



Teamwork and Communication in Interventional Radiology



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A B S T R A C T

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Teamwork and communication in the modern era are essential to the delivery of safe reliable patient care. As the complexity of the patient's disease entity increases and potential interventional procedures are warranted, consolidation of vast amounts of information from multiple teams is required. Thus, exceptional teamwork and communication are necessary for coordinated patient care. Breakdowns in teamwork and communication can lead to mistakes and breaches in patient safety. The purpose of this article is to review the fundamental principles and better understand the underlying reasons for dysfunctional teams and poor communication in the interventional radiology suite.

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Introduction

Teamwork and communication are an essential part of a continually evolving health care system. Individualized patient care in the hospital requires knowledge and input from several health care team members. As health care in the United States increases in complexity and specialization, it becomes increasingly vital to have effective teamwork and communication. Although these properties are highly interdependent, they rely on the health care system to actively promote and educate on these principles. Breakdowns in teamwork and communication can lead to mistakes, breaches in patient safety, quality of patient care, and repetition of work. Interventional radiology (IR) requires coordination from numerous groups, including schedulers, receptionists, nurses, technologists, and physicians. The purpose of this article is to better understand the theory behind teamwork and communication and identify factors that promote dysfunctional teams and poor communication.

Teamwork

The Patient Care Team

On arrival to the hospital, the patient's health care team includes every person who is encountered along the way. This includes but is not limited to receptionists, nurses, technologists, physicians, laboratory technicians, administrators, and hospital parking lot attendants. When a patient comes through the door into the IR suite, whether it be via an inpatient ward or on an outpatient basis, there is the expectation that team members seamlessly integrate and coordinate into one functional unit. Specifically in IR, once on the procedural table, there are three members in the team: the technologist, physician, and nurse. Each of these team members operates in their own microsystem, which has specific needs (Whitt, Harvey, McLeod, & Child 2007). These three microsystems have to coordinate together to provide an optimal patient experience (Nelson et al., 2002) (Table 1).

Teamwork requires planning and execution, which necessitates a coordination of shared plans. Execution of a plan requires that each teammate share his or her individual plan or mental model (Reason, 1990; Schmidt & Lee, 2005). In other words, if each person on the team knows what the other teammates thought processes are then they will have a shared mental model. However, this takes work and does not happen passively. Once teams have worked together for a period and taken the necessary steps toward improvement, they may observe each other's actions and know how to appropriately respond. Having a shared mental model leads

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Table 1
Definitions of terms

Definitions
Microsystem: A small interdependent group of people who work together regularly to provide care for specific groups of patients
Mental model: An explanation of someone's thought process about how something works
Constructive conflict: Conflict in which benefit exceeds the costs and generates productive mutually beneficial shared decisions
Authority gradient: The established or perceived command and decision-making power hierarchy in a team or group situation. A steep authority gradient implies that errors in quality and safety are rarely reported to senior leadership because of fear of punishment
High-performance team: A group of goal-focused individuals who are able to achieve superior results, despite a complex health care environment
Collective mindfulness: Mental orientation that continually evaluates the environment as opposed to mindlessness where a simple assessment leads to choosing a plan that is continued until the plan runs its course

to a high-performing team (Gleick, 1987; Surowiecki, 2004; Tapscott & Williams, 2006).

In most critical clinical situations, high-performance teams perform better than individuals. The way teams coordinate is by aggregating knowledge spread across multiple individuals, particularly in cases where there is no single good answer. A great example of aggregating knowledge in the health care system is through multidisciplinary conferences. Complex problems are best addressed by multidisciplinary teams that draw from individual experiences to come up with solutions. For example, many institutions have a multidisciplinary liver tumor conference, which includes transplant surgery, hepatology, radiation oncology, and IR. These groups come together out of their individual silos, draw on experiences, and as a group come up with the best treatment plan for the patient (Lencioni, 2002; Senge, 2006).

Characteristics of Effective Teams

Teams usually start out as a small group assigned to a particular task. In IR, this classically centers on a procedure for the patient. Typically, newer teams are assigned to less complex cases and more experienced teams to complex cases. During the early stages of team development, performance declines are expected. Performance declines during the early stages of team development are entirely predictable and can lead to teammate distrust. Therefore, during those early stages, it is critical that there is sound communication and active attempts at improving teamwork. Early performance declines can lead to dysfunctional individual behavior,

Clinical vignette 1—Teamwork

A 59-year-old patient was in the IR suite for placement of a percutaneous abscess drain. The physician asked the IR nurse to administer 1 g of Cefazolin intravenous (IV), which was not heard. The physician repeated the statement in an aggressive tone for which the nurse retorted that there is “no need to speak with me in that tone.” Within the next 5 min, the nurse asked the technologist to get more IV tubing. The technologist for the case rolled eyes and made an audible sound in disagreement with the request. These aforementioned actions are characteristics of dysfunctional teams that often lead to suboptimal patient outcomes.

which may lead to a dysfunctional team (Covey & Merrill, 2006; Lencioni, 2002).

The stages of team development were first described by Tuckman (1965). Teams start off as a working group and will have predictable growing pains, which is the dysfunctional phase. As time and resources are devoted to team development, performance increases at an exponential level. The next phases of development once the dysfunctional phase is traversed are potential team, real team, and finally a high-performance team. High-performance teams are achieved through an active effort by individuals and the institution to implement effective teamwork and communication (Lencioni, 2002; Tuckman, 1965).

High-performance teams are built on trust. Trust also includes under its attributes confidence, integrity, and predictability. Small amounts of trust accompany each newly formed team. This trust must be reinforced via the aforementioned attributes. As we have all experienced in different facets of life, trust is lost more quickly than it is gained, and the same holds true in the hospital setting. During periods of high organizational turnover, performance declines because it takes time to build trust (Argote, 2005; Argote & Eppler, 1990).

Key performance drivers include constructive conflict and eliminating destructive conflict. Constructive conflict requires team members to revise their mental models used to solve tasks and continuously improve. Too little conflict creates artificial harmony, and too much conflict is destructive. There is an ideal conflict point that allows for improvement in shared mental models. Successful teams are committed to the concept of buy-in. The concept of buy-in means that despite an individual not agreeing completely with a plan they are sold on, that it will improve team chemistry and results. However, this does not mean that disagreements should not happen. Teams should have the ability to disagree but then commit to clarifying goals. High-performance teams hold each other accountable by performance standards. Performance standards if possible should be set by team members to empower and create buy-in (Lencioni, 2002).

Successful teams are results driven. Success is measured on the team level as opposed to the individual level. Teams may choose their own way of measuring success; however, carefully chosen metrics allow the team to measure results. This in turn allows for revision of methodologies and goals. In summary, high-performance teams are built on trust, constructive conflict,

Clinical vignette 2—Teamwork

A 23-year-old patient was referred to IR for an urgent angiogram and embolization for a gunshot wound to the right lower extremity. The patient was sedated using moderate sedation, which includes midazolam and fentanyl. The patient's vital signs at the beginning of the case were stable; however, after administration of 1 mg of midazolam, the patient's O₂ saturation levels dropped to 72%. The IR nurse *audibly* voiced to everyone in the room “The patient's O₂ sats have dropped to 72%.” The technologist and physician immediately stopped what they were doing and focused on the IR nurse's statement. All members of the team focused in on managing the airway. After unsuccessfully attempting maneuvers to open the patient's airway, a CODE was called. Although, this clinical vignette may seem to be an obvious reaction, all members of the team exhibited attributes, which are characteristic of a high-performing team.

commitment, accountability, and focus on team results (Argote & Epple, 1990; Lencioni, 2002).

Team Knowledge

One of the major issues in health care is that key knowledge or information is passed down via word of mouth. Important knowledge is usually held by people who have been in the system for years and have learned through experience. In the medical field, information is passed down via an apprenticeship model. This method of information has benefits such as induction of shared mental models; however, this method of transfer is inadequate and leads to inefficiencies. Incorporating written protocols and technology helps to decrease variability and creates efficiency (Argote, 2005).

An example of written protocol that helps transfer in knowledge is during orientation of new residents rotating on service. Before developing a written protocol at our institution, orienting residents who started on the IR service were haphazard at best. Many integral pieces of information that needed to be transferred were lost, which directly affected patient care. After feedback from the residents stating that the orientation was lacking, our practice changed to a written protocol that consisted of a combination of handouts and videos. After incorporating technology into the orientation process, we saw immediate improvement in resident and team performance.

Analyzing and sharing information continuously is essential for high-functioning teams. This promotes a shared understanding known as collective mindfulness (Liker, 2004; Weick & Sutcliffe, 2001). Collective mindfulness compares predicted to observed performance while identifying variances and searching for explanations. In the health care setting, collective mindfulness has been used to improve team performance (James & Savitz, 2011; Liker, 2004; Prielipp et al., 2010).

Leadership

Members of any health care team look to official and unofficial leaders to serve as an example. Leaders should provide sound input, resolve conflicts in a peaceful manner, and understand team needs. Furthermore, there should be opportunities for members to take on leadership roles if desired. Opportunities for promotion and added oversight responsibility should be available in any organization. Leadership qualities are traditionally learned through experience and training. Strong leadership is necessary for any team to perform at optimal capacity.

Communication

Communication is another major key component to building high-performance teams in the health care system. Everyone is aware that good communication is a necessary tool for a successful organization; however, what is not entirely understood is that communication theory has been meticulously studied (Gleick, 2011; Pierce, 1980; Shannon & Weaver, 1949). Understanding communication theory informs on how to avoid errors and understand breakdowns in the process.

Communication involves transmitting a message between a sender and a recipient. In cases where a recipient is 100% sure about a topic, communication is not necessary. However, this is usually never the case unless a team has been working together for many years. The purpose of communication is to reduce uncertainty. There are several steps involved in transmitting a message from a sender to a recipient. Take for example, a patient care provider

obtaining informed consent from the patient. The patient care provider plans a message with instructions to be conveyed. This message is encoded in that the patient care provider chooses words and forms sentences to communicate to the patient. The signal or message is then transmitted via text, speech, and gestures. While the message is being communicated by the patient care provider, at the exact time, the signal is received by the patient via symbols, sounds, and appearances. During this transmission however, there can be noise while the message is being communicated. This noise may occur via other people walking around in the hospital, phones ringing, and concurrent discussions in nearby areas or any number of distractions. Once the signal is received, it is decoded by the patient by reading, listening, and interpreting. Once the message is received, the patient takes action by signing the consent and uses the information to reduce his or her uncertainty (Gleick, 2011; Pierce, 1980; Shannon & Weaver, 1949).

Communication systems that are intricately designed focus on mitigating errors at each step of the process. Message errors may occur along each step of the communication chain. The most common way to reduce errors in the message is by redundancy (James & Savitz, 2011). Redundancy simply means that the message is repeated either within the message itself or in the setting of a noisy area. Redundancy reduces encoding and decoding errors (James & Savitz, 2011). Another common strategy to reduce errors is through feedback. Feedback is the process where the recipient sends a message back to the initial deliverer. The purpose of this is that the sender understands that the message was communicated and encoded properly by the recipient. This strategy falls short if the recipient of the message states exactly what the sender said verbatim. A more appropriate response is if the recipient translates the message in his or her own words and repeats back to the sender. This is the teach-back or read-back strategies that are used throughout many hospitals. Communication theory is important to understand because it provides awareness into improving team performance and conveying information efficiently (Gleick, 2011; Pierce, 1980; Shannon & Weaver, 1949).

Barriers to Effective Teamwork and Communication

Excellent teamwork and communication are essential to preventing errors. The Joint Commission cites that the most common causes of errors are inefficient leadership, human factors, and communication breakdowns. Other barriers to effective teamwork include conflicting goals, personnel turnover, and organizational culture. For teams to survive, leadership must be supportive, but more importantly, the organizational culture should be such that

Clinical vignette 3—Communication

A 45-year-old female with the diagnosis of ovarian cancer was referred to IR for placement of a central venous catheter for chemotherapy administration. During placement of the central venous catheter, a syringe was filled with 1,000 units/mL of heparin instead of 100 units/mL. As a result, the patient received 2,500 units of heparin instead of the appropriate dose of 250 units when the catheter was flushed after placement. The error traced back to breakdowns in communication between all team members. All team members were experienced personnel but had only recently started working together. The technologist, nurse, and physician assumed that someone else would dilute the heparin before use.

Clinical vignette 4—Communication

A 67-year-old female with diagnosis of right lower extremity deep vein thrombosis was undergoing catheter-directed thrombolysis. After placement of the infusion catheter in the right lower extremity venous system, the next step usually is to infuse tissue plasminogen activator (tPA) and heparin into the catheter. The case finished at 2 AM, and each member of the team was fatigued. The interventional radiologist mumbled can you please start tPA at 0.5 mg and heparin at 50 units an hour. The IR nurse heard “start tPA at 0.5 mg and heparin at 5000 units an hour” and thus started it at those doses. The patient received a heparin dose that was 100 times the requested dose. The error here lies in communication specifically confirming and read back of the dose between the IR physician and nurse.

there is promotion of honesty and respect (The Joint Commission, 2008).

Another important barrier to effective teamwork and communication is the traditional hierarchy that often exists in medical centers. A hierarchy system leads to rewarding individual behavior. A traditional hierarchy culture also favors an authority gradient. Authority gradient is defined as team members accepting that power is distributed toward the leadership (Cosby & Croskerry, 2004). This in turn leads to constant deference. Deference leads to suppression of innovation among employees and limits the abilities of outside experts to consult. Often trainees are caught in situations where they are afraid to speak up about concerns because of a perception that they may be punished. This is no different among medical staff and hospital employees (Maxfield et al., 2005).

Other barriers to successful teamwork and communication include competing priorities because of time constraints. Time constraints often are listed as an underlying reason for compromising safety policy. To mitigate this circumstance, teams simulate applicable scenarios to form trust and build experience in situations that are time limited. Diverse communication styles are another potential barrier to effective communication and teamwork. Factors such as gender, age, culture, and language differences can often interfere with smooth communication. Patterns of communication are shaped by background and experience; thus, it is easy to see how messages may not be appropriately decoded by the recipient. Organizational culture that promotes a collaborative approach helps to decrease communication issues (Maxfield et al., 2005; Methods DoSaS, 2009; Weick & Sutcliffe, 2001).

Elements for Improving Communication

Improving communication from an institutional standpoint is an ongoing commitment. Key elements for improving communication include considering goals for the conversation before communicating, making eye contact during communication, asking for input, providing evidence-based information, encourage ongoing monitoring, continually discussing the next steps in the process, taking the time to carefully listen, and always using respectful tone and language (CUSP Toolkit, 2013).

Conclusion

Teamwork and communication are essential to exceptional patient care in IR. Although every team member knows that teamwork and communication are essential, the theories behind these concepts are not well understood. Team performance depends on shared mental models, which in turn develop from experience working together as a team. Communication occurs in three distinct steps: message encoding, transmission, and decoding. Errors in communication can be mitigated using redundancy, feedback, and simplifying the message understanding the recipient's background. Individual and organizational commitments to actively improve teamwork and communication are essential to form high-performance teams and exceptional health care delivery.

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