Emergency Department Directors Academy – Phase I

November 17-21, 2014
Dallas, TX

Engineering Patient Flow I: Theory, Metrics, and Application

Your ability to operate an efficient emergency department is paramount to your success and tenure. This becomes one of our greatest management challenges. The speaker will describe methodologies to identify barriers and bottlenecks that compromise efficient patient flow. A discussion of queuing theory, crowding, and essential metrics will help you develop strategies to improve workflow, build effective relationships with ancillary providers, and incorporate structural redesign into the already complicated picture. The manner in which informed participatory decisions can improve operational efficiency and throughput also will be discussed.

- Describe queuing theory.
- Discuss issues of crowding.
- List common ED operation metrics.
- Describe the application of metrics to the ED.
- Identify ED technologies that can help improve patient flow.

11/21/2014
9:00 AM-11:00 AM

DISCLOSURES:
(*)Salary: EmCare
Royalty: Fire Starter Pulishers

THIS SYLLABUS INCLUDES BOTH I AND II OF 'ENGINEERING PATIENT FLOW'

***Kirk B. Jensen, MD, MBA, FACEP**

Dr. Jensen is Chief Medical Officer for BestPractices, Inc. He has been medical director for several emergency departments and is a faculty member of the Institute for Healthcare Improvement (IHI) focusing on patient flow, quality improvement, and patient satisfaction both within ED and the hospital. He chaired the innovative IHI communities Operational and Clinical Improvement in the Emergency Department and Improving Flow in the Acute Care Setting. He led the IHI seminars Cracking the Code to Hospital-wide Patient Flow and Perfecting Emergency Department Operations. In addition, Dr. Jensen served on the expert panel and site examination team for Urgent Matters, a Robert Wood Johnson Foundation Initiative focused on helping hospitals eliminate ED crowding and congestion as well as preserving the health care safety net. Dr. Jensen holds a Bachelor's Degree in biology from the University of Illinois (Champaign) and a Medical Degree from the University of Illinois, Chicago. He completed a residency in Emergency Medicine at the University of Chicago and an MBA at the University of Tennessee (Knoxville). Dr. Jensen is a popular speaker and coach for EDs across the country and is co-author of three books, Leadership for Smooth Patient Flow (2007 ACHE Hamilton Award winner), Hardwiring Flow and The Hospital Executive's Guide to Emergency Department Management. He has expertise in workflow redesign, staff satisfaction, patient safety and satisfaction, project management and other topics related to patient flow, operations, and process improvement.

Engineering Patient Flow in Your Emergency Department:
I: Theory, Metrics, and Application
II: Directing Change

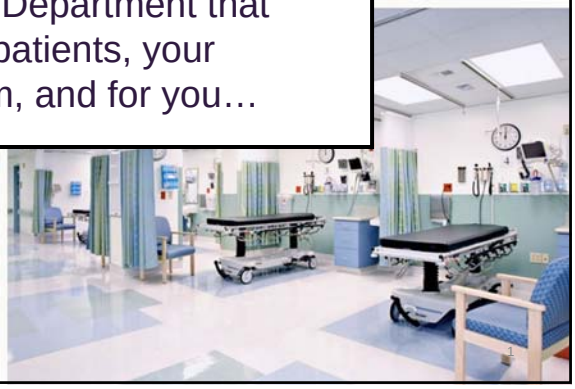
ACEP EDDA Phase I
November 2014

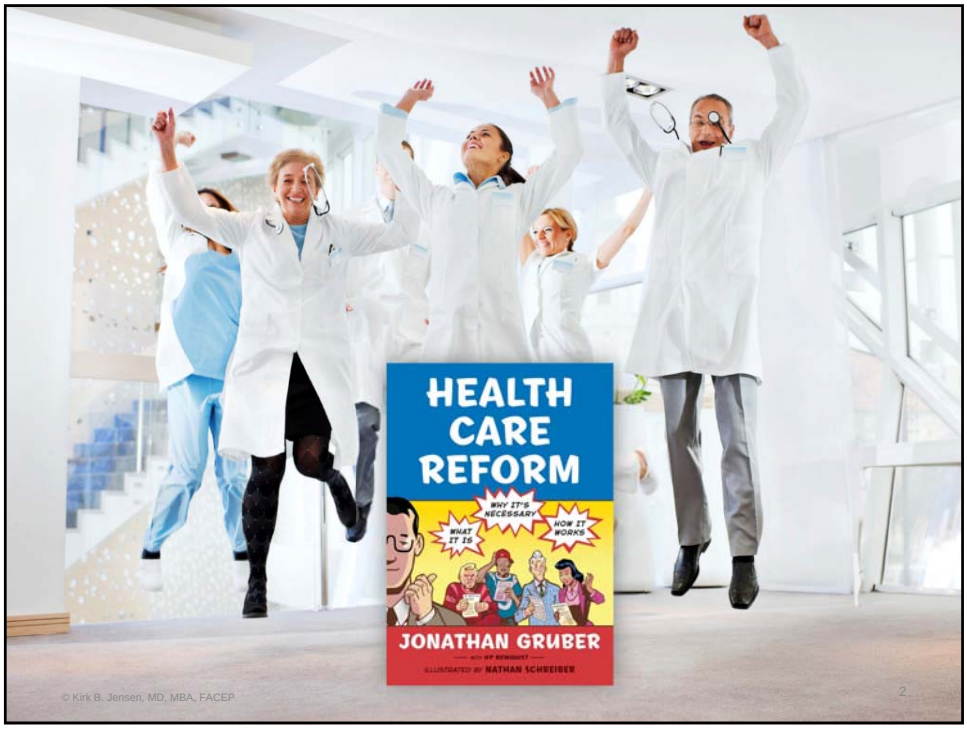
Final - Revised 9-30-2014

Kirk Jensen, MD, MBA, FACEP
Chief Medical Officer, BestPractices, Inc.
Executive Vice-President, EmCare, Inc.
Chair-IHI Improving Flow through Acute Care Settings
Chair-IHI Operational and Clinical Improvement in the Emergency Department
Studer Faculty Member and National Speaker
Urgent Matters Faculty and Advisory Board

Our Goals and Objectives

- A high-level overview of Emergency Department operations
- An Emergency Department that works for your patients, your healthcare team, and for you…





2

We do face challenges…

The impact and uncertainty of health care reform tops many a list…

3

Concerns of Healthcare Leaders

2013 → 2014 → 2015

60% expect ED operating margin to decrease ↘

75% identified ED-to-Inpatient BIGGEST bottleneck

ED→ Inpatient

9 out of 10 expect ED volumes to increase ↗

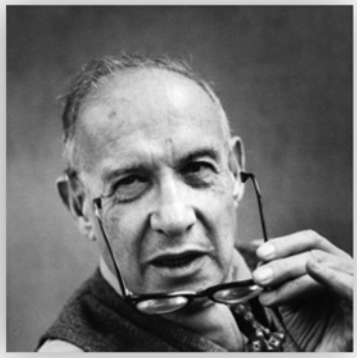
40 million newly-insured patients from ACA using the ED

$

4

Peter Drucker's Observations on Hospitals and Healthcare …

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



5

The Baby Boomers are Here…

Demographic growth is driven by the elderly:

The 65 and older age cohort will experience a 28% growth in the next decade

- One baby-boomer turns 50 every 18 seconds and one baby-boomer turns 60 every 7 seconds (10,000 a day)
- This will continue for the next 18 years

This cohort will comprise 15% of the total population by 2016

A higher proportion of patients in this cohort, in comparison to other age groups, are triaged with an emergent condition

One-quarter of Medicare beneficiaries have five or more chronic conditions, sees an average of 13 physicians per year, and fills 50 prescriptions per year…

TJC and Hospital-Wide Patient Flow

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

JCR Leadership Standard LD.3.10.10

The Joint Commission

- 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."*

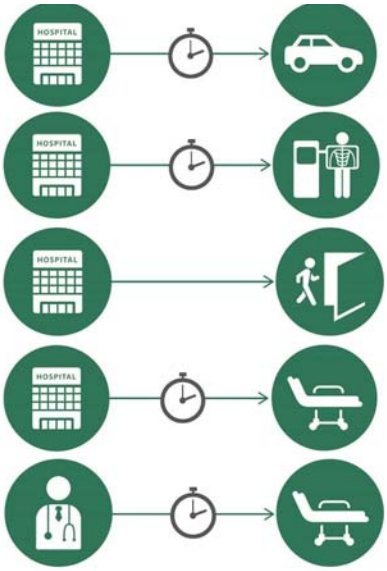
***As reported in ACEP NEWS**– January 14, 2013

- 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

HOSPITAL REPORTING OF ED MEASURES TO CMS

1. **Median time ED arrival to ED departure** - for discharged patients (CY 2013)
2. **Door-to-diagnostic** (CY 2013)
3. **Left without being seen** (CY 2013)
4. **Median time ED arrival to ED departure** - for admitted patients (FY 2014)
5. **Median time admit decision to ED departure** - for admitted patients (FY 2014)



R³ Report | Requirement, Rationale, Reference

A complimentary publication of The Joint Commission — Issue 4, December 19, 2012

Published for Joint Commission accredited organizations and interested health care professionals, R³ Report provides the rationale and references that The Joint Commission employs in the development of new requirements. While the standards manuals also provide a rationale, the rationale provided in R³ Report goes into more depth. The references provide the evidence that supports the requirement. R³ Report may be reproduced only in its entirety and credited to The Joint Commission. To receive by e-mail, visit www.jointcommission.org.

The Joint Commission

Patient flow through the emergency department

Requirements

Standards LD.04.03.11 and PC.01.01.01 are revised standards that address an increased focus on the importance of patient flow in hospitals. These revised elements of performance (EPs) go into effect January 1, 2013, with two exceptions: LD.04.03.11, EPs 6 and 9 will be effective January 1, 2014. They will be included in the 2013 standards manual, but any findings from the on-site survey will not affect the organization's final accreditation decision. Information on the implementation of these requirements will be collected by Joint Commission surveyors and staff throughout 2013, and will be used to inform the survey process.

Standard LD.04.03.11: The hospital manages the flow of patients throughout the hospital.

EP 5. The hospital measures and sets goals for the components of the patient flow process, including the following:

- The available supply of patient beds
- The throughput of areas where patients receive care, treatment, and services (such as inpatient units, laboratory, operating rooms, telemetry, radiology, and the post-anesthesia care unit)
- The safety of areas where patients receive care, treat
- The efficiency of the nonclinical services that support housekeeping and transportation)
- Access to support services (such as case manageme

EP 6. This element of performance will go into effect January goals for mitigating and managing the boarding of patients wh (See also NPSG.15.01.01, EPs 1 and 2; PC.01.01.01, EPs 4 EPs 1 and 2) Note: *Boarding is the practice of holding patient temporary location after the decision to admit or transfer has b with attention to patient acuity and best practice; it is recomm 4 hours in the interest of patient safety and quality of care.*

EP 7. The individuals who manage patient flow processes rev whether goals were achieved. (*See also* NR.02.02.01, EP 4)

EP 8. Leaders take action to improve patient flow processes w PI.03.01.01, EP 4) Note: *At a minimum, leaders include memb body, the chief executive officer and other senior managers, th staff members in leadership positions within the organization.* leader.)

EP 9. This element of performance will go into effect January 1, 2014: When the hospital determines that it has a population at risk for boarding due to behavioral health emergencies, hospital leaders communicate with behavioral health care providers and/or authorities serving the community to foster coordination of care for this population. (*See also* LD.03.04.01, EPs 3 and 6)

www.jointcommission.org

R³ Report | Requirement, Rationale, Reference
Issue 4, December 19, 2012 Page 3

Patients with psychiatric emergencies

Standard PC.01.01.01 was revised to provide a more focused set of expectations for patients at risk due to prolonged boarding in the ED while awaiting placement in a specialized psychiatric service or transfer to another facility.[26,27,28,29] Existing standards made for safe, quality care for all patients; however, PC.01.01.01, EP 24 was developed to address on-going identified deficiencies in the areas of physical environment, staffing, and assessment, reassessment and care for this vulnerable population.[30,31,32,33,34] While hospitals typically employ all resources available to facilitate appropriate transfers, on-going shortages and barriers in the provision of behavioral health care services in communities continue to confound the best efforts of case managers, social workers, and other hospital staff to find appropriate and timely placements. Research has indicated that hospitals, hospital systems, and hospital associations are increasingly reaching out at the leadership level to their counterparts in behavioral health care organizations, agencies and government. The goal of such outreach has been to identify opportunities to support a more effective continuum of care for individuals with psychiatric emergencies and reduce the inappropriate use of EDs.[35] In response, standard LD.04.03.11, EP 9 was developed to foster hospital leadership communication with behavioral health care providers or authorities to help mitigate demand for ED services and improve collaboration on continuum of care strategies for these individuals. Similar to the requirement for hospitals to collaborate with the community in emergency management planning to build a more effective and resilient response capability, better communication between hospital and behavioral health care leaders can facilitate the more efficient use of limited resources, and build leverage to implement more effective systems of care for individuals at risk of psychiatric emergencies.[36,37,38] Communication will vary depending upon the nature of relationships already established, but such communication should occur at least annually and may range from conference calls and correspondence to meetings, education forums, and strategic working groups.

9

Everybody Wants Data:

Benchmark Data- VHA ED Data 3-23-06

	Average	Min	Max	Median
Arrival to Triage	0:06	0:01	0:16	0:06
Triage Time	0:04	0:00	0:06	0:04
Triage to Registration	0:08	0:02	0:34	0:06
Triage to Room Time	0:22	0:03	0:38	0:25
Arrival to Room	**0:32**	**0:12**	**0:50**	**0:31**
Consultant Called to Present	0:37	0:17	1:09	0:37
MD Visit to First Lab Order	0:17	0:07	0:26	0:17
MD Visit to First Xray Order	0:17	0:07	0:33	0:17
In Room to First MD Visit	0:22	0:09	0:44	0:21
Arrival to First MD Visit	**0:52**	**0:13**	**1:34**	**0:51**
First MD Visit to Disposition	1:14	0:34	2:14	1:12
Disposition to Discharge	0:19	0:05	0:40	0:17
Disposition to Admit	1:36	0:33	2:35	1:38
Arrival to Admit	**4:23**	**2:36**	**7:42**	**4:21**
Arrival to Discharge	**2:23**	**1:26**	**3:52**	**2:20**
LOS	**2:41**	**1:10**	**4:37**	**2:42**
Disposition to Bed Ready	1:09	0:14	4:00	1:03
Bed Ready to Unit	0:32	0:09	1:57	0:28

10

The EDBA Annual Data Survey – (2014 Report)

The EDBA Annual Data Survey

The Cohort Summary (Page 1 of Spreadsheet)

	Total Sites	PPD	Hi CPT Acuity	Peds %	Admit %	Transfer %	EMS Arrival	EMS Arrival Admit	Median LOS	LOS Treat & Release	LOS Fast Track	LOS Admit	LBTC	Door to Bed	Door to Doc	EKG per 100	Xray per 100	CT per 100	MRI per 100	% Hosp Admits thru ED	Visits per Foot	Beds
Total All EDs																						
2013 results	1,110	107	65%	20.0%	16.6%	2.1%	17%	40%	171	146	112	288	2.3%	17	30	26	47	20	1.0	68%	3.1	27
Over 100K EDs																						
2013 results	37	309	67%	19.5%	18.7%	0.9%	22%	40%	240	199	140	416	4.1%	27	47	31	44	19	1.1	68%	4.0	72
80 to 100K EDs																						
2013 results	43	241	68%	19.5%	20.7%	0.9%	20%	44%	221	186	126	370	3.1%	23	38	28	50	22	0.9	65%	3.3	53
60 to 80K EDs																						
2013 results	122	186	67%	20.0%	19.8%	1.3%	20%	42%	200	167	111	330	2.4%	19	35	30	50	23	1.8	65%	3.0	44
40 to 60K EDs																						
2013 results	237	134	67%	17.7%	19.4%	1.6%	19%	44%	191	163	113	316	2.6%	20	33	30	50	23	1.2	69%	3.3	33
20 to 40K EDs																						
2013 results	401	80	64%	20.3%	16.0%	1.9%	15%	38%	163	138	98	268	2.1%	14	28	24	46	19	0.8	69%	3.0	19
Under 20K EDs																						
2013 results	264	36	60%	22.4%	11.4%	3.7%	12%	34%	134	116	97	230	1.7%	12	22	19	41	16	0.3	72%	2.6	11
Pediatric EDs																						
2013 Results	42	106	49%	92.8%	9.6%	0.9%	8%	26%	144	130	101	264	1.6%	19	30	3	31	4	0.3	66%	4.0	23
Adult EDs																						
2013 Results	42	147	71%	2.9%	24.9%	1.2%	23%	46%	237	198	135	351	3.3%	25	40	35	49	26	1.3	63%	2.9	39
Urgent Care, Freestanding EDs																						
2013 Results	68	44	53%	20.6%	0.1%	2.9%	7%	34%	114	106	77	238	1.2%	11	20	18	18	12	0.0	66%	2.5	12

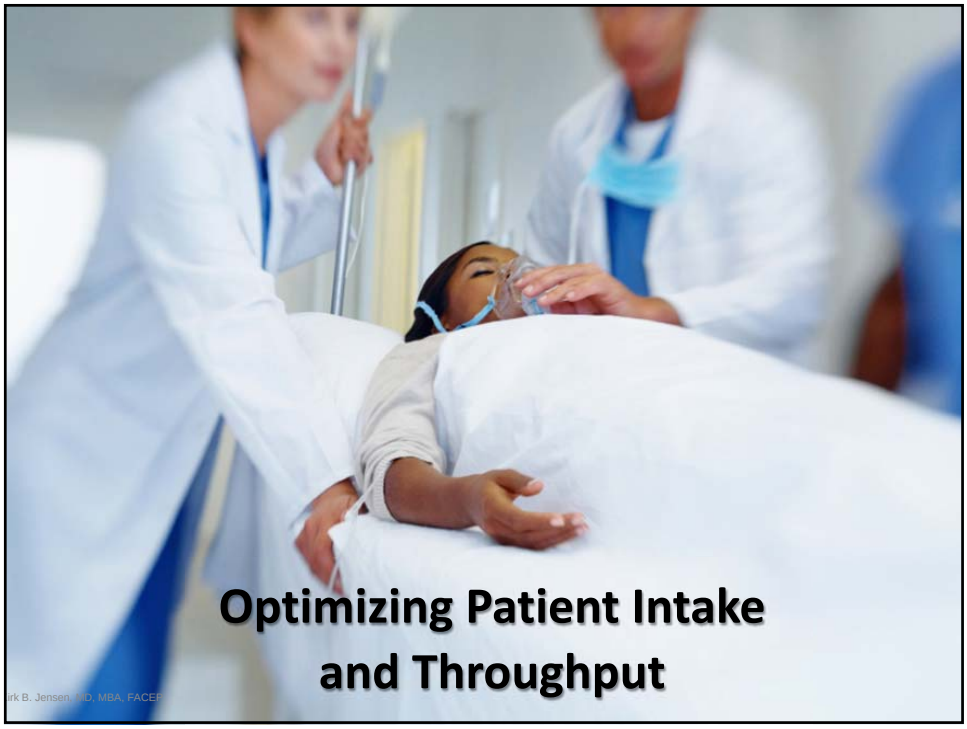
Courtesy of Jim Augustine, MD and EDBA

Everybody Wants Data: Benchmarking Resources

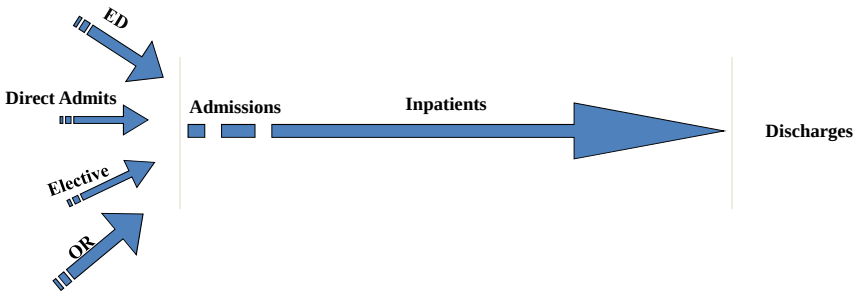
Where to find data:

- 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…

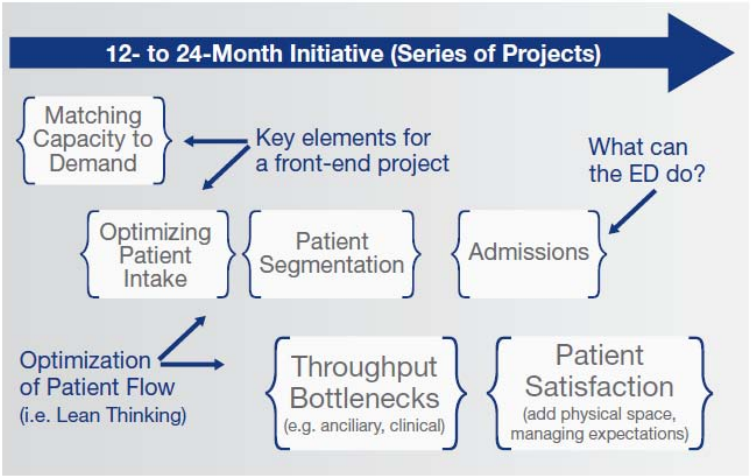


We know we compete for "scarce" resources…

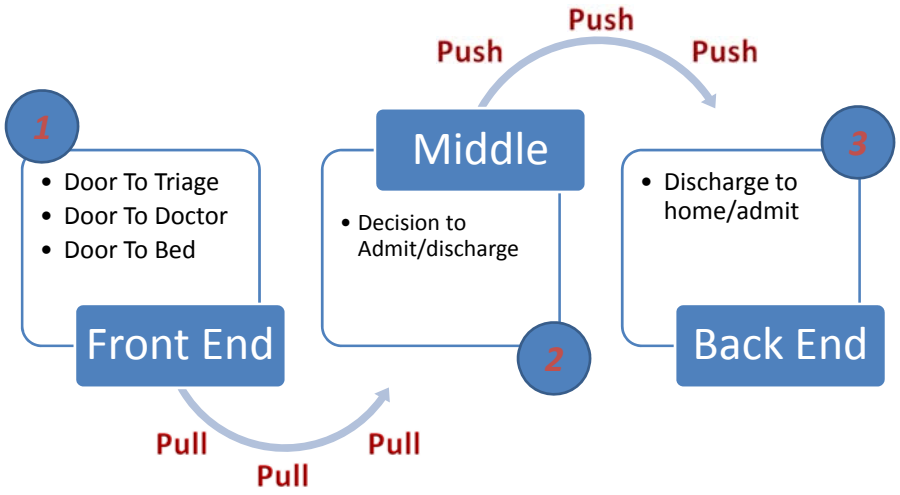


Creating an Entire System That Works

A Framework for Improvement, Sequencing and Tempo



The Lifecycle of a Patient Visit
Patient Flow and Patient Throughput
Pushing and pulling our patients through…



Getting it Right at the Front End of the ED
Service Operations- Operational Strategies and Tactics

- Measure **patient demand** by hour (HOD) and day (DOW) and design a system to handle it
- Commit to the **right staffing mix—and the right staff**
- Make sure your **triage processes enhance flow**, not form a bottleneck
  - ***Triage is a process and not a place***
- Use a simple and reliable system to **segment patient flow**
  - ***Keep your vertical patients vertical and moving***
  - ***Not all patients need beds***
- **Match** your service delivery options to your patient streams
  - ***Remove all work that does not add value***
  - ***Fast Track is a verb and not a noun***

Front End Patient Flow: A Portfolio of Options

- **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)
- **Clinician in Triage:**
  - Midlevel Provider in Triage
  - MD in Triage
  - Team Triage (Multi-disciplinary assessment and treatment team)

A <u>Portfolio of Options</u> 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.

Front End Patient Flow Service Lines

- **Fast Track**-The role of the Fast Track is to segment and serve those patients that are uncomplicated or relatively easy to treat.
  - The Fast Track <u>is not</u> a casual add-on or an overflow unit.
  - Key tactics:
    - Optimize and maximize patient selection
    - Match hours of operation to patient demand
    - Optimize space and capacity
    - The right clinical mix of providers and productivity
- **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
- **"Team Triage"-** A team of providers utilizing an "intake team" mentality for promptly assessing, treating, and discharging level 3 patients

Getting it Right at the Front End of the ED: Service Operations-The Basics

A Classic Emergency Department Change Package:

- Enhanced Triage
- Pull 'til Full
- Bedside Registration
- A Fast Track on Steroids
- Efficient Ancillary Services
  - Lab and Radiology
- A Results-Waiting Area
- Optimizing Admissions and Discharges

General Operational Strategies for Low Acuity Patients by Volume

20,000 and Below

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

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

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

Patient Segmentation and Flow

22

"Vertical" vs. "Horizontal" Patients

Vertical Patients

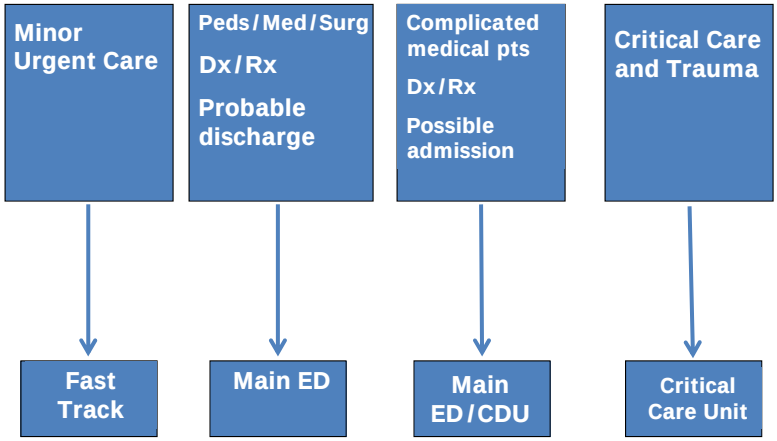
- Ambulatory
- Arrive by Triage
- Well
- Younger
- Perceived urgency or convenience factor
- Value (Starbucks or McDonalds)
  - Speed
  - Convenience
  - Financial
  - Other non-medical factors

Horizontal Patients

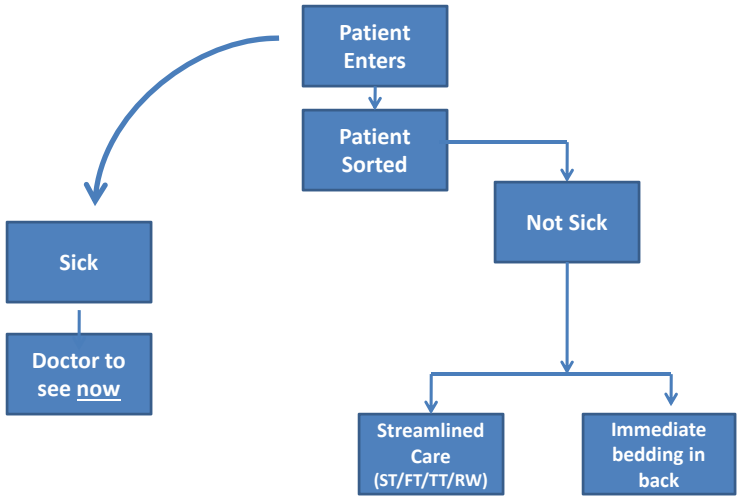
- Stretcher bound
- Ambulance Arrival
- Sick
- Older
- Perceived serious or life-threatening Condition
- Value (Traditional Healthcare)
  - Speed
  - Safety
  - Preservation of Life/Limb

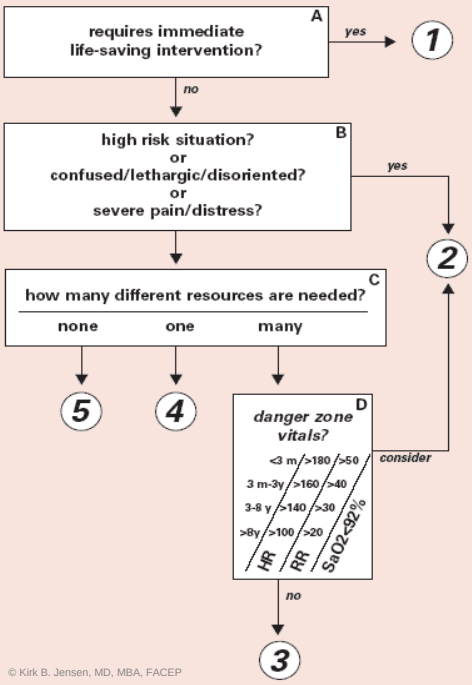
23

Segmenting ED Patient Flow



Get the patient to the right place, at the right time, with the right treatment





Patient Segmentation by Acuity: One Method-The ESI Triage System

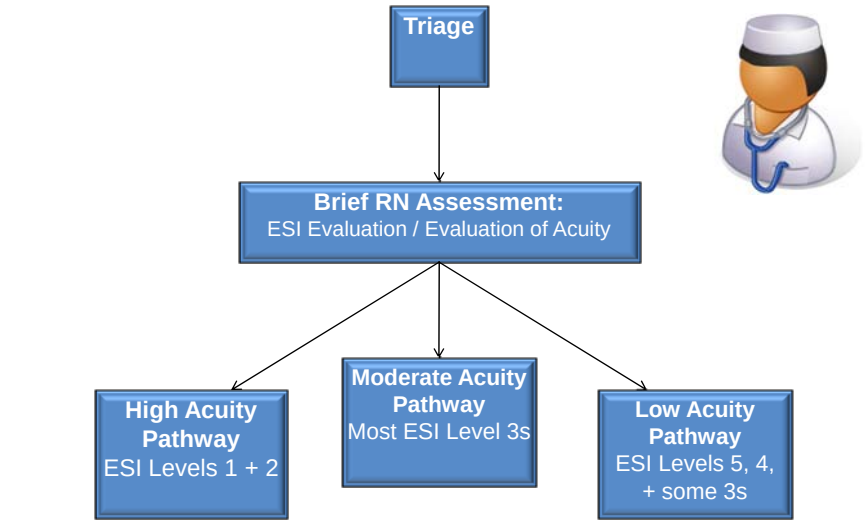
ESI 5-Level Triage System:

- Easy
- Highly Reliable
- Allows for quick patient segmentation

Gilboy N, Tanabe P, Travers DA, Rosenau AM, Eitel DR. *Emergency Severity Index, Version 4: Implementation Handbook*. AHRQ Publication No. 05-0046-2, May 2005.
Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/research/esi/

26

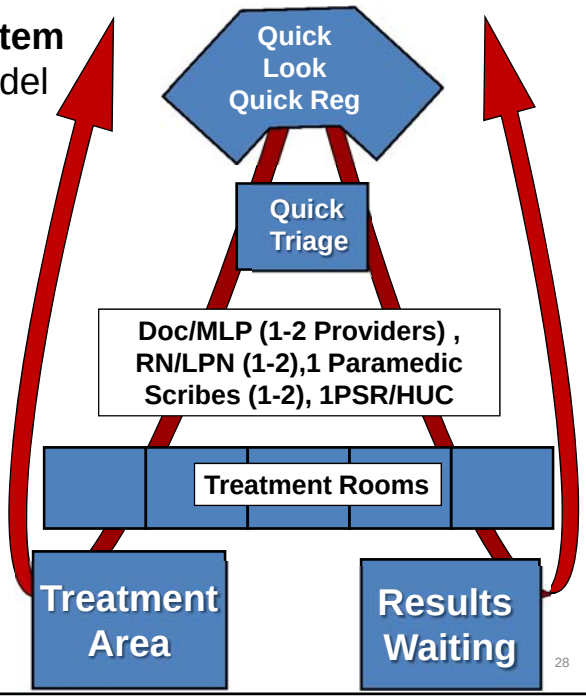
Segment Your ED's Incoming Patient Flow into Patient Streams



27

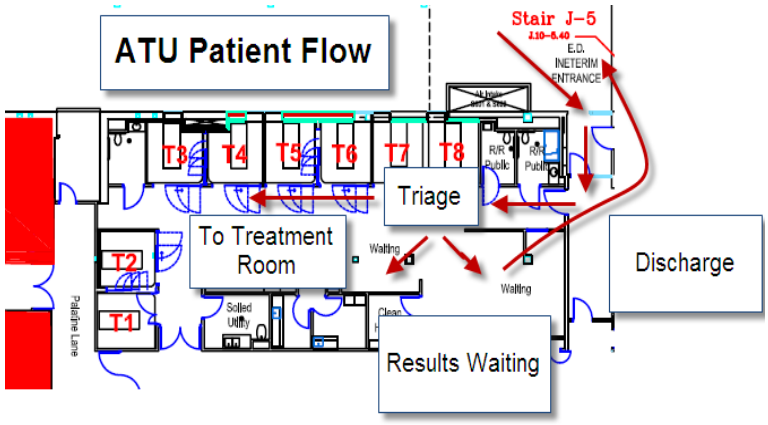
Patient Intake System
A Team Triage Model

Team of providers that promptly assess, treat, and discharge primarily ESI level 3,4, and5 patients



Modified from Jody Crane, MD, MBA and Mary Washington's "RATED-ER" design

Streamlined Front End ED Patient Flow

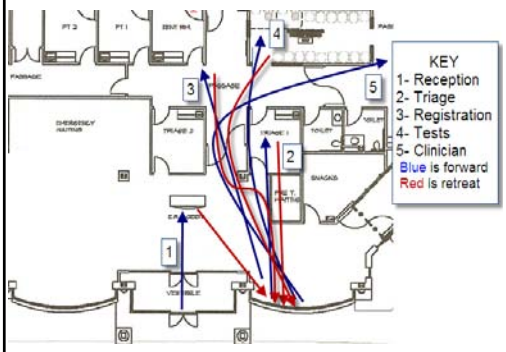


Hardwiring Emergency Department Flow

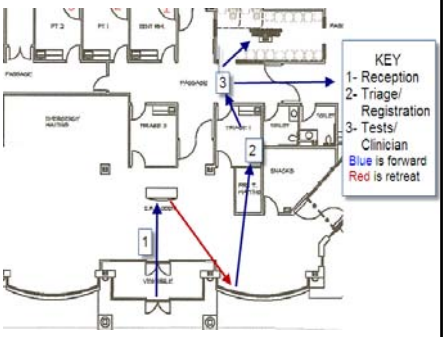
Minimizing Door to Provider Time and Maintaining Forward Flow

Utilizing lean techniques, Best Practices operations models, and process flow redesign…

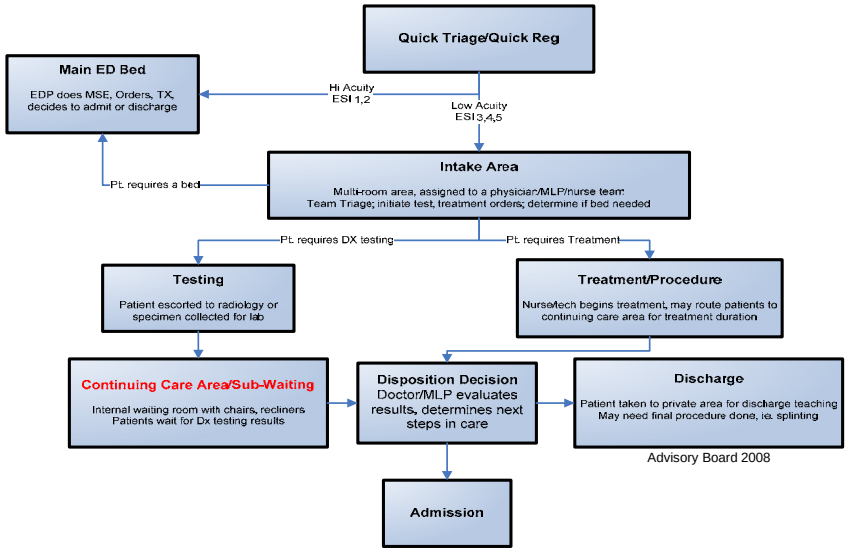
Before



After



Re-Engineering The Care Pathway-Split Flow Management Process
The Advisory Board 2008



Advisory Board 2008

The Flow Cascade

The Elements of the "Flow Cascade" include:

- Triage bypass/direct bedding
- Bedside registration
- Advanced triage/advanced initiatives
- Fast-Track
  - (and a "Fast-track on steroids")
- "Super-tracking" ESI 4s and 5s
- Provider at triage
- Team Triage and Treatment (T3)℠
- ESI level 3 fast tracks
- Results waiting rooms

Fast Track is a Process and Not a Place

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

HARDWIRING FLOW

Creating Continuous Flow

One Stop Shopping

1. **Keep area open, visible to all**
2. **Keep patients upright**
3. **Keep all equipment and manpower mobile**
4. **Each station has to be user friendly**

Lean Admissions at ThedaCare

"Encircle Health"

- Anticipates and structures to meet all needs in one visit
- Lab designed to get results to patient record within 15 minutes
- Patients leave with one plan, all results

36

Optimize Bed Capacity *AND* Utilization

Patients should be in a bed
only if it is medically necessary
<u>and</u>
only as long as medically necessary

37

TABLE TURNS - How many times a table in a restaurant is used to serve a new customer

38

Bed Turns-How Many Patients a Bed Can Serve per Unit of Time

39

Bed Turns and Results Waiting

- 6 Hour ALOS=4 patients per bed per day
- 4 Hour ALOS=6 patients per bed per day

- A key rate limiting server
- A key component of care
- A key "member" of your team

…Park bench…or MVP?

Optimize ED Bed Capacity *and* Utilization

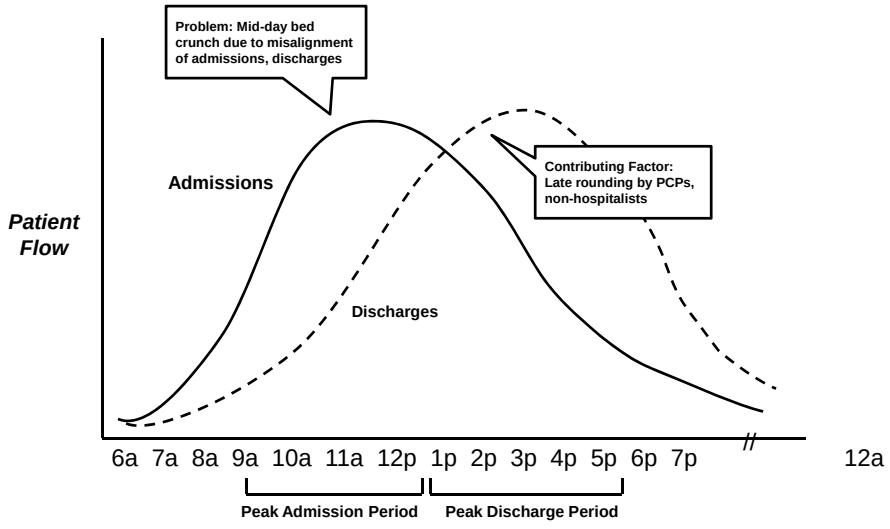
Patients should be in a bed only if it is medically necessary and only for as long as it is medically necessary…

- Optimizing or maximizing bed capacity and bed turns
  - Does bed capacity match patient demand?
  - Are patients in bed for the shortest mount of time that is medically necessary?
  - Are the patients in beds only those patients that actually need a bed?
  - Are there boarded patients or outpatients in ED Beds?

Door-To-Discharge: Ideally a Seamless Network of Processes

42

Admissions and Discharges

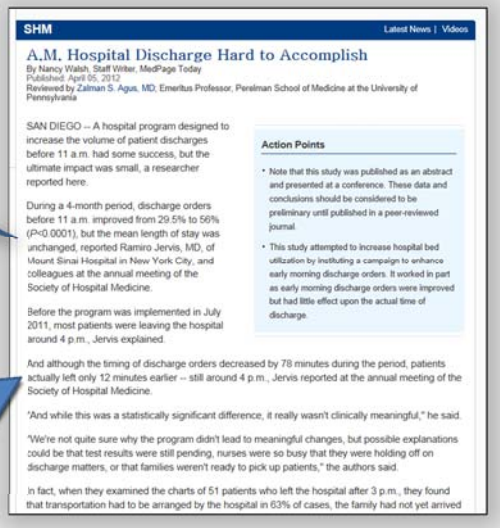


43

"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.

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.

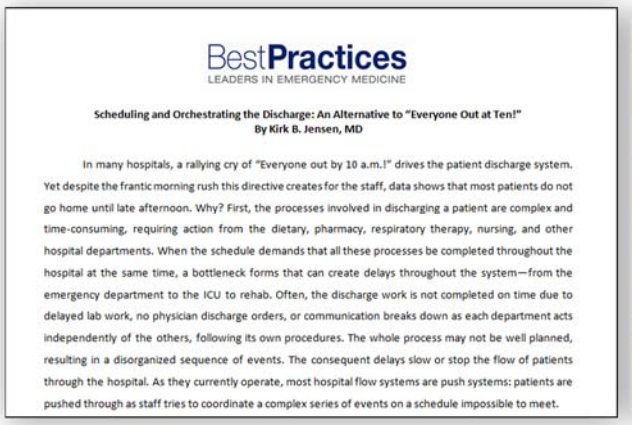
In fact, when they examined the charts of 51 patients who left the hospital after 3 p.m., they found that transportation had to be arranged by the hospital in 63% of cases, the family had not yet arrived

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.

44

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.

45

"Orchestrating the Discharge"

EFFICIENCIES

Improving Patient Flow Through a Better Discharge Process

Michelle Johnson, MBB, Lean Senat, Director, Operational Excellence—Northeast, Covidien Customer Excellence, and Vin Capasso, LSS MBB, Manager, Operational Excellence—Northeast, Covidien Customer Excellence

Hospitals are now facing a dramatic challenge: improve the quality of care while simultaneously lowering costs. The Affordable Care Act of 2010 will add an estimated 32 million additional patients to the system (CBO 2011), and hospitals will need to improve efficiency so that capacity can be expanded while still providing quality care.

One way hospitals can improve efficiency is to increase patient throughput, and many hospitals have a strategic goal to do just that. Yet, short of spending capital to expand facilities, hospitals struggle to sustain gains in this area. Patient throughput is complex, and many factors must be considered when balancing quality of care and speed through the system. The key to improving throughput is to focus on patient flow. Hospitals that succeed in improving patient flow realize that this complex process must include a disciplined and proven process improvement methodology. Patient flow must be viewed as a system, and the issues causing obstacles to smooth flow must be identified and eliminated or mitigated. Exhibit 1 shows some of the interconnected processes within a hospital. By systematically addressing key aspects of this system through rigorous analysis and redesign of the system and its interactions, effective patient flow can be achieved.

The patient flow improvement process has many stakeholders, so garnering senior leadership support is a critical first step toward developing a better process. Next, make sure the improvement activities are clearly defined and manageable. Most organizations don't have massive resources to dedicate for such a large, complex project; therefore, you need to break patient flow into essential parts. Covidien's Customer Excellence group emphasizes that an organization must embrace a Kaizen (continuous improvement) philosophy. Kaizen involves always improving and promotes a spirit of "can do," breaking even huge problems into smaller components to make improvement efforts more manageable. Exhibit 1 is an example of breaking patient flow into six major subprocesses. Each of these subprocesses holds opportunities for improvement, one of the best opportunities involves improving the inpatient discharge process, the last subprocess within the hospital setting.

While this column will focus on improving the inpatient discharge process, the first step involves understanding the patient flow process—also referred to as the patient flow value stream—in great detail. A value stream is an end-to-end series of activities that create or achieve a result for a customer (in this case, the patient). Analyzing the patient flow value stream involves gathering stakeholders from each process step from admitting to discharge and from a wide range of hospital

How to Begin the ReEngineered Discharge (RED) Implementation at Your Hospital

Contract HHSA290200600012i

New tool (deliverable 2.4)

April 15, 2011

Prepared for
Cindy Brach
Agency for Healthcare Research & Quality (AHRQ)
Rockville, MD

BOSTON UNIVERSITY

AHRQ Agency for Healthcare Research and Quality

PROJECT RED Re-Engineered Discharge

A note to users: We would greatly appreciate any feedback that you might have on how to improve this toolkit. This information should be directed to Project RED on our Boston University website,

46

Emphasizing Teams and Teamwork

47

Emphasizing Teams and Teamwork

Teams and Teamwork: It's About Your People…

The A-Team:

- Hire right-Decide in haste or repent at leisure-
  it's your call…
- Put your "A" Team on the floor at all times!

Leverage Clinical Talent, Time, and Performance

- **The clinical talent should be roving intellects engaged in value-added activities at all times**
- **The role of the clinical staff is to make diagnostic and treatment decisions and to manage the team and patient flow**
- **Anything else is non-value added activity…**

- Optimize the MD/MLP/RN mix
- Scribes to leverage the MDs
- Patient flow coordinator
- Board huddles/rounds in the ED
- Team assignments/geographic zones
- The right clinical support mix
- Tailor the hours and staff to the facility and to patient flow

4000 Clicks: a productivity analysis of electronic medical records in a community hospital ED.

Am J Emerg Med. 2013 Sep 20.
pii: S0735-6757(13)00405-1. doi: 10.1016/j.ajem.2013.06.028. [Epub ahead of print]
Hill RG Jr, Sears LM, Melanson SW. Emergency Department,
St Luke's University Health Network, Allentown, PA 18104.

Abstract

OBJECTIVE:

We evaluate physician productivity using electronic medical records in a community hospital emergency department.

METHODS:

Physician time usage per hour was observed and tabulated in the categories of direct patient contact, data and order entry, interaction with colleagues, and review of test results and old records.

RESULTS:

The mean percentage of time spent on data entry was 43% (95% confidence interval, 39%-47%). The mean percentage of time spent in direct contact with patients was 28%. The pooled weighted average time allocations were 44% on data entry, 28% in direct patient care, 12% reviewing test results and records, 13% in discussion with colleagues, and 3% on other activities. Tabulation was made of the number of mouse clicks necessary for several common emergency department charting functions and for selected patient encounters. Total mouse clicks approach 4000 during a busy 10-hour shift.

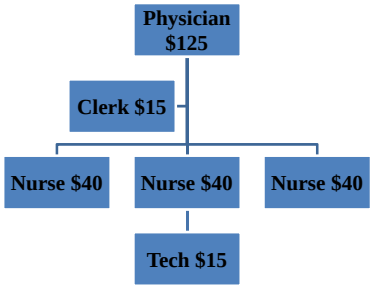
CONCLUSION:

Emergency department physicians spend significantly more time entering data into electronic medical records than on any other activity, including direct patient care. Improved efficiency in data entry would allow emergency physicians to devote more time to patient care, thus increasing hospital revenue.

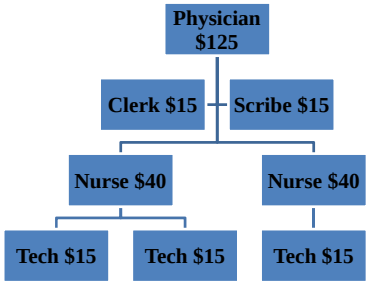
51

Optimizing Staffing Patterns for Service *and* Safety

Traditional Staffing Model = $270/Hr



Contemporary Staffing Model = $280/Hr



Courtesy Rick Bukata, MD

52

Teams and Teamwork: Working Together

Teamwork and Crew Resource Management (CRM)

- Training
- Team structure and climate
- Planning and problem solving
- Communication within the team
- Managing the workload
  - Situational awareness
- Team improvement strategies

53

Key Operational Tactics

A partial list, organized by person, place, or function

- **Physician**
  - Scribe/Best assistant
  - Diagnostic results flagging
- **Teamwork**
  - Dedicated communications nurse
  - Patient flow coordinator/expediter
  - Board huddles/rounds in the ED
  - Team assignments/ geographic zones
- **A Results Waiting room**
- **Real-time patient tracking**
  - Demand-capacity
  - Make-patient status visible
  - Surge capacity
  - Triggers and back-up
    - Signals, guidelines, and next actions,
- **Radiology**
  - Dedicated X-ray tech
  - EP "wet reads"
  - Fast-track radiology consult
  - X-ray order guidelines/protocols
  - CT capacity and turnaround
- **Lab and ancillaries**
  - Test-ordering guidelines
  - Dedicated phlebotomist
  - Turnaround time (service) guarantees
  - Ancillary usage profiling
- **Special cause variation/patient flow segmentation**
  - i.e. Mental health

Diagnostic Services

- Set turnaround time goals (metrics, KPIs)
- Regularly measure performance against the goal
  - This will help ensure strong performance (accountability)
- Prioritizing key tests (plain films, simple labs) from the ED can help minimize delays

Because of the time-sensitive nature of the customer service environment of the ED, the effect of delays from diagnostic services can be magnified

THE BENEFITS OF FLOW TO YOUR BOTTOM LINE
Monetizing Flow

There is a Compelling Business Case for Flow- A Case Study

ER Patients	Results
40,000 ED Visits x 1 Hr Reduction in LOS	40,000 Hours of ↑ED Capacity/ Year
40,000 Hours of ↑ED Capacity/ 2 Hours per ED Visit	20,000 potential new visits/year
20,000 new ED visits x $100/visit in physician revenue	$2,000,000 new revenue for the group
20,000 new ED visits @ $400/visit for the hospital	$8,000,00 new revenue per year for the hospital
New hospital admissions at $3,000 - $7500 per admission	1 more admission per day (365) X $3,000-$7500/ patient admission =$1,095,00-2,737,500/year
	(AHRQ-only 6.2% of admissions through the ED are uninsured)

The Business Case for Flow Continued…

Average $100 NCR MD income for every walkaway

Average $400 in hospital income for every walkaway

For a 50,000 visit ED= $50,000 in new MD revenue (no increased overhead) for every 1% reduction in LWBS/LWBTs

A 1% reduction in walkaways = $200,000 in new outpatient hospital revenue

- **In 2007, 1.9 million people – representing 2% of all ED visits – left the ED before being seen (LWBS), typically because of long waits**
- **These walk-outs represent significant lost revenue for hospitals**
- **A crowded ED limits the ability to accept referrals**

THE COST – IT ADDS UP

1.9 million	$1,086	$9,000
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.	A 2006 study found that each hour of ambulance diversion was associated with $1,086 in foregone hospital revenues.	A recent study showed that a 1-hour reduction in ED boarding time 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.

Service

Emergency Medicine Today

Prepared exclusively for members of American College of Emergency Physicians

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 Hidden Cost of Implementing an EMR (One point of view…)

- Hospital A treats 100 patients per day
- Staffed hours= five 8 hour physician shifts and one 10 hour shift per day
- Current throughput=180 minutes on average
- Daily coverage cost= $7,500 (each physician salary+ benefits of $150/hour)
- Calculation of increased time=100 pts/day x 5 minutes/pt=500 minutes or 8.33 hours of increased physician work per 24 hour period
- Additional EP cost to maintain patient throughput at current level: 8.33 hours x $150/hr=$1250/day or $456,000 annually

Courtesy Bryan Vineyard in EM News

The True Cost of a Complaint:

- The cost to manage the complaint
- The impact of one unhappy customer (client) multiplied out over a year
- The lifetime value of a customer

62

The True Cost of a Patient Complaint

Physician time for record review and follow-up with patient	1 hour	$150
Medical Director time for record review	30 minutes	$ 75
Medical Records pulling charts, copying	30 minutes	$ 8
Business Office copying bills, explanation, rebilling	30 minutes	$ 20
Secretary checking ED charge	15 minutes	$ 10
ED Manager time	30 minutes	$ 30
Administrative time to review (if needed)	30 minutes	$ 35
Patient Relations initial complaint, investigation, referral, f/u	2 hours	$ 40
Supplies		$ 10
Bill adjustments		$ 75

	TOTAL:	**$450**

63

The Patient Complaint: Quick Facts

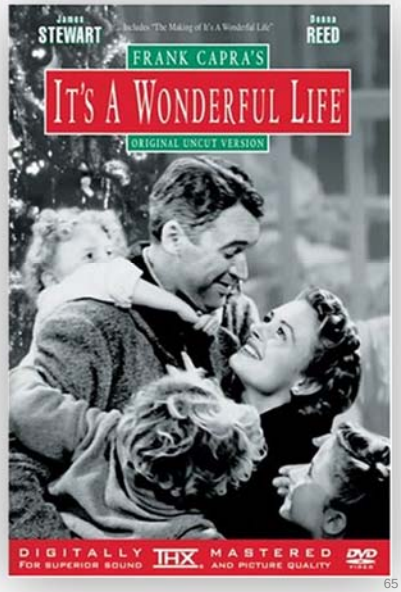
- Each disappointed patient who complains represents 6 others who are unhappy about a similar experience
  - Therefore each complaint represents 7 unhappy patients
- Each unhappy patient tells 8-10 other people about their unhappy experience
  - Therefore 63 people now know about these unhappy experiences
- 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

It's A Wonderful Life…

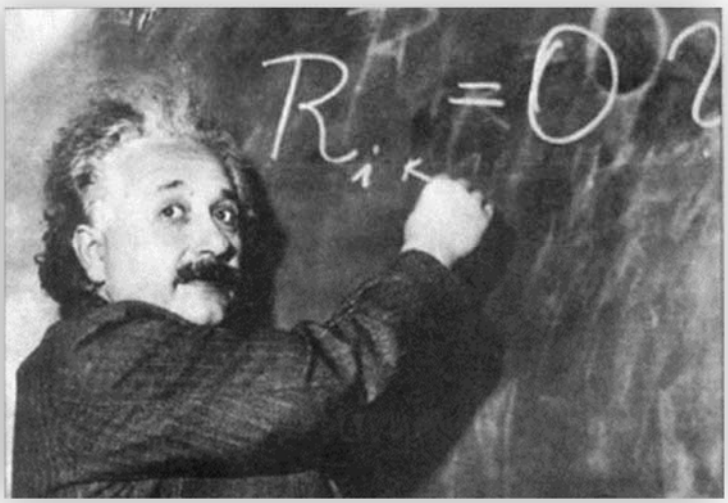
Applying the key lessons from the movie to your ED...

A "what if" analysis…



Break…

Advanced Flow Concepts



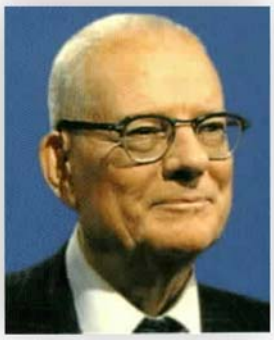
The Science of ED Service Operations- Going Deeper

- **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***

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*



Deming W.E. The New Economics for Industry, Government, and Education, *MIT, 1993 (Second Edition, 1995)*

Appreciation of a System

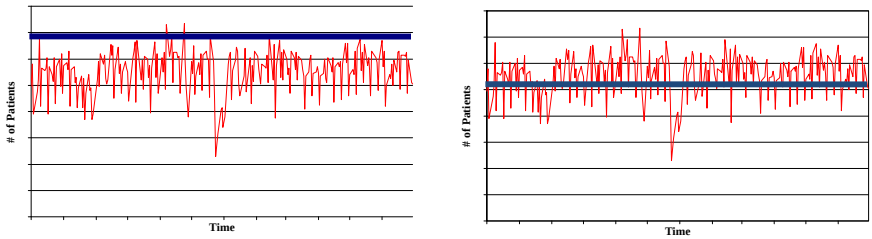
- **A system must have an aim.**
  - Without an aim, there is no system.
  - The aim of the system must be clear to everyone in the system.
- **You can't optimize a system by optimizing each part of a system** - The components of a system are interdependent - optimizing one part will usually not optimize 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

Understanding Variation
-Differentiate variation in data as a result of common causes (causes inherent in the process over time and affecting all outcomes) and special causes (causes that arise because of special circumstances) –"signal vs. noise" – "Managing by anecdote…"
-Plot data over time to view patterns and distinguish between common and special causes

It takes leaders and leadership to really optimize a system…

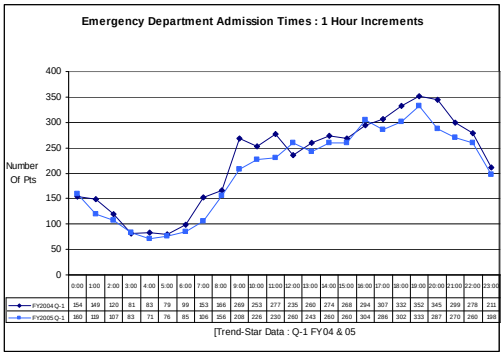
Demand-Capacity Management

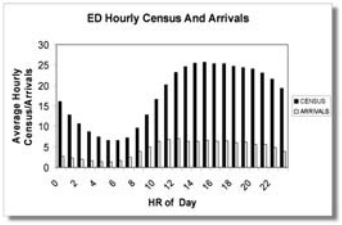
What should capacity look like to guarantee quality care?

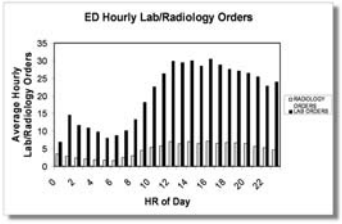


Eugene Litvak, PhD, Boston University

Classic ED Patient Flow Curves





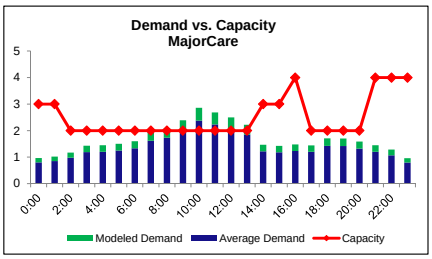


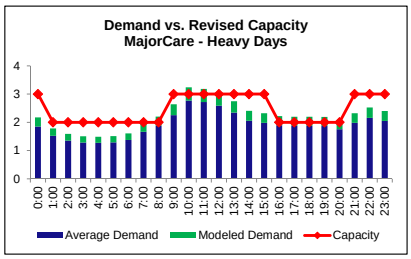
Key Questions

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

Demand-Capacity Management

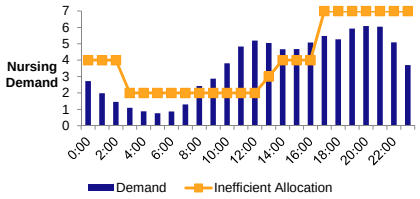
Matching Capacity To Demand: Arrivals Versus Staffing-Physicians



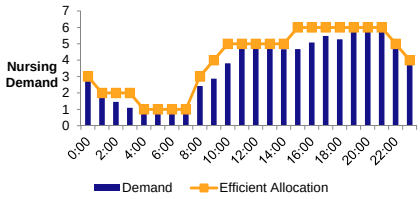


Demand-Capacity Management
Efficiency *and* Effectiveness

Before: Inefficient Allocation
Example: 96 Nursing Hours

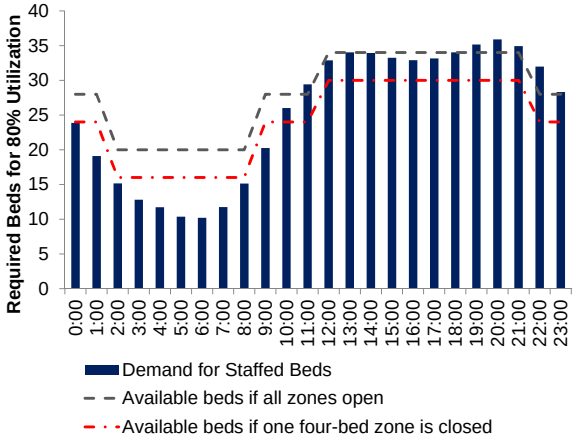


After: Efficient Allocation
Example: 96 Nursing Hours



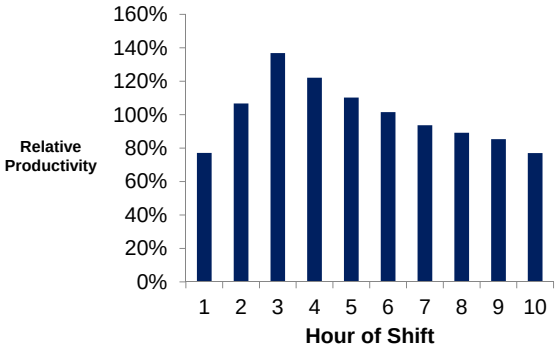
Demand for Staffed Beds

Average Day, 172 Patient Arrivals



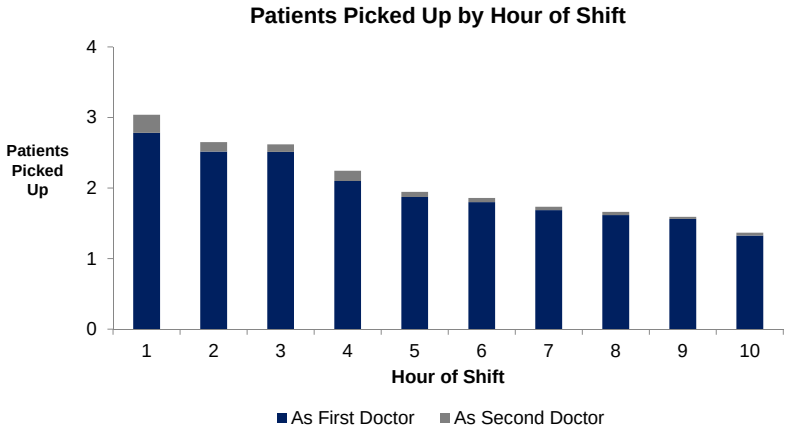
- If all available beds are staffed during peak times (12p-12a), we have sufficient bed capacity
- If one zone is closed during these peak times, we drop below required bed capacity and performance will falter

Estimated Workload Across Shift



- Combining historical patients picked up per hour with our estimated work profile, we can calculate the approximate workload across a shift
- Graph shows the relative workload compared to a straight PV of 2.0

The number of patients picked up per hour declines across the length of a shift



Demand-Capacity: Simple Mathematics

Demand-Capacity Analysis

An Example:

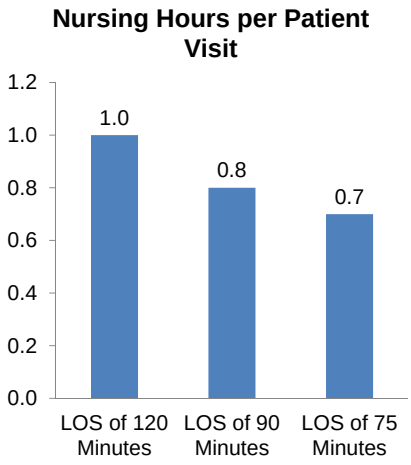
The initial calculation is relatively simple

Representative Example-Nursing

- An ED sees an average of **55 patients** each day
- The target HPPV for direct patient care is **1.0 hours**
- Targeting a utilization rate of 80%

55 pts **×** 1.0 hrs/pt **÷** 80%
= 67.75 Nursing Hours per Day

Length of Stay Impact on HPPV

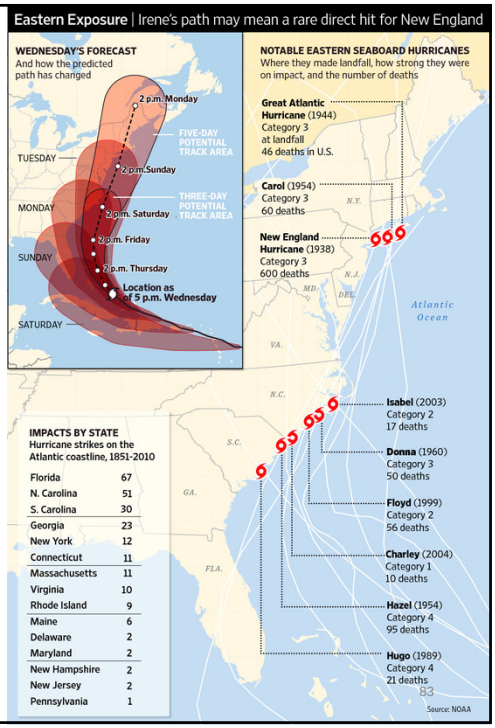


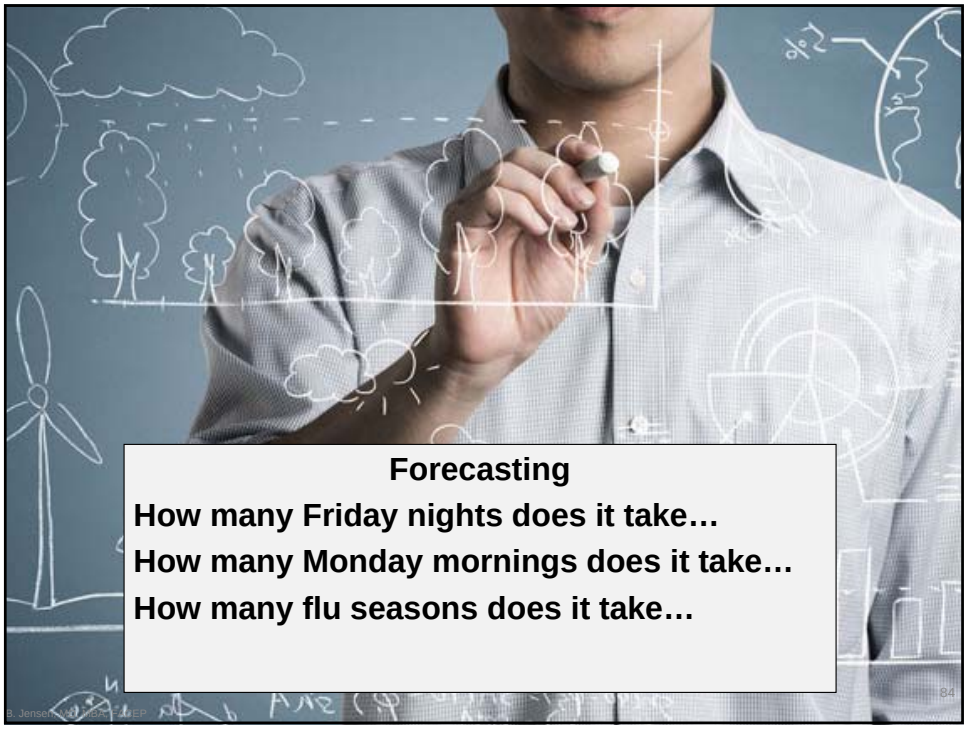
- Because of the nature of nursing work, HPPV requirements vary based on Length of Stay
- Reducing length of stay to 90 minutes or lower can decrease required staff by more than 20%

Forecasting

The weather….

Forecasting…





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…

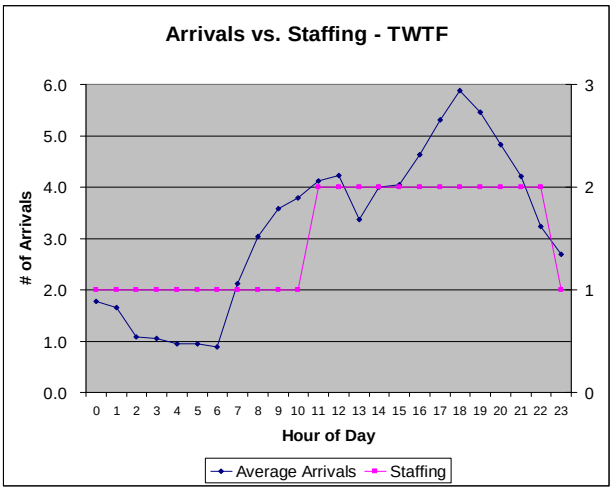
Patient Flow(Demand) is Predictable

and

Capacity (Staff, Space, Supplies, and Service…) is Manageable…*

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

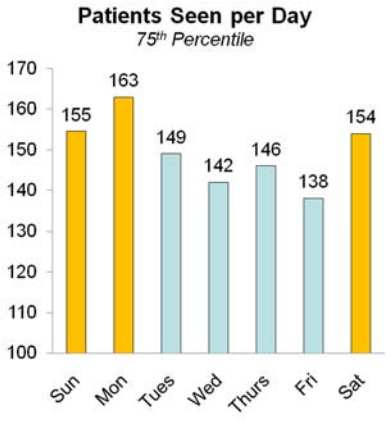
Demand-Capacity and Scientific Management Arrivals vs. Staffing



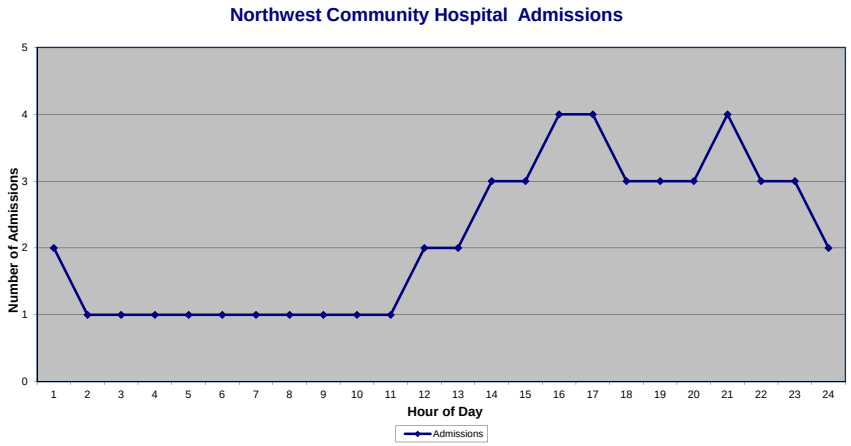
Demand/Capacity Management:
Volume Variation by Day of Week

- Volume varies significantly by day of week – 10%+ variation between heavy and light days
- Saturday, Sunday and Monday are heavier days

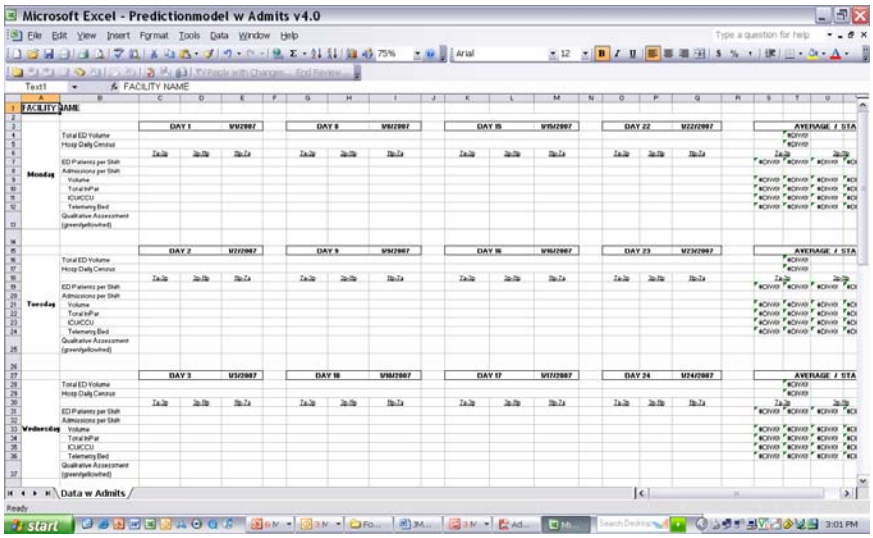
When matching capacity with demand, varying staffing by day of week is essential

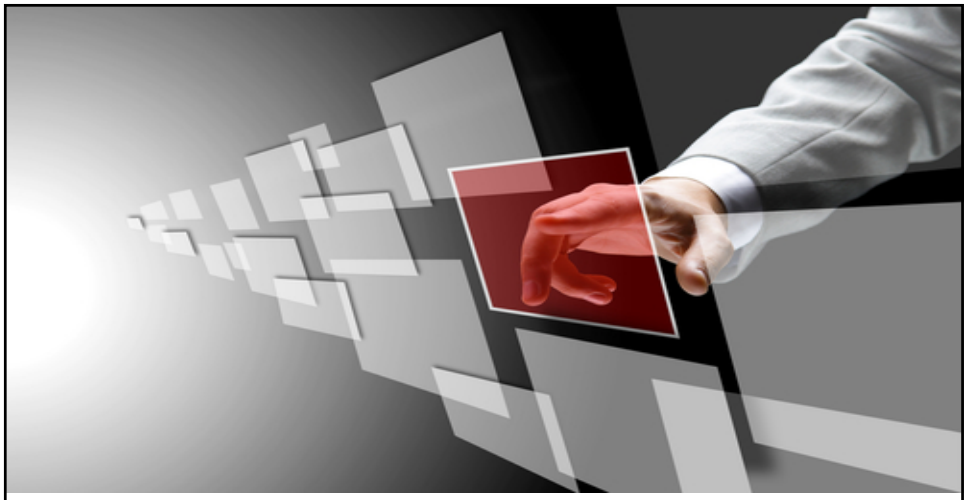


Scientific Management-Planning for Admissions



Forecasting ED Patient Flow





Real-Time Monitoring of Patient Flow

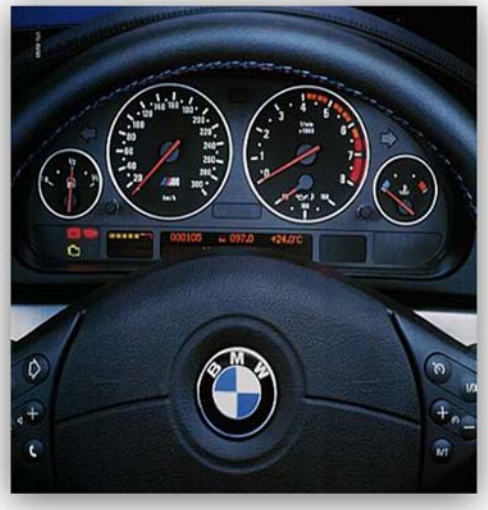
McDonald's Does It…

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

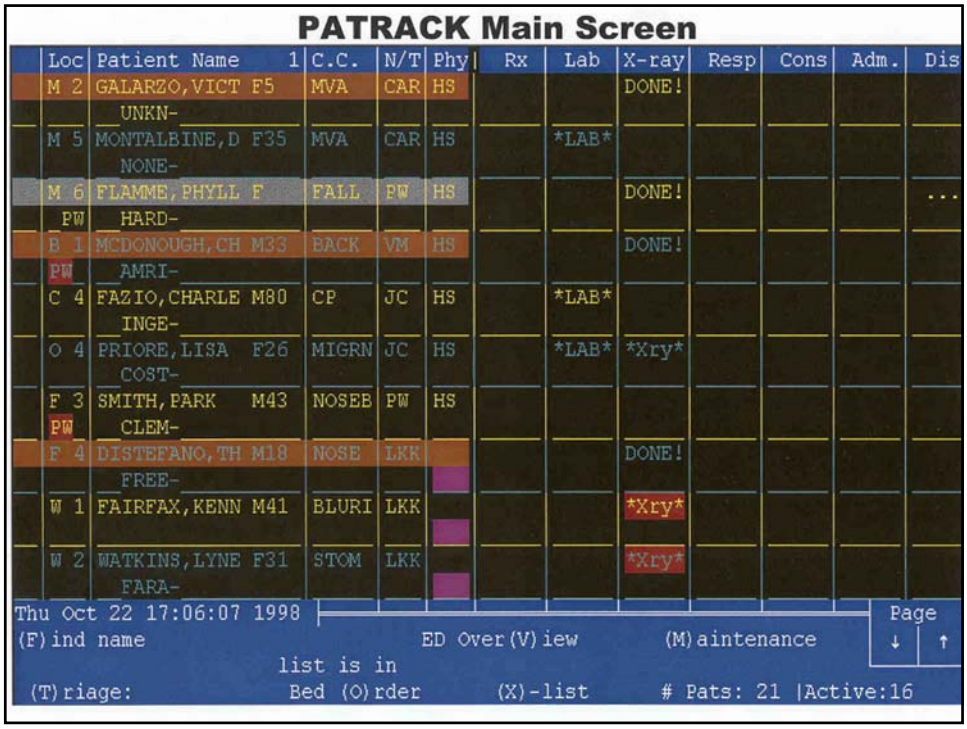
92

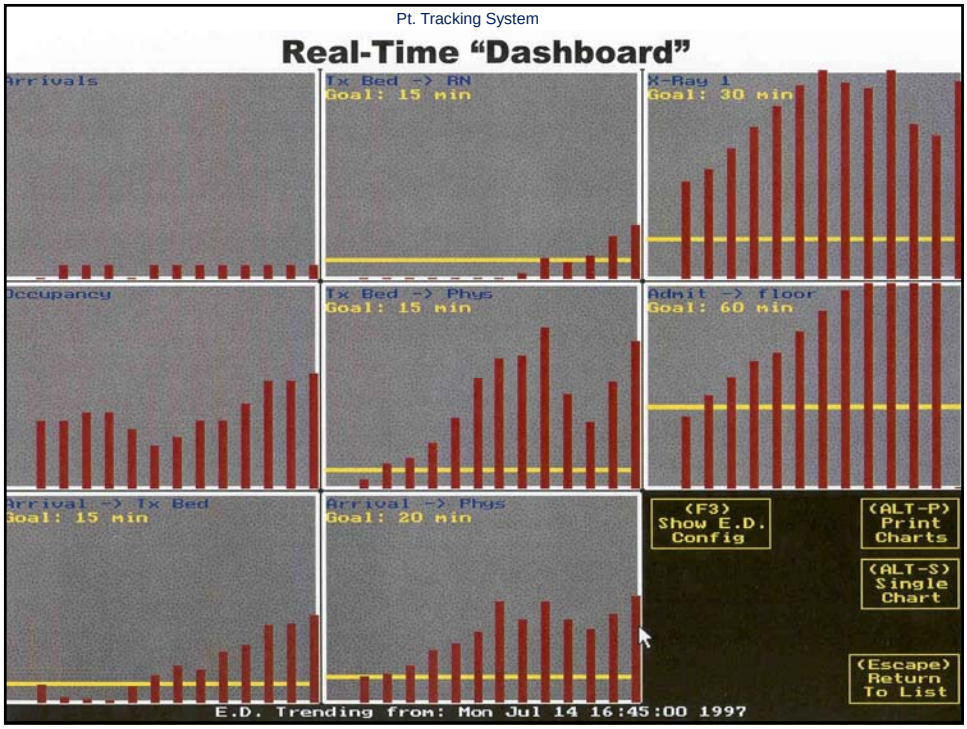
You do it…

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

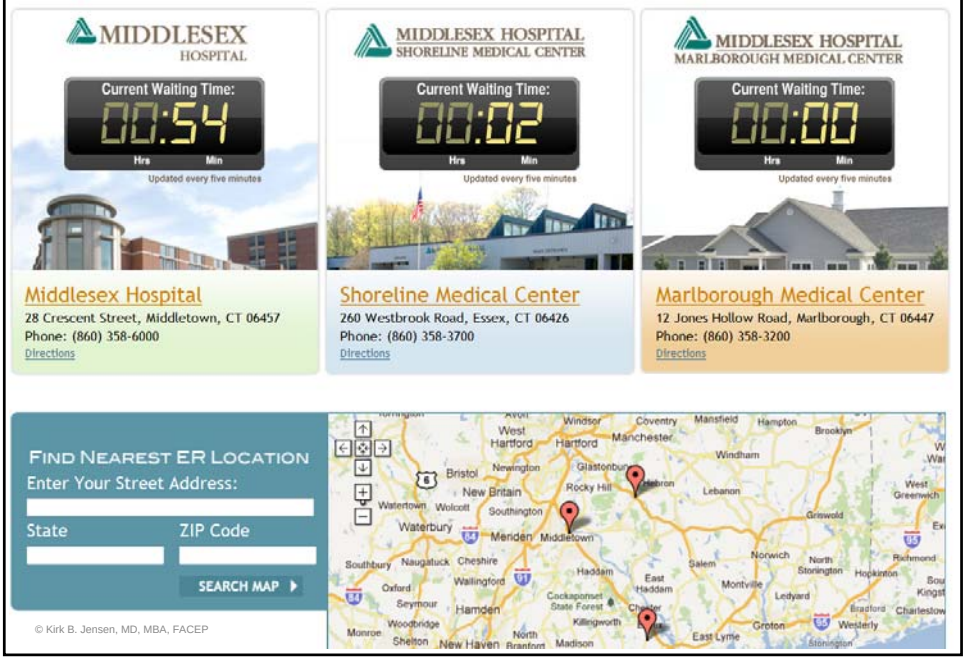


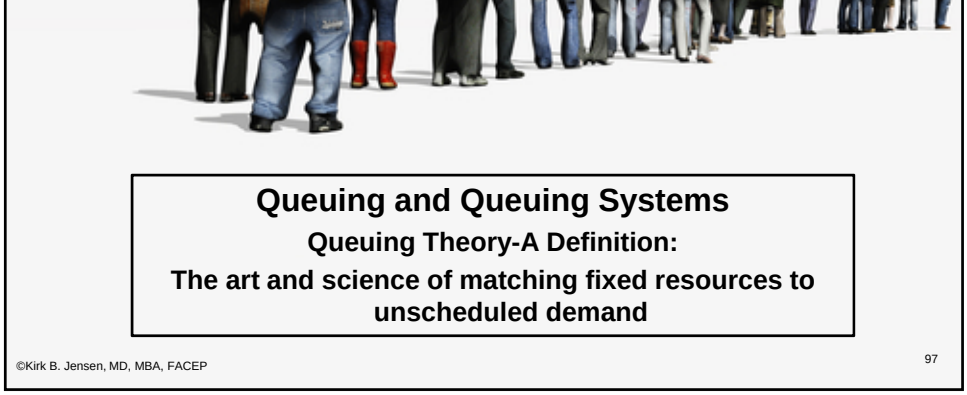
93


PATRACK Main Screen
Loc | Patient Name 1 | C.C. | N/T | Phy | Rx | Lab | X-ray | Resp | Cons | Adm. | Dis
M 2 | GALARZO,VICT F5 | MVA | CAR | HS | | | DONE!
UNKN-
M 5 | MONTALBINE,D F35 | MVA | CAR | HS | | *LAB*
NONE-
M 6 | FLAMME,PHYLL F | FALL | PW | HS | | | DONE!
PW | HARD-
B 1 | MCDONOUGH,CH M33 | BACK | VM | HS | | | DONE!
PW | AMRI-
C 4 | FAZIO,CHARLE M80 | CP | JC | HS | | *LAB*
INGE-
O 4 | PRIORE,LISA F26 | MIGRN | JC | HS | | *LAB* | *Xry*
COST-
F 3 | SMITH,PARK M43 | NOSEB | PW | HS
PW | CLEM-
F 4 | DISTEFANO,TH M18 | NOSE | LKK | | | DONE!
FREE-
W 1 | FAIRFAX,KENN M41 | BLURI | LKK | | | *Xry*
W 2 | WATKINS,LYNE F31 | STOM | LKK | | | *Xry*
FARA-
Thu Oct 22 17:06:07 1998
(F)ind name
ED Over(V)iew
(M)aintenance
Page
list is in
(T)riage:
Bed (O)rder
(X)-list
Pats: 21 |Active:16


Pt. Tracking System
Real-Time "Dashboard"
Arrivals
Tx Bed -> RN
Goal: 15 min
X-Ray 1
Goal: 30 min
Occupancy
Tx Bed -> Phys
Goal: 15 min
Admit -> floor
Goal: 60 min
Arrival -> Tx Bed
Goal: 15 min
Arrival -> Phys
Goal: 20 min
(F3) Show E.D. Config
(ALT-P) Print Charts
(ALT-S) Single Chart
(Escape) Return To List
E.D. Trending from: Mon Jul 14 16:45:00 1997

Real-Time Monitoring of Patient Flow





Queuing and Queuing Systems

Queuing Theory-A Definition:

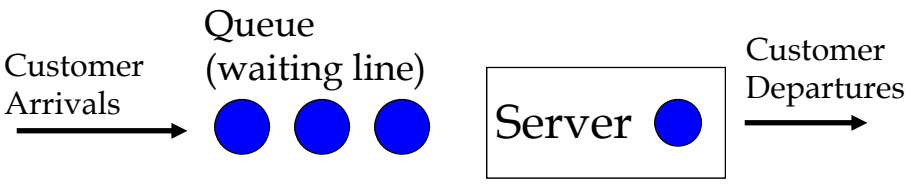
The art and science of matching fixed resources to unscheduled demand

97

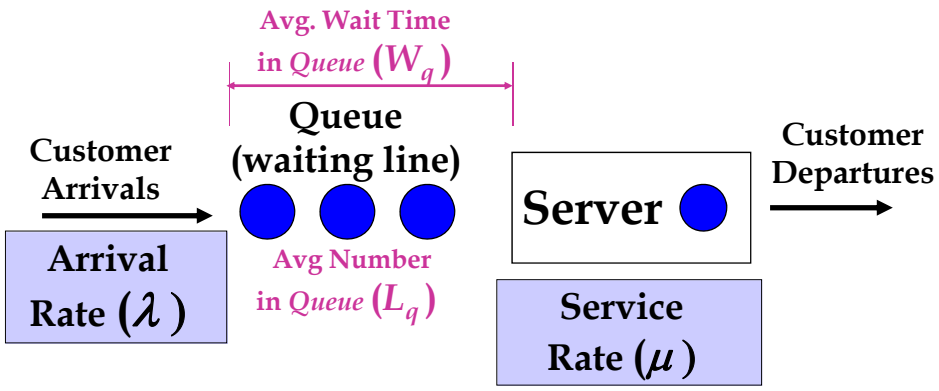
Queuing Systems-Background

- A “queuing 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 (e.g. # in the queue, waiting time) is well understood and can be described by two variables
  - -Mean arrivals per hour
  - -Capacity per hour

Queuing Theory - A Simple Queue



Queuing Systems-A Simple Queue

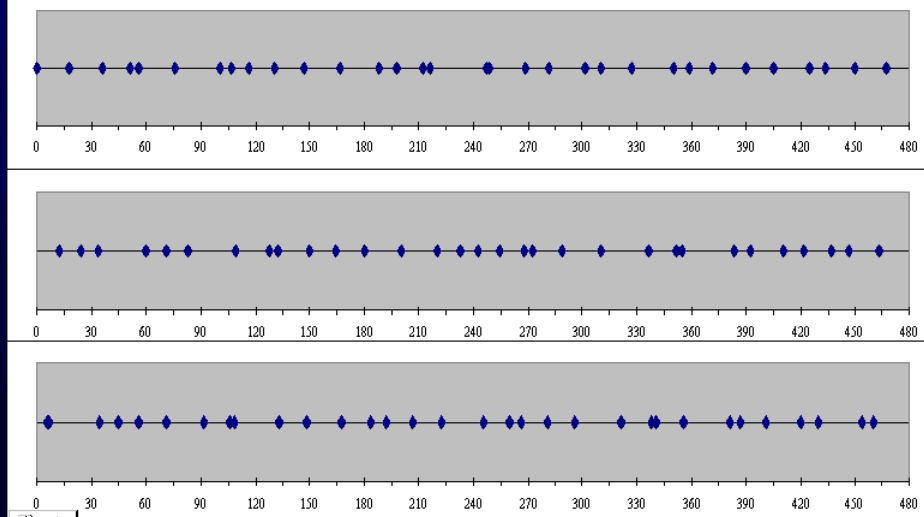


Queuing Systems Have Distinct Characteristics

- 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…

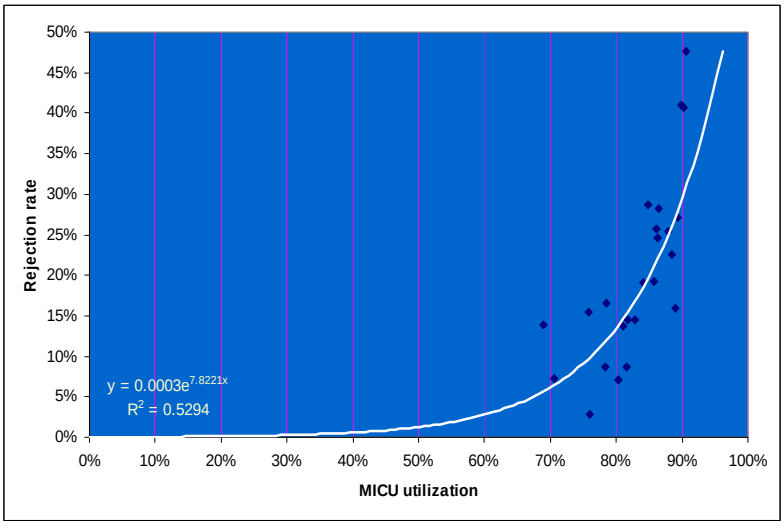
Day Clinic - Patient Arrival examples



Courtesy: Chuck Noon, PhD, PEMBA UTK

102

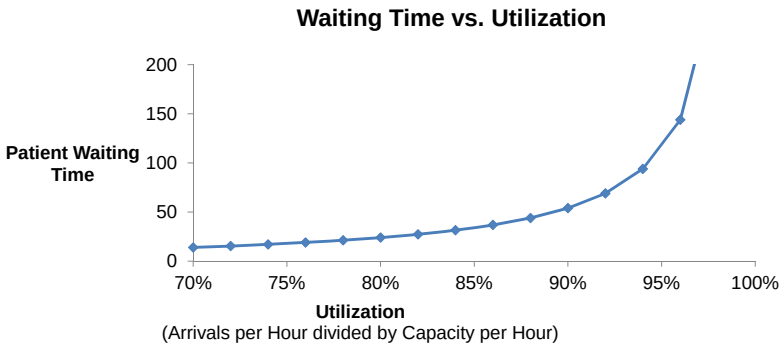
Lessons from queuing theory: MICU utilization and the patient rejection rate



Michael McManus, Boston Children's Hospital, 2001

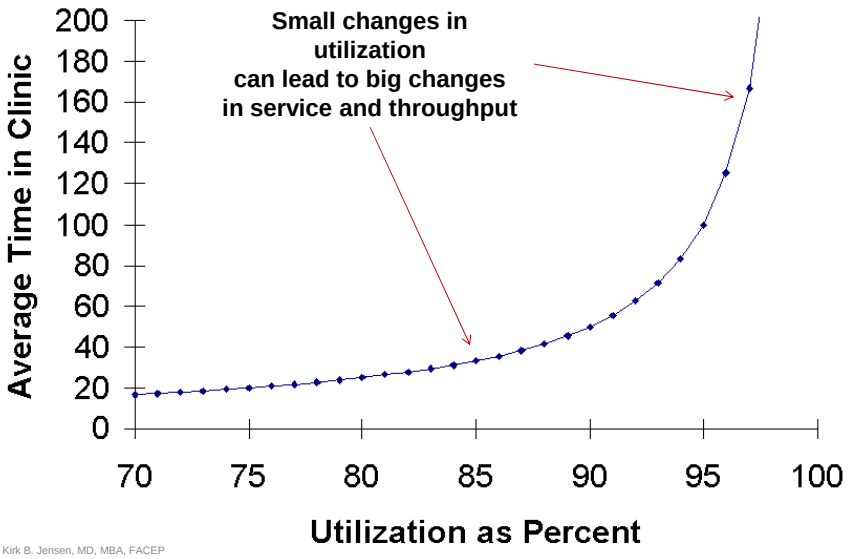
103

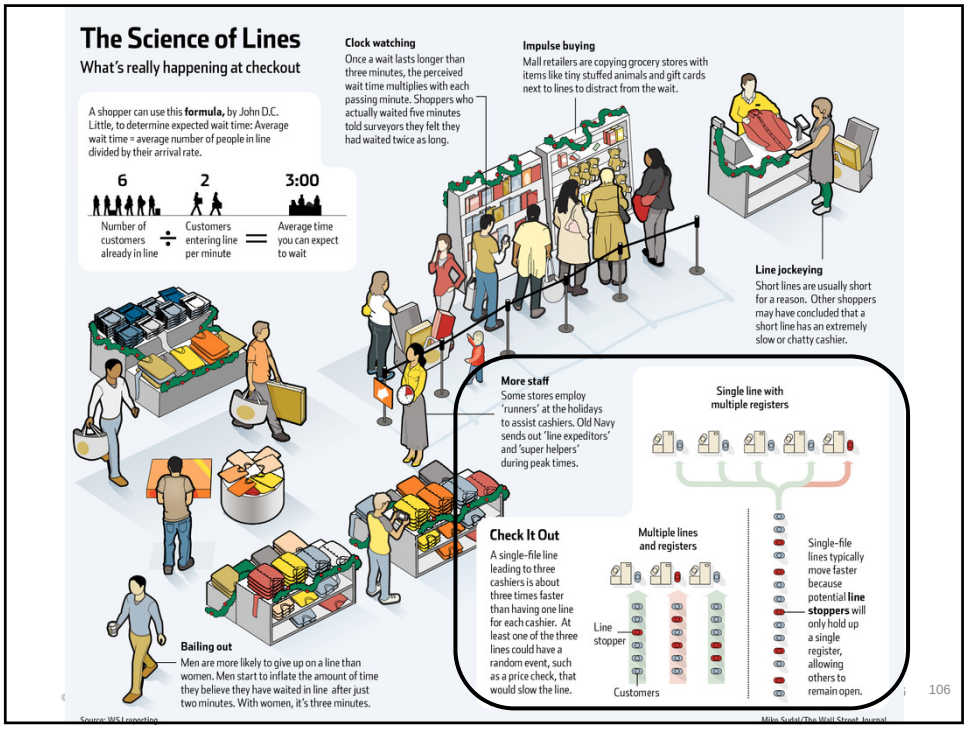
Your ED is a Queuing System



Bottom Line: In such a system, waiting time always skyrockets as the number of arrivals per hour approaches the system capacity. When optimizing a queuing system, it is critical to target a utilization around 80%

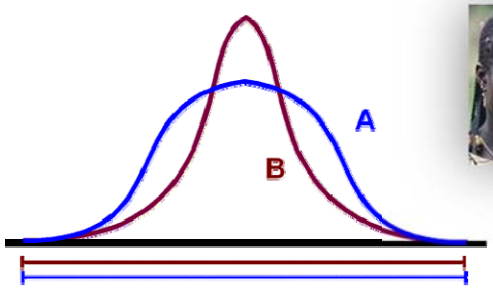
Queue Behavior as a Function of Utilization





106

VARIATION AND VARIABILITY



107

The Science of Variability Management

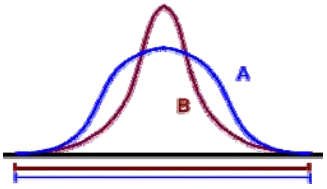
You must manage variability…

(Unless you have unlimited capacity)

Lessons from Variability and Operations Research

Sources of Variation:

1. Clinical variability
2. Flow variability
3. Professional variability



Eugene Litvak, PhD, Boston University

Variability in a Queuing System

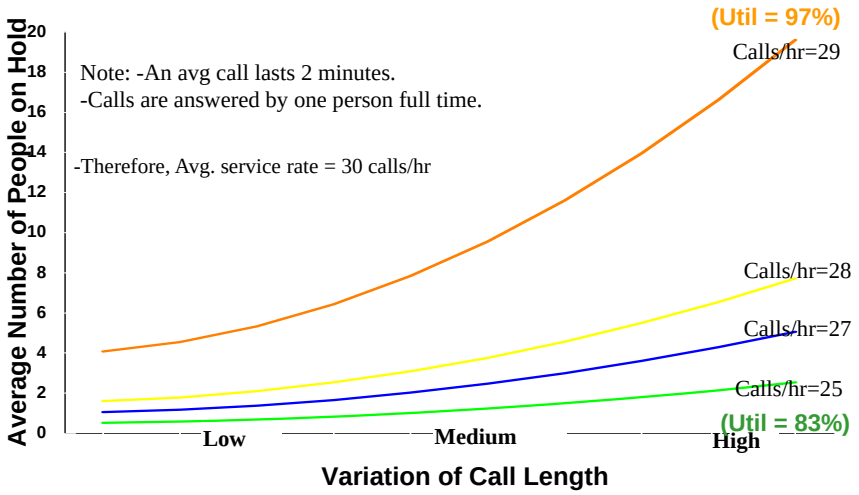
An Example: The Performance of a Telephone Answering System

- 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?

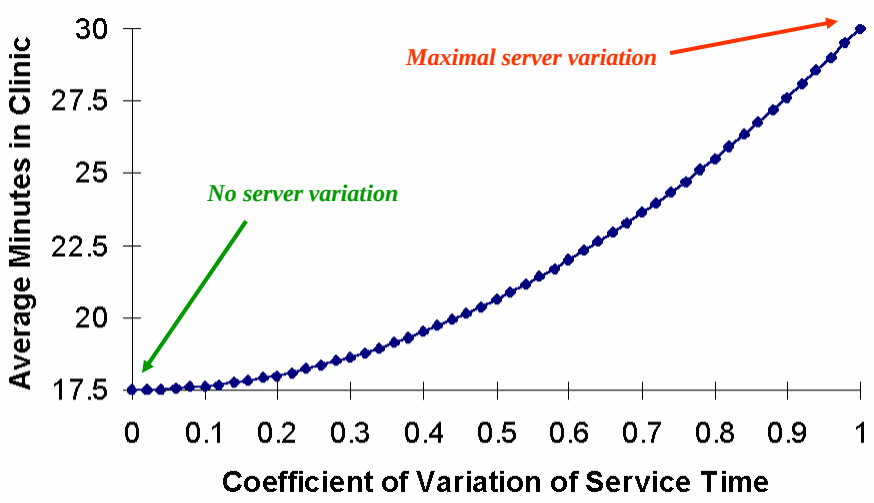
Effect of Variation on Queues

Performance of a Telephone Answering System



110

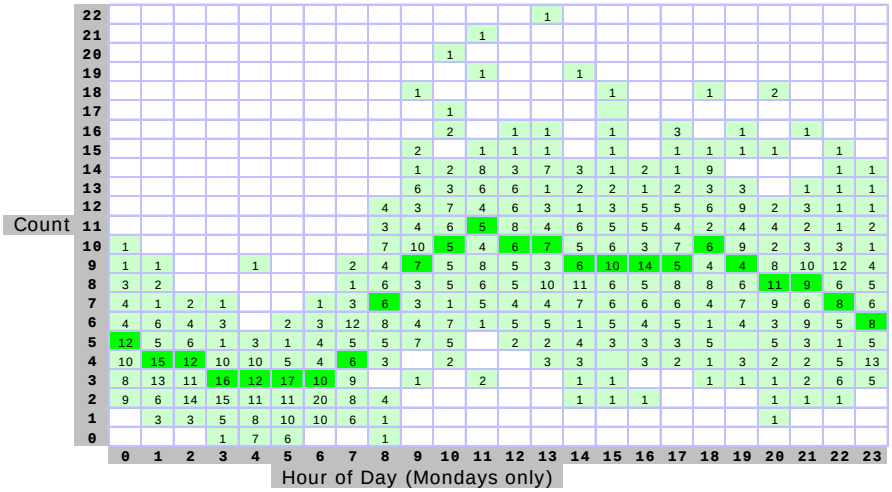
Walk-in (Unscheduled) Urgent Care
Arrival Rate of 10/hour, Service Rate of 12/hour, and Server Utilization of 83.33%



Chuck Noon, PhD UTK PEMBA

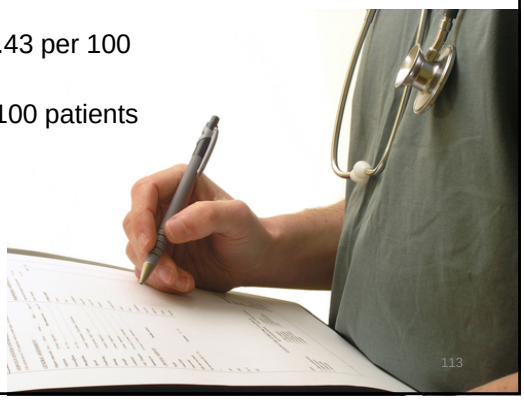
111

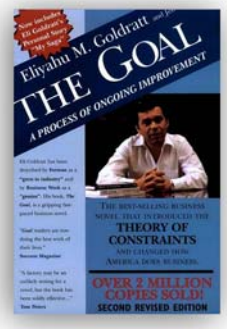
…the actual count of arrivals for any given hour or day can vary considerably. This is *arrival variation*.



Examples of 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.





The Theory of Constraints

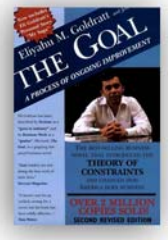
- **By Eliyahu Goldratt**
- **A business novel**
- **Theory of Constraints:**
  - **Constraints limit performance**
  - **To improve performance, focus on improving constraints**

- **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

114

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 non-critical bottleneck 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…

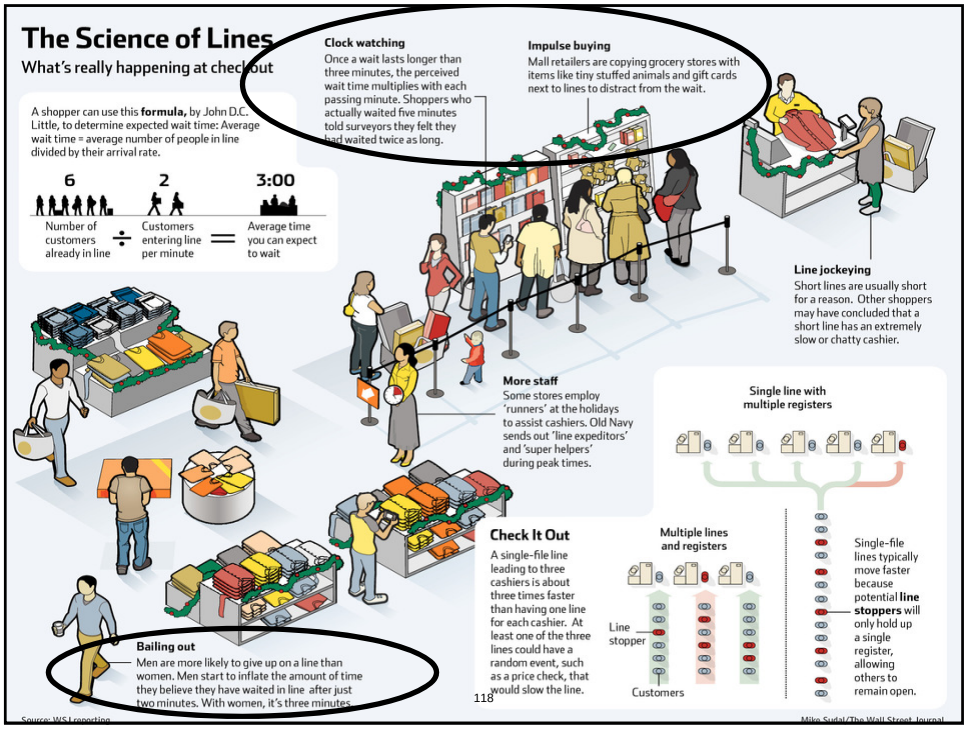
115

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



118

The Psychology of Waiting:

David Maister's Eight Principles and their ED Service Equivalents

Unoccupied time feels longer than occupied time
- TVs, magazines, health care material
- Company-Friends and family
- ROS forms, kiosks, pre-work
- Frequent " touches"

Pre-process waits feel longer than in-process waits
- Immediate bedding
- No triage
- AT/AI (Advanced Treatment/ Advanced Initiatives)
- Team Triage

Anxiety makes waits seem longer
- Making the Customer Service Dx and Rx
- Address the obvious—pre-thought out and sincerely deployed scripts
- Patient and Leadership Rounding

Uncertain waits are longer than known, finite waits
- Previews of what to expect
- Green-Yellow-Red grading and information system
- Traumas, CPRs-Informed delays
- Patient and Leadership Rounding

Unexplained waits are longer than explained waits
- In-process preview and review
- Family and friends
- Address the obvious—pre-thought out and sincerely deployed scripts
- Patient and Leadership Rounding

Unfair waits are longer than equitable waits
- Announce Codes
- Fast Track Criteria known and transparent

The more valuable the service, the longer the customer will wait
- **The Value Equation**
- Maximize benefits for the patient and significant others
- Eliminate burdens for the patient and significant others

Solo waits feel longer than group waits
- Visitor Policy-The Deputy Sheriff takes a furlough

119

The Science of ED Service Operations- 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:**
  - 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*

Getting it Right at the Front End of the ED
A Recap

- Measure **patient demand** by hour (HOD) and day (DOW) and design a system to handle it
- Commit to the **right staffing mix—and the right staff**
- Make sure your **triage processes enhance flow**, not form a bottleneck
  - ***Triage is a process and not a place***
- Use a simple and reliable system to **segment patient flow**
  - ***Keep your vertical patients vertical and moving***
  - ***Not all patients need beds***
- **Match** your service delivery options to your patient streams
  - ***Remove all work that does not add value***
  - ***Fast Track is a verb and not a noun***

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

Jensen/Mayer - The Patient Flow Advantage 2014

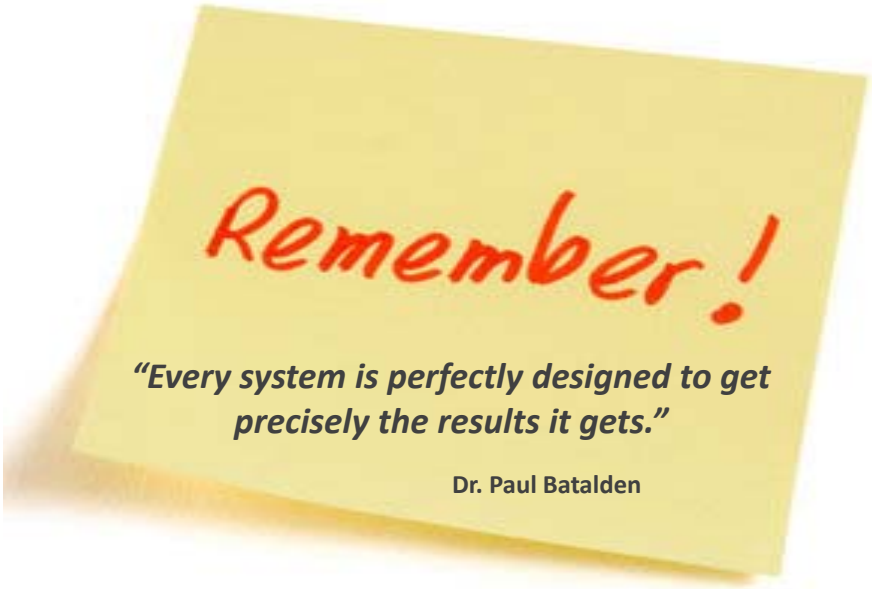
The Patient Flow Advantage:
How Hardwiring Hospital-Wide Flow
Drives Competitive Performance
Jensen/ Mayer Fall 2014 FireStarter Press

Success

Will

Ideas

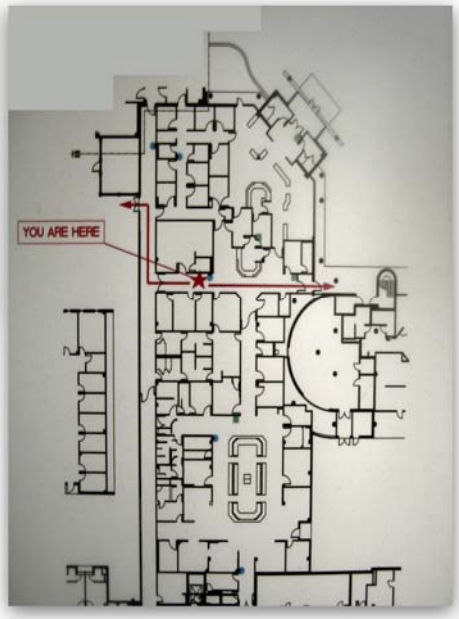
Execution



"Every system is perfectly designed to get precisely the results it gets."

Dr. Paul Batalden

124



Take a look at your ED…
-What will work for you…
-Get creative…
-Be persistent…

125

You can do this…

Thank You

REFERENCES & RESOURCES

Improving Patient Flow
In the Emergency Department

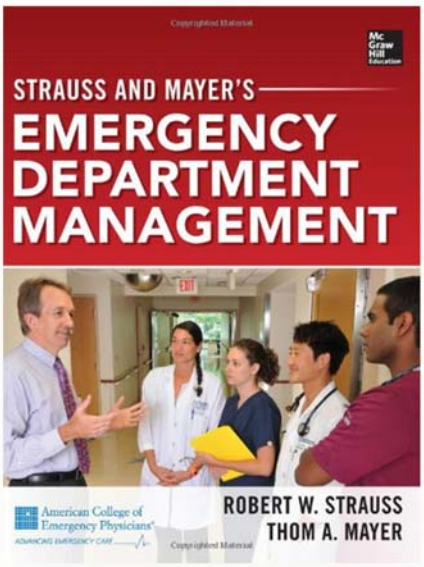
NOVEMBER 2008 **healthcare financial management**

129

Strauss and Mayer's Emergency Department Management

- By Robert W. Strauss MD, Thom A. Mayer, MD
- Kirk B Jensen, MD, MBA, FACEP, Associate Editor

ISBN-13: 9780071762397
Publisher: McGraw-Hill Professional Publishing
Publication date: 12/20/2013



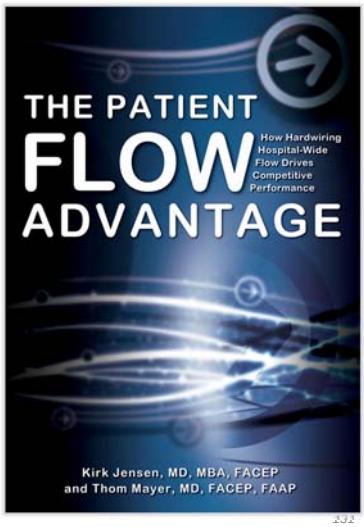
130

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



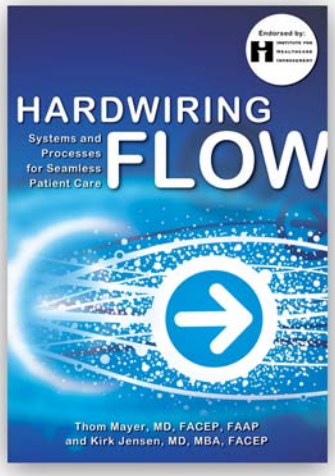
131

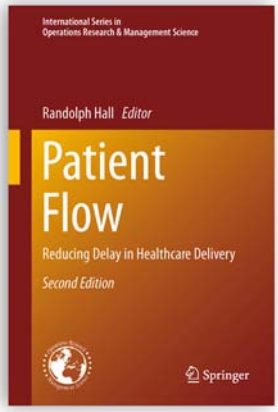
Hardwiring Flow
Systems and Processes for Seamless Patient Care

Studer Fire Starter PUBLISHING

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
Randolph Hall, PhD Editor
Springer, January 2014

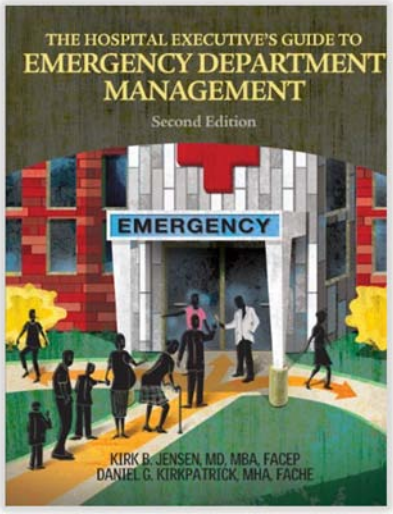
Patient Flow: Reducing Delay in Healthcare Delivery , Second Edition:

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

The Hospital Executive's Guide to Emergency Department Management

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

Table of Contents:



HcPro April 2014

Leadership for Smooth Patient Flow: *Improved Outcomes, Improved Service, Improved*

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

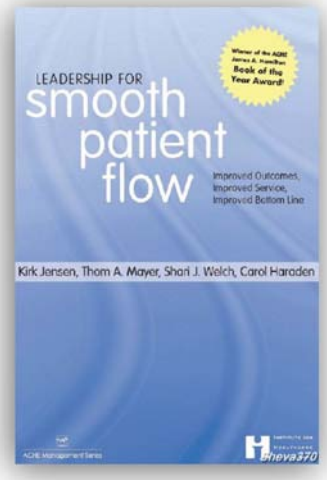
The heart of the book focuses on the practical information and leadership techniques you can use to foster change and remove the barriers to smooth patient flow.

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 initiate and sustain good patient flow behaviors Improve patient flow through 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 adapt their successful demand management and customer service techniques to the healthcare environment.

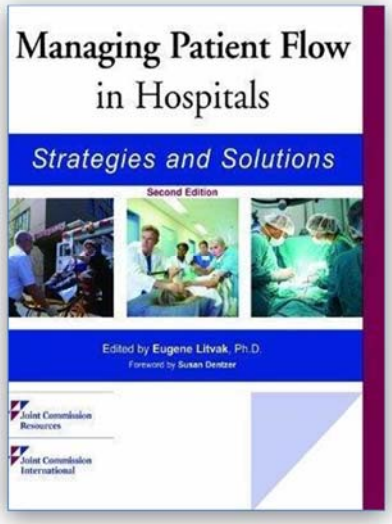
"This book marks a milestone in the ability to explain and explore flow as a central, improvable property of healthcare systems. The authors are masters of both theory and application, and they speak from real experiences bravely met."

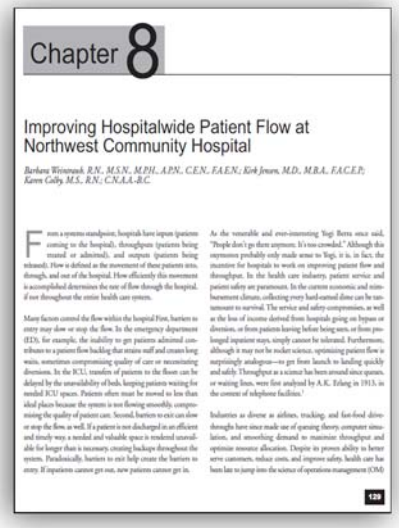
Donald M. Berwick, MD
President and CEO
Institute for Healthcare Improvement (from the foreword)

ACHE + Institute for Healthcare Improvement



Managing Patient Flow in Hospitals:
Strategies and Solutions, Second Edition




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.

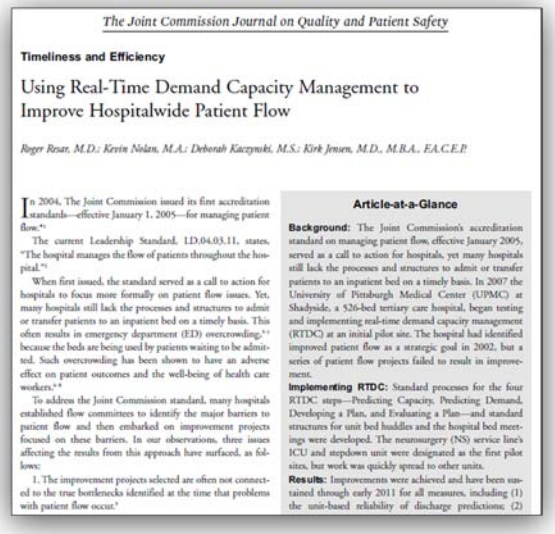
Many factors control the flow within the hospital First, barriers to entry may slow or stop the flow. In the emergency department (ED), for example, the inability to get patients admitted contributes to a patient flow backlog that strains staff and creates long waits, sometimes compromising quality of 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)

129

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


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."[1]

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,*1 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.[2*]

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.[3]

Article-at-a-Glance

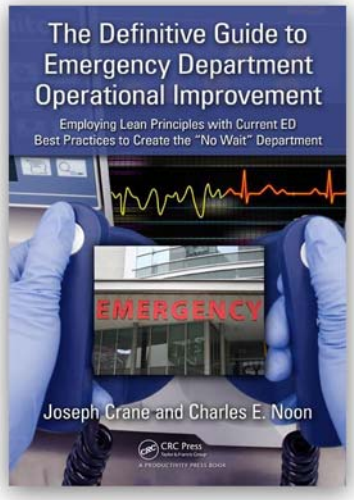
Background: The Joint Commission's accreditation standard on managing patient flow, effective January 2005, served as a call to action for hospitals, yet many hospitals still lack the processes and structures to admit or transfer patients to an inpatient bed on a timely basis. In 2007 the University 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)

The Joint Commission Journal on Quality and Patient Safety
May 2011 Volume 37 Number 5

The Definitive Guide to Emergency Department Operational Improvement



X32 Healthcare
Where analytics and innovation meet to define the future of healthcare

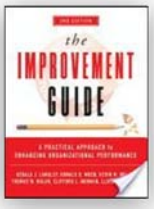
138

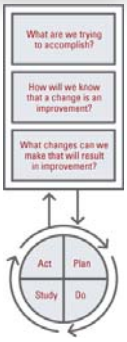
The Improvement Guide and Rapid-Cycle Testing

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

The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd edition).

San Francisco: Jossey-Bass Publishers; 2009.





139

EmCare® Door-to-Discharge™

140

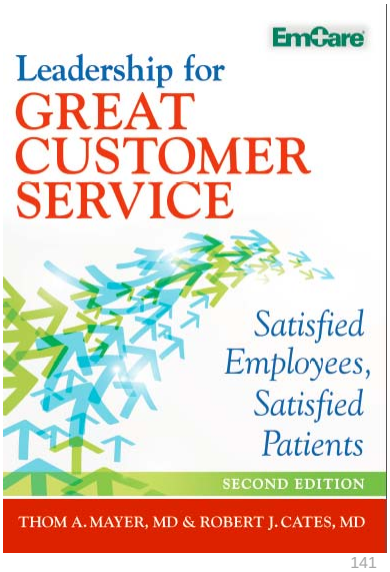
Leadership for Great Customer Service

Leadership for Great Customer Service: Satisfied Employees, Satisfied Patients

Second Edition 2014

(ACHE Management)

- **Thom A. Mayer, MD**
- **Robert J Cates, MD**



141

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…

References

- Arthur, J. L*ean Six Sigma DeMYSTIFIED: a Self-Teaching Guide*. New York, NY, McGraw Hill: 2006.
- Arthur, J. *Lean Six Sigma for Hospitals*. New York, McGraw-Hill: 2011.
- Arthur, J. *Lean Six Sigma: Simple Steps to Fast, Affordable, Flawless Healthcare*. New York, NY, McGraw Hill: 2011.
- Bandura A. *Social Foundations of Thought and Action*. Englewood Cliffs, N.J.: Prentice Hall, Inc. 1986.
- Bazarian J. J., and S. M. Schneider, et al. "Do Admitted Patients Held in the Emergency Department Impair Throughput of Treat and Release Patients?" *Acad Emerg Med*. 1996; 3(12): 1113-1118.
- Berry LL, Seltman KD. *Management Lessons from the Mayo Clinic: Prescriptions for Success*. New York, NY; McGraw-Hill, 2008.
- Berry, LL. *Discovering the Soul of Service*. New York, NY, Free Press: 1999.
- Berry, LL. *The Soul of Service*. New York, NY; Free Press, 2004.
- Berwick D. "A primer on leading the improvement of systems." *BMJ* 1996; 312: 619-622.
- Berwick DM, Nolan TW. "Physicians as Leaders in Improving Healthcare." *Ann Inter. Med*. 1998; 128 (4):289-292.
- Bisognano, M, Kenney, C. *Pursuing the Triple Aim: Seven Innovators to Show the Way to Better Care, Better Health, and Lower Costs*. San Francisco, CA, John Wiley & Sons: 2012.
- Black, J, Miller, D. *The Toyota Way to Healthcare Excellence: Increase Efficiency and Improve Quality with Lean*. Chicago, IL, Health Administration Press, 2008.

References

- Black, J. “Transforming the patient care environment with lean six sigma and realistic evaluation.” *J Health Qual* 2009; 31-29-35.
- Building the Clockwork ED: Best Practices for Eliminating Bottlenecks and Delays in the ED. HWorks. An Advisory Board Company. Washington D.C. 2000.
- Caldwell, C. et al. *Lean-Six Sigma for Healthcare: A Senior Leader Guide to Improving Cost and Throughput*. Milwaukee, WI, Quality Press: 2005.
- Chalice, R. *Improving Healthcare Using Toyota Lean Production Methods*. 2nd ed. Milwaukee, WI: ASQ Quality Press, 2007.
- Christensen, C, J Grossman, and J Hwang. *The Innovator's Prescription: A Disruptive Solution for Health Care*. New York, NY, McGraw-Hill: 2009.
- Cottington, S, Forst, S. *Lean Healthcare: Get Your Facility into Shape*. Marblehead, MA, HCPro: 2010.
- Crane, J, Noon, C. *The Definitive Guide to ED Operational Improvement*. New York, NY, CRC Press: 2011.
- Cutting, D. *The Celebrity Experience: Insider Secrets to Delivering Red Carpet Customer Service*. John Wiley and Sons, New York, 2008.
- Derlet R, et al. “Expectations of Patients Arriving in an Emergency Department.” *Society for Academic Emergency Medicine Annual Meeting*. Chicago, IL, May, 1998.
- Dickson, E, et al. “Application of lean manufacturing techniques in the emergency department.” *J Emerg Med* 2009; 37:177-82.

References

- Dickson, EW, et al. “Use of lean in the emergency department: A case series of 4 hospitals.” *Ann Emerg Med* 2009; doi:10.1016/j.annemergmed.2009.03.024
- Doing More with Less: Lean Thinking and Patient Safety in Health Care. 2006, *Joint Commission Resources*.
- Edwards N, Kornacki MJ, Silversin J. “Unhappy Doctors: what are the causes and what can be done?” *BMJ* 2002; 324: 835-38
- Fisher, Ury, Patton. *Getting to Yes*, 2nd Ed. New York, NY; Penguin, 1991.
- Fitzsimmons J., and M. Fitzsimmons. *Service Management: Operations, Strategy, Information Technology.* 5th ed. Boston: McGraw-Hill, 2006.
- Forster, AJ, et al. “The Effect of Hospital Occupancy on Emergency Department Length of Stay and Patient Disposition.” *Acad Emerg Med* 2003; 10: 127-133
- Forster, Alan, et al. "The Effect of Hospital Occupancy on Emergency Department Length of Stay and Patient Disposition." *Academy of Emergency Medicine* 10.2 (2003): 127-133.
- Full Capacity Protocol. www.viccellio.com/overcrowding.htm
- Galliour F; “Healthcare Transformation Parts I, II, III;” Health Leaders News; February 2003
- Gawande, Atul. *The Checklist Manifesto-How to Get Things Right*. New York, NY, Metropolitan Books: 2009.
- Giuliani, Rudolph. *Leadership*. New York, New York: Hyperion, 2002.
- Goldratt, E. *The Goal.* Great Barrington, MA: North River Press, 1986.

References

- Graban, M. *Lean Hospitals: Improving Quality, Patient Safety, and Employee Satisfaction*. New York, NY, Productivity Press: 2009.
- Hadfield, D, et al. *Lean Healthcare-Implementing 5s in Lean or Six Sigma Projects*. Chelsea, MI, MCS Media: 2006.
- Heifetz. R. *Leadership Without Easy Answers.* Cambridge, MA; Harvard University Press, 1994.
- Holland, L., L. Smith, et al. "Reducing Laboratory Turnaround Time Outliers Can Reduce Emergency Department Patient Length of Stay." *Am J Clin Pathol* 2005; 125 (5): 672-674.
- Holland, L., L. Smith, et al. 2005. "Reducing Laboratory Turnaround Time Outliers Can Reduce Emergency Department Patient Length of Stay." Am J Clin Pathol 125 (5): 672-674.
- Hollingsworth J, et al. "How do Physicians and Nurses Spend Their Time in the Emergency Department?" *Ann Emerg Med* 1998(1):97-91.
- Husk, G., and D. Waxman. "Using Data from Hospital Information Systems to Improve Emergency Department Care." *SAEM* 2004; 11(11): 1237-1244.
- Institute for Healthcare Improvement (IHI). Optimizing Patient Flow: Moving Patients Smoothly Through Acute Care Settings. Innovation Series 2003.
- Jensen, Kirk and Thom Mayer. *Hardwiring Flow: Systems and Processes for Seamless Patient Care*. Gulf Breeze, FL, Fire Starter Publishing: 2009.
- Jensen, Kirk, and Daniel Kirkpatrick. *The Hospital Executive's Guide to Emergency Department Management*. Marblehead, MA, HCPro: 2010.

References

- Jensen, Kirk, and Jody Crane. "Improving patient flow in the emergency department." *Healthcare Financial Management* Nov. 2008: I-IV.
- Jensen, Kirk, Thom Mayer, Shari Welch, and Carol Haraden. *Leadership for Smooth Patient Flow*. Chicago, IL, Health Administration Press: 2007.
- Jensen, Kirk. "Expert Consult: Interview with Kirk Jensen." *ED Overcrowding Solutions Premier Issue.* Overcrowdingsolutions.com. 2011.
- Kaplan, RS, Porter, M. "The Big Idea: How to Solve the Cost Crisis in Healthcare." *Harvard Business Review*, 2011, Sept 1.
- Kelley, M.A. "The Hospitalist: A New Medical Specialty." *Ann Intern Med*. 1999; 130:373-375.
- Kotler P., Roberto E. *Social Marketing: Strategies for Changing Public Behavior*. New York, NY: Free Press, 1989.
- Kotter, J. *What Leaders Really Do*. Harvard Business Review; 1947; 1999.
- Krafci, JF. "Triumph of the Lean Production System." *Sloan Management Review* 1988; 30: 41-45.
- Langley J, Moen R, Nolan K, Nolan T, Norman C, Provost L. *The Improvement Guide*. 2nd Edition.
  San Francisco: Jossey-Bass: 2009.
- Lee, Thomas. *Chaos and Organization in Health Care*. Cambridge, MA, MIT Press: 2009.
- Liu, SW, et al. "A Pilot Study Examining Undesirable Events Among Emergency Department -Boarded Patients Awaiting Inpatient Beds." *Annals of Emergency Medicine*, Vol 54, No 3 September 2009 p 381.

References

- MacLean SL, Fong M, Desy P, et al:"2001 ENA National Benchmark Guide: Emergency Departments" *Emergency Nurses Association*: 2002.
- Manos et al. "Inter-observer agreement using the Canadian Emergency Department Triage and Acuity Scale." *CJEM*; 2002:16-22.
- Mayer T, Jensen K. "Flow and return on investment in healthcare." 2008, *Int J Six Sigma and Comp Adv*, 4: 192-195.
- Mayer, Thom, and Jensen Kirk. "The Business Case for Patient Flow." *Healthcare Executive* July-Aug. 2012: 50-53.
- Mayer, Thom, and Robert Cates. *Leadership for Great Customer Service: Satisfied Patients, Satisfied Employees*. Chicago, IL: Health Administration Press: 2004.
- Mayer, Thom. *Applying the Principles of Lean Management to Healthcare*. PowerPoint Presentation, BestPractices, Inc. 2011.
- Meade, Christine, Julie Kennedy, and Jay Kaplan. "The Effects of Emergency Department Staff Rounding on Patient Safety and Satisfaction." *JEM* 2010; 38.5: 666-674.
- *Optimizing Patient Flow: Moving Patients Smoothly Through Acute Care Settings.* IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2003. (Available on www.IHI.org).
- Peters, T. *Re-imagine! Business Excellence in a Disruptive Age*. London, DK Ltd.,2003.
- Peters, T. *Talent: Develop it, Sell it, Be it*. London: Dorling Kindersley Limited, 2005.

References

- Prochaska J., Norcross J., Diclemente C. "In Search of How People Change." *American Psychologist,* September, 1992.
- Reinertsen J, Pugh M, Bisognano M. *Seven Leadership Leverage Points*; Innovation Series 2005 whitepaper, www.ihi.org
- Richardson, DB. "The Access Block Effect: Relationship between Delay to Reaching an Inpatient Bed and Inpatient Length of Stay." *Med J Australia* 2002; 177:492.
- Rogers, E. *Diffusion of Innovations*. New York: The Free Press, 1995. Addressing the human side of change
- Savary, L, Crawford-Mason, C. *The Nun and the Bureaucrat: How They Found an Unlikely cure for America's Sick Hospitals*. Washington, DC, CC-M Productions: 2006.
- Schull et al. "Emergency Department Contributors to Ambulance Diversion: a Quantitative Analysis." *Annals of Emergency Medicine* 41:4 April 2003; 467-476.
- Serrano, L, Slunecka, FW. "Lean processes improve patient care." *Healthcare Executive* 2006; 21: 36-38.
- Shook, J. *Managing to Lean: Using the A3 management process to solve problems, gain agreement, mentor and lead*. Cambridge, MA, Lean Enterprise Institute: 2008.
- Silversin J, Kornaki MJ. "Leading Physicians Through Change: How to Achieve and Sustain Results." *American College of Physician Executives*, 2000.
- Sirkin, H., Keenan P., & Jackson *A. The Hard Side of Change Management*, Harvard Business Review, October 2005.
- Smith, A. et al. *Going Lean, Busting Barriers to Patient Flow*. Chicago, IL, Health Administration Press: 2008.
- Spear, S. "Learning to Lead at Toyota." *Harvard Business Review*, 2004; 82:78-86.

References

- Spear, S. *Chasing the Rabbit: How Market Leaders Outdistance the Competition and How Great Companies Can Catch Up and Win*. New York, NY, McGraw Hill: 2009.
- Studer, Q. *Results that Last*. Hoboken, NJ, John Wiley & Sons: 2008.
- Thompson, et al. "How Accurate are Waiting Time Perceptions of Patient in the Emergency Department?" *Ann Emerg Med*, 1996(12).
- Toussaint, J, Gerard, R. *On the Mend*. Cambridge, MA, Lean Enterprise Institute: 2011.
- Tufte, E., *The Visual Display of Quantitative Information*, (Cheshire, CT:Graphics Press,1983)
- Wears, RL. "Patient Satisfaction and the Curse of Kelvin." *Annual Emergency Medicine* 2005: 46; 11-12.
- Wilson, M., and Nguyen, K. *Bursting at the Seams: Improving Patient Flow to Help America's Emergency Departments*. Urgent Matters White Paper. September, 2004.
- Womack, J, Jones, D. *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. New York, NY, Simon & Schuster: 1996.
- Worster A, Gilboy N, Fernandes CM, Eitel D, Eva K, Geisler R, Tanabe P. Assessment of inter-observer reliability of two five -level triage and acuity randomized controlled trial. *Can J Emerg Med* 2004;6(4):240-5.

References:
The Psychology of Waiting

- Fitzsimmons J., and M. Fitzsimmons. *Service Management: Operations, Strategy, Information Technology.* 5th ed. Boston: McGraw-Hill. 2006.
- Maister, D. *The Psychology of Waiting Lines*. In J. A. Czepiel, M. R. Solomon & C. F. Surprenant (Eds.), *The Service encounter: managing employee/customer interaction in service businesses.* Lexington, MA: D. C. Heath and Co, Lexington Books. 1985.
- Norman, D. A. "Designing waits that work." *MIT Sloan Management Review* 2009; 50.4:23-28.
- Norman, D. A. The Psychology of Waiting Lines. PDF version is an excerpt from a draft chapter entitled "*Sociable Design*" for a new book- www.jnd.org/dn.mss/the_psychology_of_waiting_lines. 2008.
- Meade, Christine, Julie Kennedy, and Jay Kaplan. "The Effects of Emergency Department Staff Rounding on Patient Safety and Satisfaction." *JEM* 2010; 38.5: 666-674.