Medical Errors and Behavior Management

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Organizational Behavior Management in Health Care: Applications for Large-Scale Improvements in Patient Safety

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Abstract

Medical errors continue to be a major public health issue. This paper attempts to bridge a possible disconnect between behavioral science and the management of medical care. Epidemiologic data on patient safety and a sampling of current efforts aimed at patient safety improvement are provided to inform relevant applications of organizational behavior management (OBM). The basic principles of OBM are presented, along with recent innovations in the field that are relevant to improving patient safety. Safety-related applications of behavior-based interventions from both the behavioral and medical literature are critically reviewed. Potential OBM targets in health care settings are integrated within a framework of those OBM techniques with the greatest possibility of improving patient safety on a large scale.

Introduction

Organizational behavior management (OBM) focuses on what people do, analyzes why they do it, and then applies an evidence-based intervention strategy to improve what people do. The relevance of OBM to improving health care is obvious. While poorly designed systems contribute to most medical errors, OBM provides a practical approach for addressing a critical component of every imperfect health care system—behavior. Behavior is influenced by the system in which it occurs, yet it can be treated as a unique contributor to many medical errors, and certain changes in behavior can prevent medical error. This paper reviews the principles and procedures of OBM as they relate to reducing medical error and improving health care.

First, we need to define medical error. This task is neither simple nor straightforward because the definition of a medical error varies markedly across different hospitals and health care systems. For example, the National Patient Safety Foundation[1] defines a "health care error" as: "[A]n unintended health care outcome caused by a defect in the delivery of care to a patient." According to the Institute of Medicine (IOM), a health care error is "a problem in the *process* of care itself or failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim."[2] Thus, while some refer to medical error as any *act*, or failure to act, which results in harm to a patient, others refer to medical error as any action within the process of care that may have the potential to cause harm. This latter prevention-focused definition best fits the application of OBM.

This distinction is relevant to interpreting the patient safety literature, since research results typically focus on frequencies of adverse events (outcomes) rather than process-level errors (or

behaviors) occurring during health care. However, a single error does not guarantee that a patient will experience a medical injury. An examination of case studies of errors presented in the *Annals of Internal Medicine* suggests as many as 17 separate individual errors may occur before a patient is actually harmed.[3] Thus, process measures need to be addressed in designing patient safety programs.

Dimensions of Medical Errors

The Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicators[4] (PSIs) are the most commonly used measures of patient safety performance. They include 16 classes of patient safety incidents (Table 1). Although this is a useful classification system, prevention requires a specification of actions leading to these types of patient safety incidents.

Leape[5] has provided a brief and practical typology of medical errors that includes four main domains:

1. Diagnostic.
2. Treatment.
3. Preventive.
4. Other.

Within these domains is a more specific list of 14 types of errors that can be seen as a hierarchy of severity (Table 1). In comparing these two methods of classification, the difference between outcome and process measurement is salient. Although various patient safety incidents could be caused by a number of factors, Leape's taxonomy reflects specific problem behaviors.

The most common types of preventable errors resulting in adverse events have been identified as: technical errors (44 percent); errors in diagnosis (17 percent); failures of prevention (12 percent); and errors in the use of a drug (10 percent).[5] In terms of overall numbers, preventable technical complications of surgery (10,891) and wound infections (9,659) were most common, indicating areas where hospitals should focus their intervention efforts.

A more recent report[6] suggests that almost 60 percent of all patient safety incidents include: failure to rescue (delayed diagnosis and treatment); decubitus ulcer (bed sores); or postoperative sepsis (blood infection). This report also suggests the most lethal patient safety incidents—or those most closely associated with mortality—include failure to rescue and unexpected death during a low-risk hospitalization.

Between 1995 and 2000, an increasing trend of certain types of events suggested a need for special attention. These included postoperative medical- and nursing-related adverse events, such as respiratory failure (31 percent); infection due to medical care (14 percent); decubitus ulcer (19 percent); septicemia (41 percent); thromboembolism (42 percent); and accidental punctures and lacerations (7 percent).[7]

Certain signs of progress are also noteworthy. Specifically, anesthesia reactions and complications decreased by 18 percent, and foreign bodies left during procedures were reduced

Table 1. Two widely used taxonomies for patient-safety incidents and medical errors

AHRQ PSIs	Leape Typology of Errors	
	Domain	**Error**
1. Accidental puncture or laceration	Diagnostic	1. Error or delay in diagnosis
2. Complications of anesthesia		2. Failure to employ indicated tests
3. Death in low-mortality Diagnostic Related Groupings (DRGs)		3. Use of outmoded tests or therapy
4. Decubitus ulcer		4. Failure to act on the results of monitoring or testing
5. Failure to rescue	Treatment	5. Technical error in the performance of a procedure
6. Foreign body left during procedure		6. Error in administering treatment
7. Iatrogenic pneumothorax		7. Error in dose or method of use of a drug
8. Selected infections due to medical care		8. Avoidable delay in treatment or in response to an abnormal test
9. Postoperative hemorrhage or hematoma		9. Inappropriate care
10. Postoperative physiologic and metabolic derangement	Preventive	10. Failure to provide indicated prophylactic treatment
11. Postoperative pulmonary embolism or deep vein thrombosis		11. Inadequate treatment monitoring or followup
12. Postoperative respiratory failure	Other	12. Failure in communication
13. Postoperative sepsis		13. Equipment failure
14. Postoperative wound dehiscence		14. Other systems failure
15. Transfusion reaction		
16. Birth trauma and obstetric trauma (3 types related to delivery methods)		

by 7 percent. While small, these improvements are encouraging in terms of current proactive efforts to address patient safety.

Preventing Errors in Health Care

As depicted in Figure 1, patient safety outcomes are influenced by a number of factors, including several sources external to the hospital (e.g., relevant legislation, agency mandates, and special interest groups). Within-hospital sources include the health care culture, the institutional patient safety agenda, the specific environmental context in which the health care worker operates (which includes the patient), and the focus of this paper—the behavior of the caregiver. These multiple influences are, in turn, affected by patient safety outcomes in a reciprocal system most certainly affected by innumerable additional factors in varying degrees.

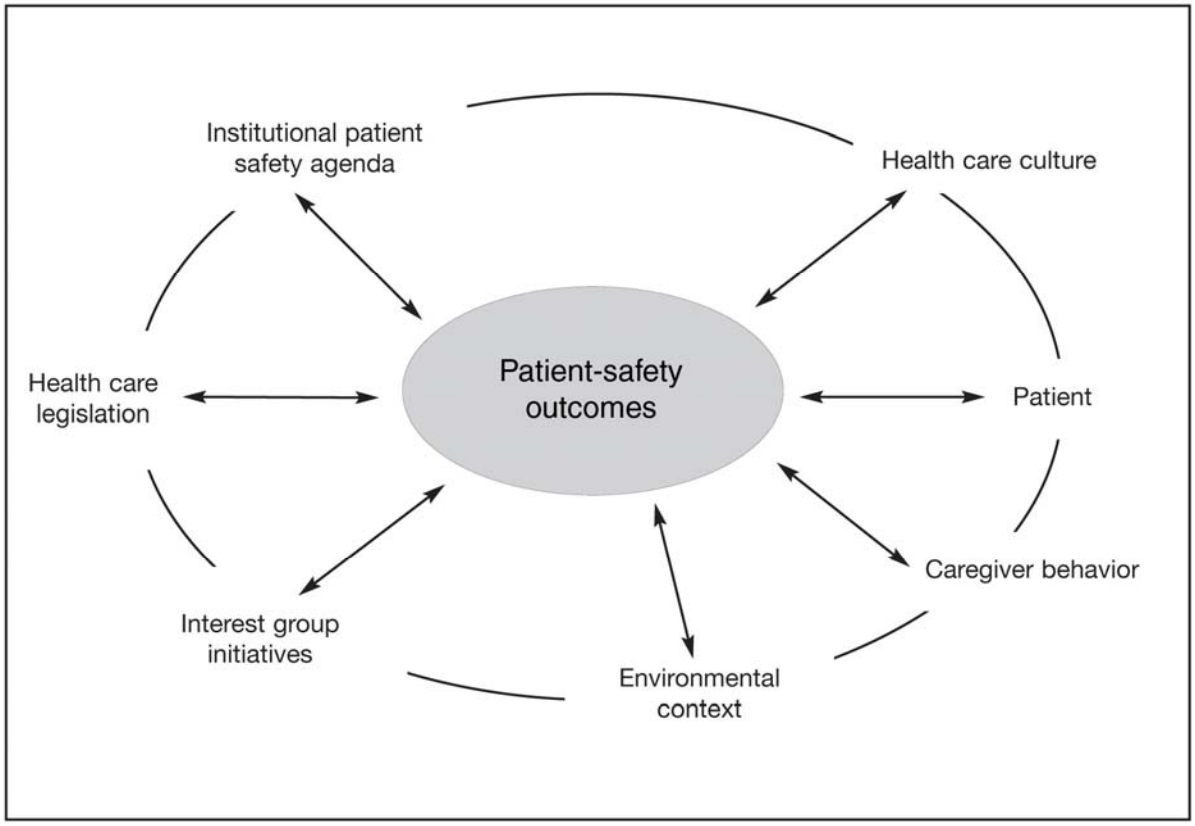

Figure 1. An overall model of patient safety. Domains of influence relevant to OBM are shown enlarged and in italics.

Errors Addressed by System Change

Medical mistakes caused by latent errors, such as similar sounding drug names or delays in treatment due to lack of staff, are best addressed by system change. For example, it would be reasonable to expect these errors to be reduced if drug names were altered and more personnel were hired. Yet, additional room for improvement often remains even after quality gains from system change are realized.

Advances in infection control often have been addressed by increasing hand hygiene among caregivers. One relevant system change has been the installation of antibacterial, alcohol-based rub dispensers in patient rooms and near sinks. This change should lead to improved infection control, because alcohol rubs reduce the volume of infection-related microorganisms by 88 percent, compared to hand washing with soap and water, which reduces the volume by only 49 percent.[8]

The use of information technology (IT) is a key component of system change for error reduction. For example, implementation of "computerized physician order entry" (CPOE) and clinical decision support systems are among specific IT practices recommended to help reduce errors.[9] Early evaluations suggest that implementation of CPOE leads to significant improvements in patient safety.[10, 11, 12, 13, 14, 15] Thus, a major contributor to medical errors (e.g., physicians' poor handwriting) is removed from the process. However, despite these promising initial findings, adoption of CPOE has been slow.[16]

Unfortunately, system changes often are not readily embraced by all caregivers. This puts administrators in the uncomfortable position of choosing whether to make protocol improvement voluntary or mandated. Some may see this as a nonissue, saying simply, "Make them do it, or else…." However, this assumption fails to take into account the tendency of forced change to elicit reactance.[17] Consistent with widespread calls for improving the health care culture, caregivers need to be supportive of autonomy[18] and to feel empowered to change behaviors that could harm their patients. Patient safety can be engineered into a health care system, but peak performance also requires systematic attention to environmental hazards and at-risk behaviors related to patient safety.

This paper reviews practical solutions to motivating the adoption and sustained practice of patient safety behaviors that have produced large-scale community and organizational change. In the medical literature, this approach is alluded to simply as "behaviorism" or "behavior modification," but the technical term should be "organizational behavior management" (OBM).

Organizational Behavior Management

OBM is defined as the application of behavior analysis to organizational settings.[19] The three-term contingency, or "A-B-C model" (i.e., Antecedent-Behavior-Consequence) is the foundation upon which most behavior-based interventions used by OBM practitioners is developed.[17, 20, 21, 22]

An antecedent (A) is a stimulus that precedes a behavior (B) and encourages performance of that behavior.[22] These can take many forms, such as signs, reminder prompts, or even noises that direct behavior.[17] One example of an antecedent strategy shown to be especially useful in improving organizational safety is goal setting (see Locke and Latham[23] for a review of the goal-setting literature).

A consequence (C) is an event that follows a given behavior and increases the probability the behavior will recur. Like antecedents, consequences can take many forms, such as behavioral feedback, monetary rewards, or a supervisor's praise for a job well done. For this reason, it can be said that consequences *motivate* behavior,[17] since we tend to act in response to the consequences we expect to receive.

Behavior-Based Feedback

One type of consequence used in numerous settings to affect behavior change is "feedback." In general, a feedback intervention involves measuring a targeted behavior and then delivering information (e.g., frequency, rate, or percent correct) about this behavior to relevant individuals or groups. This approach has been shown to successfully increase safe behavior and decrease at-risk behavior in a variety of different nonmedical settings.[24, 25, 26, 27, 28]

Behavioral Maintenance

Establishing desired behavior change during an intervention phase is not sufficient. The long-term objective of OBM is the institutionalization of contingencies needed to support the desired

behavior in the absence of intervention agents.[29, 30] Ideally, the intervention techniques become part of the organization's day-to-day practices. Several factors are critical for behavioral maintenance, including: a) educating and training; b) involving indigenous personnel in customizing and delivering an intervention process; c) developing organizational structure to monitor the intervention process and outcome; d) providing ongoing social and organizational support; and e) generating "self-rules" that individuals can use to motivate their own intervention-relevant behavior.[18, 29, 30]

Behavior is also maintained within an organization when influenced by natural (or intrinsic) contingencies. Thus, when a particular behavior's natural consequences are rewarding, external contingencies (e.g., feedback from another source) are not necessary for motivation. This occurs, notably, when physicians learn how to use CPOE and eventually find it more efficient and reliable than ordering prescriptions by hand. However, it often takes time to experience the intrinsic qualities that reinforce a behavior. People need to engage in a behavior fluently to experience its inherent, beneficial consequences. This means that external contingencies are often necessary to motivate the initiation of a target behavior.

Organizational Applications for Large-Scale Change

The OBM perspective has informed an innovative people-based patient safety approach to health care,[31] which strategically integrates behaviorism and humanism in the design of interventions to benefit patient safety. This comprehensive approach to patient safety is based on the following evidence-based guidelines, which are derived from applied and experimental behavior analysis (see Geller[17] for a comprehensive description and analysis of these guidelines):

- Target observable behavior.
- Focus on external factors to explain and improve behavior.
- Direct with antecedents and motivate with consequences.
- Focus on positive consequences to motivate behavior.
- Design interventions with consideration of internal feelings and attitudes.
- Apply the scientific method to improve intervention.
- Use theory to integrate information, not to limit possibilities.

Safety-Related OBM Research in Health Care Settings

Intervening to Improve the Safety of Health Care Workers

Several successful applications of OBM in health care settings, based on the seven guidelines listed above, provide the foundation for designing interventions to initiate and maintain behaviors relevant for patient safety.[31] In one example, various feedback schedules were investigated to determine which best supported the acquisition and maintenance of three health-care routines: feeding, positioning, and transferring physically disabled patients.[32] All feedback schedules were effective at increasing and maintaining the target behavior, but densely scheduled feedback produced more immediate behavior change.

In another study,[33] an intervention that combined goal setting with interpersonal reviews of behavior-based feedback increased nurses' use of behavioral feedback to promote infection control practices in a head injury treatment center. A different study of infection control found that applied performance feedback increased nurses' use of sterile gloves in potentially infectious situations in an emergency room.[34]

OBM techniques—specifically, training, goal setting, and feedback—also helped increase nurse anesthetists' compliance with procedures (i.e., hand sanitizing) to reduce the probability of accidental exposure to blood-borne pathogens.[35] Hand sanitizing increased from 24 percent at baseline to 65 percent during the intervention and was maintained at 52 percent following withdrawal of the intervention. Additionally, nontargeted precautionary behaviors increased as a result of the intervention, including recapping needles with one hand (from 45 to 61 percent); removing gloves from the inside out (from 61 to 93 percent); and wearing gloves when discarding waste (from 31 to 52 percent). This impact on nontargeted behavior suggests a spread of OBM influence, a phenomenon known as "response generalization."[36]

This line of OBM research informed an intervention to decrease injuries from sharps among surgical team members during operations by increasing the use of a "hands-free" method for exchanging sharp instruments.[37] The intervention package, which included task clarification, pre-intervention feedback, goal setting, and weekly intervention feedback, led to dramatic increases in the use of this injury-reduction technique from 32 to 64 percent).

Whereas these examples of OBM research targeted the safe behavior of caregivers, each of these interventions indirectly advanced patient safety. Patient safety cannot be separated from caregiver safety.[38]

An OBM Approach to System Change

A behavioral approach also can be useful in evaluating the impact of system change. For example, a systematic, behavior-based evaluation of a gradual, voluntary CPOE implementation found that CPOE medication orders were safer and more efficient compared to the standard paper-based ordering method.[16] However, OBM may be needed to increase CPOE use.

For example, a number of strategies were evaluated to increase the use of CPOE among physicians. These included a) presenting evidence in support of CPOE use; b) rewarding CPOE use with small trinkets; c) providing individual access to computers; d) adding clinical decision support; e) instigating relevant peer pressure; and f) providing financial compensation for the extra time required to become proficient with the CPOE system. The financial compensation strategy was found to be most effective in the short term, increasing CPOE use from 35 to 57 percent. After financial compensation was discontinued, though, CPOE use declined to 42 percent after several months but did not fall to baseline levels.[39]

The maintenance of CPOE use following the withdrawal of the financial incentive probably occurred because some physicians experienced intrinsic or natural reinforcement. However, the lack of peak maintenance raises the concern that external consequences of a financial incentive may over-control or over-justify the behaviors targeted for intervention, reducing self-persuasion or the influence of intrinsic consequences.

OBM for Patient Safety

In one study,[40] providing feedback to caregivers on their frequency of hand washing led to an increase in hand washing following patient contacts (from 63 percent at baseline to 92 percent post-intervention). The impact of this intervention was significantly greater than adding an emollient hand washing agent to the environment.

A number of other OBM intervention studies have demonstrated significant increases in hand washing among caregivers.[41, 42, 43] The intervention programs varied substantially among these studies, but all included a behavior-based feedback component. Moreover, nonbehavioral attempts to increase hand washing among caregivers suggest that hand-hygiene interventions targeting attitude change, intentions, or self-reported practice are likely to fail at altering actual behavior.[44]

Other examples of OBM interventions targeting patient safety include the following:

- A quota system (antecedent strategy) for emergency patients' admission to internal medicine departments resulted in reduced length of stay with no difference in outcomes.[45]
- Education, discussion, and feedback on proper laboratory tests reduced the overall number of tests ordered without any decrement in patient outcomes.[46]
- Standardizing the handoff communication procedure using antecedent reminders and feedback improved patient satisfaction, medication administration record-keeping, completion of cardiac enzyme regimens, and patient transportation without a cardiac monitor, thereby making an additional 67.5 hours of nursing time available each month.[47]

This is not an exhaustive review, yet the OBM approach to patient safety certainly appears promising. However, additional field research in this domain is clearly needed.

A Disconnect Between OBM and Health Care Management

Methodological Distinctions

Health care has been noted as being resistant to importation of ideas from other disciplines.[48] This tendency has been referred to as the "not-invented-here" syndrome.[49] Generalizations about psychologists also may be a barrier to the acceptance of OBM techniques by health care professionals, since such consultants might be perceived as trying to fix the "mentally ill" caregiver. From a physician's or administrator's standpoint, one might even speculate that an OBM consultant might share potentially damaging data with the public.

The patient safety literature often contains rather illustrative case examples of how particular errors led to dramatically adverse events for patients.[3] This emphasis on the case study outcome stands in contrast to the OBM paradigm, which focuses on objective behavioral data gained from several systematic observations of the process. In addition, standards of valid evidence differ between the fields of medicine and OBM. In medicine, the results of randomized, controlled trials from different institutions are considered to be evidence of the highest grade, whereas observational studies within the same institution are viewed as having less validity because they reportedly overestimate treatment effects.[50] Conversely, in OBM research, the multiple-baseline

design,[51] employing nonequivalent controls, is the most frequently used evaluation methodology.

Health Care Organizational Structure

Within the vertical hierarchical structure that tends to be the norm in health care settings, differences in levels of authority contribute to many communication errors.[52] In addition, the hierarchical structure that characterizes interprofessional communication among caregivers can limit valuable interpersonal feedback related to patient safety.[53] In fact, such occupational hierarchies have led to a low frequency of error reporting and corrective action. Practitioners are hesitant to report errors or incidents to senior colleagues because of "cultural taboos" associated with error reporting and the possible detriment to career advancement.[54] Junior practitioners do not want to seem incompetent or offend those in power.[52] Expected and actual negative consequences from error-related communications serve to reduce such reporting and limit learning from mistakes.

The uncertainties of the health care profession have caused physicians to accept risk[55] and to view error as an unavoidable and necessary feature of their work.[56, 57, 58] It has even been argued that errors and mistakes play a necessary role in the learning process of training programs.[59] In contrast, the OBM practitioner does not view an error as an unavoidable accident from which to learn, but rather as an instance of contingencies failing to influence appropriate behavior.

Medical Errors to Target with OBM

Errors Remaining After System Change

It is acknowledged that several types of errors are already being addressed by well-informed system-based changes, but a number of categories of errors persist. These include technical errors during care procedures, failures in communication among caregivers and between provider and patient, contamination errors due to ineffective employee and patient hygiene, and lapses in patient monitoring.

To be of maximum benefit to medical professionals and OBM practitioners, the categories of errors discussed here are based on already established classification methods and priority areas (e.g., Table 1; The 100,000 Lives Campaign[60]). Also, given the aim of proactive measurement and intervention, they are process- rather than outcome-based and include:

- Diagnosis errors, such as using the wrong test, delays in diagnosis, and failing to act as indicated on test results.
- Treatment errors, such as ordering a wrong drug or dosage, accidental puncture or laceration, and incorrectly executing a procedure.
- Monitoring errors, such as bedsores, failure to rescue, and patient falls.
- Infection-control errors, such as failing to wash hands, lack of glove use, and compromising sterile-field maintenance.
- Communication errors, such as failing to inform other caregivers of acute risk, changes in care, and critical hand-off information, as well as ineffective communication with patients.

These intervention targets are not identified as independent of system influences, but rather as activators for specific kinds of OBM intervention. Behavior is a part of the health care system, which can be targeted for change within a supportive or unsupportive culture.

OBM Interventions to Address Medical Errors

Behavioral antecedents, including prompts, pledge cards, and communication strategies, as well as consequences, are the primary types of OBM intervention techniques (for a comprehensive description of available OBM techniques, see Geller et al[61]). The overarching theme of the intervention approach suggested here is to reduce the probability of error by increasing the frequency of safe standards of practice. Several behavioral targets might be relevant for a particular type of medical error, and one target behavior may be related to several categories of error.

Table 2 depicts a framework for classifying OBM interventions and specific behavioral targets for error prevention. As the IOM suggests in *Crossing the Quality Chasm*, "Attention to improving quality includes continuous monitoring, often based on small samples of events that can provide organizations with timely data at the front lines to manage the processes of concern."[62] This is precisely what OBM brings to the domain of patient safety.

System-Change Participation

Much of the patient safety literature calls for improved incident reporting systems that include less focus on finding fault and greater attention to the context in which the error occurred.[2, 3, 63, 64, 65] Adding OBM to this directive could have an immediate positive impact. Winokur and Beauregard[38] offer a checklist for ensuring that investigations of caregiver errors are performed with a process focus, placing emphasis on specific task demands and contextual factors, rather than on the identification of individuals at fault. Anonymous error reporting and group feedback can influence individual behavior without assigning personal blame for poor performance.

Additionally, improved tracking systems include more uniform, reliable, and freely given close-call reporting. A close call is likely to have been previously paired with negative feelings, such as guilt, shame, or fear, thus leading to underreporting of close calls or "near misses." Increasing the quantity and quality of close call reports is a critical behavioral target for OBM. The close call report should be portrayed as an event of success, whereby one or more holes in the system can be fixed and thereby prevent harm to a patient.

The best way to support close-call reporting is to visibly show knowledge gained from the report, which might be a change in the system that prevents similar errors from occurring.[64] In other words, the close call report should be treated as a trophy for patient safety. It offers the kind of feedback needed to develop a corrective action plan, and it suggests a possible target for an OBM intervention.

Table 2. Proposed framework of behaviors to target for error prevention

Patient safety outcome category	Potential behavior targets	Antecedent strategies	Consequence strategies	Relevant literature
Patient-HCW communication error	• Patient-centered communication	• Patient education for increased prompts/questions	• Patient rating feedback	Burroughs et al[66] Larkin et al[67]
HCW-HCW communication error	• Communication of change in status of care	• Prompts on transcription order and patient transfer forms • Appreciative Inquiry training	• Praise • Communication-style feedback	Rotstein et al[45] Shendell-Falik et al[47] Wachter[3]
Diagnosis error	• Complete diagnosis protocol compliance	• Written prompts, checklists, etc.	• Peer observational feedback	Geller[17]
Infection-control error	• Hand washing • "Hands-free" exchanges of sharps • Glove use	• Goal-setting • Prompting • Task-clarification (modeling) • Incentive	• Feedback • Supervisor praise • Reward	Cunningham & Austin[37] Babcock et al[33] Devries et al[34] Watson et al[68] Stephens & Ludwig[35] Mayer et al[40] Sharek et al[41] Randle et al[42]
Decubitus ulcer monitoring error	• Increased checking of inpatients for decubitus ulcers	• Monitoring forms or behavioral checklists	• Decubitus ulcer incidence rate feedback • Supervisor praise	Geller & Johnson[31]
Failure to rescue monitoring error	• Vigilance behaviors	• Prompts for patient checks	• Response time feedback	Geller & Johnson[31]
Surgical treatment error	• Upward communication among team members	• CRM training	• Team perception survey feedback • Peer-to-peer coaching	Geller & Johnson [31] Gordon[69] Salas et al[70]
Technical procedure treatment errors	• Recommended practice compliance	• Written policy statements • Reminders	• Peer-to-peer coaching	Geller[17]
System-change errors	• Adoption of CPOE • Error reporting	• Software user training • Public reminders • Education on use of error reports • Anonymous reporting reminders	• SCF • Technology incentive • Recognition with corrective action • Rewards	Levick et al[39] Cunningham et al[16] Boyce & Geller[29] Force et al[71] Larkin et al[72]

HCW = Health care worker; CRM = Crew resource management; CPOE = Computerized physician order entry; SCF = Social-comparison feedback

Another key target behavior for patient safety is the adoption of emerging technologic innovations. Implementing CPOE is more easily accomplished with hospital-employed caregivers rather than with professionals operating under contract, because more immediate contingencies are available for these individuals. Increasingly intense levels of intervention are needed for individuals resistant to adopting system changes such as CPOE. Incentive and reward strategies have increased this target behavior, but other strategies such as promise card commitments may be more effective in the long term, since this approach tends to be perceived as imposing less external control and promoting self-persuasion.[18, 65]

Social comparison feedback[29] (SCF) is another OBM option for intervening with groups and individuals resistant to adopting system changes. SCF involves providing caregivers with objective data comparing their own use of patient safety devices or methods with that of their peers. It should be most effective for groups with more individualistic and competitive tendencies.

Diagnosis Errors

Diagnosis errors are among the most difficult to address because despite system changes, they remain devastating in terms of their overall high frequency of occurrence and potential to harm patients. Furthermore, diagnosis is mainly the responsibility of physicians. One technique already being used in the training of symptom identification is a behavioral checklist. Following training, the trainer's checklist becomes a mental checklist to direct the behavior of a skilled caregiver.

A variation of the behavioral checklist for training is the behavior-based observation and feedback process, which has dramatically reduced injury rates in numerous industrial applications.[17, 65] This OBM process involves workers in the development of a checklist of critical safety-related behaviors for a particular task. Subsequently, the checklist is used to conduct systematic peer-to-peer behavioral observations, followed by a review of the checklist data.

Both the observer and the person observed learn valuable error-reduction information throughout this peer-to-peer coaching process. Furthermore, the very act of observing another's behavior has been demonstrated to increase the observer's performance of desired behavior.[73] This is a paradigm shift from the "see one, do one, teach one" aphorism[5] to continuous learning.

Treatment Errors

Some types of treatment errors may lend themselves to direct observation and feedback. Many complicated surgical procedures, which are problematic in terms of frequency and severity, provide a clear opportunity for peer-to-peer coaching. Often, observation is already sought for highly complicated cases among surgeons and for hands-on training of caregivers. However, there are no known reports of the regularity with which such strategies are used for more common types of health care procedures performed by experienced caregivers.

Peer-to-peer coaching can also ensure compliance with recommended practices and offer opportunities for corrective feedback. In the context of a patient safety culture looking for

success, this is a learning opportunity rather than an event to be dreaded and avoided. The observation and feedback process also fits with the burgeoning team approach to health care.[66, 67]

Monitoring Errors

Failure-to-rescue errors seem to warrant a call for increased vigilance among all levels of caregivers. This is a highly desirable, yet difficult to attain objective without clear definitions of what behaviors make up "increased vigilance." Geller and Johnson[31] propose using a list of behavior-based expectations to specifically target behaviors linked to a patient safety objective, in this case increased vigilance on the medical unit floor. Once these behaviors are defined, they can be observed and recorded, and once a baseline level of performance is established, they can be targeted for OBM intervention. Continued data collection indicates whether the intervention is effective and should be continued.

Other types of monitoring errors may be addressed adequately by using process-based data for group feedback, which would also compliment a team-based approach. Group data allow for the diffusion of responsibility so individuals do not fear personal consequences from disclosing an error.

Infection Control Errors

Infection errors are best addressed by targeting behaviors, such as hand washing, glove use, sterile operating room entry, and other specific infection control practices (e.g., the Institute for Healthcare Improvement "Ventilator Bundle"[74]). The pinpointed behavior of hand washing is widely linked to infection rates in hospitals. With reported levels of hand washing varying from one institution to another, and self-report being an inflated estimate of compliance with hygiene protocol, OBM is called for at both group and individual levels. While not directly referring to OBM practices, some research reported in medical journals suggests hospitals have been implementing OBM strategies to increase the occurrence of appropriate hygiene behaviors among caregivers.[75]

Communication Errors

Regardless of advances in information technology, medical care will continue to involve direct communication between individuals.[4] Handoff errors are a major type of communication error affected by multiple factors, including staffing shortages and caregiver fatigue. Providing all relevant patient care data to oncoming physicians and nursing staff is an obvious target for OBM. With signs in the locker room or other salient locations, oncoming caregivers might be prompted to ask end-of-shift coworkers about each patient.

Communication errors with the patient may also be addressed with a number of specific behavioral approaches. Patient education is one way to prevent medical errors.[73] When patients know the questions to ask and feel they can effectively communicate with caregivers, they are providing prompts to activate safe health care behaviors. Effective communication between the empowered patient and receptive caregiver not only helps alleviate patient concern about experiencing a negative outcome,[73] it also adds a patient-centered, customized set of cues to

prompt the occurrence of critical safety-related behaviors. Patient rating data gained from discharge surveys may also lead to pinpointing caregiver behaviors in need of OBM intervention.

Conclusion

Much of the patient safety improvement literature calls for moving away from a negative, punishment-governed culture of blame to a more empathic, interdependent, and positive context for discussing and preventing medical errors. However, for optimal patient safety improvement, the culture of health care needs to be modified so caregivers and their patients feel safe reporting and learning from medical mistakes observed or anticipated. OBM can increase and maintain desirable behavior, but it is necessary to define the behaviors that need to be avoided and those that need to be increased.

If medical errors are to be fully understood and adequately addressed, a health care culture of interpersonal trust, success seeking, and positive behavior change is needed. The effective and achievement-focused technology of OBM enables the development of this type of culture within the context of continuous learning and beneficial behavior change.

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