Managing Patient Flow by Reducing Variability

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INTRODUCTION

Effective management of patient flow can improve performance of a healthcare organization in many ways, these include:

- Improved personnel satisfaction and ability to recruit high quality staff who suffer less stress from being overloaded with high patient to staff (nursing, clerical, tech, physicians) ratios.
- Improved patient satisfaction due to shorter wait times, more individual attention from staff, fewer complications or patient harm events.
- Increased utilization of fixed cost capacity which allows facilities to handle more volume without having to add beds or space, thus avoiding large capital costs.
- Lower costs / increased revenues, secondary to the avoidance of overtime and agency staff use, avoidance of new capital costs (see above) and improved throughout, which means higher revenues.
- Improved quality by avoiding periods of understaffing and overstressed healthcare providers. This can dramatically lower morbidity and mortality rates.

Unfortunately, however, most healthcare administrators don't understand how to manage variability in patient flow and thus turn to other solutions, which only aggravate the problem, such as building out more space capacity, hiring more staff, turning away patients (diversion) and applying process engineering techniques (e.g. Lean) when the problem is with patient flow not process design.

This paper will outline the basics of patient flow management and suggest some areas in the healthcare delivery system where this methodology can be most helpful.

MANAGING PATIENT FLOW

The key to managing patient flow is to decrease the variability in the flow of patients through a healthcare facility.

Variability comes in two varieties – artificial and natural. Artificial variability is man made and thus under our control. An example of artificial variability is the number of

patients scheduled for admission to a hospital each day of the week after having elective surgery. In most hospitals the number of these elective surgical admissions rises to a peak in the middle of the week (Tuesday through Thursday) and then virtually falls to zero on at the end and first of the week (Friday through Monday).

Natural variability is a force of nature and out of our control. Examples of this type of variability include flu epidemics that bring higher than usual numbers of patients into an emergency department or motor vehicle accidents that may occur more frequently on weekends or with bad weather.

The focus of an effective patient flow management program, therefore, needs to be on managing the artificial variability in flow, i.e. smoothing out this flow and eliminating the peaks and valleys in this flow stream. Think of it like water running through a pipe. If the water runs smoothly under a constant pressure then there are no problems. If, however, the water gets blocked at times by obstructions in the pipe or the flow of water comes at times in gushes of higher pressure then the water pressure in the pipe can build up to the point where the pipe bursts. This can be catastrophic in a hydraulic sense and the same thing can happen when patient flow comes in waves of high flow that overwhelms the healthcare staff and leads to mistakes that can be catastrophic for patient care.

How then do you effectively manage the artificial variability in patient flow and lessen the dangers that can come from especially the high peaks in the flow stream?

Step one is to separate the patient flow into homogenous streams. The flow of patients into a healthcare facility tends to be heterogeneous and consists of intrinsic variability in patient demographics, acuity, patient complaints and patient needs. This heterogeneity needs to be reduced by separating the flow and matching like patients. An example of this might be to separate out all the patients presenting to an outpatient clinic into those who are there for a scheduled appointment versus those who are there for a walk-in visit to address an acute problem. Likewise, the operating schedule might be separated into those patients needing emergent or urgent surgery from those patients scheduled for elective procedures.

Step two is to smooth the individual flow streams. Once the flow is separated into homogenous streams, then each stream needs to be smoothed by eliminating, as much as possible, the artificial variability in that stream. (Remember, nothing can be done about the natural variability). Examples of artificial variability that can be smoothed includes elective surgeries, everyone wants to operate on Tuesday, Wednesday and Thursday in order to free up their weekend patient load. Shifting cases from mid-week to later in the week and even operating on weekends can have a dramatic effect on a facilities effectiveness and efficiency, even outside of the OR. Another example is

smoothing the variability of time demands in an outpatient clinic. If every patient is given a fifteen-minute appointment but some patients need thirty or forty-five minutes, due to higher complexity, then the flow of patients through the schedule will get bogged down. If patients can be isolated who need more time and then scheduled for an appropriate length visit the schedule and patient flow will move much more smoothly.

Step three involves matching flow with capacity. This involves allocating resources to adequately manage the patient flow, which has now been smoothed and therefore can be predicted. The result is less waste or stress on the resources, such as beds, staff, equipment and space. As an example, allocating bed space to certain service lines within a hospital, such as orthopedic, cardiac surgery etc., or allocating exam room space and staff to a primary care physician allows the service line or physician to adequately handle the flow of patients coming their way.

AREAS OF FOCUS

Now that we've seen how to manage patient flow by reducing variability in the flow stream, the next question is where can this technique be best applied within the healthcare system?

Elective Surgery Schedule:

Surprisingly, in most hospitals, the day-to-day variability in the number of patients admitted through the OR is much higher than those admitted through the ER. Therefore, smoothing out the variability in flow of patients coming for admission via the OR can dramatically improve operational effectiveness and efficiency in these facilities. In fact, smoothing out the variability in the elective surgery schedule has been shown to have significant "downstream" effects on everything from wait times in the emergency department to morbidity and mortality rates in the medical-surgical units.

A major obstacle to doing this is that many physicians don't want to give up their operating days and are especially unwilling to operate on Mondays, Fridays or weekends. This problem may be lessened by the fact that more and more surgeons are becoming hospital employees and therefore the hospital can incentive alignment between the physician's schedules and the hospital's goals.

Physician Practices

The implementation of the Affordable Care Act (ACA) has increased demands for access to healthcare services, especially for primary care. Furthermore, primary care physicians are in critically short supply and therefore, it is imperative that patient flow through a primary care or ambulatory care setting be as efficient as possible.

Big improvements in the ambulatory setting can be accomplished by separating the patient flow into streams of patients with scheduled appointments and patients with acute problems or those who walk-in asking to be seen without an appointment. Separating the flow into these two streams allows the scheduled patients to be seen on time and without long waits or interruptions in their visits with providers. This leads to higher levels of patient and provider satisfaction. Walk-in patients also get seen more quickly and have improved access to a provider. This also improves patient satisfaction, provider satisfaction, quality of care (fewer patients are treated over the phone or diverted) and cost of care (fewer patients are sent to more expensive locales for treatment, such as the ED).

SUCCESS STORIES

Eliminating variability in patient flow and improving throughput and other performance elements is not just a theoretical concept but a proven method that has been applied successfully in some of the most well-known healthcare facilities and consortiums of hospitals in the world. Examples include, the Cincinnati Children's Hospital, Mayo Clinic Jacksonville, Boston University Hospital, Johns Hopkins Hospital, the New Jersey Hospital Association and the National Health Service of Scotland.

SUMMARY

Management of variability in patient flow can dramatically improve performance of almost any healthcare facility. Artificial variability, which is under our control, needs to be identified and eliminated in order to smooth the patient flow. One quick way to do this is to separate patient flow into homogenous streams that can then be directed to appropriate levels of care and managed much more efficiently and effectively. Once flow is smoothed it can also be matched to resources more effectively, which dramatically reduces costs and patient harm events. Effectively managing variability in patient flow is an essential task for any manager in today's healthcare delivery system.

BIBLIOGRAPHY

1. Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 2002;288(16):1987-93.
2. Bohmer R. *Designing Care*; 2013.
3. Fineberg HV. Shattuck Lecture. A successful and sustainable health system--how to get there from here. N Engl J Med. 2012;366(11):1020-7.
4. Litvak E, Laskowski-Jones L. Nurse staffing, hospital operations, care quality, and common sense. Nursing. 2011;41(8):6-7.
5. Litvak E, Fineberg H. Smoothing the Way to High Quality, Safety, and Economy — NEJM. New England Journal of Medicine. 2013;369:1581-3.
6. McGlinchey P, Fuda K. Cincinatti Children's Hospital Medical Center - Case Study. 2013.
7. McHugh MD, Ma C. Hospital nursing and 30-day readmissions among medicare patients with heart failure, acute myocardial infarction, and pneumonia. Med Care. 2013;51(1):52-9.
8. Needleman J, Buerhaus P, Pankratz VS, Leibson CL, Stevens SR, Harris M. Nurse staffing and inpatient hospital mortality. N Engl J Med. 2011;364(11):1037-45.
9. onMichtalik HJ, Yeh HC, Pronovost PJ, Brotman DJ. Impact of Attending Physician Workload on Patient Care: A Survey of Hospitalists. JAMA Intern Med. 2013:1-2.
10. Porter ME, Pabo EA, Lee TH. Redesigning primary care: a strategic vision to improve value by organizing around patients' needs. Health Aff (Millwood). 2013;32(3):516-25.
11. Smith CD, Spackman T, Brommer K, Stewart MW, Vizzini M, Frye J, et al. Re-Engineering the Operating Room Using Variability Methodology to Improve Health Care Value. Journal of the American College of Surgeons. 2013;216(4):559-68.