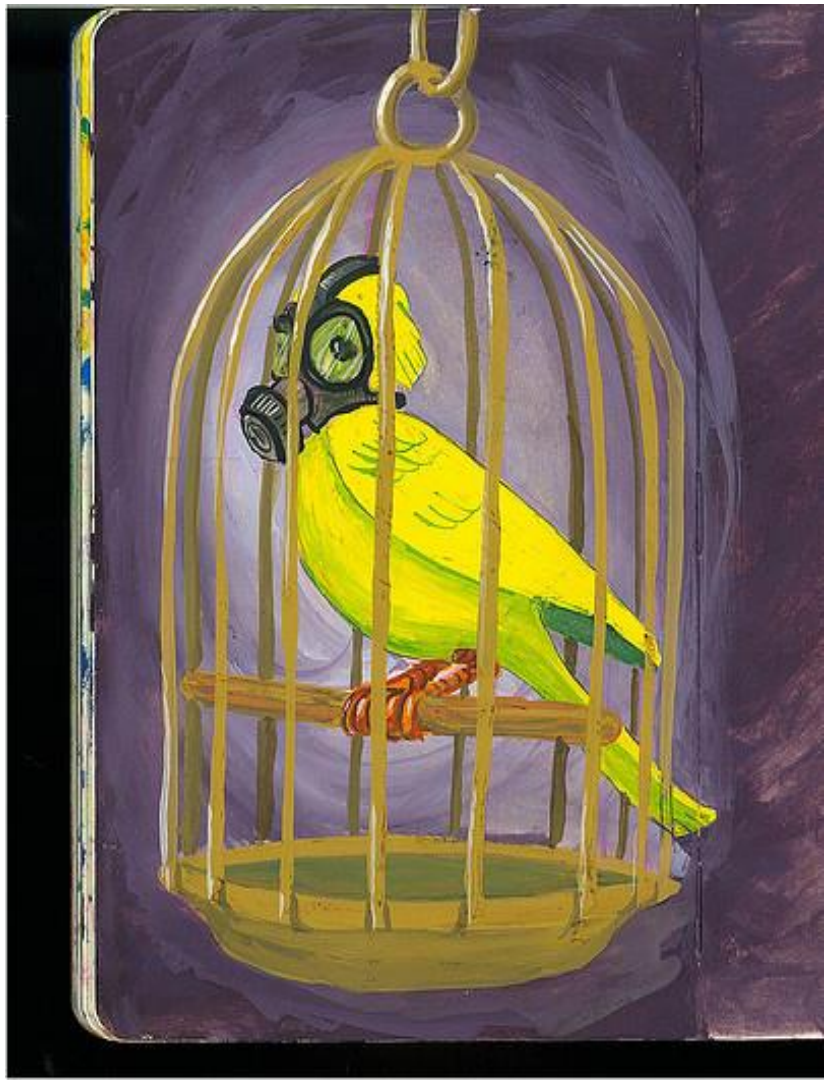
CAEP Definition of Emergency Medicine

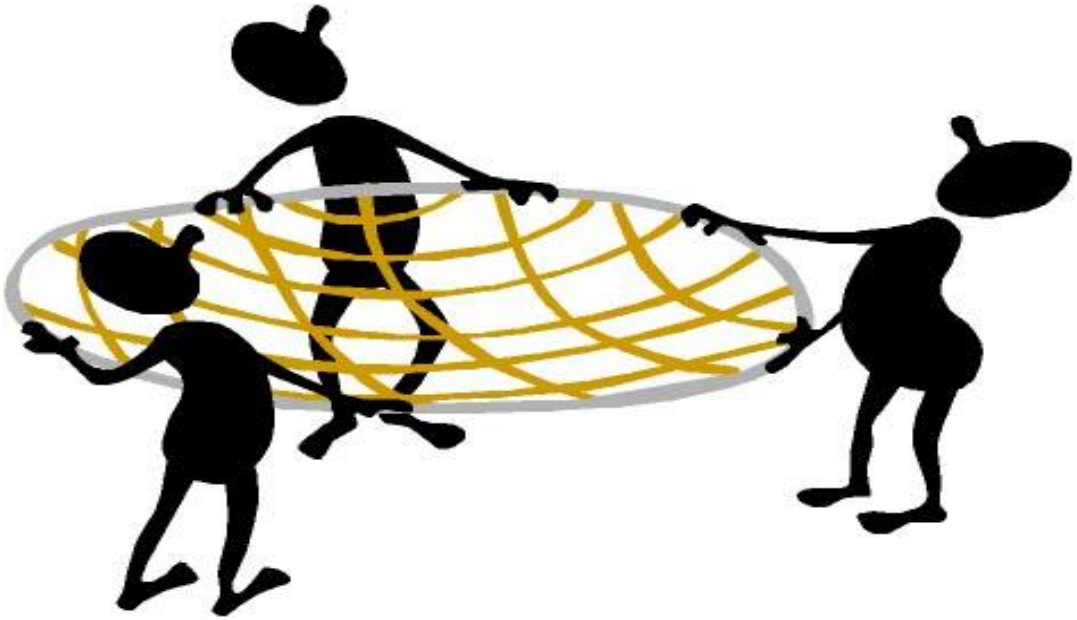
Emergency medicine is a field of medical practice comprised of a unique set of competencies required for the timely evaluation, diagnosis, treatment and disposition of all patients with injury, illness and/or behavioural disorders requiring expeditious care, 24/7/365. These conditions are often undifferentiated 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:





BRIEF

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.

The NEW ENGLAND JOURNAL of MEDICINE

Arthur L. Kellermann, M.D., M.P.H., and Ricardo Martinez, M.D.

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

By Ricardo Martinez and Brendan Carr

DOI: 10.1377/hlthaff.2013.0884
HEALTH AFFAIRS 32,
NO. 12 (2013): 2082–2090

Creating Integrated Networks Of Emergency Care: From Vision To Value

Ricardo Martinez (Ricardo.Martinez@northhighland.com) is vice president of North Highland Worldwide Consulting; an assistant professor of emergency medicine, Emory School of Medicine; and a physician at Grady Memorial Hospital, all in Atlanta, Georgia.

Brendan Carr is an assistant professor of emergency medicine and epidemiology at the Perelman School of Medicine, University of Pennsylvania, in Philadelphia.

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.

Triple Aim EM

Access

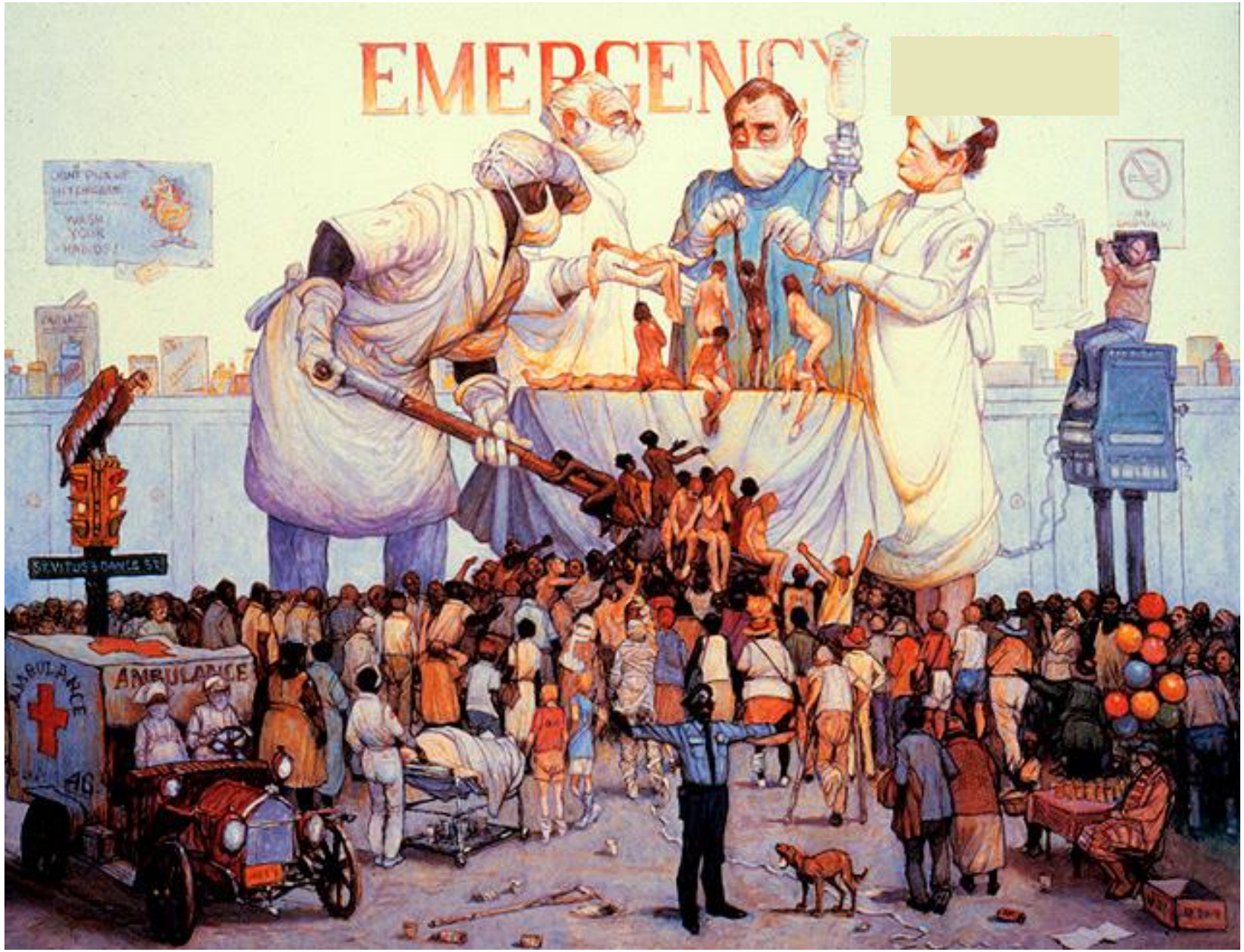
Quality

Cost

Challenges	Urban	Rural
Access	• "Overcrowding" • Boarding → 75:20:5 • ED efficiencies	• "ED closures" • Primary care access • Recruit/retain
Quality	• Vertical integration • Wait times • CQI/research	• Horizontal integration • Standards • MoC

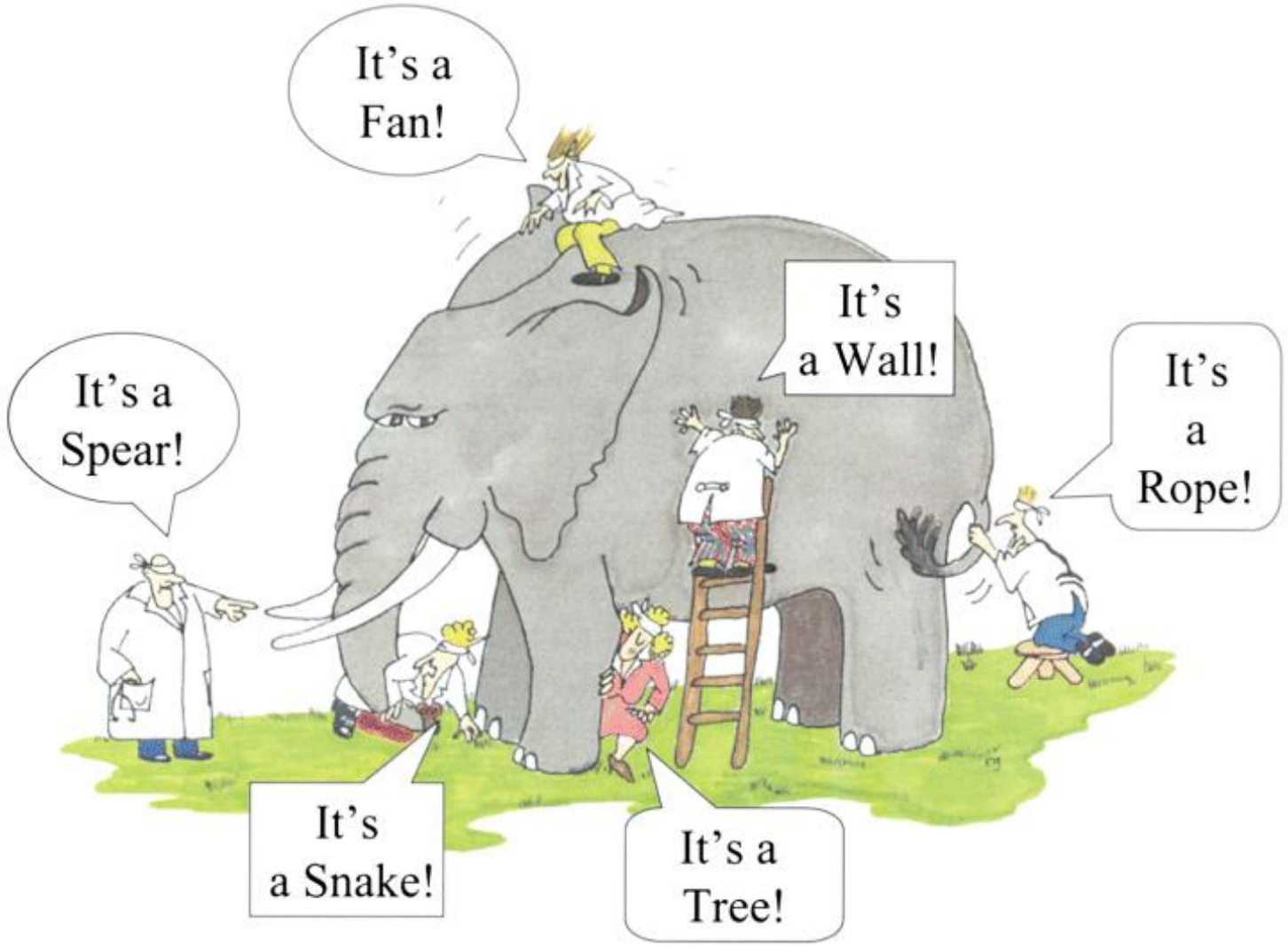
Persistent EM Myths impacting policy

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

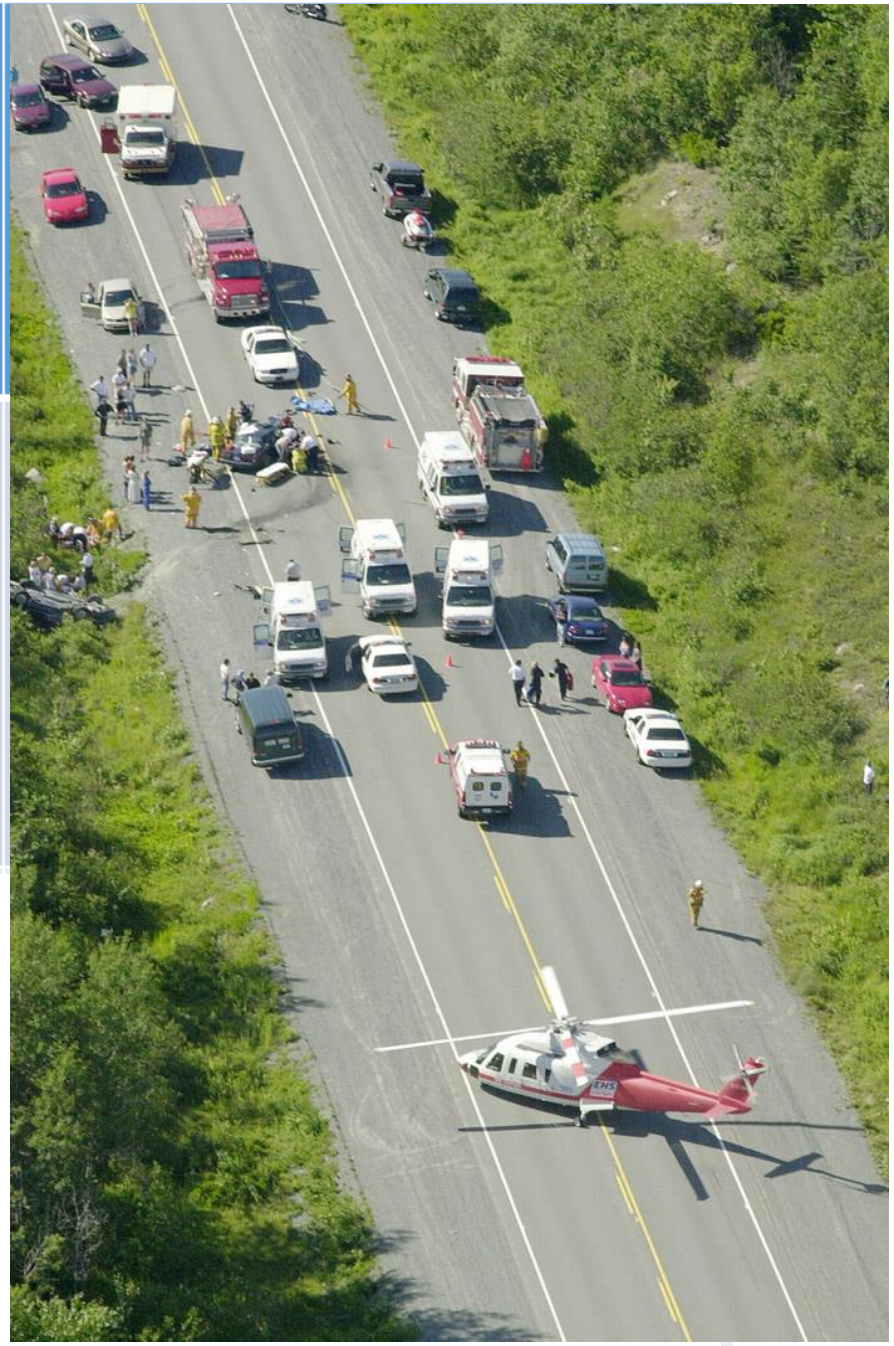


EM Myths # 1

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)**
CTAS 1, 2, 3	• **Time Dependency of Diagnosis and Treatment:** very high to possibly high • **When Did Symptoms Start?:** < 1hr, < 1 day, or < 1 week • **Examples:** major trauma, chest pain, suicidal thoughts, acute exacerbations of chronic disease, etc… **Cohort A**



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CTAS 4, 5	• **Time Dependency of Diagnosis and Treatment:** moderate • **When Did Symptoms Start?:** < 1hr, < 1 day, or < 1 week • **Examples:** minor trauma (lacerations, extremity injuries), sore throat/fever, eye redness +/- discomfort, etc… **Cohort B**

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

www.jama.com

“Inappropriate visits to the ED”???

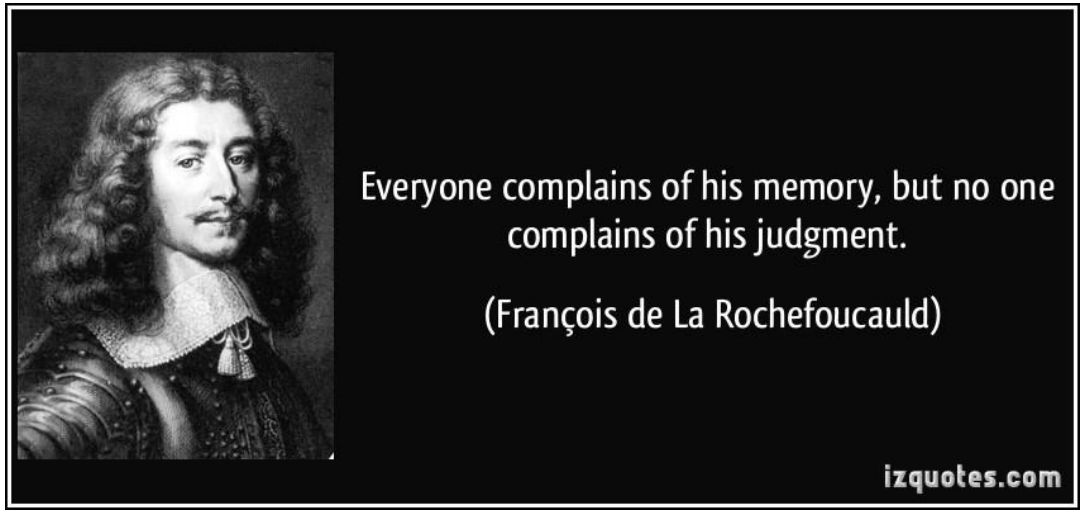
Retrospectoscope…

*

Prospective / uncertainty / undifferentiated /high stakes?/ time dependent / emergency

Signal and the Noise…

- Data
- Information
- Knowledge
- Wisdom



Big Data ≠ Big Wisdom

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

What is Emergency Medicine?	Unforeseen Unscheduled (ACEP definition of an Emergency)	Predictable Schedulable (or ought to be schedulable)
CTAS 1, 2, 3	• **Time Dependency of Diagnosis and Treatment:** very high to possibly high • **When Did Symptoms Start?:** < 1hr, < 1 day, or < 1 week • **Examples:** major trauma, chest pain, suicidal thoughts, acute exacerbations of chronic disease, etc… **Cohort A**	• **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… **Cohort C**
CTAS 4, 5	• **Time Dependency of Diagnosis and Treatment:** moderate • **When Did Symptoms Start?:** < 1hr, < 1 day, or < 1 week • **Examples:** minor trauma (lacerations, extremity injuries), sore throat/fever, eye redness +/- discomfort, etc… **Cohort B**	

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

VIEWPOINT

The Evolution of the Master Diagnostician

Gurpreet Dhaliwal, MD
Department of Medicine, University of California, San Francisco; and Medical Service, San Francisco

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,

Emergency Patient Cohorts: (Column 2, not row 2, is the "problem" which requires improved system design in order to improve ED efficiency)	**Unforeseen Unscheduled** (ACEP definition of an Emergency)	**Predictable Schedulable** (or ought to be schedulable)
CTAS 1, 2, 3	• **Time Dependency of Diagnosis and Treatment:** very high to possibly high • **When Did Symptoms Start?:** < 1hr, < 1 day, or < 1 week • **Examples:** major trauma, chest pain, suicidal thoughts, acute exacerbations of chronic disease, etc… **Cohort A**	• **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… **Cohort C**
CTAS 4, 5	• **Time Dependency of Diagnosis and Treatment:** moderate • **When Did Symptoms Start?:** < 1hr, < 1 day, or < 1 week • **Examples:** minor trauma (lacerations, extremity injuries), sore throat/fever, eye redness +/- discomfort, etc… **Cohort B**	• **Time Dependency of Diagnosis and Treatment:** low • **When Did Symptoms Start?:** > 1 week to > 1 month • **Examples:** prescription request, "2nd opinion" abd pain x 1 year, "safe sanctuary" for vulnerable pt population, etc… **Cohort D**

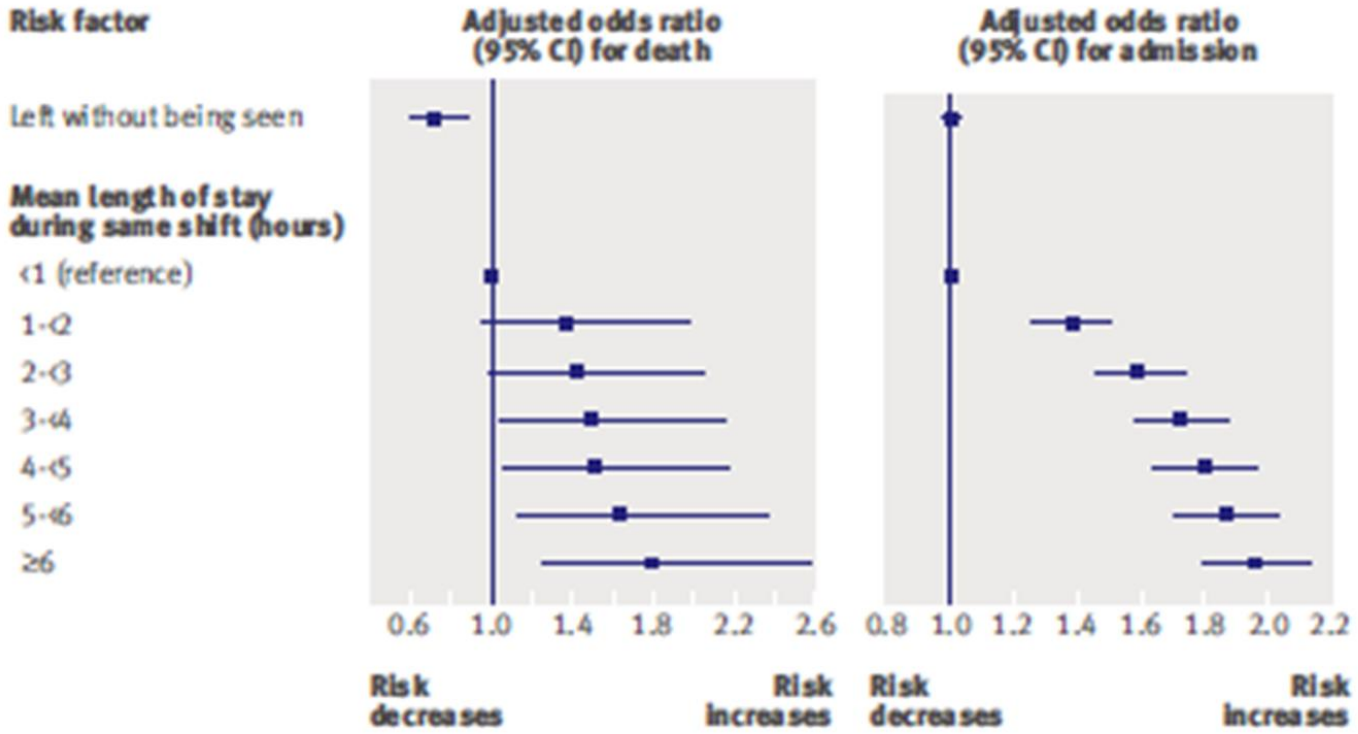
What is Emergency Medicine?

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

BMJ | ONLINE FIRST | bmj.com

BMJ

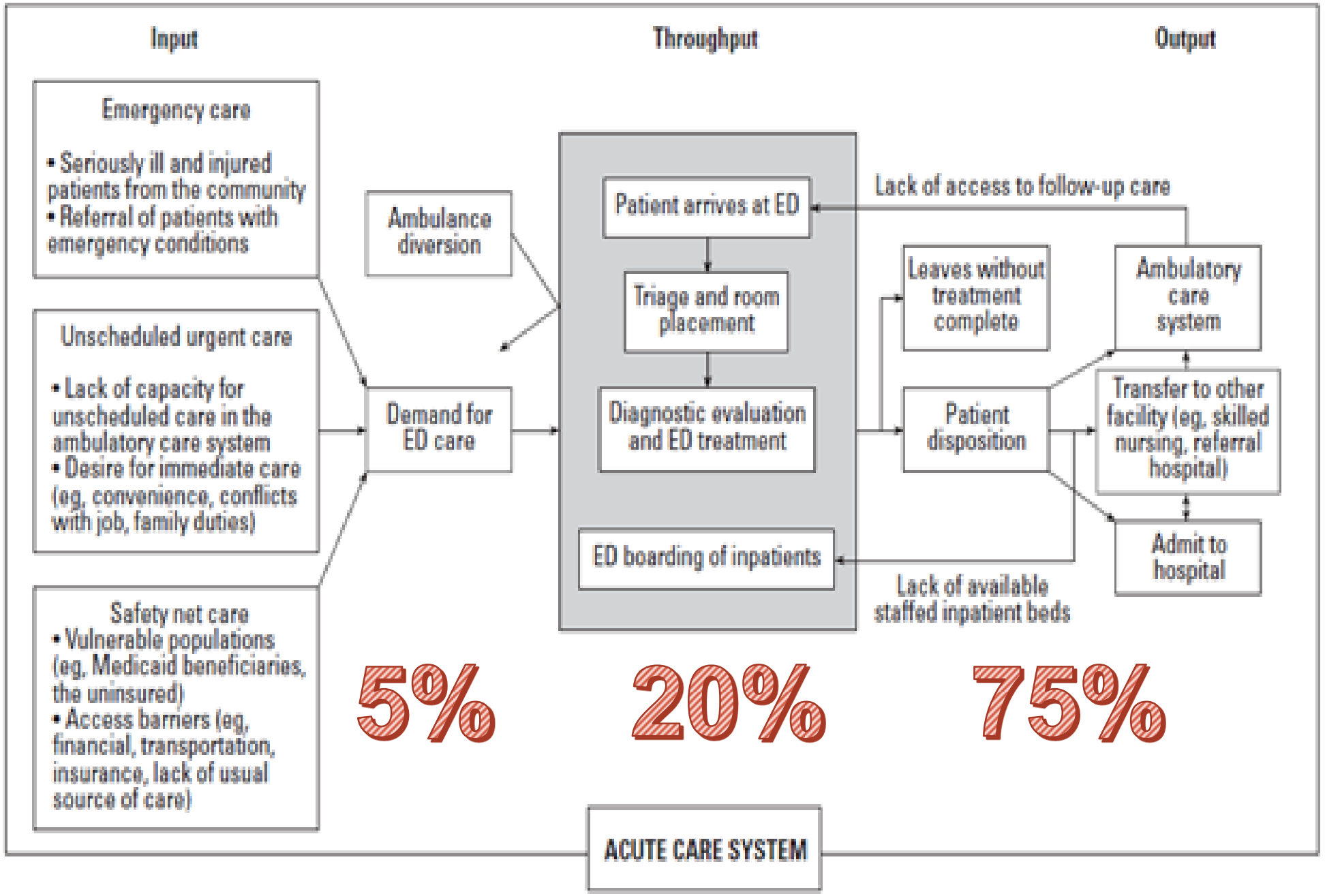
BMJ 2011;342:d2830 doi: 10.1136/bmj.d2830

EM Myths # 3

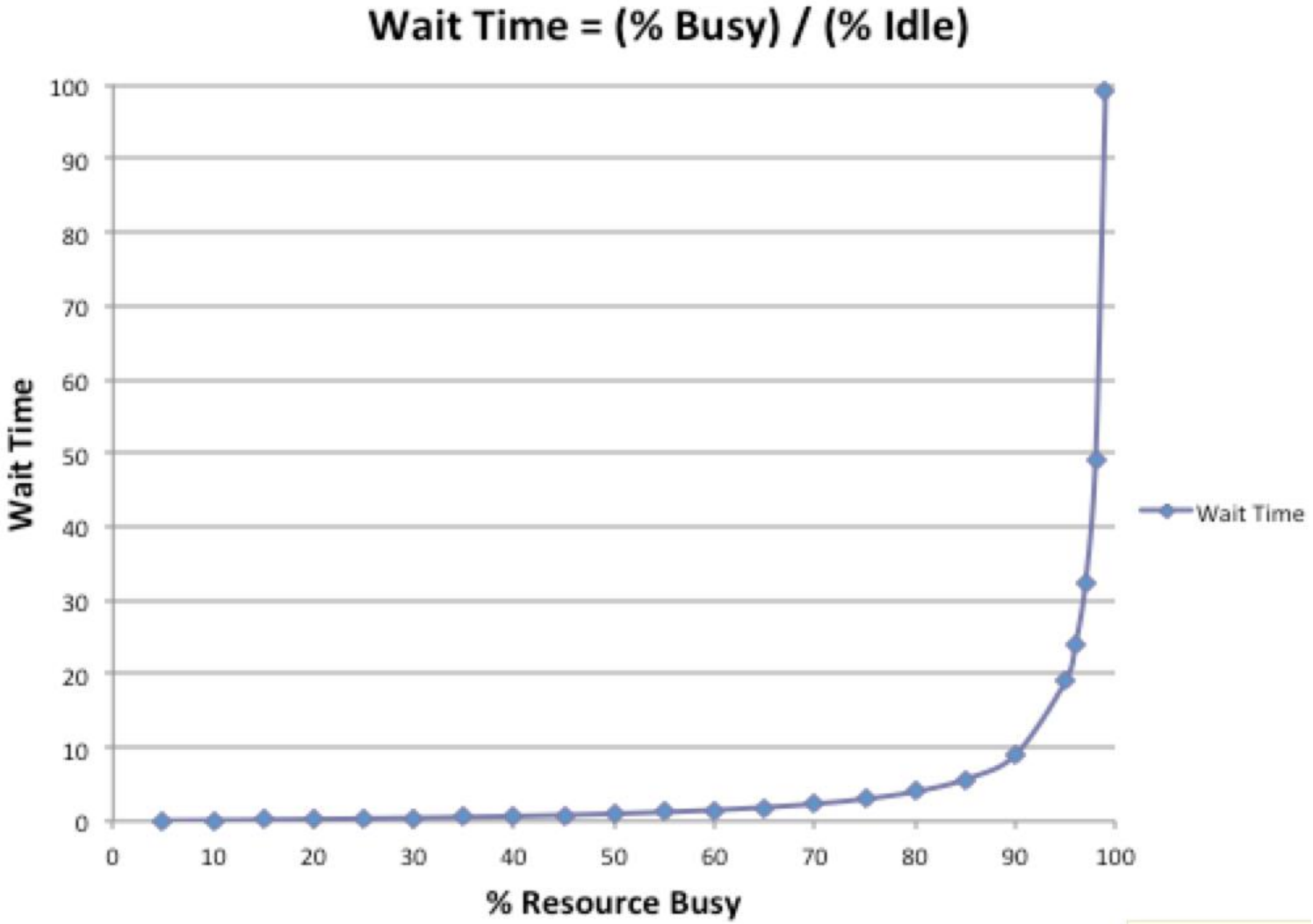
1. Real life in the ED is about “real” emergencies
2. Waiting in the ED is just inconvenient
3. **Overcrowding is caused by low acuity patients**
4. EM is expensive

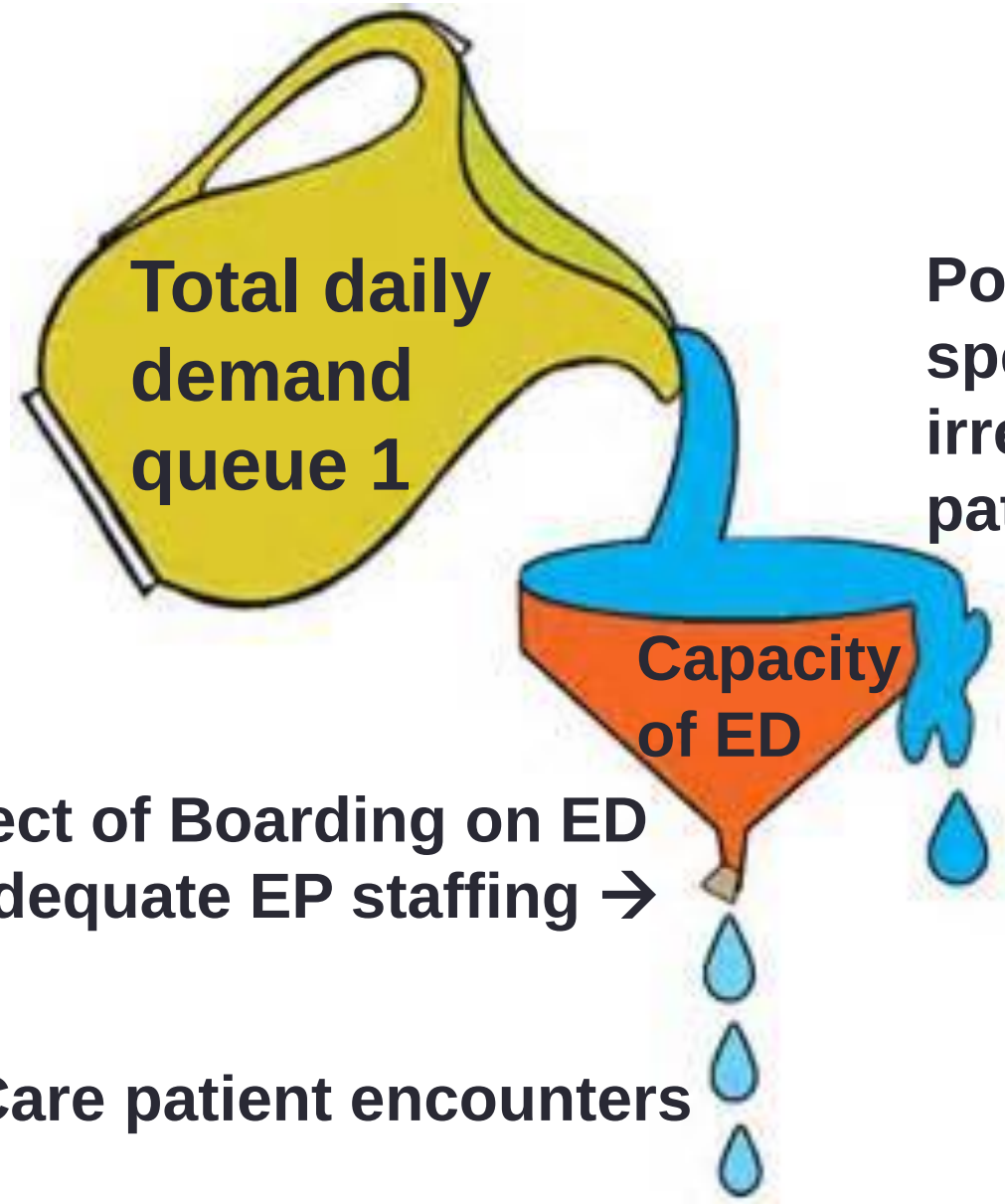
CHSRF
CANADIAN HEALTH SERVICES RESEARCH FOUNDATION

FCRSS
FONDATION CANADIENNE DE LA RECHERCHE SUR LES SERVICES DE SANTÉ


Input
Throughput
Output
Emergency care
• Seriously ill and injured patients from the community
• Referral of patients with emergency conditions
Unscheduled urgent care
• Lack of capacity for unscheduled care in the ambulatory care system
• Desire for immediate care (eg, convenience, conflicts with job, family duties)
Safety net care
• Vulnerable populations (eg, Medicaid beneficiaries, the uninsured)
• Access barriers (eg, financial, transportation, insurance, lack of usual source of care)
Ambulance diversion
Demand for ED care
Patient arrives at ED
Triage and room placement
Diagnostic evaluation and ED treatment
ED boarding of inpatients
Lack of access to follow-up care
Leaves without treatment complete
Patient disposition
Ambulatory care system
Transfer to other facility (eg, skilled nursing, referral hospital)
Admit to hospital
Lack of available staffed inpatient beds
5%
20%
75%
ACUTE CARE SYSTEM

Queuing theory:





Pour rate = speed and irregularity of patient arrivals

Adverse events
Mortality
Increased costs

Effect of Boarding on ED
Inadequate EP staffing →

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)

QUEUE # 1

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 preganancy, 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)

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**

642 THE NEW ENGLAND JOURNAL OF MEDICINE March 7, 1996

THE COSTS OF VISITS TO EMERGENCY DEPARTMENTS

ROBERT M. WILLIAMS, M.D., DR.P.H.

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

SYSTEMS THINKING

for Health Systems Strengthening

Alliance for Health Policy and Systems Research

World Health Organization

Emergency Program of Care (EPoC) Health Services Planning

Overview / Update

David Petrie
Tanya Penney

nova scotia health authority

IWK Health Centre

NOVA SCOTIA

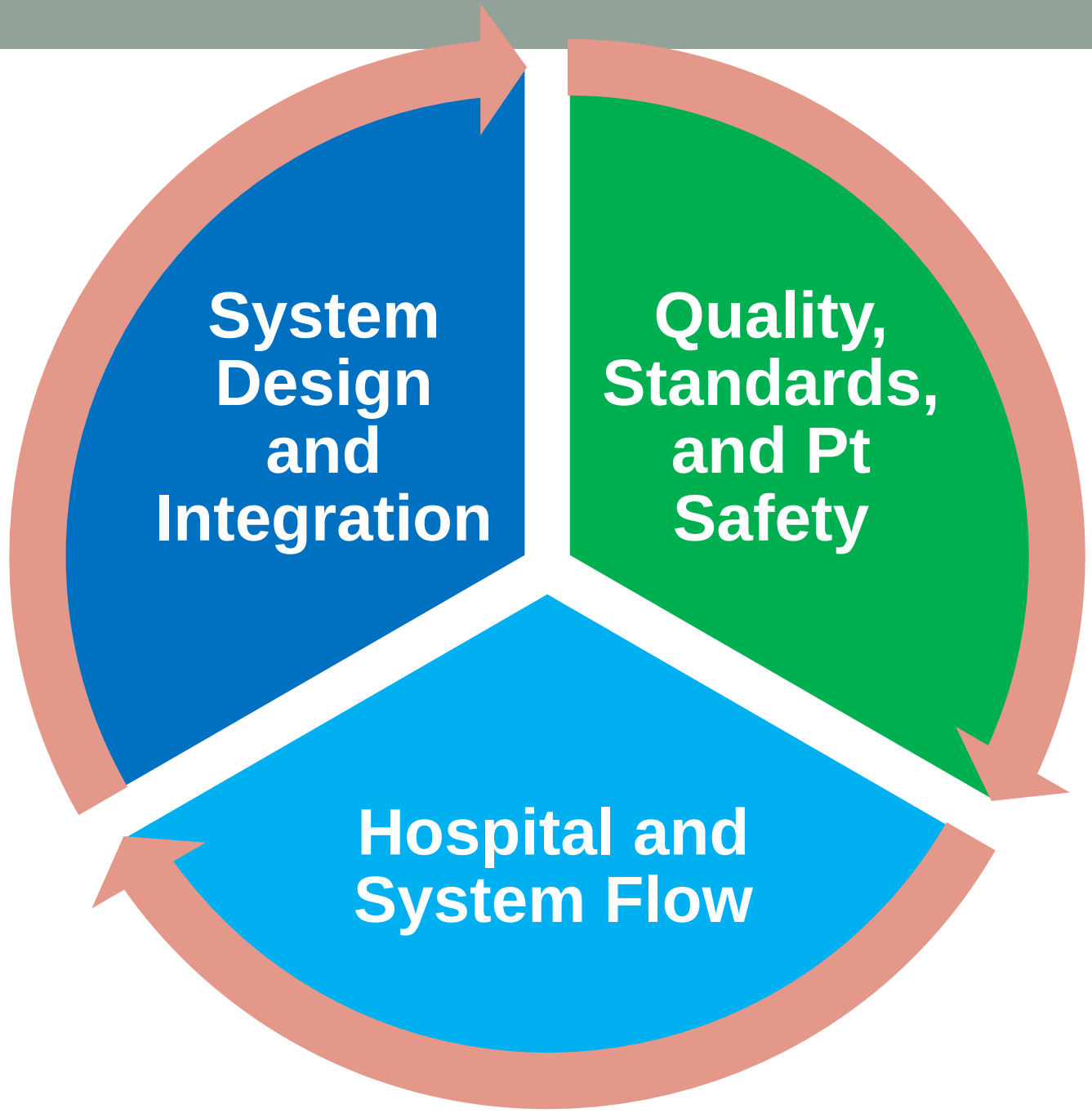
Evolution of Emergency Care in Nova Scotia

Back Door of Hospital

Front Door of Hospital

Keystone node in connected Health Ecosystem


Locally based "ERs"
Regional/District Based Programs
Integrated Networks of Emergency Care


System Design and Integration
Quality, Standards, and Pt Safety
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 Pt safety

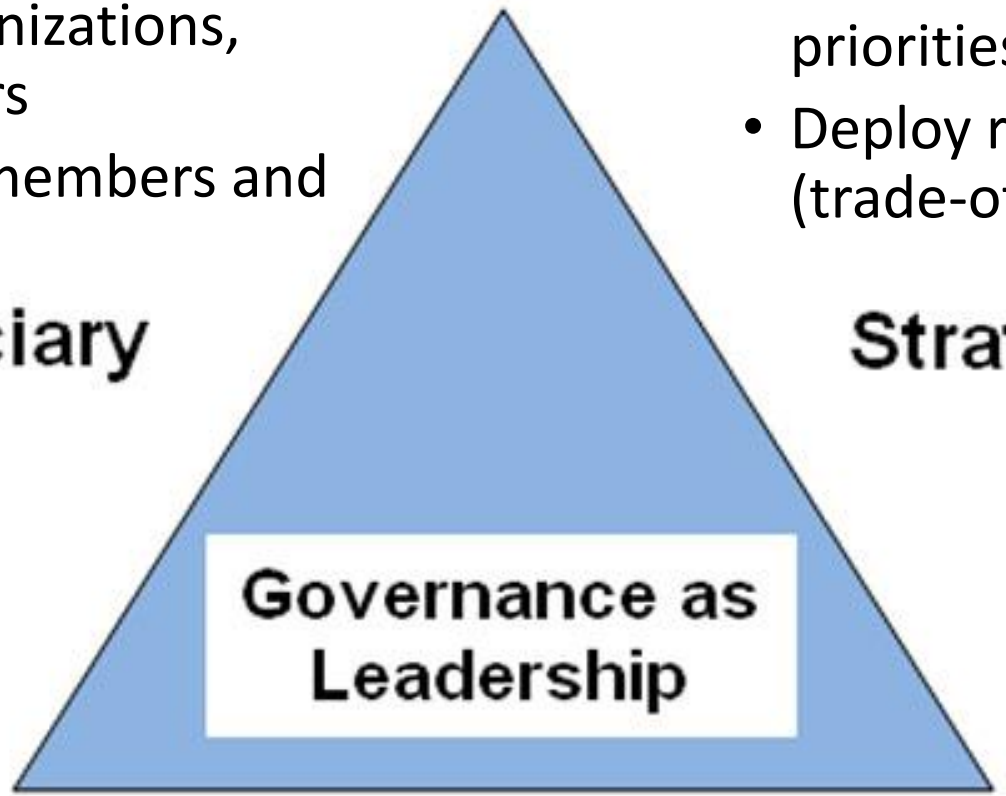
1. Q&S committee
2. Quarterly reporting
3. Standards (accountability and support)
4. Maintenance of Competence

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

3. Hospital and System Flow

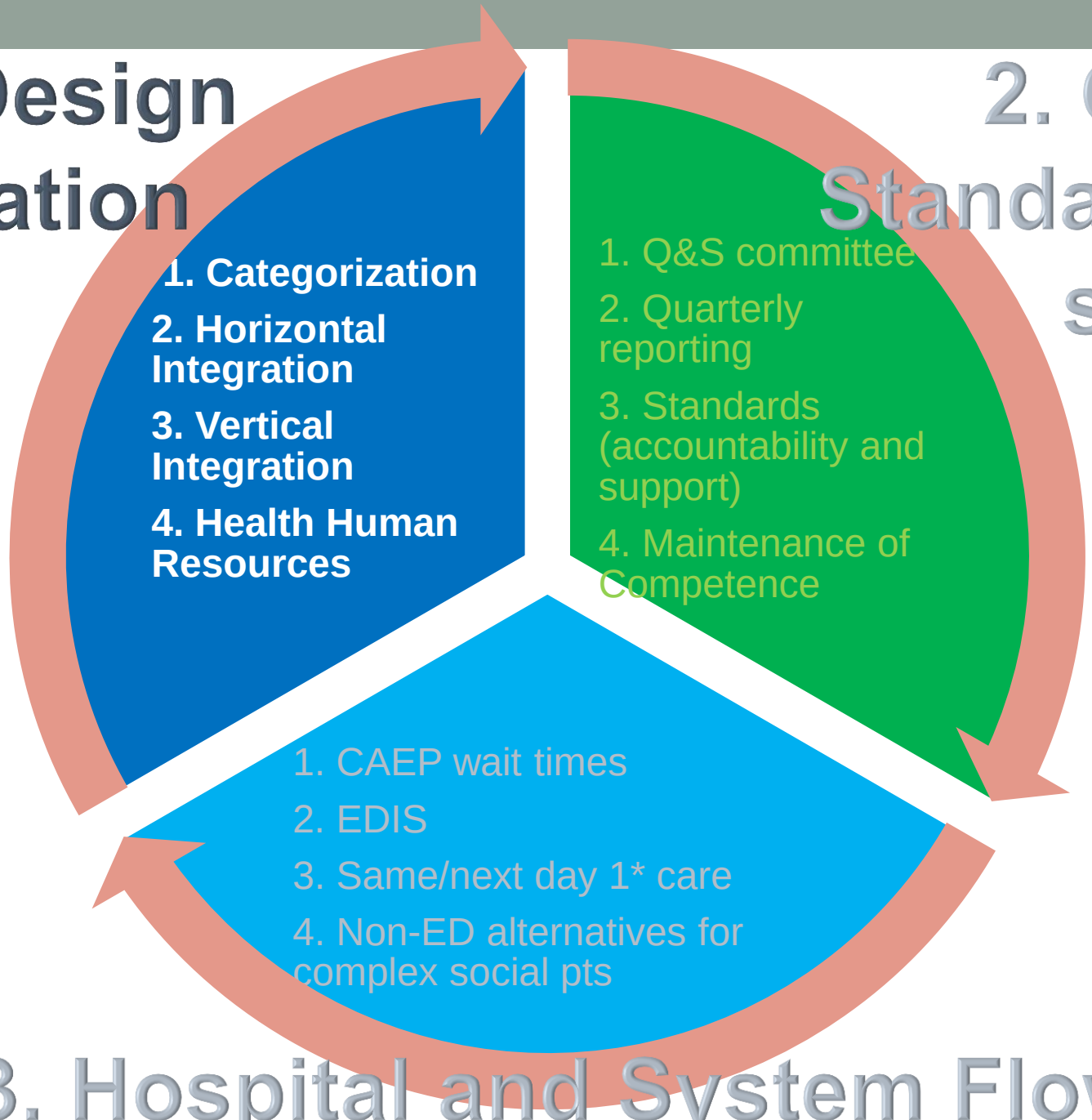
- Stewardship of tangible assets (financial and legal obligations)
- Accountability to senior organizations, payers, partners, stakeholders
- Accountability to individual members and constituent interests

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



- Frame problems and make sense of ambiguous situations
- Evolve, adapt, respond to uncertainty and changing environments

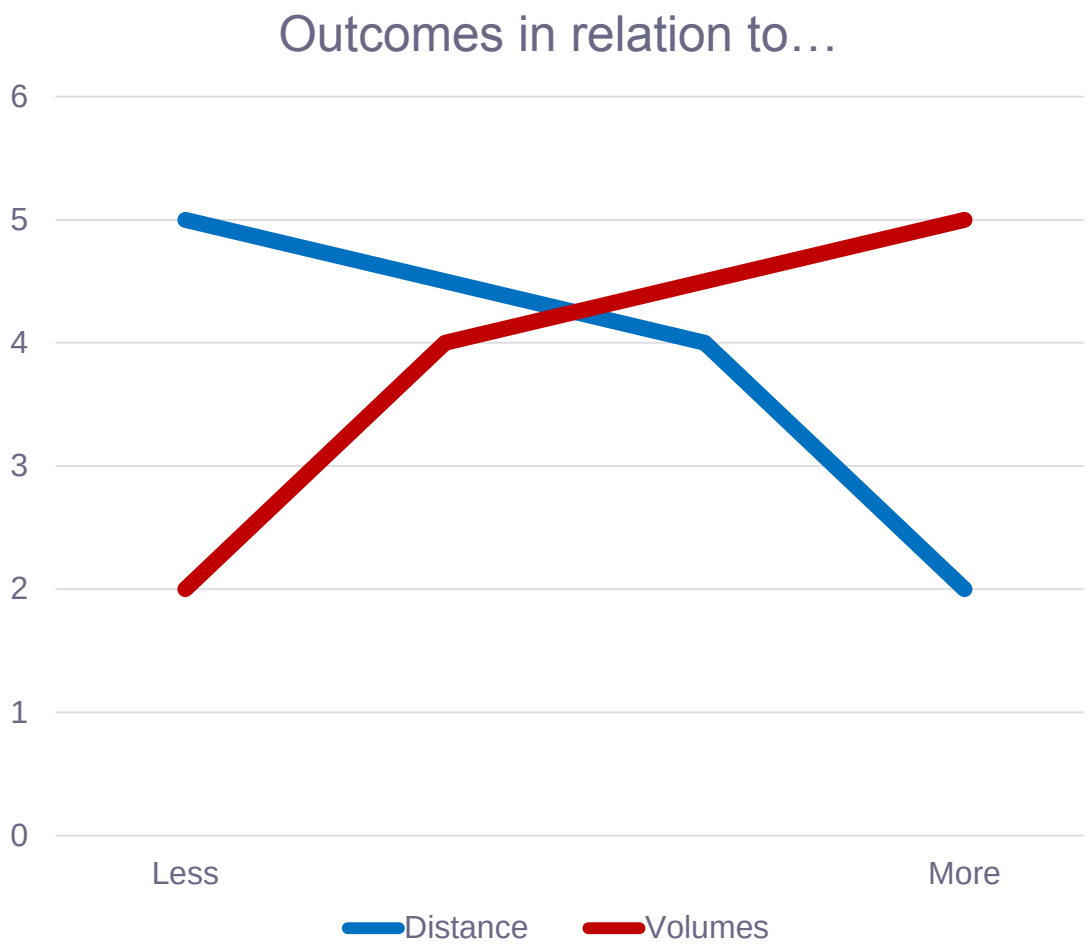
1. System Design and Integration



2. Quality, Standards, and Pt safety

3. Hospital and System Flow

1.1: Categorization



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 MPharm PhD, Alan J. Forster MD MSc

Open Access Research

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

To cite: Nimptsch U, Mansky T. Hospital volume and mortality for 25 types of inpatient treatment in German hospitals: observational study using complete national data from 2009 to 2014. *BMJ Open*

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 (Diagnosis-

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.

Canada
May 20, 2017 7:00 pm

Emergency room closures front and centre on Easteros campaign trail

By Alexa MacLean
Video Journalist Global News

“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.

Canada
May 20, 2017 7:00 pm

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

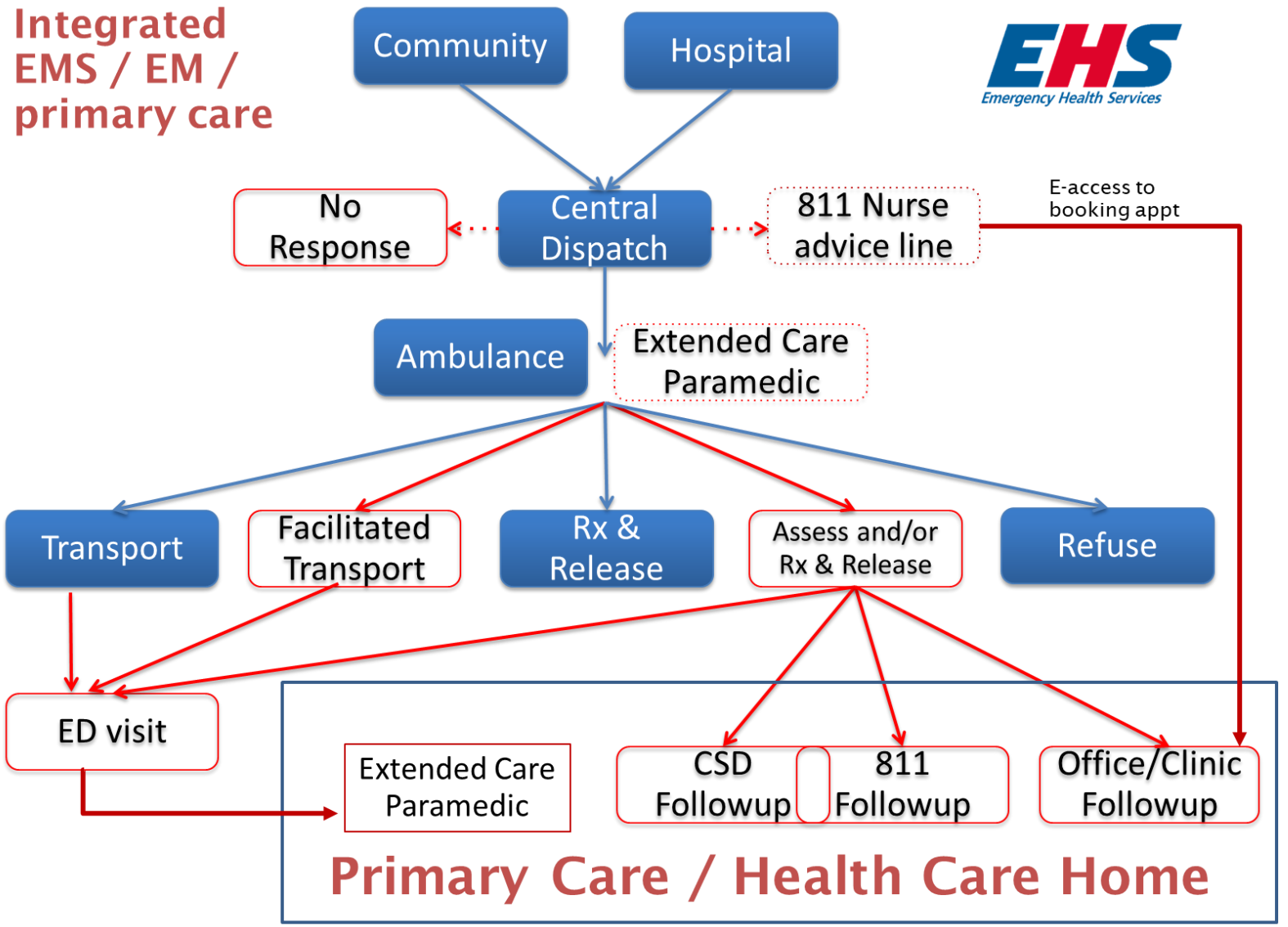
Keith E. Kocher, MD, MPH, MPhil, David P. Sklar, MD, Abhishek Mehrotra, MD, Vivek S. Tayal, MD, Marianne Gausche-Hill, MD, and R. Myles Riner, MD

Abstract

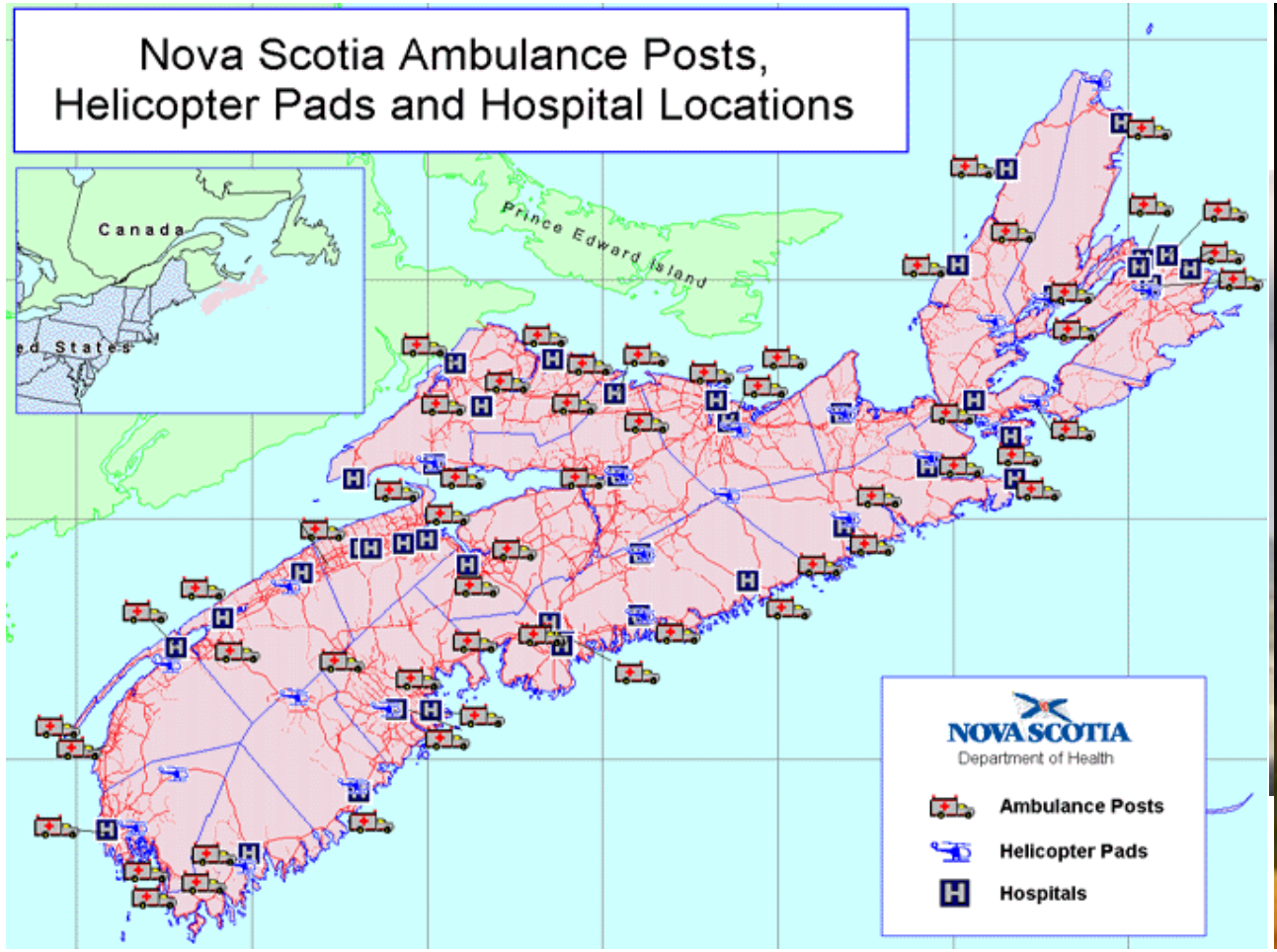
This article reflects the proceedings of a breakout session, "Beyond ED Categorization—Matching Networks to Patient Needs," at the 2010 *Academic Emergency Medicine* consensus conference, "Beyond Regionalization: Integrated Networks of Emergency Care." It is based on concepts and areas of priority identified 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

1.2: Horizontal Integration



1.3: Vertical Integration



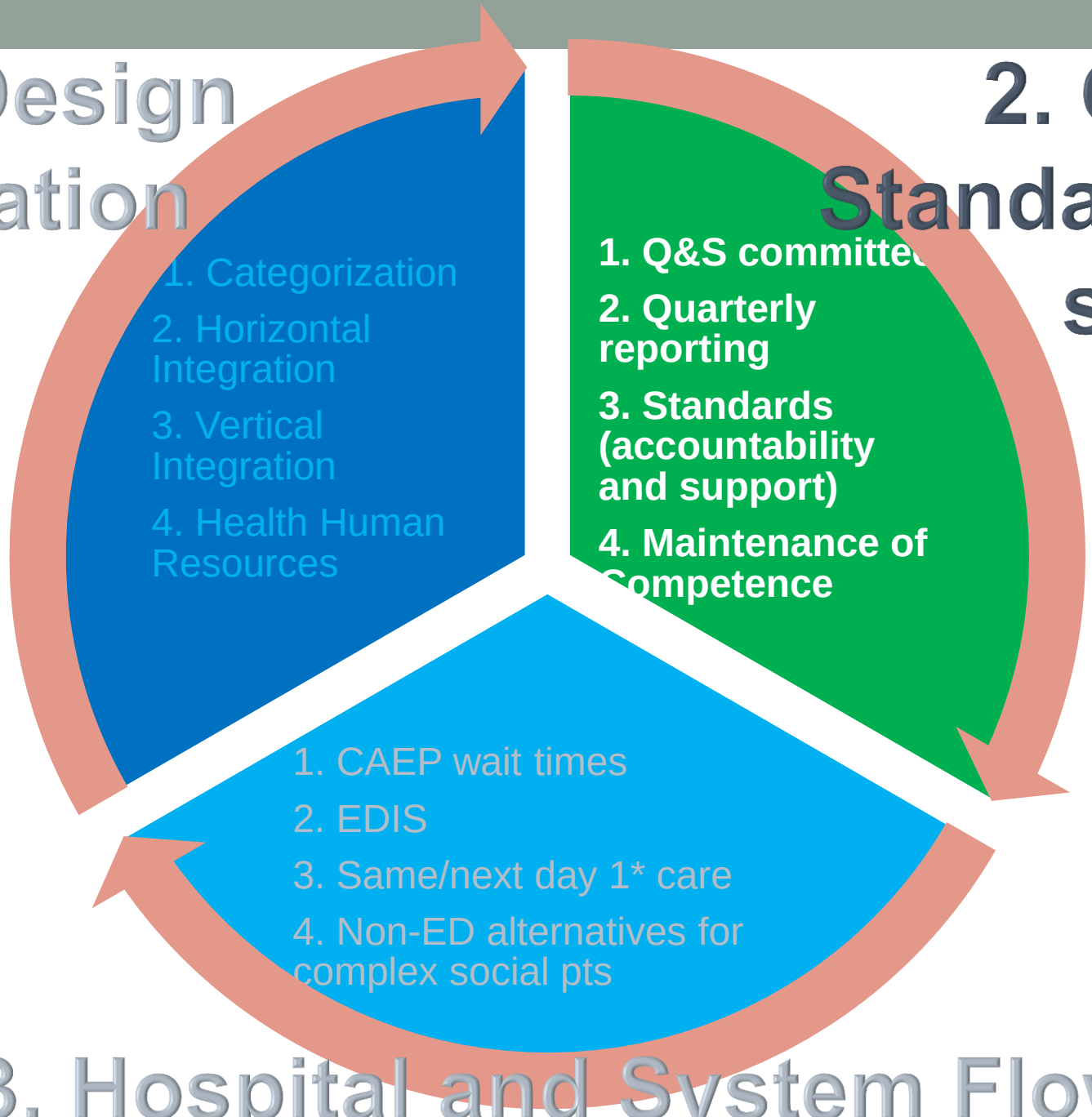
1.4: Human Resources

STRATEGIC DIRECTION #1

Network Design and Integration: Siting, Sizing, Synergizing and optimizing health human resources

Goal #1	Goal #2	Goal #3	Goal #4
Categorization (siting and sizing of EDs should be formalized with operational implications and system accountabilities in relation to all other system access points	Better Horizontal integration of "the patient care journey" for the person with an unexpected illness of injury that does not require hospitalization	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	Optimize human resource utilization and integration of all health care professionals as part of the Emergency Medicine (EM) patient care team
Actions	**Actions**	**Actions**	**Actions**
1.1.1 Review the literature so that ED definitions can be based on a developing consensus and national guidelines 1.1.2 Develop and integrate "virtual" & electronic access points 1.1.3 Recommendations must involve hazard analysis methodology in determining proposed levels of care and mitigation strategies 1.1.4 Collaborate with key Programs of are to establish mutually supportive care delivery models	1.2.1 Improved the transitions/interfaces with primary care, the ED, and home/continuing care to improve patient outcomes 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 1.2.3 Integrate with the strategic plans of EHSNS 1.2.4 Partner with the Maritime SPOR support unit to evaluate effectiveness	1.3.1 Improved planning of patient transitions/interfaces with other Programs of Care, and other specialist/sub-specialists. 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) 1.3.3 Integrate with the strategic plans of EHSNS. 1.3.4 Partner with the Maritime SPOR support unity to evaluate effectiveness	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. 1.4.2 Paramedics, Nurse Practitioners and Physician Assistants are utilized/.integrated where appropriate 1.4.3 Physician Resource Plan should recognize board certification in EM (credentialing aligned with national recommendations and definitions) 1.4.4 Strengthen inter-professional teams focusing on team work and culture 1.4.5 Creative hub and spoke partnering/supporting for staffing and scheduling

1. System Design and Integration



2. Quality, Standards, and Pt safety

3. Hospital and System Flow

2.1: Quality, Standards + Patient Safety committee

QUALITY

By Jeremiah D. Schuur, Renee Y. Hsia, Helen Burstin, Michael J. Schull, and Jesse M. Pines

Quality Measurement In The Emergency Department: Past And Future

DOI: 10.1377/hlthaff.2013.0730
HEALTH AFFAIRS 32,
NO. 12 (2013): 2129–2138

2.2: Quarterly Reporting, Public Reporting

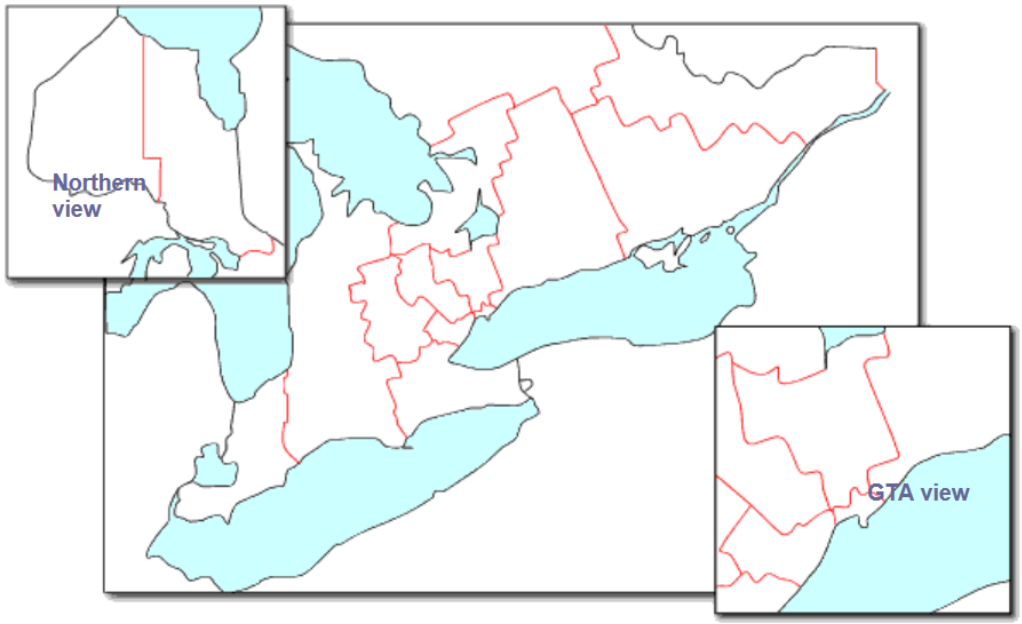
Ontario Wait Times

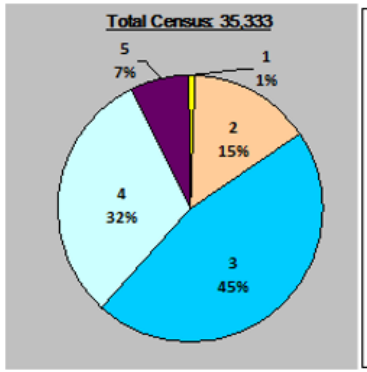
http://www.ontariowaittimes.com/er/

Select a search type to show your results:

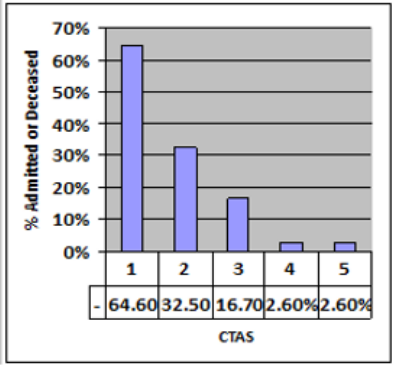
LHIN MAP | CITY/TOWN OR POSTAL CODE | HOSPITAL SITE NAME

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

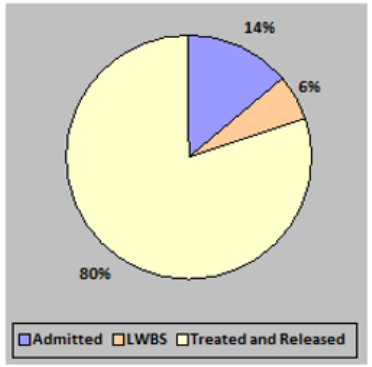




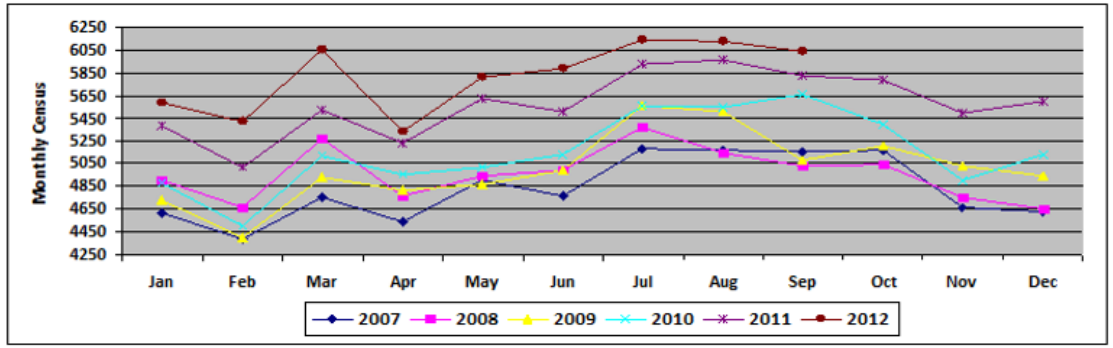
CTAS Distribution



Percentage Admits



Discharge Distribution

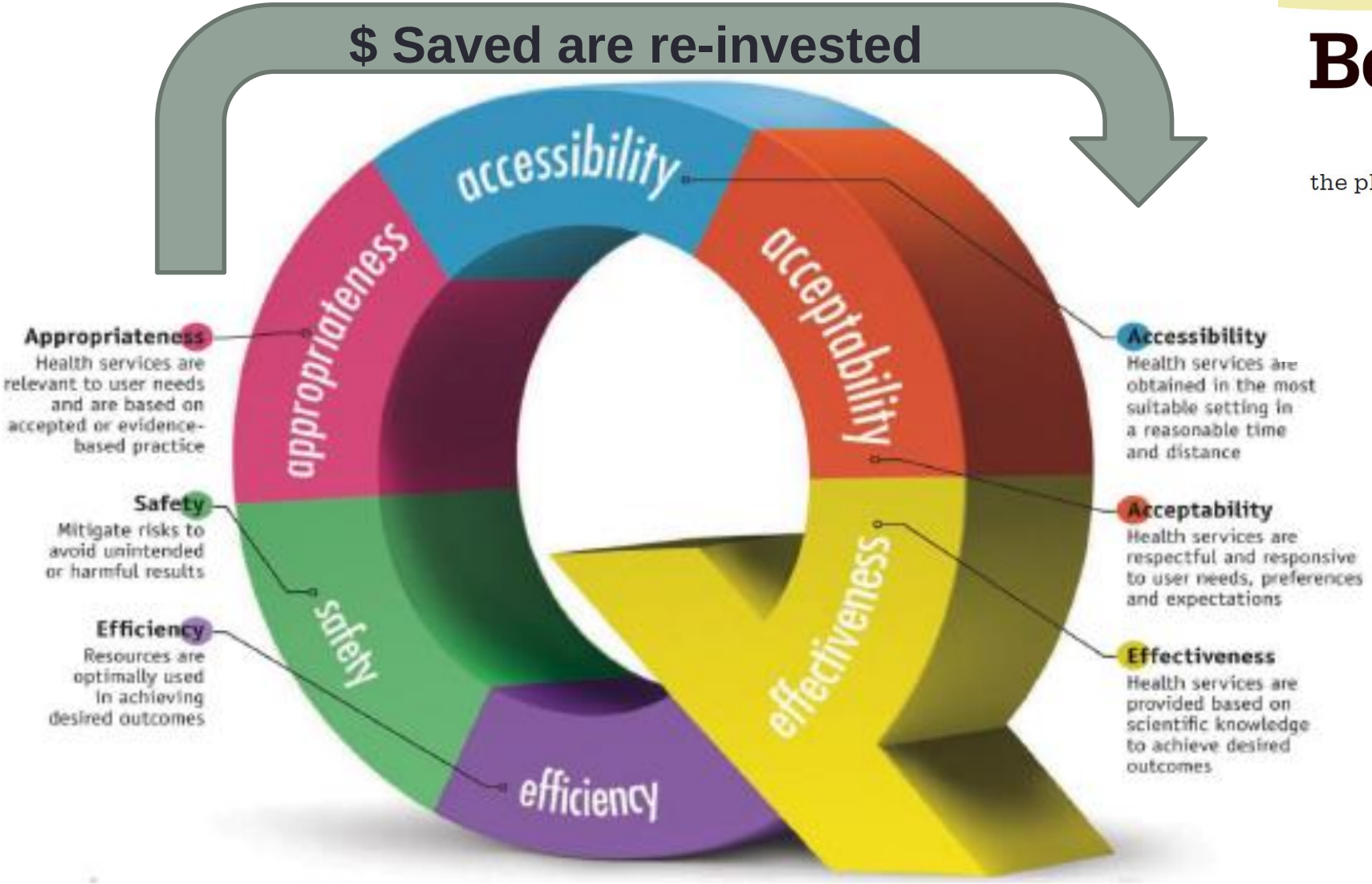


2.3: Provincial ED standards

Better Care Sooner

the plan to improve emergency care

NOVA SCOTIA



2.4: Decision support + Maintenance of Competence

https://www.bcemergencynetwork.ca/clinical_resource/

Trekk.ca

OUR WORK | RESOURCES | NEWS & EVENTS | PARTNERS | ABOUT US | CONTACT US

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.

BROWSE PEDIATRIC RESOURCES

Select a condition

All resource types

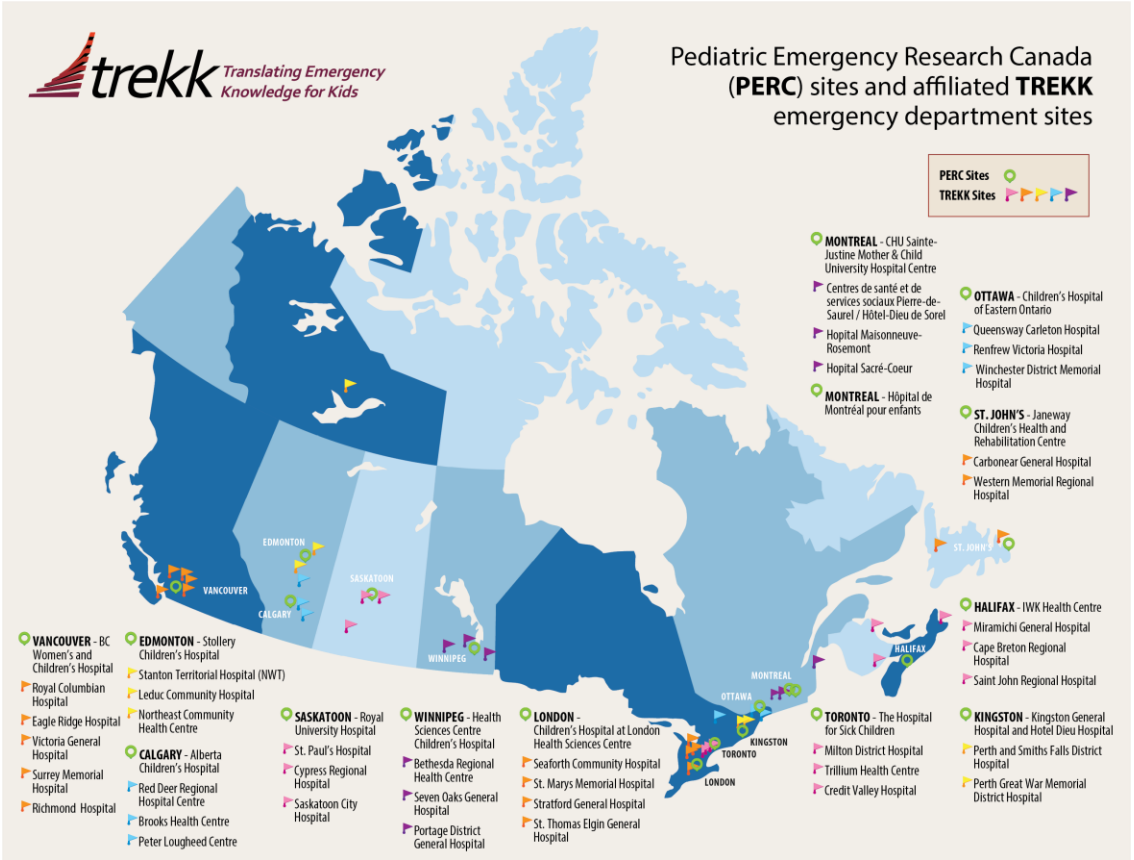
Most Viewed Resources

ASTHMA MORE

Bottom Line Recommendations: Asthma

BRONCHIOLITIS MORE

Bottom Line: Bottom Line Recommendations: Bronchiolitis



STRATEGIC DIRECTION #2

Exceptional Emergency Care through Standardization, Monitoring, and Continuous Quality Improvement

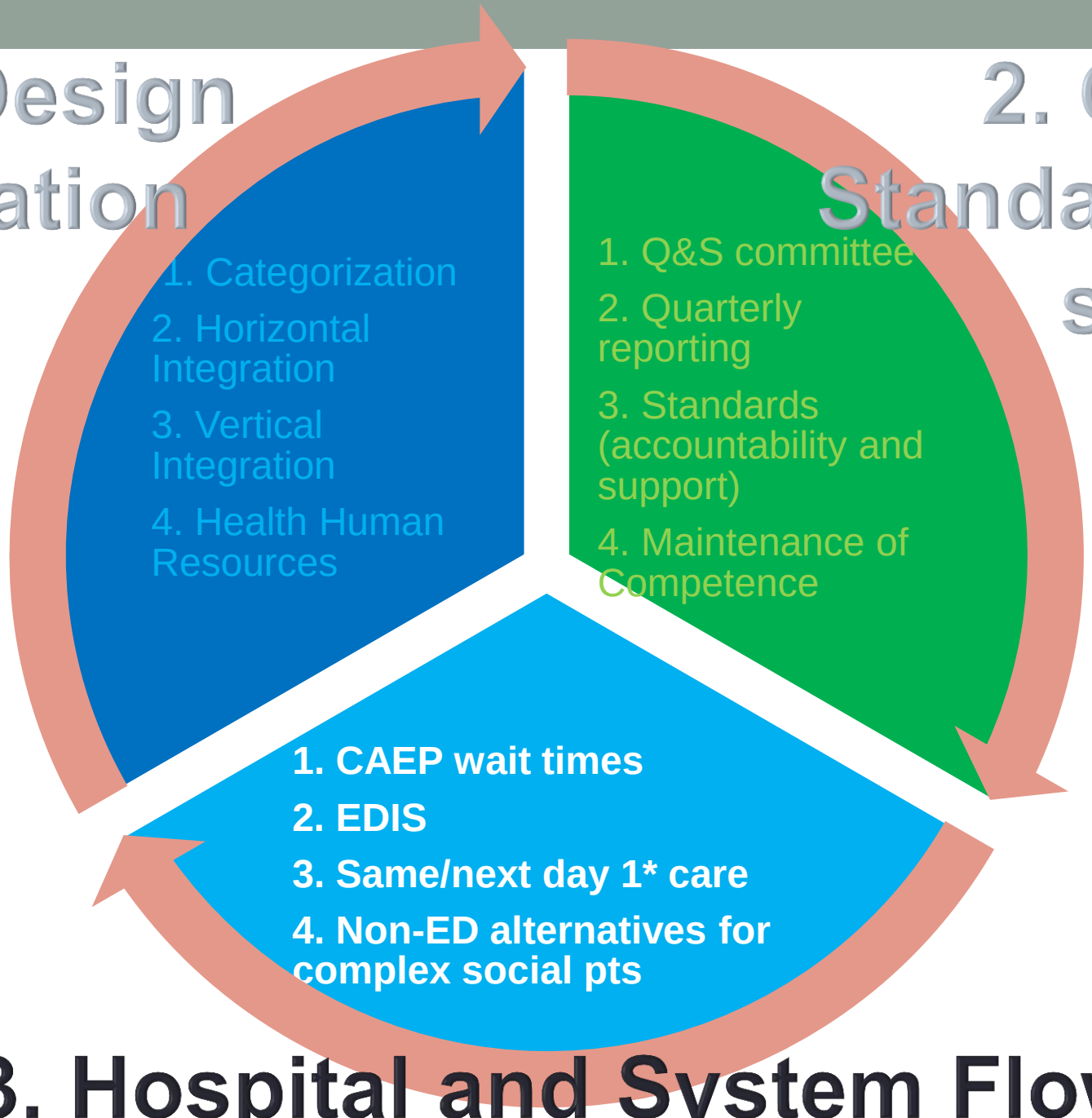
Goal #1	Goal #2	Goal #3	Goal #4
Provincial Emergency Quality and Standards Committee- Integrated with zonal operational structures to establish high quality standardized practices throughout the emergency care system	Quarterly reporting of key process indicators and outcomes (when available) for all sites and zones	Support the existing provincial ED standards and continue to evolve/modify/improved the standards	Establish a provincial strategy that supports maintenance of competence, and ongoing professional raining for front-line providers
Actions	**Actions**	**Actions**	**Actions**
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 2.1.2 Align operational work plan to the business planning cycle 2.1.3 Create an up to date electronic dashboard of clinical practice guidelines (i.e. TREKK), polices, and procedures 2.1.4 Procure necessary financial, technological implementation and on-going operations of an online repository/dashboard	2.2.1 Create a standard quarterly report templates based on national/international benchmarks 2.2.2 Support development of data definitions, minimum data sets, and timely access to necessary databases for periodic reporting 2.2.3 Feedback re site and zone performance on KPIs informs system change and improvements 2.2.4 Publically report performance	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) 2.3.2 Establish and enforce an accountability framework (including incentives and sanctions) for the EM standards 2.3.3 Publically report performance	2.4.1 Define key areas of Emergency competencies in alignment with national colleges and standards. 2.4.2 Describe standards for competence and establish a mix of training models 2.4.3 Explore opportunities for expanded scopes of practice with requisite training and regulation/oversight 2.4.4 Build upon growing simulation training expertise, and make available provincially

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



1. CAEP wait times

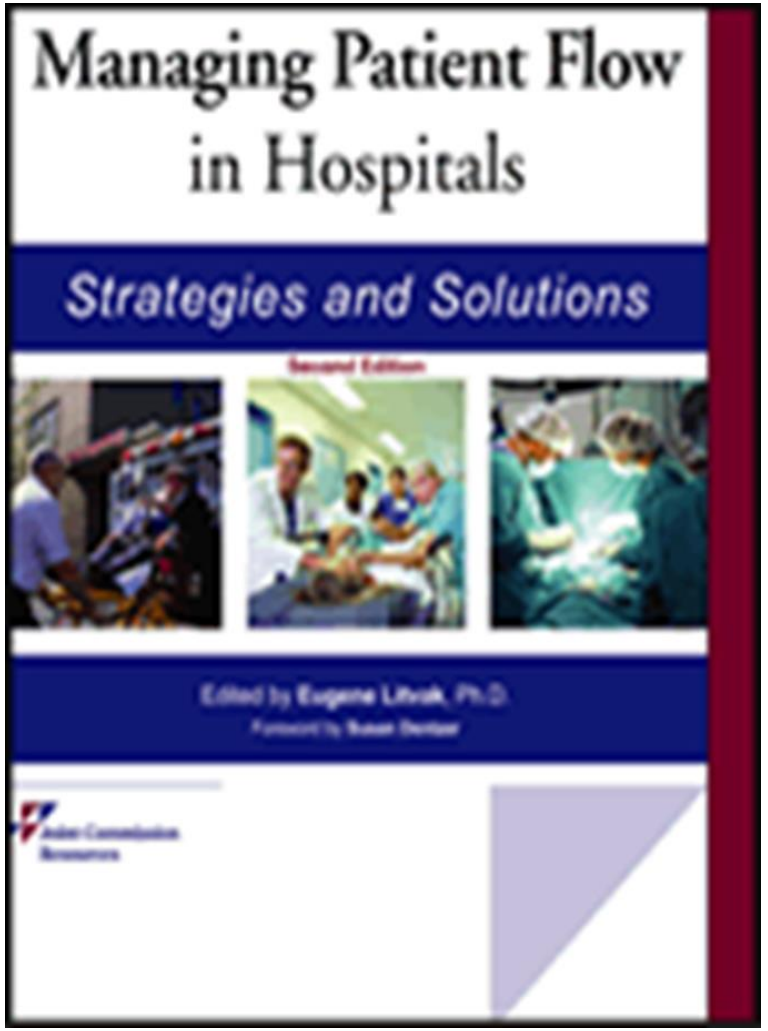
2. EDIS

3. Same/next day 1* care

4. Non-ED alternatives for complex social pts

3. Hospital and System Flow

3.1: Patient wait times



EMERGENCY CARE

By Elaine Rabin, Keith Kocher, Mark McClelland, Jesse Pines, Ula Hwang, Niels Rathlev, Brent Asplin, N. Seth Trueger, and Ellen Weber

Solutions To Emergency Department 'Boarding' And Crowding Are Underused And May Need To Be Legislated

DOI: 10.1377/hlthaff.2011.0786
HEALTH AFFAIRS 31,
NO. 8 (2012): 1757–1766

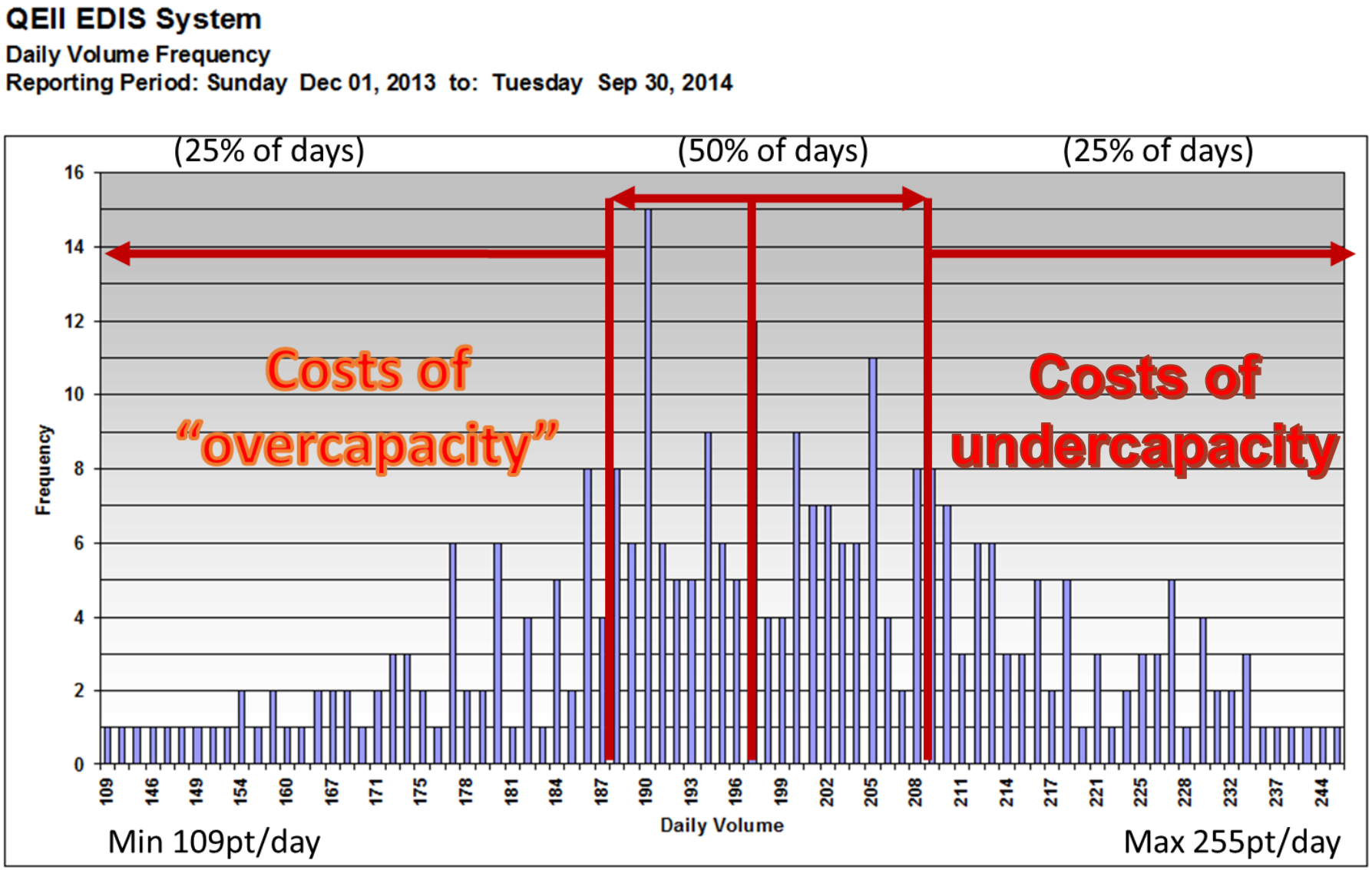
ABSTRACT The practice of keeping admitted patients on stretchers in hospital emergency department hallways for hours or days, called "boarding," causes emergency department crowding and can be harmful to patients. Boarding increases patients' morbidity, lengths of hospital stay, and mortality. Strategies 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.

Elaine Rabin (elaine.rabin@mssm.edu) is an assistant professor in the Department of Emergency Medicine at the Mount Sinai School of Medicine, in New York City.

Keith Kocher is an assistant professor in the Department of Emergency Medicine and a member of the Center for Healthcare Outcomes and Policy at the University of Michigan, in Ann Arbor.

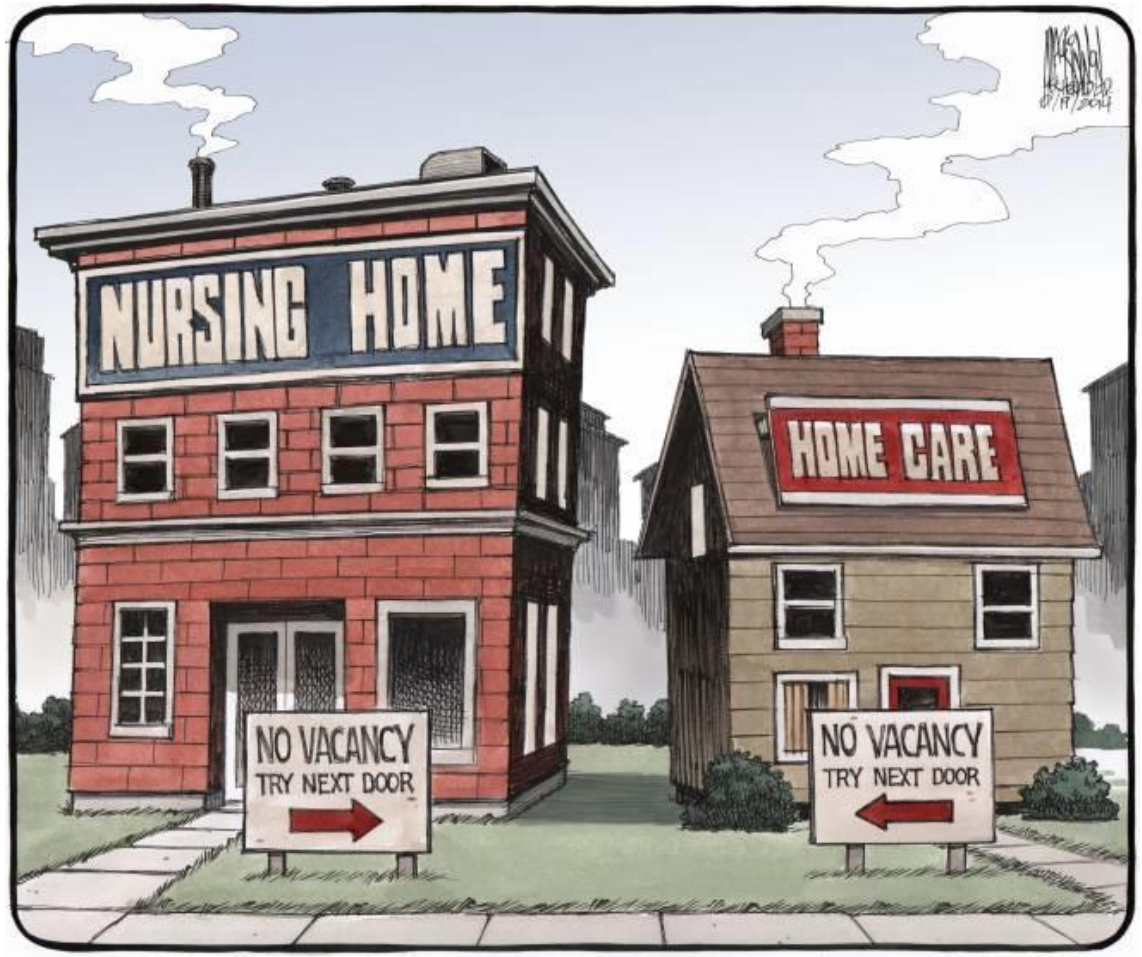
Mark McClelland is an assistant research professor in the Department of Health Policy and project manager for the Urgent Matters

3.2: ED Information Systems



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

Goal #1	Goal #2	Goal #3	Goal #4
Patient wait times are in the top third of performers of the nationally accepted CAEP benchmarks	An **emergency department information system** (EDIS) is available in all level 1 and 2 EDs to monitor patient flow and inform planning	Work with primary care and specialists to **improve same day/urgent access alternatives** for appropriate patients	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
Actions	**Actions**	**Actions**	**Actions**
3.1.1 Reduce boarding in the ED through hospital flow efficiencies (see appendix 3) 3.1.2 A System and Hospital patient flow committee is empowered, with accountability, to make significant system wide changes 3.1.3 Implement a provincial wide overcapacity policy and processes in all (level 1 &2) EDs 3.1.4 ED LOS standard is emphasized and enforced with incentive/sanctions by senior leaders (culture change)	3.2.1 Support the staged development and implementation of an information system 3.2.2 Align capability of the EDIS with functionality to improve patient care/flow and meet quality program and ED standards requirements 3.2.3 Give front-line providers a voice in the design and implantation of the EDIS and future e-pcr 3.2.4 Feedback ED efficiency metrics to influence change/improvement	3.3.1 Explore " advanced access scheduling" for primary care and specialist clinics 3.3.2 Explore electronic triage and specialist consult access for specialist to primary care 3.3.3 Explore increased evening and weekend primary care and specialist clinics 3.3.4 Explore increased evening and weekend access to diagnostic imaging and lab 3.3.5 Explore better access to surgical complication follow up, indwelling medical device follow-up, non-urgent transfusion services, or non-urgent medical procedures, etc.	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 3.4.2 Explore the cost-benefit of discharge liaison coordinators in the ED setting with specific attention to high user group 3.4.3 Provide non-ED alternative for adult protection cases awaiting full assessment and placement 3.4.4 Expand access through telemedicine technologies in long term care residences

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

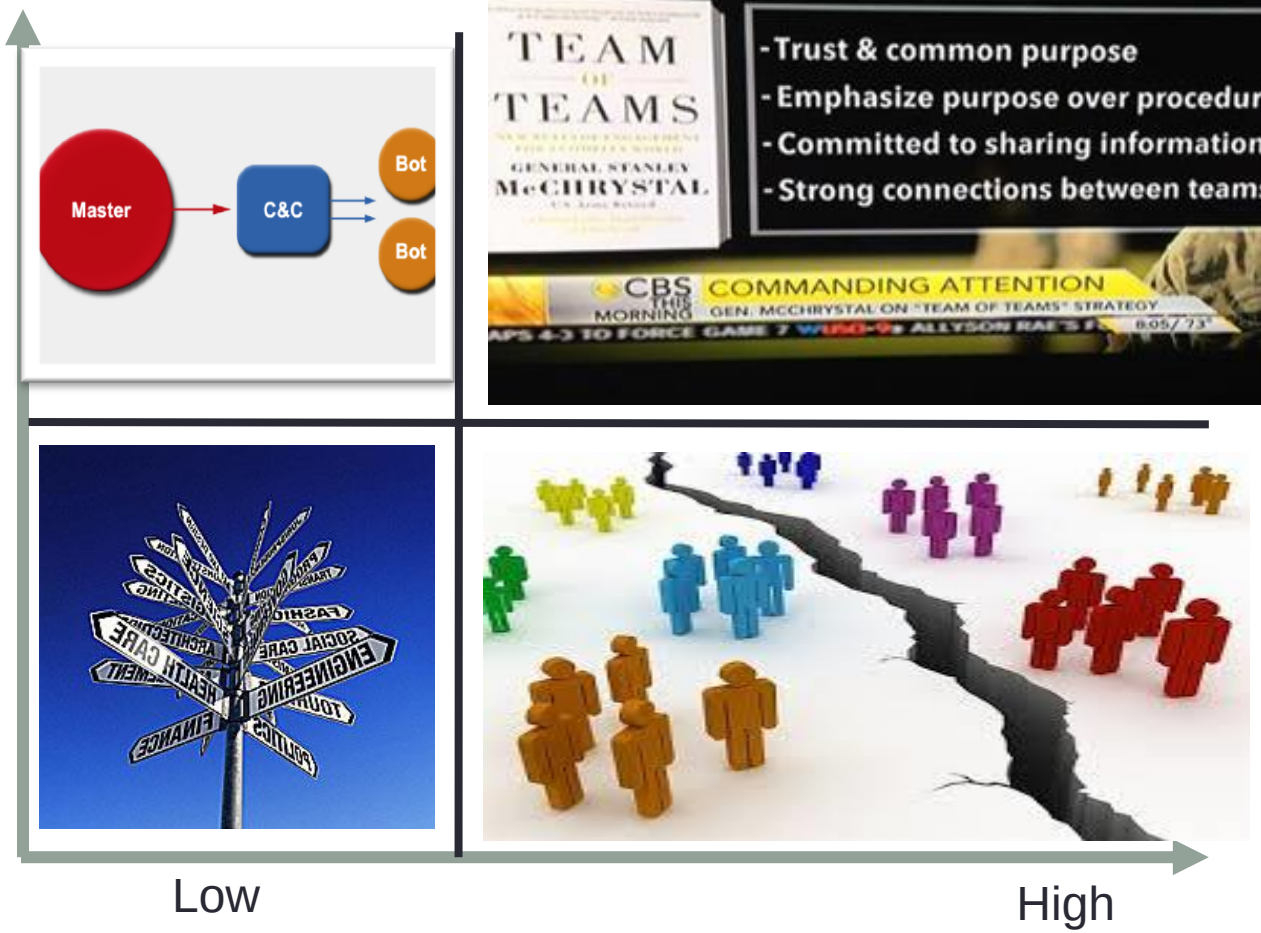
1. CAEP wait times
2. EDIS
3. Same/next day 1* care
4. Non-ED alternatives for complex social pts

3. Hospital and System Flow


Fiduciary
Strategic
Governance as Leadership
Generative
(Adaptive)

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

Evaluation / Quality improvement / Patient outcomes / Iterate

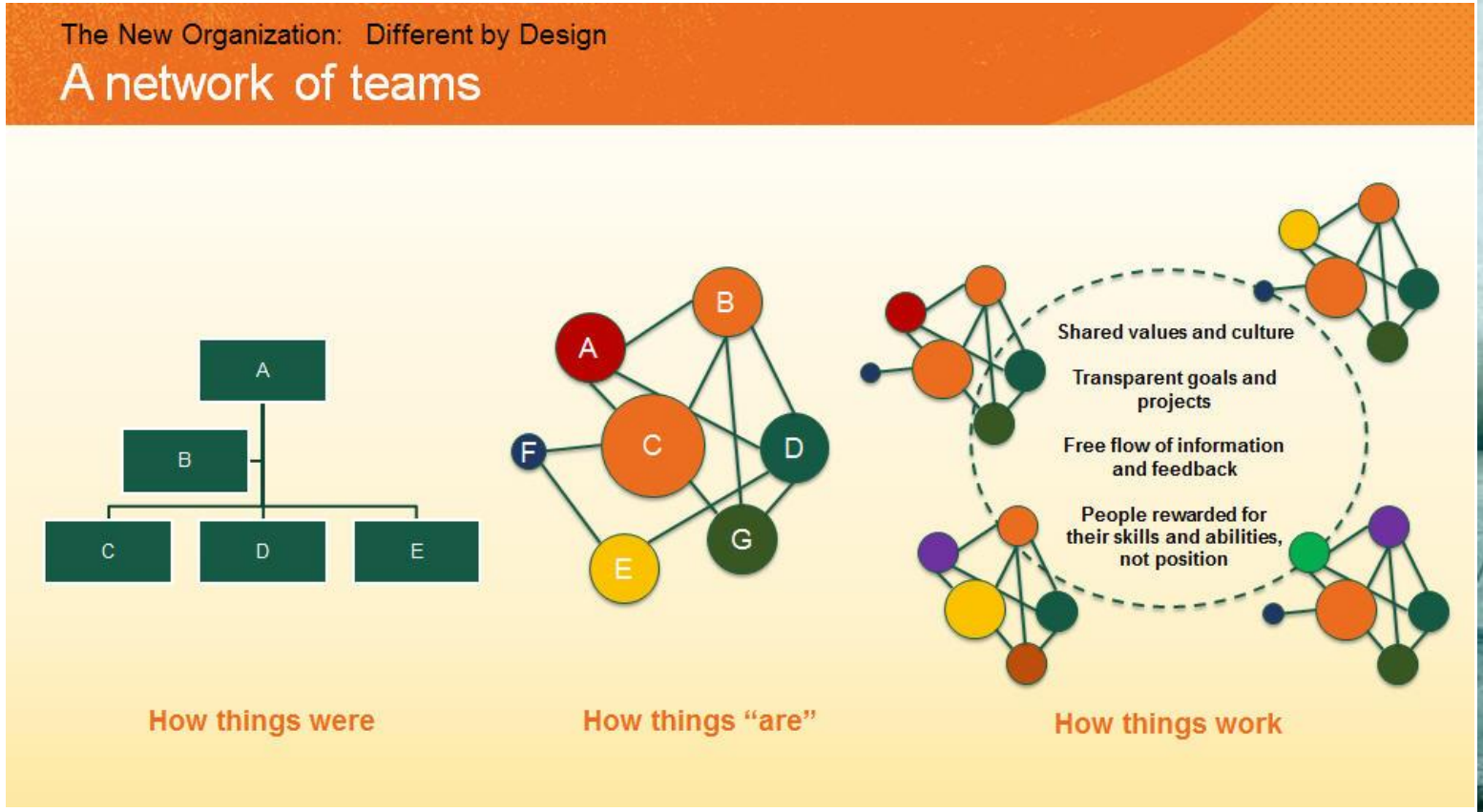
Integrate / Coordinate / Stakeholder coalition building / Social accountability

BOTTOM UP

Implementation / Adaptations / Front-line Ownership / Patient engagement

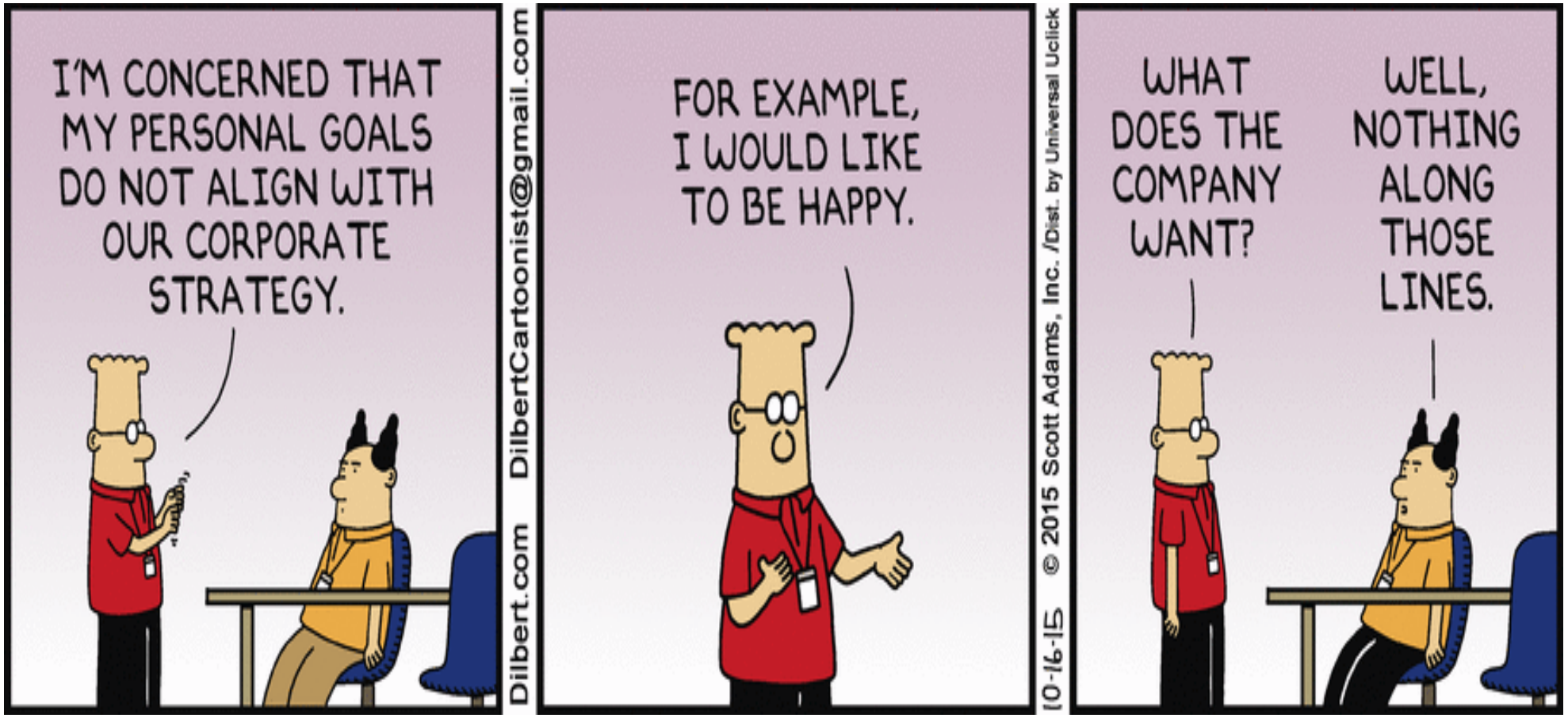
4.3: leadership roles and responsibilities are clear (and flexible)

- Team of teams



4.4: Provider autonomy and accountability are balanced

Trust and Engagement are two sides of the same coin



STRATEGIC DIRECTION #4

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

Goal #1	Goal #2	Goal #3	Goal #4
EM care must be **planned as a single Integrated Network, but will respect and enable local management**	Have a **Provincial Steering and Strategy Committee** overseeing the implementation, evaluation, and iterative improvements of the EPoC strategic plan	Have a detailed **leadership and accountability structure** to support the Emergency Program of Care	Physicians are **accountable** through performance based service agreements and NSHA/ISK/DHW is **accountable** to maintain standards and support the necessary infrastructure
Actions	**Actions**	**Actions**	**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	4.2.1 Establish terms of reference (and stand up committee) 4.2.2 Align with other committees and overall governance structure in NSHA 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	4.3.1 Clear roles and responsibilities shall be defined for Senior Co Leaders, Zone Co-Leaders and Site Chiefs 4.3.2 Site, zone, provincial job descriptions, relationships, and accountabilities are described 4.3.3 Establish a communication strategy between the leadership structure and all stakeholders	4.4.1 Support the development of appropriate letters of agreement and contractual rights and responsibilities of physicians to their zone chiefs 4.4.2 Create mechanisms for NSHA/IWK/DHW to understand and respond to ongoing operational pressures to improve patient outcomes

Easterosians

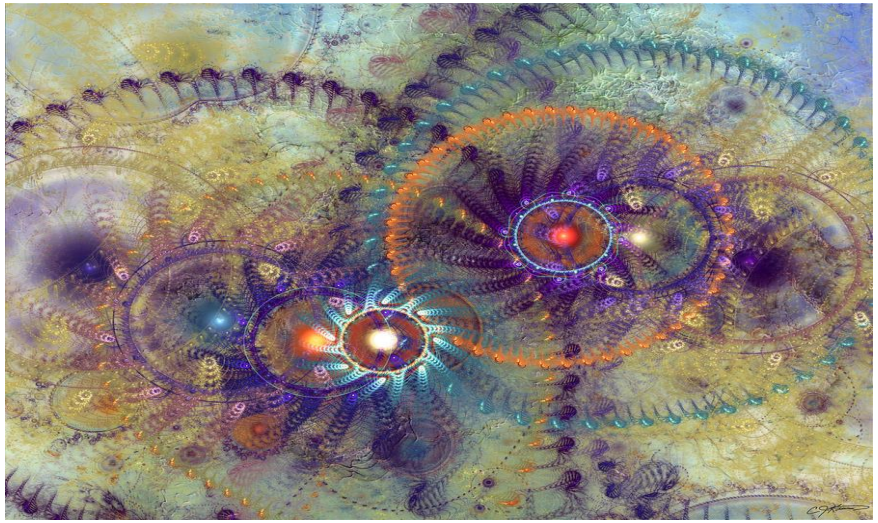

IT'S GOOD TO SEE THE SAFETY NET STILL FUNCTIONING.
STAHLER.

Keystone Species

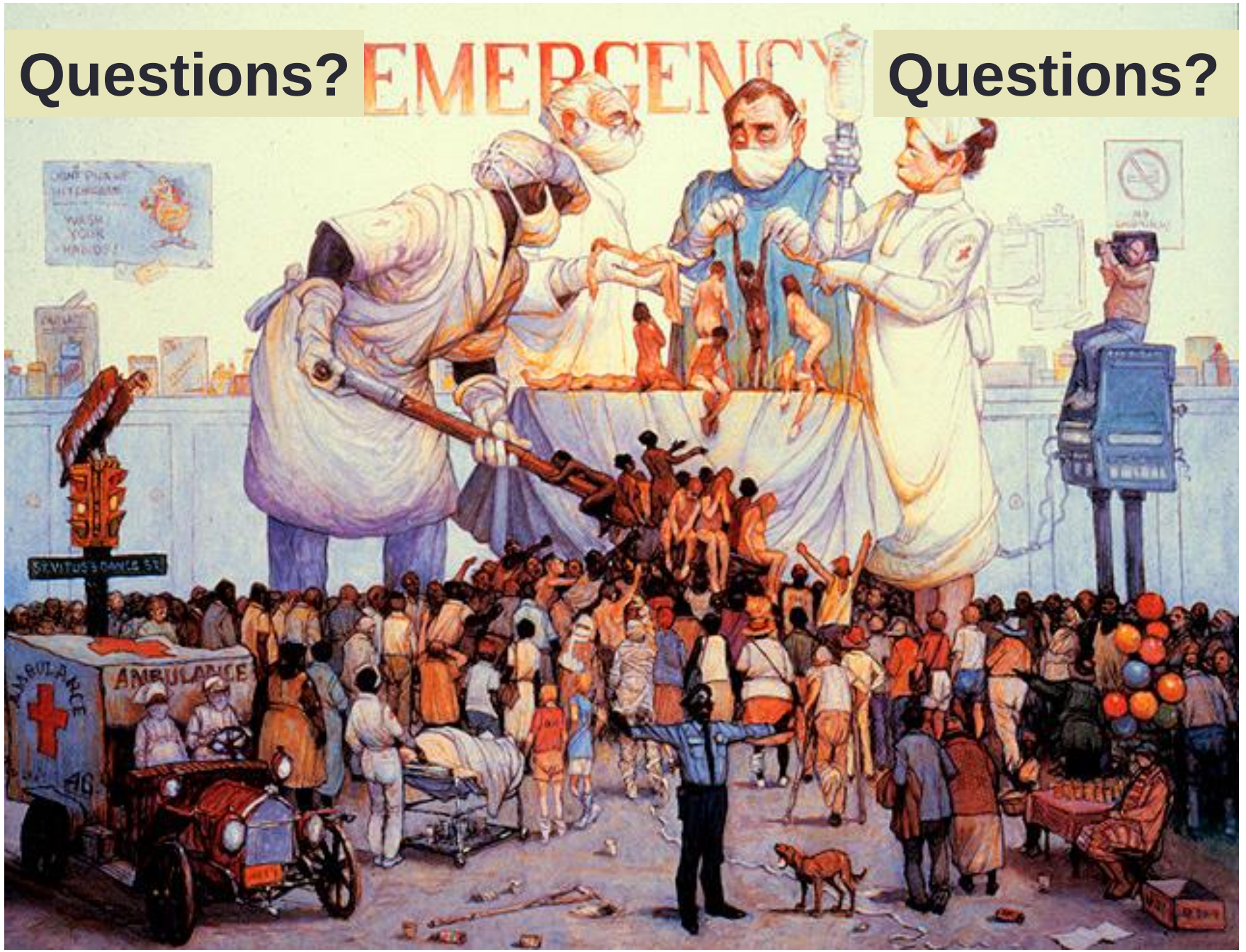
- A group of species whose impacts on a community are larger than they appear
- Not just top predators

- 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



Questions?



Questions?

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

Sizing and Siting Approach

Table 1
Proposed Categorization Scheme: Minimum Requirements for Each Category*

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

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

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

Community shaped, Primary Care governed

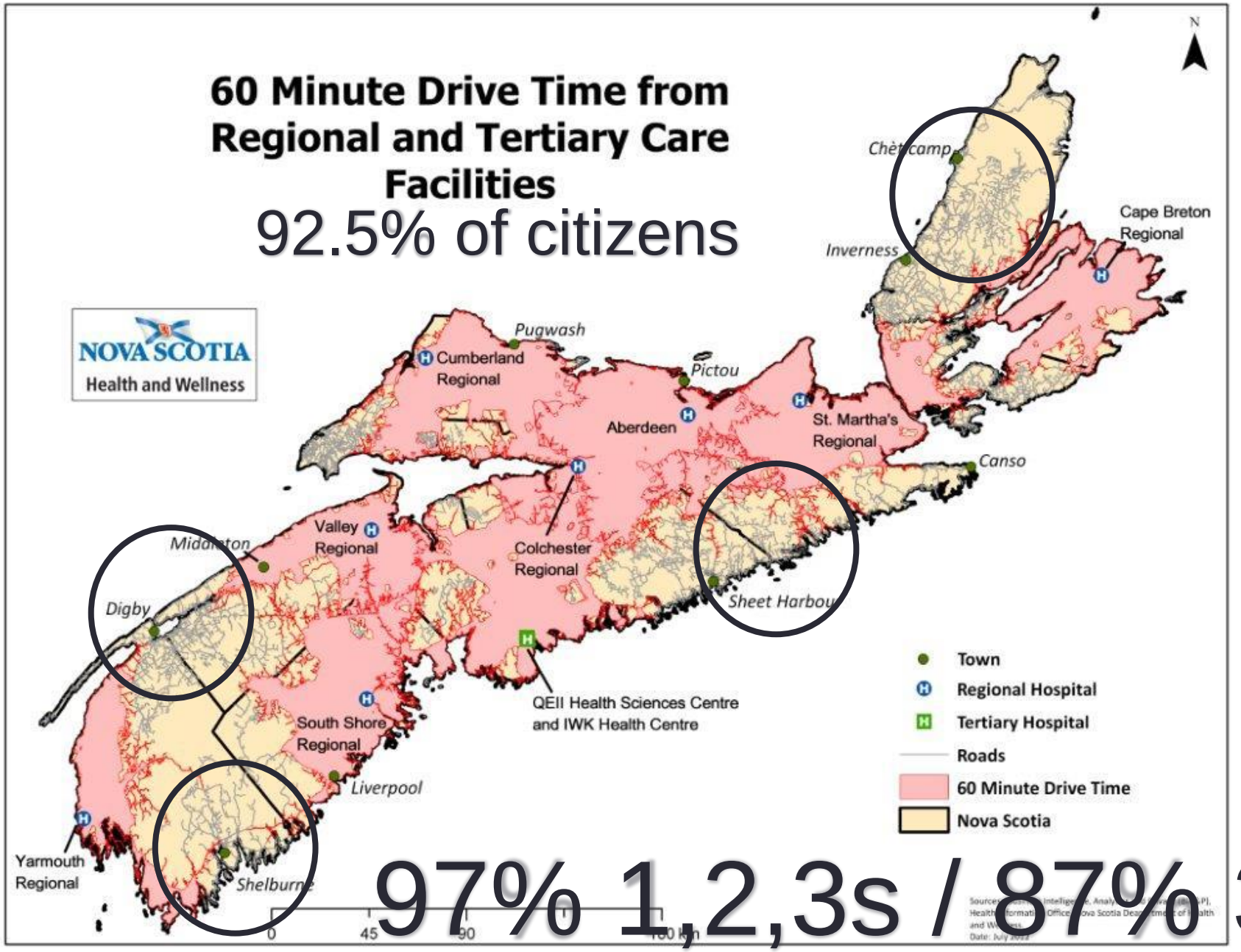
Hazard Analysis

Hazard Analysis of NS ED access:

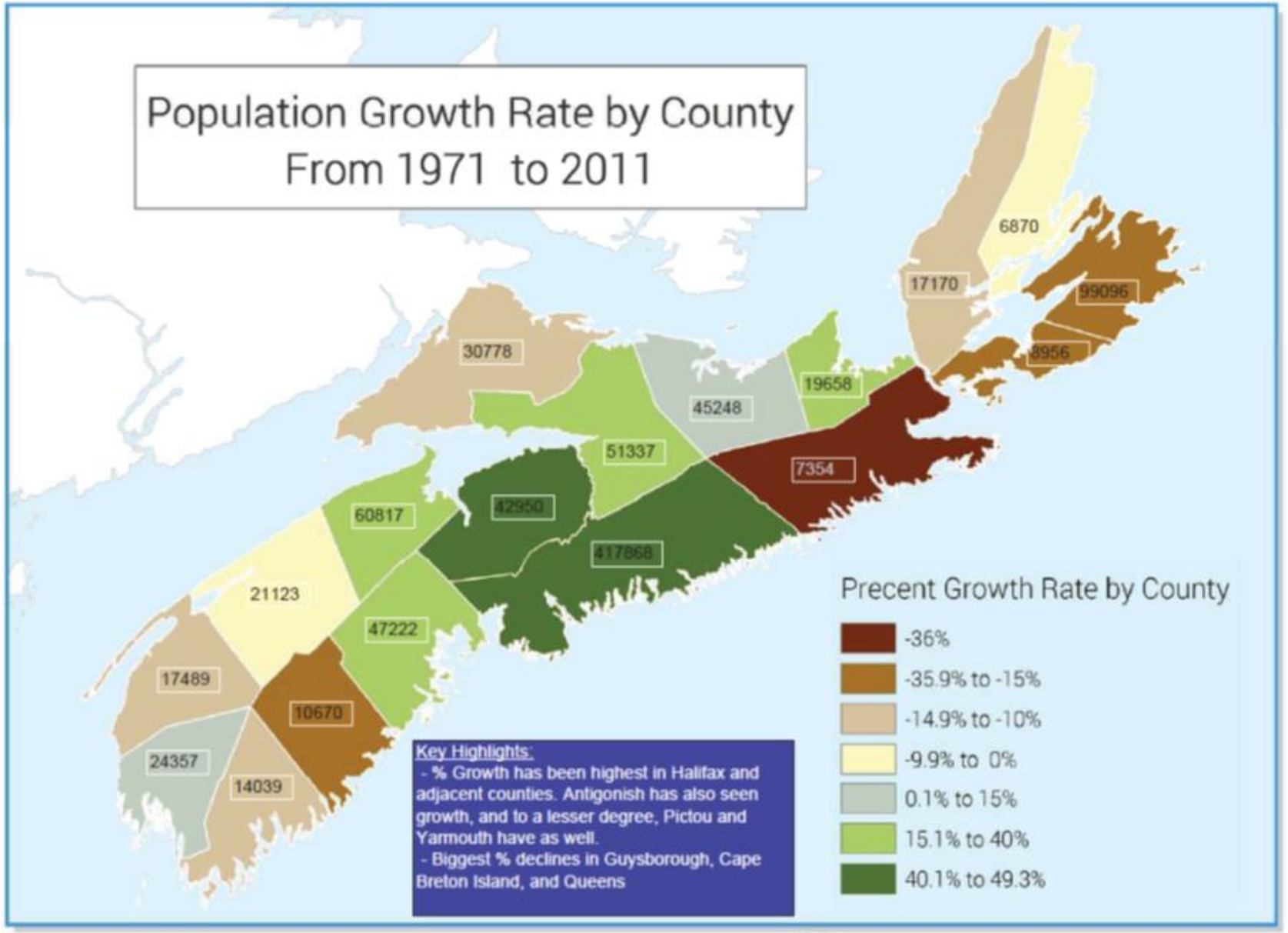
RISK = What is the likelihood of the event? What is the severity of the event?	CTAS 4,5	CTAS 3	CTAS 1,2
>30%		Level 3	
>10%	Level 5*	Level 4	
>5%			

	Site	CTAS 1-2	CTAS 3	CTAS 4-5	CTAS 1-2	CTAS 3	CTAS 4-5
Northern	Colchester East Hants HC	58.90%	99.70%	98.90%	75.30%	100.00%	97.50%
	Aberdeen	66.30%	98.90%	95.30%	68.70%	98.50%	94.20%
	Cumberland Regional	24.10%	91.50%	95.10%	30.20%	88.60%	96.70%
	All Saints Springhill	1.90%	14.20%	11.00%	2.50%	17.10%	8.00%
	North Cumberland Memorial	1.60%	9.30%	7.10%	0.90%	9.30%	14.50%
	Lillian Fraser Memorial	0.80%	12.60%	10.70%	1.10%	14.20%	12.40%
	South Cumberland	0.30%	8.50%	10.40%	0.70%	5.80%	10.20%
Eastern	Cape Breton Regional	99.50%	100.00%	99.50%	98.90%	100.00%	99.60%
	St. Martha's Regional	45.20%	93.70%	85.70%	52.70%	94.90%	82.50%
	Glace Bay Health Care	36.40%	67.50%	78.40%	52.70%	88.40%	93.10%
	Northside General	3.30%	1.90%	12.60%			
	Strait - Richmond Hospital	21.40%	62.30%	52.10%	11.10%	53.10%	50.20%
	New Waterford Consolidated	1.50%	2.70%	2.50%		0.40%	3.30%
	Inverness Consolidated Memorial	9.60%	30.70%	37.50%	8.70%	36.70%	42.20%
	Victoria County Memorial	4.90%	16.40%	31.30%	2.90%	22.20%	38.20%
	Sacred Heart	0.80%	23.80%	30.70%	0.40%	32.50%	25.50%
	Guysborough Memorial	4.10%	19.10%	23.80%	5.80%	9.10%	18.20%
	Buchanan Memorial	1.90%	11.00%	8.80%	1.60%	13.50%	8.40%
	Eastern Memorial	1.60%	6.80%	7.40%	1.40%	14.50%	9.50%
	St. Mary's Memorial	1.10%	4.70%	6.60%	1.10%	5.50%	6.90%
Western	Valley Regional	77.00%	98.60%	97.50%	77.80%	95.60%	98.90%
	Yarmouth Regional	33.40%	97.80%	96.70%	46.50%	98.20%	97.10%
	South Shore Regional	68.50%	98.40%	93.20%	67.60%	94.90%	94.50%
	Soldiers' Memorial	61.90%	85.20%	81.40%	61.30%	86.20%	84.40%
	Queens General	2.90%	84.70%	66.30%	1.60%	67.60%	68.70%
	Roseway	5.20%	56.70%	51.20%	8.70%	54.50%	47.60%
	Fishermen's Memorial		0.30%	1.60%			2.20%
	Digby General	14.00%	67.10%	59.20%	16.00%	62.50%	74.50%
	Annapolis Community	9.30%	14.50%	7.40%	10.90%	12.00%	8.40%
Central	HALIFAX INFIRMARY	100.00%	100.00%	99.70%	100.00%	100.00%	100.00%
	DARTMOUTH GENERAL HOSPITAL	98.90%	99.70%	96.20%	99.30%	100.00%	97.10%
	COBEQUID COMMUNITY HEALTH CENTRE	15.60%	40.50%	49.90%	16.40%	42.20%	48.40%
	HANTS COMMUNITY HOSPITAL	52.10%	86.00%	74.80%	46.90%	83.30%	77.50%
	ESMH	0.80%	14.20%	13.20%	1.50%	10.50%	12.40%
	MVMH		0.50%				
	TOMH	5.20%	7.10%	6.30%	5.50%	9.50%	13.80%

Day time, Night time changes
Distance Over-rides
EMS system status plan
PRP/ MA support



97% 1,2,3s / 87% 30 min



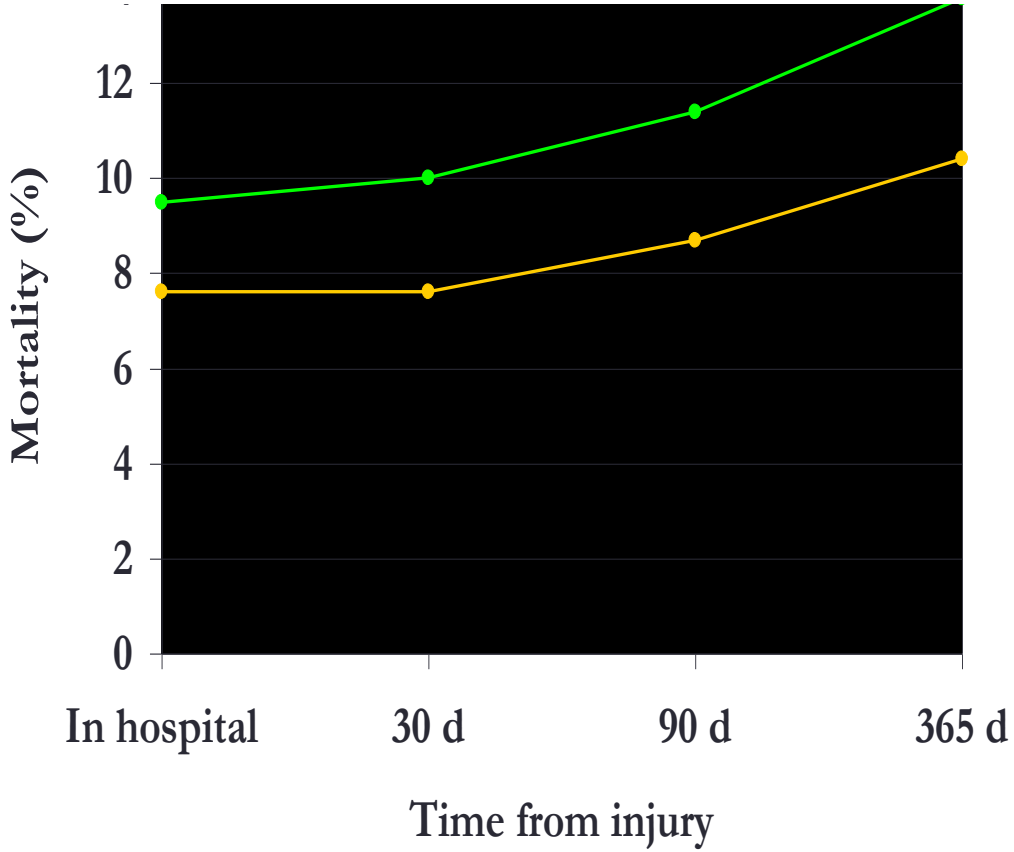
Source: Investment & Decision Support, Department of Health and wellness
Population – Statistics Canada, 2011 Census
April 2016

The NEW ENGLAND JOURNAL of MEDICINE

EJ MacKenzie et al, 2006

SPECIAL ARTICLE

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

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).

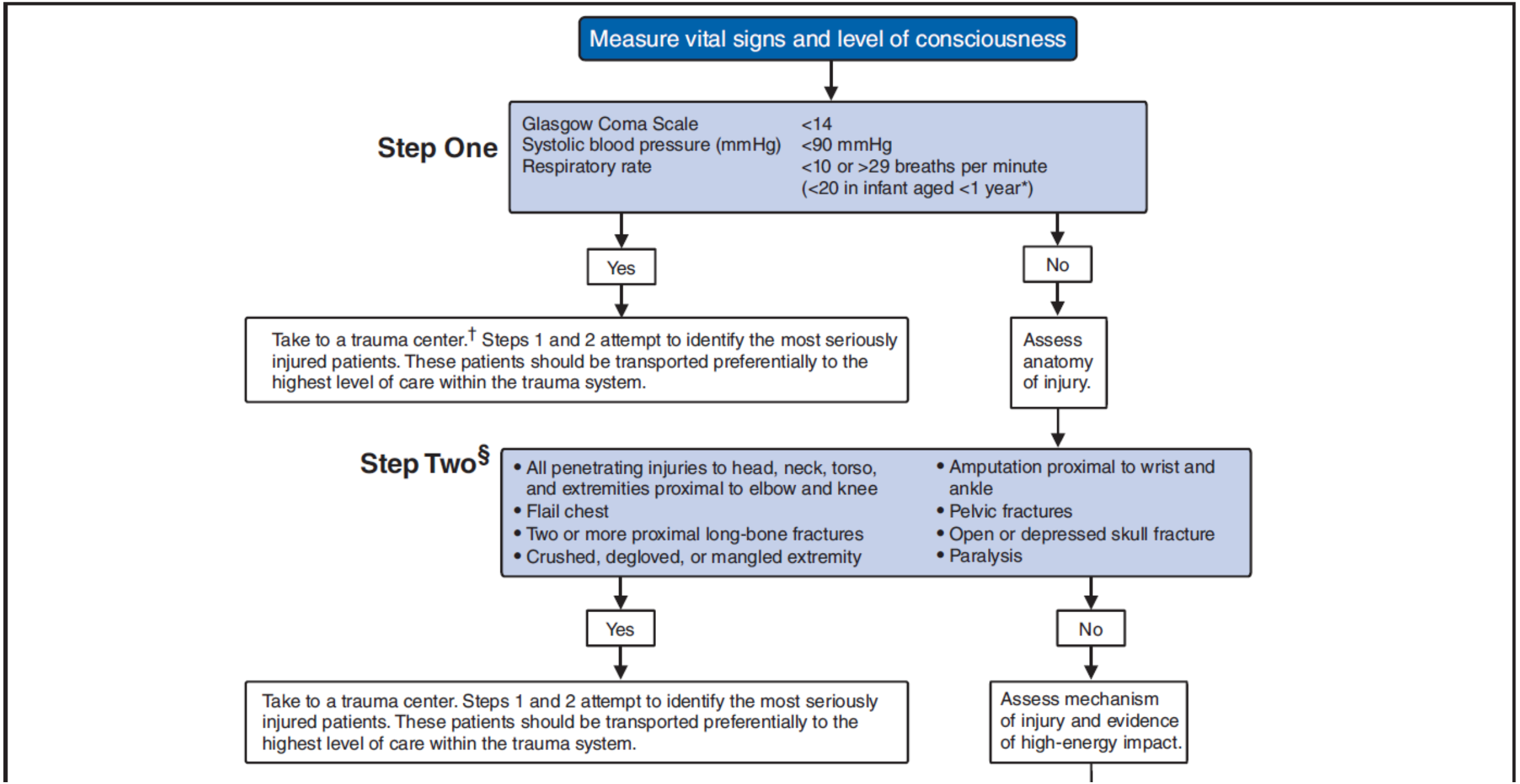
Prov

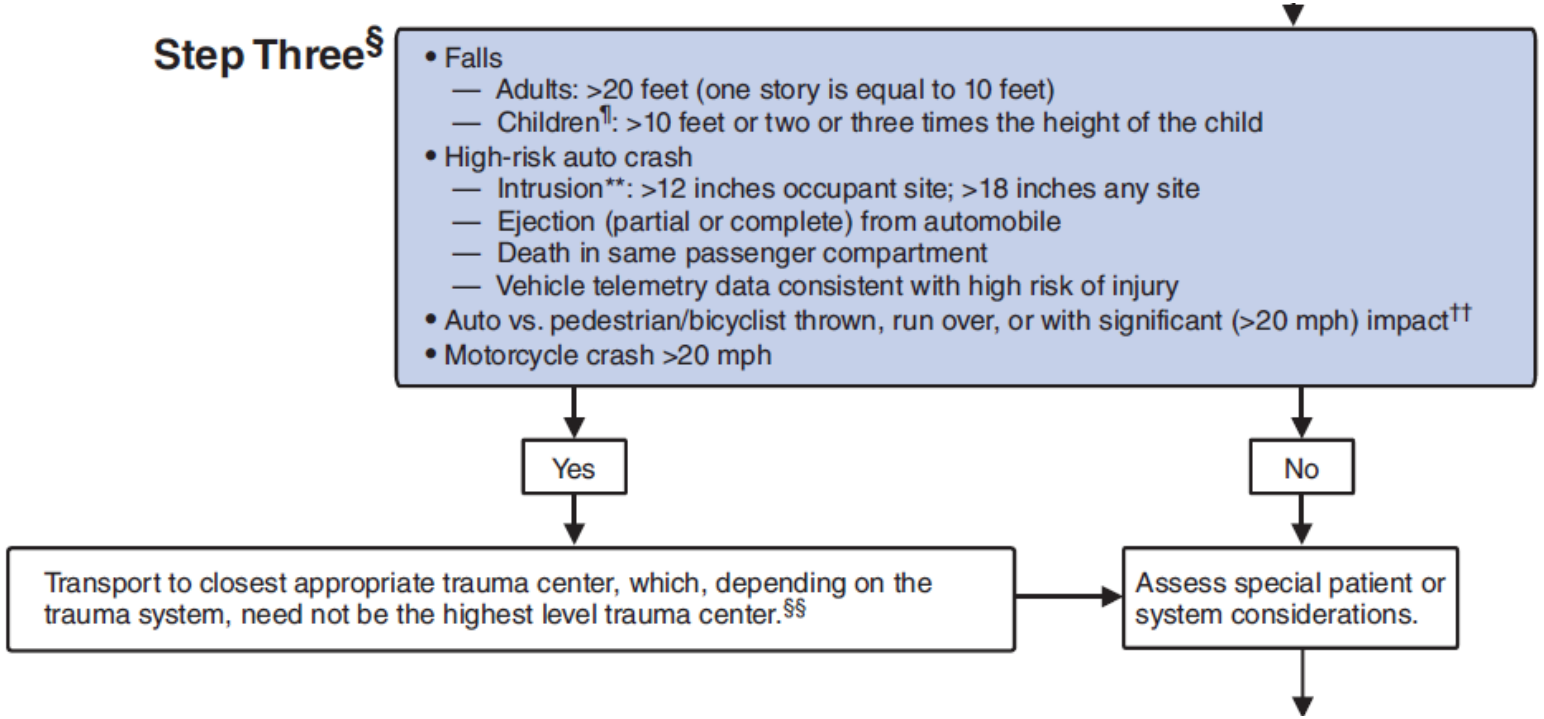
Trauma system Integration

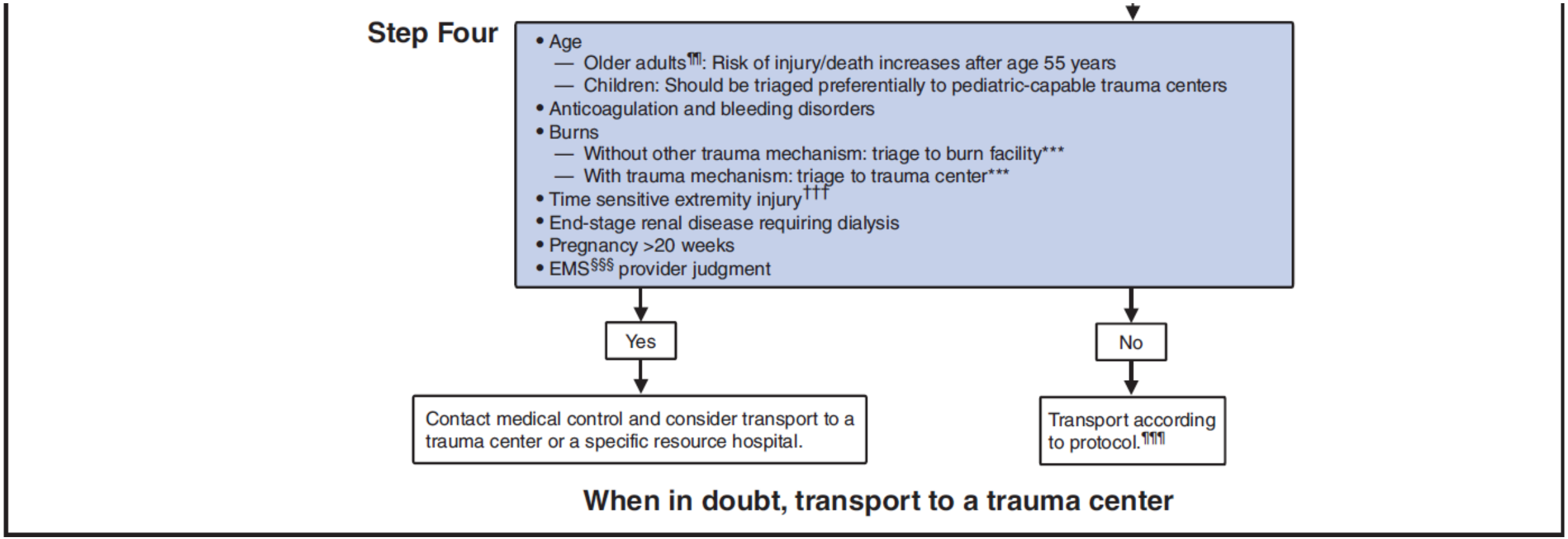
EMS/Trauma System Integration

"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
No
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.
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
No
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.
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
No
Transport to closest appropriate trauma center, which, depending on the trauma system, need not be the highest level trauma center.§§
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
Yes
No
Contact medical control and consider transport to a trauma center or a specific resource hospital.
Transport according to protocol.¶¶¶
When in doubt, transport to a trauma center

London Ambulance Service NHS
NHS Trust

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 29bpm

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 (>55years)
- **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 The 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 The Clinical Hub on PD09.

Should the airway become compromised and cannot be managed consider conveying /diverting to the nearest Trauma Unit

Handover and pre-alert call

- **C** CAD
- **A** Age of patient
- **T** Time of injury
- **M** Mechanism of injury
- **I** Injuries found and suspected
- **S** Signs (vital)
- **T** Treatment given or required

Only patients triggering the trauma tool should be taken to a Major Trauma Centre, unless the patient is within the normal catchment of that emergency department. In this case you note LT in the trauma tool trigger box on the PRF.

Is your patient at risk of significant bleeding?
Signs of Shock (diaphoretic)?
Consider Tranexamic Acid.
Do not delay on scene.

Sponsored by an educational grant from Prometheus Medical, supplier of trauma equipment to the London Ambulance Service NHS Trust.

Foster *et al. BMC Medical Research Methodology* 2010, **10**:60
http://www.biomedcentral.com/1471-2288/10/60

BMC
Medical Research Methodology

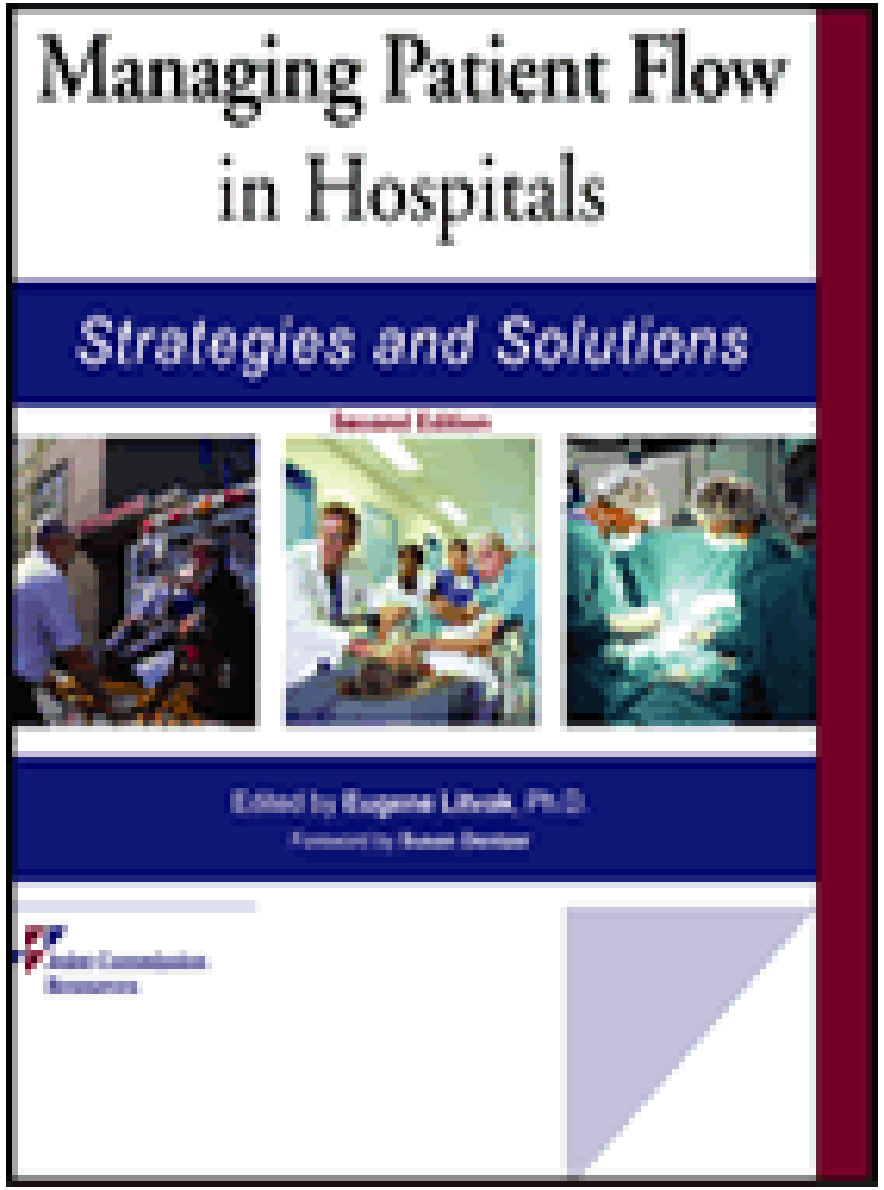
CORRESPONDENCE Open Access

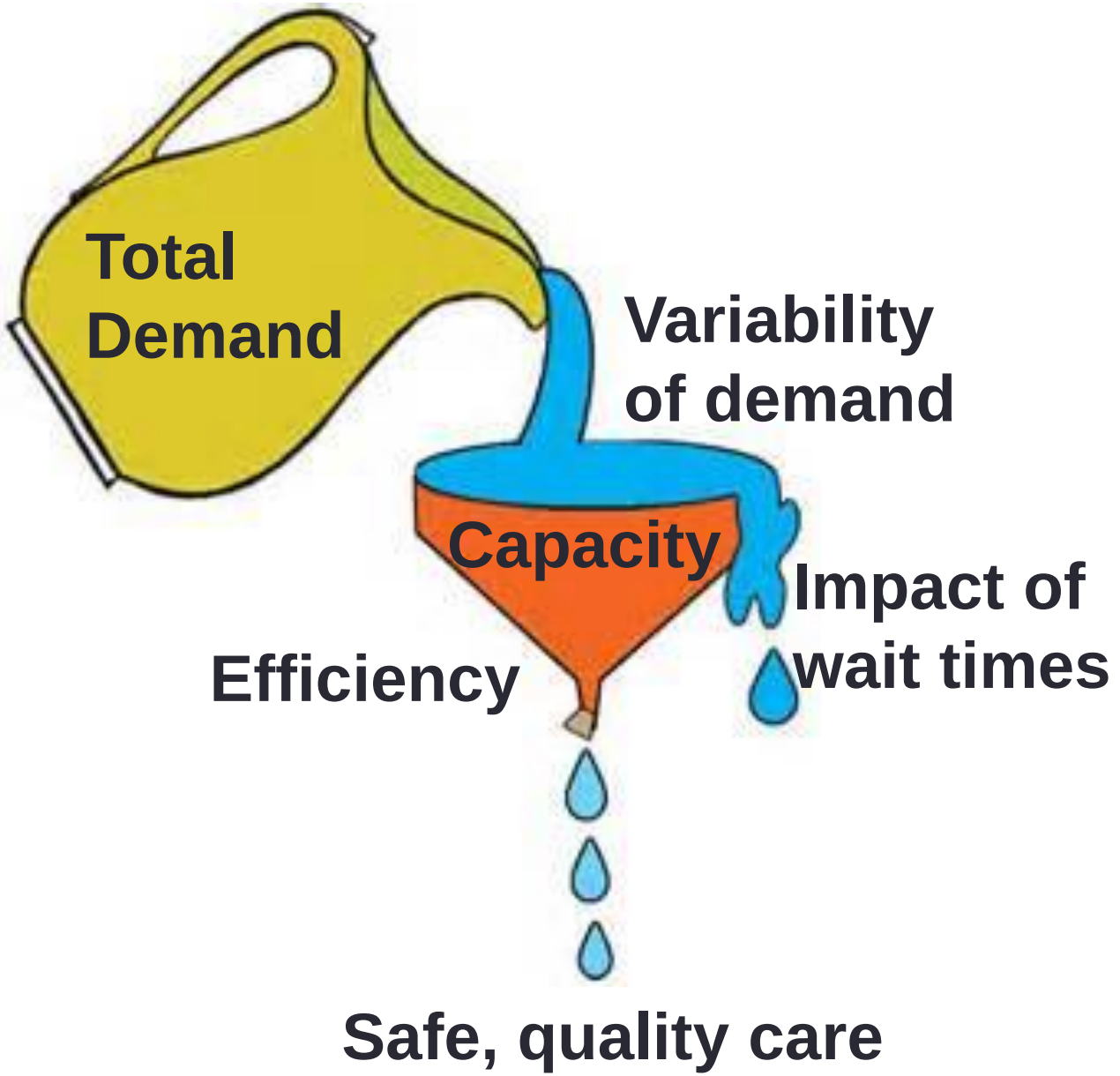
A Spoonful of Math Helps the Medicine Go Down: An Illustration of How Healthcare can Benefit from Mathematical Modeling and Analysis

E Michael Foster*[1], Michael R Hosking[2] and Serhan Ziya[2]

Abstract

Objectives: A recent joint report from the Institute of Medicine and the National Academy of Engineering, highlights the benefits of--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.


Managing Patient Flow
in Hospitals
Strategies and Solutions


Total
Demand
Variability
of demand
Capacity
Efficiency
Impact of
wait times
Safe, quality care

Sorry—we're full! Access block and accountability failure in the health care system

Grant Innes, MD

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

Sorry—we're full! Access block and accountability failure in the health care system

Grant Innes, MD

The Accountability Crisis:

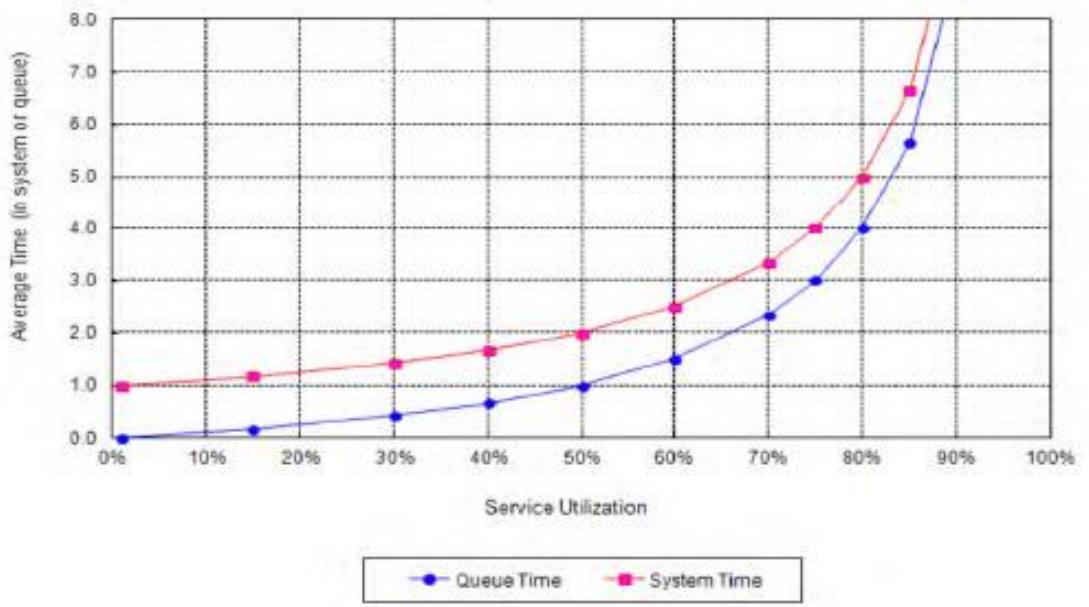
In the face of demand capacity mismatch a program / queue can:

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

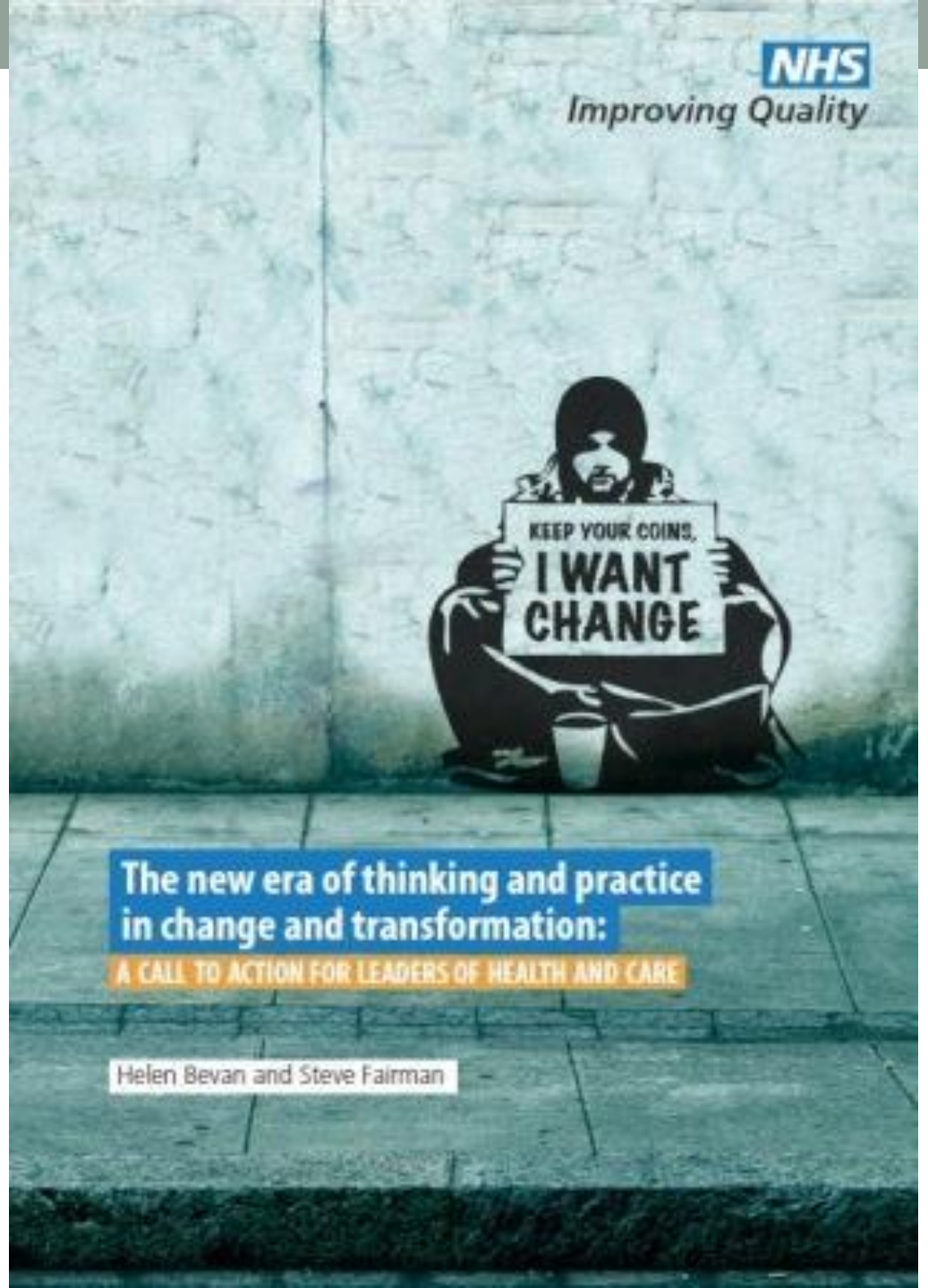
Figure 3. Relationship between waiting time and utilization of a resource or service



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

http://emergencymedicinecases.com/emergency-physician-speed-and-productivity-solutions/

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**

http://www.nhsiq.nhs.uk/resource-search/publications/white-paper.aspx

PERSPECTIVE

nature International weekly journal of science

doi:10.1038/nature12047

Globally networked risks and how to respond

Dirk Helbing[1,2]

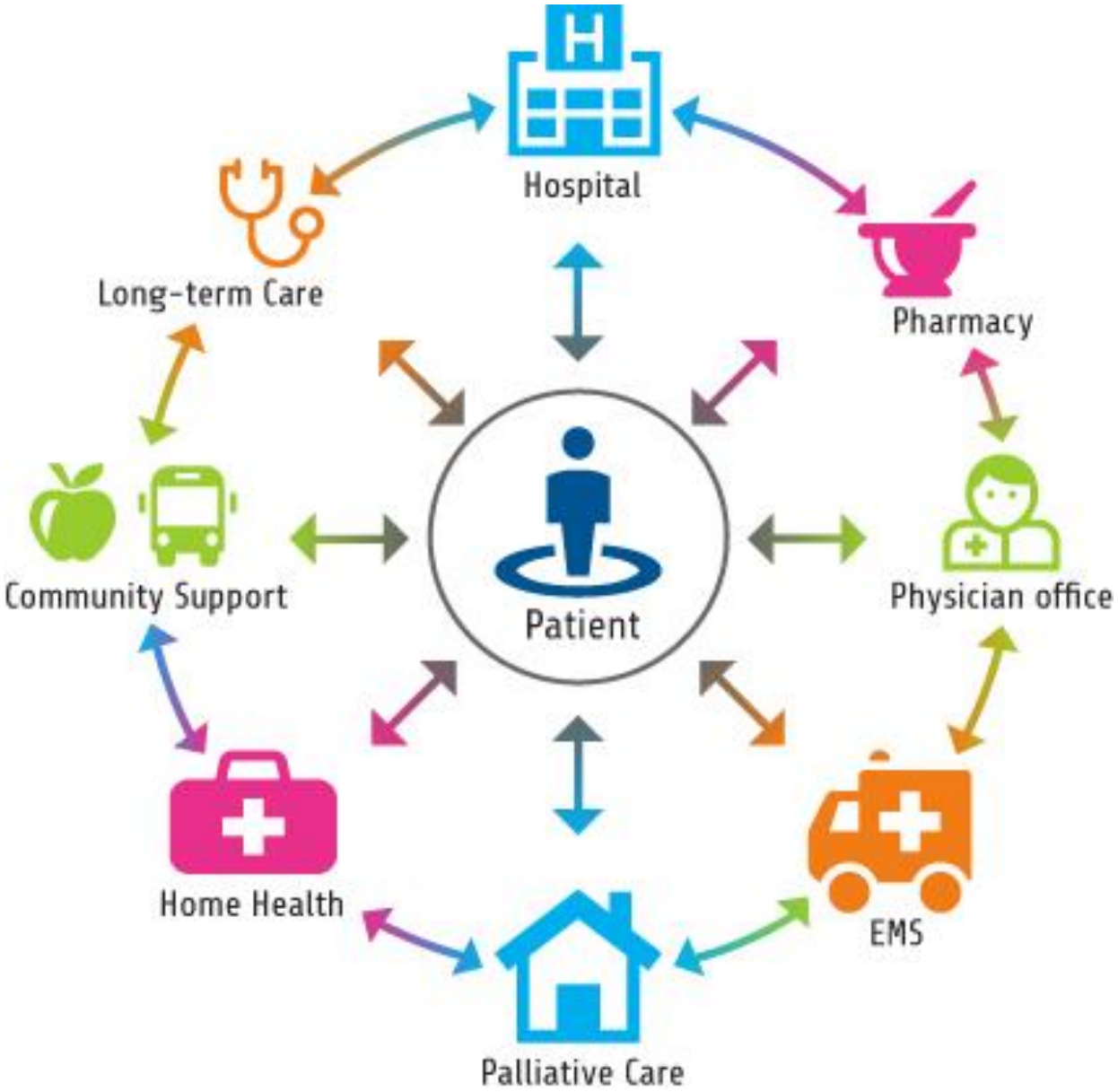
Today's strongly connected, global networks have produced highly interdependent systems that we do not understand and cannot control well. These systems are vulnerable to failure at all scales, posing serious threats to society, even when external shocks are absent. As the complexity and interaction strengths in our networked world increase, man-made systems can become unstable, creating uncontrollable situations even when decision-makers are well-skilled, have all data and technology at their disposal, and do their best. To make these systems manageable, a fundamental redesign is needed. A 'Global Systems Science' might create the required knowledge and paradigm shift in thinking.

"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

	Traditional System	Complex Adaptive System
Roles	Management (top down)	Situational leadership (context dependent)
Methods	Command and Control	Evaluate and Iterate
Measurement	Activities	Outcomes
Focus	Efficiency	Agility
Relationships	Contractual Linear	Personal Commitments Non-linear
Network	Hierarchy	Heterarchy
Design	Organizational design Rigid planning	Self organization Trial and error and improve

System as machine vs ecoSystem



Health Care as a Complex Adaptive System

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 **thresh hold 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.

Key facts for Canada from OECD Health Statistics 2014

	Canada			OECD average		Rank among OECD countries*
	2012	2000		2012	2000	
Health care resources						
Number of doctors (per 1000 population)[1]	2.5	2.1		3.2	2.7	27 out of 34
Number of nurses (per 1000 population)	9.4	8.5	(2003)	8.8	7.5	16 out of 34
Hospital beds (per 1000 population)	2.7	..	(2011)	4.8	5.6	30 out of 34

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**.