The Key to Success: Teamwork

11

Case Study

A worker in a printshop attempts to remove a foreign object from moving print cylinders. During a brief moment of inattention, the cylinders catch the sleeves of his shirt and both of his arms are drawn into the machine. Despite a nearly instantaneous shut down of the equipment by one of his colleagues, both arms are trapped up to the elbows. Because of the unusual circumstance, EMS dispatch decides to send a physician to the scene along with the ambulance. When the emergency physician, a senior resident in emergency medicine, arrives at the scene with two paramedics, he finds a patient with a reduced level of consciousness standing in front of the print cylinders. The worker's colleagues are supporting him in a standing position. With the help of the paramedics, the physician places a large-bore peripheral IV line in a vein of the dorsal foot and starts volume resuscitation. With repetitive small boluses of ketamine and midazolam, the patient receives adequate analgesia and sedation, while the two paramedics with help from two workers construct a small temporary platform adjacent to the print cylinders. Assessment of the situation by the machine technician reveals a difficult and protracted disassembly. Since the printshop is not far from the local hospital, the emergency physician contacts the operating room and requests a surgeon and anesthesiologist to come to the scene. Because the patient is young and an amputation would impose severe risks, the emergency physician and surgeon decide not to amputate the patient's extremities. Meanwhile, the fire department arrives and, after the anesthetist has deepened the analgesia and sedation, help the machine technician with the difficult task of disassembling the press. Two hours later, both arms are freed from the printing machine. Sudden pulsating bleeding is stopped by the inflation of upper extremity tourniquets that the paramedics had placed on both arms before they were released from the machine. The patient is intubated on site and transferred to the operating room. Due to the rapid and coordinated rescue and surgical intervention, both extremities are saved with a good degree of functionality.

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Both the trauma mechanism as well as the pattern of injury of this occupational accident pose complex demands on the medical treatment of the entrapped patient. The temporary team of physicians from different specialties, paramedics, fire rescue workers, and employees of the printing plant successfully coped with the challenge because all the necessary tasks were managed by sharing and contributing the skills and experience of all team members. Together, they achieved teamwork at its finest.

11.1 The Team

11.1.1 Why Teamwork Has Come into Focus Only Lately

Teamwork is the cooperative effort by members of a group or team to achieve a common goal. Wherever ill or injured people are cared for, healthcare providers will take care of their patients in groups of two or more people. Therefore, teamwork is an inherent feature of healthcare; there is virtually no modern healthcare without teamwork. Despite this fundamental feature, the medical community traditionally neglected this issue until a few years ago. The reasons for that are manifold.

First, the widespread tendency of the healthcare community not to think in team concepts may reflect a *deep-seated cultural issue*: Many team members in Western societies are children of a culture that has come to cherish the individual human being in an unprecedented way. The pursuit of individual happiness and the fulfillment of personal agendas are unchallenged goals of our culture and have strongly affected the way we perceive human relationships.

Secondly, compared to other high-risk industries such as nuclear power and aviation, healthcare has been slow to regulate itself. The traditional culture, now slowly changing, has been that physicians are largely independent practitioners who make decisions with little oversight or accountability.

In addition, the foundations for a preference of individual proficiencies over social competence are laid early on. From birth through college, we nurture and praise the individual accomplishments of our children, as well as admire their cognitive faculties and the new skills they acquire. Collectively, we communicate the message that the most important is what an individual can successfully accomplish single-handedly. The basic presumption that individual technical expertise will guarantee a desirable outcome has further found expression in the medical and nursing educational cultures. Healthcare providers have been taught isolated technical tasks or clinical algorithms but have not been taught to perform in a team environment nor familiarized with basic concepts of communication and team performance (Leonard et al. 2004). In short, contemporary Western culture has produced a medical community wherein medical quality and safety have historically been viewed as dependent on the performance of expert individual practitioners.

While there has been extensive scientific work on requirements for successful teamwork within other industries and professions, the medical community has only recently started to address and implement relevant teamwork concepts.

Perhaps one of the reasons for this translational gap is that healthcare providers traditionally favor "hard facts" over any kind of "soft science" originating from human factors research or from psychology and organizational studies (Rice 2009). Thus, it has been silently assumed that effective communication and teamwork are adequate for daily clinical practice. Simply put, teamwork has not been a valued skill in the medical community. It is only in the last decade or so that parts of the healthcare community have come to accept the fact that healthcare provides no exception to the rule that a team of experts does not make an expert team. The necessary teamwork skills, like any other skills, have to be learned and practiced (Chap. 16).

Another important reason has been identified as a contributor to insufficient team performance and miscommunication: the *power relationships* that exist in healthcare. In nearly all healthcare organizations, there exist different groups or workers and clinicians with traditionally different statuses. Healthcare organizations tend to be dominated by a strongly hierarchical structure with a concept of leadership that resembles more of an authoritarian, military-like model rather than the mature interaction of adult healthcare providers (Firth-Cozens 2004). Ideally, critical information should flow freely among all team members, with all – regardless of professional status – empowered to ask questions and to voice concerns if they believe that a planned action may result in less than optimal care or harm the patient. However, unbalanced power relationships result in a steep "authority gradient" (Chap. 12). Open dialogue within the team is impaired or even rendered impossible. The authority gradient creates a team climate that globally discourages employees to come forward with questions and concerns and often denies them the ability to fully exercise their skills in service to the patient.

Considering the prevalence of this mindset, it is not surprising that for decades the concept of teamwork has largely been reduced to a gathering of people who give and take orders. But even when a teamwork concept is embraced, physicians and nurses nevertheless have different attitudes about the teamwork they experience with each other, including issues such as suboptimal skills with regard to conflict resolution and interpersonal communication (Makary et al. 2006; Thomas et al. 2003; Undre et al. 2006). Furthermore, there seems to be a difference between novice and senior physicians of the same discipline (Flin et al. 2006) and between physicians of different disciplines (Ummenhofer et al. 2001).

Teamwork failures have increasingly been noted as causes of mishaps in healthcare. This is partly due to the fact that there is more awareness of human factors these days than before. The other reason for increased attention to teamwork is that medical mishaps and error analyses have shown that as much as 50–70 % of medical errors are due to failures in communication and teamwork. When looking at healthcare mishaps, it's clear that clinical skills, drug administration, and device-related errors are less and less of a factor; and human factors and communication are increasingly found to be a primary or contributing factor. This phenomenon is exactly what happened in aviation: as the field experienced significant technical advances, the proportion of mishaps owing to teamwork and communication failures grew to as much as 70–80 %.

11.1.2 Why Teamwork Is Necessary

Fortunately, the past decade has witnessed an increasing concern among specialties involved in acute medical care about the fundamentals of successful teamwork. Stimulated by a large body of evidence from other high-stakes environments (e.g., civil and military aviation, military command operations, nuclear power plants, offshore oil platforms), healthcare providers started to analyze the antiquated approach to teamwork within their own fields of expertise and have tried to adopt and integrate team training measures.

From a task perspective, this approach to teamwork is long overdue. Many tasks impose mental and physical demands that are too strenuous even for the most experienced individual to perform in isolation. Furthermore, the required tasks in highly technical and specialized environments demand that different groups of professionals cooperate if a problem is to be dealt with successfully. The case study at the beginning of this chapter represents such an interprofessional team approach.

The strongest support, however, for a cultural change and for a focus on teamwork in healthcare comes from the extensive body of research that has been directed at identifying the factors that contribute to an undesired patient care event. Working groups from different healthcare environments have identified unequivocally a close relationship between teamwork and performance in a high-stakes environment (e.g., Weaver et al. 2014; Reader et al. 2006; Jain et al. 2006; Risser et al. 1999, 2000; Wheelan et al. 2003). Poor teamwork and weak communication between members of healthcare teams have emerged as key factors in poor care and medical errors (Barrett et al. 2001; Morey et al. 2002). An observational study in the OR showed that 30 % of communication incidents were faulty and led to consequences for the patient (Lingard et al. 2004). Another survey carried out in hospital emergency showed that insufficient teamwork was responsible for 43 % of all medical errors (whereby 8.8 errors were made in average per patient). In addition, team members often failed to question actions of teammates, even when serious concerns about the adequacy of a diagnosis or a treatment existed (Fig. 11.1; Risser et al. 2000).

One of the consistently found reasons for poor team formation and teamwork is the lack of a shared understanding about the necessity and function of teamwork. As a result, emerging conflicts among team members and a breakdown in communication impair collaboration and result in an underutilization or misallocation of available resources.

Despite the delayed introduction of teamwork concepts in healthcare, there is a growing awareness of the significance of communication and team coordination for efficient task management in critical situations and the need to strive for the cultural change that is needed to support a new approach to providing care in a teamwork environment. Interviews with all specialties of acute medical care have yielded comparable results: Healthcare providers in the operating room (e.g., Flin et al. 2003a; Helmreich and Schaefer 1994; Schaefer et al. 1995; Sexton et al. 2006), emergency departments (e.g., Barrett et al. 2001; Cole and Crichton 2006; Morey et al. 2002; Risser et al. 1999), adult intensive care units (e.g., Brown et al. 2003; Kaissi et al. 2003; Ohlinger et al. 2003; Reader et al. 2006; Sherwood et al. 2002;

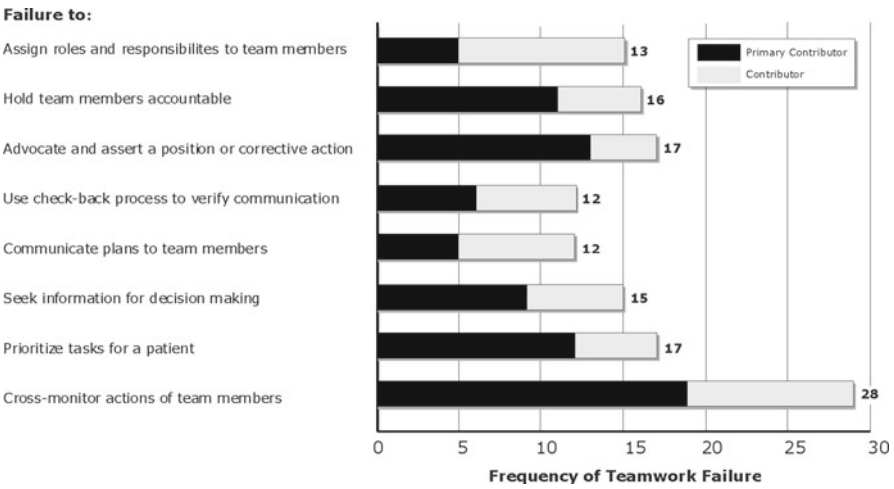

Fig. 11.1 The most frequent teamwork errors. Depicted is the data of 54 cases from 11 cooperating hospitals of retrospective emergency department closed-claims review where poor teamwork was judged to have contributed to clinical error (From Risser et al. 2000)

Thomas et al. 2004), pediatric intensive care units (Brown et al. 2003), labor and delivery units (Guise and Segel 2008), and preclinical emergency medicine (Matera 2003) acknowledge the importance of human factors issues and conclude that training measures are necessary to improve their teamwork skills and enhance patient safety.

The fact that the incidence of unwanted events correlates with the quality of the teamwork can also be proved reversely: In several studies, quality of acute medical care was improved, and error and incident rates were reduced through effective communication and good teamwork. Therefore, it has become clear that there is a correlation between the quality of team processes on the one side and treatment processes and patient outcomes on the other (overviews in Weaver et al. 2014; Schmutz u. Manser 2013; Salas et al. 2008). For this reason, the promotion of team skills and widespread systematic team training is fundamental for patient safety within acute medical care.

11.1.3 What Is a Team?

Although the term *team* has been used repeatedly in the preceding text, it is worthwhile to clearly define the type of team found in acute care. The definition of the term *team* has been the subject of lengthy and controversial discussions within the scientific community. Research in team psychology has provided differing conceptual frameworks and theories concerning the nature of teams and team performance. Types of teams can be conceived to fall on a continuum, with highly structured, interdependent teams at one extreme and teams whose members interact minimally and perform

most of their tasks individually in a group context at the other extreme. And there are shared definitions of "team" that distinguish teams from working groups or organizations (Kriz 2000; Katzenbach and Smith 1993; Risser et al. 2000; Salas et al. 1998).

A team in acute healthcare can be defined along three dimensions:

1. Mission and Goals
   - Teams are oriented to accomplishing a well-defined, time-bound objective.
   - There is a definable standard of performance.
2. Performance
   - Teams have a time orientation to their work. There is an identifiable start and stop time for a team's tasks and mission.
   - There is real-time communication.
   - Members operate in parallel and their actions must be coordinated.
   - Certain team tasks are routine and can be choreographed or scripted. Other aspects of working together are ad hoc and can be guided by teamwork rules and principles.
   - Decision-making takes place (planned or on the fly) that affects the team's actions and performance.
   - Teams manage their resources through awareness of team members' workloads.
   - It is possible to plan and critique performance.
   - A team can improve its performance through practice.
3. Membership
   - Individuals can identify themselves as a member of the team.
   - Team membership is structured. Team members understand the roles of leader and follower. There are opportunities for emergent leadership and followership roles depending on the demands of the situation and team member skills.
   - Team membership is initially defined by the skills of each member. There is partial overlap of skills among at least some of the team members so that workload can be distributed.
   - Based on structure and skill criteria for team membership, it is possible to partition responsibilities.
   - During the temporal life of the team, the team's mission is superordinate to the goals of the individual.

11.1.4 The Strength of Teamwork

Whenever people work together as a team in complex situations and under time pressure, it is expected that team performance will exceed the sum of individual actions. Several reasons account for the strength of teamwork:

- Different talents and abilities can be used strategically as strengths and not as a factor of competition.
- Larger amounts of cognitive and attentional capacity are available because of the many eyes, ears, and minds involved. More information can be gathered and

processed. With this, more substantiated decisions are possible when communication works well.
- More views and alternatives can be brought to light. It is possible that a more comprehensive picture of the current situation will emerge. This in turn helps the team leader plan and make decisions.
- Mutual monitoring can help notice individual and team errors.
- Shared workload can help prevent work overload of an individual and make sure that all planned and required tasks can be executed in a timely manner.
- Mutual support can encourage and enable team members to master even the most difficult situations.

11.2 Team Performance: Input Factors

Team performance research has been able to define major factors that affect the way a team will cope with a given task. Integrating these data into a conceptual framework, several theoretical models have been proposed (for an overview, see Salas et al. (1998)). Despite the diversity of the models, they share an understanding that defines team performance as the result of how (process, throughput) a team utilizes its human and technical resources given a specific situational and task context (input factors). Results of team performance (output) in healthcare are first of all safe patient care, but also error incidence, working climate, and team member satisfaction (Salas et al. 1998; Mickan and Rodger 2000; Paris et al. 2000). Knowledge of these factors is necessary for the advancement of teamwork training programs in healthcare. Additionally teamwork knowledge can help sensitize healthcare professionals and healthcare educators to team processes that can serve as guidelines for strategies in team training (Chap. 16). It is recognized that teamwork skills and knowledge are not a substitute for clinical skills, rules, and knowledge; they are the tool with which clinical skills are used. Fig. 11.2 is a conceptual depiction of an integrated model of team performance in a healthcare high-stakes environment.

The input factors for team performance can be subdivided into:

- Individual characteristics
- Team characteristics
- Characteristics of the task (“emergency”)
- Characteristics of the performance environment

11.2.1 Individual Characteristics

Every team member brings a set of individual characteristics (attitudes, motivation, personality) and individual skills (experience and skills in clinical care, communication, and human factors) to the team. In addition to individual skills, team members need team skills. Team skills are a set of skills that individuals must develop to

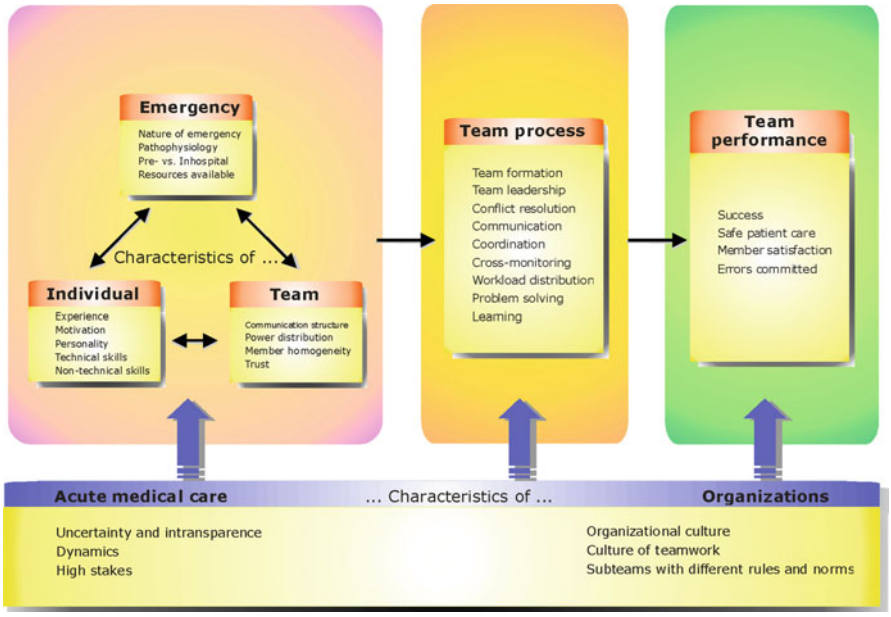

Fig. 11.2 Integrated model of team performance in a medical high-stakes environment. Successful teamwork is the result of an interaction of work and task characteristics, team characteristics (individual, team), and the team process over time. The organizational and situational characteristics influence input and process. The model is based on the theoretical framework of Salas et al. (1998)

function effectively in a team: effective communication, adaptation to varying situational demands, compensatory behavior, mutual performance monitoring, and giving and receiving feedback (Burke et al. 2004). These team skills ensure that team members' abilities will be complementary and combined to manage resources and to form professional relationships that enhance team performance. Thus, sometime soon (and in acute healthcare settings, this should be very soon), clinicians will experience a merging of clinical skills with teamwork skills to perform successfully.

In actuality, the individual's personal performance on the team can be understood as the product of three factors: individual characteristics, individual skills, and teamwork skills.

Another way to define this is: Personal performance on the team = individual characteristics × individual skills × teamwork skills. Describing team performance as a product shows that each factor is necessary. Personality conflicts and varying levels of individual proficiencies can degrade team performance.

Certain skills have been identified that characterize a successful team player. A successful team player can:

- Listen and participate actively
- Ask the right questions

- Hold an opinion and then change points of view
- Assess and value the qualities of other team members
- Assess what he or she can do best and appreciate where others have more experience and skills
- Keep to an agreement and identify with a task
- Be self-critical
- Solve conflicts in a constructive way

Teams whose members perform in a team-oriented and cooperative way are demonstrably more successful than teams with team members who equate success with competition (Driskell u. Salas 1992).

11.2.2 Team Characteristics

General team characteristics define the team as an entity: team size, group cohesiveness, intra- and inter-team cooperation, power distribution within the team, communication patterns among team members, and the homogeneity and heterogeneity of the team members. For these factors, desirable attributes have been described for teams in a high-stakes environment such as industrial or military teamwork. The research is based mainly on established teams that have a life span of weeks or months in the formation of an identity.

Acute healthcare specialists, however, are more like teams in aviation because healthcare teams usually work with "temporary" teams that are gathered in a random fashion ("*ad hoc teams*"). For instance, the odds are low that the same group of emergency medical technicians, physicians, and firefighters will ever again be dispatched for another medical emergency.

As a result, successful teams in high-stakes healthcare environments show, in addition to the general characteristics of teams, a range of additional features and problems:

- *Teams in an acute medical care setting often have to organize themselves "on the fly:"* The acute healthcare setting requires the organization of caregivers – who may be strangers from diverse disciplines who do not know one another's roles or special skills and may even be uncertain about one another's goals – into "ad hoc" teams (Murray and Foster 2000). Task demands ("treating the patient") and social demands ("getting acquainted with each other") have to be implemented in parallel and without any delay. In the example case, the team met for the first time in the printshop while the severely injured patient needed immediate attention.
- *The team is defined functionally:* The task distribution during the parallel medical treatment and technical rescue operation is specified by profession and status and does not have to be negotiated. Nevertheless, some changes in function can be made during the treatment. For instance, the emergency physician assigned the induction and maintenance of anesthesia to the anesthesiologist and left the

treatment of the extremity to the surgeon. The fact that role expectancies do not have to be negotiated anew in every single case is important for the strength of ad hoc teams (*action teams*; Manser 2009), in which team members have little or no experience working together, e.g., operating room, intensive care unit, EMS, and emergency departments.

- *Teams in an acute healthcare setting are hierarchical*: Hierarchy is necessary because in most emergent or acute emergencies there has to be one responsible decision-maker. Hierarchy supports the management of critical situations by clear paths of information flow and decision-making. Hierarchy can hinder problem solving, on the other hand. For instance, instead of actively participating in the acquisition of data and contributing to finding the best treatment options, team members might be inclined to leave everything to the team leader.
- *The team often consists of various specialties or disciplines with specific rules and different ways to handle a situation:* Multidisciplinary teamwork is a characteristic feature of acute healthcare. The major prerequisite for successful teamwork with an interdisciplinary or interprofessional team is communication to develop a shared understanding of the situation and what must be done.
- *External circumstances can render teamwork difficult:* Teamwork in acute healthcare has to function under emotional strain, often coordinating with strangers and in less than ideal physical circumstances. EMS, firefighter/rescue personnel, and various clinical specialists in this chapter's scenario could not provide acute medical care in the tidy and ordered interior of an ambulance or hospital but were literally bound to a small temporary platform adjacent to the print cylinders.
- *Decision-making is embedded in performance:* Team tasks differ in the centrality of decision-making in their activities (Orasanu and Salas 1993). While decision-making can be the central task for some teams (e.g., tactical command and control), teams in an acute healthcare setting have to decide and take action at the same time. If attention focuses strongly on a physical task, this will impair the decision-making process and increase the chances for ineffective or error-prone care. Thus, it is best to explicitly allocate decision-making and task performance among the team.

11.2.3 Task Characteristics

Tasks arise due to an outside set of stimuli to which a team must respond in a coordinated and timely fashion. The team's response depends highly on the characteristics of the task assigned: Tasks differ in their complexity (Xiao et al. 1996), in task organization (i.e., the degree of interdependencies that exist between various subtasks), and in task structure (i.e., the manner in which subtasks are assigned to and shared by various team members and different professional groups). These task characteristics have a strong impact on the communication structure of a team. If few interdependencies exist among subtasks (i.e., low demand for task organization), team members will focus almost exclusively on performance of their assigned

subtask. An example would be a domestic fire with the firefighters making their way through smoke-filled passages to rescue people who are trapped in the burning structure while the Emergency Medical Team is treating patients with smoke inhalation in the safety of the ambulance. However, if subtasks of teams are highly interrelated (as in the case of the printshop injury), the communication structure has to be elaborate and comprehensive to synchronize the different subteams. In the case of the printshop mishap, team members must communicate frequently and clearly to coordinate the flow of individual work.

Another aspect of the task is what resources are at hand. External and internal resources can limit or expand the possibilities for successful team performance. Equipment, staffing, and availability of special treatment options have an impact on whether or not a decision can be executed.

11.2.4 Characteristics of the Performance Environment

Task characteristics become especially important in the environment of high-stakes healthcare. The foregoing case study calls attention to several characteristics of the environment healthcare providers find themselves in:

- The task environment is characterized by dynamic complexity, uncertainty, and tight coupling, i.e., wherein decisions carry substantial risk in a time compressed environment. There are several unique features that characterize decision-making and action in a healthcare high-stakes environment. They are explained in detail in Chap. 2.
- External circumstances affect teamwork. Time and space matter in healthcare. Decisions have to be made under time pressure – the patient trapped in the press has little time to wait for the team to organize. "Space" in acute healthcare incidents often means "little or no space" – the treatment of the patient on site or in an ambulance demands the ability to work in close physical proximity to teammates and to coordinate actions with precision. In preclinical trauma patient care, prehospital providers may have difficulty accessing the victim. In the present case study, the treatment of the patient cannot be performed in the familiarity of an ambulance. Instead the victim's entrapped arms demand care that has to be provided in an unusual and unfamiliar setting. The problem of inaccessibility also applies in a moderate way to patients on ICUs whose access may be impeded behind respirators, monitoring lines, and instruments, and a multitude of tubes and IV lines.
- The task type can vary considerably. Thus, acute care teams must have or be able to access a broad spectrum of clinical skills, rules, and knowledge. In every healthcare specialty, providers can be confronted with a great variety of medical or trauma emergencies. In addition, several specialties (e.g., anesthesia, emergency medicine) have to deal with a broad spectrum of patient characteristics (e.g., from neonatal to geriatric multimorbid patients) demanding very different sets of clinical abilities.

11.3 Team Process

Team processes are intertwined with the way team members communicate and coordinate their activities. Team processes have been an important focus for team research because they determine whether teams will be effective or ineffective. The individual characteristics that make a team member a good team player have already been listed. However, a successful outcome of teamwork requires adequate interaction of all team members involved. Several models (Fleishmann and Zaccaro 1992) have identified team process factors that enable, support, and enhance team performance (Table 11.1). Team processes are a management tool to expedite high-quality care to patients. They give caregivers increased control over a constantly changing environment and form a safety net that helps protect patients and healthcare providers from the consequences of inevitably occurring errors (Sexton 2004). Teamwork will only function in critical situations if team processes are exercised and perfected

Table 11.1 Characteristics of a good team process in a medical high-stakes environment

Team process factor	Action
Team formation and positive team climate	Develop a "we" feeling
	Demonstrate mutual respect in all communications
Establish team leadership	Encourage leadership behavior in non-routine situations
	Establish a team leader
	Assign roles and responsibilities
Solve conflicts constructively	Try to see the positive aspects of a conflict
	Avoid struggle for power with team members
	Focus on "what is right" not "who is right"
Apply problem-solving strategies	Whenever appropriate, use problem-solving strategies (e.g., FOR-DEC, DECIDE)
Communicate and share mental models	Create a "psychologically safe" environment for team members to speak up
	Offer and request information
	Develop and verbally maintain a shared mental model
Coordinate task execution	Profit from implicit coordination and strive for explicit coordination
	Coordinate planned actions
Cross-monitor teammates	Monitor teammates' performance
	Address critical issues
	Anticipate possible results
Share workload and be true to your performance limits	Monitor the workload of team members
	Offer backup behavior
	Communicate clearly, when you have reached your performance limit
Improve team skills	Engage in informal and formal team training measures (personal feedback, team debriefing, simulation)

After the MedTeams Project; Risser et al. (2000)

through frequent practice – that is, we have to practice teamwork so that in an emergency we can rely on it.

11.3.1 Team Formation and Positive Working Climate

Good teamwork provides the foundation to accomplish daily operational task objectives, but it does not simply "happen." Rather, it must be taught, consciously implemented, reinforced, and maintained. Teamwork grows in a trustful, cooperative climate that has to be nurtured, for example, by respectful communication. Only within a psychologically safe work environment will employees mention seemingly "unimportant" information or concerns about the safety of planned actions. Team formation is a leadership task *and* the task of every single member. The cohesion within the team and respectful interpersonal relationships play a vital role in the successful management of a critical situation.

11.3.2 Establish Team Leadership

The clinical leadership role in an in-hospital emergency is usually assigned to a physician, whereas in the case of on-scene management, the leadership role can vary between different people (e.g., emergency physician, EMS team leader, chief firefighter), depending on which task is being executed at the moment (e.g., medical treatment, technical rescue). In some emergencies (i.e., cardiac arrest in the general ward), the performance environment may be noisy and chaotic, with many people involved. When emergent events occur in unusual places or under unusual circumstances, it is common to have confusion about who is the clinical leader. In this case, the person best capable of managing the crisis should actively take the role of clinical team leader. This is especially important for situations with an unrehearsed group that is called together in an emergency from different disciplines and professional groups (Murray and Foster 2000). This kind of emergent leadership behavior should be encouraged in unstructured situations. But in routine tasks where roles and functions are clear, it should be crystal clear if who is the clinical leader.

Many hospitals are adopting an organizational approach to high-stakes situations and have two leaders with different functions. One is the clinical leader, usually a physician, who leads the multidisciplinary team in the clinical care of the patient. The other is an event manager, often a nurse, who takes charge of resourcing the event, e.g., calling for pharmacy and respiratory therapy, allowing people into the room and asking others to leave, calling for equipment, etc.

Good leaders change their focus frequently between ensuring that clinical tasks are executed and that team coordination is maintained. A good clinical leader seeks to prevent overload of individual team members by distributing responsibility and workload in a well-balanced way and insists on good two-way communication. A good event manager ensures that the right people, equipment, and medications are available.

11.3.3 Solve Conflicts in a Constructive Way

Conflicts are an inherent part of team performance. Whenever different people assess a situation, different points of view will emerge because everybody has unique motivations, knowledge, and information about the situation. In this respect, conflicts are necessary, helpful, and constructive. The contribution of diverse opinions can support a team to get a more comprehensive picture of a situation. However, if conflicts turn into power struggles, they become destructive: "Who's right" instead of "what's right" is the kind of conflict that will invariably and severely impair team performance. As a general rule, *relational conflicts* should not be addressed in an emergency situation but rather in a follow-up discussion, when stress has eased and emotions have calmed down. In contrast, *task-related conflicts* (e.g., the choice of the right treatment) should always be resolved even if it seems cumbersome. In addition, each team member should feel empowered to speak up and voice concerns so that all arguments and all information flow into decision-making. While the contribution of the team members is crucial for decision-making, professional conflicts are not solved democratically. The leader makes the decisions and is responsible for them.

11.3.4 Apply Problem-Solving Strategies

The medical care of the patient with two entrapped arms is not an everyday problem. As a result, the practical approach to this problem cannot be deduced from a rule but instead needs team-based problem solving. Critical situations with moderate time pressure are best solved when a problem-solving strategy is applied. One way to strengthen this process is to apply problem-solving strategies that contain all essential steps. Two example strategies, DECIDE and FOR-DEC, were discussed in Chap. 10.

11.3.5 Communicate and Share Mental Models

Only the information that team members verbally communicate to their teammates will contribute to the overall situation awareness and to decision-making (Leonard et al. 2004). Only when team members feel psychologically safe within the team environment will they speak up when they have information or concerns. By psychologically safe, we mean that individuals feel safe to state their observations and concerns without fear of being ridiculed or embarrassed and that they will be respected and valued team members. Good communication in critical situations is aimed at creating a shared mental model of patient-related and operational issues, thereby "getting everyone on the same page."

The term "shared mental model" (Chap. 10) refers to the team members' knowledge and beliefs concerning the task, the relevant environment, the role and functions of each team member, and the available resources (Cannon-Bowers et al.

1993). When team members reach a shared understanding of these factors, they can coordinate their actions and, through ongoing communication and updates, adapt to the demands of the task and the team.

Developing shared mental models for a problem creates a context within which decisions can be made and the cognitive resources of the entire team can be exploited (Stout et al. 1999). Such shared knowledge enables each person to carry out his or her role in a timely and coordinated fashion, helping the team to function as a single unit with minimal negotiation of what to do and when to do it. The greater the degree of accuracy and overlap among team member mental models, the greater the likelihood that the team members will predict, adapt, and coordinate with one another successfully, even under stressful or novel conditions. Essential for the accuracy and commonality of the situational picture are regular updates of the members' mental models.

If teams want to achieve a shared mental model, they need time to communicate verbally, ideally before the start of the common task, e.g., during a team time-out before a surgical operation. Questions that help to build shared mental models:

- What is the patient's problem? What exactly are we going to do to help the patient?
- Who is on the team, what are our names, and what are our roles?
- What are the expectations for sender and receiver when speaking up and sharing information?
- What resources do we have? What resources might we need and how will we get them if needed?
- What problems might we expect during the procedure and, if they happen, what is the plan for managing and ameliorating them?
- Who in our team is responsible for which subtasks?

To maintain a common understanding, team situation awareness (Chap. 8) is needed. Team members should regularly scan the environment for relevant cues and patterns and then communicate information to the team. It is incumbent on all team members to help each other integrate new information into the team's existing knowledge structures and plans. A noteworthy axiom is that there is no chance that team members will see things similarly unless things are verbalized. Put another way, "Assumptions are the bedrock of mishaps in high-performance, high-stakes teams."

11.3.6 Coordinate Task Execution

Coordination of actions is necessary because of time pressure, differing technical knowledge and roles, and the need for parallel operations by team members. Shared mental models allow teams to anticipate, without too much talking, each other's resource needs and actions (implicit coordination), especially when workload becomes high and the amount of communication naturally decreases.

However, if teams rely too heavily on implicit coordination, they are prone to suddenly find themselves overwhelmed by a problem exactly because an individual's or the team's unspoken expectancies are not met. A good team process will be characterized by team members defining the problem much more explicitly, volunteering relevant information, articulating plans and strategies, discussing contingencies, explaining the rationale for a decision to all teammates, and by allocating and coordinating responsibilities within the team (explicit coordination).

11.3.7 Cross-Monitor Teammates

Complexity, coupling, and opacity increase the likelihood of errors. In order to mitigate the effects of inevitably occurring patient safety errors, healthcare providers should be encouraged to monitor their team members. They should ask critical questions and voice concerns if one believes that an action may harm the patient ("four-eyes principle," cross-monitoring) or if a plan or task may be less than optimal. If the clinical work environment actively embraces the idea of mutual monitoring for errors regardless of rank, discipline, or specialty, cross-monitoring will reduce clinical errors considerably. One caregiver's error can often be prevented or corrected by another caregiver. Cross-monitoring and speaking up implies a working climate of open communication and a willingness to accept help from others, irrespective of their professional status, i.e., a climate of "what's right" needs to predominate instead of "who's right." In an environment where this is not the case, slips, lapses, poorly executed actions, and faulty plans will go unnoticed or remain unchallenged. In a high-stakes performance environment where human fallibility is known and accepted to be always present, cross-monitoring has the power to provide a safety net that can protect both the patient and the caregiver.

11.3.8 Share Workload and Be Mindful of Performance Limits

Mutual monitoring is not confined to the detection of errors but also includes the workload status and the performance limits of each team member. High workload has been widely shown to degrade performance in individuals and to have a negative effect on team performance. In addition, high workload conditions increase the need for explicit coordination among team members (Urban et al. 1995). Critical situations can bring healthcare providers to a point where they may be overwhelmed by the task load and personal stress. Therefore, team members should make it a habit to monitor the workload of other members and to offer help early and readily. On the other hand, when team members feel that their personal limit is reached, they should communicate this to the team, e.g., "Things are going too fast for me, please slow down" or "I'm not ready yet, please do not continue. I'll tell you when"). Do not hesitate to ask for help!

11.3.9 Improve Teamwork Skills

Teamwork is not an automatic consequence of placing healthcare professionals together in the same shift or room. Teamwork depends highly on the set of social and interpersonal skills discussed in this book that should be taught in training programs in a systematic and efficient way. In order to achieve this objective, any training effort should be underpinned by a properly developed skills framework. Ideally, this skills framework should

- Have empirical data to substantiate learning activities and objectives
- Developed into structured skill and team taxonomies to facilitate instruction and
- Include feedback to the team vis-à-vis post-case debriefings that explores and rectifies gaps in team performance

Based on the framework of the European aviation marker system NOTECHS (NOn-TECHnical Skills; Flin et al. 2003b), several very similar sets of behavioral markers have been developed for healthcare. These adaptations of NOTECHS include ANTS for anesthetists (Fletcher et al. 2003), NOTSS for surgeons (Yule et al. 2006), OTAS for surgical teams (Healey et al. 2004), and UTNR for neonatal resuscitation teams (Thomas et al. 2004). Other frameworks include TeamSTEPPS (AHRQ 2008), MedTeams (Morey et al. 2002), and others.

Numerous healthcare team training programs have been developed and implemented in response to the patient safety crisis. Some of these programs are specialty-specific (e.g., anesthesia, obstetrics, pediatrics, emergency medicine), whereas others are multidisciplinary. Two complementary categories of team training have become widely used: programs that rely heavily on state-of-the-art simulators and others that primarily use didactic classroom team training (Overview in: Hunt et al. 2007; Sundar et al. 2007). With the recent advent of virtual worlds, a third team training opportunity is emerging that enables participants to engage in a multiplayer mode with standard in-hospital scenarios (Youngblood et al. 2008; Theodoropoulos et al. 2007) as well as with trauma and mass casualty scenarios in city buildings and on streets (Dev et al. 2007).

Whereas most of the simulation-based team trainings have adapted courses from Crew Resource Management (CRM) conducted in commercial and military aviation (e.g.; ACRM; Howard et al. 1992), classroom-based programs offer interactive training that incorporates facilitated discussion, role playing, case studies, behavior modeling, and knowledge testing. Many of the principles that are advocated and behaviors that are taught are similar across programs. The strongest team training programs will offer a combination of classroom and simulator training.

Although research unequivocally supports the notion that teamwork skills can be learned and systems can be designed to enhance team performance (e.g., Morey et al. 2002), the acquisition and maintenance of team behaviors requires a supportive organizational culture, sufficient time, and regular refresher and reinforcement training opportunities. Unfortunately, culture trumps training. A number of central aspects of team training (e.g., open communication, cross-monitoring, and speaking

up across the authority gradient when necessary) run counter to the prevailing professional culture in most institutions. Thus, a critically important challenge facing the success of team training efforts will be to have leadership that clearly values clinical teamwork and to provide sustained on-the-job support and reinforcement.

11.4 Why Teamwork Can Go Wrong

Given that teams represent increased cognitive resources compared with individuals, we might take it for granted that teams perform better than individuals: After all, they represent multiple ears, eyes, and brains that can contribute a substantial amount of information, situational awareness, and proposed courses of action. In addition, workload can be shouldered by all team members. Yet the presence of others can actually degrade the performance of an individual team member. If basic principles of a successful team process are neglected or if teams operate under stress without support from other team members, internal team dynamics will develop that lead to lower performance of the whole team than what might have been expected from the sum of its parts (Badke-Schaub 2000; Schulz and Frey 1998; Orasanu and Salas 1993). What do we know about the underlying mechanisms?

11.4.1 Deficits of the Individual

Some teams fail to perform well because individual team members lack clinical or team skills. When individual skills are deficient, other team members must compensate accordingly. There are two problems that arise in this type of situation. First, team members must become aware that there is a skill deficiency. This is not always easy to know because clinically weak members often do not think of themselves as weak or may be unwilling or too uncomfortable to state their deficiency or lack of confidence. The second problem is that other team members, once they become aware of the deficiency, must spend some of their valuable attentional, cognitive, and physical resources to fill in where the team is weak.

While having sufficient clinical skills is one important aspect of having a strong team, there are other factors to consider as well. First, a team needs to be adequately structured for an individual to know what he or she is supposed to do, i.e., there must be role clarity. Second, team members must be willing to try to be good team players. There are people who simply don't want to or can't perform well in a team environment for reasons such as:

- Individual characteristics such as personality or behavioral characteristics (e.g., self-centeredness, excessive perfectionism)
- Absence of skills that support the team process (e.g., communication skills, physical limitations such myopia or late-onset hearing impairment). For exam-

ple, if a team leader lacks the necessary communication and leadership skills and ability, teamwork will become virtually impossible.

Besides being unable to be a good team player, there is also the possibility that a team member is unwilling to work with other members of a team. This may be the case if team members:

- Are forced to work as part of a team, although they actually prefer to work alone
- Have to cooperate with people they dislike
- Try to solve an interpersonal conflict with other team members (often from other specialties of professional groups) by means of a patient case
- Seek to use a team for their own interests
- Use their role within a team to resolve power issues
- Do not work with full motivation but let others do the work and benefit from teammates' efforts ("social loafing")

11.4.2 Deficits of the Team

11.4.2.1 Communication Deficit

Dynamic exchange of information and resources and coordination of actions are vital if a critical situation is to be managed successfully. Without communication, it is impossible to develop a shared understanding of the situation and to act in concert. If critical information is not shared, decisions will be made on the basis of less complete data. Misunderstandings can arise when mental models are not shared. Lack of communication leads to a failure to announce intended tasks and to a reluctance to challenge assumptions about the appropriateness of actions taken by other team members (Stout et al. 1999). Due to the vital importance of communication regarding team activity, Chap. 12 deals with the subject extensively.

11.4.2.2 Unclear Specification of Responsibility

If leadership is not clearly established in an unstructured situation, and if teams fail to agree on responsibilities in critical situations, we will see a diffusion of responsibility (Darley and Latane 1968): Some tasks (e.g., the easiest or least risky) tend to be addressed by several team members, although one person might have been enough and other tasks may remain undone because everybody expects somebody else to take care of it. When roles are not clear, time limits for critical tasks may pass without action because team members are unaware of their responsibilities nor the need for timely execution of assigned tasks. If several healthcare providers are in charge of an emergency without having agreed on a team leader, then the tendency for risky decisions may increase because nobody will have to fully account for the clinical care (*risk shift*; Kogan and Wallach 1969).

11.4.2.3 Shared Misconceptions

Teams and team members may develop different and unspoken conceptions of how the team should function. Some examples include:

- Teams can develop a tendency to follow a "majority rules" approach in their decision-making instead of rational arguments.
- Our psychological cognitive and affective dispositions to respond (Chaps. 6 and 10) can affect the entire team.
- Team members may assume that other members of the team know what to do without verbally coordinating decisions and actions.
- Individuals naturally tend to perceive that others on the team see things exactly the same way even though this is practically never correct.
- Successful teams, ones who've worked together before, may succumb to an *illusion of unanimity* and invulnerability. The internal reasoning goes along this line: "If every single team member agrees with a solution, it cannot be wrong." The pitfall is that because all team members are in agreement, they see no further need to discuss other possible options. Thus, the search for solutions is abandoned too early. Expert opinion from outside the team is not requested and the team unknowingly suspends its rational judgment.

11.4.2.4 Development of Peer Pressure

If group cohesion is highly valued by the team, dissent and discussions are easily seen as a threat. Proposals from a leader unite the team in a course of action so they are not challenged. Once the majority of the team members have formed an opinion, they will stick to it even when faced with contradicting information that proves an opinion wrong and unrealistic. Criticism by dissenting members is suppressed; disagreement is seen as disruption. Team members are ignored or bullied instead of rationally convinced. The danger of peer pressure lies in the failure to rationally explore potential decisions and actions because only those pieces of information that confirm a decision or course of action are used in the decision-making process. In the context of peer pressure, the problem is that once a treatment path has been chosen, the team can become surprisingly inflexible to change because nobody expresses doubt or asks critical questions.

11.4.2.5 "In-Group" and "Out-Group"

The feeling of togetherness and mutual support can stimulate teams into exceptional and outstanding performance; however, if this feeling of togetherness becomes excessive, teams tend to set boundaries between themselves and other teams. This can also happen between subteams: "We" are right, "they" are wrong; "we" know best, "they" do not. Teamwork under these circumstances no longer encompasses all parties involved – group interests may unconsciously outweigh the interest for the patient's health.

11.4.2.6 Groupthink

Groupthink is a term applied to situations wherein a highly cohesive group subjected to considerable pressure tries to minimize conflict and reach consensus

Table 11.2 Eight symptoms indicative of groupthink

Illusion of invulnerability	Creates excessive optimism and encourages extreme risk taking
Illusion of unanimity	Resulting from self-censorship of deviations, and augmented by the false assumption that silence means consent, team members believe that all team members hold a common view
Collective rationalization	Discounts warnings, which might lead to reconsidering assumptions before recommitting to past decisions
Unquestioned morality	Inclines members to ignore the ethical or moral consequences of decisions because of unquestioned belief in the group's inherent morality
Stereotyped view	Characterizes the opposition as too evil for genuine negotiation or too weak and stupid to effectively oppose the group's purposes
Direct pressure	Discourages dissent by any member who expresses strong arguments against any of the group's stereotypes, illusions, or commitments
Self-censorship	Reduces deviations from the apparent group consensus, reflecting each member's inclination to minimize to himself the importance of his doubts and counter arguments
Self-appointed mindguards	Attempt to protect the team from adverse information that might shatter their shared complacency about the effectiveness and morality of their decisions

Adapted from Janis (1972)

without critically testing, analyzing, and evaluating all options (Janis 1972; Table 11.2). Although group cohesion has been shown to be the most important antecedent to groupthink, it will lead to groupthink only if one of the following two antecedent conditions is present:

- Structural faults in the organization: insulation of the group, lack of tradition of impartial leadership, lack of standard operating procedures, homogeneity of members' social background and ideology
- Provocative situational context: high stress from an emergency situation, recent failures, excessive difficulties with the decision-making, ethical dilemmas

In the context of acute medical care, provocative situational factors can prevail. The effect of acute stress and the feeling of incompetence can severely degrade a person's individual and teamwork abilities and propagate groupthink. Chapter 9 addresses the pathology of teamwork in emotionally strained situations.

11.4.2.7 The Organizational Context

The organizational context or environment surrounding a team plays an important role in groupthink. For example, although the emergency physician, the emergency medical technicians, and the firefighters were dispatched from different sites and from different organizational cultures, they are nevertheless embedded in larger organizations (e.g., hospital, EMS organization, fire department). An organization can impact teams working in their sphere of influence via:

- Structure of leadership
- Working climate, corporate identity
- "Us vs. Them" thinking, sometimes called "tribalism" in healthcare
- Safety culture
- Resource allocation

If the institutional culture tolerates disrespectful interactions among the different disciplines and specialties, this will negatively affect cooperation. Healthcare providers may not support one another more than absolutely necessary and a real team spirit will not develop. On the other hand, if senior healthcare providers (e.g., physicians, nurses) ask their coworkers to monitor their decisions and actions and give feedback on any concerns, then a top-down model encouraging safe behavior will develop.

Organizational deficiencies do not always lead immediately to bad teamwork. Highly motivated teams can compensate for these problems for a long time. For instance, during unusual, temporally bound situations like a staff shortage for a shift in an intensive care unit, personal commitment to patient care can increase. In the long run, however, this strategy will prove to be weak. Healthcare workers will become overstrained, motivation will diminish, and job satisfaction will decrease. And staff burnout will likely increase (Chap. 9).

On the other hand, the organizational context can support and reinforce competent teamwork by creating a supportive safety culture and by providing sufficient resources in terms of training, staff, equipment, and working conditions. This will positively affect the stress level of team members and the quality of team performance. A comprehensive information system, a functional educational system, and a reward system for safety-conscious performance can further propagate effective teamwork in a high-stakes environment. Chapter 15 covers this topic in greater detail.

11.5 Tips for Daily Practice

- If you want to benefit from a good team process in a critical situation, you need to rehearse team skills on a frequent basis. In an emergency situation, only well-developed habits and skills will be available (i.e., behavior that has been practiced time and again).
- Make respectful interactions a routine practice.
- When differences of opinion arise, focus on "what's right" not "who's right."
- Clarify roles and functions in an emergency. You cannot manage without role clarity.
- People cannot read your mind. State your perceptions and opinions clearly!
- You will not succeed if you do not talk! Talking is the way team members develop and maintain a shared mental model.

- Employ a simple concept to effectively manage workload: Watch out whether your teammates need help or information and ask for help or information for yourself.
- Teamwork and leadership are tightly connected. Many team problems are really problems of insufficient leadership.
- Everybody who is involved in the immediate care of the patient belongs to the team.

11.6 "Teamwork" in a Nutshell

- Teamwork is the cooperative effort by members of a team to achieve a common goal.
- Teamwork is an inherent feature of healthcare.
- High-quality, safe patient care depends on outstanding teamwork.
- Poor teamwork and communication breakdowns between members of healthcare teams are involved in most of the mishaps in healthcare.
- Research conducted in a wide variety of work environments, such as aviation, special forces, athletic teams, etc., have identified a close relationship between teamwork and performance in a high-stakes environment.
- Member interdependency and the need for coordination are key characteristics of a team.
- Superb individual clinical skills do not guarantee effective team performance. Corollary: a team of experts does not make an expert team.
- Communication is at the core of team performance. With it, teams will form readily and perform well; without it, they may not function as a team at all.
- Team performance (output) is the result of how a team utilizes (process) its available human and material resources given a specific situational context (input factors). The results of good team performance are safe patient care, low error incidence, good working climate, and team member satisfaction.
- There are identifiable team process factors that enable, support, and enhance team performance. These processes can be identified, taught, and mastered.
- If people manage to work together as a good team, then the team's performance in complex situations and under time pressure is much more effective than the actions of an individual.
- Teams in acute medical care have their own characteristic features and specific problems; in other words, learning about teamwork in other industries such as nuclear power, commercial aviation, etc., will not solve a problem of weak teams in healthcare.
- Teamwork can fail because team members lack clinical skills.
- Individual clinical skills and knowledge are not sufficient for successful team performance; the collective resources of the team must be appropriately organized and utilized through interaction processes.
- Communication is used to build shared situational mental models that are especially important when conditions demand nonhabitual responses. Once shared

models have been created, they provide a context for interpreting information, making decisions, taking actions, and adjusting a plan.
- A high level of situation awareness also provides a basis for predicting the needs of other team members.
- The old adage, "There is no I in TEAMWORK," it turns out, is well supported by research.
- The presence of others who are perceived by teammates as a threat or as being rude and disrespectful can degrade the performance of an individual team member. Dysfunctional personal relationships will negatively impact team performance.
- Teamwork behaviors and skills are teachable.
- Expert teams have been trained in both task work and teamwork skills.
- Organizations can reinforce good teamwork by creating a culture of mutual respect among caregivers, valuing patient safety, and by providing sufficient resources in terms of staff, training, and equipment.

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