



Maximizing Hospital Capacity

*Increasing Patient Through-Put by
Improving the Patient Flow Continuum*

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INTRODUCTION

After a ten-year process during which hospitals moved to reduce capacity via consolidations, bed reclassifications, and some hospital closures, we are nearing a national capacity crisis. Combined with the increasing population growth, especially within the “baby boomer” segment, this situation becomes even more critical. In today’s busy hospital environment, it’s easily observed that demand for in-patient beds frequently outstrips a hospital’s apparent supply. The term apparent supply is used because even during a time of high census and activity, many hospitals may have un-occupied beds that remain unavailable to accept a new patient. The reasons may vary from the lag time associated with turning the bed over (from the time vacated to the time made ready for another patient) and communicating the bed’s availability to the appropriate people, to beds that are purposefully hidden by staff to avoid adding another patient to their current workload, to those beds that are simply overlooked after the discharge process. The implications of not capitalizing on the unused capacity can cause backlogs throughout the hospital, including the Emergency Department (ED), Post-Anesthesia Care Unit (PACU) and by extension the Surgical Suite, areas that provide the majority of hospital admissions. Bottlenecks in these critical areas often lead to unacceptably long wait times in the ED, diversions to competitors’ hospitals, surgical delays, and avoidable overtime within the peri-operative services. In fact, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has proposed a new Emergency Department Overcrowding Standard, Rationale and Elements of Performance. The proposal cites “Increased scarcity of available inpatient and long-term care beds and alternate care settings...” as a cause that leads to overcrowding in the ED. Ultimately, these backlogs and delays result in poor patient and staff satisfaction, strained physician relations, and foregone revenue opportunities.

While the onus is most directly shouldered by bed management or patient access management professionals, the dynamics creating the need for a bed and its ultimate assignment profoundly impact hospital employees across multiple departments, medical staff and the patient and family. The inter-departmental nature of the patient flow continuum, presents a significant management issue from a responsibility and accountability standpoint. It comes as no surprise then, that *Capacity Management*, as the process of managing the supply and demand for beds is becoming known, is rapidly finding its way as a *mission critical* item near or at the top of many health executives’ agendas. Coupled with the shortages of key healthcare professionals, increased demand for emergency services, and the JCAHO recommendations for hospital leaders “...to develop and implement plans to identify and mitigate situations that result in Emergency Department overcrowding” (JCAHO, Emergency Department Overcrowding Standards LD.3.4) the problem cannot be ignored.

To that end, hospitals need to increase their emphasis on understanding and managing capacity by improving patient flow; a much larger and more complex set of circumstances. This paper will focus on four areas, 1) Understanding the Dependencies of the Patient Flow Continuum (including a discussion of five sub-processes); 2) Managing Staff involved in Patient Flow; 3) Accountability; 4) Understanding and Eliminating the Barriers to Improvement.

UNDERSTANDING THE DEPENDENCIES OF THE PATIENT FLOW CONTINUUM

Patient flow can be defined as the observable process a patient experiences while moving through the healthcare delivery process — from admission to transfer to discharge. The management of this patient flow is often explained in terms of *resource capacity management*, not unlike that in a manufacturing setting. To maximize the available hospital capacity, it is necessary to understand the correlation of patient flow vis-à-vis bed *supply and patient demand*. While there is an inherent tendency to focus all attention on available beds (supply) as it is often the most visible variable of this equation, hospital executives need to devote equal time to understanding and managing the *demand* for available beds. This demand comes from several areas throughout the hospital, such as the ED, PACU, and general admissions from the community. Understanding the balance between the patient flow continuum and the factors that affect it is essential to beginning an effective capacity management initiative.

The Patient Flow Continuum

The patient flow process consists of five distinct sub-processes that cumulatively determine the overall flow of patients into and out of the hospital:

Demand -

- Surgical Demand Management
- Length of Stay (LOS) Management

Capacity -

- Assessment & Assignment
- Discharge Coordination
- Bed Turnover

The Surgical Demand Management and Length of Stay (LOS) Management sub-processes significantly affect resource demand, while the remaining sub-processes affect resource capacity. Managing resource demand will involve forays into corporate culture, the practice of medicine, the quality of care, competition and internal politics. While it is difficult to address all of these areas in this document, it should be known that even small improvements found through effective management of these sub-processes will have a significant impact on patient flow.

The Assessment & Assignment, Discharge Coordination and Bed Turnover sub-processes, are tightly integrated. Unfortunately, they often are analyzed and modified independently without carefully considering the downstream impact. For example, a change in discharge coordination affects the bed turnover process and in turn, bed assignment. These sub-processes should be analyzed collectively and any change to one sub-process must be measured in a context of its impact on the whole of the three connected sub-processes to positively impact patient flow.

These five sub-processes affecting inpatient flow are common among most hospitals. Furthermore, each sub-process is comprised of many singular components that typically impact, and are impacted by, more than one person. So, to improve patient flow and maximize use of a hospital's capacity, one must improve each sub-process *and* understand the motivations of each involved stakeholder.

Sub-Process #1: Surgical Demand Management

Operating Rooms (ORs) are perhaps the most expensive real estate and the most revenue-productive area of any hospital. It is no wonder that most hospitals work to maximize the use of their available OR time. Indeed, many hospitals have devoted time, talent and money to improve workflow within the surgical suite,

and there are several sound technological solutions available to support this important effort. These initiatives may improve the efficiency of the OR and may lead to better capacity management within the suites. However, unless OR schedule management and Bed management are integrated, the potential for disrupting the patient flow process is almost assured. Therefore, the demand for an available hospital bed, post-surgery, must be coordinated with the supply and availability of a bed is critical to maximizing resources and providing a superior quality of care experience.

Inputs and Outputs

Inserting the variable of future patient flow into a scheduling model may require an element of estimation based on historical trending, especially the further into the future one schedules. These estimates can be improved, however, by combining the theoretical predictability of trending with the more reliable predictors, such as LOS, to create a more accurate predictive model. The reliability of the model will improve as one approaches the current day, since the in-house population is more accurately defined. This method is predicated upon establishing projected dates of discharge for all patients already in-house and for those currently scheduled. This will be discussed in greater depth in the next section.

Patient Flow Continuum

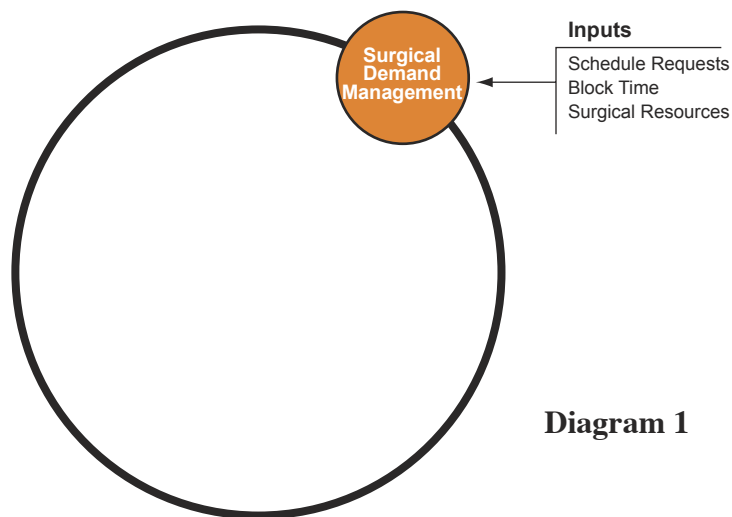


Diagram 1

By creating a model of predicted census, one is in a position to begin integrating bed management into the sub-process of surgical scheduling. The goal of integration is “smoothing” or removing the variability of demand by using the predicted census on each patient unit. With this knowledge, if a patient requiring a bed on a particular unit post-surgery cannot be accommodated because that unit is expected to be full from both the in-house patients as well as the new patients already scheduled, the scheduler would simply try to accommodate the patient on a different day. The earlier this procedure is put into place, the less likely the physician and/or patient will be surprised by requests to reschedule. **Diagram 1.**

Sub-Process #2: Assessment & Assignment

A patient requiring a bed is assessed at various stages throughout the care delivery process and defined by certain *qualifying criteria* (QC). The QC are distinct and identifiable attributes used to understand the patient requirements, assess the most appropriate bed and location for the patient (specific units or bed types) and optimize the bed assignment. While some of these criteria are straightforward, such as sex, age and diagnosis, others are less so, or are related to the condition of the room, bed, or the unit where the room is located. **See Table 1.**

Table 1 Qualifying Criteria Samples

Patient	Bed
Sex	Sex of roommate
Age	Age of roommate
Diagnosis	
Clinical Service	Clinical Service
Requires Telemetry	Telemetry Available
Requires Isolation?	Isolation Available
Observation	Eligible for Observation patients
Size Requested	Size of bed
Accommodation Requested	Accommodation
	Staffed Beds
	Blocked Beds
	Flexed Beds

It is often within this sub-process that most placement delays occur. Therefore, it is critical that an automated workflow process be implemented whereby all QC are identified and able to be matched, in real time, to effect more efficient bed capacity management. In most cases, the patient based Qualifying Criteria is captured at the time the bed is requested; and although most bed attributes do not vary throughout the hospital, a limited number of nursing units do have variability within their QC. The dynamic fluctuations affecting those bed/unit attributes create the need for a re-qualification process several times per day (as patients are discharged). This is typically done through a manual process which requires a significant amount of staff time (nursing and bed management personnel) with bed rounding and multiple telephone calls.

Unless automated, there is a great challenge of matching the patient QC with the bed or unit-based QC, due to the variability.

To help simplify the process, patient and bed attributes should be identified, studied and standardized. The Qualifying Criteria can fall into three maintenance categories of variability: *No Maintenance*, *Infrequent Maintenance*, and *Moderate Maintenance*. See **Table 2**.

Table 2 Qualifying Criteria Maintenance Categories

<i>No Maintenance</i> - Some Qualifying Criteria will be able to be maintained by simple facts surrounding the bed or patient.
Age of roommate: Children will not be in the same room or ward as adults. This will not require updates to maintain.
Accommodation: Private, semi-private, or multi-bed ward. The only updates required occur when one bed is blocked to create a private room.
Eligible for Observation: Observation patients often can be put into any permanent bed, as long as they are not kept there for more than 23 hours. This may be true for all beds on a given unit, or only a portion of the beds. This QC will, in most cases, require no maintenance.
Size: The size of a bed is a physical attribute. In most cases on adult patient units, there is no need to maintain the QC beyond the initial designation. However, on a Pediatric ward, or on most patient units in a Children’s hospital, this attribute varies by patient. Diagram 2.

Table 2

Qualifying Criteria Maintenance Categories

Patient Flow Continuum

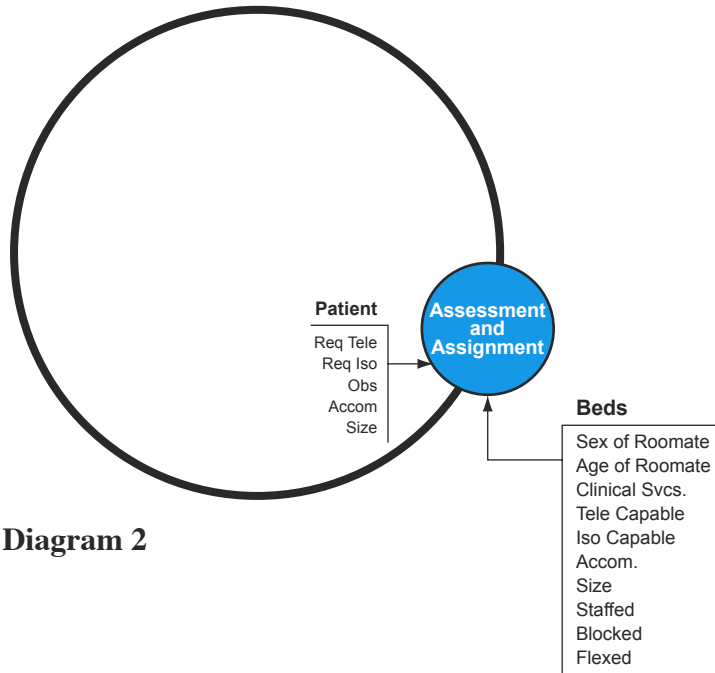


Diagram 2

Table 2

<u>Rare or Infrequent Maintenance</u>	
Blocked Beds:	Rooms may be temporarily blocked; generally for maintenance or cycle cleaning. This attribute may vary from time to time.
Flexed Beds:	As a means of effectively allocating nurses and other staffing resources, a hospital may <i>flex</i> beds down or up, which will affect staffing requirements. When beds are temporarily closed, the bed attributes need to be updated as <i>available</i> or <i>flexed</i> .
<u>Possible or Occasional Maintenance</u>	
Isolation Available:	While negative pressure rooms will be permanently designated as a physical attribute of a given room, other general isolation rooms may be able to be set up by simply blocking any other beds in the room from being occupied. Since the first condition (isolation) will trigger the second condition (block), this will require maintenance for rooms only after the first occupant (of a multi-occupant room) is admitted.

Table 2

Possible or Occasional Maintenance cont'd.

Clinical Service: Skilled nurses in specific clinical specialties will affect where patients can be placed, and what a particular unit can handle. Often, entire units are designated as a specific service, such as Orthopedic. However, in many cases, a unit can contain a sub-set of beds defined for a specific service within a given unit. In these cases, there will be a need to manage what service is still available on each patient unit, as beds become open.

Telemetry Available: While some units will be entirely *tele-capable*, others will be able to designate a subset of beds for telemetry. In such cases, these beds are not associated with a physical bed, but similar to Clinical Services, they are subject to a specific number of beds.

Staffed Beds: Ideally, for a hospital to maximize its bed capacity, *physical* beds on a given unit would equal *staffed* beds, along with the appropriate nurse-to-patient ratio. This is difficult to manage effectively. However, given the manual methods for obtaining and managing data such as patient type, patient volume, bed type and availability; all of which are necessary to make appropriate staffing decisions, these limitations, coupled with the current nursing shortage crisis, aging population and rising patient acuity, among other things, will have a material effect on how many, and which type of patients can be admitted to a given unit. It is necessary, therefore, to **establish *real time communication of bed attributes and availability, nurse staffing, and patient demand, to bed management personnel.***

Centralized vs. Decentralized Bed Assignment

Armed with all of the necessary information to match the patient’s needs with the available resources, a bed can be effectively assigned. The manner in which the patient and bed are matched, however, can be accomplished in a variety of ways, each with their own strengths and weaknesses. Bed assignment can be a highly centralized process, managed by a Patient Access or Bed Control Department. A bed can also be assigned at the discretion of a charge nurse at the patient unit level, making bed assignment highly decentralized. In practice, however, there are often hybrids which combine the efforts of a central office with those of a mobile patient placement nurse to complete bed assignments. **See Table 3.**

Table 3

<u>Structure</u>	<u>Ultimate Placement Decision</u>	<u>Information Access</u>	<u>Notification Possibilities</u>
Centralized	Patient Access Department	Patient Access	Computer updates
Decentralized	Patient Unit Charge Nurses	Patient Access Individual Units	Computer & Pages
Hybrid	Mobile Patient Placement Nurses	Patient Access Individual Units	CPU, Pages, PDA Wireless Devices

Management philosophy and corporate culture will dictate the organizational structure, but in all cases, effective management of patient flow requires real-time exchange of information to complete an efficient and appropriate bed assignment. Since it is directly affected by frequent and repeatable *notification events*, (pending and actual departures, cleaning status, new bed requests, straight-forward assignments, etc.), automating these workflow processes will greatly increase the reliability, improve the accountability, and reduce the communication burden of the patient flow continuum. Automation is discussed in further detail later in this paper.

Sub-Process #3: Length of Stay Management

Over the past 20 years, hospitals have made significant gains in reducing the average length of patient stay. Financial pressures created by prospective payment have made this a management imperative. While, according to a national study by the Center for Disease Control and Prevention/National Center for Health Statistics¹, the average lengths of stay (ALOS) have been reduced by roughly 32% since 1980, it is being only partially managed at most healthcare facilities where greater gains, albeit with more effort, can still be achieved.

A key factor of this reduction in ALOS has been effective Case Management programs. As a critical component of the patient care team to improve treatment outcomes, attentive case managers can also help more efficiently manage patient flow and, as such, patients are typically discharged in a timelier manner. For example, a patient *not* on a case management watch list may unnecessarily occupy a bed while awaiting the required steps necessary for final discharge. Important discharge criteria such as picking up medications, scheduling physical or occupational therapy visits, evaluations by social services, etc., if not managed in a timely manner (hopefully via automation), may delay discharge. This impedes the entry of a new patient and additional revenue opportunity, while also forcing a pending admission to continue to occupy other high

demand beds within the ED or recovery beds in the Post-Anesthesia Care Unit (PACU). It is impractical, however, for all inpatients to be treated within strict case management protocols, simply to improve the discharge process. This impracticality illustrates the need to automate the discharge process wherever possible, with the sequential trigger events ensuring that all discharge criteria are met.

Additionally, a reliable methodology for predicting pending discharge date based on LOS national averages and risk-adjusted data to project the patient's discharge date should be conducted *upon* admission, for *every* admission. The ability to better predict patient discharges will result in the ability to more efficiently manage new patient placements and even plan for future admissions (i.e., Scheduled surgery patients that might require room with specific attributes). **Diagram 3.**

Patient Flow Continuum

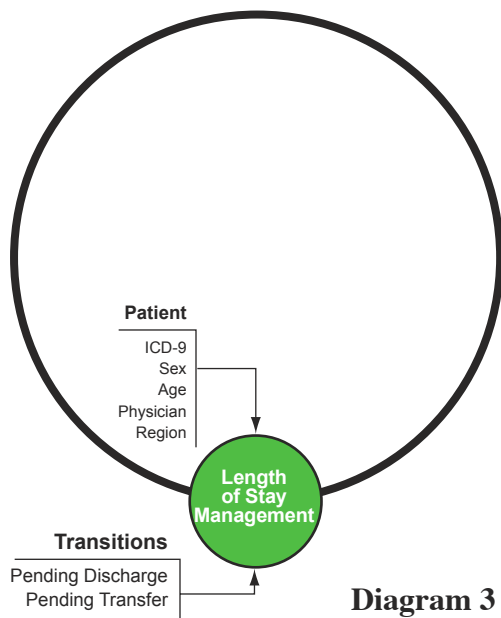
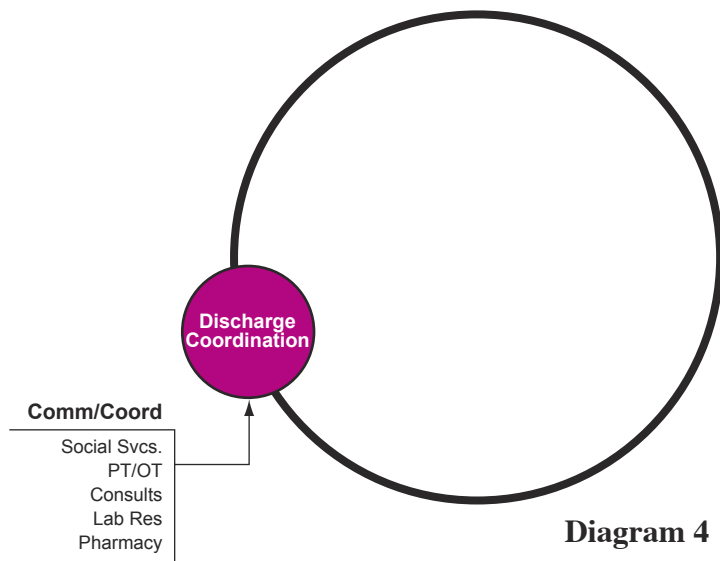


Diagram 3

Sub-Process #4: Discharge Coordination

The process of a patient's discharge requires much coordination between doctor, primary nurse, pharmacist, physical therapists, social services and other care team professionals before they leave the hospital. Often, hours pass between a physician's authorization for discharge until the time the patient actually vacates the bed. Conversely, it is not uncommon for a patient to leave the hospital, only to have the patient bed and room sit idle and un-cleaned for a variety of reasons, including delays in updating the Admit-Discharge-Transfer (ADT) system until near shift change or, while uncomfortable to mention, staff *hiding* beds to avoid accepting another patient, thus increasing their workload. For example, prior to physically leaving the hospital, a patient may require a final physical therapy treatment, a visit from Social Services, and retrieval of medication from the Pharmacy. Discharge coordination is as dependent on communication, flow of information and teamwork, as is the bed assignment in the admission processes. Coordinating these services, tracking their completion and communicating their respective status through proper planning, event tracking, and automated communication, will serve to expedite the patient's departure, improve the efficiency of all departments, and minimize the potential for lengthy delays. **Diagram 4.**

Patient Flow Continuum



Sub-Process #5: Bed Turnover

Bed turnover — converting a dirty bed into a clean bed for the next patient — is one of the most familiar sub-processes involved in the patient flow continuum. A hospital can expertly and efficiently manage the other sub-processes; however, if the bed has not been cleaned in a timely fashion, a bottleneck ensues and the patient will wait. This also significantly affects downstream variables with delays in patient flow from the ED, PACU or Admitting leading to overcrowding and possible ED diversions. As such, it is critical to successfully expedite the entire bed turnover sub-process, where each variable is dependent upon its timely execution and communication along each point of the patient flow continuum. This requires that accountability and oversight must be designed into the employee protocols in order for this sub-process and its interdependent activities to achieve optimum efficiency, as described below:

Patient Departure

The bed turnover process should begin *immediately* upon departure of the patient from the hospital room. This key *linking event* is the trigger point between managing demand and managing capacity. Clearly, the sooner it is known that a bed has been vacated, the better the resulting turnover process. In many hospital settings, it is common for the bed turnover process to begin when the ADT system is updated with the patient's departure, or *discharge*. Unfortunately, this is usually well after actual departure, or when a staff member has time to note that the room is vacant and requires cleaning. This critical data point, therefore, must be broadly and effectively communicated to the Environmental Services (EVS) personnel to expedite the start of the cleaning process. Additionally, it is a vital planning element for Bed Management personnel to know that a bed will soon be available and ready to accept a new patient.

Some hospitals rely on manual notification of a vacant bed in a dirty state. Typically this is accomplished via written documentation made available at the central nursing station. This requires housekeeping personnel to periodically report to the nursing station and seek an assignment. Although more timely than awaiting a message from the ADT system, this chance process is not real time, and it ignores the vital information needed by the patient placement/bed control personnel.

These delays in notification of a patient's departure can lead to several beds in the *dirty state* at one time. Real time notification will provide a more even distribution of the workload; however, it will not alleviate having multiple beds in a dirty state at one time. As such, EVS personnel need the ability to be directed to the bed in most urgent need. Most hospitals affect some level of bed cleaning prioritization by using a *stat* designation. Unfortunately, few hospitals restrict the authority for placing a bed on *stat* clean status resulting in overuse and, therefore, no clear cleaning sequence. For the most efficient patient flow management, the process should require that only those with a complete view of Patient Access (bed availability and patients awaiting placement) be allowed to sequence the cleaning of beds, and that a greater differentiation between a *normal clean* versus a *stat clean* be designed into the process. Some hospitals have achieved a higher level of success by introducing a *clean next* priority between *normal* and *stat* clean designations, and restricting the use of the more urgent cleaning status only to Bed Management personnel.

Bed Cleaning Start

The *beginning* of the actual cleaning process is a critical, but typically un-communicated, patient flow data element. Requiring the notification and broad communication of the beginning of the bed cleaning process provides a starting point from which EVS personnel must begin before reporting that the bed has been cleaned. This sequence will help prevent *batching* or calling in several bed cleaning requests at one time, which would otherwise lead to an undue number of *stat* requests. Furthermore, similar to the *patient departure* bed status, it is vital to communicate the stage of cleaning (*dirty* or *in progress*) to bed management personnel in real-time, so that bed management personnel are fully aware of which beds are in the process of being cleaned. This information provides the ability to make "pre-assignments" to patients in immediate need of a bed before the bed has actually been cleared for admission, further improving the patient placement process.

Bed Cleaning Complete

To effectively manage patient placement, and therefore patient flow, patient placement personnel must have *immediate* notification of when the room cleaning process is complete. It is common for nurses caring for patients in the PACU, ED and other areas throughout the hospital to place multiple telephone calls to bed control or other patient units seeking information about bed availability. This is an inefficient use of a valuable clinician’s time away from direct patient care. It also creates inter-departmental conflicts and added stress levels. Therefore, upon completion of a room cleaning assignment, the EVS employee should be required to communicate the completion to bed control, and other patient holding areas, in a *broadcast* fashion.

In addition to communicating an important data point for managing the patient flow process, the information of tracking the time a bed was vacated, the time the cleaning process started and the time it ended, provides valuable productivity information and reports to EVS management. As productivity is managed and improves, so does the patient flow process. **Diagram 5.**

Patient Flow Continuum

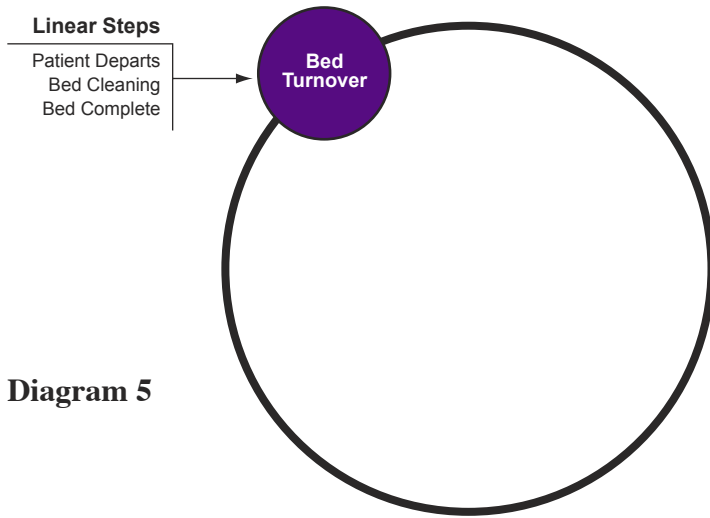


Diagram 5

MANAGING STAFF INVOLVED IN PATIENT FLOW

Having reviewed each of the sub-processes affecting the patient flow process, it is clear that many people in several areas of the hospital are involved and depend on the process. To manage their time and their performance effectively, one must follow three principles: *Earliest Knowledge, Highest and Best Use, and Self-Motivation.*

The Principle of Earliest Knowledge

The primary tenet of this principle is: *The individual closest to an event that affects patient flow is responsible for communicating the information to others who need to know.*

If a transporter assists a patient from the room upon discharge, the transporter (i.e., a nurse, nurse’s aide or transport personnel) must communicate that the bed is vacant and dirty prior to leaving the room with the patient. Likewise, the EVS employee assigned to clean the room must communicate the time the cleaning process starts and ends. If a room is blocked for any reason and cannot be used, the person having authority to block the room must communicate that information to bed control.

If the Principle of Earliest Knowledge is followed, delays in obtaining the information are avoided and the accuracy of the information is enhanced. As the organization increases the accuracy and timeliness of information, it will also increase its reliability and improve patient flow.

The Principle of Highest & Best Use

As procedures are developed to define each sub-process in the patient flow continuum and protocols are outlined for various personnel, it is important to employ the Principle of Highest and Best Use: *All personnel will be assigned to duties consistent with their set of skills, training and education.* As touched on in Sub-Process #5, it is simply not an efficient use of a nurse's time to clean a room or transport a patient from the unit, unless the patient being transported requires skilled nursing care. While this concept should always hold true, the current shortages of qualified nurses and radiology technicians highlight its importance to an even greater degree. To summarize, tasks should be *pushed* down to the appropriate personnel with the requisite skill set to avoid burdening a more highly skilled, higher paid and generally more in demand, human resource.

The Principle of Self-Motivation

A challenge faced by all executives, managers and supervisors across all industries is that of compliance. Developing protocols, policies and procedures is an important responsibility; however, getting broad acceptance and compliancy is also important, and perhaps, more challenging. Communicating the reasons for developing the protocol, monitoring performance, rewarding compliance and addressing non-compliance are essential, albeit basic management tools to achieve high levels of performance consistency. Beyond those tools, however, it is suggested that Management also understand key elements of an employee's behavior and what motivates their actions. Specifically, understanding and managing the answer to the question, "What's in it for me?" is critical in achieving and sustaining high levels of compliance over time.

ACCOUNTABILITY

To increase patient through-put, it is critical to monitor performance, measure results, and use that information to improve the patient flow continuum. An intrinsic requirement of process improvement is *accountability* of individual performance and collective outcomes. It is evident, however, that with the significant number of individuals involved and the interdependencies of each sub-process of patient flow, manual performance measurement is not feasible.

It is necessary, therefore, to automate as many of those activities as possible, and have the ability to monitor the associated performance measurements. The design of this process will require that each task be associated with *an individual*, and that that information be captured in a central database to provide the means for assessing performance, tracking compliance and achieving accountability. While this is a complicated set of automation requirements to gather, technology is currently available to automate many aspects of the interdependent sub-processes while tracking performance, often at the individual employee level. By definition, the technology used to facilitate a workflow process such as this, is called workflow automation.

Workflow Automation

If a process can be automated, efficiency and effectiveness will improve because the reliability of compliance is much higher. Before a process can be automated, however, each dependent sub-process involved must be identified and reviewed to identify the consistent and reliable events — called trigger dependencies — that precede it. Additionally, critical to maximizing the auto-completion of each dependency is the need to identify, report, audit, and monitor each step in the process, in real time. Trigger dependencies create *automation opportunities* which can be exhibited in a variety of ways, such as digital or alpha paging, or computer screen updates via various alerts. **See Table 4.**

Table 4

	<u>Manual</u>	<u>Auto</u>	<u>Possible Stakeholder(s)</u>
1. Surgical Demand Management (and Scheduled Admits)			
1.1	Surgery Schedule Requests	X	Central Scheduling
1.2	Surgery Block Time	X	O.R. Mgt
1.3	O.R. Resources	X	O.R. Mgt
2. Length of Stay Management			
2.1	ICD-9 code/diagnosis		X Case Mgt
2.2	Sex		X
2.3	Age		X
2.4	Multiple Diagnosis (Y/N)		X
2.5	Physician		X
2.6	Region		X
2.7	Pending Discharge		X
2.8	Pending Transfer	X	
3. Assessment & Assignment			
3.1	Sex (Patient)		X
3.2	Age (Patient)		X
3.3	Diagnosis		
3.4	Clinical Service (Patient)	X	Requestor, Pt. Plcmt., etc.
3.5	Requires Tele (Patient)	X	Requestor, Pt. Plcmt., etc.
3.6	Requires Isolation?	X	Requestor, Pt. Plcmt., etc.
3.7	Observation	X	Requestor, Pt. Plcmt., etc.
3.8	Bed Size Requested	X	Requestor, Pt. Plcmt., etc.
3.8	Accommodation Requested	X	Requestor, Pt. Plcmt., etc.
3.9	Staffed Beds	X	Requestor, Pt. Plcmt., etc.
3.10	Blocked Beds	X	Requestor, Pt. Plcmt., etc.
3.11	Flexed Beds	X	Requestor, Pt. Plcmt., etc.
3.12	Sex of roommate (Bed)		X
3.13	Age of roommate (Bed)		X
3.14	Clinical Service (Bed/Unit)		X Nursing
3.15	Tele Available (Bed)		X Nursing
3.16	Isolation Available (Bed)		X
3.17	Eligible for OBS patients (Bed/Unit)		X
3.18	Size of bed (Bed)		X
3.19	Accommodation Available (Bed)		X
4. Discharge Coordination			
4.1	Assessment of services needed	X	
4.2	Contacting the first service provider		X Nursing, Case Mgt
4.3	Following on with each additional service		X Each Dept.
4.4	Noting completion		X Each Dept.
5. Bed Turnover			
5.1	Requesting Transport	X	
5.2	Departing Patient		X Nursing
5.3	Housekeeping Notification		X Transport, Volunteers
5.4	Prioritization	X	
5.5	Bed Cleaning		X Patient Placement
5.6	Clean & "Ready" Notification		X Environmental Svcs

The activities involved in managing the patient flow continuum are categorized in Table 4 as those capable of being automated and those that require manual input. As the table highlights, a vast majority of the activities and communication events tied to the patient flow continuum can and should be automated. In light of the current hospital capacity management crisis throughout the country, and indeed hospitals throughout much of the world, few hospitals have moved to redesign the patient flow continuum — with or without automation. However the tide has begun to change, given the length of patient wait times and the overcrowding of EDs. Hospital executives are more seriously considering the need to seek advice from consultants and others to help overcome the barriers that, heretofore, have inhibited progress with this mission critical process. **Diagram 6.**

Patient Flow Continuum

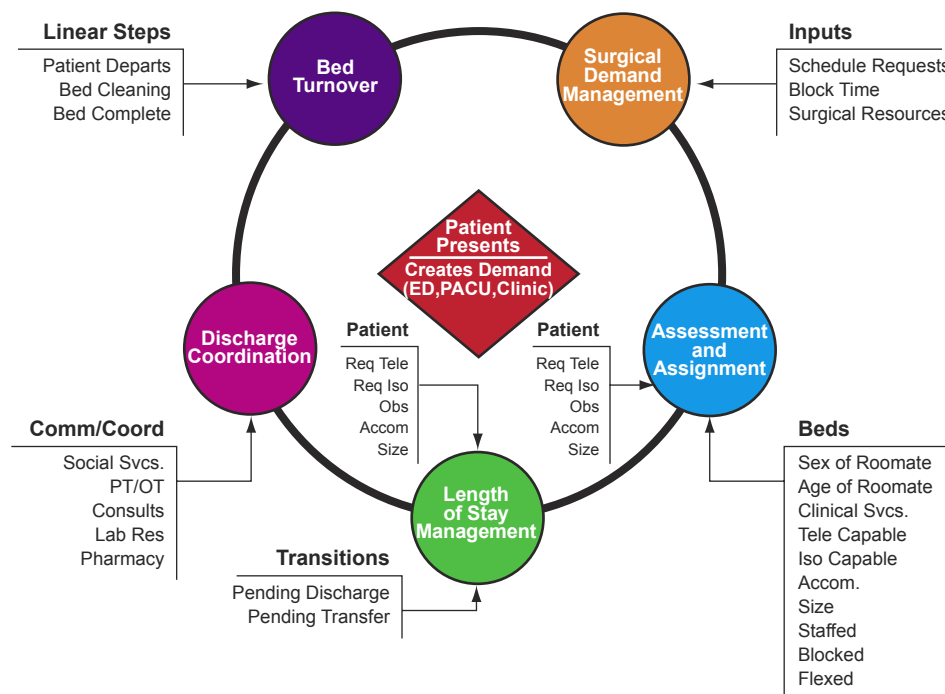


Diagram 6

UNDERSTANDING AND ELIMINATING BARRIERS TO IMPROVEMENT

G.I.G.O.

Although automating the process as described above may appear complicated, the tools to automate already exist. Indeed, hundreds of hospitals employ some or all of the tools available and have realized significant and measurable improvements in managing their inpatient bed capacity. The question remains, why don't all hospitals automate this mission critical process? Arguably, some may not know about the availability of the automated tools; others may not consider the issue important enough to warrant the work involved to change historic patterns. However, many who are aware of the tools have formed committees to improve the process and *still* hit a barrier to change. The so-called *G.I.G.O.* or "garbage in, garbage out" defense to change is all too common and rapidly becoming the main reason to resist automation. If management accepts that "***the information is only as good as the people who put it in***" and does not take initiative to improve the input, management is ignoring its mandate for continuous process improvement. Clearly, the issue is not one of resistance to improvement. Instead, it is one of resistance to change.

In today's rapidly changing healthcare environment, leaders across the nation have accepted their roles as change agents and are effectively managing the fear and resistance to process change. One must conclude, as the issues of sub-optimal patient flow management continue to manifest in overcrowded EDs, backed surgical schedules and diversions to other hospitals, that healthcare leaders must turn to automation to help manage the changes and champion the benefits that a redesigned and automated workflow process can generate.

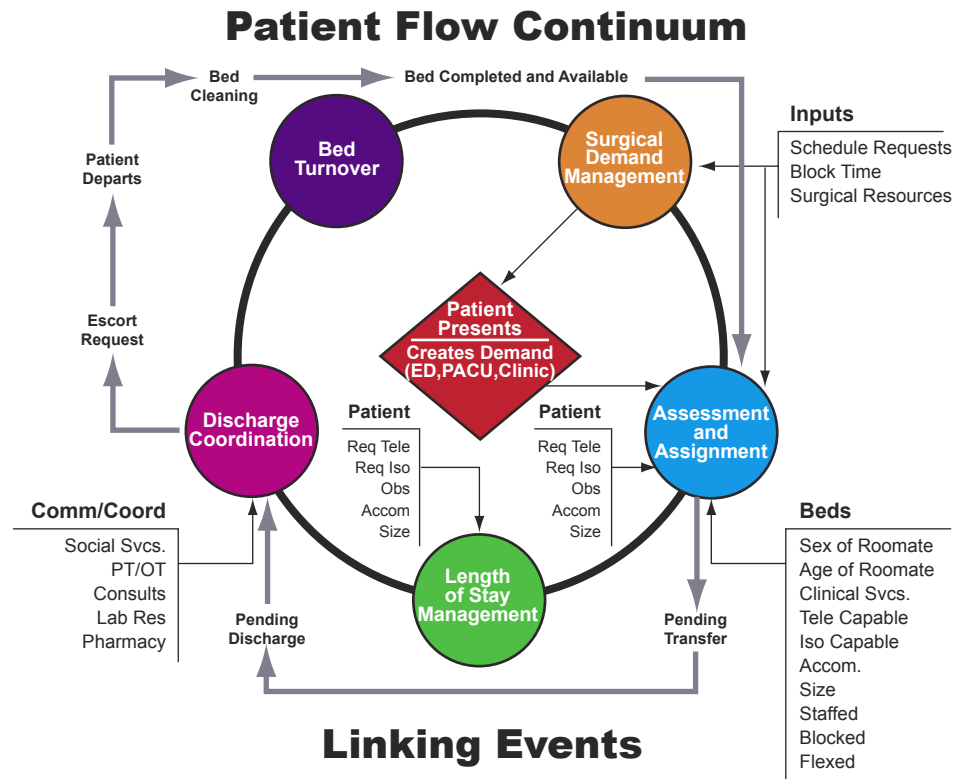
Change Management without Technology or Technology without Change Management

Another common barrier to improvement is the decision to delay automation until a new process can be designed. The process of managing patient flow in its myriad facets is equally a matter of change management and implementation of the right technology to support it. Without addressing each concurrently, attempts to manage patient flow will be subject to substantial variation, with little chance for systematic improvements. Therefore, the approach needs to be one where the workflow processes are mapped in conjunction with, not at the exclusion of, technology to automate, manage and monitor the interdependencies therein.

An attempt to design a new process without considering the supporting technology, may lead to a substantial amount of change trauma before the value of the solution is fully complete. Additionally, it will require workflow analyses, process changes, and decisions applicable only in a manual environment which might not be able to be directly translated once technology is introduced. As is evident from the discussions above, a manual solution will not only require greater amounts of human resources to implement, but the ability to measure outcome and manage accountability will be severely compromised. Furthermore, without automation, it may be more difficult to answer the "What's in it for me?" question implied in the principle of *Self-Motivation*, further exacerbating the change management trauma. While some degree of change management trauma is to be expected, it can be managed by redesigning the workflow with the supporting technology to support the change and integrate it within the process redesign.

By combining change management with technological support, it becomes easier to sell the changes, and address the *Self-Motivation* for each stakeholder with minimal resistance. A smooth integration of change and technology will help maximize the efficiencies between *Linking Events*. This is critical in that certain dependencies are the key *links* within a sub-process or more often, ***between*** two sub-processes, which have the inherent ability to either expedite the next sub-process, or stop the entire continuum for a given patient. The degree to which these Linking Events are automated and made reliable, will be the degree to which the entire patient flow process will be successful.

To illustrate, consider the most obvious, and repeated example within this discussion – a patient's departure upon discharge. If the process followed upon a patient departure does not employ the following principles, the chances for an efficient discharge are jeopardized by the myriad variables within the *linking events*. See Table 5. **Diagram 7.**



Summary

The Patient Flow Continuum is a complex and mission critical process composed of several involved sub-processes. To effectively manage and improve the process, it should be viewed in its entirety, but analyzed in its sub-parts. A critical analysis of the Patient Flow Continuum on the basis of these five sub-processes will identify all of the inputs, outputs, dependencies, and linking events that impact the success of moving patients through the acute care hospital. As many as 60 separate data elements are involved; some concurrent, others as linear dependencies, all impacting patient flow. Technology, process, and staff resource principles must be analyzed in context, in order to manage the continuum as a whole, and not as disjointed problems. Seeing the continuum in its entirety will allow one to combine people, process and technology for a solution with measurable and sustainable results, ultimately impacting the ability of a hospital to provide patients with high quality, cost-effective and efficient healthcare.

Source¹: 1999 National Hospital Discharge Survey. Advance Data No. 319. 18 pp. (PHS) 2001-1250

“According to a report released today by the Centers for Disease Control and Prevention (CDC), the average length of stay for hospital inpatients was 5.0 days in 1999, down from 7.3 days in 1980, as measured by the National Hospital Discharge Survey, conducted by CDC’s National Center for Health Statistics.”

Maximizing Hospital Capacity

*Increasing Patient Through-Put by
Improving the Patient Flow Continuum*

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