Engineering Patient Flow
In Your Emergency Department:
Theory & Practice:

Kirk Jensen, MD, MBA, FACEP
President and CEO, Healthcare Management Strategies, LLC

- **Institute for Healthcare Improvement (IHI) Faculty Member**
- **Former Chair-IHI Improving Flow through Acute Care Settings Collaboratives**
- **Former Chair-IHI Operational and Clinical Improvement in the Emergency Department Collaboratives**
- **Faculty Member - Healthcare Leadership Master's Program - Wake Forest University Graduate School of Arts & Sciences**

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Final

How Our Time Together is Organized…

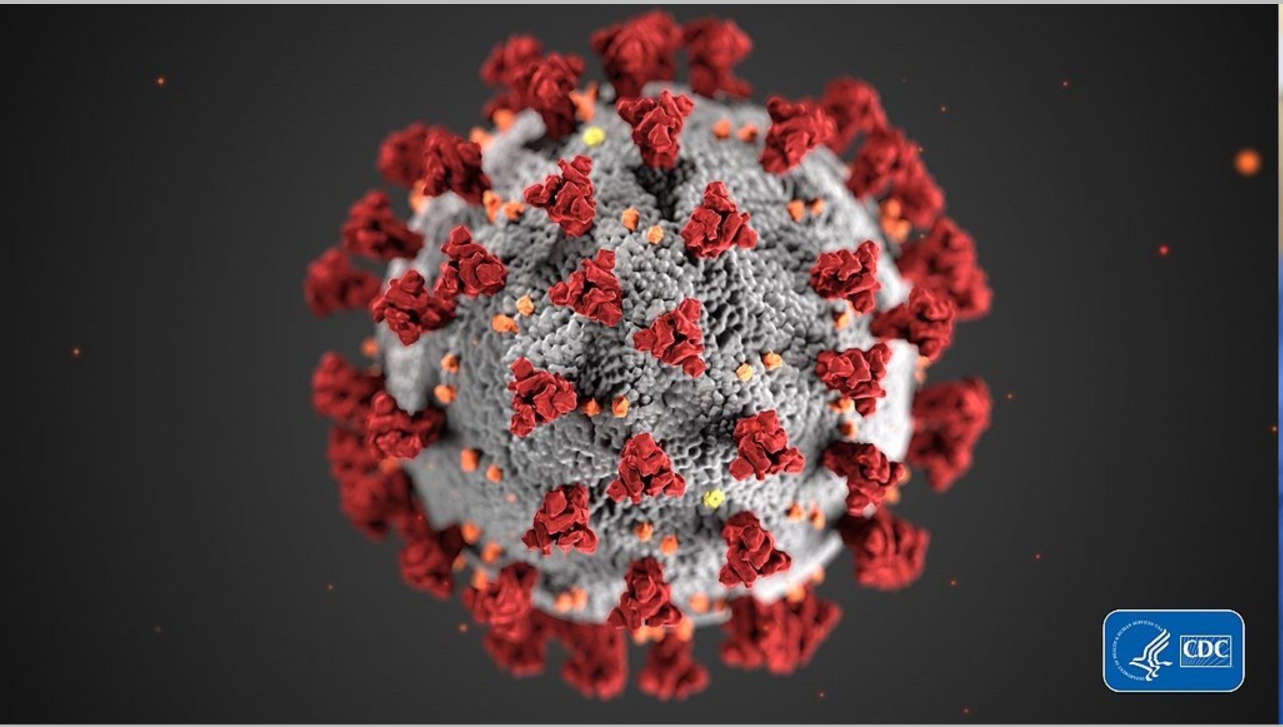
Three Sections:

- The Emergency Department – Patient flow into and through the ED
- The Hospital – Boarding & Its Potential Solutions – Patient flow into and through the hospital/healthcare system
- Advanced Patient Flow Concepts – A selected overview

We…Our Patients And Our Team Members…Deserve Emergency Departments And Health Care Systems That Work…

The deck
is often
stacked
against us…

We Do Face Operational Challenges…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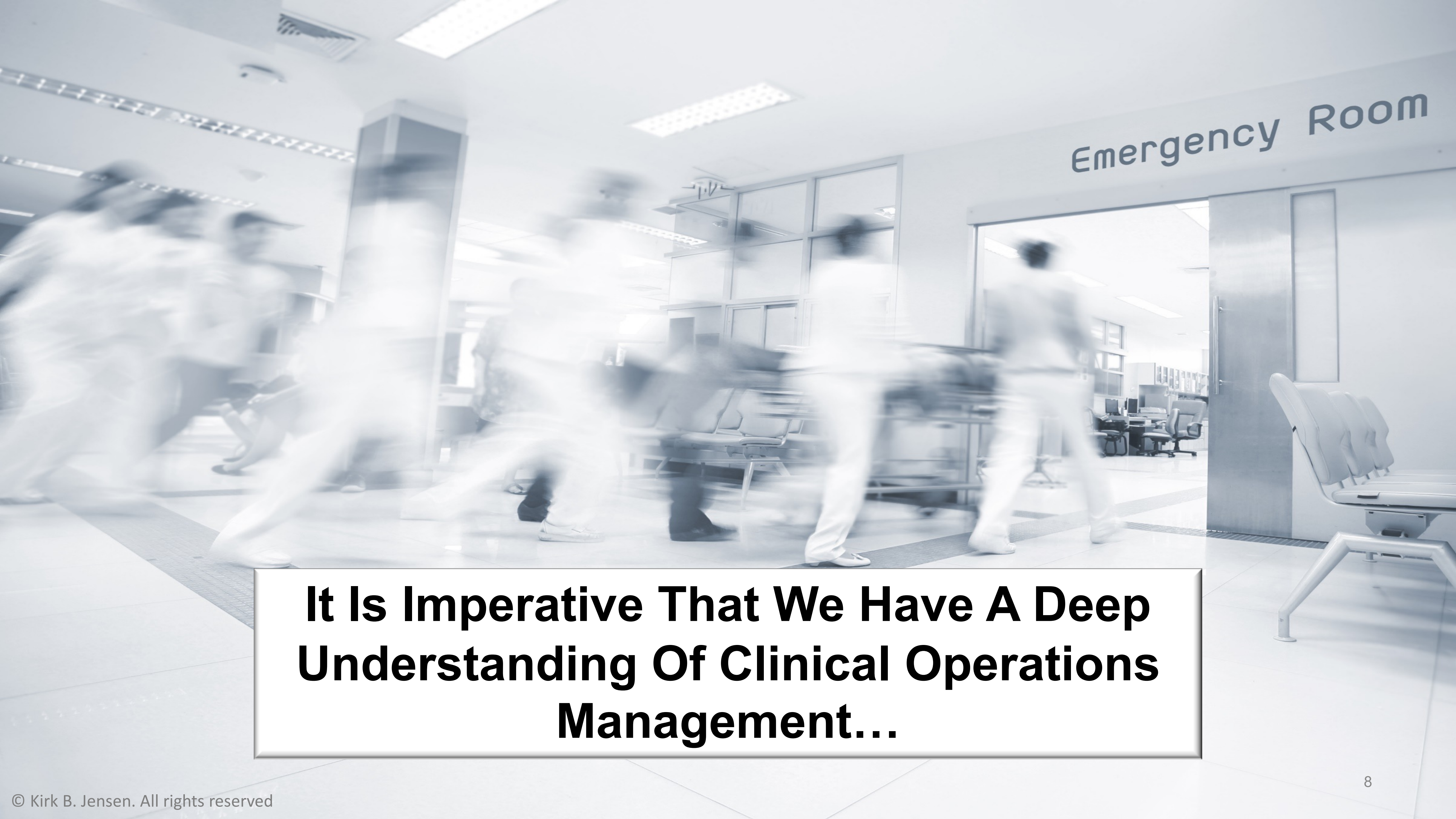
We Were Already Experiencing Changing Demographic Trends …

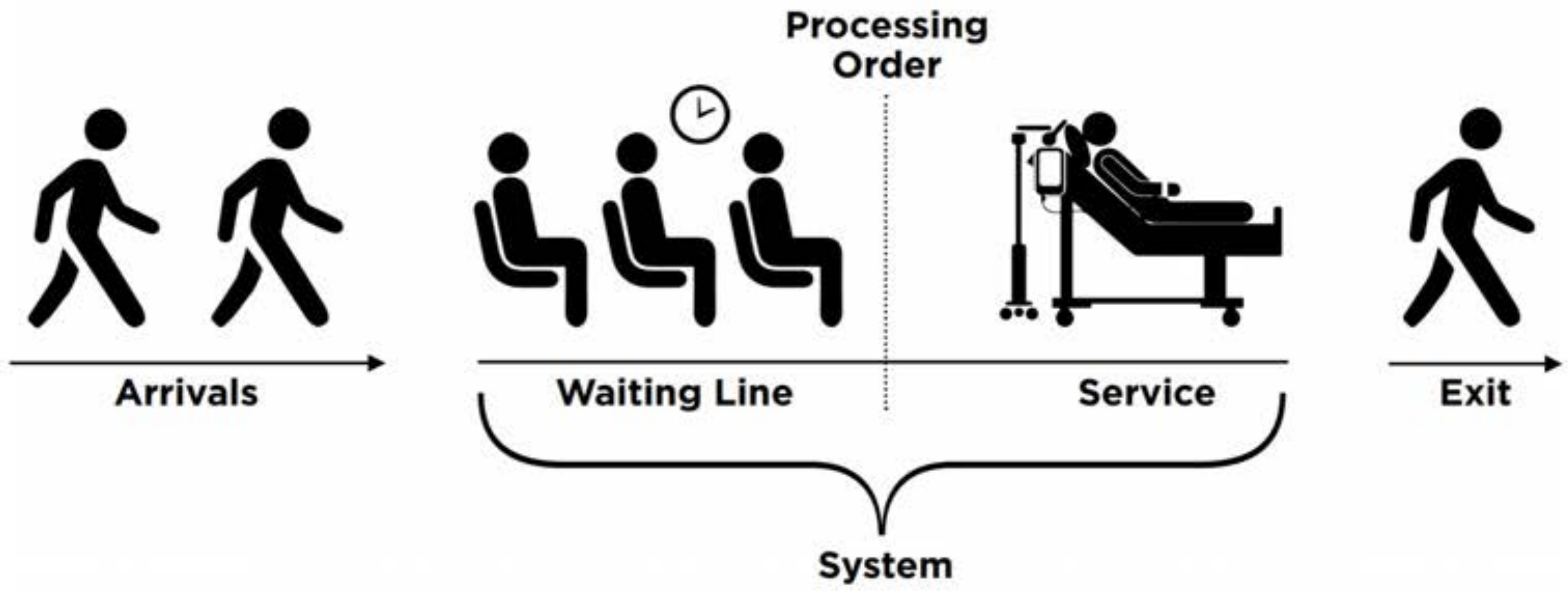
Emergency Departments are seeing:

- Higher-acuity patients with complex medical needs
- More adults
- Increasing EMS patient volume
- Greater use of diagnostic tests
- Transferring increasing numbers of ED patients
- Absorbing the early time of patients who need inpatient services (i.e., boarding)…



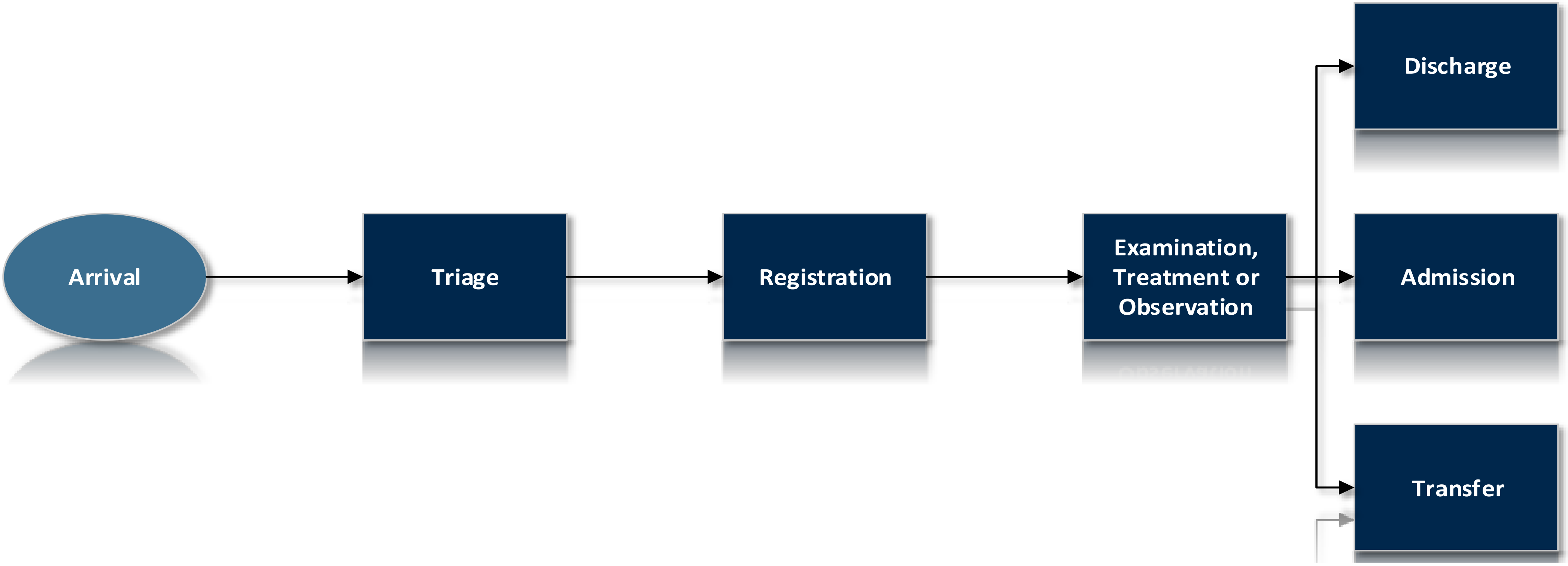
It Is Imperative That We Have A Deep Understanding Of Clinical Operations Management…

Looking at Our World Through The Lens/Perspective of Patient Flow & Operations…

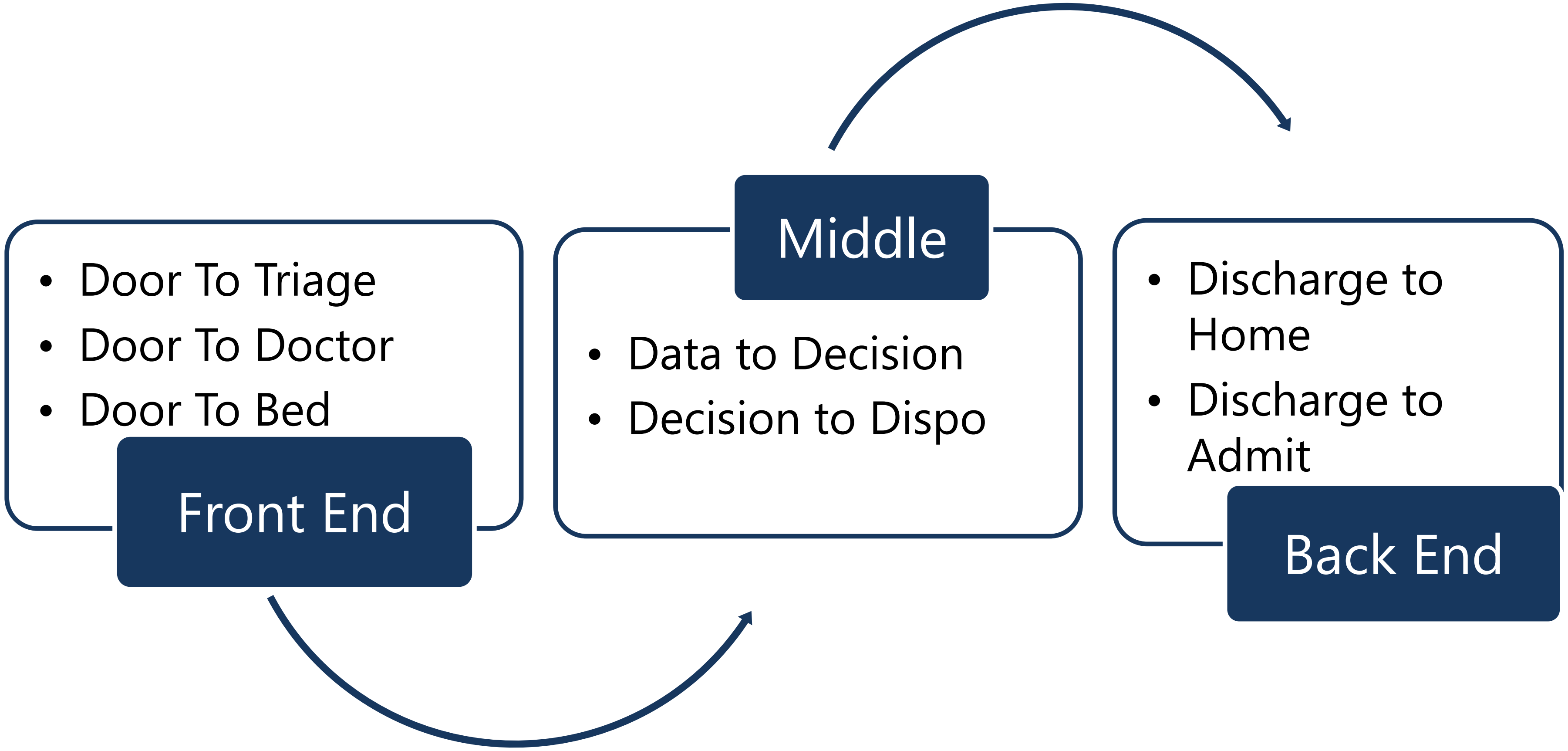


The ED Is An Example Of A Production System.

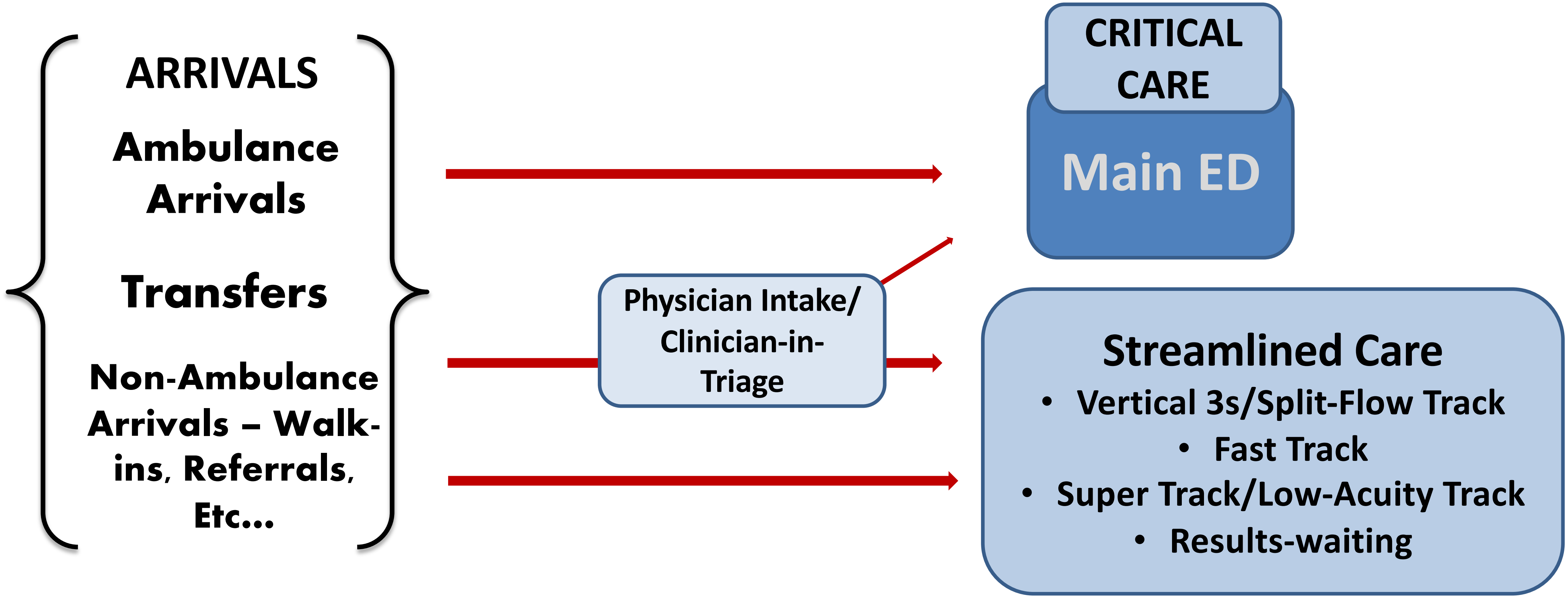
Emergency Department Input/Throughput/Output



The Lifecycle of a Patient Visit
Our Objective: Creating Continuous Flow…



Patient Flow - Segmentation & Streaming: Operational Models



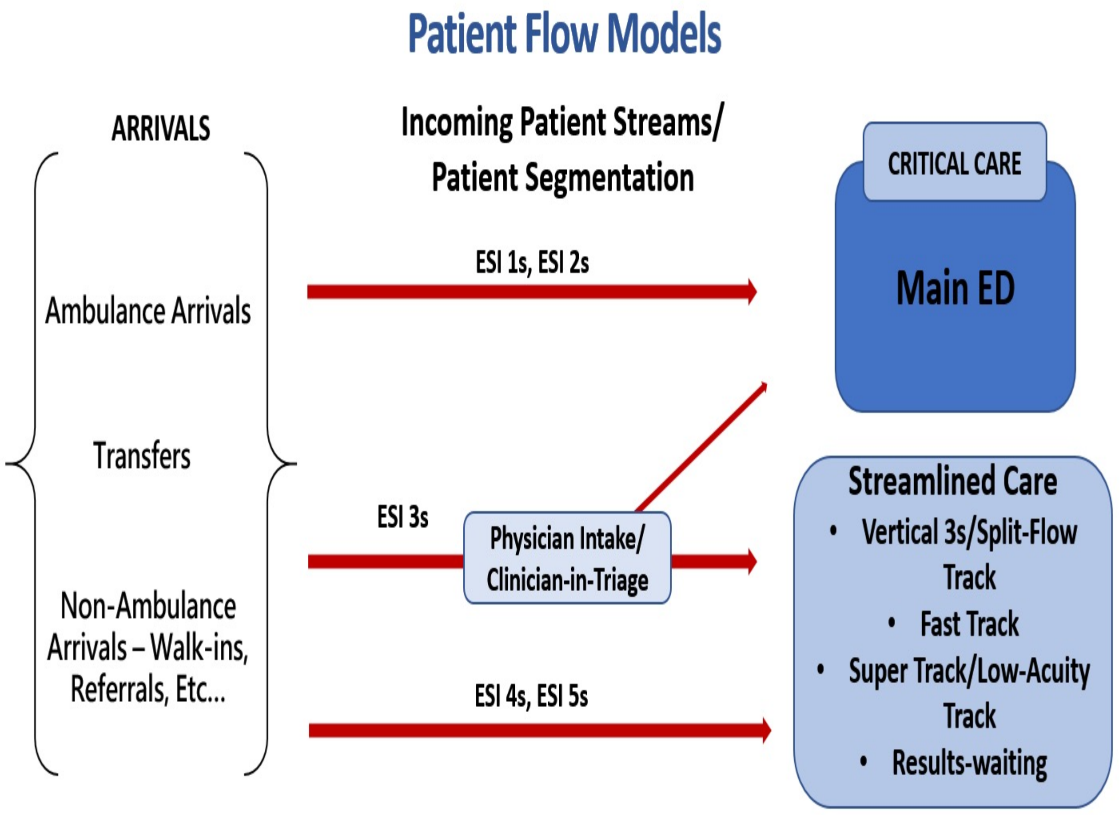
Segmentation, Streaming & Patient Flow in the ED…

Leveraging the Classic Management Operations Concepts of Segmentation, Streaming, or Cohorting…

Capacity Planning:

Leveraging Streaming (or Patient Segmentation)

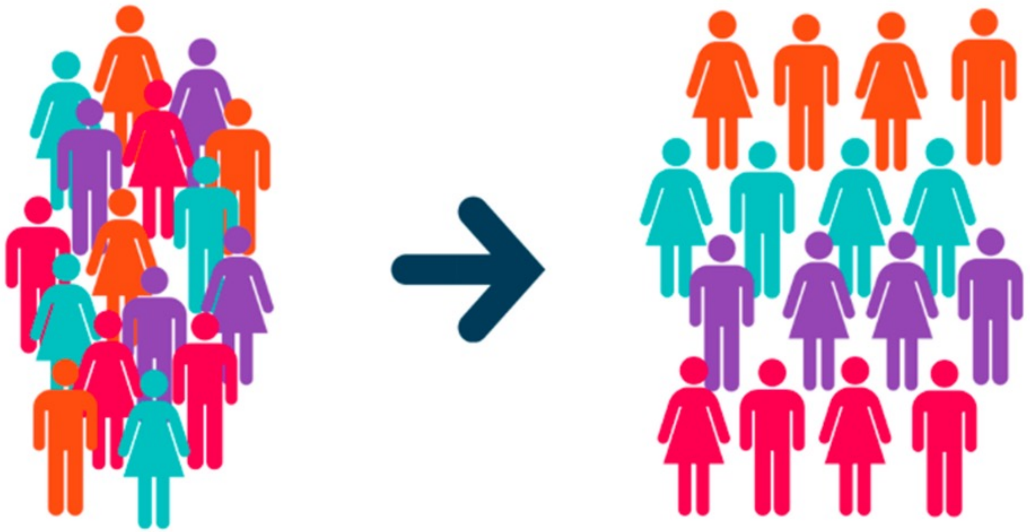
- In manufacturing terms, streams can be thought of as production 'cells': areas of a factory where similar processes are undertaken in a dedicated fashion.
- One should understand overall demand for each stream by HOD, DOW, and by season….



Patient Arrivals Can Be Broken Down By Stream, Or Segment, In Any Number Of Ways…

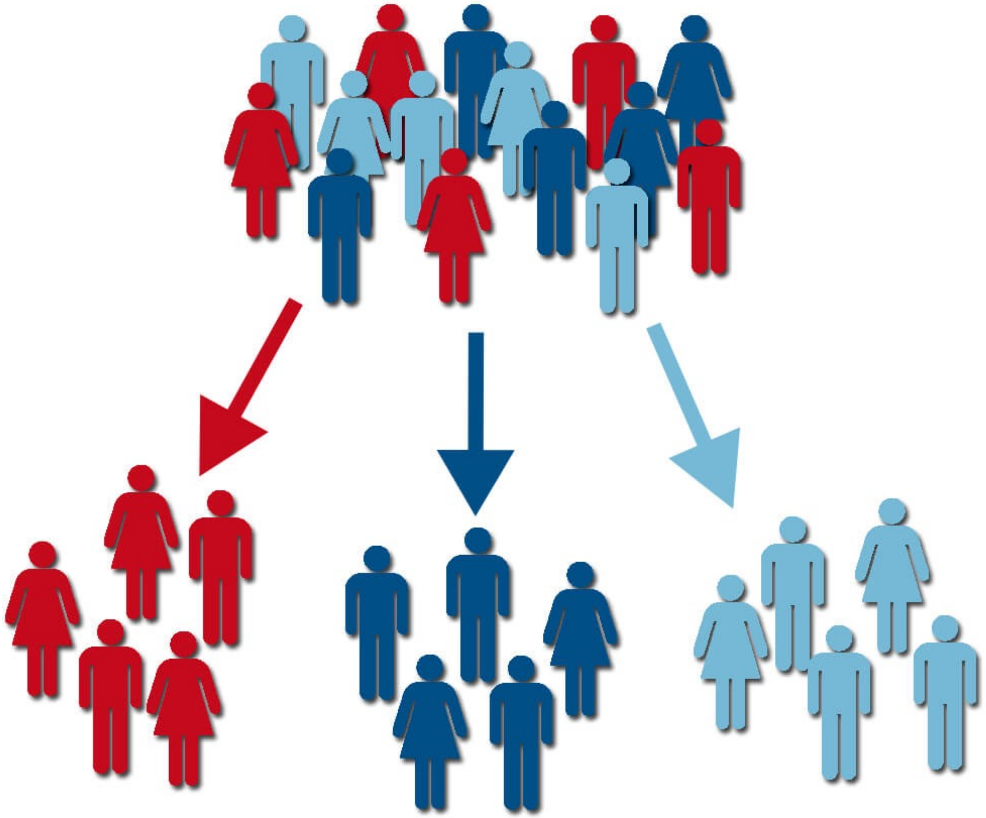
Arrivals can be analyzed by:

- Acuity, or
- Presenting complaint (e.g. chest pain)
- Diagnoses (e.g. Covid, asthma)
- Resource needs
- Healthcare resource grouping (product family, DRG, etc…)
- ICU patients
- Admissions
- Or any other split (e.g. pediatrics), depending on need.



Breaking Down Service or Patient Care Demand into Patient Care Streams:

- We need to decide how to organize our ED in terms of incoming streams.
- In order to maintain optimal flow these areas should ideally run independently of each other.
- Streams should work separately, and they therefore need to be staffed separately.



Patient Flow Optimization

Service Line Considerations:

- Make sure the **low acuity service line** (ESI 5s,4s, and select 3s) is **adequately resourced** (space, staff, supplies) and **busy at all times**
- Staffing for your ESI 2s, 3s, and 4s - err on the side of **staffing "fat" or "heavy"** to handle **variations in volume and acuity**.

- If you are responsible for **"boarded patients"** (those awaiting admission to an inpatient unit but who are still located in the ED), then:
  - Your **staffing resources** will be reallocated in order to monitor and treat these patients.
  - Your **bed capacity** will be reallocated to monitor and treat these patients.
  - Your ability to **meet incoming patient demand** is effectively reduced.

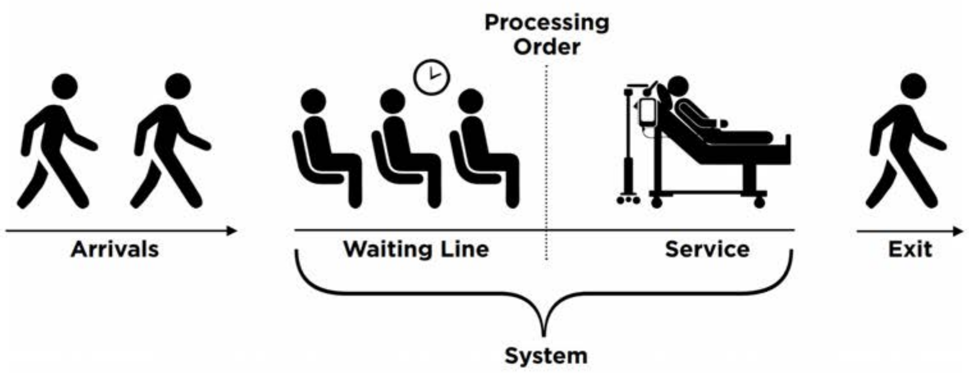
We Need to Optimize & Preserve
the Effectiveness, Safety & Well-Being of Our Key Servers:

<u>Doctors/APPs</u> *<u>Nurses</u> *<u>Beds</u>

We Have a Portfolio of Field-Tested Options Available To Us…

ED Flow & Operations:

- ❑ Enhanced Triage
- ❑ Direct Bedding (“Pull ‘til Full”)
- ❑ Bedside Registration
- ❑ Advanced Triage Orders/Treatment Protocols
- ❑ Fast-Tracking Low-Acuity Patients:
  - ❑ Super-Track (ESI 5’s + simple 4’s)
  - ❑ Fast-Track (ESI 5’s, 4’s, and simple 3’s)
    - ❑ “A Fast Track on Steroids”
- ❑ ESI Level 3 Fast Tracks
- ❑ Clinician in Triage:
  - ❑ APP Provider in Triage
  - ❑ MD in Triage
  - ❑ Team Triage (Multi-disciplinary assessment and treatment team)
- ❑ A Results-Waiting Area
- ❑ Efficiently Managing Admissions and Discharges



A Portfolio of Options is available to be deployed as patient volume and demand either requires it or can justify it. The front-end flow tactics(s) are selectively and scientifically implemented at certain hours of the day and days of the week based upon your demand-capacity modeling of incoming patient flow.

Operational Strategies for Front-End Patient Flow by Volume Band: An Illustrative Sample

20,000 ED Visits per Year and Below

- No triage, Immediate bedding, bedside registration for all
- No Segmentation – Clear signals to identify low acuity patients
- Results waiting process and place

40,000

- Quick Look Triage to segment, Quick/Bedside Registration for all
- For ERs with low acuity/low admit: Super Track (9a-11p) with 1-2 MLP with committed resources for lab/rad
- For ERs with high acuity/high admit: Intake Team (9a-11p) with 1 doc, 1 MLP with committed resources for lab/rad
- Results waiting process and place

60,000 and Above

- Quick Look Triage to segment, Quick/Bedside Registration for all
- Super Track (8a-1a), MD/MLP Intake Team (9a-11p)
- Results waiting process and place

Front End Split Flow Patient Flow Service Lines - Definitions and Descriptions

- **Fast Track**-The role of the Fast Track is to <u>segment and serve</u> those patients that are uncomplicated or relatively easy to treat. (ESI 5's, 4's, and simple 3's)

- **Super Track**- A "Super" Fast Track located <u>in or near triage</u> for the purpose of promptly treating patients who require very low resource utilization (ESI 5's + simple 4's)

- **Vertical Flow – ESI Level 3 Fast-Tracking -** Establishing a process (or set of processes), people, and a place (or places) to <u>fast track your "vertical 3" patients</u>

- **Clinician in Triage/RME/ or "Team Triage"-** Front-loading a team of providers utilizing an "<u>Intake Team" mentality</u> for promptly assessing, treating, and either placing or discharging ESI level 3 patients, and perhaps ESI 4s and 5s…
  - Midlevel Provider in Triage
  - MD in Triage
  - Team Triage (Multi-disciplinary assessment and treatment team)

The Science of ED Service Operations: Operational Strategies and Tactics

•Measure **<u>patient demand</u>** by hour and design a system to handle it

•Commit to the **<u>right staffing mix—and the right staff</u>**

•Make sure your **<u>triage processes enhance flow</u>**, not form a bottleneck

- Triage is a process and not a place…

•Use a simple and reliable system to **<u>segment patient flow</u>**

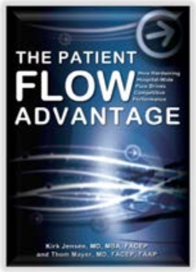
- Keep your vertical patients vertical and moving…

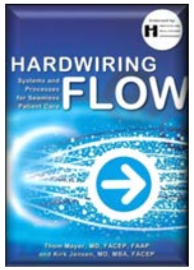
- Not all patients need beds…

•**<u>Match</u>** your service delivery options to your **<u>incoming patient streams</u>**

- Remove all work that does not add value…

- Fast Track is a verb and not a noun…





ED Patient Flow – Additional Design Principles….

- The front door and your front end processes drive flow.
- Get the patient and the doctor together as quickly and efficiently as possible.
- Patients should be in a bed only if it is medically necessary and only as long as it is medically necessary…
- Patients who need few or no resources should not routinely wait behind those patients who need multiple resources - no matter how heavy the ED patient volume…
- We want to be fast at fast things and slow at slow things…and wise enough to know the difference…
- For horizontal patients, its about real estate…For vertical patients, its about speed…
- Making people unhappy and sending them a bill is not a healthy business model….

Jensen/Mayer/Crane

ED Patient Flow & Throughput –
A Step-Wise Approach
to Engineering Patient Flow:

- ❑ **Demand-Capacity Analysis & Management:**
  - ❑ Planning for our critical servers – Docs (APPs), Nurses and Beds (Treatment Spaces) …
  - ❑ Getting it right on average…
  - ❑ Managing peak loads…
- ❑ Leveraging **our ED's Points of Entry -** Optimizing the value and impact of Triage and the Front End of our EDs
- ❑ **Segmenting and "Fast-Tracking"** our incoming patient streams
  - ❑ Efficiently and Effectively **Fast-Tracking Our Low-Acuity Patients**: ESI 5s and 4s
  - ❑ **Mid-Acuity Management** - ESI Level 3 Fast Tracking
  - ❑ A Plan and Process for our **High-Acuity Patients**
- ❑ Making the most of **Teams and Team-Based Care**

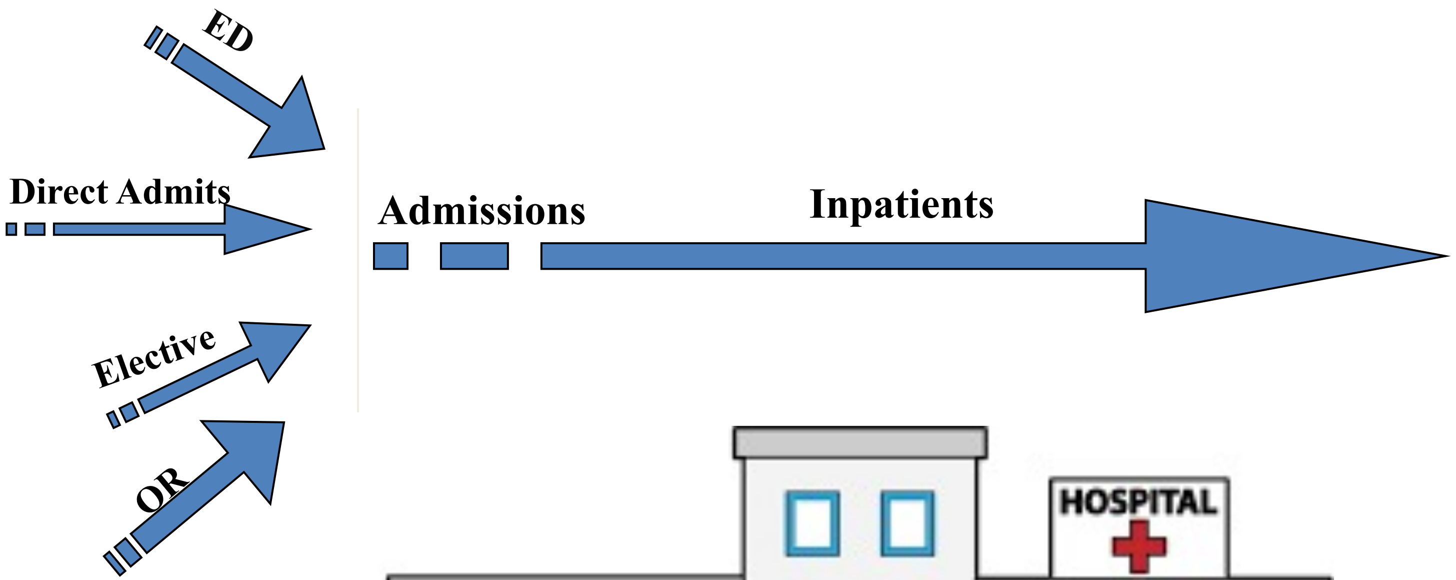
Admissions & Boarders…

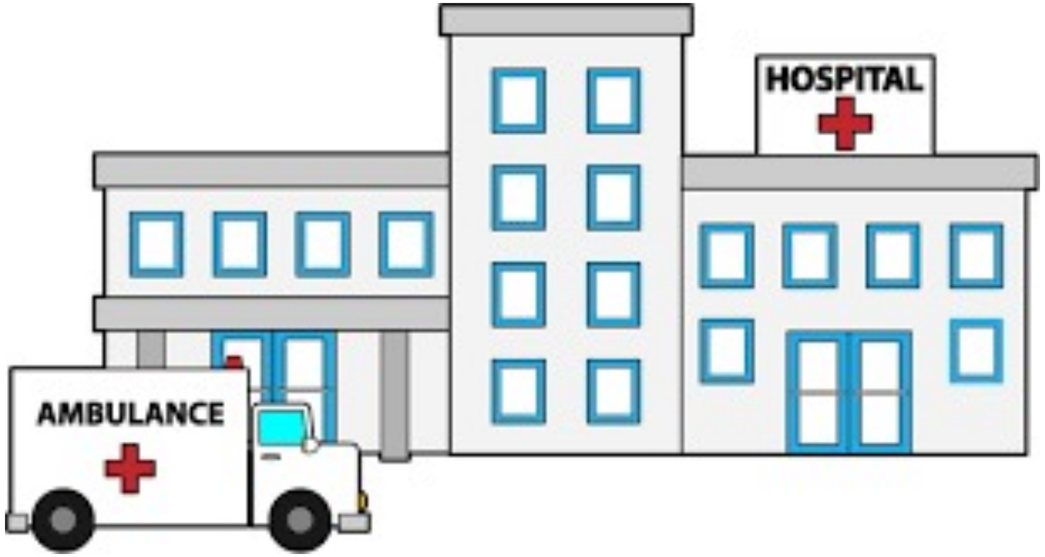
Our Healthcare Systems Need to Expedite Patient Flow at the Back End of Our Emergency Departments...

Emergency Department Boarding
“A Decades-Long Crisis”

- 67% of hospital admissions come through the ED.
- ED Boarding is a hospital operations problem – these are “inpatients in outpatient beds”…ER beds…
- The “problem is upstairs”, the “pain is downstairs”…
- If your boarding burden is not overwhelming, much can be accomplished by focusing on the front-end and the throughput bottlenecks under your control and/or influence…Think TOC and Lean…
- If your boarding burden is overwhelming, you are….!@!&%#!

We Know We Compete For A "Scarce" Resource…





TJC and Hospital-Wide Patient Flow

2005 -TJC and the Hospital-Wide Patient Flow Committee:

JCR Leadership Standard LD.3.10.10

- The leaders develop and implement plans to identify and mitigate impediments to efficient patient flow throughout the hospital.
- Effective for all accredited hospitals on January 1, 2005

2013 - The Joint Commission says "Boarding in the ED requires a hospital-wide solution."*

***As reported in ACEP NEWS**– January 14, 2013

- Performance standards put into effect Jan 1, 2013 require hospital leaders – namely the chief executive officer, medical staff and other senior hospital managers – to set specific goals to:
  - Improve patient flow
  - Ensure availability of patient beds
  - Maintain proper throughput in labs, ORs, inpatient units, telemetry, radiology and post-anesthesia care units

"We want to make sure that organizations are looking at patient flow hospital-wide, even if the manifestation of a flow problem seems to be in the emergency room."

~ Lynne Bergero, The Joint Commission

What Drives Ambulance Diversion – Inpatient Volume or ED Crowding?

By Renee Y. Hsia, Nandita Sarkar, and Yu-Chu Shen

Is Inpatient Volume Or Emergency Department Crowding A Greater Driver Of Ambulance Diversion?

DOI: 10.1377/hlthaff.2017.1602
HEALTH AFFAIRS 37,
NO. 7 (2018): 1115–1122

ABSTRACT Inpatient volume has long been believed to be a contributing factor to ambulance diversion, which can lead to delayed treatment and poorer outcomes. We examined the extent to which both daily inpatient and emergency department (ED) volumes at specified hospitals, and diversion levels (that is, the number of hours ambulances were diverted on a given day) at their nearest neighboring hospitals, were associated with diversion levels in the period 2005–12. We found that a 10 percent increase in patient volume was associated with a sevenfold greater increase in diversion hours when the volume increase occurred among inpatients (5 percent) versus ED visitors (0.7 percent). When the next-closest ED experienced mild, moderate, or severe diversion, the study hospital's diversion hours increased by 8 percent, 23 percent, and 44 percent, respectively. These findings suggest that efforts focused on managing inpatient volume and flow might reduce diversion more effectively than interventions focused only on ED dynamics.

Renee Y. Hsia (renee.hsia@ucsf.edu) is a professor in the Department of Emergency Medicine and a core faculty member at the Philip R. Lee Institute for Health Policy Studies, both at the University of California, San Francisco.

Nandita Sarkar is a postdoctoral research analyst at the National Bureau of Economic Research in Cambridge, Massachusetts.

Yu-Chu Shen is a professor in the Graduate School of Business and Public Policy, Naval Postgraduate School, in Monterey, California, and a faculty research fellow at the National Bureau of Economic Research.

When an emergency department (ED) does not have the capacity to take on more patients, it must close its doors to incoming ambulances. This phenomenon, known as diversion, means that ambulances must drive to the next available ED, which increases the time required

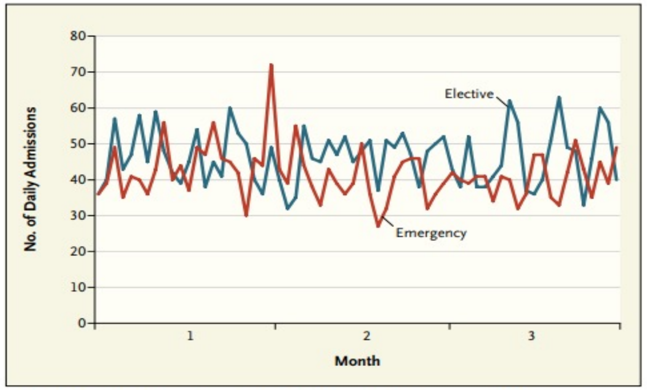
decrease diversion, since many current interventions focus on ED dynamics rather than overall hospital systems and resources.[12,13]

Previous studies that examined the relationship between patient volume and ED diversion used average or annual volumes instead of daily volumes[14] or limited sample sizes[15–17] or were based on simulations[18]—design features that

“The single most important factor contributing to ED diversion is the daily variability in the operating room (OR) elective surgical caseload.”*

*According to Eugene Litvak, PhD, from Boston University School of Management and Harvard School of Public Health

- **A 2002 Root Cause Analysis of Massachusetts EDs showed that there was a minimal relationship between diversion and patient arrivals (diversion did little diverting), and between diversion and ED volume.**
- **The authors found ED census did not affect diversion, and diversion had little impact on ED turn around times (TATs).**
- **They did find that ED boarders strongly correlated with diversion, as did scheduled admissions.**
- **Interestingly, they also found that the ED admissions were more predictable than the scheduled admissions.**



Daily Fluctuations in One Hospital’s Admissions for Emergency and Elective Surgery.
Data are for weekdays only and are from the Institute for Healthcare Optimization.

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Journal of Health Economics

journal homepage: www.elsevier.com/locate/econbase

Swamped: Emergency Department Crowding and Patient Mortality☆

Lindsey Woodworth

Department of Economics, University of South Carolina, 1014 Greene Street, Columbia, SC, 29208, United States

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ABSTRACT

U.S. emergency departments are experiencing extreme levels of crowding. This study estimates the impact of emergency department crowding on patient mortality. Identification relies on the abrupt crowding shocks felt by "old" emergency departments at the time a new emergency department opens nearby. Using death records linked to hospital administrative records, I find that a 10% alleviation of emergency department patient volume significantly lowers the average patient's chance of mortality. Improvements appear to be realized both inside the hospital and after the patient has left.

1. Introduction

age number of visits made to each ED per year (Fig. 1). What is more, emergency physicians say "they've seen [ED]

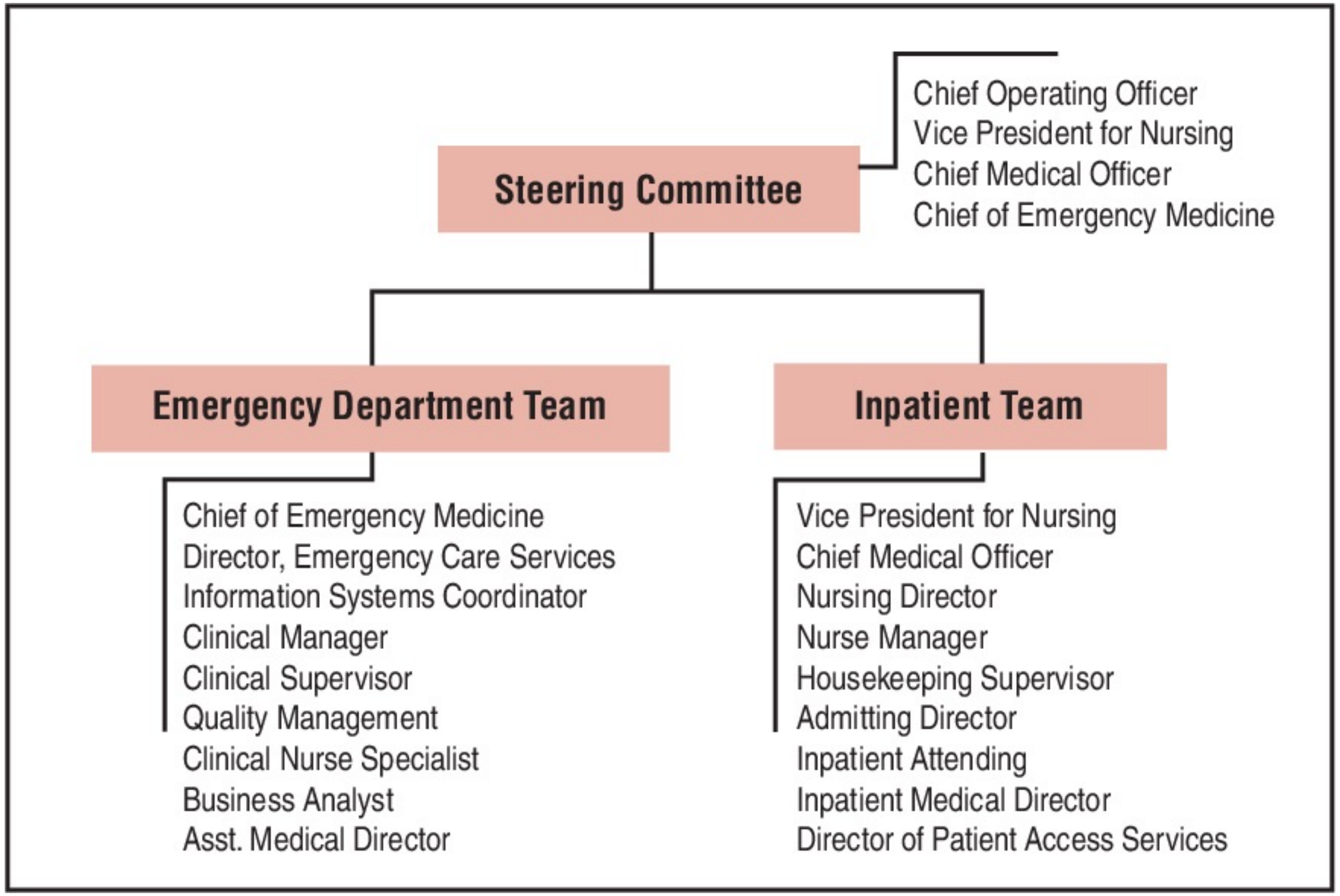
"I find that a 10% alleviation of emergency department patient volume significantly lowers the average patient's chance of mortality. Improvements appear to be realized both inside the hospital and after the patient has left."
Wordsworth

Addressing Boarding & Inpatient Flow Is A Heavy Lift…

Tackling Hospital-Wide & ED Patient Flow Projects –

Consider the Need for the Following: Allies, Power, Authority, Data, Stories, Resources & Commitment…

One Example of Hospital-Wide Team & Governance Structure*



*From ***BURSTING AT THE SEAMS -*** *Improving Patient Flow to Help America's Emergency Departments* – Lessons Learned by the Urgent Matters Learning Network

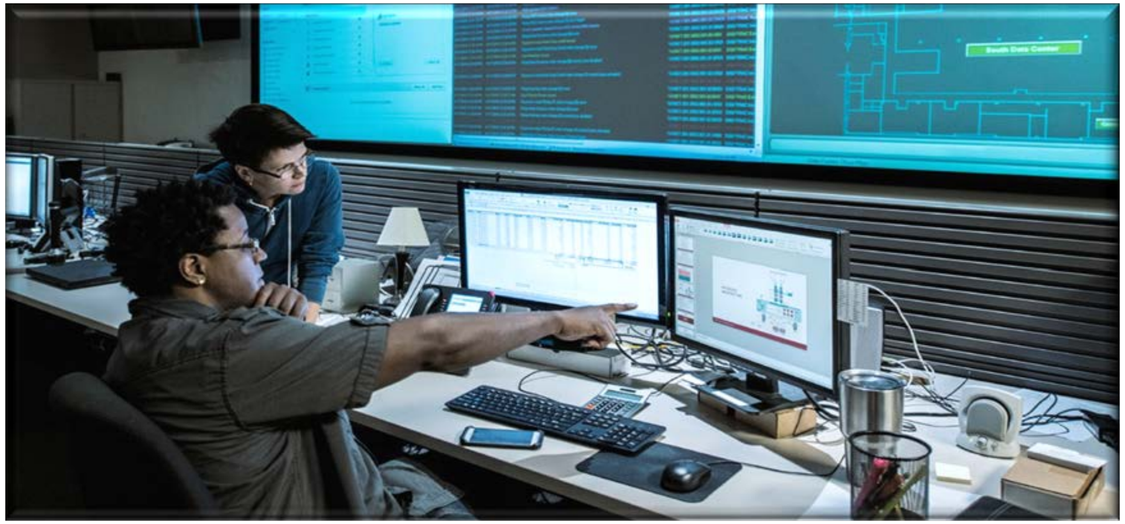
Confronting The Challenge And Opportunity Of Boarding & Hospital-wide Patient Flow… A Potential Checklist Of What Needs To Be/Should Be True To Tackle The Problem…

- ❑ **Is the problem(s) correctly stated** and **identified**
- ❑ A healthy review of the subject matter & **what is already known about the problem**
- ❑ Is there a **compelling reason** to do the work (other than it is a good idea)
- ❑ Generous **administrative support & engagement**
- ❑ Nursing is effectively involved
- ❑ There is a true passionate **local champion** or two or two or three…
- ❑ Sufficient employee **interest** and **support**
- ❑ **Process Flow Mapping & Root Cause Analysis** undertaken
- ❑ **Measures/metrics** in place
  - ❑ Are they the right measures
  - ❑ Are they timely
- ❑ Is there a **day-to-day leader/project manager**
  - ❑ Sufficient time
  - ❑ Skills
  - ❑ Effectiveness
- ❑ Local, **functioning PI team(s)**
  - ❑ In place
  - ❑ Effective
  - ❑ Adequate **training & skills**
- ❑ Ample **allotted time** for PI team(s)
- ❑ Are **incentives aligned**
- ❑ Are **consequences** in place for failing to act
  - ❑ Are they the right consequences

Expediting Admissions – A Portfolio of Potential Solutions…

Key Interventions

- **Optimize The Day Of Admission & The Day Of Discharge Processes**
  - Facilitate Admissions
  - Organize/Optimize The Inpatient Discharge Process
- **Carve-outs**
  - Observation Units
  - Full Capacity Protocols
- **High-Yield Targeted Interventions**
  - ICU
  - Telemetry
  - The Operating Room
    - OR Smoothing
- **Air Traffic Control**
  - Beds, Staffing & Resource Management
  - Command Center Medicine

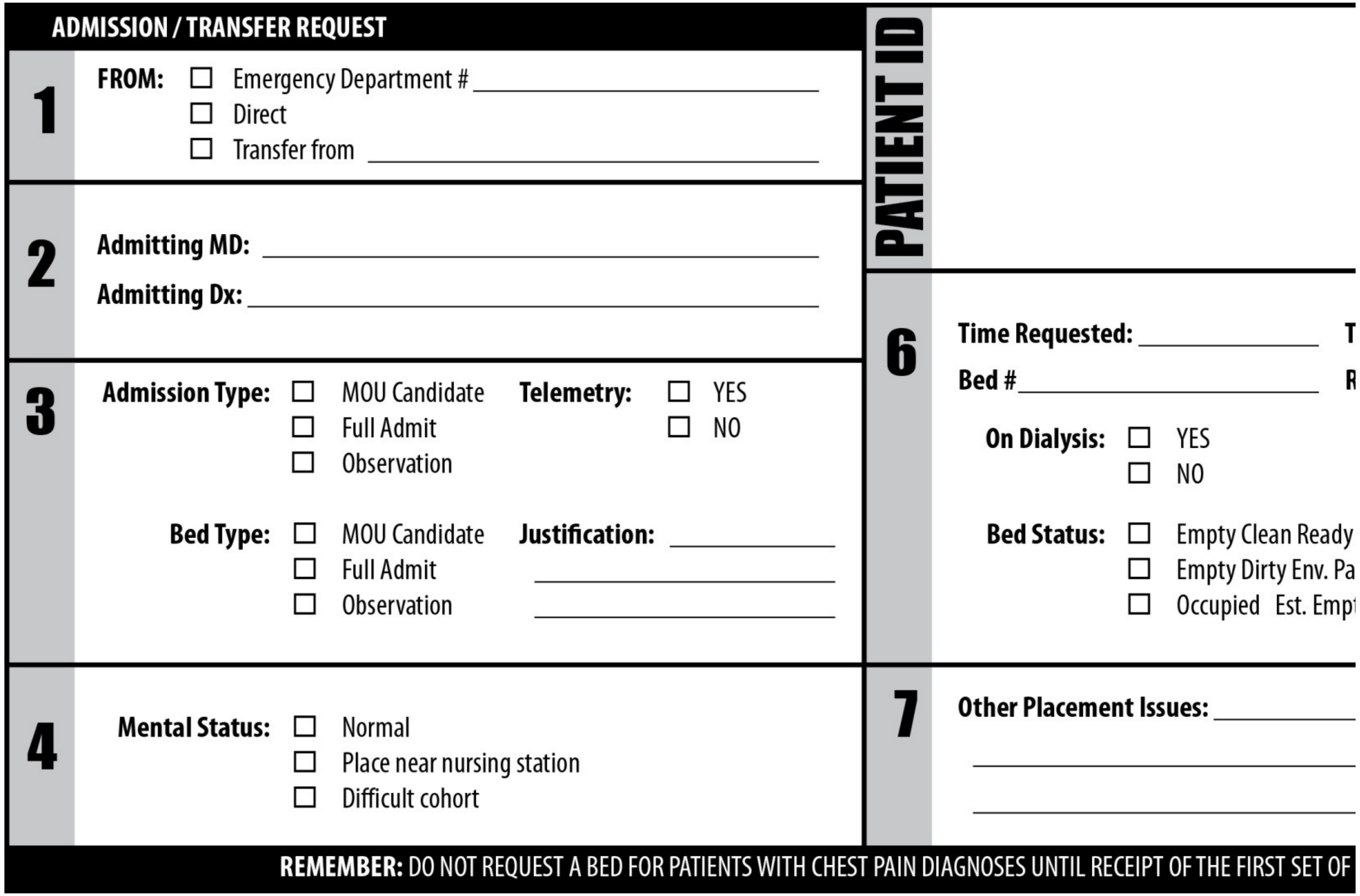


Optimize the Front End…

- Get in early
- Accelerated testing
- Timely notification of the admitting team
- Early to bed - and to the right bed…

Being Proactive – Expediting The Decision To Admit

- **In most cases, an experienced emergency physician or nurse will know if a patient needs hospital admission within minutes of entering the patient's room and performing a brief assessment**
- **Delaying admission until every lab and diagnostic study is back is an unrealistic expectation on the part of the admitting team**
- **Early consultation for admission is often resisted, despite the obvious improvement in patient flow**


ADMISSION / TRANSFER REQUEST

1
FROM: ☐ Emergency Department # ____
☐ Direct
☐ Transfer from ____

2
Admitting MD: ____
Admitting Dx: ____

3
Admission Type: ☐ MOU Candidate ☐ Full Admit ☐ Observation
Telemetry: ☐ YES ☐ NO
Bed Type: ☐ MOU Candidate ☐ Full Admit ☐ Observation
Justification: ____

4
Mental Status: ☐ Normal ☐ Place near nursing station ☐ Difficult cohort

PATIENT ID

6
Time Requested: ____ T
Bed # ____ R
On Dialysis: ☐ YES ☐ NO
Bed Status: ☐ Empty Clean Ready ☐ Empty Dirty Env. Pa ☐ Occupied Est. Empt

7
Other Placement Issues: ____

REMEMBER: DO NOT REQUEST A BED FOR PATIENTS WITH CHEST PAIN DIAGNOSES UNTIL RECEIPT OF THE FIRST SET OF

An Example Of A Standardized Bed Request Tool

No Delay Nurse Reports

The “In-Patient Fast Track”:

Express Admitting Units (EAUs), Observation Units and ED Holding Areas

- Busy EDs need to decompress before the number of boarders starts to grow.
- After evaluation, admitting service can select the most appropriate in-hospital bed.

Fast-Tracking ICU Admissions

Consider ICU "Fast-Tracking" – One Example:

POLICY - A Critical Care Alert can be called for patients meeting the following inclusion criteria:

Sepsis/Sepsis syndrome
Acute respiratory failure requiring mechanical ventilation
Resuscitation post-arrest
Unstable hemodynamics requiring vasopressor intervention
Intracranial hemorrhage with evolving neurological deficits or airway compromise

- Patients meeting inclusion criteria will have a Critical Care Alert called at the time they are recognized to meet inclusion criteria.
- A 30-minute response time (from notification to arrival in ED) is required from patient's physician or the intensivist.
- Critical Care Unit will respond within 30 minutes of notification with both a bed assignment and a team for transporting the patient to Critical Care.
- All immediate diagnostic radiology needs should be completed prior to transport.
- The patient's ED nurse will accompany the team to the Critical Care Unit to give bedside report.

"Fast Track is a Verb and Not a Noun"…

- Code Blue
- Code STEMI
- Code Stroke
- Code Sepsis
- Code Vascular
- Code…

Critical Care Delivery Solutions in the Emergency Department

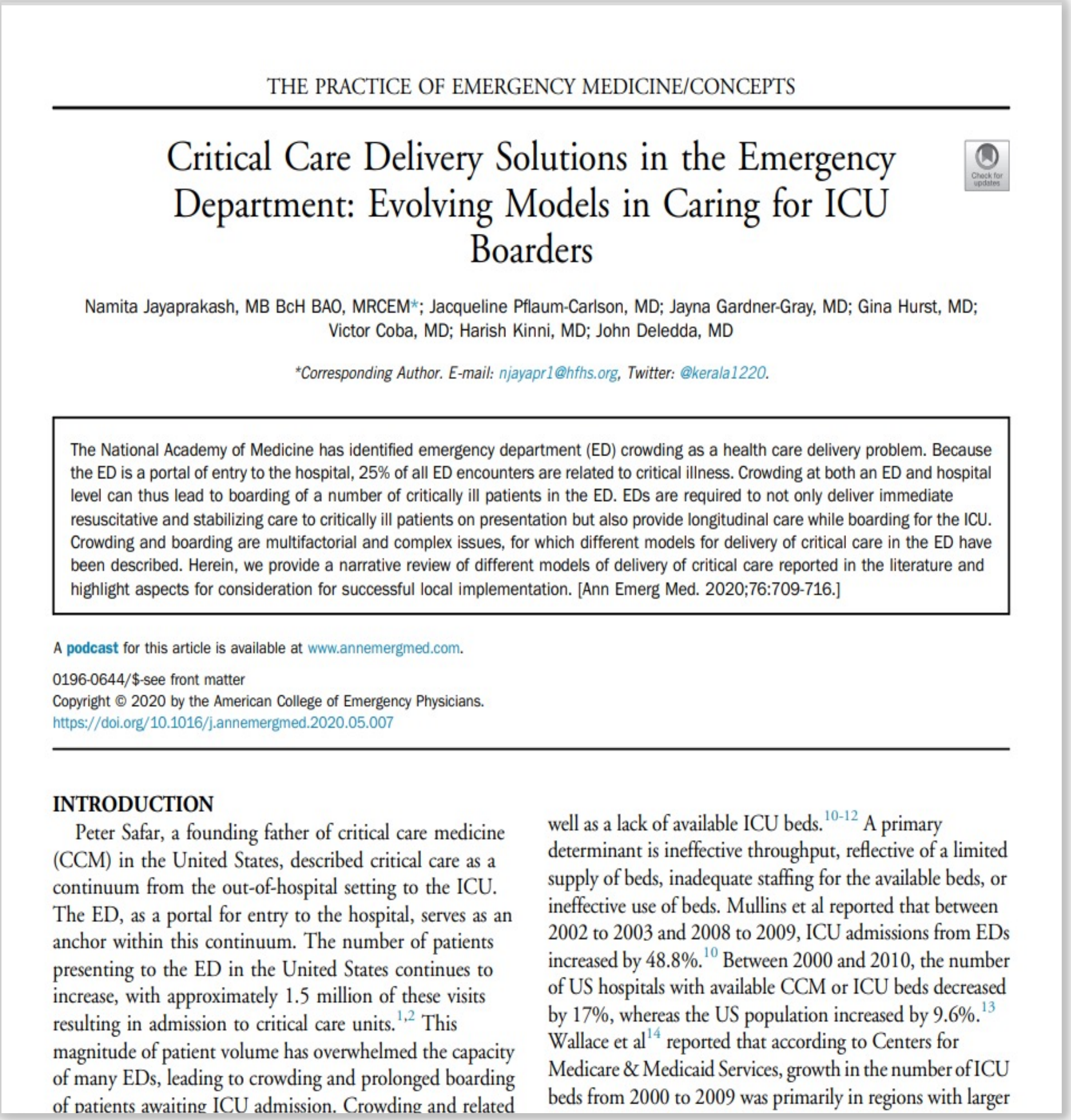
An overview of existing models for the delivery of critical care:

Geography-Based Models

- Expediting Admission to ICU
- Hybrid ED-ICU
- ED-ICU or Resuscitation Care Unit (RCU)

Personnel-Focused Models

- ICU-Based Critical Care Consultation Model
- ED-Based Critical Care Consultation



THE PRACTICE OF EMERGENCY MEDICINE/CONCEPTS

Critical Care Delivery Solutions in the Emergency Department: Evolving Models in Caring for ICU Boarders

Namita Jayaprakash, MB BcH BAO, MRCEM*; Jacqueline Pflaum-Carlson, MD; Jayna Gardner-Gray, MD; Gina Hurst, MD; Victor Coba, MD; Harish Kinni, MD; John Deledda, MD

*Corresponding Author. E-mail: njayapr1@hfhs.org, Twitter: @kerala1220.

The National Academy of Medicine has identified emergency department (ED) crowding as a health care delivery problem. Because the ED is a portal of entry to the hospital, 25% of all ED encounters are related to critical illness. Crowding at both an ED and hospital level can thus lead to boarding of a number of critically ill patients in the ED. EDs are required to not only deliver immediate resuscitative and stabilizing care to critically ill patients on presentation but also provide longitudinal care while boarding for the ICU. Crowding and boarding are multifactorial and complex issues, for which different models for delivery of critical care in the ED have been described. Herein, we provide a narrative review of different models of delivery of critical care reported in the literature and highlight aspects for consideration for successful local implementation. [Ann Emerg Med. 2020;76:709-716.]

A podcast for this article is available at www.annemergmed.com.

0196-0644/$-see front matter

https://doi.org/10.1016/j.annemergmed.2020.05.007

INTRODUCTION

Peter Safar, a founding father of critical care medicine (CCM) in the United States, described critical care as a continuum from the out-of-hospital setting to the ICU. The ED, as a portal for entry to the hospital, serves as an anchor within this continuum. The number of patients presenting to the ED in the United States continues to increase, with approximately 1.5 million of these visits resulting in admission to critical care units.[1,2] This magnitude of patient volume has overwhelmed the capacity of many EDs, leading to crowding and prolonged boarding of patients awaiting ICU admission. Crowding and related

well as a lack of available ICU beds.[10-12] A primary determinant is ineffective throughput, reflective of a limited supply of beds, inadequate staffing for the available beds, or ineffective use of beds. Mullins et al reported that between 2002 to 2003 and 2008 to 2009, ICU admissions from EDs increased by 48.8%.[10] Between 2000 and 2010, the number of US hospitals with available CCM or ICU beds decreased by 17%, whereas the US population increased by 9.6%.[13] Wallace et al[14] reported that according to Centers for Medicare & Medicaid Services, growth in the number of ICU beds from 2000 to 2009 was primarily in regions with larger

Inpatient Hallway Boarding

- Inpatient hallway boarding describes moving admitted patients from the ED to inpatient hallways until inpatient beds become available, in an effort to improve ED capacity. Patients who are boarded on inpatient hallways are typically a limited class of patients (up to and including telemetry patients but usually excluding stepdown/intermediate care or critical patients) who do not have one of a few exclusion criteria, such as incontinence. The decision to board in hallways may include time, where ED LOS exceeds a set threshold, or volume, where there are an excessive number of ED boarders.
- The process is safe and preferred by 85% of surveyed patients. Mortality and ICU transfer rates were less among patients placed in inpatient hallway beds compared to those awaiting standard bed placement. 50% of patients sent to inpatient hallways to board end up spending an hour or less in the hallway.

Partnering With Our Hospitalists…

Contributions to Patient Flow By Specialty

Significant flow and service efficiencies plus improved clinical outcomes can be achieved through the combined efforts of both services.

Emergency Medicine

- Effective **triage**
- Professional, organized **communication**
- **Lean** thinking and **patient-centered** processes
- A **continuous focus** on improving flow and the patient experience

Hospital Medicine

- Patient **rounding** throughout the day
- **Foresight** and **planning**
- **Observing** and **understanding** a patient's needs
- Arranging appropriate **services** and assistance
- Managing the patient experience and **creating a positive care environment**

So Happy Together…

Ideal ED Doctor

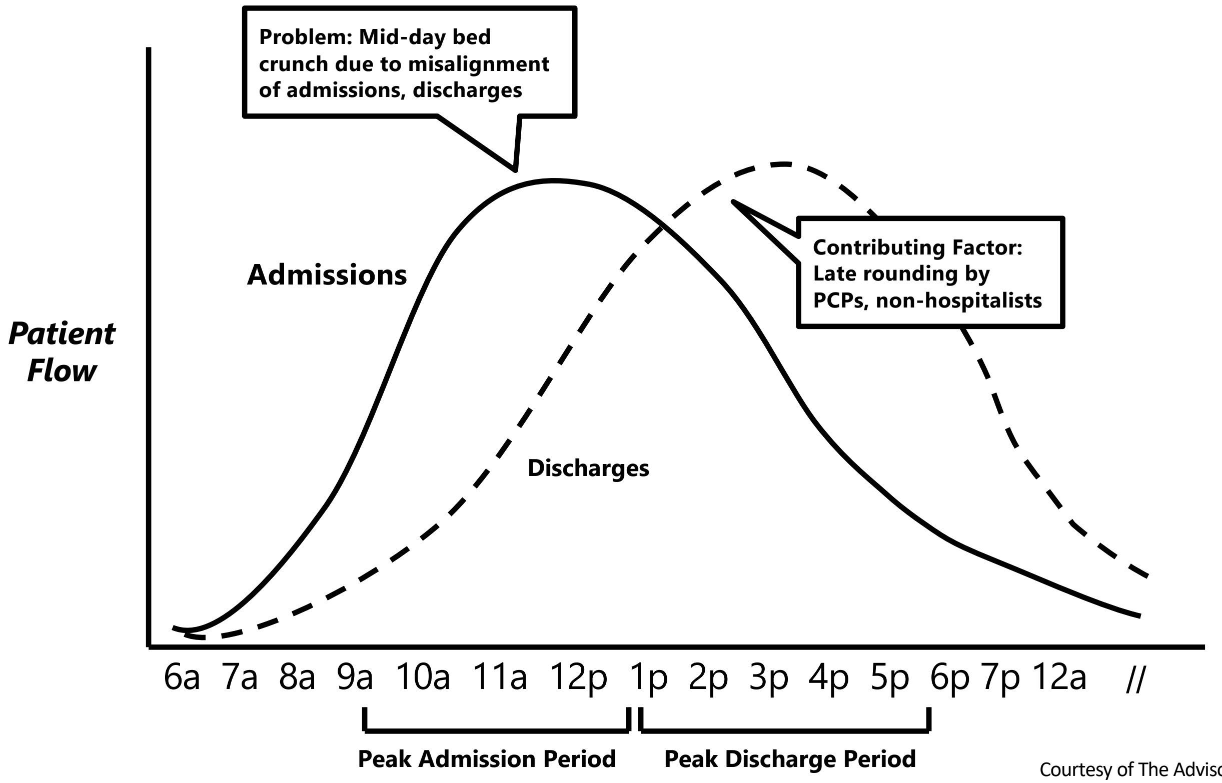
- Now/later?
- Sick/not sick?
- Has a diagnosis
- Accurate drug list
- Proper bed/location ??
- No batching
- Oriented to our culture
- Oriented to resources
- Plays well with others
- Mutual professional respect
  - Standard work
  - SBAR
  - Case discussions
- Shared governance

Ideal Hospitalist

- Call back on time
- Just say yes!
- 1-800-ADMIT
- Healthy/Professional dialogue
- Good communication
- The decision to admit ***
  - Bed ahead
- Allows bridge orders
- Can multi-task/serial admits/parallel process
- Aware of ED metrics

Active Inpatient Bed Management…

Admissions and Discharges

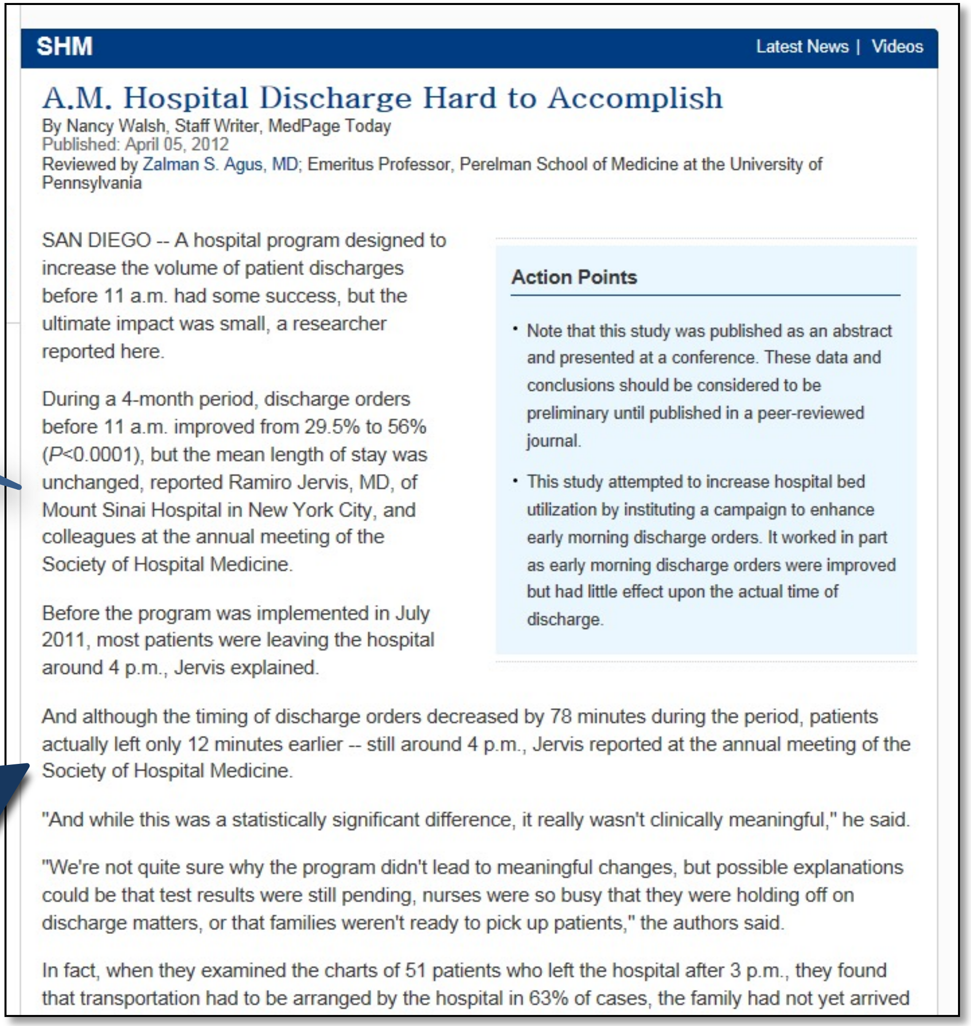


Courtesy of The Advisory Board Company

“Everybody Out By 11…”

…discharge orders improved from 29.5% to 56%, but the mean length of stay was unchanged…

…although the timing of the discharge orders decreased by 78 minutes during the period, patients actually left the hospital only 12 minutes earlier-still around 4 p.m…



SHM | Latest News | Videos

A.M. Hospital Discharge Hard to Accomplish

By Nancy Walsh, Staff Writer, MedPage Today
Published: April 05, 2012
Reviewed by Zalman S. Agus, MD; Emeritus Professor, Perelman School of Medicine at the University of Pennsylvania

SAN DIEGO -- A hospital program designed to increase the volume of patient discharges before 11 a.m. had some success, but the ultimate impact was small, a researcher reported here.

During a 4-month period, discharge orders before 11 a.m. improved from 29.5% to 56% (*P*<0.0001), but the mean length of stay was unchanged, reported Ramiro Jervis, MD, of Mount Sinai Hospital in New York City, and colleagues at the annual meeting of the Society of Hospital Medicine.

Before the program was implemented in July 2011, most patients were leaving the hospital around 4 p.m., Jervis explained.

Action Points

- Note that this study was published as an abstract and presented at a conference. These data and conclusions should be considered to be preliminary until published in a peer-reviewed journal.
- This study attempted to increase hospital bed utilization by instituting a campaign to enhance early morning discharge orders. It worked in part as early morning discharge orders were improved but had little effect upon the actual time of discharge.

And although the timing of discharge orders decreased by 78 minutes during the period, patients actually left only 12 minutes earlier -- still around 4 p.m., Jervis reported at the annual meeting of the Society of Hospital Medicine.

"And while this was a statistically significant difference, it really wasn't clinically meaningful," he said.

"We're not quite sure why the program didn't lead to meaningful changes, but possible explanations could be that test results were still pending, nurses were so busy that they were holding off on discharge matters, or that families weren't ready to pick up patients," the authors said.

In fact, when they examined the charts of 51 patients who left the hospital after 3 p.m., they found that transportation had to be arranged by the hospital in 63% of cases, the family had not yet arrived

Bed Utilization Efficiency (In-Patient)

-Percentage of beds utilized relative to the potential inpatient capacity

-90% and higher utilization rates are indicative of bottlenecks, staff burnout, and capacity/demand mismatches…

The Joint Commission Journal on Quality and Patient Safety

Timeliness and Efficiency

Using Real-Time Demand Capacity Management to Improve Hospitalwide Patient Flow

Roger Resar, M.D.; Kevin Nolan, M.A.; Deborah Kaczynski, M.S.; Kirk Jensen, M.D., M.B.A., F.A.C.E.P.

In 2004, The Joint Commission issued its first accreditation standards—effective January 1, 2005—for managing patient flow.*[1]

The current Leadership Standard, LD.04.03.11, states, "The hospital manages the flow of patients throughout the hospital."[2]

When first issued, the standard served as a call to action for hospitals to focus more formally on patient flow issues. Yet, many hospitals still lack the processes and structures to admit or transfer patients to an inpatient bed on a timely basis. This often results in emergency department (ED) overcrowding,[3-5] because the beds are being used by patients waiting to be admitted. Such overcrowding has been shown to have an adverse effect on patient outcomes and the well-being of health care workers.[6-8]

To address the Joint Commission standard, many hospitals established flow committees to identify the major barriers to patient flow and then embarked on improvement projects focused on these barriers. In our observations, three issues affecting the results from this approach have surfaced, as follows:

1. The improvement projects selected are often not connected to the true bottlenecks identified at the time that problems with patient flow occur.[9]

2. The changes that result from the projects may optimize only part of the system but may not optimize flow throughout the hospital.[10]

3. Few hospitals have the resources or the capability to work on the numerous proposed projects.[11]

Given those issues, in 2006 the Institute for Healthcare Improvement (IHI), in the context of its Improving Hospital-wide Patient Flow Community began developing a method to improve hospitalwide patient flow on the basis of a more

* Standard LD.3.10.10, as it was then known, stated, "The leaders develop and implement plans to identify and mitigate impediments to efficient patient flow throughout the hospital."[13,14]

Article-at-a-Glance

Background: The Joint Commission's accreditation standard on managing patient flow, effective January 2005, served as a call to action for hospitals, yet many hospitals still lack the processes and structures to admit or transfer patients to an inpatient bed on a timely basis. In 2007 the University of Pittsburgh Medical Center (UPMC) at Shadyside, a 526-bed tertiary care hospital, began testing and implementing real-time demand capacity management (RTDC) at an initial pilot site. The hospital had identified improved patient flow as a strategic goal in 2002, but a series of patient flow projects failed to result in improvement.

Implementing RTDC: Standard processes for the four RTDC steps—Predicting Capacity, Predicting Demand, Developing a Plan, and Evaluating a Plan—and standard structures for unit bed huddles and the hospital bed meetings were developed. The neurosurgery (NS) service line's ICU and stepdown unit were designated as the first pilot sites, but work was quickly spread to other units.

Results: Improvements were achieved and have been sustained through early 2011 for all measures, including (1) the unit-based reliability of discharge predictions; (2) overnight holds in the postanesthesia care unit, a problem eliminated two months after RTDC work began; (3) the percentage of patients who left without being seen (LWBS), routinely < 0.5% by May 2008; (5) the emergency department median length of stay for admitted patients, routinely < 4 hours after March 2008; and (6) aggregate length of stay (ALOS), generally maintained at < 5.75 days.

Conclusions: RTDC represents a promising approach to improving hospitalwide patient flow. Its four steps, integrated into current bed management processes, are not an add-on to the work needing to be accomplished everyday.

Real-Time Demand Capacity Management (RTDC): This Is Not Your Typical Hospital-Wide Bed Meeting

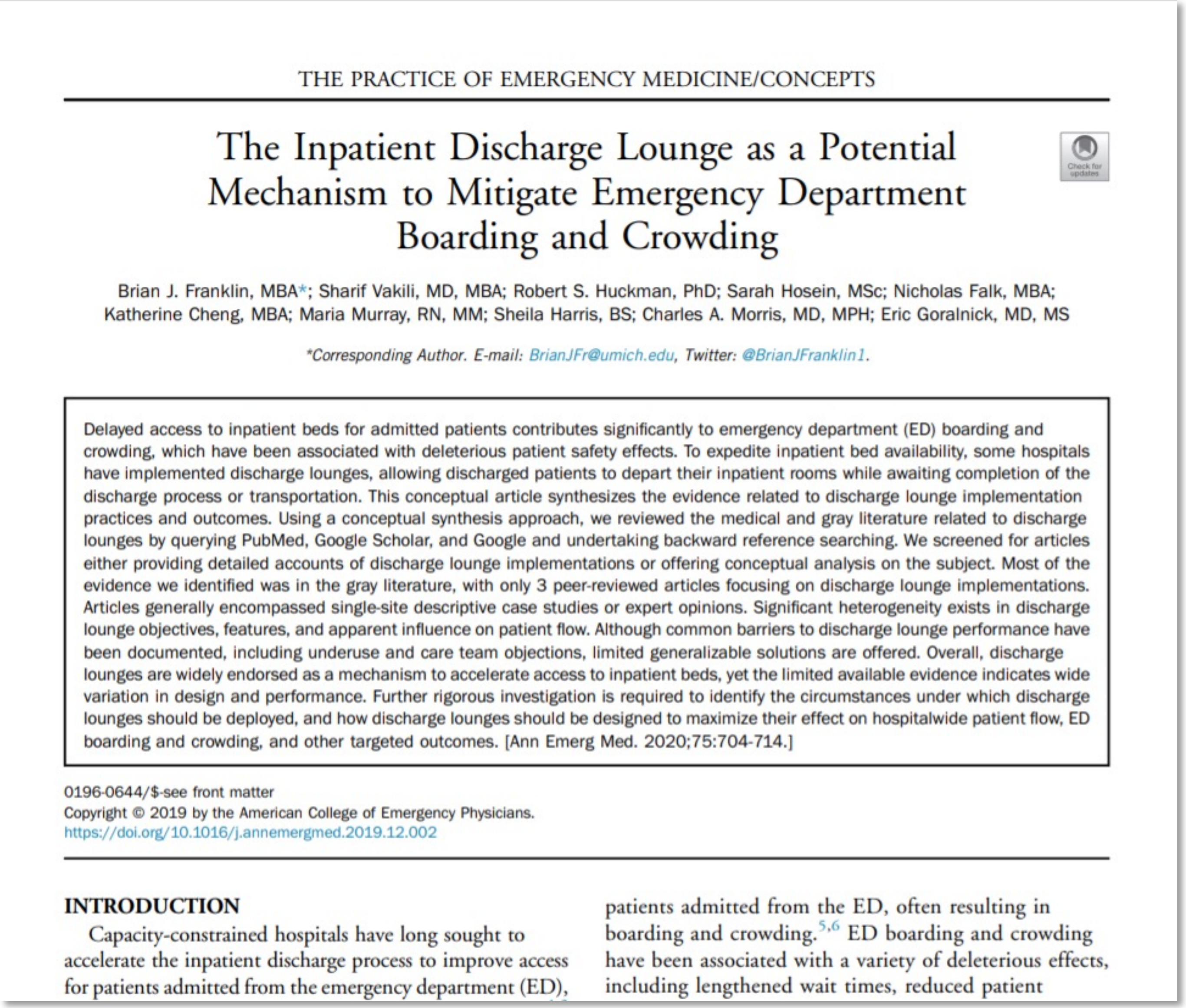
- **Hospitals benefit from an administrative system for flow that:**
  - **Predicts** at a unit level the **capacity** to accept admissions within a designated time period
  - **Predicts** at a unit level the **demand** within a designated time period
  - **Documents a plan** at a unit level if demand is predicted to be greater than capacity
  - **Evaluates the success or failure** of predictions and plans
  - Uses failures and successes of predictions and plans **to develop the key improvement projects to improve flow…**

ORCHESTRATING THE DISCHARGE

BestPractices
LEADERS IN EMERGENCY MEDICINE

Scheduling and Orchestrating the Discharge: An Alternative to "Everyone Out at Ten!"
By Kirk B. Jensen, MD

In many hospitals, a rallying cry of "Everyone out by 10 a.m.!" drives the patient discharge system. Yet despite the frantic morning rush this directive creates for the staff, data shows that most patients do not go home until late afternoon. Why? First, the processes involved in discharging a patient are complex and time-consuming, requiring action from the dietary, pharmacy, respiratory therapy, nursing, and other hospital departments. When the schedule demands that all these processes be completed throughout the hospital at the same time, a bottleneck forms that can create delays throughout the system—from the emergency department to the ICU to rehab. Often, the discharge work is not completed on time due to delayed lab work, no physician discharge orders, or communication breaks down as each department acts independently of the others, following its own procedures. The whole process may not be well planned, resulting in a disorganized sequence of events. The consequent delays slow or stop the flow of patients through the hospital. As they currently operate, most hospital flow systems are push systems: patients are pushed through as staff tries to coordinate a complex series of events on a schedule impossible to meet.



The Inpatient Discharge Lounge as a Potential Mechanism to Mitigate Emergency Department Boarding and Crowding

Brian J. Franklin, MBA*; Sharif Vakili, MD, MBA; Robert S. Huckman, PhD; Sarah Hosein, MSc; Nicholas Falk, MBA; Katherine Cheng, MBA; Maria Murray, RN, MM; Sheila Harris, BS; Charles A. Morris, MD, MPH; Eric Goralnick, MD, MS

*Corresponding Author. E-mail: BrianJFr@umich.edu, Twitter: @BrianJFranklin1.

Delayed access to inpatient beds for admitted patients contributes significantly to emergency department (ED) boarding and crowding, which have been associated with deleterious patient safety effects. To expedite inpatient bed availability, some hospitals have implemented discharge lounges, allowing discharged patients to depart their inpatient rooms while awaiting completion of the discharge process or transportation. This conceptual article synthesizes the evidence related to discharge lounge implementation practices and outcomes. Using a conceptual synthesis approach, we reviewed the medical and gray literature related to discharge lounges by querying PubMed, Google Scholar, and Google and undertaking backward reference searching. We screened for articles either providing detailed accounts of discharge lounge implementations or offering conceptual analysis on the subject. Most of the evidence we identified was in the gray literature, with only 3 peer-reviewed articles focusing on discharge lounge implementations. Articles generally encompassed single-site descriptive case studies or expert opinions. Significant heterogeneity exists in discharge lounge objectives, features, and apparent influence on patient flow. Although common barriers to discharge lounge performance have been documented, including underuse and care team objections, limited generalizable solutions are offered. Overall, discharge lounges are widely endorsed as a mechanism to accelerate access to inpatient beds, yet the limited available evidence indicates wide variation in design and performance. Further rigorous investigation is required to identify the circumstances under which discharge lounges should be deployed, and how discharge lounges should be designed to maximize their effect on hospitalwide patient flow, ED boarding and crowding, and other targeted outcomes. [Ann Emerg Med. 2020;75:704-714.]

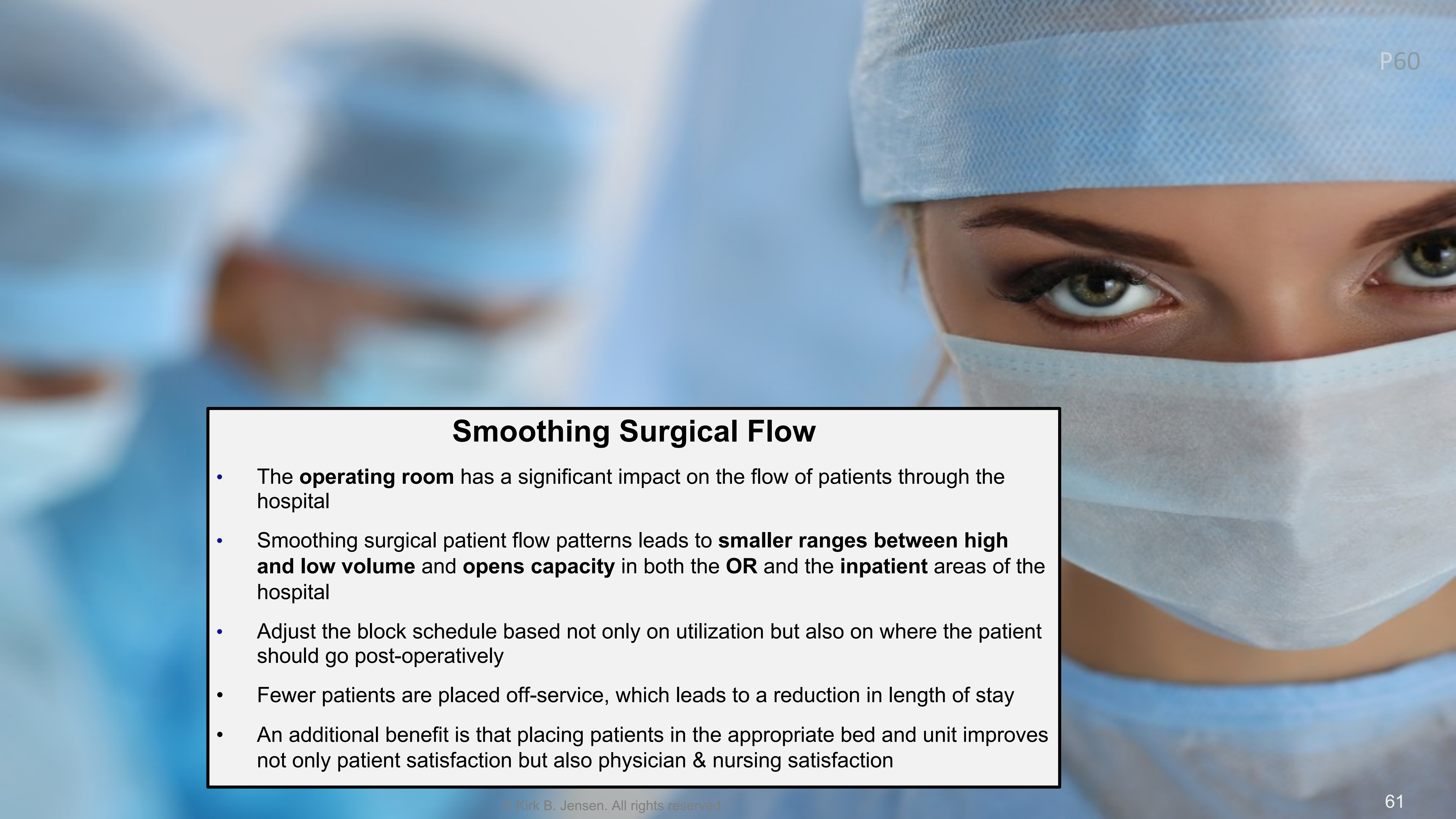
0196-0644/$-see front matter

https://doi.org/10.1016/j.annemergmed.2019.12.002

INTRODUCTION

Capacity-constrained hospitals have long sought to accelerate the inpatient discharge process to improve access for patients admitted from the emergency department (ED), patients admitted from the ED, often resulting in boarding and crowding.[5,6] ED boarding and crowding have been associated with a variety of deleterious effects, including lengthened wait times, reduced patient

Flow, Surgery And Anesthesia



Smoothing Surgical Flow

- The **operating room** has a significant impact on the flow of patients through the hospital
- Smoothing surgical patient flow patterns leads to **smaller ranges between high and low volume** and **opens capacity** in both the **OR** and the **inpatient** areas of the hospital
- Adjust the block schedule based not only on utilization but also on where the patient should go post-operatively
- Fewer patients are placed off-service, which leads to a reduction in length of stay
- An additional benefit is that placing patients in the appropriate bed and unit improves not only patient satisfaction but also physician & nursing satisfaction

Surgery - Fundamental Change Concepts:

- ❑ Dedicate a room for unscheduled surgeries
- ❑ Develop and enforce scheduling procedures
- ❑ Place cases with unpredictable length in a separate room or at the end of the day
- ❑ Stagger surgery case start times
- ❑ Standardize room set-up and prepare commonly used drugs, equipment, supplies, etc. ahead of time
- ❑ Use historical data to establish surgical schedules (i.e. case length)
- ❑ Complete all pre-op work before start time
- ❑ Synchronize case start time to an agreed upon point in time (e.g. incision time)
- ❑ Designate “on-call” staff to help alleviate unexpected high demand situations
- ❑ Use an RN perioperative facilitator to streamline and manage the room transition process
- ❑ Use admission/discharge criteria to ensure appropriate post-op patient placement
- ❑ Use an OR room cleaning and turnaround strategy

Maximizing OR Resource Utilization & ROI

- Operating rooms generate about 42 percent of a hospital's revenues.
- Data suggest this figure could be higher.
- Increasing throughput offers substantial opportunity.
- A recent industry study shows that *the average OR runs at only 68 percent capacity.*
- And because many OR resources can be considered "fixed" expenses, improving throughput by just one additional procedure per day per OR suite can generate anywhere from $4 million to $7 million in additional annual revenue for the average-sized organization.

Moving From This…

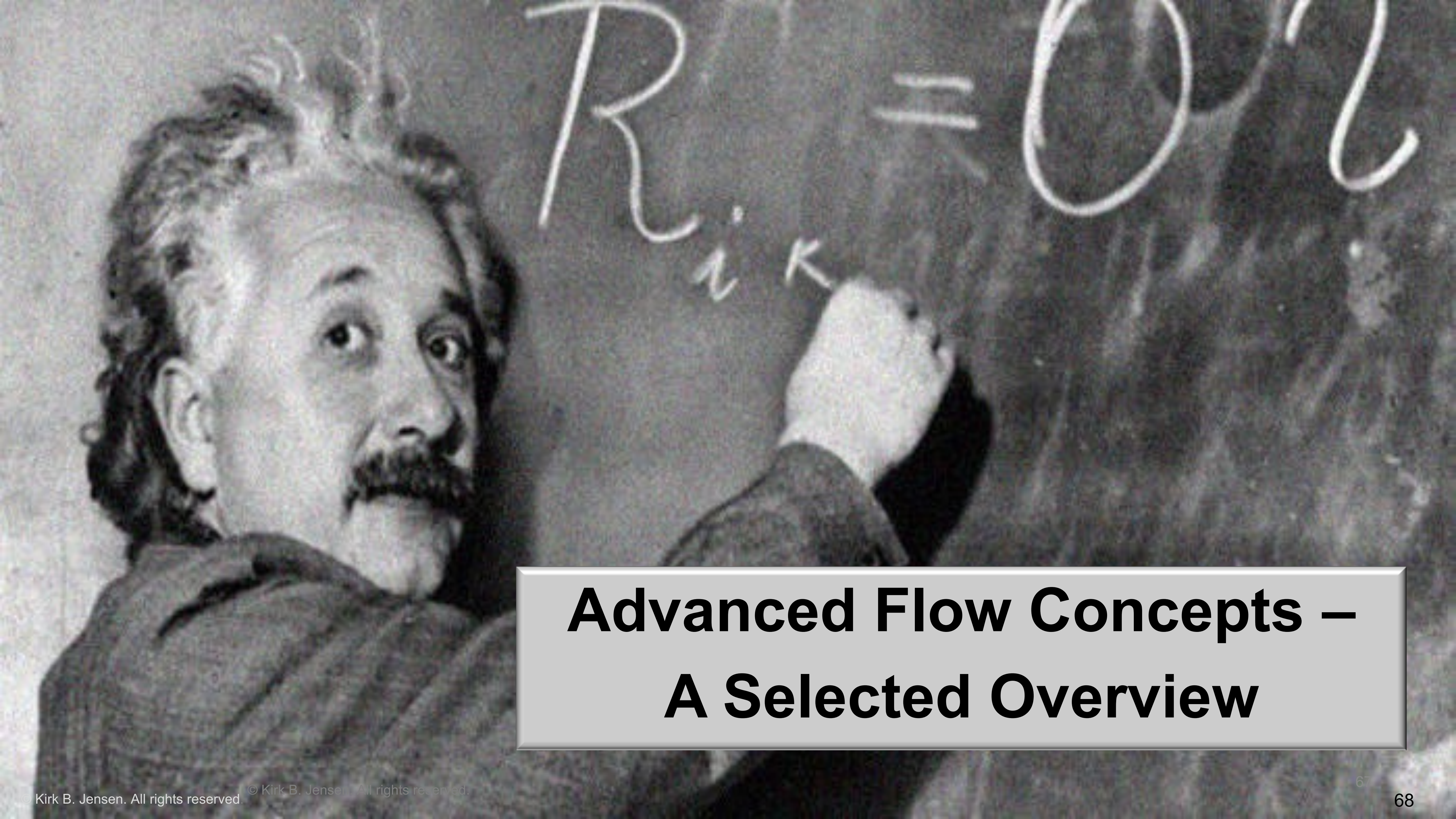
To This…

Only by Working Together…

~~…Can We Hope To~~

Optimize Flow Into, Through, And Out Of The Hospital & Our Healthcare Systems…

A Brief Pause…



Advanced Flow Concepts – A Selected Overview

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The Science of ED Operations Management as a Route to Operational Excellence…

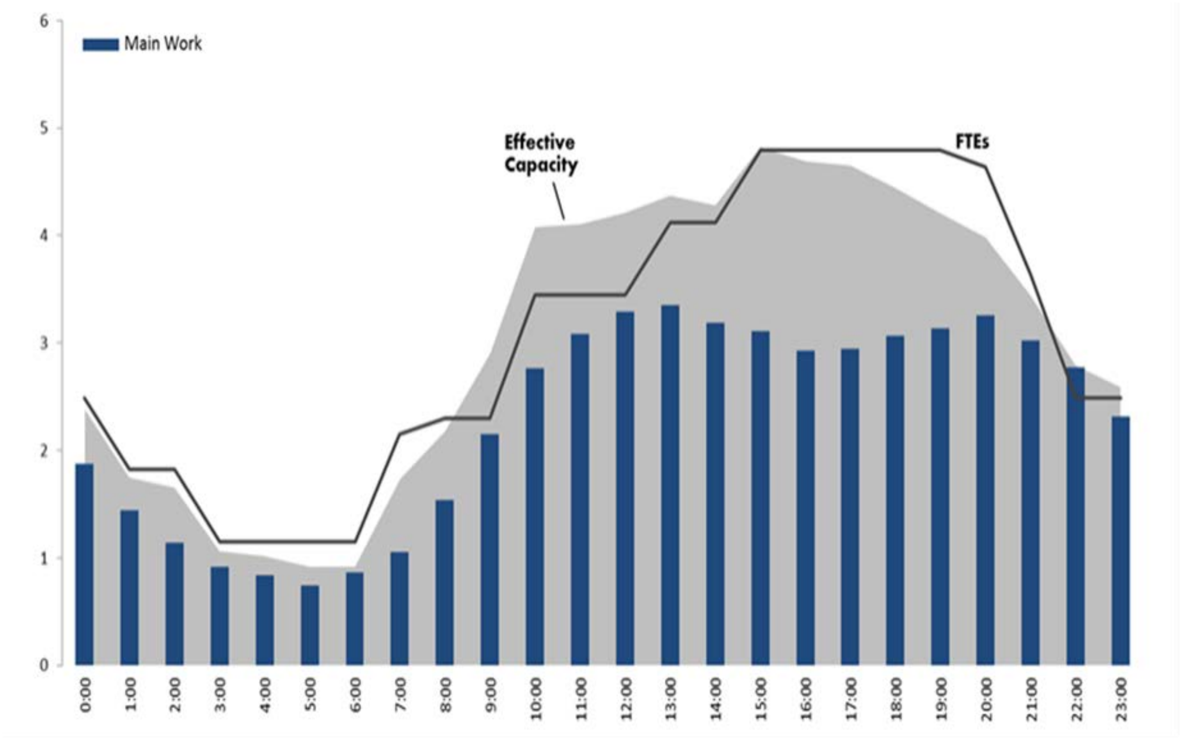
- **Get clear about the key drivers of system performance:**
  - Demand - Capacity management
  - Queuing
  - Variation
- **Define the high-leverage interventions:**
  - Theory of Constraints
- **Deploy a method for improvement**: Lean, Six Sigma, TQM…
- **Where waiting exists** - applying ***The Psychology of Waiting Lines***

Demand-Capacity Management Is Of Paramount Importance…

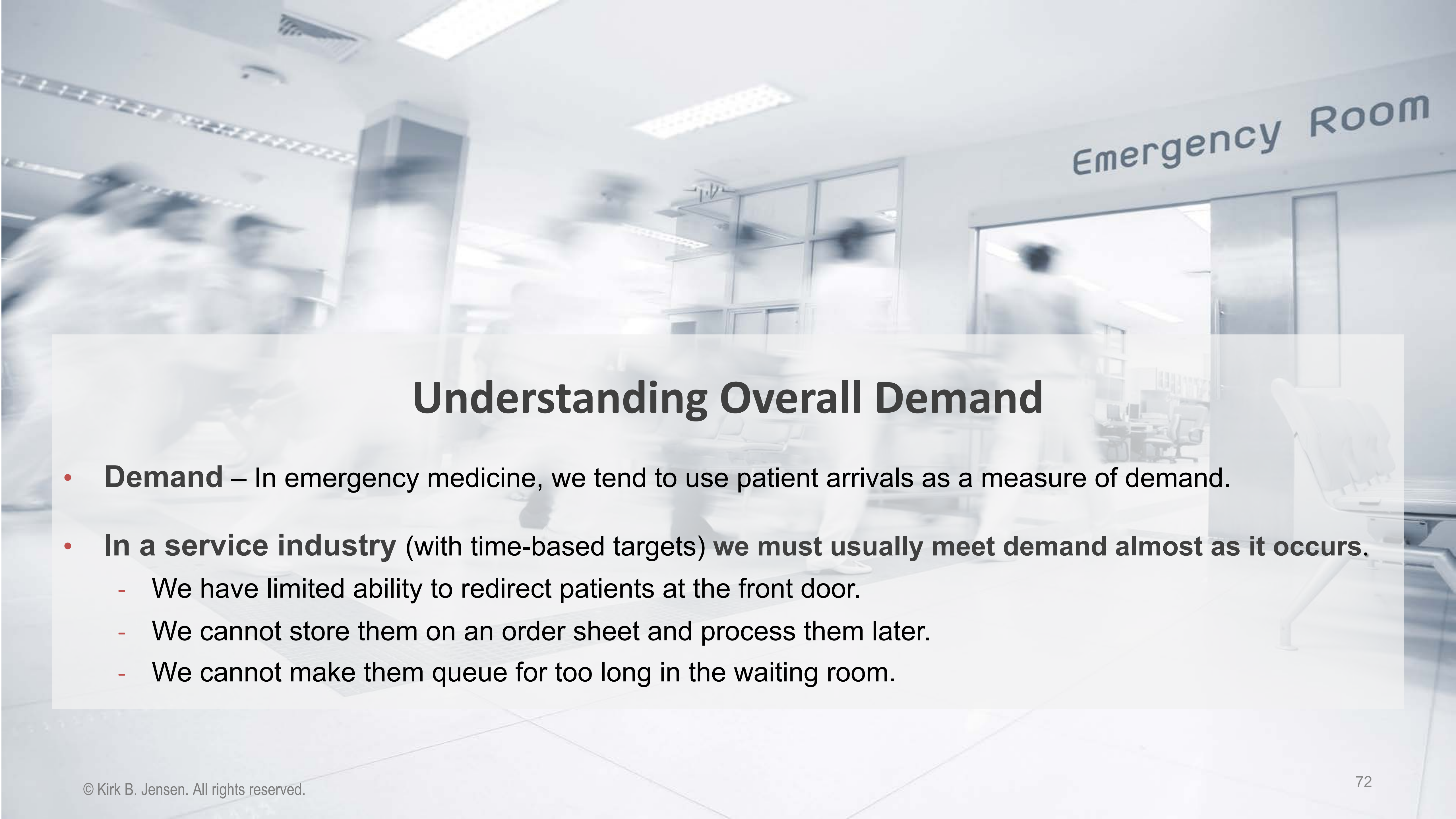
Demand & Capacity – Planning

- Demand: the number of requests for a service, task, skill or machine.

- Capacity is the maximum level of value-added activity that a process can achieve under normal operating conditions over time.



The Capacity Of The ED Is Largely A Function Of Its 4Ss
Staff – Space – Supplies – Systems



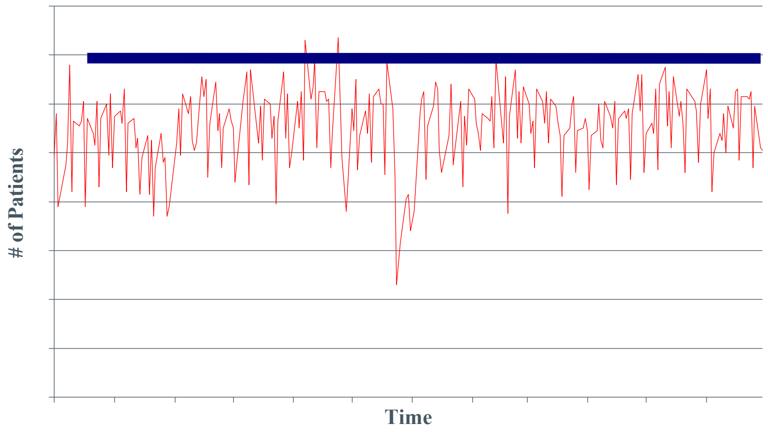
Understanding Overall Demand

- **Demand** – In emergency medicine, we tend to use patient arrivals as a measure of demand.
- **In a service industry** (with time-based targets) **we must usually meet demand almost as it occurs.**
  - We have limited ability to redirect patients at the front door.
  - We cannot store them on an order sheet and process them later.
  - We cannot make them queue for too long in the waiting room.

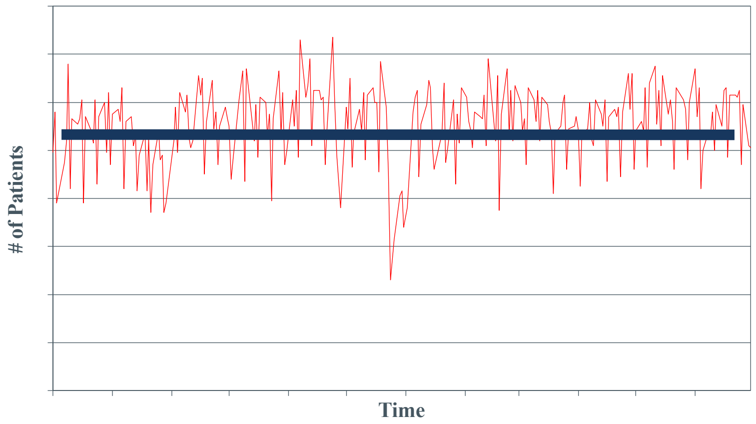
Arrival Volume, Acuity and Variation as Key Drivers of Staffing…

Demand/Capacity Management

What staffing level is needed to consistently provide safe and quality care?



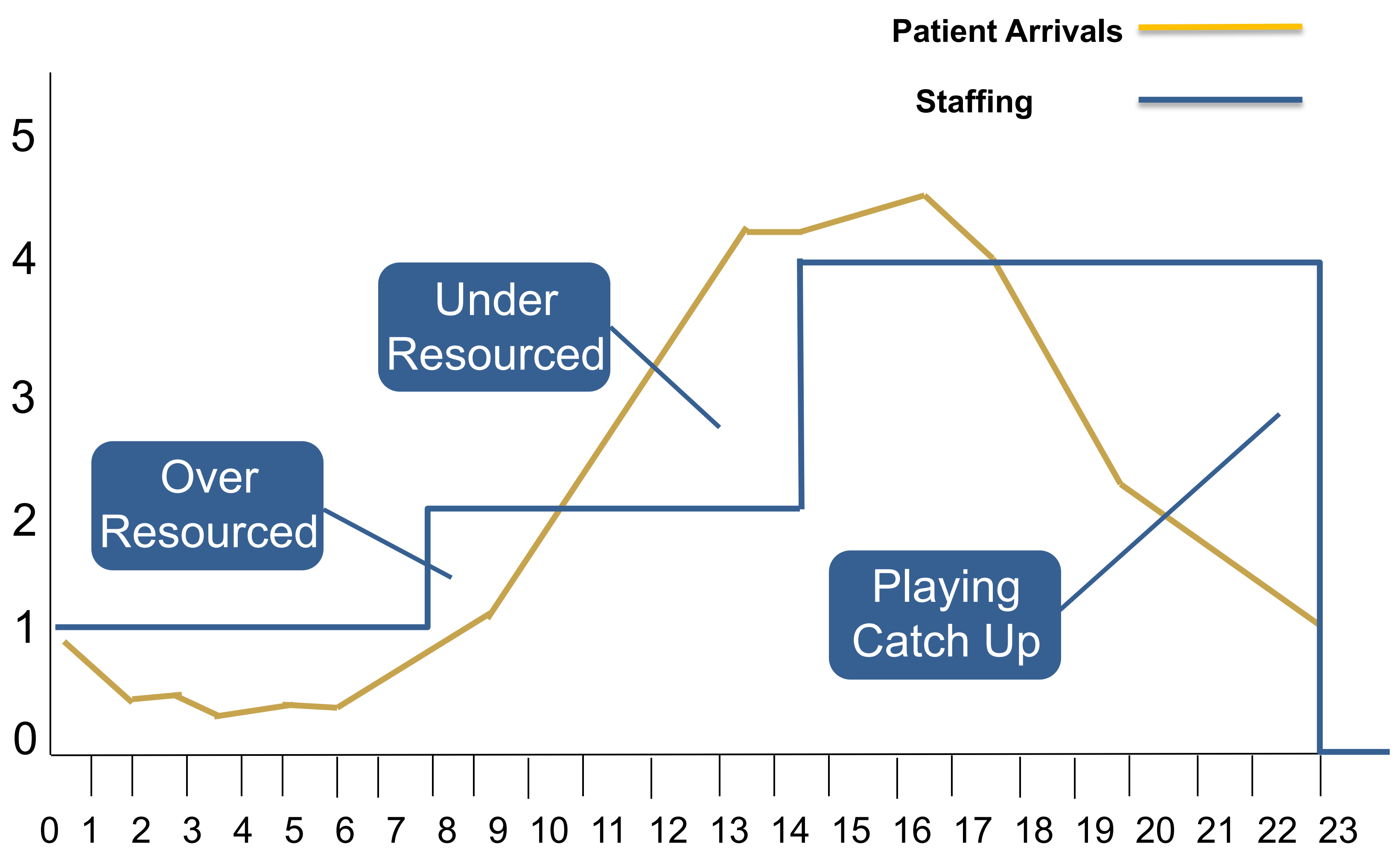
Staffing for >95% census/occupancy



Staffing for average census/occupancy

Eugene Litvak, PhD, Institute for Healthcare Optimization

Demand-Capacity Modeling & Management: Patient Arrivals (Demand) vs. Staffing (Capacity)



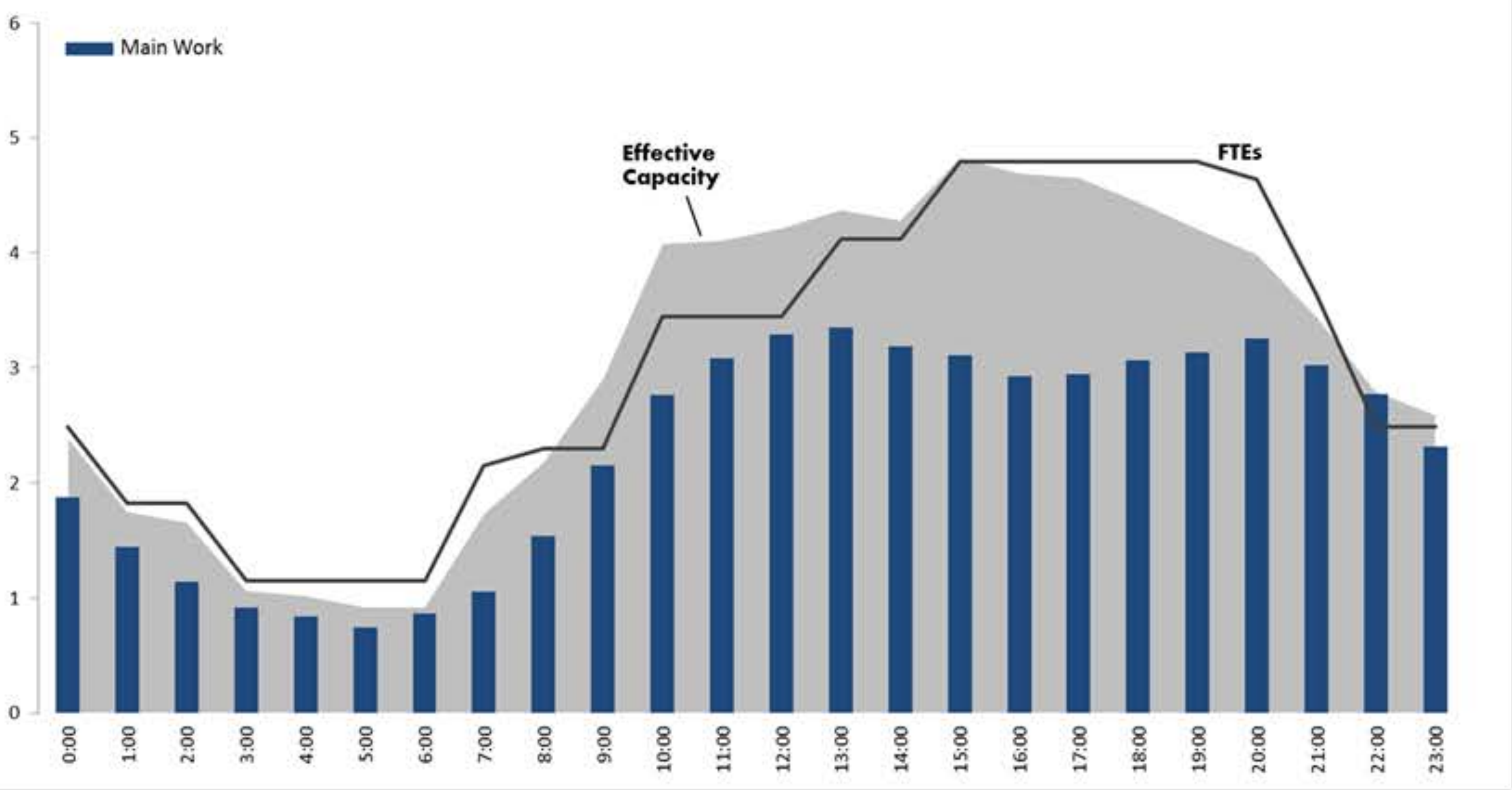
Patient Flow Is Predictable…

Who's Coming, When Are They Coming,
And What Are They Going To Need…

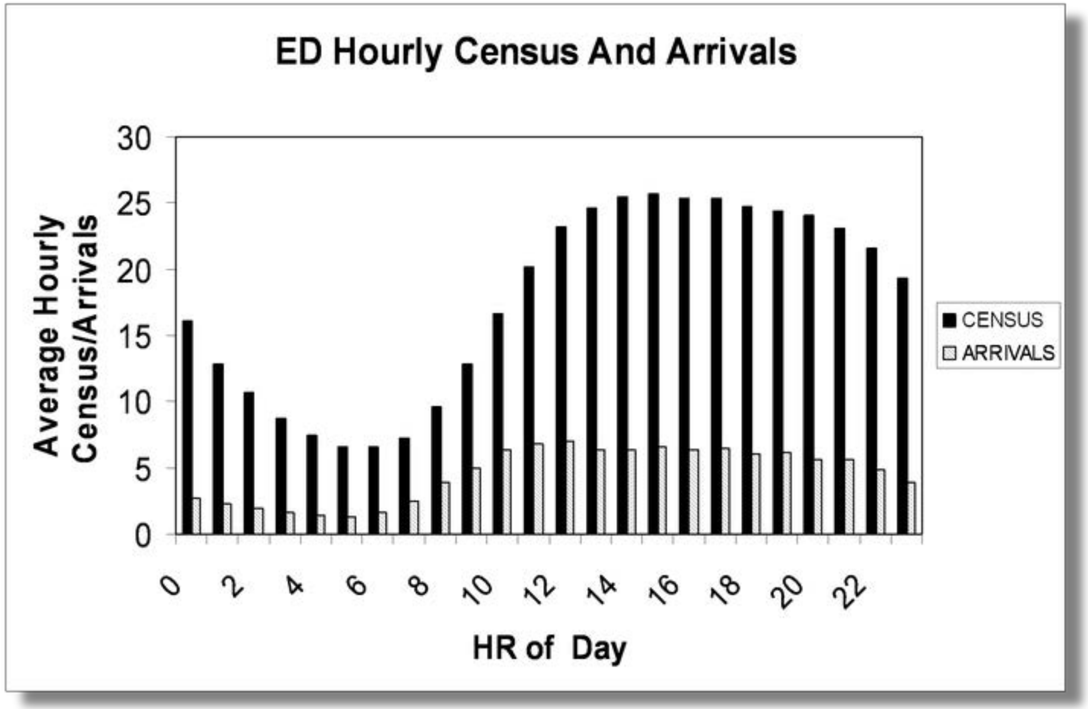
One needs to understand demand (volume and complexity) by hour of the day (HOD), day of the week (DOW), and by season (if applicable)…

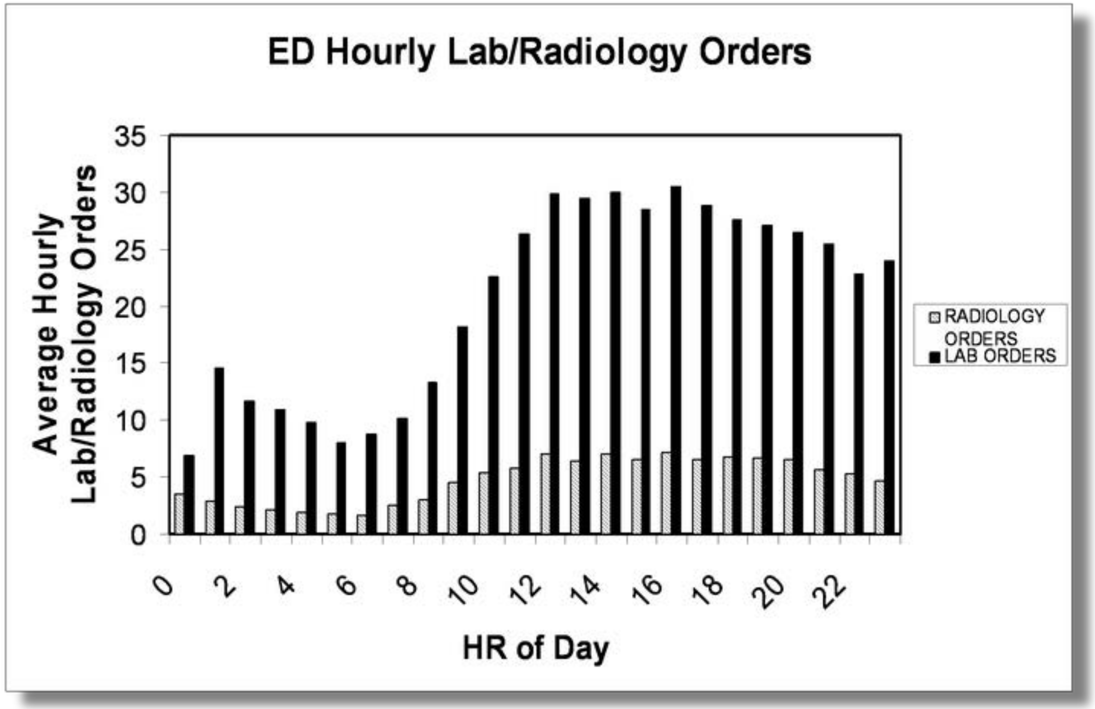
Demand-Capacity Management:

Modeling and Matching Staffing (Capacity) to Predicted Patient Arrivals (Demand)



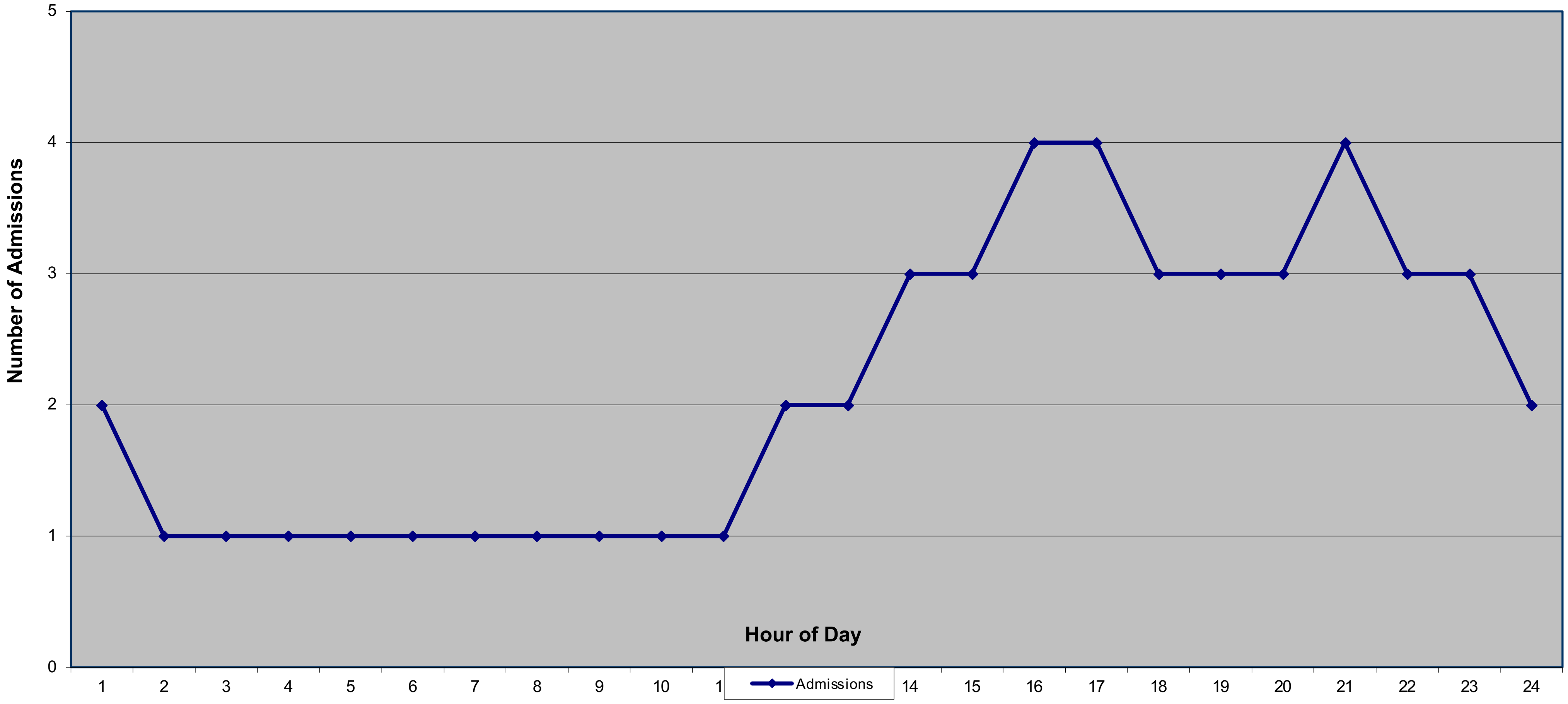
Patient Flow is Predictable-
Classic ED Patient Flow Demand Curves





Scientific Management - Planning for Admissions

Forecasting Hospital Admissions from the ED by HOD



Key Questions:

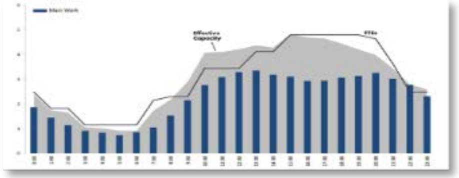
- How many patients are coming?
- When are they coming?
- What are they going to need?
- Is our service capacity going to match patient demand?

And what are we/you going to do about it if it doesn't?...

Demand-Capacity (DCM) Analysis – Key Questions in More Detail…

- With the appropriate use of Demand-Capacity Management (DCM) analytics and tools, the ED operations team is best equipped to answer the following questions*:
  - How many physicians, APPs, and scribes do I need to meet the demand of incoming patients?
  - How many nurses do I need to meet the demand of incoming patients?
  - How many beds do I need in my department to meet the demand of incoming and boarded patients?
  - Do I have the right staffing levels, staffing mixes, and staffing hours?
  - How do scribes & techs optimize physician, APP, and nursing productivity?
  - Is there an opportunity to operationalize a Fast Track/Low-Acuity Track or some other Front-End Patient Flow model?

*The suggestions should be based off arrivals, acuity, and productivity by hour of the day (HOD) and day of the week (DOW), and even by season of the year…as well as service times and targeted performance measures.



Remember, We Can’t Store Service Capacity…

Queuing and Queuing Systems

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

A "**queuing system**" is one where customers arrive at undetermined, but normally distributed, times. Classic examples include call centers, grocery lines, and emergency departments.

Queueing System

A queueing system combines the components of arrival time, service time, and the number of servers allowing one to model (predictive modeling or forecasting…) demand and capacity, as well as characterizing the impact of natural variation.

Queuing Parameters:

Number of Servers (n)

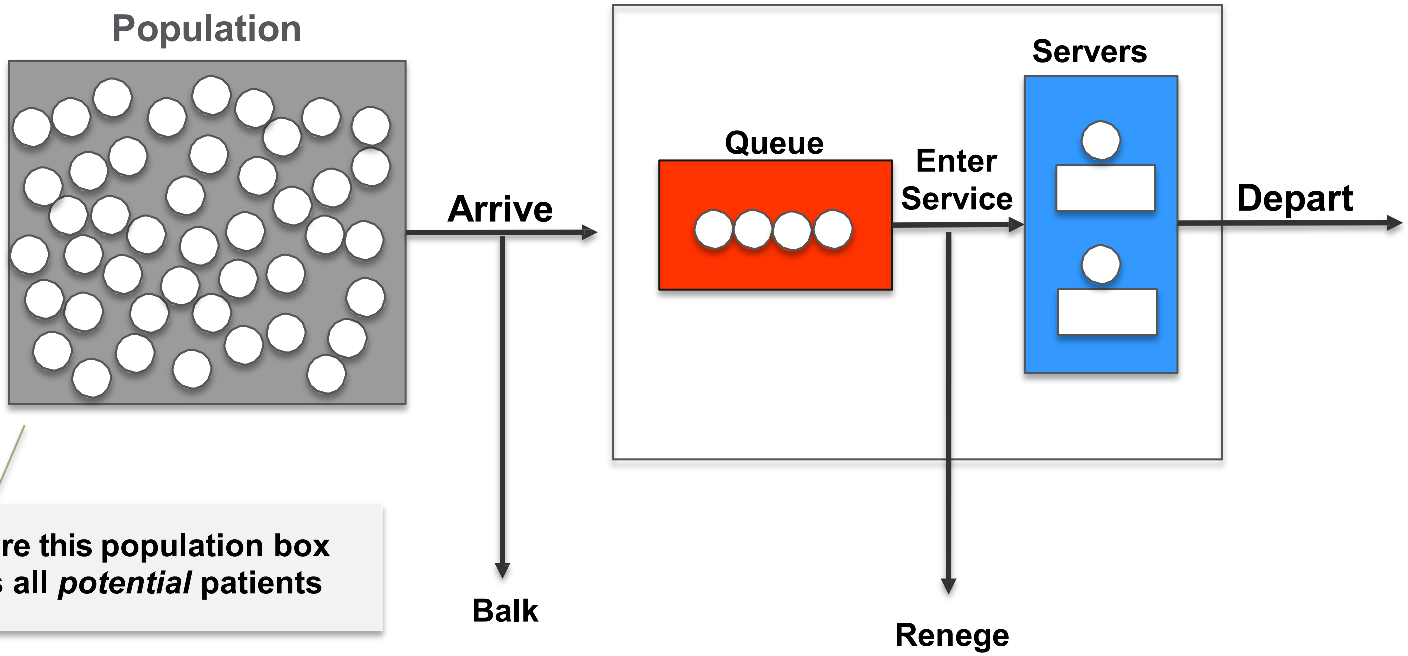
Average Arrival Rate (λ)

Average Service Rate (μ)

The key servers in the emergency department are beds, clinicians, and nurses

Patient Velocity – the rate at which patients are treated

Queuing System

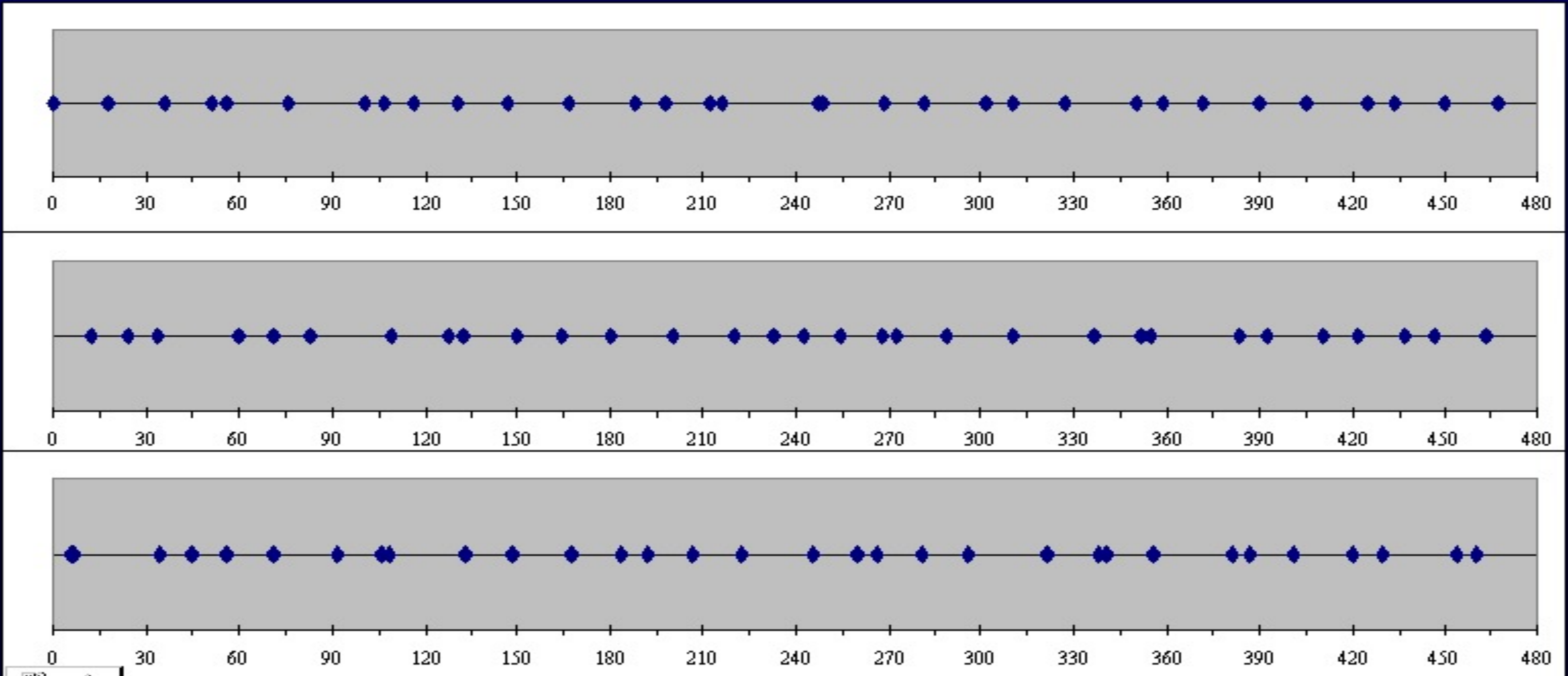


In healthcare this population box represents all *potential* patients

Queuing:

- **A queue is due to the combination of the <u>queue</u> (<u>demand sitting in the waiting room</u>), patients undergoing assessment or treatment (<u>patients in process</u>), and patients waiting for beds (<u>exit block</u>).**
- **Patients in any of these groups constitute <u>work in progress</u>.**
- **By the time queues have built up they are hard to clear.**
- **Stopping queues building up, making processes more efficient and reducing <u>exit block</u> will all increase effective capacity.**

Day Clinic - Patient Arrival examples



Courtesy: Chuck Noon, PhD, PEMBA UTK

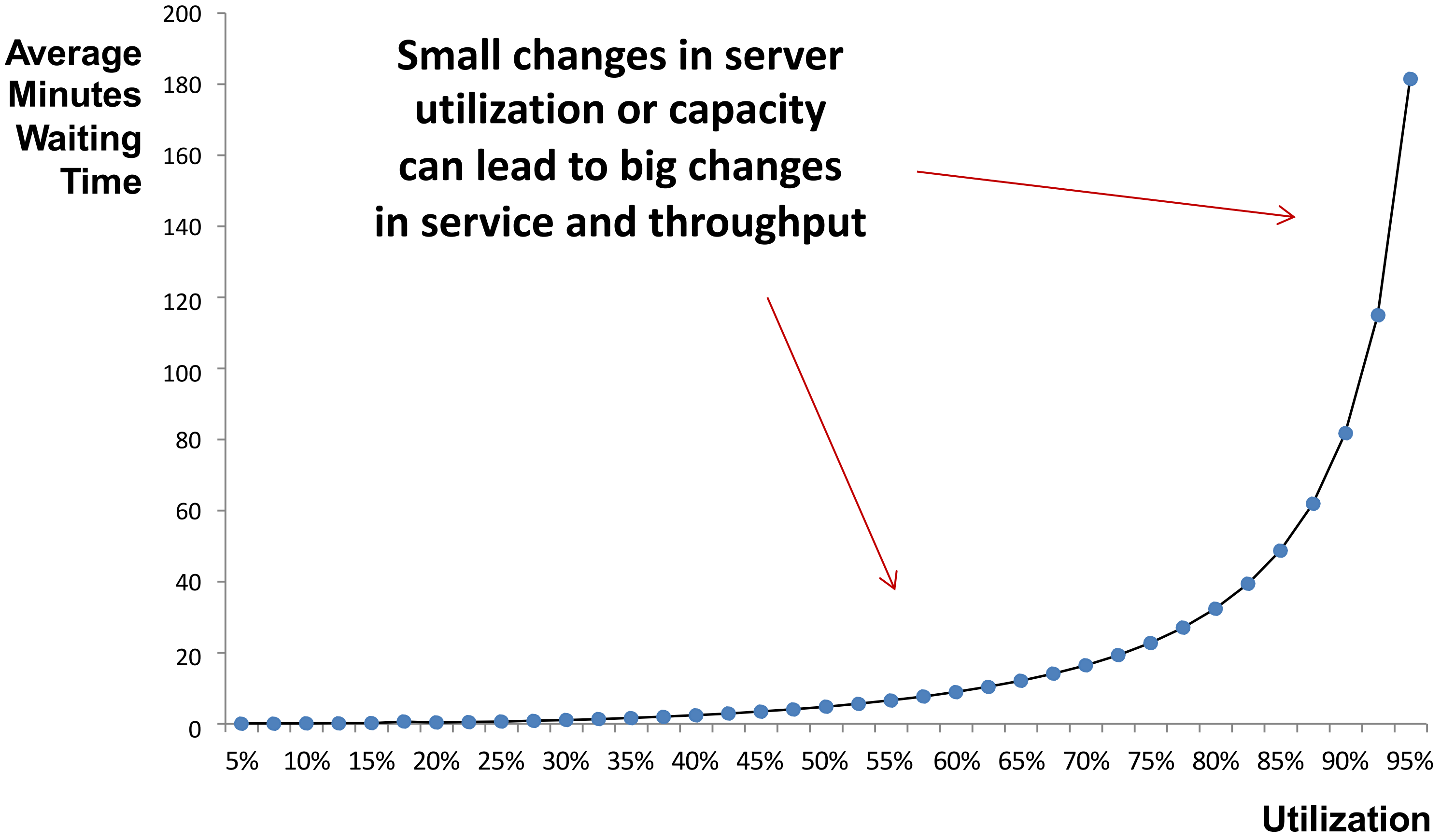
The Relationship between Waiting Time and Utilization

Queuing Systems Have Distinct Characteristics

- Systems serving unscheduled (uncontrolled) arrivals behave in a characteristic fashion.
- When (patient) inflow and service times are random, their response to increasing utilization is non-linear.
- As utilization rises above 80-85%, waits and rejections increase exponentially.

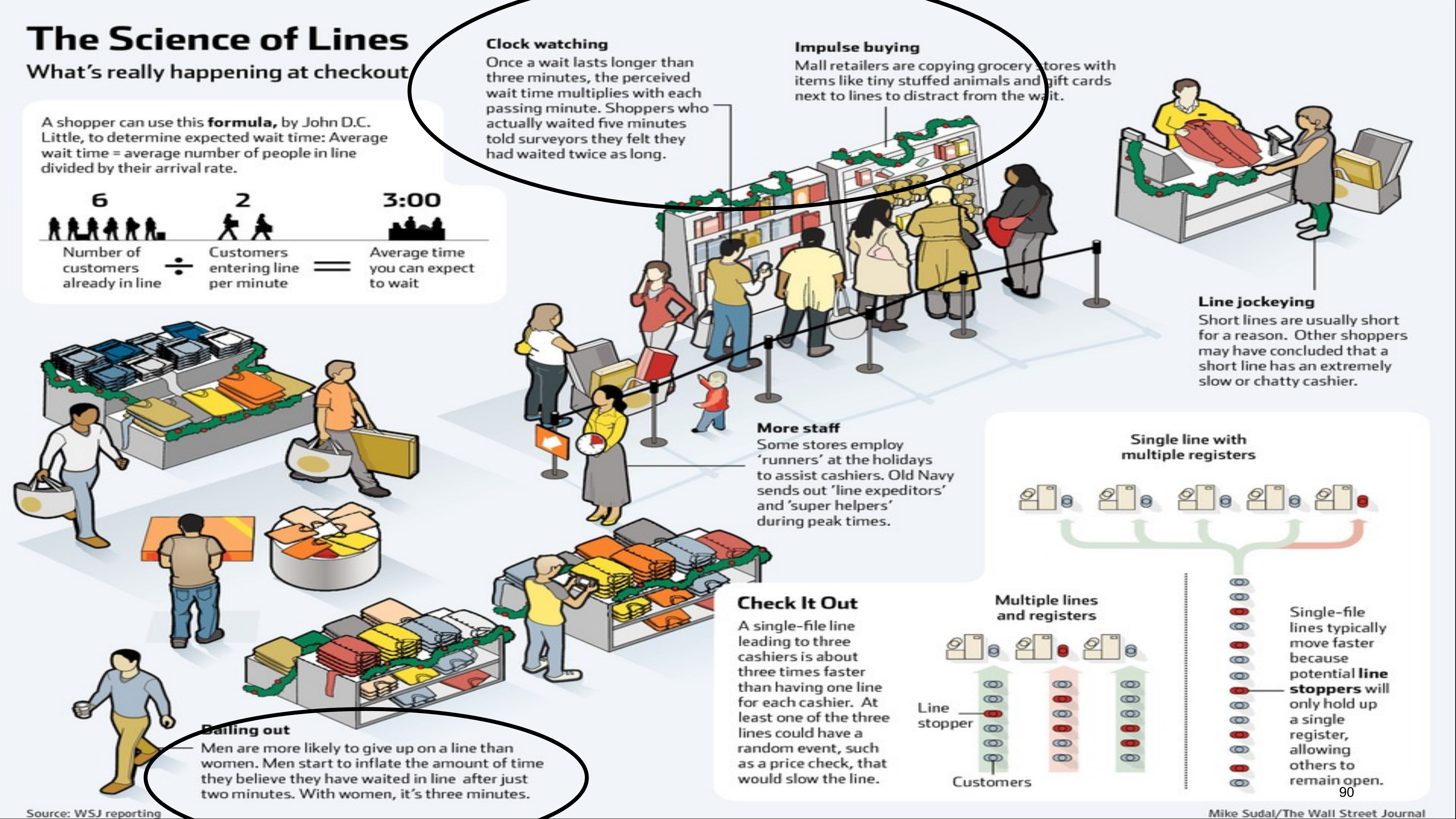
At high levels of utilization small changes can lead to big improvements…

As utilization approaches 100% waiting times for the server increase in a *highly non-linear fashion.*

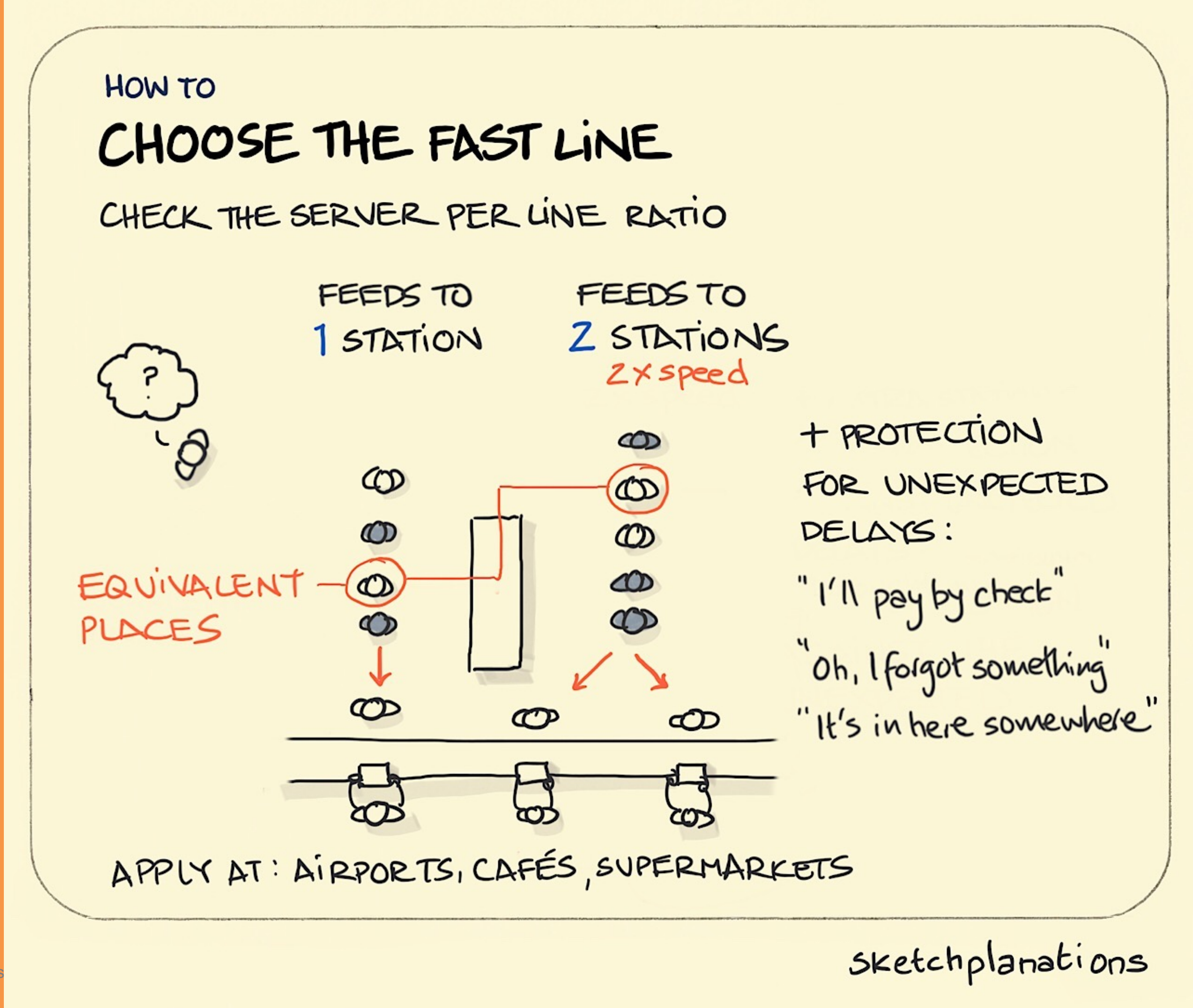


Queuing Systems Have Distinct Characteristics

- In a queuing system, the waiting time for the key server(s) skyrockets as the number of arrivals per hour approaches system/server capacity.
- At high levels of utilization small changes can lead to big improvements in service…
- A queue will persist until ongoing capacity is sufficient to deal with both <u>ongoing demand</u> and <u>the backlog</u>.
- When staffing for a queuing system, and accommodating for variation, it is critical to target, on average, a <u>utilization of approximately 80% - 85%</u>,

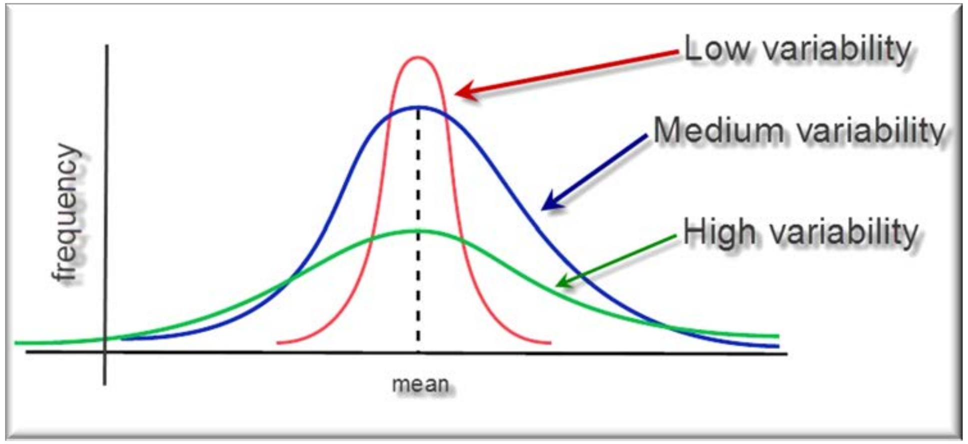


The Science of Lines
What's really happening at checkout
Clock watching
Once a wait lasts longer than three minutes, the perceived wait time multiplies with each passing minute. Shoppers who actually waited five minutes told surveyors they felt they had waited twice as long.
Impulse buying
Mall retailers are copying grocery stores with items like tiny stuffed animals and gift cards next to lines to distract from the wait.
A shopper can use this formula, by John D.C. Little, to determine expected wait time: Average wait time = average number of people in line divided by their arrival rate.
6
2
3:00
Number of customers already in line
÷
Customers entering line per minute
=
Average time you can expect to wait
Line jockeying
Short lines are usually short for a reason. Other shoppers may have concluded that a short line has an extremely slow or chatty cashier.
More staff
Some stores employ 'runners' at the holidays to assist cashiers. Old Navy sends out 'line expeditors' and 'super helpers' during peak times.
Single line with multiple registers
Check It Out
A single-file line leading to three cashiers is about three times faster than having one line for each cashier. At least one of the three lines could have a random event, such as a price check, that would slow the line.
Multiple lines and registers
Line stopper
Customers
Single-file lines typically move faster because potential line stoppers will only hold up a single register, allowing others to remain open.
Bailing out
Men are more likely to give up on a line than women. Men start to inflate the amount of time they believe they have waited in line after just two minutes. With women, it's three minutes.
Source: WSJ reporting
Mike Sudal/The Wall Street Journal


HOW TO
CHOOSE THE FAST LINE
CHECK THE SERVER PER LINE RATIO
?
FEEDS TO
1 STATION
FEEDS TO
2 STATIONS
2x speed
+ PROTECTION FOR UNEXPECTED DELAYS:
"I'll pay by check"
"Oh, I forgot something"
"It's in here somewhere"
EQUIVALENT PLACES
APPLY AT: AIRPORTS, CAFÉS, SUPERMARKETS
sketchplanations

Variation

You must plan for and manage variability…(Unless you have unlimited capacity…)



Sources of Variation

- Demand
- Capacity
  - Clinical variability
  - Flow & Process variability
  - Professional variability
    - Staff – hours, mix, capabilities, speed..

Variability in a Queuing System

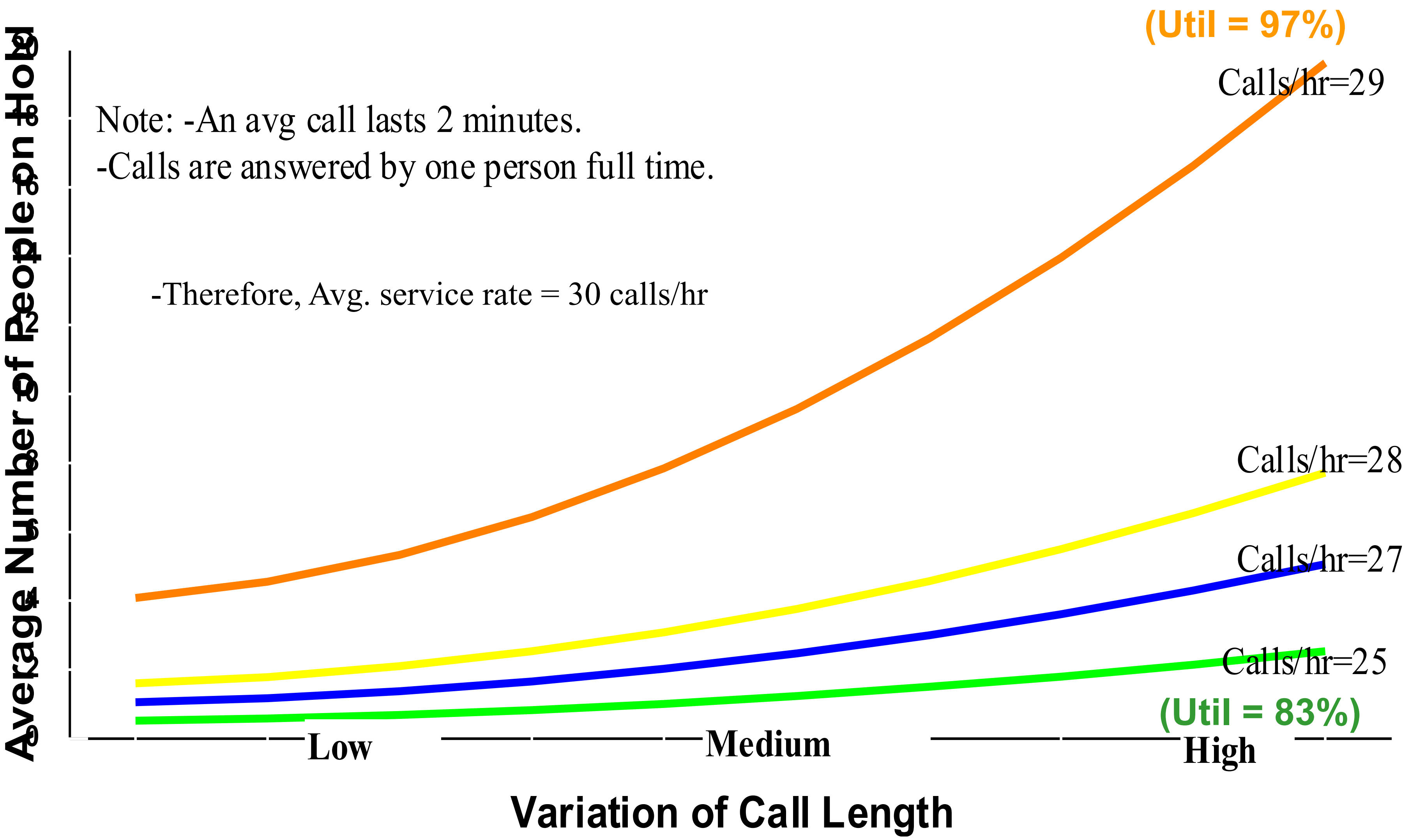
An Example:
The Performance of a Telephone Answering System

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

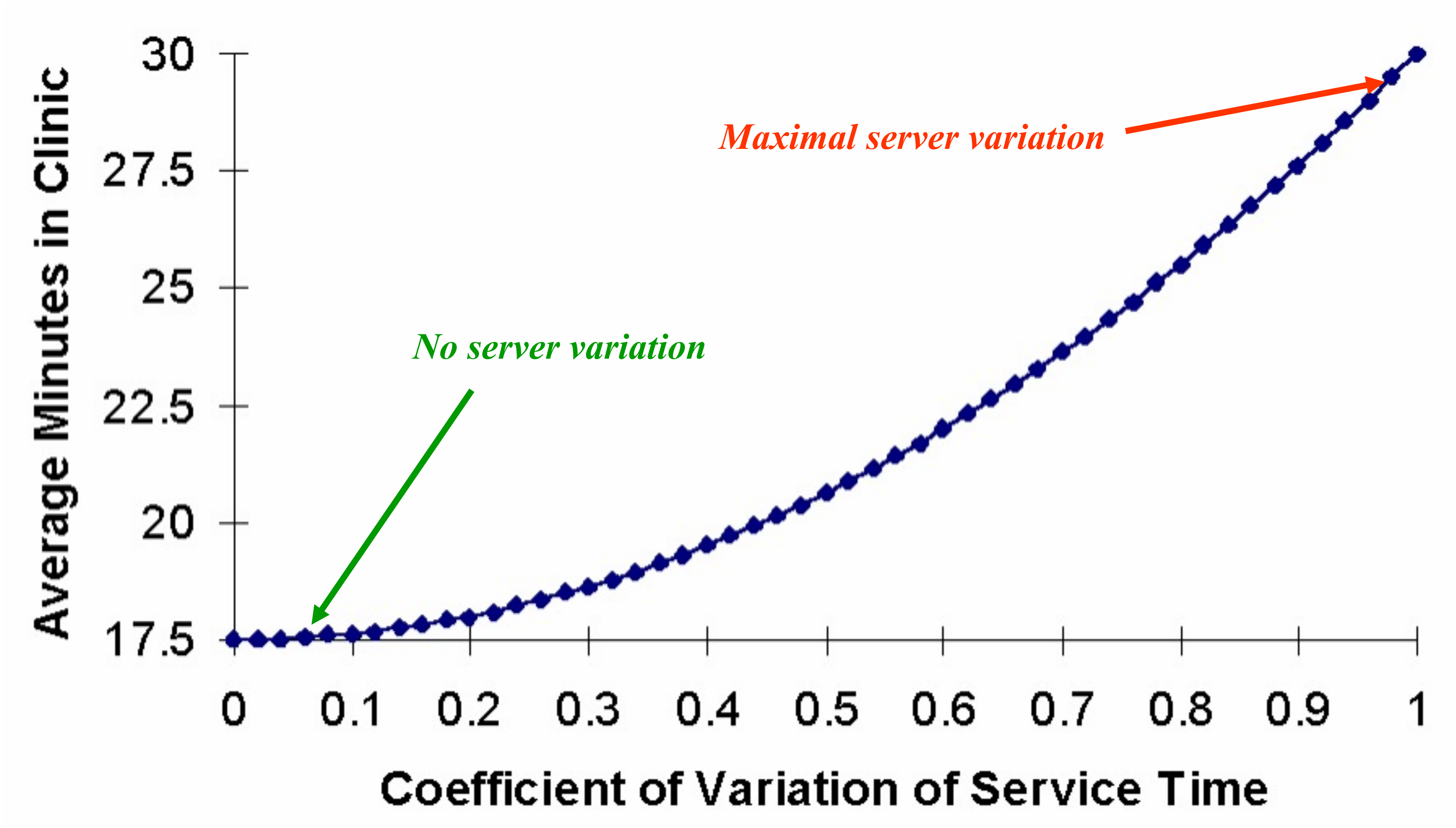
Question: Can the system handle 30 calls an hour without putting people on hold?

Effect of Variation on Queues

Performance of a Telephone Answering System



Walk-in (Unscheduled) Urgent Care: Arrival Rate of 10/hour, Service Rate of 12/hour, and Server Utilization of 83.33%

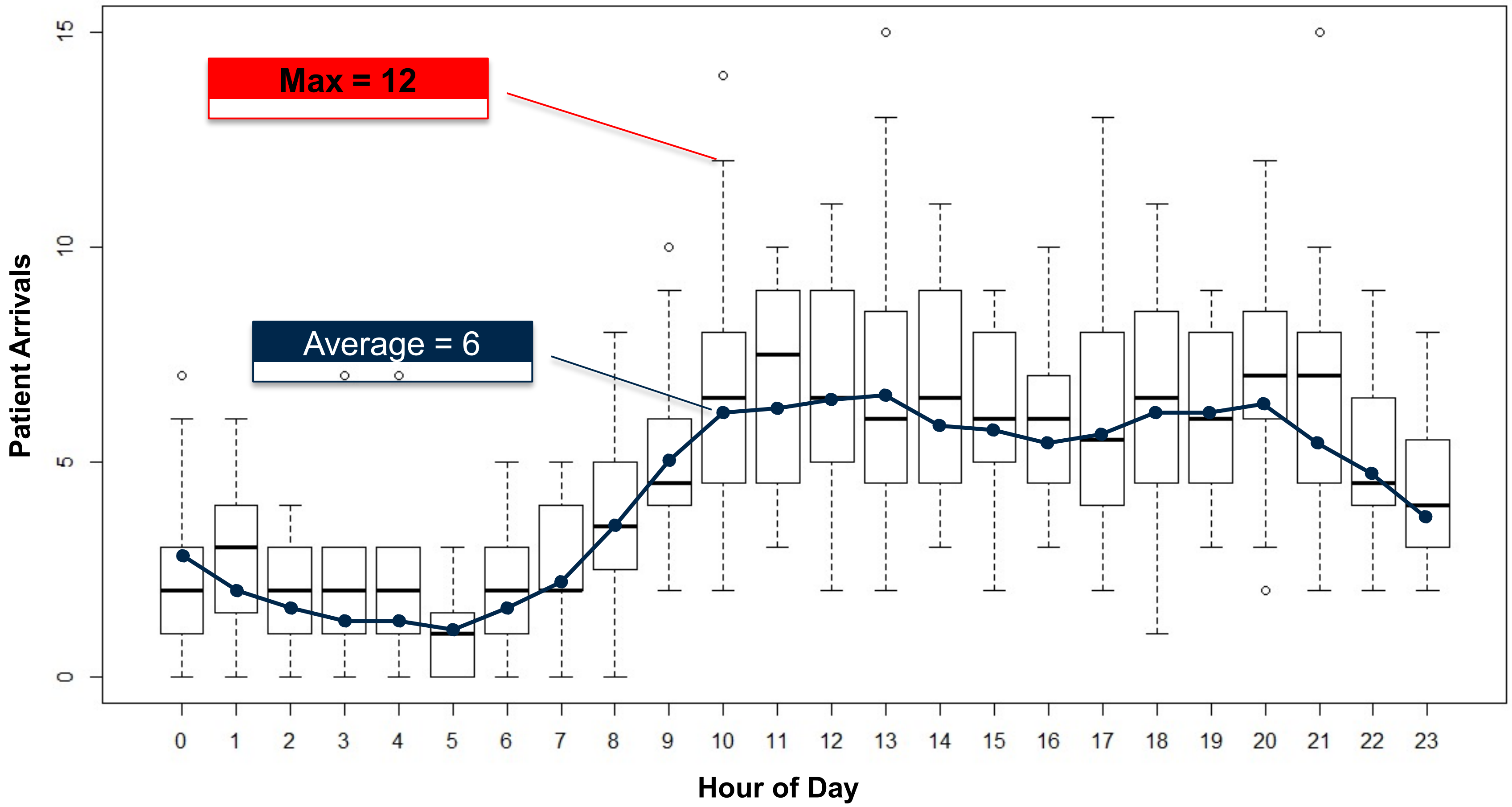


Chuck Noon, PhD UTK PEMBA

Variation In Our Arrivals…

The role that **variation** plays in congestion and delay in the emergency department is well known, **but is typically ignored** in day-to-day planning and scheduling.

The common practice of **"staffing to averages"** in the emergency department often leads to an overworked staff and inordinate waiting times for our patients.



Artificial Controllable Variation vs. Natural Statistical Variation

As managers it is important to distinguish between the two different types of variation. Much variation is due to non-valued added activities and inefficient processes that can be controlled. However, there are other types of variation outside of our control that are often overlooked and not well understood. All variation should considered in decision making.

- **Artificial Controllable Variation** – non-random, non-predictable variation which, in many cases, is preventable. Unlike natural variation, it should *not* be managed. Rather, it should be identified and eliminated/reduced.
  - **The *human factor***: Artificial variation is often affected by human actions, individual preference, and artificial "rules" created by humans

- **Natural Statistical Variation** – statistical variation inherent in any process. It cannot be eliminated or even reduced. Instead, it must be properly managed.
  - Three Types of Natural Variability
    1. Patient Flow (arrival time variation)
    2. Clinical Presentations (service time variation)
    3. Professional Variability (service time variation)

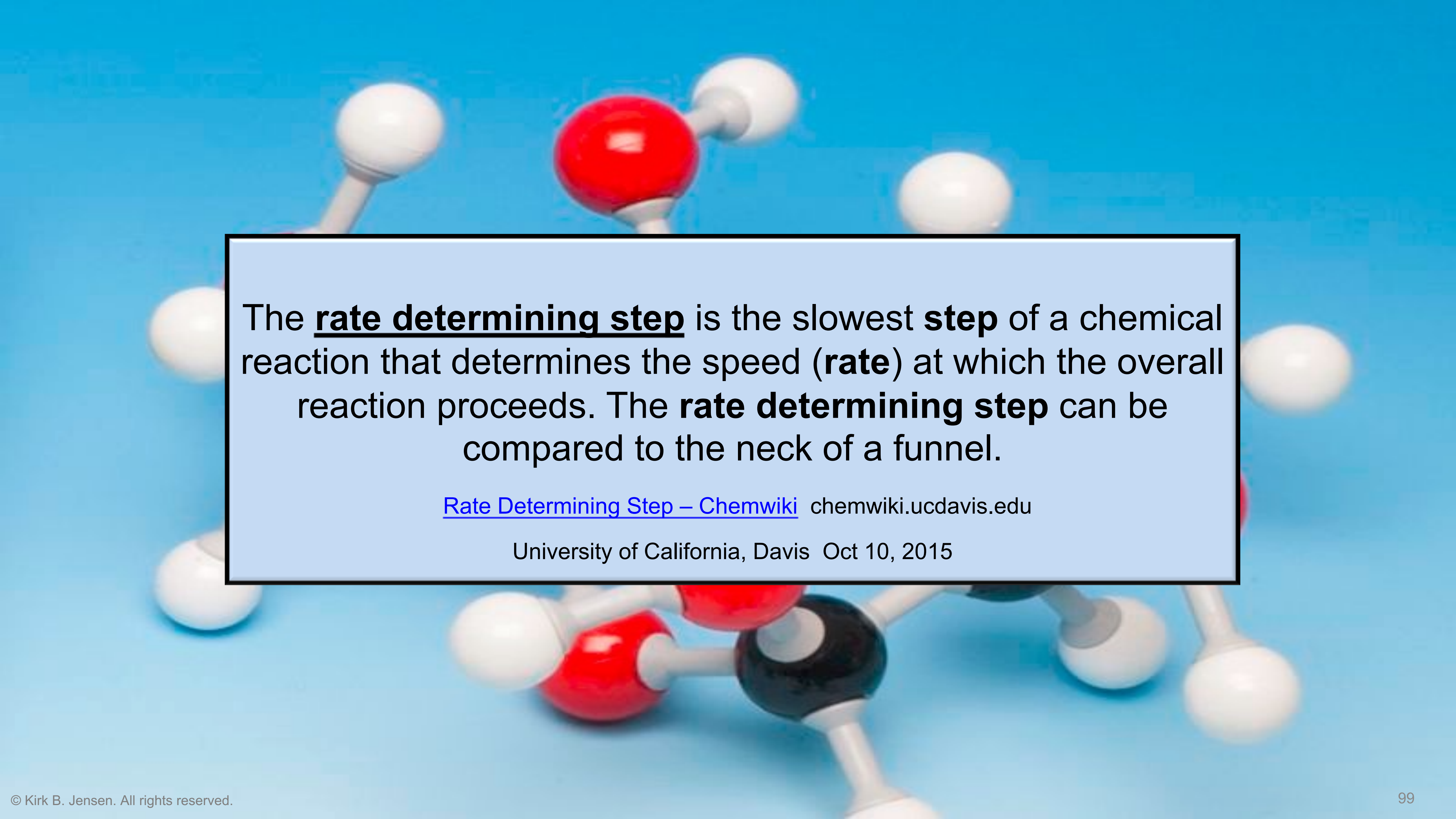
Patient Driven

Although natural variation is outside our control, we can manage it using methods that evaluate the impact of natural variation on key performance metrics such as patient velocity, length of stay, and waiting time. One such powerful tool is queueing theory.

Litvak, Eugene. "Optimizing Patient Flow by Managing It Variability." *From Front Office to Front Line: Essential Issues for Health Care Leaders.* Ed. Steven Berman IHI, 2005. 91-111.

THE THEORY OF CONSTRAINTS

101



The **rate determining step** is the slowest **step** of a chemical reaction that determines the speed (**rate**) at which the overall reaction proceeds. The **rate determining step** can be compared to the neck of a funnel.

Rate Determining Step – Chemwiki chemwiki.ucdavis.edu

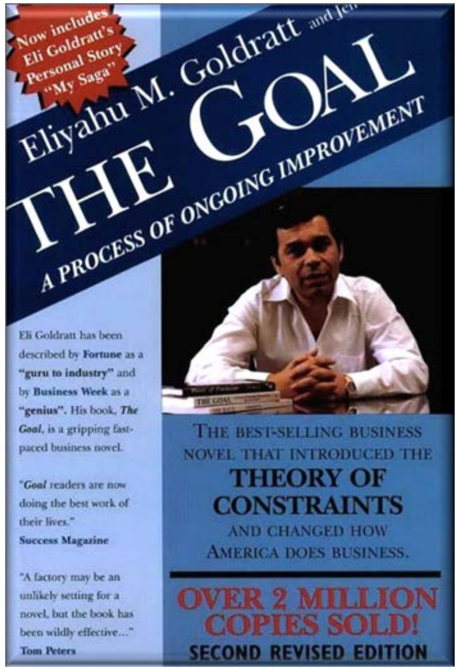
University of California, Davis Oct 10, 2015

The Rate Determining Step or the Rate-Limiting Step

=

The Narrowest Funnel in the Series

Khan Academy



The Theory of Constraints

- By Eliyahu Goldratt
- A business novel
- Theory of Constraints:
  - Constraints limit performance
  - To improve performance, focus on improving constraints…

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

➢ **Two Types of Resources**
  - ➢ ***Bottleneck***- A resource that has the capacity equal to or less than the demand placed upon it.
  - ➢ ***Non-bottleneck***- A resource that has a capacity that is greater than the demand placed upon it.

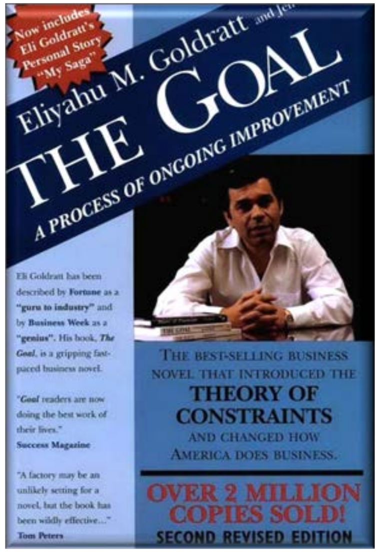
Identifying Constraints (Bottlenecks)

- **How To Identify Constraints:**
  - Ask staff
  - Where does inventory (i.e. patients) pile up?
  - Process flow diagram analysis/VSM
  - Time analysis
  - Load analysis (capacity utilization)
- Most systems or processes have one…or a small number of constraints…
  - Does the ED?
- Concentrate on the primary work processes and ignore marginal or non-critical processes…

Is That Resource a Bottleneck?

- **Bottleneck Test:**
  - If we increase the capacity or efficiency of the resource suspected to be the bottleneck, would throughput of the whole system increase?
  - Would we be closer to our goal?
  - Yes → Bottleneck

The Theory of Constraints (TOC)



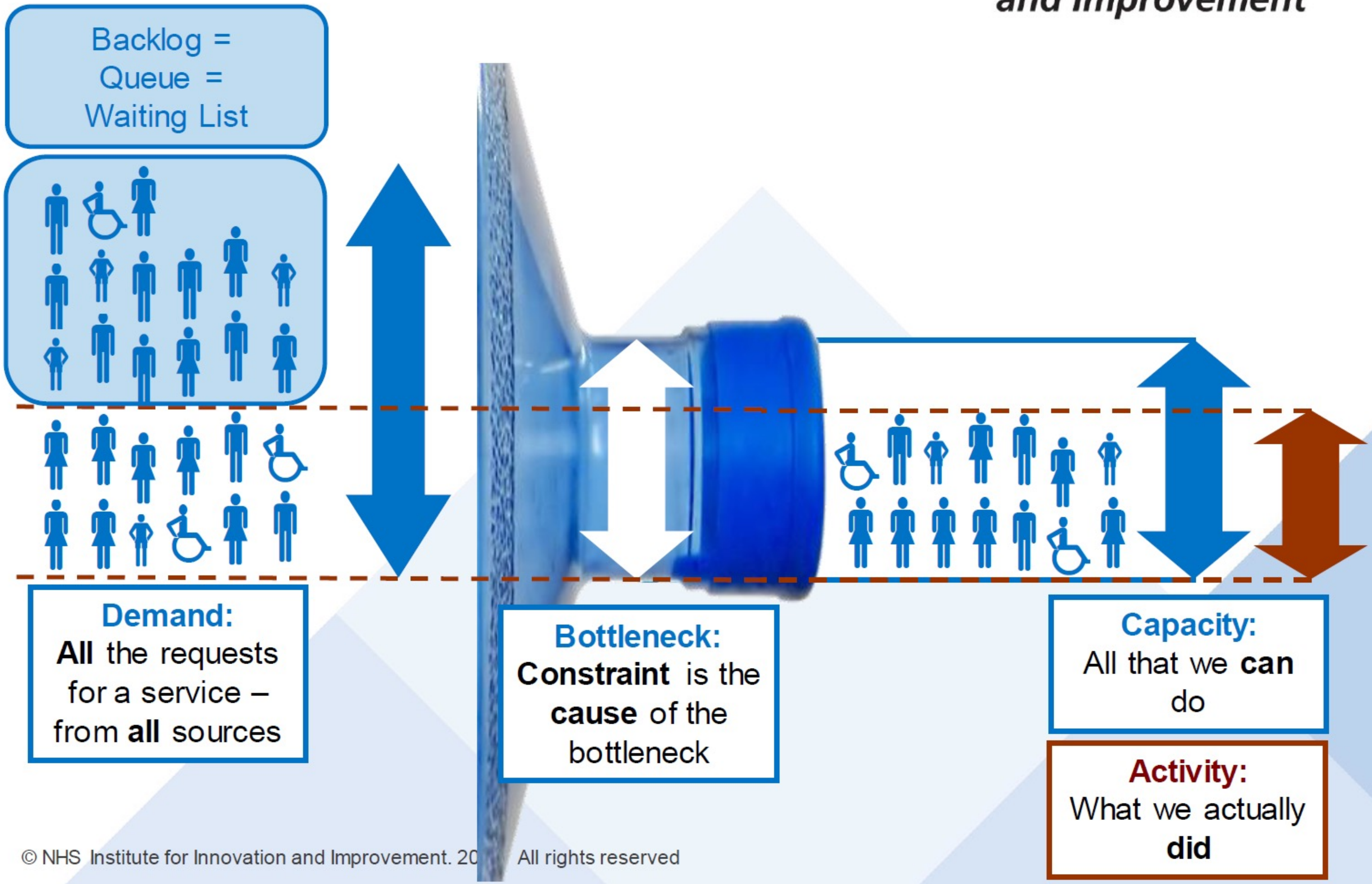
The Theory of Constraints (TOC)

- Patient care is **network** of queues and service transitions
- An hour lost at a **bottleneck** is an hour lost for the whole system
- Time saved at a ***non-bottleneck*** is a mirage
- Efforts spent improving a <u>non-critical bottleneck</u> will not improve the overall performance of your process or system

In highly variable systems (i.e. the ED), the bottlenecks can appear to jump around…

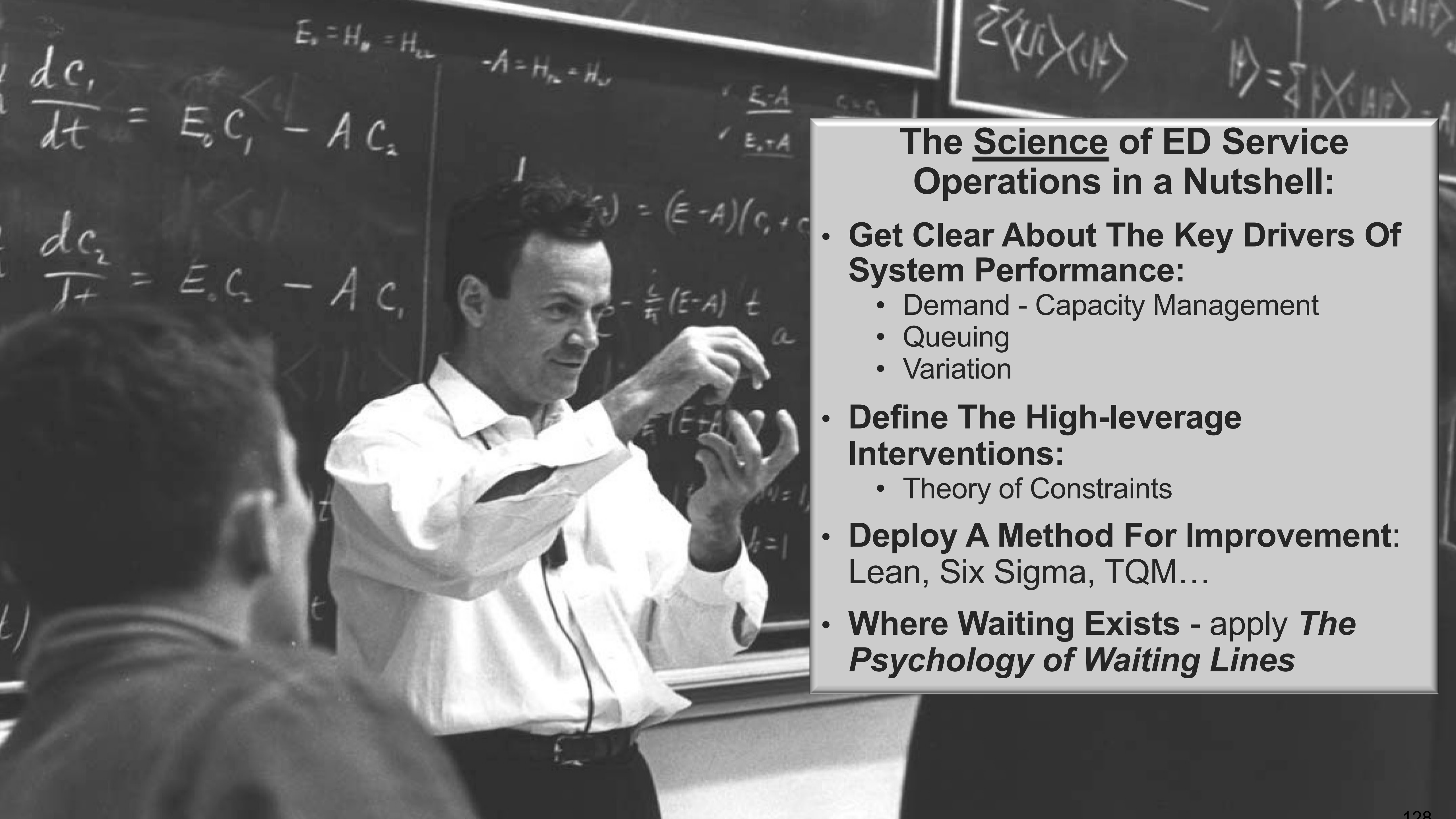
How do they fit together?

NHS
Institute for Innovation and Improvement



Optimizing a Bottleneck - TOC & The 5 Focusing Steps – Continuous Constraint Improvement:

- **Identify the constraint(s)** – weakest link(s)
  - Can be rooms, process, staff, or policy (place, people, performance or policy)
- **Decide how to exploit the constraint** – <u>How to maximize its utilization and availability</u> – How rooms, staff and beds are optimally utilized.
- **Subordinate and synchronize everything else to above decisions**
  - Align every other part of the system to support the constraints even if this reduces the efficiency of non-constraint resources
    - Standard work
    - Support
    - Process Buffers
- **Elevate the performance of the constraint** (If output is still inadequate, acquire more of this resource so that it is no longer a constraint) - *Scribes/ CIMS are an effective tool that illustrate this.*
- **If the constraint has been broken (fixed or optimized), go back to Step 1 and start the search for the next constraint.**



The <u>Science</u> of ED Service Operations in a Nutshell:

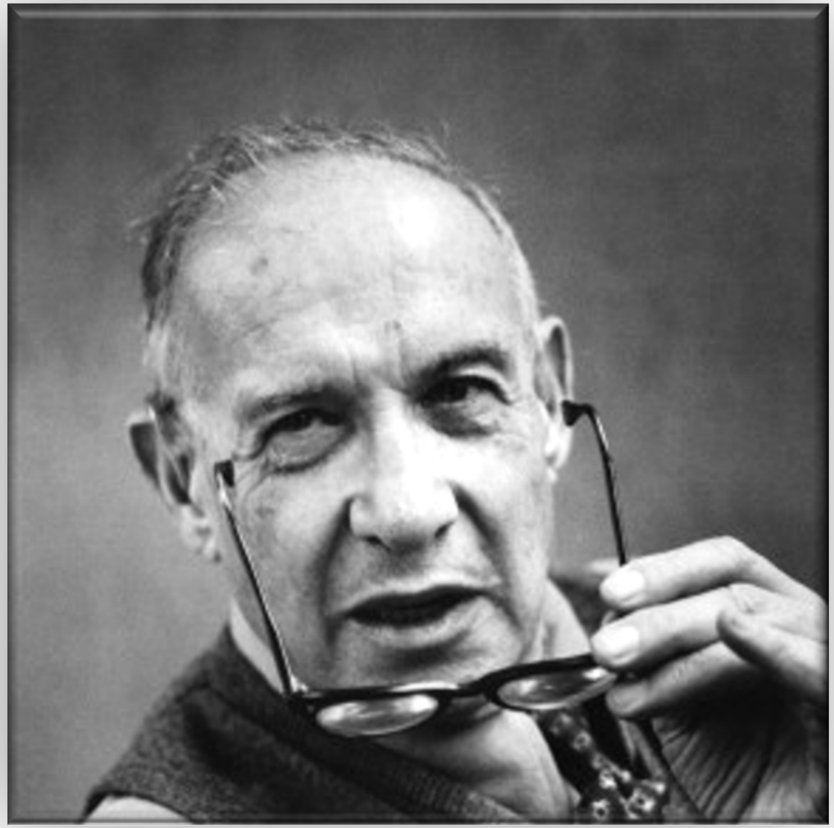
- **Get Clear About The Key Drivers Of System Performance:**
  - Demand - Capacity Management
  - Queuing
  - Variation
- **Define The High-leverage Interventions:**
  - Theory of Constraints
- **Deploy A Method For Improvement**: Lean, Six Sigma, TQM…
- **Where Waiting Exists** - apply ***The Psychology of Waiting Lines***

Patient Flow And Clinical Operations: Bringing It Home…

Peter Drucker – Select Observations on Hospitals and Leadership …

"The ***hospital*** is altogether the ***most complex*** human organization ever devised."

" Only three things happen naturally in organizations: **friction**, **confusion**, and **underperformance**. Everything else requires **leadership**."



“Every system is perfectly designed to generate precisely the results it produces..”

Dr. Paul Batalden

Success

Will

Ideas

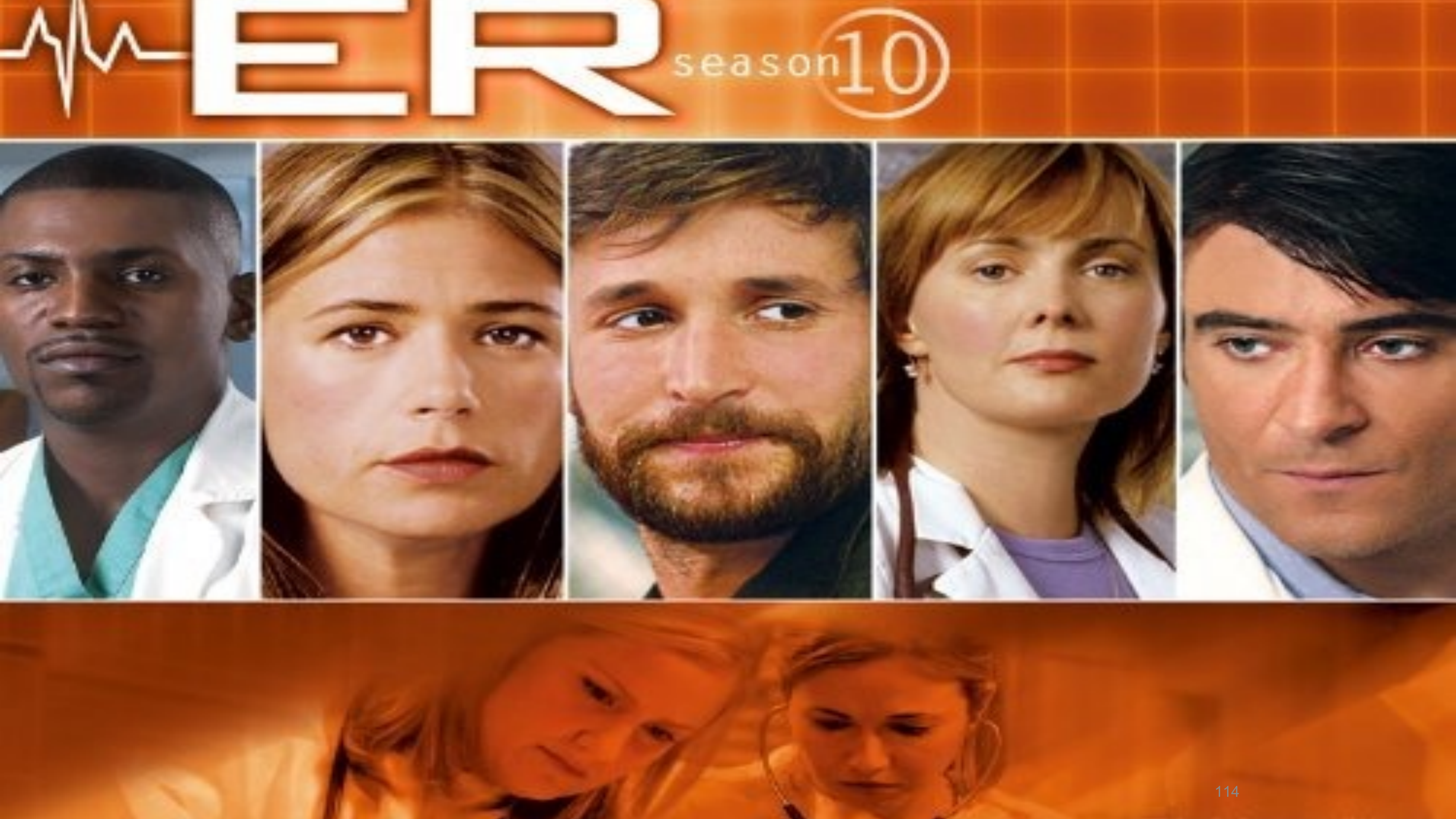
Execution

Remembering To Focus On Our Opportunities And Not Just Our Problems…

"Leveraging the Science, the Art and the Business of Emergency Medicine to Achieve Your Aims" –

A clinical department and a hospital that works for your patients, your healthcare team, and for you…

You Can Do This…


ER
season 10


Thank
You!

THE BENEFITS TO YOUR BOTTOM LINE
Optimizing Flow & Operations…


Show Me
the Money!

Demand-Capacity Management - The Business Case

ER Patient Type	Baseline Charges/Collections*
Average <u>hospital charge</u> for a treat and release patients (not including diagnostic testing)	$2,350
Average <u>hospital collection</u> for a treat and release patients (not including diagnostic testing)	$395
Average <u>physician charge</u> for a treat and release patients	$1,850 (assuming a 100% Medicare fee schedule)
Average <u>physician collection</u> for treat and release patients	$160 (assuming the use of multi-plan for most commercial/managed care payers
Average contribution margin for a <u>hospital patient admitted from the ED</u>	$13,500 in hospital revenue (based on AMA data – a blended med-surg/ICU admission should generate $13,500 in hospital revenue)

"Ballpark" collection figures courtesy of Mike Drinkwater, CEO of Gottlieb

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Demand-Capacity Management - The Business Case In a 50,000 Visit Per Year ED

ER Patient Type	Charges	Collections
Average <u>hospital charge</u> for a treat and release patients - (not including diagnostic testing)	**$2,350/pt x 50,000 Tx & Release patients/year**	**=$117,000,000 /year in charges**
Average <u>hospital collection</u> for a treat and release patients - (not including diagnostic testing)	**$395/pt x 50,000 T&R patients per year**	**=$19,750,000 in collections per year**
Average <u>physician charge</u> for a treat and release patient	**$1,850/pt x 50,000 T&R patients per year**	**=$92,000,000 charges per year**
Average <u>physician collection</u> for treat and release patients	**$160/pt x 50,000 T&R patients year**	**=$8,000,000 in collections per year**
Average contribution margin for a <u>hospital patient admitted from the ED</u>	**$13,500 in hospital revenue/pt x 10,000 ED admissions/year**	**=$135,000,000 per year for ED admissions**

Yes, You Can Cut Costs…

Average Physician Hourly Pay - $160-225/hr	**1 physician hour reduced/day @$200/hr = $73,000 annually**
Average Nursing Pay - $30/hr	**1 nurse hour reduced/day @$30/hr = $10,950 annually**

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Better Yet, You Can Grow Your Revenue & Capacity -

Revenue Benefits from Patient Flow & Throughput Optimization Efforts
Increased Capacity Leading to Increased Patient Volume
As Staffing Is Held Relatively Constant – A Case Study

ER Patients	Results
50,000 ED Visits x .5 Hr Reduction in LOS	25,000 Hours of ↑ED Capacity/ Year
25,000 Hours of ↑ED Capacity /@ 3Hours / ED Visit	=8,333 Potential New Visits / Year
8,333 New ED Visits x $160 Collected / Visit in Physician Revenue (@ $150-200 / Visit)	$1,333,333 in New Collected Revenue / Year for ED Group
8,333 New ED Visits @ $395 Collected / Visit for the Hospital	$3,291,535 in New Collected Revenue / Year for Hospital
New Hospital Admissions $13,500 / Admission* x 1 Additional Admission / Day (365 days/yr)	1 Additional Admission / Day = $4,927,500 / Year in patient admission revenue
For Every 1% Reduction in LWOTs 50,000 Annual Visits x 1% x $160 Collected / Visit = $80,000 / Year	Every 1% Reduction in LWOTs =$80,000 / Year in revenue

(AHRQ – Only 6.2% of Admissions through the ED are Uninsured)

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Service

Emergency Medicine Today

Prepared exclusively for members of American College of Emergency Physicians® ADVANCING EMERGENCY CARE

In affiliation with CUSTOM BRIEFINGS

Today's News for the American College of Emergency Physicians from Newspapers, TV, Radio and the Journals

Customized Briefing for Kirk B Jensen

May 20, 2010

Leading the News
Emergency Medicine
Hospital News
Clinical News
Legislative and Policy News

Leading the News

People With Private Health Insurance As Likely To Use EDs As Uninsured.

USA Today (5/20, Marcus) reports that people "with private health insurance" may be "just as likely to use the emergency room as people without insurance, according to a new report by the Centers for Disease Control and Prevention." These "results may surprise some who believe that ERs mainly serve uninsured people, says second author Amy Bernstein, chief of the Analytic Studies Branch in the Office of Analysis and Epidemiology for the CDC and the National Center for Health Statistics." USA Today adds that "the findings that older, sicker people are more likely to use the ER and that insurance or lack of insurance doesn't matter are not surprising, says Angela Gardner, president of the American College of Emergency Physicians."

WebMD (5/19, Hendrick) reported that "adults 75 and over were more likely to have reported at least one ER visit in a12-month period than younger people." The researchers also found that "non-Hispanic black people were more likely to have reported one or more ER visits in a 12 month period than non-Hispanic whites or Hispanics."

Reuters (5/20) quotes Dr. Gardner as saying, "It's important to note the report finds that having a usual source of medical care, such as a primary care provider, does not affect the number of times people under age 65 visit the emergency department."

THE COST – IT ADDS UP

1.9 million

In 2007, 1.9 million people – representing 2% of all ED visits – left the ED before being seen. These walk-outs represent significant lost revenue for hospitals.

$1,086

A 2006 study found that each hour of ambulance diversion was associated with $1,086 in foregone hospital revenues.

$9,000

A recent study showed that a 1-hour reduction in <u>ED boarding time</u> would result in over $9,000 of additional revenue by reducing ambulance diversion and patients who left without being seen.

Source: Ambulance Diversion: Economic and Policy Considerations, 14 July 2006 Robert M. Williams *Annals of Emergency Medicine* December 2006 (Vol. 48, Issue 6, Pages 711-712) Retrieved from http://www.annemergmed.com/article/S0196-0644(06)00621-4/abstract April 29, 2014.

The Patient Complaint: Quick Facts

- Each disappointed patient who complains represents 6 others who are unhappy about a similar experience
  - Therefore each complaint represents 7 unhappy patients
- Each unhappy patient tells 8-10 other people about their unhappy experience
  - Therefore 63 people now know about these unhappy experiences
- ¼ of these 63 people (16) will act on what they hear and will choose not to do business with you
  - 16 patients x average revenue/patient x #visits/patient/lifetime = lost revenue per type of complaint
  - 16 patients x $500/patient x 5 lifetime visits= $40,000
- Just to handle the average complaint costs your institution at least $375.00 per complaint
  - (Or $19,500 per year)
- If 5% of inpatients opt not to return each year, the revenue at risk is $2,500,000 per year.
- 95% of customers will be satisfied, surprised and tell others if the problem is resolved on the spot
- 95% of dissatisfied customers never complain
- It is 6 times more expensive to attract a new patient than it is to keep an old one

Source-A Dissatisfied Customer? Do the Math by Patricia Weber www.epinc.com

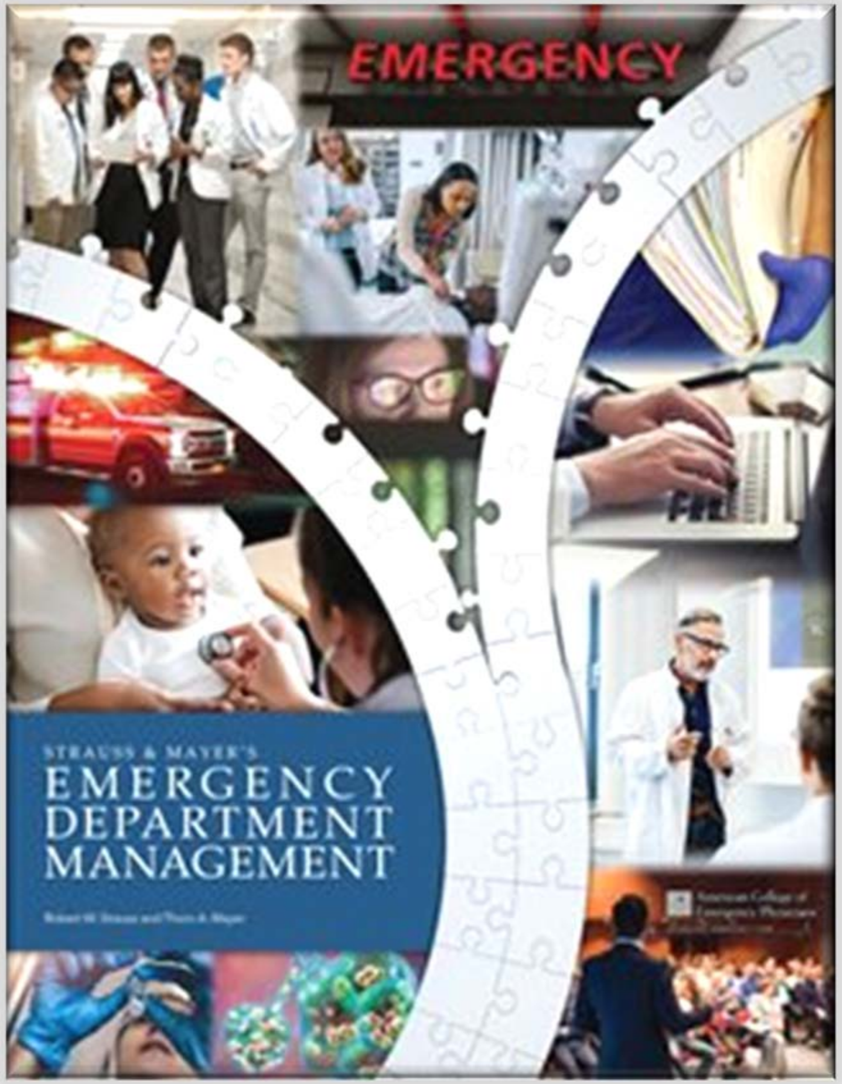
RESOURCES AND REFERENCES

Strauss and Mayer's
Emergency Department Management
Second Edition – October 2021

- Robert W. Strauss MD, Thom A. Mayer, MD, Chief editors
- Kirk B Jensen, MD, MBA, FACEP, Senior Associate Editor (as well as Section Editor – S-1-Leadership Principles, S-3 -Operations: Flow S-6 – Quality and Service, S-11 - Malpractice)

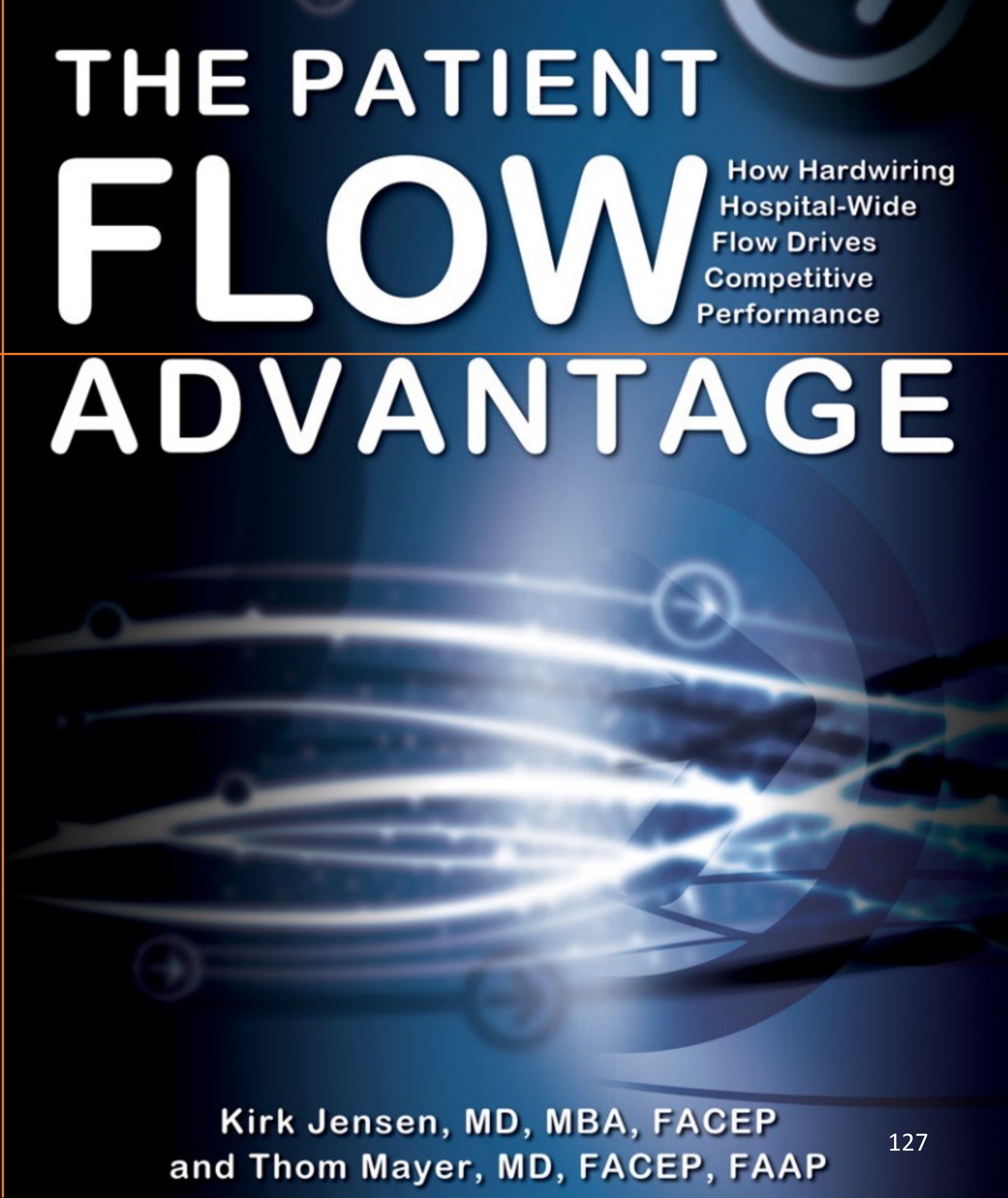
Publisher: ACEP

Relevant chapters on patient flow, patient safety, risk management, teamwork, culture change, and leadership development…



The Patient Flow Advantage:
How Hardwiring Hospital-Wide Flow Drives Competitive Performance
Kirk Jensen/Thom Mayer FireStarter Publishing, 2014

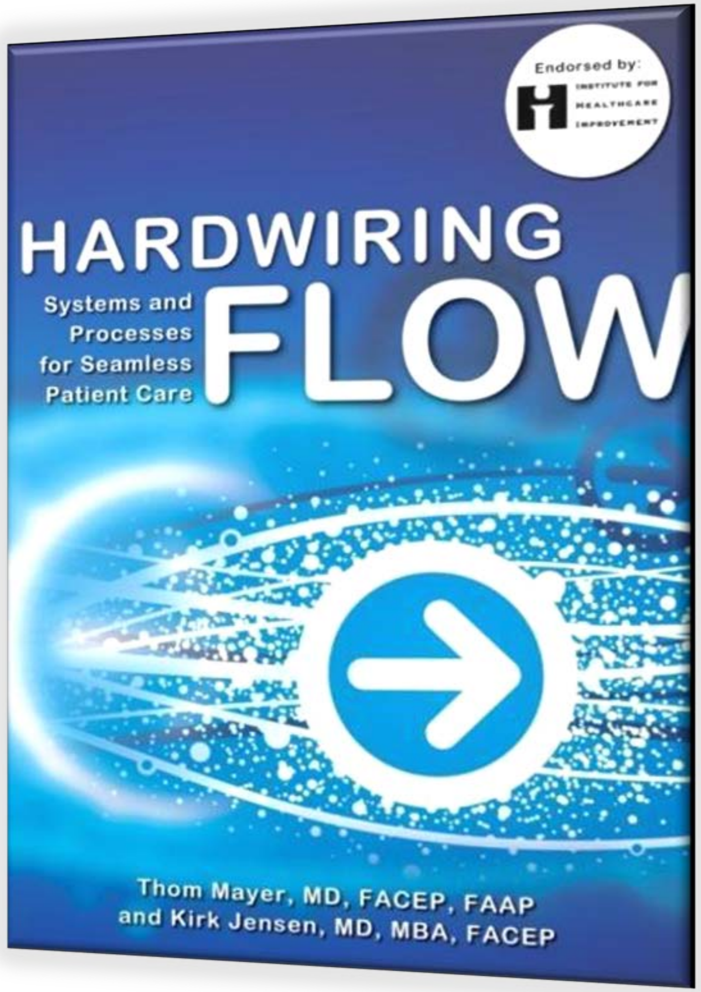
The Patient Flow Advantage: How Hardwiring Hospital-Wide Flow Drives Competitive Performance



Hardwiring Flow:
Systems and Processes For Seamless Patient Care

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

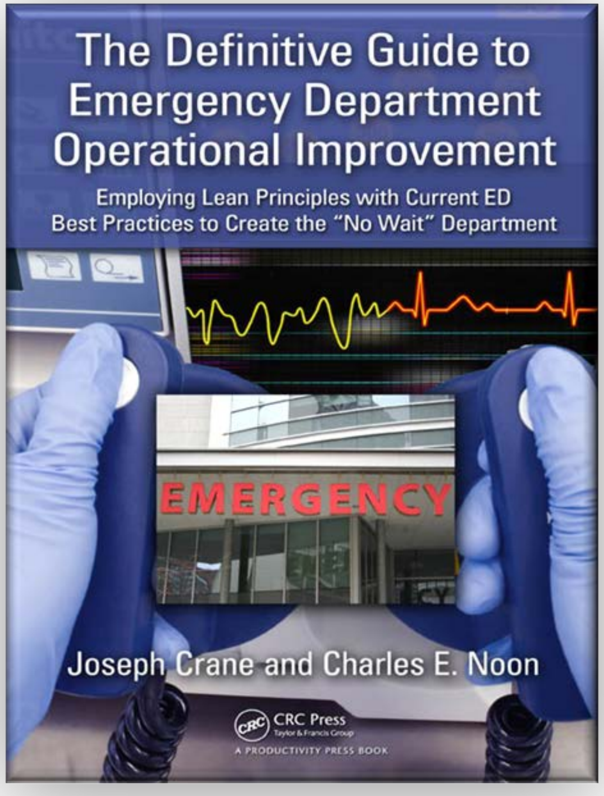
- Why patient flow helps organizations maximize the "Three Es": Efficiency, Effectiveness and Execution
- How to implement a proven methodology for improving patient flow
- Why it's important to engage physicians in the flow process (and how to do so)
- How to apply the principles of better patient flow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



The Definitive Guide to Emergency Department Operational Improvement

X32 Healthcare

Where analytics and innovation meet to define the future of healthcare



Improving Patient Flow
In the Emergency Department

Jensen/Crane

NOVEMBER 2008 **healthcare financial management**

healthcare financial management

NOVEMBER 2008

Kirk Jensen
Jody Crane

hfm
healthcare financial management association www.hfma.org

improving patient flow in the emergency department

There are nine strategies hospitals can incorporate to more effectively manage patient flow in the emergency department without sacrificing quality of care.

AT A GLANCE

To improve patient flow in the ED, hospitals should:
> Establish a measure of patient demand by hour, and design a system to handle it
> Appropriately capacitate triage processes and systems
> Use a system for patient segmentation and establish distinct processes for different patient segments
> Consider using team triage, and examine current triage protocols
> Devise a method of tracking patients and results
> Field a willing staff with a burning platform

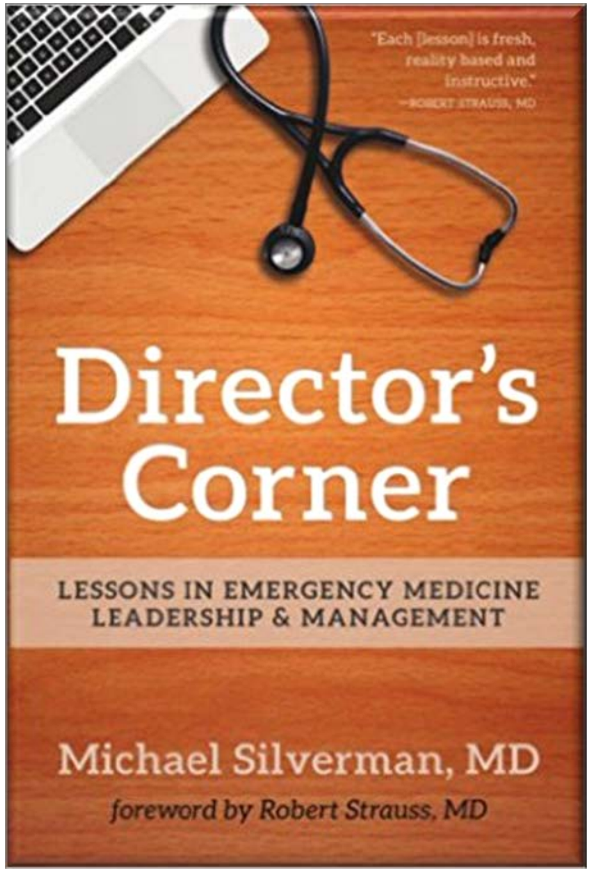
In a consumer-driven healthcare marketplace, successful patient outcomes and high levels of customer satisfaction define hospital success. Healthcare organizations must deliver excellent and timely care in environments that reward teamwork and quality service. One basic component of this success model is smooth patient flow: the movement of patients through the network of queues and service transitions that characterize modern health care.

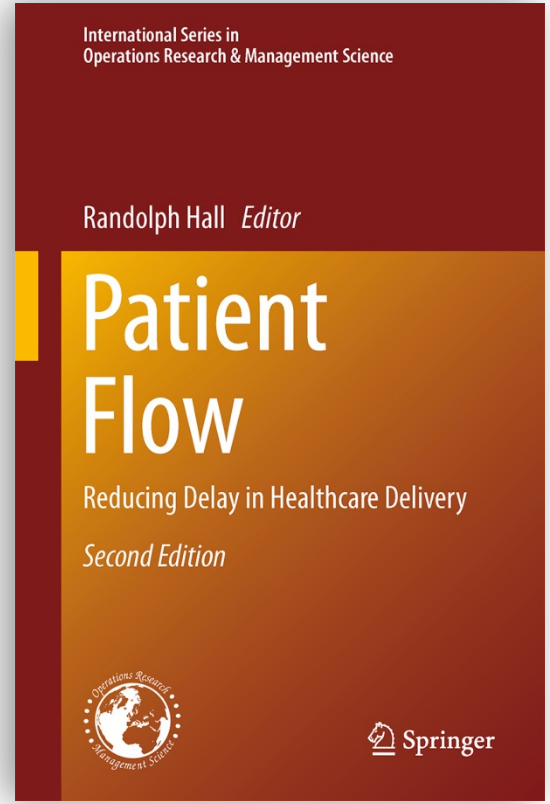
Weak patient flow systems that produce patient and service backups create poor patient care situations, dissatisfied patients, frustrated employees, and diminished bottom lines. When patients wait for hours, nurses are overloaded, physicians have no available rooms in which to see patients, and test results are long in coming, no one is happy. Improving patient flow can make a tremendous difference in quality of life for patients, healthcare workers, families, and administrators—and can raise the profitability of the hospital.

As the point of entry for the largest number of patients—the hospital's de facto "front door"—the emergency department (ED) is critical to effective patient flow and the logical place to begin addressing flow challenges. This department gives the customer the first and most lasting impression of the quality of care and service the hospital offers. Yet the ED is often an underdeveloped and undervalued resource, costing the hospital in many ways. There is the high cost of walkaway patients; of lost admissions; of going on diversion; of the boarding burden; and of patient complaints. Other costs weigh in as well.

Consider this: Your ED waiting room may be the most dangerous place in the ED, if not the hospital. It consists of sick or potentially sick patients who are often unmonitored. We are all familiar with examples or anecdotes about misses and near misses and real tragedies happening in the ED. Yet here is the silver lining: For every one hour of throughput reduction coupled with unmet service demand, there is a significant potential for increasing ED patient volume. When we improve flow, we can serve more patients and serve them well.

2014 Michael A. Silverman, MD, FACEP
Chairman of EM at the Virginia Hospital Center
Emergency Medicine Associates
Columnist - ***Emergency Physicians Monthly***





Patient Flow: Reducing Delay in Healthcare Delivery, Second Edition
Randolph Hall, PhD Editor
Springer, January 2014

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 CERDÁ, LAURA DE PABLOS, MARIA V. RODRÍGUEZ-URÍA
10. Triage and Prioritization for Non-Emergency Services-KATHERINE HARDING
11. Personnel Staffing and Scheduling-MICHAEL WARNER
12. Discrete-Event Simulation Of Health Care Systems SHELDON H. JACOBSON, SHANE N. HALL AND JAMES R. SWISHER
13. Using Simulation to Improve Healthcare: Case Study-BORIS SOBOLEV
14. Information Technology Design to Support Patient Flow KIM UNERTL, STUART WEINBERG
15. Forecasting Demand for Regional Healthcare-PETER CONGDON
16. Queueing Analysis in Healthcare -LINDA GREEN
17. Rapid Distribution of Medical Supplies - MAGED DESSOUKY, FERNANDO ORDÓÑEZ, HONGZHONG JIA, AND ZHIHONG SHEN
18. Using a Diagnostic to Focus Hospital Flow Improvement Strategies ROGER RESAR
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

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

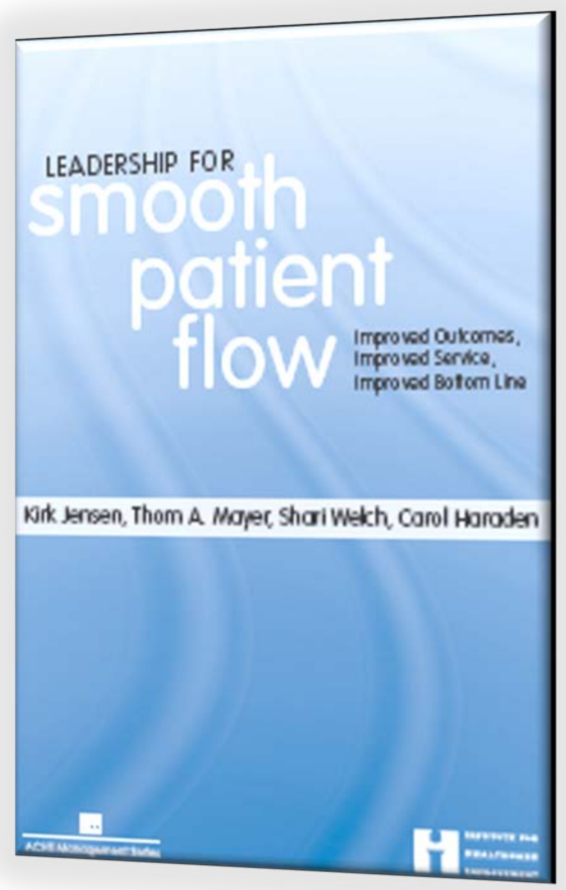
Kirk B. Jensen, MD, MBA, FACEP
Thom A. Mayer, MD, FACEP, FAAP
Shari J. Welch, MD, FACEP
Carol Haraden, PhD, FACEP

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:

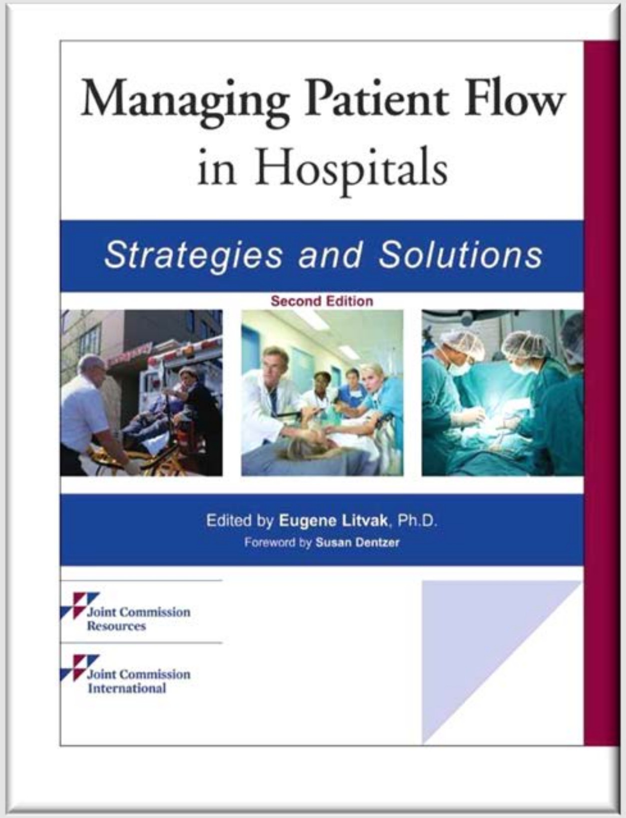
- Break down departmental silos and build a multidisciplinary patient flow team
- Use metrics and benchmarking data to evaluate your organization and set goals
- Create and implement a reward system to initiate and sustain good patient flow behaviors
- Improve patient flow through the emergency department – the main point of entry into your organization

"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 met."
~ Donald M. Berwick, MD, President and CEO, Institute for Healthcare Improvement



Managing Patient Flow In Hospitals:

Strategies and Solutions, Second Edition



Chapter 8

Improving Hospitalwide Patient Flow at Northwest Community Hospital

Barbara Weintraub, R.N., M.S.N., M.P.H., A.P.N., C.E.N., F.A.E.N.; Kirk Jensen, M.D., M.B.A., F.A.C.E.P.; Karen Colby, M.S., R.N.; C.N.A.A.-B.C.

From a systems standpoint, hospitals have inputs (patients coming to the hospital), throughputs (patients being treated or admitted), and outputs (patients being released). Flow is defined as the movement of these patients into, through, and out of the hospital. How efficiently this movement is accomplished determines the rate of flow through the hospital, if not throughout the entire health care system.

Many factors control the flow within the hospital First, barriers to entry may slow or stop the flow. In the emergency department (ED), for example, the inability to get patients admitted contributes to a patient flow backlog that strains staff and creates long waits, sometimes compromising quality of care or necessitating diversions. In the ICU, transfers of patients to the floors can be delayed by the unavailability of beds, keeping patients waiting for needed ICU spaces. Patients often must be moved to less than ideal places because the system is not flowing smoothly, compromising the quality of patient care. Second, barriers to exit can slow or stop the flow, as well. If a patient is not discharged in an efficient and timely way, a needed and valuable space is rendered unavailable for longer than is necessary, creating backups throughout the system. Paradoxically, barriers to exit help create the barriers to entry. If inpatients cannot get out, new patients cannot get in.

As the venerable and ever-interesting Yogi Berra once said, "People don't go there anymore. It's too crowded." Although this oxymoron probably only made sense to Yogi, it is, in fact, the incentive for hospitals to work on improving patient flow and throughput. In the health care industry, patient service and patient safety are paramount. In the current economic and reimbursement climate, collecting every hard-earned dime can be tantamount to survival. The service and safety compromises, as well as the loss of income derived from hospitals going on bypass or diversion, or from patients leaving before being seen, or from prolonged inpatient stays, simply cannot be tolerated. Furthermore, although it may not be rocket science, optimizing patient flow is surprisingly analogous—to get from launch to landing quickly and safely. Throughput as a science has been around since queues, or waiting lines, were first analyzed by A.K. Erlang in 1913, in the context of telephone facilities.[1]

Industries as diverse as airlines, trucking, and fast-food drive-throughs have since made use of queuing theory, computer simulation, and smoothing demand to maximize throughput and optimize resource allocation. Despite its proven ability to better serve customers, reduce costs, and improve safety, health care has been late to jump into the science of operations management (OM)

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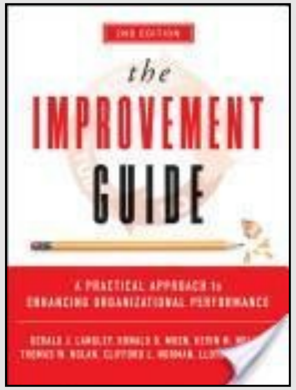
The Improvement Guide and Rapid-Cycle Testing



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

The Improvement Guide:
A Practical Approach to Enhancing Organizational
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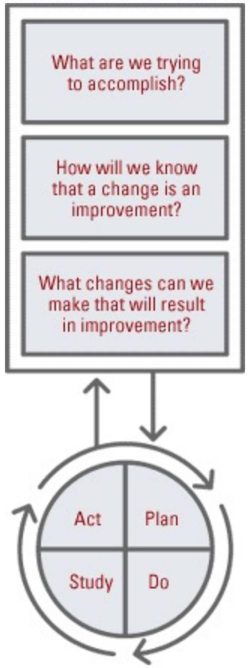

Emergency Department Leadership and Management
Best Principles and Practice

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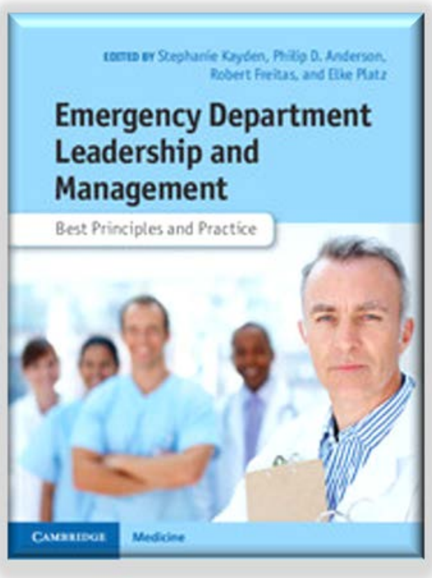
- Stephanie Kayden, Brigham and Women's Hospital, Harvard Medical School, Boston
- Philip D. Anderson, Brigham and Women's Hospital, Harvard Medical School, Boston
- Robert Freitas, Brigham and Women's Hospital, Harvard Medical School, Boston
- Elke Platz, Brigham and Women's Hospital, Harvard Medical School, Boston



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