Healthcare Industry Incentive Structures
Pressure System Operators to Operate in a High-risk Risk State

Margaret V. Stringfellow, SM
Complex System Research Laboratory
Department of Aeronautics and Astronautics
77 Massachusetts Ave., 33-407c
Cambridge, MA 02139
Tel: +1-617-253-4519
sapphire@mit.edu

Meghan Dierks, MD
Harvard Medical School
Division of Clinical Informatics
Beth Israel Deaconess Medical Center
330 Brookline Ave., W/PA617
Boston, MA 02215
Tel: +1-617-632-0358/Fax: +1-617-632-0369
mdierks@bidmc.harvard.edu

Nancy G. Leveson, PhD
Complex System Research Laboratory
Department of Aeronautics and Astronautics
77 Massachusetts Ave., 33-334
Cambridge, MA 02139
Tel: +1-617-258-0505
leveson@mit.edu

Abstract

The operation of hospitals in a low-risk state has become more a more challenging goal to meet as cost-of-care increases have forced hospitals to find alternative revenue sources. In particular, hospitals have compensated for increasing costs by expanding their ad hoc patient referral base and overloading their operation schedules without a corresponding increase in resources to treat the increased patient load. Without adequate resources to treat patients, proceduralists respond to throughput pressure by speeding up the pace of cases, thereby exposing the patient to greatly increased risk of an adverse event. The subsequent treatment of adverse events caused increases the cost-of-care as hospitals bill related treatment to insurance companies. Recent changes by third-party payers to the hospital reimbursement policy have attempted to address this issue by denying coverage of adverse event treatment. The policy is examined along with alternative solutions that seek to align the incentives of insurance companies, hospitals and surgeons in an effort to decrease the cost of care and encouraging the low-risk operation of hospitals.

Healthcare, fix-that-fails, resource shortage, incentives, decision-making, safety, risk

Introduction

In recent years, there have been dramatic changes in the healthcare domain. Significant increases in the cost of delivering care combined with decreased reimbursement to hospitals and physicians have created unprecedented financial pressures. At the same time, demand for, and consumption of health care services by an increasingly complex mix of patient types has increased the burden to the system [1-5].

In response to these pressures, a number of policies have been enacted that are reshaping healthcare delivery. First, hospitals have enacted policies intended to simultaneously limit costs and increase throughput. These strategies, combined with the increased complexity of the patient mix, create new opportunities for adverse events[i] or undesirable outcomes. At the same time, third-party payers who reimburse for healthcare activities have responded to increasing utilization and costs with a number of other specific policies:

- limits in access to specific types of services
- limits in the duration of services
- constraints on who can provide services
- limits in the magnitude of reimbursement for specific types of services.

Finally, recognizing that adverse events or harm incurred during the delivery of care can itself increase the cost of care, third-party payers are also changing their policies to withhold reimbursement when adverse events occur.

In the past, healthcare providers focused predominantly on delivery safe, effective care. With this change in the policy landscape, key decision-makers now must try to satisfy multiple goals that include both cost-containment and high quality, safe care. This is particularly challenging when policies aimed at reducing costs interact (dysfunctionally) with practices aimed at providing safe care (e.g., especially with safe practices initially seem to increase cost). In this paper, we will discuss how attempts to satisfy multiple goals at high levels of the healthcare system (hospitals and third-party payers) create policies that have affected the decision-making of the care providers (e.g. surgeons) and paradoxically may encourage hospitals to operate in a high-risk state with respect to safe patient care.

A system dynamics model was built to demonstrate the unintended consequences of policies aimed at containing costs, maximizing opportunities to generate revenue, and promoting safety. The model both helps stakeholders understand how multiple system goals are dependent upon each other, as well how the effects of delayed feedback in the system work to create instability that works against system goals. The model is intended to measure the relative magnitude of effect of various policies and explore new ways of structuring the system to allow for better stakeholder alignment and achievement of system goals.

Overview of the Healthcare System Operations

All of the decision-makers in the healthcare delivery system, including third party payers (e.g., commercial insurers, state/Medicaid and federal/Medicare payers) hospital administrators and

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[i] An adverse event is defined as “unintended harm to the patient by an act of commission or omission rather than by the underlying disease or condition of the patient.”- **Institute of Medicine.** Patient Safety: Achieving a New Standard for Care. Washington, DC: National Academy Press; 2003.

the physicians attempt to operate the health care system in such a way as to provide care in a safe, clinically effective, cost effective and sustainable manner. Currently though, local pressures and constraints are placing heavier emphasis on a subset of these goals, disproportionately favor one goal over another or, in some cases, even rendering other goals unattainable. The relationship between third-party payers, hospitals and providers provide the context for the behavior shown in the healthcare system dynamics model.

Operational Context*:* Hospital, Third-party Payers and Providers

Hospitals are in business to deliver healthcare, and without adequate revenue, they cannot carry out their primary mission of delivery of care. In the US most hospitals are not-for-profit, so yearly revenue targets are set to cover costs. Costs to the hospital have been growing in recent years and so attention has focused on ways to generate additional revenue so that hospitals can continue to provide care to patients.

Hospitals pursue specific courses of action in order to generate revenue in a number of ways, but most notably through reimbursement of procedural care, hospitalizations, emergency medical services and ancillary services, such as laboratory testing provided to ambulatory patients (outpatients). Hospitals are reimbursed for these services primarily by third-party party payers (i.e. private and commercial insurance companies and state and federal government sources) at rates that are negotiated with each payer source. Depending on the specifics of the contract and the services in question, reimbursement can be revenue-favorable, revenue-unfavorable or revenue-neutral, and often varies widely across all payer sources. If a service is revenue-favorable, it is in the interest of the hospital to maximize throughput (in terms of procedures performed or admissions processed) while containing cost (measured in terms of time and resources required).

Providers, (e.g., physician, nurse, physical therapist) like hospitals, have strong social commitments and pursue specific courses of action based on this implicit social contract strong to deliver high quality and safe care. While hospitals provide the environment and operating conditions to make healthcare delivery possible, providers make the patient-by-patient decisions that affect patient care and safety. However, their ability to provide safe care is strongly influenced by the hospital. Providers may make safe decisions regarding patient care, but without sufficient hospital resources, patient safety may be at risk. For example, if a surgeon safely performs a procedure on a patient, but the patients recovery is overly shortened due to the hospital's inability to hire sufficient nursing staff, the patient may be at risk of an adverse event. Insufficient staffing conditions may arise as hospitals try to balance goals of sustainable operations through cost containment and resource conservation, safety and clinical effectiveness.

Third-party payers also try to achieve cost-containment and safe healthcare operations. Over time, if costs to third-party payers increase (in the form of reimbursement claims) third-party payers will renegotiate contracts with hospitals less-favorably to pass on their increased costs to the hospital. Third-party payers have attempted to introduce additional incentives intended to improve quality and safety. For example, Medicare, the federally administered system of health insurance, has created specific quality and safety measurement activities with which hospitals

must comply in order to qualify for reimbursement altogether. Over time, the safety record of a hospital may influence the negotiated rates of reimbursement by third party payers.

The safety record (including history of associated adverse events) of an individual provider is tracked by a number of external agencies and regulatory bodies. While rates of reimbursement are rarely influenced by the safety record of an individual provider, their long-term participation in a particular insurance plan may be influenced by their safety record, efficiency and overall effectiveness in managing the plan's patients. In fact, if a provider's safety record is perceived to be poor or their productivity is perceived to be low, they may be dropped from the insurance company.

Effect of Operational Context on Hospital Policy

Hospitals are facing increasing costs and decreased reimbursement from third-party payers that are causing them to enact policies intended to increase revenue while containing cost. In particular, hospitals are increasing procedures performed without increasing resource utilization (including staffing). In cases where the facility is under capacity, this strategy works to both contain costs and provide sustainable operations without putting patients at risk and within the bounds of safe practice. However, many centers are at or over capacity, and this increase in throughput goals have put patients at risk. Patient safety may be compromised for a number of reasons, including a shortage of specialized members of surgical teams are not available when needed, specialized rooms are not available when needed or fewer staff are available to take care of patients.

Effect on Hospital Policies on Delivery of Care

Because of new hospital policies intended to increase throughput, providers have been given an increased number of procedures to do in a fixed amount of time without a commensurate increase in the number of resources available to treat their case load. Depending on the specific types of cases being done, these changes in practice have caused providers to respond in way they would not normally act, in way that significantly increases the likelihood of some types of adverse events. The policy of hospitals and its effect on provider's ability to give high quality care is dysfunctional: while in the short-term hospital revenues will increase as a result of increased procedures, a coincident increase in the rate of adverse events will increase the long-term cost of care and negatively affect the hospital's safety record.

Detailed Example: Surgeons can increase their productivity in two ways, they can attempt to complete more cases in a finite period of time (in the model, this is called *rushing*) and they can skip specific steps that are perceived to improve patient safety but slow case performance (in the model, this is called *waiving safety controls.*) For example, surgeons have the option to waive the use of an anesthesiologist for some patients. Surgeons can perform the procedures and manage the anesthesia, through directions to a nurse, without an anesthesiologist, but risk of an adverse event is greatly increased. However, the anesthesiologist is a scare resource, and long waits are common, which lower the surgeon's productivity and impacts their ability to get through the scheduled workload. Hospitals allow the waivers because they perceive the combination of more productive surgeons and fewer required anesthesiologists and related

equipment, to increase revenues and reduce costs [6]. With surgeons' overloaded work schedule, *rushing* and *safety control waiving* may be the only way to complete the case load at all. Without sufficient resources, such as specialized members of the surgical team, operating rooms, or technical staff, operating in the hospital environment is high risk.

Effects and Consequences of Adverse Events

The occurrence of an adverse event can be similar to the occurrence of a manufacturing defect due to inadequate manufacturing, and the treatment of an adverse event is similar to rework. The treatment of an adverse event and rework are costly to system operations in both money and time. In manufacturing, plants are often sent back their own rework, and so are incentivized to keep rework rates low and create the product to specifications in the first place. The manufacturing plant bears both the time and monetary cost.

In healthcare, and for example, surgical care, consequences of adverse events (as experienced by the hospital and provider) are quite different. Until recently, hospitals were reimbursed for the cost of the primary procedural care, as well as the cost of managing the adverse event. In this way, there was no financial penalty to the hospital for adverse events. Providers typically are reimbursed at a fixed rate even if there is an adverse event requiring secondary interventions or care. From a time standpoint – i.e., time and provider resources required to manage the adverse event ('rework' the problem), the situation is and has been more variable. In some centers, the surgeon responsible for the adverse event assumes responsibility of managing the complication from the adverse event.. This adds to workload, potentially decreasing the capacity to manage new cases. In some medical centers, however, the adverse event is managed by a different set of providers (e.g., critical care physicians or hospitalists), thus enabling the proceduralist to continue to focus on the procedural schedule.

Since hospitals do not bear a significant financial penalty for managing an adverse event, an important balancing feedback is missing. Similarly, an important balancing feedback is missing if a proceduralist does not bear the time and rework penalty associated with managing and adverse event. On its face, it appears that by removing the ability to reimburse adverse event treatment would reduce the occurrence of adverse events, however, due to delays in the healthcare system, non-reimbursement of adverse event treatment actually gives rise to further incidence of adverse events, as will be shown later in the analysis.

High-level Effect of Falling Revenues

A high-level causal loop diagram in Figure 1 shows the system structure that leads to the practices described above. The center loop shows that strategies of increased throughput (even with the an increase in adverse events) is seen to close the hospital financial target gap, and so overcapacity hospitals have not enacted policies to limit for adverse events as that would decrease productivity. In actuality however, adverse events are increasing the hospital financial target gap through the cost of care reinforcing loop.

An increase in adverse events increases the cost of health care by adding the (preventable) cost of the adverse event complications. The cost of adverse event complications is passed

onto the third-party payers through an increase in insurance claims, which in turn renegotiates reimbursement contracts with hospitals less favorably. The less-favorable reimbursement contracts pressure hospitals to be more conscious of throughput and costs. The delay between the occurrence of adverse events and the contract renegotiation hides the connection between them to healthcare decision-makers. As discussed in [7] a delay between cause and effect limits the ability to cognitively connect the two.

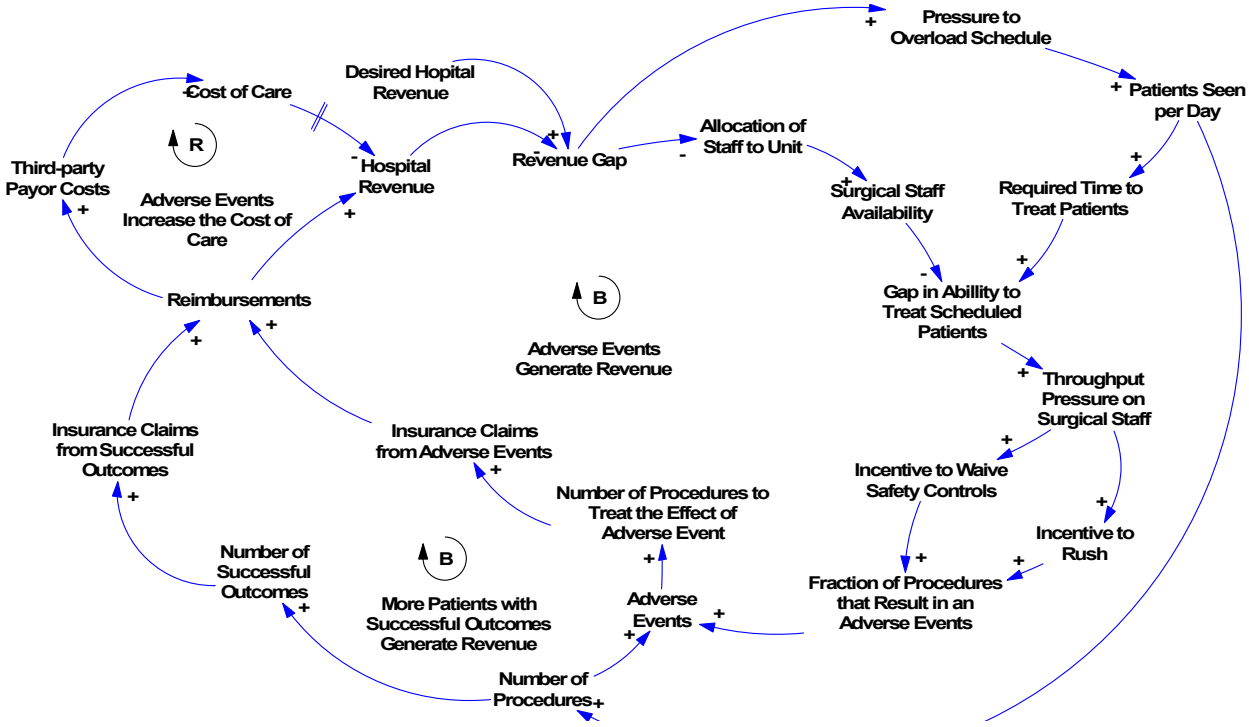

Figure 1 High-level Effect of Falling Revenues

Changes to Third-party Payer Policy

To combat their escalating costs and increase patient safety, third-party payers, have instituted new policy: Denial of reimbursement for most treatments due to an adverse event. This policy was intended to act as a balancing loop and drive the adverse events and cost of care down. However, as can be seen in Figure 2, the policy is actually creates a reinforcing loop and increases throughput pressure and adverse event rates. When payment is denied for treatment of adverse events, the financial shortfall drives up the throughput pressure.

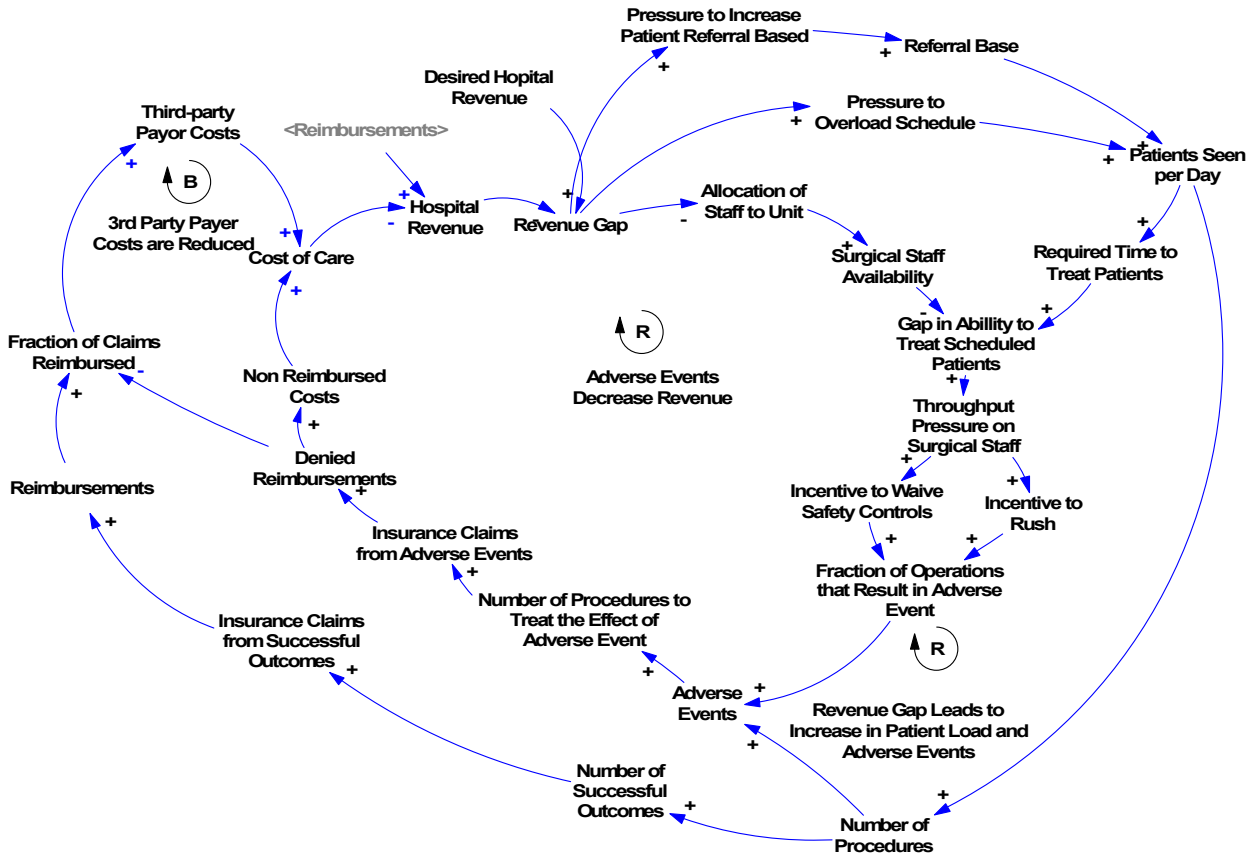

Figure 2 Policy of Denied Reimbursements for Adverse Events

Changes in Hospital Practice Due to New Third-party Payer Policy

The model shown in Figure 2 shows that as hospitals are responding to decreasing revenues from denied reimbursements, they increase their patient referral base but are not able to hire additional the staff (e.g. anesthesiologist or surgeons) to safely treat the increased case load. For example, some hospitals have agreements with outlying communities that state they will accept any patient that walks in the door as a high priority case and will add them to the schedule. These negotiated agreements generate significant revenue for the hospital but due the ad hoc nature of the patient arrivals and budgetary constraints, hospitals do hire adequate staff to handle these patients. The policy increases the number of adverse events.

Analysis of Policy Change and Alternative Solutions

The change to the reimbursement policy is another example of a fix that fails: a well–meaning action is undermined by unintended consequences [8]. The effects of new policies are not obvious to system stakeholders who do not have a system view and treat the system goals (safe, clinically effective, cost effective and sustainable operations) as independent.

Figure **3** shows hospital finances dipping due to unfavorable contract renegotiations with third-party payers before and after the payment for adverse event policy was implemented. These financial shortfalls increase the scheduled workload, risk tolerance and consequently, the incidence of adverse events as discussed in [6].

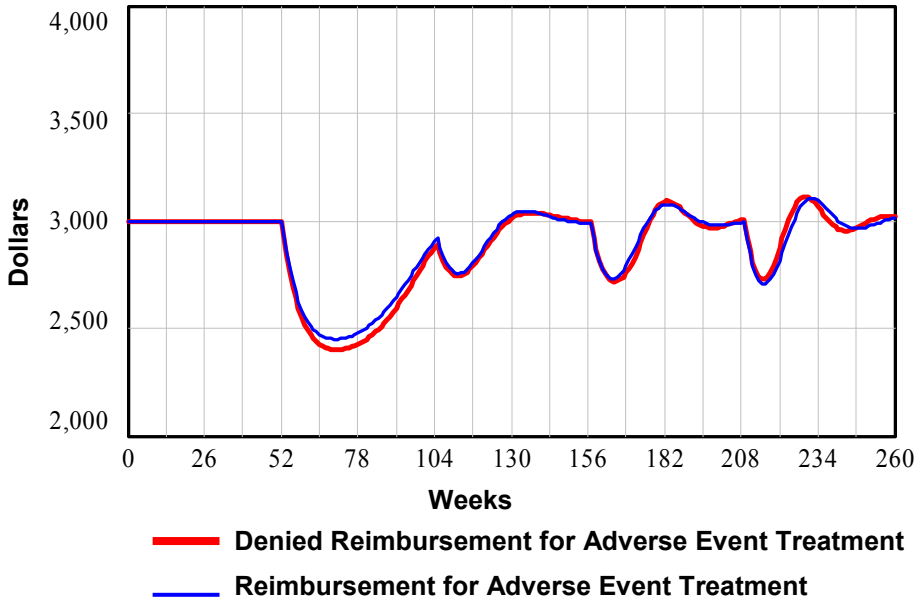

Figure 3 Hospital Finances as a function of Time (weeks)

Figure 4 shows the affect on the incidence of adverse events before the new third-party payer policy was instituted and after the policy was implemented. While the system was operated in a high-risk state with ever increasing adverse events before the change, the policy has made the situation even worse.

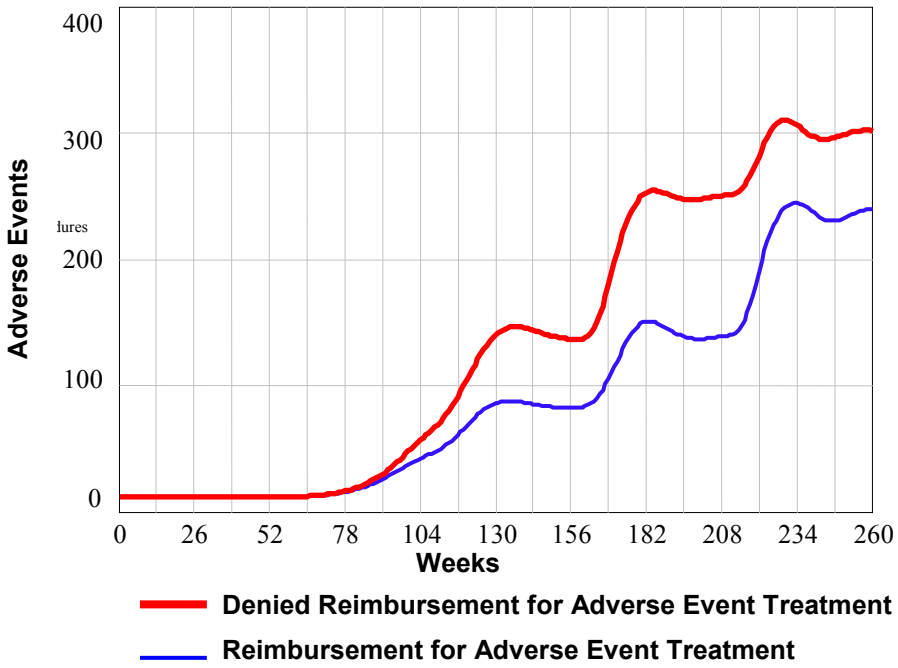

Figure 4 Number of Adverse Events as a function of Time (weeks).

The hospital system operation is an example of the "Out of Control" archetype [9] as shown in Figure 5. The intended consequence, lessening hospital's financial pressure by overloading the procedure schedule is a balancing loop. The unintended consequence is that the hospital revenue gap and financial pressure increases in a reinforcing loop due to the delayed consequences of adverse events on the cost of care. After the third-party payer policy is instituted, the hospital system operation is also an example of the "Out of Control" archetype. In this case, the intended action was the reduction of third-party payer costs and forms a balancing loop, while the unintended consequence acts as a reinforcing loop that increases the cost of care and the adverse event rate.

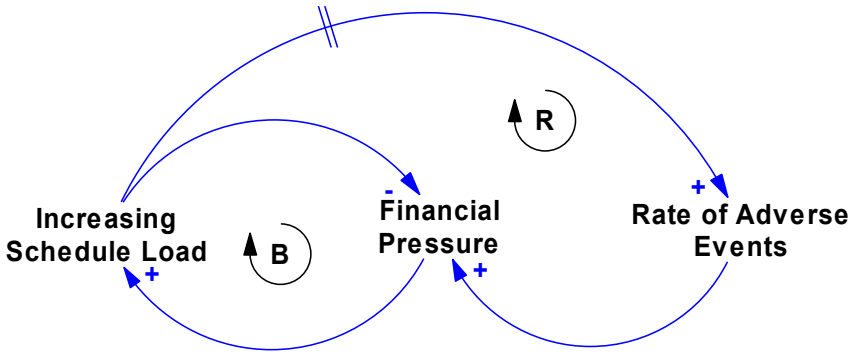

Figure 5 Wolstenholme's "Out of Control" Problem Archetype [9]

The solution archetype to this problem archetype is to add a feedback between the control action and the system reaction to create a reinforcing loop. Solutions that add this feedback

can be implemented several ways. Alternatively, the link between the control action and the system reaction can be changed.

Partial solutions that change the link between the control action and the unintended system reaction can be made within the purview of the surgical unit include risk-based scheduling and increased patient screen accuracy. Some benefit can be derived by changes to the scheduling of risky cases so that demand for anesthesia is constant throughout the day ensuring that spare anesthesia capacity is not wasted and wait times are short. Additionally, tools to assist providers in the assessment of patient risk, i.e. accurate determination of high and low risk cases, encourages providers not to waive steps that increase patient safety but slow case performance for high-risk cases. However these solutions are limited, as they do not align the incentives of the hospitals, third-party payers and providers to that of patient safety.

One solution that adds the missing feedback between the control action and the system reaction and aligns stakeholders is a policy of provider accountability. If proceduralists manage their complications (thus limiting their capacity) for no additional fee-for-service, they may better able to negotiate throughput pressure and patient safety. Without such a solution, in the presence of throughput pressure, physicians may work in a riskier fashion than they realize, and adverse events will occur. Providers must have the freedom to work at a rate such that their compensation is maximized when they are working safely. While hospitals would lose revenue in the short-term in the form of lower surgeon productivity, they reap long-term gains in the form of more favorably negotiated reimbursement contracts.

In addition, shorter term feedback to hospitals regarding a rise in the rate of adverse events would help to highlight the relationship between adverse events and throughput pressure. This feedback must not remove hospital reimbursement for adverse events. In the practice of surgical care a few adverse events will always occur, as an individual's response to surgery is not predictable even if surgical skill is high and safety measures are followed. Without adverse event reimbursement, costs due to surgical complication treatment may drive the system into an unsafe state.

Discussion

There is little that can be changed solely within the hospital segment of the healthcare system that will benefit the system as a whole that does not require a substantial investment of resources. System decision-makers must have aligned incentives so that their local operations contribute positively to a common system goal: low-risk and sustainable operations. It is only by decreasing the cost-of-care that a reduction in the number of adverse events gains cost savings for the hospital.

The occurrence of adverse events leads to the same issues found in rework and backlog in manufacturing [10]. The provider accountability solution has the same effect of reducing the occurrence of rework and increasing the system's efficiency and has the same effect on costs: increased costs at first followed by system savings in the long run.

Conclusion

Recent changes policy governing the reimbursement of procedures for the treatment of the consequences of adverse events, have exasperated an already poor alignment of stakeholder incentives in the healthcare domain. Long delays and the complexity of the hospital care system have masked the effects of safety due to perverse incentives and poor policies. Only solutions that align system operator incentives with those of the patient will encourage low-risk, cost-contained hospital operations and improved system safety.

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