Optimizing Patient Flow in the ED

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It’s said that the larger the ED, the more time a patient will spend there. Unfortunately, patients do not perceive that as a good thing. You may have a great ED, have great people, give great treatment; but the fact of the matter is, the longer the stay in the ER, the worse the patient’s satisfaction scores.

So, how do you get a handle on flow? First you need a theory for understanding how your system works. Then you need to get as many of your people in your department thinking about how to make processes and procedures better. That’s when the department really starts to take off.
Key Models and Strategic Concepts:

- Demand Capacity Management
- Patient Flow and Forecasting
- Queuing Theory
- Theory of Constraints
- Managing Variations
- Teamwork and Culture
- Psychology of Waiting

Demand Capacity Management

This chart helps illustrate Demand vs. Capacity. The graph bobs up and down, and at first glance looks totally random. But if you step back, you see a lot of white space above the line and a lot of white space below the line.

Imagine drawing a horizontal line through the middle of the curve. It shows that patient flow is predictable. We are able to predict with about an 80 - 85 percent certainty what’s coming and when it’s coming. The other thing the chart illustrates is the challenge of staffing for averages. Half the time you don’t have the resources or staff you need and the other half, you’re overstaffed. While being overstaffed may feel like a good thing, resources are finite and budgets must be met.

Patient Flow Is Predictable

Look at the curve above. This is a graph of patient arrivals in an emergency department. On the horizontal axis, we have the time (hour) of day. On the vertical axis, we have the number of patients arriving per hour.

The startling thing is that this curve fits every emergency department in the United States. Patient flow is predictable. The only thing that differs from department to department is the magnitude of the numbers on the vertical axis.

When you look at demand/capacity planning and management, the key questions to ask are:

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

Queuing Theory

Queuing theory is the art and science of matching fixed resources to unscheduled demand. These principles hold true for every queuing system, from the line at Starbuck’s, to a telephone help line, to patients arriving in the emergency department. All of these are examples of systems with unscheduled demand and they follow a set of mathematical principles.
Here's an example from an urgent care clinic with unscheduled arrivals. The horizontal axis is utilization as a percent tracking physician utilization. The vertical axis is average time spent in the clinic.

As utilization goes up, the waiting time starts to rise. Note that this is not a linear curve. It goes up algorithmically. Waiting time soars as the utilization of the key server exceeds 85 percent, but what do most of people try to do in managing our healthcare systems? We try and operate at a 90 percent or greater utilization or capacity.

Hospitals may think it’s a good thing to run at 100 percent capacity. Physicians and nurses may think it is a good thing to run close to your 100 percent capacity. The chart shows that it’s not. By running at 100 percent, you are guaranteeing patient care backups and patient care safety issues. People cannot operate at 100 percent capacity and be effective and efficient at handling variations in volume and complexity. That’s what being in a queuing system means for you.

Systems serving unscheduled arrivals behave in a characteristic fashion. When patient inflow and service times are random, the response to increasing utilization is nonlinear. As utilization rises above 80 percent to 85 percent, waits and rejections increase exponentially. So the sweet spot is 80 percent to 85 percent.

The good news is that small changes can lead to big improvements. Just decreasing utilization a bit or increasing capacity can lead to huge improvements in function and flow.

Managing Variations

Variation is everywhere. There’s clinical variation, there’s variation in flow and there’s professional variation.

Here’s an illustration: Imagine a telephone helpline. Calls coming in are lasting on average two minute and are answered by one full-time person. Can the system handle 30 calls an hour without putting people on hold?

Earlier, you would’ve said, “Yes, they should do pretty well.” But look at the curves. The horizontal axis is the variation in call length. When every call is two minutes and only two minutes, the variation is really low. On the far right, some of the calls are seconds long, some of the calls are ten minutes, but they still average two minutes per call.

Let’s look at the top (green) curve. When every call is two minutes and only two minutes, we have four people on hold. When the average is still two minutes, but with lots of variation in the length of the call, we have 29 people on hold. This is a mathematical certainty that you cannot work around. Understanding the impact of the variation, identifying and implementing best practices and then trying to move the outliers in can be a very powerful tool to improving flow in any system.

Theory of Constraints

Patient care is a network of queues and service transitions. An hour lost at a bottleneck (any resource whose capacity is equal to or less than the demand
placed upon it) is an hour lost for the whole system. However, efforts spent improving a non-critical bottleneck will not improve the overall performance of your process.

What’s most important is identifying what is (are?) the critical bottleneck(s) and working on those first. Find the key constraints, but keep in mind they can bounce around depending on how busy you are. Fix one constraint, then move on to the next.

**Fast At Fast Things and Slow At Slow Things**

A man walks into the ER and says, “I think my ankle’s broken. I need an X-ray.” The ER staff says, “We’re empty, we’ll see you right away.” Three hours later, a physician assistant walks into the room and says, “I think you need an ankle X-ray.” That three hour delay is not value-added time. That’s not what we would consider a “best practice.”

However, when a 75-year-old gentleman comes in with severe abdominal pain and he spends eight hours in the emergency department getting serial exams, laboratory tests, a CT exam and a visit from the surgeon, that is value added time.

**Driving with the Headlights Off**

Imagine you’re on the busiest highway in your area. You’re alone and driving at 70 miles an hour. Imagine turning off the headlights and the dashboard lights. How safe and competent would you feel? This is what you do this each and every day when you show up in your ER without dashboard.

A dashboard lets you monitor patient flow by common variables (X-ray turnaround time, bed turnaround time, patient arrival, etc). A dashboard lets you understand where you are and what’s going on.

**Vertical vs. Horizontal Patients**

Which are harder to treat: the walking wounded or the patients that think they may die? It’s the walking wounded or the “vertical” patients. Yet they are the
ones who wait the longest and have the lowest patient satisfaction scores. That’s why you need to segment incoming patient flow.

Above is a simple outline of incoming patient flow. On one side (left side of the figure), we have the walking wounded. They should get a focused evaluation and treatment, then release. On the other side, we have the critical care and ICU patients. Then there is significant clinical variation in between. We have the capabilities to “fast track” the patients on the far left and the far right. the two middle flows present significant operational challenges.

Patient Segmentation

There are several ways to move effectively and efficiently your patient streams through the ED:

**Super track** – This is a super fast track located in or near triage. It could be a two-bed area with a mid-level or a physician, a nurse and a tech. A Super Track sees the Level 5s and some Level 4s that can be treated and discharged right away.

**Team triage** – This is a team of providers using an intake team mentality to promptly assess, treat and discharge Level 3 patients. It may consist of a 1 or 2 physicians or mid-level clinical providers, perhaps 2 nurses, 2 scribes and a tech. The team gets the workup going and then either routes those patients to a results waiting room or moves them into the fast track for further care, depending upon their level of acuity.

Optimization

Optimize your fast track. The role of a fast track is to segment and serve those patients that are uncomplicated or relatively easy to treat. Getting your fast track working at optimal speed will significantly improve your ER performance.

Optimize bed capacity and utilization. Patients should be in the bed only if it is medically necessary and only for as long as it is medically necessary.

Leverage clinical talent and time. The role of the clinical staff is to make diagnostic and treatment decisions and to manage the team and patient flow. The clinical talent
should be roving intellects engaged in value added civilities at all time. Everything else is non-value added activity.

The Psychology of Waiting

This is outlined in an article by David Master. David makes some key points that illustrate how we should think about and manage waiting:

- Unoccupied time feels longer than occupied time.
- Pre-process waits feel longer than in-process waits.
- Anxiety makes waits seem longer.
- Uncertain waits are longer than known, finite waits.
- Unexplained waits are longer than explained waits.
- Unfair waits are longer than equitable waits.
- The more valuable the service, the longer I will wait.
- Solo waits feel longer than group waits.

Time Is Money

This is a true story. We took a 40,000 visit ED and we reduced the length of stay by one hour. That gave us 40,000 new hours of ED capacity. We took the treat-and-release main ED throughput time from three hours to two hours, and the fast track throughput time from two hours to one hour.

We ended up with 40,000 new hours of service capacity without building bricks and mortar and without adding staff. Now, if you take 40,000 new hours of service capacity and you divide that by two hours per patient visit, you have the capacity for 20,000 new ED patient visits that you can handle with little to no increase in overhead.

We improved throughput by an hour. At an average physician reimbursement of $100 per visit, this will generate $2 million in new physician revenue. Let’s say you find this too difficult to believe. Cut this in half and you now have at least $1 million new dollars to pass around. Divide $1 million by ten (the number of physicians on the team) and that gets you $100,000 per man or woman. (Double that if you completely utilize the new service capacity.)

On the hospital side, at $400 a visit, you’re looking at $8 million in new revenue. These numbers are astronomical. Just look at the number of patients you admit per day, multiply that the contribution margin per admission and look at the millions of dollars you are or could be bringing into your hospital. One more admission per day is anywhere from $1 to $3 million dollars in new profit per year for your hospital. The numbers are impressive.

You Can Do This!

In summary, there are critical strategies to improving the emergency department patient flow:

- It’s optimizing and maximizing patient intake.
- It’s optimizing the fast track.
- It’s getting the most out of your ED bed utilization.
- It’s leveraging the clinical talent and time.
- It’s maximizing bed turns.
- It’s team work and culture.
- It’s minimizing the boarding burden.
- It’s accelerating the admissions process.

Take a look at your emergency department. Think about what could or will work for you, which of these ideas can make a difference in how patients flow through your hospital. I know you can and want to do this.
About the Author

Kirk B. Jensen, MD, MBA, FACEP, is Chief Innovation Officer for EmCare and Chief Medical Officer for BestPractices, Inc. Dr. Jensen has spent over 20 years in Emergency Medicine management and clinical care-coaching, consulting, and developing innovative patient care solutions including the award-winning Risk-Free ED, and is a national thought leader in patient safety, risk management, integrated care, practice management, standardization, emergency department flow and hospital-wide flow.

As a faculty member for the Institute for Healthcare Improvement (IHI), Dr. Jensen has held numerous leadership positions focusing on quality improvement, patient satisfaction, and patient flow both within the ED and throughout the hospital. Dr. Jensen also serves as a Medical Director for Studer Group. He was honored by the American College of Emergency Physicians (ACEP) as the 2010-2011 Outstanding Speaker of the Year.

Dr. Jensen has contributed to numerous articles and books including The Hospital Executive’s Guide to Emergency Department Management, Emergency Department Leadership and Management: Best Principles and Practice, Emergency Department Management and The Patient Flow Advantage.

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