Accountability for Patient Safety:
A Review of Cases, Concepts, and Practices

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- Executive Summary -

The Massachusetts Coalition for the Prevention of Medical Errors has undertaken a project to facilitate dialogue about accountability for patient safety. A review of published research, theory, cases, and practices has been prepared to support this effort. This topic is broad and complex, and the review paper is correspondingly lengthy. This executive summary provides some highlights of that review. The summary includes key concepts, brief descriptions of some alternative approaches to accountability, and a summary of each of the cases presented in the larger paper.

CONCEPTS

Accountability: The expectation that one may be called on to justify one's action, beliefs, and/or feelings to others. Accountability typically triggers rewards for favorable accounts and/or sanctions for unfavorable accounts. This expectation constitutes a relationship between agent (the accountable party) and principal to whom the agent is accountable. Accountability is a means of social control: the principal's power to trigger rewards or sanctions provides the principal the expectation of some degree of control vis-à-vis the agent's actions.

Fundamental Attribution Error: As a rule, people's causal explanations of events tend to over-attribute causality to individuals. Correspondingly, we tend to under-attribute causality to situational factors.

Sharp-end bias or proximal-cause bias: People's causal explanations of events also tend to over-attribute causality to causes that are proximal in time and space. In health care, we are likely to blame the person whose hands were last on the patient, despite the fact that, in complex systems, causes and effects are often distant from one another.

Human Factors: This refers to the science of how humans respond physically and psychologically in relation to particular environments, technologies, and objects (e.g., equipment). In the domain of safety, human factors research has provided insight into the limits of human physical and cognitive capacity and into the way human "wiring" predisposes us to certain kinds of errors.

Culture of Blame: Culture can be defined as shared intangibles such as values, norms, meanings, and behavior patterns. When a culture of blame is present, it is typical for individuals and groups to deal with adverse events by identifying one or more individuals to hold accountable for the event and to seek resolution through sanction and/or retribution involving those individuals. Culture often tells us what makes sense in a particular social setting. In the context of a culture of blame, finger-pointing and buck-passing constitute sensible behavior, and learning from adverse events is difficult because of damning interpretation and use of information about the event.

Psychological Safety: Psychological safety is a shared belief among members of a group or organization that it is safe to take interpersonal risks. In relation to accountability for patient safety, the greater the psychological safety, the more willing people—especially those who are lower in a hierarchy—are to question others, especially those above them in the hierarchy, and to give voice to challenging or disconfirming information. Research has shown that, when leaders create climates of psychological safety, errors are more likely to be reported and groups learn more effectively.

Just Culture: Just culture is one antidote to a culture of blame. Just culture is a shared understanding of how the acceptability of individual behavior is to be determined and how accountability for adverse events is to be assigned and categorized. It values fair, objective, and explicit decision rules for determining accountability and culpability subsequent to an adverse event. The fairness of a just culture stems, in part, from awareness of limitations on human capability, such as human factors.

Cycles of Accountability: Every accountability relationship is affected by a context of accountability relationships in which it is embedded. There is a reciprocal relationship among accountability relationships. For example, the hospital executive's accountabilities to the hospital Board and to regulatory and accreditation agencies affect how that executive attempts to create and maintain accountabilities within the hospital, and the accountabilities of middle managers to that hospital executive affect how those middle managers hold front line staff accountable.

ACCOUNTABILITY IN PRACTICE

Crew Resource Management (CRM): A system of communication and coordination practices for flight crews. The aims of CRM include creation of a communication pattern and climate where it is the captain's job to assure in an ongoing way that all vital tasks are attended to by identified personnel, and it is the crew's job to assure that the captain is fully aware if and when there are indications that operations are abnormal or unsafe.

Threat and Error Management: A model for analysis of adverse events that seeks to determine both training needs and organizational strategies to improve the management of threats to safety. The stages, categories, and questions in this model provide a structure for the analysis that yields a thorough, systems-oriented description of the adverse event, and that determines individual and shared accountabilities in fair and objective ways.

High Reliability Organizations (HRO's): This describes organizations where the risks and consequences of error are high, opportunities to learn through experimentation are limited, and complex processes and technology are used to maintain a high level of safety and reliability in the face of shifting threats to safety. In an HRO, accountability for rule-following is balanced by accountability for maintaining a high degree of situational awareness and for continually attempting to anticipate possible failure. Among HRO's are nuclear power plants, aircraft carriers, and air traffic control units.

Having the Bubble: This expression is an example of the kind of situational awareness that is promoted in a high-reliability organization. Members of a crew or team have the

bubble when they succeed in maintaining in their minds a continually updated representation of the overall activity of the group and monitor progress to know when and how they might intervene to move it forward successfully.

Two Hundred Percent Accountability: This expression of shared accountability reflects the necessity of redundancy and overlap in accountabilities for safety in high-hazard organizations. It goes hand-in-hand with an understanding of human factors and the inevitability of human error.

Stopping the Line: This is an example of empowering front-line people in an organization to take the necessary steps to maintain safety. While the term comes from mass production settings, it has been applied in hospitals, where nurses will close a unit temporarily to new cases when the patient care load in the unit is approaching an unsafe level for the staff present. Holding people accountable for safety is only effective to the extent that they have the capacity (e.g., resources and permission) to do what needs to be done to achieve and maintain safety.

Performance-Based Accountability: In the area of safety, performance-based accountability sets targets or goals and leaves it to the accountable party to set specific criteria for achieving those targets. This approach has been adopted by the U.S. Nuclear Regulatory Commission, based on research demonstrating that accountability for detailed safety standards, rules, and procedures did not achieve the desired results. Operating environments, as well as strengths and weaknesses, vary across facilities. Performance-based accountability supports and prompts facilities to adapt and learn in their own unique situations, and to take advantage of local strengths and resources, while maintaining accountability for system-wide safety performance.

CASES

Three cases presented in the literature review are presented in abbreviated form below. Following the cases is a table summarizing what the cases illustrate and suggest about accountability for safety.

Flight 173: Landing gear failed to extend properly as a commercial jet approached the airport. The Captain led a half-hour-long effort to diagnose and resolve the landing gear problem. During this time, a First Officer tracked fuel supply and reported that they risked running out of fuel before the time the Captain planned to land. The Captain did not sufficiently heed this warning and proceeded with his plan. All four engines stopped when the fuel supply was exhausted; the plane crashed twelve miles short of the airport. While only ten people out of the 181 passengers plus crew were killed, a planned landing without landing gear at the airport would likely have resulted in fewer casualties.

The Wrong Patient: A 67-year-old woman with a head injury was admitted to the hospital for cerebral angiography. A day after that procedure was done, she mistakenly was subjected to an invasive cardiac electrophysiology study. Fortunately, an hour into the procedure, it was determined that she was the incorrect patient, the procedure was terminated, and she was returned to her room in stable condition. Several individuals made errors and

assumptions as to patient identity and location and neglected to positively identify the patient, despite warning signs including the patient's own insistence that there was a mistake.

Death of an Eight-year-old Boy: An eight-year-old boy was in the operating room for elective ear surgery. The anesthesiologist encountered difficulty with the probe that monitors body temperature, ordered a replacement, and neglected to attach either the probe or the stethoscope. When the patient's carbon dioxide concentrations began to rise, the anesthesiologist did not respond because he was dozing in his chair. Nurses chose not to speak to him because they feared a confrontation. By the time the surgeon responded to the boy's increased respiration rate and a disconnected breathing tube was discovered and remedied, it was too late. The boy's heart stopped and he could not be resuscitated.

Summary of Cases

CASE:	*Where was knowledge or information that could have prevented the adverse event?*	*Why was that knowledge not brought to bear on the situation?*	*What accountability problem is illustrated here?*	*How might the organization prevent this in the future?*
Flight 173	1st Officer Mendenhal re: quantity of fuel remaining	1st officer didn't assert; Captain didn't question his own under-standing of the situation	Norms and roles (organizational culture): Too much reliance on individual technical accountability, too little reliance on accountability for communi-cation and coordination	Crew Resource Management (CRM); Leaders accountable for creating & maintaining psychological safety for crew
The Wrong Patient	Floor nurses; medical record; charge nurse	Diffusion of responsibility; Lack of initiative to look beyond immediate task and beyond one's floor/unit to "big picture" of patient safety	Narrow accountability (organizational structure)	Build accountability for situational awareness; Build shared ("200%") accountability; Build collective accountability.
Death of an 8-Year-Old Boy	Anesthesiologist; operating room nurses	Anesthesiologist possibly impaired; OR nurses feared consequences of speaking up	Hierarchy; power relations among professional groups (organizational politics)	Empower front line staff (e.g., "stopping the line"); Leaders accountable for creating & maintaining psychological safety for staff

CONCLUSIONS

Accountability for future safety is distinct from accountability—and blame—for past events. Accountability is both retrospective and prospective. For individuals and organizations to learn from adverse events and near misses and to improve safety in the future, it is important for them to create some separation between those two perspectives.

Adverse event reporting and analysis processes that are anonymous or that are otherwise off limits to internal or external sanction are examples of this separation. Blame, which is often a byproduct of retrospective accountability, inhibits disclosure and learning. The question of who *should be* accountable in the future should be answered in terms of what will most effectively and efficiently assure safety in the future.

Safety in organizations necessitates accountability for social, as well as technical, actions. The aviation and health care cases in this paper illustrate how essential social action, in the form of awareness, communication, and coordination, is to safety in an organizational context. Technical proficiency and effort are not enough. Accountability for safety must include accountability for recognizing and working effectively with the interdependencies that are part of any organization.

Safety in complex, high-hazard organizations, including those delivering health care, requires general, as well as specific accountabilities; and it requires awareness as well as rule-following. As the cases also illustrate, prevention of error and harm requires organization members to maintain awareness of the "big picture" and to act, sometimes beyond the narrow confines of their own specific tasks, in order to maintain safety.

Accountability for safety exists within a cultural and political context. While safety requires social action, such as effective communication and teamwork, in addition to technical action, such as administering the correct medication, no amount of training in communication and teamwork will be effective if the cultural or political context does not support those actions. If the organization remains hierarchical, as it was in the case of the 8-year-old boy described above, if front line staff are not empowered to take the necessary actions to maintain safety, or if tensions across units or professional groups (e.g., nurses and residents) constrain communication, then accountability for safety cannot achieve its potential.

Accountability for safety also exists within a larger system of accountability. Accountability is a relationship that is part of a system of accountability relationships. Any evaluation or change effort must look at individual accountabilities in that context: for example, the nurse's accountabilities are affected by the accountabilities of the nurse manager and others in the hospital leadership, to the hospital board, to regulatory and accrediting agencies, to patients, and to the public.

Individual accountability vs. system accountability is not necessarily an either/or tradeoff; it can be both-and. As study of high-reliability organizations and the case of Flight 232 illustrate, safety is a product of both individual and system accountability. An accountable system is a structure built from individual accountabilities. Collective accountability (as in the case of Westchester Hospital), mutual accountability (as in flight crews), and shared accountability (as in "200% accountability") are all part of an accountable system, and none of them need diminish individual accountability.

INTRODUCTION

The Massachusetts Coalition for the Prevention of Medical Errors has undertaken a project to facilitate dialogue about accountability for patient safety. The dialogue pertains to an important patient safety question: to the extent that health care is delivered in a complex system of interdependent individuals and groups, how is accountability for patient safety best defined and implemented? Who should be accountable for what aspects of safety, and to whom should they be accountable? Behind these questions is the concern that moving toward a systems approach to patient safety risks a dangerous dilution of individual accountability, including increased opportunity for individuals to "blame the system." The purpose of the present literature review is to inform and stimulate the thinking of participants in the dialogue about accountability for patient safety.

Demands for greater patient safety. The Coalition's work is, in part, a response to calls for increased patient safety. Those calls come from politicians, advocates, the media and others who speak on behalf of the health care consumers and the general public. Some have demanded increased accountability on the part of health care providers--both individual and institutional--for patient safety and error prevention.[1-3] Those who advocate for the public interest seek better (e.g., more stringent, quicker, more transparent) means by which to identify, and protect the public from, providers who harm patients. These demands are driven by fear, not only of incompetent providers, but also of providers who may strike an unethical or unsafe balance in their response to efficiency incentives as opposed to safety and quality incentives. The context for this latter fear is the institutionalization of financial incentives, over the past twenty-five years, to reduce unnecessary utilization and to minimize the unit cost of services. The hope expressed by advocates is that increased accountability for quality and safety will assure the right balance between cost pressures and pressures for quality and access.

Individual accountability or system accountability? Medical care traditions that place a heavy emphasis on individual professional accountability have become inadequate and even inappropriate to the complex realities of current health care delivery.[3] A growing body of research supports the experience of many in the health care industry, that the individual closest to the patient in the care process often is not the sole, or even the primary, causal agent in an adverse event.[4-6] This work also has shown that the most effective, efficient, and fair actions that can be taken to prevent recurrence of an adverse event often are "upstream" from that individual with hands on the patient, upstream in the cascade of processes that led to the adverse event. This understanding of patient safety underlies a move toward approaching accountability in system terms and not merely individual terms.

The blame problem. Accountability that is heavily focused on the individual with hands on the patient not only runs the risk of relying on erroneous assumptions about the causes of adverse events, it also interferes with learning from adverse events. Individuals, groups, and organizations need to be able to learn from adverse events in order to improve patient safety. Blaming individuals for unsafe processes or bad outcomes serves to inhibit this learning in several ways. It can create an incentive to cover up or downplay an event or its seriousness, and it can create a climate that triggers defensiveness rather than supporting

learning. Blaming individuals also can shift attention away from a systems perspective that holds groups and organizations, as well as individuals, accountable. An excessive focus on individual blame is thus counterproductive as well as ineffective in its assumptions about causality.

The accountability debate. While individual accountability and blame may constrain learning and improvement, a move toward system approaches to safety and toward shared accountability runs the risk of diluting individual accountability in potentially harmful ways. It runs the risk of legitimating "blaming the system." Medical educators and others are concerned that the opportunity to blame the system may reduce practitioners' motivation to learn from error.[7] Therefore, the challenge to be addressed by this paper is: How can health care organizations and systems create and maintain accountabilities for patient safety that (1) enable and motivate the highest individual performance; (2) do not contribute to unnecessary and counterproductive blaming for adverse events; and (3) are consistent with a systems approach to safety improvement? A closely related question is: how can shared and collective accountability be built without constraining or de-motivating individual performance? Observers of the patient safety movement have asserted that differing assumptions about the effects of accountability relationships underlie most of the debates about how to change systems to improve patient safety.[8]

Even before health care began to experience these issues so acutely, other industries and organizations had begun to face similar issues. In particular, health care has begun to learn about safety work from the aviation industry. The military, aircraft carriers, and nuclear power plants also offer valuable lessons for health care. This paper will use cases and research from these other types of organizations as well as from health care to present some ideas and learning that may be brought to bear on these questions. The outline of the paper is as follows:

- A closer look at the concept of accountability
- Human factors and limits on the reasonable accountability of an individual
- What underlies a bias toward individual accountability and a culture of blame
- Just culture and a fair approach to individual accountability
- Sharing accountability up and down the hierarchy; sharing accountability laterally with peers and others
- How aviation and other fields minimize the drawbacks of shared accountability
- Accountability and real-time organizational learning
- Collective accountability
- Accountability as a system

WHAT IS ACCOUNTABILITY?

Accountability has many definitions. We first present some definitions from authors whose work is particularly relevant to this paper, and then we explore the dimensions of accountability suggested by these definitions. Accountability is:

- Particular, concentrated responsibility of the individual for performance in keeping with expectations of the individual's role (Jaques[9]);

- Procedures and processes by which one party provides a justification and is held responsible for its actions by another party that has an interest in those actions (Emmanuel[1]);
- Implicit or explicit expectation that one may be called on to justify one's beliefs, feelings, and actions to others; accountability typically triggers rewards for favorable accounts and/or sanctions for unfavorable accounts (Tetlock[10]).

Accountability is a relationship between Principal and Agent. An accountability relationship exists between a party taking the role of accountable *agent* (e.g., an independent professional, an employee, or a public servant) and a party taking the role of *principal* to whom the agent is accountable (e.g., a client or patient, an employer, a regulatory agency, or the public).

Accountability consists of account and control. From the definitions quoted above, it can be inferred that accountability has two fundamental elements: (1) the agent's obligation to provide the principal with an account that explains and/or justifies what has or has not occurred; and (2) control exerted by the principal vis-à-vis the agent, in the form of desirable consequences for favorable accounts and/or undesirable consequences for unfavorable accounts. A health care worker who catches an error-in-the-making that has been missed by others can provide an account that may lead to a reinforcing form of control such as a favorable mention in an employee newsletter; a health care worker whose failure to properly disinfect a piece of equipment was attributable to his beginning his shift drunk is the subject of an account that will likely lead to a sanctioning form of control such as dismissal.

Accountability is both retrospective and prospective. "Calling the agent to account" is accountability in its retrospective form. When something has gone wrong or right, principals look for responsible agents to sanction or reward and they and agents look for ways to either prevent or encourage recurrence of the event. Retrospective accountability receives the clearest emphasis in Emmanuel's and Tetlock's definitions above. On the other hand, accountability is prospective when principals seek to establish agents' accountabilities for future action. Prospective accountability is clearest in Jaques' definition above. The same accountability relationship may manifest in both its prospective and retrospective forms: the pharmacy director establishes the pharmacy assistant's dispensing accountabilities when the assistant is hired, and that director asks for an account of the incident after there is an apparent dispensing error.

Discussions of accountability frequently confuse retrospective with prospective accountability, yet these are different frames of reference with different influences on the thoughts and feelings of the parties to an accountability relationship. When we seek to establish accountability for safety retrospectively, we are in the historical, journalistic or legalistic mode of attempting to determine "who did it." When we seek to establish accountability for safety prospectively, we have the opportunity to adopt the perspectives of inquiry and prevention, attempting to determine "who is in the best position to prevent it next time," which is not necessarily the same as "who did it." Often, there are multiple "true" stories as to how an event occurred and who was responsible. There might be a "sharp-end" story focused on the individual with hands on the patient and a "blunt-end" story focused on systems. Those responsible for safety innovation and improvement need to be free from the retrospective focus of what "should have been" according to the rules

and roles of the existing organization in order to adopt a prospective focus on "what could be" in the improved organization of tomorrow or next year. Active effort to imagine future failure is one attribute of high reliability organizations.[11] This is one of the reasons why adverse event reporting systems such as the Veterans Healthcare System's Patient Safety Reporting System are careful to separate safety learning processes from employee sanction processes.[12]

HUMAN FACTORS: LIMITS TO INDIVIDUAL ACCOUNTABILITY

Individual Accountability on Flight 173. Helmreich and others have observed many similarities between the work of physicians and that of airline pilots.[5, 13] In each field, a single individual can bear enormous responsibility—and accountability—for human safety. In each field, professional standards and norms are built and maintained in order to assure the highest competence and dedication on the part of the individual professional. Each profession has a culture of invulnerability that has the unfortunate side effect of blinding the professional to the potential for error.

As the following case illustrates, even the "pilot's pilot" has his or her limits. Pilot and crew are interdependent, and in this case we see how failure to acknowledge and act on this interdependence through effective, timely communication led to disaster. This case has been used in Kaiser system safety education programs for physicians.[i]

> United Airlines flight 173, with 181 passengers, was flying from Denver to Portland on a December night in 1978. The captain of the DC-8 was Malburn McBroom, a highly respected and experienced pilot with nearly 28,000 hours, over 5,000 of those hours captaining DC-8's. All seemed well as the flight approached Portland with clear weather and plenty of reserve fuel. First Officer Roderick Beebe, at the controls, requested extension of landing gear. What followed, instead of the usual sounds of landing gear extending, were some thumping sounds and shudders of the aircraft that both crew and experienced passengers reported as very unusual. Indicator lights showed the nose gear extended correctly but the main gear neither "down and locked" nor "in transit."
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> During the next thirty minutes, the Captain and crew were preoccupied with diagnosing and resolving the landing gear problem. First Officer Forrest Mendenhal checked the visual indicators in the main cabin, which appeared to show that the landing gear was in fact in landing position, although he expressed some uncertainty. Eventually, through contact with United ground maintenance personnel, it was ascertained that the gear was almost certainly ready for landing despite the reading from the indicator lights. The captain and crew then engaged in contingency planning for an emergency landing, given the remaining possibility that the gear was not functioning correctly. This included preparing the passengers for a possible emergency exit. The captain told the first officer he wanted to give the flight attendants plenty of time for this.
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> During the half hour of dealing with the landing gear, First Officer Beebe, still at the controls, asked Mendenhal what the remaining fuel was. Mendenhal reported 5,000

pounds. Captain McBroom said that he expected to land in about fifteen minutes. Mendenhal was heard to say to himself, "Not enough! 15 minutes is going to really run us low on fuel here." Captain McBroom soon asked Mendenhal to radio the airport to let them know that they would be landing with about 4,000 pounds of fuel left after landing. The captain's statement indicated that he was unaware of the fuel situation, as the aircraft would consume far more than 1,000 (5,000 – 4,000) pounds of fuel in fifteen minutes of flight and landing.

Captain McBroom then asked Mendenhal to go to the cabin to check on the passengers, resulting in Mendenhal being absent for the flight deck for the next four minutes. McBroom and Beebe continued to plan the landing and McBroom reiterated his plan to take plenty of time. First Officer Beebe radioed the airport to prepare for a possible crash landing and the flight turned south from the airport for a final loop. Beebe reported that they would land in approximately five minutes. Mendenhal to the flight deck returned and told Captain McBroom that the fuel was now down to 3,000 pounds. Captain McBroom told the airport they would begin their descent in "another three, four, five minutes."

While Captain McBroom talked with the senior flight attendant about preparing the passengers for landing, Beebe at the controls told Mendenhal "I think you just lost [engine] number four, better get some [fuel] crossfeeds open there or something." As the flight attendant was leaving, Beebe said "We're going to lose an engine!" to which McBroom replied "Why?". Beebe replied, "Fuel!" This strongly suggests that the captain still was not fully aware of the severity of the fuel situation. Mendenhal's efforts led to engine four restarting, but fuel was now down to 1,000 pounds with one tank empty. Within a few minutes, still twelve miles from the airport, all four engines had gone out. Flight 173 crashed six miles short of the runway in a wooded suburb. 156 of the passengers were able to escape with only minor injuries. Ten occupants were killed including Mendenhal and the senior flight attendant. [ii]

Investigation found, in essence, that the captain and crew had all performed consistent with then-current standards. The investigation and resolution of the landing gear problem and the preparations for a possible emergency landing were appropriate. The fuel in the tanks upon takeoff was supposed to be enough for a reserve capacity equal to an extra hour of flight beyond the scheduled route, and fuel consumption during the flight had been normal. Yet, there was a catastrophic failure in communication where, despite crew members' awareness of insufficient fuel and their attempts to communicate this, the captain remained less than sufficiently aware.

Human factors research has found that the individual human, no matter how competent and diligent, has limited information-processing capability and cannot be relied upon to attend adequately to all important data in a crisis such as this.[14, 15] In other words, no amount of accountability and training focused on the captain's knowledge and skill alone would assure that flight captains don't miss some crucial data. The central point of the case, for the purposes of this paper, is that individual accountability for diligent and competent performance is necessary but not sufficient for the safe performance of a complex organization. The important lesson for health care is that, just as the most highly skilled and motivated of flight captains is subject to human limitations and is reliant on the coordinated

work of her or his crew to negotiate a difficult incident safely, so are the best of physicians, nurses, and other professionals subject to similar limitations and reliant on the coordinated efforts of a health care team. This insight highlights the importance of putting bounds on medicine's culture of perfection.

ROOTS OF MEDICINE'S BIAS TOWARD INDIVIDUAL ACCOUNTABILITY AND ITS CULTURE OF BLAME

In medical care, a culture of blame exists as a kind of shadow side to the longstanding culture of perfection.[3, 6, 16, 17] Medical and nursing training, each in its own way, promote the ideal of error-free individual practice stemming from accumulated knowledge and expertise. To the extent that quality performance is equated with error-free performance, professional status is inversely related to error rates, and there is a strong incentive to hide or downplay one's own errors and to shift the finger of blame toward others. Through the lens of this culture, patient safety is best achieved by holding individual health professionals accountable. The following sections argue that health care's culture of blame is rooted in more than a simple misunderstanding of the etiology of adverse patient care events: it springs both from the broader U.S. culture and from fundamental biases in human cognition.

Cultural roots. Regardless of how we handle adverse events in practice, many of us experience it as "natural" to wish to identify, blame, and punish a perpetrator when harm is experienced. A number of cultural and psychological factors further lead us to focus this blame on individuals rather than groups. First, U.S. culture is very high in individualism rather than collectivism. We share a bias toward holding individuals, rather than groups, accountable.[18] Second, our culture is universalistic: we prefer to judge behavior on universal standards rather than on the particulars of situations, which further fuels our preference for individual accountability.[19] The American mythology of individual responsibility can create a particularly sharp dilemma for professionals in high-risk occupations such as health care: we value a heroic, risk-taking, "can-do" attitude; yet we are quick to say "gotcha" and hold the individual accountable when things go wrong.[20] State licensing laws, such as nursing practice acts, tend to reflect and reinforce this emphasis on individual accountability.

Psychological origins. A predisposition to blame individuals also is consistent with the well-documented psychological phenomenon of the fundamental attribution error: as a rule, people tend to over-attribute causality to individuals and correspondingly to under-attribute causality to situational factors.[21] Another form of attribution error that hinders problem-solving in complex systems is the human bias toward causes that are proximal in time and space: in health care, we are likely to blame the person whose hands were last on the patient, despite the fact that, in complex systems, causes and effects are often distant in time and space.[22] This phenomenon is often referred to as a sharp-end focus or bias.[23] A third form of bias is a pragmatic relative of proximal cause or sharp-end bias: once we have in mind a set of possible causes for an adverse event, we tend to single out that causal element that appears most amenable to control.[24] Thus, our assignment of responsibility, blame, or accountability is often driven by our pragmatic interest in identifying the person or persons most easily within reach and subject to our influence.

Blame discourages learning. Both the fear of blame and the actual experience of blame tend to work against individual and system learning. Sanction, embarrassment, or other adverse consequences of blame serve behavioral deterrents to disclosure of errors and problems. In addition, negative emotions such as fear and embarrassment prompt a defensive, fight-or-flight stance toward interactions related to events that trigger those emotions.[25, 26] The more defensive an individual is feeling about an event, the less able that individual is to engage in creative, thorough and well-reasoned individual thinking or conversation with others about the event. Instead, the fearful and defensive individual who is a target of blame is likely either to remain silent and avoid the topic, or to jump to conclusions without a thorough process of search and reasoning.

Blame discourages cooperation. In a complex system, successful operation in general, and safety improvement in particular, require ongoing cooperation among subsystems and among individuals. Blame contributes to perceptions of conflicting interests among the parties exchanging blame, which in turn is likely to move them to a more competitive and less cooperative and collaborative stance towards each other.[27, 28]

Distinguishing accountability from blame. An important step toward building accountability with minimal amounts of the unnecessary and counterproductive side effects of blame is building awareness of the differences between accountability and blame. Marilyn Paul writes, "Accountability emphasizes keeping agreements and performing jobs in a respectful atmosphere; blaming is a more emotional process that discredits the blamed."[29] Because accountability places responsibility in the context of social systems, an accountability perspective invites a system level of problem analysis, whereas a blame perspective tends to keep the analysis more focused on individuals. Because accountability is about responsibility "in general" and not only for a particular event, the accountability perspective prompts attention to the problem and to the question of how to improve performance, whereas the blame perspective is more likely to focus on the person and on punishment. Overall, then, a conscious effort to take an accountability perspective rather than a blame perspective facilitates a shift from the defensive, anti-learning consequences of blame toward a more open, pro-learning response to adverse events.[29]

JUST CULTURE AND A FAIR APPROACH TO INDIVIDUAL ACCOUNTABILITY

James Reason, David Marx, and others have put forth the concept of a *just* organizational culture as one way to put in practice our understanding of human factors and cultural biases by placing bounds on individual accountability. In the context of safety culture, a just culture is a shared understanding of how the acceptability of individual behavior is to be determined [30] and how accountability for adverse events is to be assigned and categorized.[31]

Marx defines a just culture as one that distinguishes among four categories of action: human error, negligence, recklessness, and intentional rule violation. An understanding of the actor's intention is central to the application of these categories. *Human error* is action that differs from what should have been done. Human error is the term that is often applied to wrong actions resulting from known limits on human capacities and therefore not worthy of sanction. *Negligence* differs from human error in that the actor fails to exercise the expected care and the actor should have been aware of the risk. In the just culture model, negligence

is not the result of conscious disregard or ill intent and is therefore also not worthy of sanction. The just culture model reserves sanction primarily for *recklessness* (conscious disregard of substantial and unjustifiable risk) and *intentional rule violation*.[31][iii]

As an illustration of just culture, Reason cites the common practice of applying a "substitution test" in determining whether disciplinary action is warranted. The substitution test asks whether another individual with comparable qualifications, training and experience would have done the same.[30] A just culture complements an error-reporting culture—and thereby supports system-level learning—by building trust that any disciplinary consequences of involvement with adverse events will be invoked with care and fairness.

Threat and Error Management. Robert Helmreich and colleagues have developed a Threat and Error Management (TEM) model for analysis of adverse events. TEM seeks to determine both training needs and organizational strategies to improve the management of threats to safety.[32] A TEM analysis of an event includes identification and categorization of factors such as expected and unexpected external events, many categories of crew errors, and crew actions such as error detection and response behaviors. The stages, categories, and questions in the TEM model provide a structure for the analysis that yields a thorough, systems-oriented description of the adverse event. The particular relevance of this model to the topic at hand is that it puts individual accountability in the context of an explicit system.

Some airlines are now putting the TEM model into practice in their investigation of adverse events. Following an adverse event, such as a near miss, a pilot has the option of filing a confidential report that exempts the pilot from sanctions except in cases of recklessness. A trio of experts representing different stakeholders and carrying different professional perspectives constitutes the Event Review Team. Typically, the experts are the airline safety director, an FAA (Federal Aviation Administration) representative, and a representative of the pilots' union. Given the opposing interests and perspectives, the team's process can be contentious. One study suggests that the Event Review Team program owes its success in balancing divergent views to the professionalism, learning orientation, and pragmatism of the team members and to their commitment to the team process.[33]

Once the Event Review Team agrees on a list of root causes for the event, its first order of business is to determine whether it is sufficiently safe for this pilot and/or crew to continue flying. The second question is what training intervention, if any, should be made with this pilot and/or crew. Finally, the committee must determine whether to recommend any system improvements or training in order to reduce the likelihood that this event will occur in the future with a different pilot or crew. When the group is reviewing the event, the easy route is to blame individuals; using the threat-and-error model forces the group to consider the actual context of the event in all its complexity. In order to further focus the group on the specifics of the event and on the context, the pilot's record (e.g., history of prior safety events) is not disclosed to the committee. There is a separate process for identifying and dealing with "repeat offenders."[iv]

Accountability double binds. Palmer, Smith, and Emmanuel describe some of the double binds created by ineffective systems of accountability.[8] One of these is the authority-responsibility double bind, where the accountable agent is subject to sanctions for bad outcomes but lacks sufficient authority to influence those outcomes. Particularly when resources are scarce,

organizations sometimes create accountabilities without granting the power and resources to carry out those accountabilities successfully, or professionals (e.g., nurses) find themselves implicitly or explicitly held accountable for actions beyond the scope of their license.[34] Hence the rubric, closely related to just culture, that accountability should match authority. In a just culture, when an individual has every intention of following established practice, but is prevented by a work context that makes this impossible or unreasonable, those who are in a position to change that context are held accountable.

Some health care organizations have addressed this dilemma by moving authority "down" the hierarchy to empower accountable staff to do what is needed to maintain safety. For example, Luther Midelfort Hospital in Wisconsin is among a growing number of facilities that empower nursing staff to "shut down the line" by putting a hold on new cases in bed units and diagnostic units when patient volume exceeds safe levels. Units throughout the facility use a "traffic light" system to signal to the rest of the facility their current volume relative to capacity. Contrary to what one might expect, the resulting increased capacity of the system to pace the flow of patients led to an increase in the percent of "green light" time overall.[35]

SHARING ACCOUNTABILITY UP AND DOWN THE HIERARCHY

Crew Resource Management. In addition to supporting fairer determinations of individual accountability, insights from research into the limits of human cognition have supported a move toward more shared forms of accountability. As a result of Flight 173 (see above) and other aviation disasters with similar patterns of missed information, the aviation industry supported the development and adoption of Crew Resource Management (CRM). The essence of CRM is creation of a communication pattern and climate where it is the captain's job to assure in an ongoing way that all vital tasks are attended to by identified personnel, and it is the crew's job to assure that the captain is fully aware if and when there are indications that operations are abnormal or unsafe. Captain and crew constitute an interdependent system with defined roles, coordination, and accountability that is both shared and mutual. CRM practices include: communicating known threats to safety, asking questions, speaking up, challenging others, and providing clear and timely communication of operating plans to all.

The stories of Flight 173 and the development of CRM are about dealing with the limits of individual human capacity by organizing in ways that promote enactment of reciprocal (two-way) interdependence among leader and group members. This interdependence was observed by Hackman in his study of flight crews: fatigued flight crews with experience working together actually made fewer errors than fresh crews without experience working together because members of the crew with experience working as a team were willing and able to catch each other's mistakes before it was too late and compensate for them (cited by Edmondson.[36])

Hierarchy Can Constrain Safety Performance. The process of building shared accountability in a health care organization can encounter obstacles in the hierarchical nature and structure of relationships among health care professionals. Helmreich describes a case in point:

> *The case of the eight-year-old boy:* An eight-year-old boy, in the operating room for elective ear surgery, had been anaesthetized and the endotracheal tube (with internal stethoscope and temperature probe) had been inserted. The anesthesiologist noticed that the temperature probe was incompatible with the monitor due to a recent change in supplies; he called for another probe but neglected to connect it and did not connect the stethoscope. The patient's carbon dioxide concentrations began to rise after thirty minutes, but the anesthesiologist did not respond. Nurses were aware that the anesthesiologist was dozing in his chair, head nodding, but later reported that they chose not to speak to him because they feared a confrontation. The patient's breathing rate rose to the point where the surgeon had to stop operating; the surgeon found that the airway tube was disconnected and reported this to the anesthesiologist. The anesthesiologist reconnected the tube without using the stethoscope to check the breathing sounds. The patient's respiration continued to deteriorate, his heartbeat became irregular and stopped, and a code was called. The endotracheal tube was removed and found to be blocked by a mucous plug. Despite resuscitation efforts, the boy died on the operating table. [5]

While the proximal cause of this tragedy was gross negligence on the part of the anesthesiologist, several opportunities for potential intervention by others went unrealized. In particular, the nurses were aware that the anesthesiologist was not responding adequately to the emerging problems, but they chose to allow the risk to the patient to continue rather than risking the consequences of questioning or challenging the anesthesiologist. The surgeon also failed to take as active a role as he might have, in responding to the patient's distress, due to his reluctance to step onto the anesthesiologist's turf. In addition, this particular case was not the first incident where nurses had observed substandard performance on the part of this anesthesiologist, yet for similar reasons of not wanting to challenge his authority, the earlier incidents had gone unreported.

Medicine's culture of perfection and its orientation to individual performance create an environment where it is difficult to question the actions and competencies of professionals, particularly when the questioning is "up" the hierarchy, e.g. nurses questioning physicians. In a setting where relations among professionals are friendly and collegial, this resistance is a matter of mutual face-saving, of not wanting to cause embarrassment. In a setting with less collegial relations, the resistance is a matter of avoiding conflict and retribution. Particularly when there is an accountability relationship between those aware of a potential problem (e.g., nurses) and those in a position to take action (e.g., physicians), those lower in the hierarchy typically are reluctant to disclose information that could be key to individual and organizational learning.[37] Crew Resource Management (CRM) and other team leadership strategies in high reliability organizations (see below) deal with this hierarchical communication constraint head-on by explicitly encouraging those lower in the hierarchy to respectfully and constructively challenge those above them.[11] The leader is responsible for creating a climate of psychological safety where feedback up the hierarchy is both appreciated and not punished.[38] Explicit accountability for raising questions and concerns and for delivering "bad news" about system performance and near misses is intended to counter people's implicit understanding that this type of communication up the hierarchy is unwelcome.

Hierarchy and Delegation: Specific vs. General Accountabilities. Hierarchical constraints on individuals taking responsibility for safety are also lessened to the extent that individuals on the front lines are empowered—and given the resources—to make decisions and take action in the interests of safety without having to go up the chain of command. The capacity of nurses to "stop the line", cited above, is an example of this.

A system view of patient safety—such as Reason's "Swiss cheese" view, described below—coupled with an understanding of the complexities and uncertainties inherent in much health care delivery, leads to an additional insight about the nature or direction of safety activity. Accountability for practices to prevent adverse "downstream" consequences of acts and omissions can be specified or spelled out in detail only to a certain extent. Eventually, the variability and unpredictability of situations, actions, and results render specification of practices impractical or impossible. Therefore, delegation of safety responsibility in the form of protocols, menus, and checklists, while important and helpful, is unlikely to achieve the full desired result. Individuals on the front line also must have the necessary awareness, resources, and authority to take some degree of initiative in the face of unforeseen developments.

How patient safety accountability is delegated also affects level of effort. Research on accountability has shown that, from the perspective of individual motivation, closely specified accountabilities, in general, tend to be less effective than more broad or general accountabilities. The more specific the accountabilities, the less engaged people are likely to be in their work.[39] Accountability is more likely to lead to favorable work performance if the individual is accountable to a party who is considered legitimate and well-informed, but whose specific views on what constitutes favorable performance are unknown.[10] The more specific the accountabilities, the greater the accountable person's focus on compliance, whereas when accountabilities are nonspecific, the accountable person is likely to respond to the work situation in more learning-oriented ways, such as taking multiple perspectives and engaging in self-criticism. For example, if someone is accountable only for very specific results such as counting sponges before and after surgery, that individual may not respond appropriately to situational variations where delivering those results doesn't accomplish the greater goal of preventing harm to a patient.

Specific vs. General Accountabilities in the Nuclear Power Industry. The U.S. nuclear power industry and the Nuclear Regulatory Commission have experienced the tension between a need for specific safety accountabilities, and a need for facilities to learn from experience, build on strengths, and adapt to local and changing conditions. During the last six years, the NRC has taken a "performance-based" and "risk-informed" approach to regulation. This is replacing the agency's customary deterministic mode of regulation that prescribes processes and criteria in detail up front and then measures compliance. In the area of safety, performance-based regulation sets targets or goals and leaves it to the licensee to set specific criteria for facilities, equipment, and operations for. The risk-informed aspect of the regulatory process is its increased emphasis on explicit, quantifiable assessment of public safety and other risks.[40, 41] In a similar vein, the federal government's experience with regulation of nuclear waste disposal, in particular the Yucca Mountain disposal facility, has provided a lesson that the uncertainties of the undertaking preclude prescribing what constitutes safe design and operation: as with performance-based regulation, the process needs to incorporate ongoing learning. In addition, the political and social turmoil

surrounding this issue illustrate the fact that what constitutes risk and safety is ultimately a matter of social, and not only technical, judgment.[42, 43]

Professional vs. Hierarchical Accountability. In her work on military and other public sector accountability, Romzek makes a distinction between professional and hierarchical accountability that builds on this general-vs.-specific categorization.[20, 44] In her model, *hierarchical accountability* is explicit and rule-based. The locus of decision making involving judgment is with the superior; any decision making by the subordinate is based on explicit rules or protocols. In the case of *professional accountability*, the locus of judgment is with the accountable professional. While the professional is accountable for following rules, the professional exercises discretion, e.g., in determining which rules apply to a given situation. Superiors and others in the organization are likely to defer to the professional's judgment. When there is lack of clarity or agreement about the extent to which people are professionally as opposed to hierarchically accountable, there can be adverse consequences both for safety and for fair treatment of organization members.[20] Romzek and Dubnick illustrate the importance of this issue in their analysis of the space shuttle Challenger disaster: they assert that, had professional accountability been less outweighed by hierarchical accountability, the engineers' warnings about defective O-rings would have been given more weight in the decision process.[44]

SHARING ACCOUNTABILITY AMONG PEERS AND ACROSS SUBSYSTEMS

The preceding section focused primarily on the "vertical" dimension in an organization: up and down the hierarchy. This next section looks at accountability issues on a "horizontal" plane, as shared among peers and across units and subsystems.

Narrow Accountability vs. Teamwork and the Case of The Wrong Patient[45]: One factor that limits the applicability of Crew Resource Management practices (described above) to health care is that the organization of a flight crew assumes the active presence of a single leader responsible for the overall operation. Health care delivery provides an additional challenge: the patient moves among interdependent subsystems—e.g., from outpatient office to testing unit to inpatient ward to surgery—rarely with the luxury of a single "captain" overseeing the full process. The following case illustrates the potential consequences of the sequential nature of health care, where the handoff process between subsystems is central to patient safety.

A 67-year-old woman with a head injury was admitted to the hospital for cerebral angiography. A day after that procedure was done, she mistakenly was subjected to an invasive cardiac electrophysiology study. Fortunately, an hour into the procedure, it was determined that she was the incorrect patient, the procedure was terminated, and she was returned to her room in stable condition.

How do we determine accountability for this error? How could it have been prevented? There were many errors and many missed opportunities along the way:

- EP lab calls the right patient's floor looking for a 77-year-old woman scheduled for EP studies; a nurse states incorrectly that she is on another floor;

- The nurse on the other floor says the patient is there when in fact another patient with a similar name—the 67-year-old woman with the head injury—is there;
- The nurse on that other floor transports the wrong patient to the EP lab despite the lack of written or verbal order for the procedure to be done on that patient;
- When the patient objects, she is ultimately allowed to speak with the ordering physician by phone; the physician does not realize he is speaking with the wrong patient and, furthermore, states that she has given her verbal consent for the EP study, which she has not;
- A fellow finds no written consent and succeeds in gaining the patient's signature for "EP study w/possible ICD and possible PM placement";
- The resident who had been caring for the patient finds that she has been taken to the EP lab; however, when the EP lab tells him she had been scheduled there, he assumes the attending had ordered the study and he dropped his questioning;
- The EP lab charge nurse notes a discrepancy in patient names but chooses not to interrupt the procedure because it was at a delicate juncture.

This illustrates James Reason's "Swiss cheese" notion of latent system vulnerability, where the holes in an organization's layers of protection against failure occasionally line up and allow a problem to slip all the way through the potential points of intervention, and the potential for failure is realized.[30] The evidence suggests that a number of individuals in direct contact with the patient acted carelessly and most likely failed to follow hospital procedures for informed consent and patient identification. The report also identifies a few individuals who were in a position to intervene but who either chose not to do so or did not persist sufficiently for their efforts to succeed. Undoubtedly, there were yet others in the patient care process who were in a position to notice a potential error in the making.

The nature of the failure in this case is different from Flight 173, where human factors and the limits on individual capacity necessitated a different model of communication and coordination. The individual action that might have prevented harm here, in the case of the wrong patient, was in the realm of ordinary, everyday action, and not heroics. The reason for considering a broadening of individual accountability here is not to develop interdependencies in order to compensate for human limitations; it is instead to respond to existing system interdependencies by assuring that they are known and adequately attended to. For example, when people are held accountable for maintaining awareness of the potential "downstream" consequences of their acts and omissions, the "Swiss cheese" form of organizational vulnerability to failure is lessened.[30]

Accountability for awareness vs. rule-following. A key word in the preceding statement is "awareness," which can be contrasted with rule-following. The complex nature of most health care limits the absolute predictability of processes. Therefore, accountabilities that are specified, e.g., protocols and rules, cannot contemplate a sufficiently high proportion of possible chains of events. It follows that health care personnel must be accountable for maintaining a quality and continuity of awareness of the care process and awareness of interdependencies among subsystems if they are to catch potential failures before they are realized. Scholars of high-reliability organizations (HROs) offer some insight on the topic of accountability for maintaining organizational awareness. In HROs, such as nuclear power plants, aircraft carriers and air traffic control systems, are defined as organizations where the

risks and consequences of error are high, opportunities to learn through experimentation are limited, and complex processes and technology are used to maintain safety and reliability in the face of shifting vulnerabilities.[11] While most health care settings do not fall completely into the domain of HROs, the nature of health care delivery as a complex, uncertain, and high-stakes undertaking gives it many similarities.

In one manifestation of situational awareness, members of effective HROs engage in a process of "heedful interrelating." For example, members of a crew or team maintain in their minds a continually updated representation of the overall activity of the group and monitor progress to know when and how they might intervene to move it forward successfully.[46] Maintaining this awareness is sometimes referred to as "having the bubble".[47] Accountabilities in HRO's are oriented to process rather than to outcomes. Members are accountable, not only for carrying out certain actions (performance processes), but for their ongoing attention, thought, and inquiry (cognitive processes). Even within this domain of cognitive process, accountability is often stronger for inquiry and interpretation than for decisions and actions: in an HRO context, failure to maintain situational awareness and failure to actively interpret emerging events is at least as blameworthy as failure to make the right decision or take the correct action. [11]

Mutual accountability. The accountability that CRM builds between captain and crew is, in terms of hierarchy and organizational chart, a vertical form of accountability: principal and agent are above and below each other in the hierarchy. By contrast, accountability in the context of teamwork and heedful interrelating in a HRO is a more horizontal form of accountability: principal and agent are peers. It is a reciprocal accountability: I'll keep an eye on how you're doing and you'll keep an eye on how I'm doing. One important dimension of accountability, therefore, is this horizontal, peer-to-peer accountability. Variation on the horizontal dimension includes both how far in organizational space (e.g., across subdivisions) that accountability goes from the person with hands on the patient in the present moment, and the extent to which that accountability is structured as mutual. William Corcoran, consultant to nuclear power and chemical industries, uses the expression "two hundred percent accountability" to highlight the fact that, in cases of mutual accountability, such as the patient handoff process that failed in the Wrong Patient case above, each party to the handoff is fully accountable for a safe handoff.

Research on negotiation has found a positive association among shared identity, mutual accountability, and cooperation rather than competition.[48] This is consistent with the model of accountability that is developed in the military, with its "all for one and one for all" culture. When new recruits and cadets are in training, the entire group is often held accountable for the error of an individual, and individuals are also made very aware of the consequences of their errors for the group. Accountability is clearly mutual. The military attempts to perpetuate a culture that, while demanding the highest possible individual performance, also stresses and values acknowledgement of individual human limitations. There is an effort to minimize the shame associated with saying, "I am not equipped to carry out this responsibility successfully", thereby avoiding the situation where the individual puts her or his fellow group members or subordinates in harm's way.[49] This is in marked contrast to the traditional culture of perfection in the health care professions, particularly among physicians, where up-front acknowledgement of one's own limitations is not valued.

Scope of shared and mutual accountability: microsystems, shells, and leadership. When we conceive of accountability in collective and mutual terms, we open up a broad field of potential accountability for the individual—in terms of both *what* one is accountable for and *to whom* one is accountable. However, human factors research and the work on just cultures remind us of the importance of bounding that field. Ideally, one might draw lines around collectivities of individuals, subsystems, and processes, in order to define the situational field that a given individual is accountable for monitoring. However, health care is increasingly delivered by microsystems or teams [50] which, particularly in larger settings such as hospitals, are composed of shifting casts of individuals. The situational field that determines the bounds of shared and mutual accountability is thus likely to consist of regularly shifting microsystems.

While there is evidence that effectively functioning teams and microsystems are associated with higher quality care[36, 50], health care organizations have had mixed success developing effective teams, due to incomplete physician participation, lack of communication, and lack of support from the broader organizational environment. Shortell, O'Brien and Carman (1995) found that a group-oriented health care organization culture that emphasizes affiliation, teamwork, coordination and participation is associated with more effective implementation of quality-improvement practices.

Organizations exhibit a phenomenon of predetermined and/or expected sets of interactions among individuals and subsystems; these interaction patterns have been called "organizational shells."[51] Shells are not elements of the formal organization in the way that units or teams are, and they are not ad hoc structures in the way that microsystems are. Shells are more cognitive than structural: they are templates that might include roles, relationships, norms, and/or shared routines that come together around a particular type of task, project, or situation. For example, ER staff, lab, and radiology might maintain organizational shells that inform their shared handling of trauma cases. While the specific individuals and subsystems to which the templates apply are regularly shifting, the cognitive and behavioral framework remains consistent. However, the simplicity and predictability afforded by the shell can also be its weakness: as with any routine or mental shortcut, attention to the unique aspects of the current situation can fall short.[51] The role of leaders in settings where organizational shells develop is to maintain awareness of the shell in relation to the situation, to elaborate and expand on the shell and to keep it "alive" and responsive to current exigencies.

Shared accountability and redundancy. Shared accountability can entail redundancy of responsibilities among members of a group or system. Simple redundancy in the absence of adequate means of integration can lead to the problem of *diffusion of responsibility*, where individuals fail to take initiative under the assumption that someone else will act. In a situation of simple redundancy, when everyone is accountable, it often is true that nobody is accountable.[51] Closely related to diffusion of responsibility is the phenomenon of *social loafing*, where individual effort drops as size of work group increases.[52] Social loafing and diffusion of responsibility are not merely problems of inadequate coordination, but actual reductions in individual effort that occurs as redundancy increases. However, there are ways to counter diffusion of responsibility and social loafing in situations of redundancy. Research has found that moving from anonymity to *identifiability* of the individuals sharing accountability is an effective counter to diffusion of responsibility.[52] Research also has

found that, when individuals perceive that they can make a *unique contribution* to a group effort, social loafing is reduced even if individual contributions remain unidentifiable.[53]

Researchers in high hazard organizations differ in their assessment of the effects of redundant accountabilities. On the one hand, Normal Accidents Theory suggests that redundancy can create confusing complexity and encourage risk-taking.[54] When people know that there is redundancy in the organization, they may be confused as to who should handle a given task, or they may be over-confident in the capacity of the organization because there appears to be plenty of backup. On the other hand, studies of high-reliability organizations such as aircraft carrier flight decks have found that, under the right organizational conditions, redundancy contributes to safety. Whether redundancy is a liability or a strength can depend on whether individuals are actively, continually taking account of the actions and expectations of others as they go about their work, as in the heedful interrelating [46] and "having the bubble" described above. Shared accountability in this model is not a matter of "passing the buck", but a matter of "grabbing the buck" when it needs to be taken. Effective teamwork and heedful interrelating overcome the risk of diffusion of responsibility by extending the accountabilities of individuals in organizational space, e.g. across functions and disciplines within the team to encompass more of the "big picture", and in organizational time, e.g. to assuring successful communication with the next shift.

ACCOUNTABILITY AND ORGANIZATIONAL LEARNING

Accountability for practice, accountability for learning. Conversations about accountability for safety sometimes fall prey to confusion about whether the focus is on following established practices or on learning ways to improve safety. Accountability for safe practices may or may not fall on the same shoulders as accountability for learning what it is that constitutes safe practices. A "best practices" model of organizational learning has been popular in many industries. Leaders learn from other leaders or organizations that are perceived to be successful and attempt to implement those practices in their own domains. In this model, there is separation between those accountable for safe practice and those accountable for organizational learning about safety. While a "best practices" approach is used widely, research has found that this model is fraught with difficulty in the translation across settings: when a rural community hospital adopts published best practices developed at Brigham and Women's, those practices might look and function very differently. [55] At the other end of the spectrum are various practice-focused models of organizational learning, such as practice-based learning[56] and work-based learning[57], where learning occurs close to the point of practice. In this model, accountability for organizational learning and accountability for practice fall on the same shoulders. An example of a practice-focused model applied to patient safety is the use of the Toyota Production System[58] to improve patient safety in a hospital. The Toyota system involves the people who are at the point where the problem manifests, in developing system solutions that remain grounded in local practice. Preliminary results of a study by Steven Spear and colleagues at Harvard Business School show promising results in terms of improved compliance with safe practices and reduction in infection rates.[59]

Accountability and its consequences for system-level organizational learning. Thus far, we have seen how accountability can be both bounded and shared in order to address fundamental human limitations; we have seen how shared accountability can be enacted in the form of shared awareness of work processes; and we have seen how accountability can motivate favorable performance when the accountability is general and process-oriented and when the individual's actions or inaction and unique contributions to the collective are identifiable. These individual- and group-level perspectives on accountability are consistent with an organization-level perspective that is focused on organizational learning and system improvement. Classic assumptions about accountability (i.e., erratic people degrade an otherwise safe system) are erroneous: in high-hazard and high-reliability organizations, the cycle of accountability that succeeds in developing and maintaining safety is not one that focuses on sanctioning individuals for not following rules. [60, 61]

These erroneous notions about accountability for safety and reliability are partly rooted in the fact that reliability and routine are often conflated. In accord with that mental model, accountability for reliability becomes accountability for following routines.[11] This model may be appropriate in a simple organization with predictable and unchanging work processes. However, the following of routines in a complex, continually adapting organization with a high level of uncertainty can easily lead to propagation of practices that turn out to be unsafe. How have high-hazard industries successfully redefined accountability? The shift is from "hold individuals accountable for acting in accord with the system such that they maximize reliability and avoid error" to "hold people accountable for continually contributing to collective/whole-system learning and adapting." The continual, inquiring, shared awareness of work processes described above as key to coordination and to compensating for individual limitations, is also key to organizational safety learning. While protocols, checklists, and other routines are essential to the safe operation of aircraft, nuclear power plants, and operating rooms, it is also essential that individuals and systems be vigilant about what isn't on the checklist or in the protocol because it hasn't happened before.

Achieving the impossible: Flight 232. Despite massive failure of engine and controls, crew managed to crash land a DC-10 at Sioux City, Iowa in July of 1989. While 112 people died in the crash, 184 people survived. The fact that anyone survived is attributed to extraordinary initiative and coordination among crew, air traffic control, airport and civic authorities and others. In subsequent flight simulations, no pilot has succeeded in landing the aircraft with so many survivors.

> On July 19, 1989, United Airlines Flight 232 took off from Denver, headed for Chicago. En route, a bang so loud it could be heard from the ground shook the DC-10. The rear engine (a DC-10 has an engine on each wing plus a third in the rear) failed. Portions of the disintegrating engine flew forward and damaged the controls and hydraulics on the wings. All controls were lost: there were no ailerons to bank the plane, no rudder to steer, no elevators to control altitude, no flaps to slow down and land, and no brakes or steering on the landing gear. The only means of controlling the plane were the throttles for the two remaining engines.
>
> Excellent communication and cooperation combined with luck to enable the crew to achieve what was nearly impossible. An off-duty pilot whom the crew had not previously met happened to be a passenger. He was brought to the flight deck

> where he and the two other pilots learned how to control the aircraft by synchronizing movement on the throttles which, due to the nature of damage to the controls, was a three-person task. Crew, including flight attendants, looked out windows to provide feedback on equipment damage and status. There was a constant flow of useful information from Air Traffic Control. The crew contacted a DC-10 maintenance facility in San Francisco, which provided a stream of diagnostic information. Crew brainstormed about whether and how to deploy landing gear, in a "collective mind" fashion until they arrived at what seemed the best strategy. Despite an airspeed and sink rate far exceeding standards, and with only the throttles manned by the three pilots for control, the crew managed to bring the aircraft down just at the end of the Sioux City runway, just off the center line. Unfortunately, a wing tip caught the ground, and that plus the excessive impact led the plane to break up and catch fire upon landing. Nonetheless, 185 people managed to escape the burning plane.

It is instructive to compare this case with Flight 173, described earlier. In both cases, the individuals involved were competent and carried out their responsibilities with diligence. In the earlier case, a crisis that could have been averted was not, due to failure of communication. In the latter case, the impact of an unavoidable crisis was lessened by superb communication and cooperation. The clearest contribution of this case to our understanding of accountability is the stance of inquiry and openness that the captain and crew maintained. They consistently asked for, and received the help and advice of people on the aircraft and on the ground. Transcripts and accounts of the flight show a determination to *learn*, more than to *know*, how to get the plane onto the ground as safely as possible. They demonstrated the kind of heedful interrelating that is present in many successful high-reliability organizations.

COLLECTIVE ACCOUNTABILITY

The phrase "practice accountability" appears in patient safety literature. Most often, this term refers to the collective accountability of a group of practitioners for maintaining a patient safety focus in their shared practice. This is of more than symbolic importance in a shift away from excessive reliance on individual accountability: it is a statement that certain aspects of accountability for patient safety fall on the collective, on the organization, and not on individuals. Hospitals, for example, are publicly taking responsibility for adverse events and making changes in policies, procedures, training, and equipment, to avoid recurrence of these events. The following case illustrates this:

> In the summer of 2002, an accident at Westchester Medical Center in Valhalla, New York, led to the death of a six-year-old boy. The boy was receiving an MRI when, subsequent to the activation of the MRI magnets, he was hit in the head by an oxygen canister that accidentally had been left too close to the MRI equipment. The medical center's CEO immediately acknowledged the error and stated that the hospital assumed full responsibility. The medical center made 32 changes to its MRI procedures, including not allowing ferrous equipment such as oxygen cylinders and fire extinguishers in the MRI suite. The hospital has since been praised for being

unusually forthright, not attempting to minimize or cover up any aspects of the incident, and acting immediately to prevent recurrence.

Institutional leadership of this nature does a great deal to promote a healthy balance between safety accountability and safety learning. It models an open, non-punitive approach to error. It promotes the just-culture ideal of treating system weakness as just that, rather than blaming an individual for actions that others in the same position also would have taken. It says, "We're all in this together."

ACCOUNTABILITY AS A SYSTEM

A number of scholars argue that accountability is more appropriately viewed as a system rather than a collection of binary links between principal and agent[8, 62]. This section develops that concept of an accountable system.

Accountability context. So far in this paper, we have defined and illustrated accountability—both individual and shared—and its favorable and unfavorable consequences. Also, we have shown some of the ways that contexts affect both the nature and consequences of accountability. In all of this, we have looked at accountability as a particular relationship between or among parties. Perhaps the most important context of any accountability relationship, however, is the *other* relevant accountability relationships of those parties. In other words, the hospital executive's accountabilities to the hospital Board and to regulatory and accreditation agencies affect how that executive creates and maintains accountabilities in the hospital, and the accountabilities of middle managers to senior management affect how they hold front line staff accountable. The flow goes both ways: the accountabilities that the executive is able to negotiate with staff or physicians affect what that executive will attempt to negotiate with the parties to whom she is accountable.

Cycles of accountability. Palmer, Emmanuel, and Woods refer to this flow of accountabilities as cycles of accountability to emphasize their systemic and reciprocal nature.[8] Emmanuel previously described the phenomenon as a reciprocating matrix of accountability.[1] As we explore opportunities to enhance accountability for patient safety, it is essential that we keep in mind this systemic and reciprocal nature of accountability. One approach at the heart of systems thinking is attempting to understand the properties of the part in terms of the properties of the whole (this is the opposite of analytical thinking, an equally useful mode, which attempts to understand the properties of the whole in terms of the properties of its parts.)[22] As we attempt to apply the lessons of this paper and other sources to the task of diagnosing and improving problems in systems of accountability, as we find parts of the system that are creating problematic accountabilities, actionable explanations for those problems may easily be found "upstream" or "downstream" in the flows of accountability. What appears to be ignorant or irrational behavior in isolation turns out to make sense when the broader accountability context is considered. Just as a health care worker who does not follow safety procedures may be in a context that effectively prevents following procedure, an entity that appears to create blaming, punitive forms of accountability may be in a context where this is the optimal—or even the only—way to meet that entity's own accountabilities to others.

Accountability across professional and organizational cultures. As accountability flows through a system, it may encounter some translation problems along the way. Some of Helmreich's recent work has shown how accountabilities are interpreted differently in different cultures. For example, degree of adherence to internationally accepted standard operating procedures in aviation will vary depending on the extent to which a culture values rule-following (Helmreich and Merritt's Rules and Order dimension of culture).[32] While comparison of national cultures was the centerpiece of this study, it is well documented that cultures, such as norms and values related to rule-following and other aspects of accountability, can vary across organizations (for example, see the work of Schein[63]) and across professions (for example, see van Maanen and Barley[64]). Therefore, when we look at accountability as a system, we see not only the structural constraints caused by the cycles of accountability described above, but also the cultural translations that can occur as accountabilities cross institutional boundaries such as those of professions or organizations. For example, a physician's accountability for professional competence flows from various sources including hospitals, professional associations, patients, regulatory agencies, and insurers. As those accountabilities cross the thresholds of organizations and professions, differences in meanings, values, and resulting tradeoffs among competing goals related to safety are likely to emerge.[8] Referring back to our original definition of accountability, principal and agent are likely to have different understandings of what is, on paper, the same accountability. In addition, they may have different understandings of the relationship between that accountability and the actions and/or results it is intended to promote.

CONCLUSIONS

Accountability for future safety is distinct from accountability—and blame—for past events. Accountability is both retrospective and prospective. For individuals and organizations to learn from adverse events and near misses and to improve safety in the future, it is important for them to create some separation between those two perspectives. Adverse event reporting and analysis processes that are anonymous or that are otherwise off limits to internal or external sanction are examples of this separation. Blame, which is often a byproduct of retrospective accountability, inhibits disclosure and learning. The question of who *should be* accountable in the future should be answered in terms of what will most effectively and efficiently assure safety in the future.

Safety in organizations necessitates accountability for social, as well as technical, actions. The aviation and health care cases in this paper illustrate how essential social action, in the form of awareness, communication, and coordination, is to safety in an organizational context. Technical proficiency and effort are not enough. Accountability for safety must include accountability for recognizing and working effectively with the interdependencies that are part of any organization.

Safety in complex, high-hazard organizations, including those delivering health care, requires general, as well as specific accountabilities; and it requires awareness as well as rule-following. As the cases also illustrate, prevention of error and harm requires organization members to maintain awareness of the "big picture" and to act, sometimes beyond the narrow confines of their own specific tasks, in order to maintain safety.

Accountability for safety exists within a cultural and political context. While safety requires social action, such as effective communication and teamwork, in addition to technical action, such as administering the correct medication, no amount of training in communication and teamwork will be effective if the cultural or political context does not support those actions. If the organization remains hierarchical, as it was in the case of the 8-year-old boy described above, if front line staff are not empowered to take the necessary actions to maintain safety, or if tensions across units or professional groups (e.g., nurses and residents) constrain communication, then accountability for safety cannot achieve its potential.

Accountability for safety also exists within a larger system of accountability. Accountability is a relationship that is part of a system of accountability relationships. Any evaluation or change effort must look at individual accountabilities in that context: for example, the nurse's accountabilities are affected by the accountabilities of the nurse manager and others in the hospital leadership, to the hospital board, to regulatory and accrediting agencies, to patients, and to the public.

Individual accountability vs. system accountability is not necessarily an either/or tradeoff; it can be both-and. As study of high-reliability organizations and the case of Flight 232 illustrate, safety is a product of both individual and system accountability. An accountable system is a structure built from individual accountabilities. Collective accountability (as in the case of Westchester Hospital), mutual accountability (as in flight crews), and shared accountability (as in "200% accountability") are all part of an accountable system, and none of them need diminish individual accountability.

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NOTES

[i] Michael Leonard, MD, personal communication, November 2002.
[ii] Case material from http://www.airdisaster.com/investigations/ua173.shtml , http://www.airsafetyonline.com/accidents/ayers/173.shtml , http://www.avweb.com/news/safety/183016-1.html
[iii] Space does not allow a full presentation of Marx' model, which is more nuanced than this summary. Interested readers are encouraged to look at Marx' work cited above.
[iv] Personal communication, Michelle Harper, research assistant to Robert Helmreich, November 2002.