Getting to Improvement: Key Strategic Concepts

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Our Goals and Objectives

• Review key strategies for improving ED patient flow and service operations
• Outline useful mental models for flow and operations-setting the stage for the tactics to follow
• List crucial strategic and tactical concepts to improve ED patient flow
Creating an Entire System That Works
A Framework for Improvement, Sequencing and Tempo

12- to 24-Month Initiative (Series of Projects)

- Matching Capacity to Demand
- Key elements for a front-end project
- What can the ED do?
- Optimizing Patient Intake
- Patient Segmentation
- Admissions
- Optimization of Patient Flow (i.e. Lean Thinking)
- Throughput Bottlenecks (e.g. ancillary, clinical)
- Patient Satisfaction (add physical space, managing expectations)

The Lifecycle of a Patient Visit:
Patient Flow and Patient Throughput
Pushing and Pulling our Patients Through...

1. Door To Triage
   - Door To Triage
   - Door To Doctor
   - Door To Bed

2. Decision to Admit/discharge

3. Discharge to home/admit

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The Science of ED Service Operations

Key Strategic Concepts - Going Deep...

- **Systems thinking and appreciation**: A system is a network of components which work together to try to achieve common aims.
- **A theory of knowledge**: You need a theory of knowledge about your system—an understanding of your ED, your hospital, and your processes.
- Get clear about the **key drivers of system performance**:
  - Demand-capacity management
  - Queuing
  - Variation
- Define the **high-leverage interventions**:
  - Theory of Constraints
- **Deploy a method or system for improvement**: Lean, Six Sigma, TQM...
- **Where waiting exists**: Applying *The Psychology of Waiting Lines*

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Appreciation of a System

Deming’s System of Profound Knowledge

1. **Appreciation of a system**
2. **Knowledge of variation**
3. **Theory of knowledge**
4. **Knowledge of psychology**

Appreciation of a System

- A system is a network of interdependent components that work together to try and accomplish the aim of the system
- A system must have an aim.
  - Without an aim, there is no system.
  - The aim of the system must be clear to everyone in the system.
- You can’t optimize a system by optimizing each part of a system - The components of a system are interdependent - optimizing one part will usually not optimize the system
- Some people have to take a loss
- The larger the boundaries of a system the more difficult it is to optimize but the greater the potential benefits.
  - Constraints or bottlenecks limit the overall performance of a system
  - Every system is perfectly designed to deliver the results it produces

Quality is everyone’s responsibility.  
W. Edwards Deming

It takes leaders and leadership to really optimize the system...

Demand-Capacity Management...

What should capacity look like to guarantee quality care?
Demand vs. Capacity – A Dynamic Tension...

What should capacity look like to guarantee quality care?

Eugene Litvak, PhD, Boston University

Classic ED Patient Flow Curves
Demand/Capacity Management
Efficiency and Effectiveness

- Demand/Capacity analysis can be used to identify the best utilization of resources
  - Ensure appropriate coverage during the heaviest hours of the day
  - Allocate coverage appropriately between heavy and light days
- This is particularly useful in a resource-constrained system

Real-Time Monitoring of Patient Flow
You do it…

Would you drive your car at high speeds in the dark without one?...

McDonald's Does It…

Hyper-Active Bob
- Roof-top cameras that monitor traffic
- Recognition software
- Volume forecasting
- Reduced waiting times
- Waste has been cut in half

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Real-time Monitoring of Patient Flow

Middlesex Hospital
28 Crescent Street, Middletown, CT 06457
Phone: (860) 356-6000
Directions

Shoreline Medical Center
266 Westbrook Road, Essex, CT 06426
Phone: (860) 356-3700
Directions

Marlborough Medical Center
12 Jones Hollow Road, Marlborough, CT 06447
Phone: (860) 356-1200
Directions

Find nearest ER location
Enter your street address:
State
ZIP code
Search map

Forecasting

Eastern Exposure | Irene's path may mean a rare direct hit for New England

Wednesday's forecast
And how the predicted path has changed:

Great Atlantic
Hurricane (1938)
Category 5
at landfall
40 deaths in U.S.

Carol (1954)
Category 3
40 deaths

New England Hurricanes (1938)
Category 3
18 deaths

Impacts by state:

North Carolina 30
New York 12
Massachusetts 15
Virginia 10
Rhode Island 9
Maine 6
Delaware 2
Massachusetts 18
New Hampshire 2
New York 2
Pennsylvania 1

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Forecasting
How many Friday nights does it take...
How many Monday mornings does it take...
How many flu seasons does it take...

Patient Flow is Predictable...
Key Questions

- How many patients are coming?
- When are they coming?
- What are they going to need?
- Is our service capacity going to match patient demand?
- And what are we going to do about it if it doesn’t?

Forecasting ED Patient Flow
Patient Flow (Demand) is Predictable and Capacity (Staff, Space, Supplies, and Service...) is Manageable...*

*i.e. ...is a management responsibility*

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Queuing and Queuing Systems

Queuing Theory - A Definition:
The art and science of matching fixed resources to unscheduled demand
Queuing Theory

Arrivals

Queue

Service Rate ($\mu$)

Departures

Arrival rate ($\lambda$)

Your ED is a Queuing System

Waiting Time vs. Utilization

Small changes in utilization can lead to big changes in service and throughput

<table>
<thead>
<tr>
<th>Utilization (Arrivals per Hour divided by Capacity per Hour)</th>
<th>Waiting Time (Patient Waiting Time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70%</td>
<td>50</td>
</tr>
<tr>
<td>80%</td>
<td>100</td>
</tr>
<tr>
<td>90%</td>
<td>150</td>
</tr>
<tr>
<td>100%</td>
<td>200</td>
</tr>
</tbody>
</table>

Bottom Line: When staffing for a queuing system, it is critical to target a utilization of under 80%

Background

- A “queueing system” is one where customers arrive at undetermined, but normally distributed, times.
  - Classic examples include call centers, grocery lines, and emergency departments.

- The behavior of these systems is well understood and can be described by two variables:
  - Mean arrivals per hour
  - Capacity per hour

- In such a system, waiting time always skyrockets as the number of arrivals per hour approaches the system capacity.

Variation and Variance

Variability in a Queuing System
An Example: The Performance of a Telephone Answering System

- A call lasts an average of two minutes.
- Calls are answered by one full time person...

Question: Can the system handle 30 calls an hour without putting people on hold?
Effect of Variation on Queues:
Performance of a Telephone Answering System

Note: An average call lasts 2 minutes.
-Calls are answered by one person full time.

Therefore, average service rate = 30 calls/hr

Variation of Call Length

Calls/hr = 29
(Utility = 97%)

Calls/hr = 28

Calls/hr = 27

Calls/hr = 25

(Utility = 83%)

Variation in Your Hospital

Emergency Department Variation
- Admission rates ranged from 15% to 29% despite equal work schedules.
- Length of stay for discharged patients varied by 25% between physicians.
- Abdominal CTs ranged from 0.9 to 3.9 per 100 patients treated per physician.
- Head CTs ranged from 4 to 12.43 per 100 patients treated per physician.
- PTTs ranged from 1 to 13 per 100 patients treated per physician.

In-Patient LOS Variation
- Congestive heart failure, severity 2 - range 2.6 to 5.6 days
- Simple pneumonia, severity 2 - range 2.5 to 7.7 days
- Exacerbation of COPD, severity 2 - range 2 to 6 days

Emergency Medicine and Acute Care Essays,
Volume 29, Number 3, March 2005
4/17/2015

The Theory of Constraints

- Patient care is a network of queues and service transitions.
- All elements of the ED – Beds, Nurses, Patients, Lab, Radiology are a system of interconnected queues.
- Emergency departments are part of a system of patient flow or patient care.

- **Goldratt**: A system’s **constraints** limit its performance or progression toward its goal (throughput/flow).

- Are waits and delays inevitable?
You Need a Method or a System for Improvement...

A Method or a System for Improvement:
- Lean
- Rapid Cycle Testing (RCT)
- Six Sigma
- Statistical Process Control (SPC)

Where Waiting Exists—
Apply The Psychology of Waiting Lines

Managing Waits
and
the Psychology of Waiting...
The Psychology of Waiting

1. Unoccupied Time Feels Longer than Occupied Time.
2. Pre-Process Waits Feel Longer Than In-Process Waits.
3. Anxiety Makes Waits Seem Longer.
4. Uncertain Waits are Longer than Known, Finite Waits.
5. Unexplained Waits are Longer than Explained Waits.
6. Unfair Waits are Longer than Equitable Waits.
7. The More Valuable the Service, the Longer I will Wait.
8. Solo Waits Feel Longer Than Group Waits.

David Maister- The Psychology of Waiting

The Science of ED Service Operations - Key Strategic Concepts - A Recap

- **Systems thinking and appreciation**: A system is a network of components which work together to try to achieve common aims
- **A theory of knowledge**: You need a theory of knowledge about your system—an understanding of your ED, your hospital, and your processes
- Get clear about the **key drivers of system performance**:
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- **Where waiting exists**: applying *The Psychology of Waiting Lines*
“Every system is perfectly designed to get precisely the results it gets.”

Dr. Paul Batalden

“Some is not a number. Soon is not a time. Somehow is not a strategy.”

Jensen/Mayer - The Patient Flow Advantage 2015
Success

Will

Ideas

Execution

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You can do this…

©Kirk B. Jensen, MD, MBA, FACEP
Thank You

REFERENCES & RESOURCES
Improving Patient Flow
In the Emergency Department

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Publication date: 12/20/2013

• Strauss and Mayer’s Emergency Department Management
  • By Robert W. Strauss MD, Thom A. Mayer, MD
  • Kirk B Jensen, MD, MBA, FACEP, Associate Editor
  • Jody Crane, MD, MBA Section Editor

ISBn-13: 9780071762397
Publisher: McGraw-Hill Professional Publishing
Publication date: 12/20/2013
Chapter 1: Why Flow Matters

Section 1 — Framing the Flow Mandate
Chapter 1: Why Flow Matters
Chapter 2: Defining Flow: Establishing the Foundations
Chapter 3: Strategies and Tools to Hardwire Hospital-Wide Flow
Chapter 4: Lessons from Other Industries

Section 2 — Advanced Flow Concepts
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Chapter 8: Hospital Medicine and Flow
Chapter 9: Real-Time Demand and Capacity Management

Section 3 — Frontiers of Flow
Chapter 10: Hardwiring Flow in Critical Care
Chapter 11: Smoothing Surgical Flow
Chapter 12: Acute Care Surgery and Flow
Chapter 13: Integrating Anesthesia Services into the Flow Equation
Chapter 14: The Role of Imaging Services in Expediting Flow
Chapter 15: The Future of Flow

References
About the Authors
Acknowledgments
Additional Resources

Emergency Department Leadership and Management

Best Principles and Practice

- Stephanie Keyton, Brigham and Women’s Hospital, Harvard Medical School, Boston
- Philip D. Anderson, Brigham and Women’s Hospital, Harvard Medical School, Boston
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- Elke Paitz, Brigham and Women’s Hospital, Harvard Medical School, Boston

Publication December 2014 format: Hardback

Kirk Jensen, MD, MBA, FACEP

The Patient Flow Advantage: How Hardwiring Hospital-Wide Flow Drives Competitive Performance
Kirk Jensen/Thom Mayer
FireStarter Publishing, January 2015
Hardwiring Flow
Systems and Processes for Seamless Patient Care

Thom Mayer, MD, FACEP, FAAP
Kirk Jensen, MD, MBA, FACEP

- Why patient flow helps organizations maximize the “Three Es”: Efficiency, Effectiveness, and Execution
- How to implement a proven methodology for improving patient flow
- Why it’s important to engage physicians in the flow process (and how to do so)
- How to apply the principles of better patient flow to emergency departments, inpatient experiences, and surgical processes

Patient Flow: Reducing Delay in Healthcare Delivery, Second Edition

1. Modeling Patient Flows Through the Healthcare System. RANDOLPH HALL, DAVID BELSON, PAVAN MURALI AND MAGED DESSOUKY
2. Hospital-wide System Patient Flow - ALEXANDER KOLKER
3. Hospitals And Clinical Facilities, Processes And Design For Patient Flow - MICHAEL WILLIAMS
4. Emergency Department Crowding - KIRK JENSEN
5. Patient Outcomes Due to Emergency Department Delays - MEGHAN MCHUGH
6. Access to Surgery and Medical Consequences of delays - BORIS SOBOLEV, ADRIAN LEVY AND LISA KURAMOTO
7. Breakthrough Demand-Capacity Management Strategies to Improve Hospital Flow, Safety, and Satisfaction - LINDA KOSNIK
8. Managing Patient Appointments in Primary Care - SERGEI SAVIN
9. Waiting Lists for Surgery - EMILIO CERDA, LAURA DE PABLO, MARIA V. RODRIGUEZ-URIA
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13. Using Simulation to Improve Healthcare: Case Study - BORIS SOBOLEV
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16. Queueing Analysis in Healthcare - LINDA GREEN
17. Rapid Distribution of Medical Supplies - MAGED DESSOUKY, FERNANDO ORDOÑEZ, HONGZHONG JIA, AND ZHIHONG SHEN
18. Using a Diagnostic to Focus Hospital Flow Improvement Strategies - ROGER RESSAR
19. Improving Patient Satisfaction Through Improved Flow - KIRK JENSEN
20. Continuum of Care Program - MARK LINDSAY
21. A Logistics Approach for Hospital Process Improvement - JAN VISSERS
22. Managing a Patient Flow Improvement Project - DAVID BELSON
The Hospital Executive’s Guide to Emergency Department Management
Second edition  HcPro April 2014

Kirk B. Jensen, MD, FACEP
Daniel G. Kirkpatrick, MHA, FACHE

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Leadership for Smooth Patient Flow:
Improved Outcomes, Improved Service, Improved Bottom Line

Kirk B. Jensen, MD, FACEP
Thom A. Mayer, MD, FACEP, FAAP
Shari J. Welch, MD, FACEP
Carol Haraden, PhD, FACEP

The heart of the book focuses on the practical information and leadership techniques you can use to foster change and remove the barriers to smooth patient flow.

You will learn how to: Break down departmental silos and build a multidisciplinary patient flow team Use metrics and benchmarking data to evaluate your organization and set goals Create and implement a reward system to engage and sustain employees at all levels Improve performance by focusing on the emergency department—the main point of entry into your organization The book also explores what healthcare institutions can learn from other service organizations including Disney, Ritz-Carlton, and Starbucks. It discusses how to adopt their successful demand management and customer service techniques to the healthcare environment.

“This book marks a milestone in the ability to explain and explore flow as a central, improvable property of healthcare systems. The authors are masters of both theory and application, and they speak from real experiences bravely told.”

Donald M. Berwick, MD
President and CEO
Institute for Healthcare Improvement (from the foreword)

ACHE + Institute for Healthcare Improvement
Managing Patient Flow in Hospitals: Strategies and Solutions, Second Edition

Real-Time Demand Capacity Management and Hospital-Wide Patient Flow

The Joint Commission Journal on Quality and Patient Safety
May 2011 Volume 37 Number 5
The Definitive Guide to Emergency Department Operational Improvement

The Improvement Guide and Rapid-Cycle Testing

Langley GL, Nolan KM, Nolan TW, Norman CL, Provost LP.


Benchmarking Resources

Where to find data

• Your neighbors
  • Call and/or visit
• ACEP
  • http://www.acep.org
• Premier
  • www.premier.com
• VHA
  • www.vha.com
• ED Benchmarking Alliance
  • www.edbenchmarking.org
• UHC
  • www.uhc.org

Be sure to compare hospitals with similar acuity and similar volume...

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• Berwick D. “A primer on leading the improvement of systems.” BMJ 1996; 312: 619-622.
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- Black, J. "Transforming the patient care environment with lean six sigma and realistic evaluation." J Healthc Qual 2009; 31-29-35.

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