Solving The Overcrowding Challenge

ED OVERCROWDING SOLUTIONS

Expert Consult: A Methodological Approach To ED Operations Redesign

EB MEDICINE

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In the following series (to be presented in several installments over the next several issues), Belaval and Perea discuss their methodological approach to addressing ED overcrowding. This first installment reviews key definitions and creating a framework for redesign.

Introduction

Our main objective is to discuss a methodological approach to ED patient-flow operations redesign that has achieved average door-to-doc times of 7 minutes, left-without-being-seen (LWBS) rates of 0.3%, ED non-admitted length of stay (LOS) of 100 minutes, top quartile ED satisfaction scores, no ambulance diversions, 33% more emergency medical services (EMS) visits, 20% more inpatient admissions, and millions in recouped revenue. Furthermore, this approach has already been proven in institutions with diverse ED volumes, settings, and patient populations.

Application of this methodology can fundamentally change the way patient flow is managed throughout a hospital and can achieve results unobtainable through incremental improvements alone. It maximizes current resources and

infrastructure and does not require new information systems, technologies, or physical expansion to be applied.

Background And Scope

This methodology is based on process redesign and operations science concepts adapted to the hospital setting. It contains the waste eliminating and process streamlining elements of LEAN production, some of the system control elements of Six Sigma, the demand-supply matching and variability elimination concepts of Queuing Theory, and the barrier isolating elements of the Theory of Constraints. Even though it sounds complex, the focus of this methodology is on the practical application of these proven concepts without the need for mathematical or statistical manipulations. In fact, it is fairly simple to learn, understand, and apply by any hospital staff member or team.

Emergency Department Crowding Primer

Emergency department crowding manifests whenever an ED cannot meet the demand for services with their ability to supply it. As these demand-supply mismatches compound, we develop incremental operational queues and service backlogs that affect the entire system. The reason for these mismatches is that variability prevents us from predicting or anticipating the resources needed to meet demand in real time. The more variability a system has, the more unpredictable responses to demand fluctuations will be and the more queues a system will form. Solving ED crowding involves creating operational models that eliminate as much of this artificial variability as possible.

Variability Sources

The first form of variability comes from the demand side and is known as natural variability. By definition, natural variability cannot be eliminated, as we are not the source of it, but can only be managed. Probably no other service industry is subjected to the amount of demand variability EDs must contend with daily.

First, demand for ED services is uncapped -- which means the ED cannot put strict limits on it. Second, demand for ED services is unscheduled, so the ED cannot make exact predictions as to when (or how many) patients will come on a minute per minute basis. Finally, ED demand is non-homogeneous, which means that an ED cannot reliably anticipate which resources will actually be required to treat the next patient coming through the doors nor anticipate the overall acuity composition the department will have at any given time. This puts the ED at a marked disadvantage.

In contrast to demand variability, we are the primary source of variability on the supply side. As such, this variability is mostly artificial and can be eliminated through process and operations redesign. In order to do this properly, we must first identify where artificial variability is found at all levels of a system.

System Levels:

Process: there are 5 sources of process level variability:

1. *Overprocessing:* occurs whenever we do more steps than necessary when trying to move patients along in a system.
2. *Sequentialism:* manifests whenever we wait for something to occur before we can execute other clinical support elements necessary to move patients along.
3. *Idle Time:* occurs when patients remain "stuck" in the system while no value-added processing is being undertaken.
4. *Waste:* manifests when there is excess motion, distance, or redundant steps.
5. *Hindrance:* manifests when tools, instruments, or equipment are faulty, inadequate, outdated, or have intrinsic issues that hinder system performance.

Asset Utilization: involves the way we use physical spaces and resources to support flow. There are 3 primary sources of asset utilization variability:

1. Underutilization: manifests whenever assets are unable to be used at any given time or current utilization patterns are suboptimal or not leveraged.
2. Segregation: manifests whenever we separate patient populations within the ED. Because ED demand is unscheduled and non-homogenous, whenever you segregate patient populations you create areas that at times will be underutilized (because their kind of patients don't show up) and at others times will be overwhelmed (because other areas can't handle their overflow). The result of this is that the ED cannot adjust spaces and resources according to the composition of a fluctuating patient demand in real time.
3. Staff Entrapment: happens whenever we cannot reallocate staff based on demand requirements. For example, when we segregate patient populations, we also tend to resource these areas with staff that gravitate towards the types of patients or acuity these areas receive. Over time, these more specialized staff members become unable to float to other areas that might need help, even if they are not busy in their own areas.

System interfaces: these involve external support systems required to move patients along the care continuum. There are 3 main interfaces:

1. Inbound Interfaces: include ancillary departments

that must deliver results or materials (lab, radiology, pharmacy, transport, etc.) or consulting services required to see patients in the ED (social services, psychiatry, physical therapy, etc.).
2. Competitive Interfaces: manifest when ED patients, elective admissions, or recovery unit patients compete for inpatient beds at the same time.
3. Outbound Inter*faces:* involve any inpatient unit or outside facilities we must send, admit, or transfer ED patients to.

People: involves differences in the skill sets, preparation, and capabilities of people working the system. There are 3 main sources of people variability:
1. Productivity Outliers: occur when staff members are significantly less productive than the average for their peer group.
2. Non-Homogeneous Skills: manifest when there are significant differences in skills and capabilities amongst staff members that perform similar clinical or clerical functions. For example, if only one ED technician can perform orthopedic splinting, any time several ED patients require that function they'll queue up until that specific technician can go through all of them. In contrast, if all technicians were cross-trained to perform the same functions, all work could be promptly divvyed up and unnecessary queuing prevented.
3. Response Outliers: occur whenever ancillary, consulting, or admitting staff fails to respond promptly to ED requests for service or support. For example, transporters that don't respond on time, consultants that don't show up, admitting physicians that do not call back.

Management/Control: at this level, there are 2 major sources of variability:
1. Ad-Hoc Management: manifests when individuals define how they work and operate in the system instead of the system itself being the one defining their collective daily actions and responses.
2. Ad-Hoc Staffing: manifests when staff choices, circumstances, and preferences drive the scheduling rather than strategic choices that ensure optimal staffing.

Variability Enablers: in systems where different departments and stakeholders must cooperate to reach a combined performance goal, some elements can prevent integration of efforts and enable variability to exist and thrive unabated:
1. Silo Operations: refers to the fact that most departments, units, and services operate like independent fiefdoms within a hospital. Namely, they tend to maintain separate internal metrics specific to their silo and don't share a visible amount of accountability for overall patient flow. Each silo can thus keep itself shielded from scrutiny and protect detrimental processes and individuals from being challenged by the institution at large.
2. Competing Priorities: manifest when there is misalignment between a system and its primary interfaces. For example, while the ED might want to unload admitted patients into inpatient units, these units might view this as additional work. As such, they might adjust their operations and behaviors in ways that allow them to delay or even block ED admissions, avoid telling Bed Control when a bed is ready for other patients, and decrease workload by avoiding transferring their low acuity patients.

Operations Redesign Framework

Now that we know the major sources of variability, we are ready to redesign the system. The objective is to eliminate as much variability as possible to obtain the capability to manage responses to natural demand fluctuations and retain control of patient flow. To do this, we implement several defined steps:
1. Map out the process or system to be redesigned and list all the Critical Events. (Critical Events are the absolute stand-alone steps that cannot be bypassed or omitted without halting forward movement or progress in a system.)
2. Look for over-processing between critical events by identifying the steps that represent overkill or don't add value. Look for sequentialism by identifying all the processing and clinical events that could be performed in tandem or parallel. Look for idling by identifying the parts of the system where patients tend to become "stuck" without progressing forward. Look for waste by identifying excess distance, excess motion, or redundancy in either documentation or interventions. Look for process hindrance by identifying whatever tools and equipment are currently conflicting or we anticipate will be conflicting with stated performance goals.
3. Look for asset underutilization by identifying all possible spaces, areas, and staffing resources that might not be used to their potential or leveraged capacity. Look for patient segregation tactics that prevent allocating patients depending on real-time demand needs. Look for resource entrapment by identifying issues that might prevent reallocation of staff members based on demand fluctuations.
4. List and identify all inbound, outbound, and competitive interfaces. Then, map the ways they interact with each other and redesign them using this framework.

5. Address Ad-Hoc Management by establishing Standard Operating Procedures and queue management protocols aimed towards decreasing variable discretionary staff responses to demand fluctuations and controlling the quality and consistency of the collective actions of the staff working the system.
6. Establish acute decompression tactics that protect the system against extreme spikes in demand, and address Ad-Hoc Staffing by developing strategic staffing plans aimed towards maintaining proper staffing and performance levels.
7. At the people level, eliminate outliers in productivity and address any lack of homogeneity in the skill sets and capabilities of staff members that perform similar clinical or clerical functions. Also, look for outliers in the response times of ancillary, clerical, or clinical support staff.
8. Eliminate silos by establishing cross-functional metrics and shared reporting processes. Look for competing priorities between interfaces. Finally, address stakeholder variability within their own internal operations.

Figures 1 and 2 on pages 15 and 16 show the differences between traditional ED operations and an ED operational model redesigned through the approach described in this article.

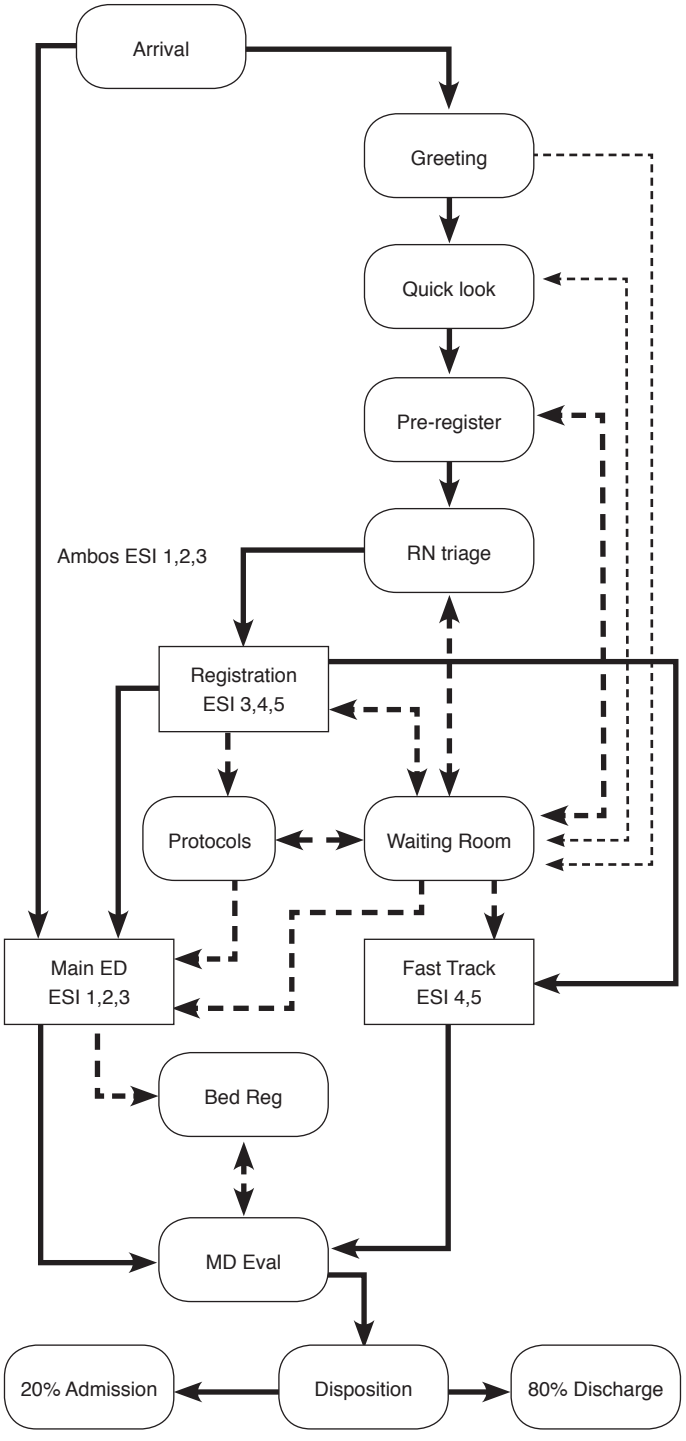
Do You See The Pattern?

This approach represents an iterative process that can be repeated as often as needed to identify were variability lurks anywhere in the system and to brainstorm the ideas and strategies necessary to eliminate it.

Specific Pointers

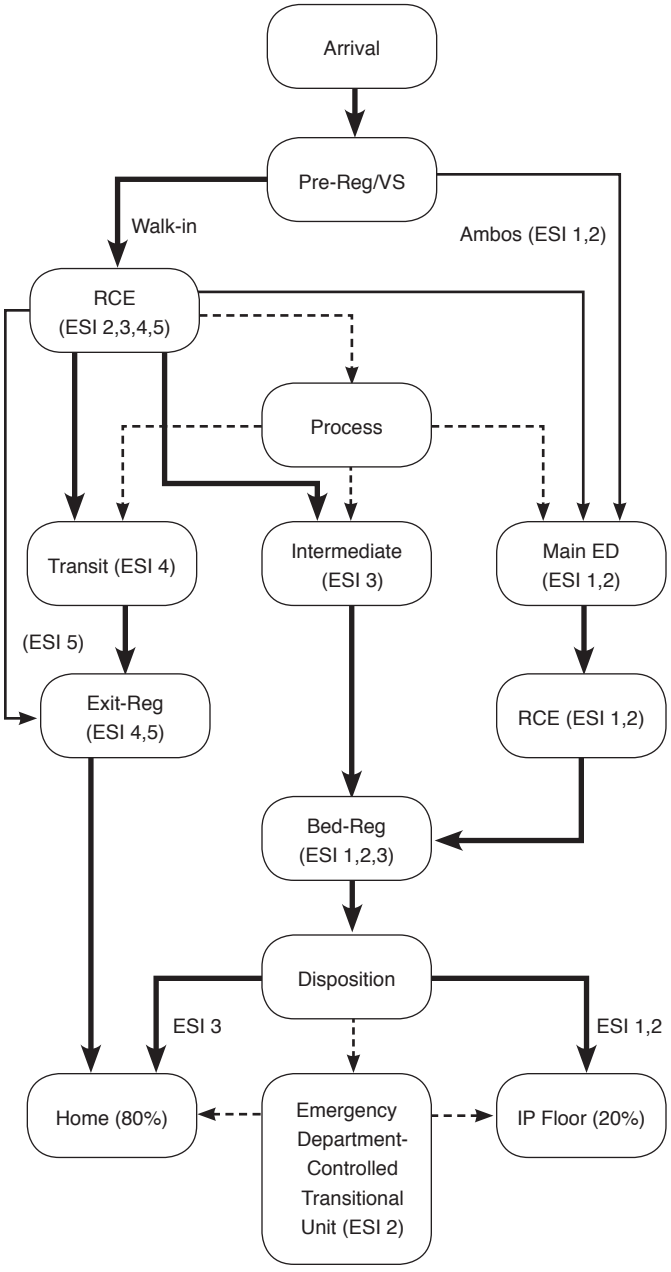
1. When looking for sources of variability at the process level, ask the following: Are we doing more things than absolutely necessary between Critical Events? Are we doing things sequentially by following this processing pattern? And, do patients spend idle time while attempting to move forward in this pattern? If the answer to any of these questions is yes, redesign the system by removing, combining, changing, circumventing, or rearranging the non-critical steps and/or moving the Critical Events closer together. Anything happening between Critical Events is by definition amenable to redesign.
2. When identifying possible sources of process hindrance, don't look at every tool, piece of equipment, and instrument the system currently uses, as there will easily be hundreds of things to look at. Instead, concentrate primarily on documentation, communi-

Figure 1. Initial Emergency Department Flow



This model has 6 potential queuing points before a patient can see a provider (overprocessing), and the waiting room is a central figure where patients keep going back to (idle time). Fast-track spaces and resources are used to see low acuity patients (underutilization), and sicker patients cannot be processed until a bed becomes available (sequentialism).

Figure 2. Redesigned Emergency Department Flow



This model has only 2 potential queuing points before a patient is seen by a provider by using a Rapid Clinician Evaluation (RCE) strategy, and the waiting room can no longer promote idle time. The fast-track space has been converted instead into an area capable of seeing intermediate-acuity patients (Emergency Severity Index [ESI] 3), and low-acuity patients (ESI 4/5) can now be seen, evaluated, and discharged from an alternative transit area without placing them in a bed. In addition, all patients that do require a bed can now be immediately processed when no beds are readily available, and some delaying steps (like registration) have been moved to either the bedside or performed after the actual discharge event to avoid intake delays.

cation tools, par levels of essential equipment, inventories of automated medication dispensing machines, computers, and software.

3. When looking for sources of waste in the system, look for excess distance and motion and then establish "hubs of control" in which everything necessary is within reach and easily accessible to the operational staff working in the system. Also, establish the use of trays for commonly performed procedures like eye trays, epistaxis trays, incision & drainage trays, etc.
4. When looking for variability in the way the ED utilizes assets and resources, ask: Does the current model use all treatment spaces (including alternative treatment areas) and all of our staff resources? Does this operational model segregate patient populations? Does this format prevent staff reallocation based on demand fluctuation? If the answer to any of these questions is yes, attempt to find ways to redirect demand to underutilized areas, integrate populations, and eliminate barriers to resource allocation.
5. When looking for variability in ancillary support elements and interfaces, first map out the interface process you want to redesign step-by-step and from beginning to end. Then, identify all Critical Events of the interface. Then, eliminate over-processing, sequentialism, waste, and idle time in the interface process, and make sure interfacing departments are not underutilizing their assets or resources.
6. Address variability in the skills and capabilities amongst staff members that perform the same functions or clinical duties through standardization means like the preferential hiring of board-certified ED physicians, having all charge nurses go through similar managerial training, making sure technicians are cross-trained to perform the same duties, and having all staff nurses meet standardized training requirements.
7. Address Ad-Hoc Management by developing operating procedures that dictate how patient flow is to be processed and managed within the new system. In addition, create queue management procedures to proactively manage whatever queuing points are left in the redesigned system and standardize responses to acute demand fluctuations.
8. Develop acute ED decompression plans aimed at facilitating movement of ED admitted patients to underutilized but staffed areas of the hospital that may be able to take care of these patients at the time. The purpose is to avoid ED "crunches" by redistributing a limited number of patients across several hospital areas without overwhelming any particular unit involved. For example, a limited number of stable ED patients waiting for telemetry beds might be divided between the unused bed capacity of a Post-operative

Care Unit and a Cath Lab Recovery Unit during their earlier operational hours, while a limited number of patients waiting for a Med-Surg bed might be divided between the unused but already staffed beds of an Endoscopy Unit, an Ambulatory Care Center, a Maternity unit, a Pediatric Inpatient Unit, and so forth.

9. Address Ad-Hoc Staffing variability by developing enforceable plans to deal with staff "no-shows" or "call-outs" and by developing strategic staffing plans that adjust staffing patterns to have more resources scheduled to work the days of the week the ED is expected to handle more demand and avoid "fatal staff member combinations" from being scheduled together on busier shifts.
10. Address silos by establishing cross-functional shared metrics that are monitored and reported frequently in visible open ways. Another way to implode silos is to tie salary, bonuses, opportunities for advancement, or even seniority benefits to patient-flow performance goals. Possibilities to create cross-functional accountabilities for patient flow are almost endless and remain one of the most underused tactics to promote multi-departmental support and accountability for ED operations.

For a list of several proven interventions to address all system levels, **see Table 1 on page 18.**

How To Interpret Table 1

The first column corresponds to the system and issues being addressed; all other columns, labeled as Tier 1, 2, and 3, are described below:

- **Tier 1 interventions,** in general, should be implemented first, are relatively easy and rapid to implement, usually have the lowest cost for implementation, and/or have the quickest or most dramatic effect.
- **Tier 2 interventions** are complementary to Tier 1, should be implemented at the same time or immediately after, might have higher implementation costs, and/or might require more involved planning for implementation.
- **Tier 3 interventions**, in general, must be implemented last, either require and/or are complementary to Tiers 1 and 2, might be the most difficult to implement, and/or might have the highest cost for implementation.
- **Highlighted (shown in gray) interventions** (regardless of the tier) have the most combined leveraged effects, offer the best potential for eliminating ED crowding, transform patient flow/operations when most are implemented, and must be considered high-priority for combined implementation when compared with nonhighlighted interventions.

One caveat that is not quite reflected in **Table 1**: implementing the suggested combinations of interventions will require a concerted multidepartment effort that will involve staff and resources at both the operational and the managerial levels of a hospital. By definition, it will also require strong administrative support and a flattened organizational change management process that will allow a rapid cycle of changes unencumbered by "red tape" and that make any inaction immediately visible and accountable to the entire organization. ■

Pivotal Points

- Identifying the steps that represent overkill or don't add value will help you look for over-processing between critical events.
- Developing strategic staffing plans aimed towards maintaining proper staffing and performance levels will establish acute decompression tactics that protect the system against extreme spikes in demand and address Ad-Hoc Staffing.
- Establishing cross-functional metrics and shared reporting processes will help eliminate silos.
- When identifying possible sources of process hindrance, concentrate primarily on documentation, communication tools, par levels of essential equipment, inventories of automated medication dispensing machines, computers, and software.
- When looking for sources of waste in the system, look for excess distance and motion and then establish "hubs of control" in which everything necessary is within reach and easily accessible.

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