Distractions in the Operating Room

Michelle Feil, MSN, RN
Senior Patient Safety Analyst
Pennsylvania Patient Safety Authority

ABSTRACT

Distraction is a threat to patient safety in the operating room (OR). Analysis of events reported through the Pennsylvania Patient Safety Reporting System from January 2010 through May 2013 revealed 304 reports of events occurring in the OR in which distractions and/or interruptions were indicated as contributing factors. Attention is warranted to all events impacted by distraction in the OR regardless of frequency, due to their high potential to result in serious patient harm. Distraction is particularly detrimental to performance of complex tasks that require higher levels of cognitive processing, such as those frequently encountered in the OR. Studies examining the impact of distraction in the OR setting, along with guidelines and tools developed by perioperative professional associations and patient safety agencies to limit and/or ameliorate the negative impact of distraction are discussed (e.g., application of the "sterile cockpit" concept from aviation, reducing distractions from technology and noise, use of surgical safety checklists and briefings, teamwork training). Engagement of surgeons and multidisciplinary teams is necessary to address the problem of distractions in the OR. (Pa Patient Saf Advis 2014 Jun;11[2]:45-52.)

INTRODUCTION

Distraction is defined as having one's attention drawn or directed "to a different object or in different directions at the same time."[1] The impact of distraction is influenced by multiple variables, including the characteristics of the primary task, the distractions themselves, and the environment.[2] In fact, distraction is to be expected in an environment, such as healthcare, that requires constant communication and coordination. Rivera-Rodriguez and Karsh concluded that distraction due to interruptions that are purposeful and share important information may actually improve care by appropriately refocusing attention and improving problem identification, collaboration, and communication[3] (e.g., clinical alarms, a request to "stop the line" when a member of the staff identifies a patient safety concern). Of greater concern is distraction due to nonpurposeful interruptions or operational failures that impair performance and contribute to error.

Distraction is particularly detrimental to performance of complex tasks that require high levels of cognitive processing.[4] Such tasks are encountered often in the operating room (OR) due to the complex nature of each work system factor: the physical environment, teamwork and communication, tools and technology, tasks and workload, and organizational processes.[5] Even minor distractions in the OR can have a cascade effect that ultimately results in major events and patient harm.[6] Healthcare facilities can reduce both the occurrence of distractions in the OR and their potential negative impact on patient safety by identifying the sources of distraction currently present and addressing them through application of strategies and tools such as those developed by perioperative professional associations and patient safety agencies.

BACKGROUND

Distractions occur frequently in the OR setting, both due to intrinsic sources (e.g., surgical equipment alarms, surgical team communication relevant to the procedure) and extrinsic sources (e.g., beepers, phone calls, communication from staff outside the OR).[7] Distractions can affect all members of the surgical team: anesthesiologists and nurse anesthetists, nurses, perfusionists, surgeons, surgical technicians, and other team members. Cognitive workloads are demanding for each of these professionals, with high levels of cognitive processing required of different members of the team at different times, resulting in multiple high-risk points in the course of an operative procedure.[8]

OR team members can serve as both the source and the recipient of distracting communication. An observational study of distracting communications in the OR by Sevdalis, Healey, and Vincent identified many case-irrelevant communications (CICs), defined as communication not relevant to the surgical procedure in progress. Half of all CICs consisted of "small talk." Although surgeons initiated and received the greatest number of CICs, visitors to the OR (defined as external staff not belonging to the OR team involved in the current surgical procedure) initiated CICs with the highest levels of observable distraction (i.e., causing team members to pause, disrupting workflow).* Communications directed to nurses and anesthesia providers resulted in higher levels of distraction than communications directed to surgeons.[9]

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*At the time of this writing, new research was published by Sevdalis et al. that identified communication from external visitors directed to the surgeon or the entire OR team as statistically the most distracting ($p < 0.05$). Lack of coordination between hospital departments was identified as the most disruptive problem. A statistically significant correlation ($p < 0.05$) was found between more frequent and/or severe communication distractions and failure to complete intraoperative patient safety checks, even with experienced teams. (Sevdalis N, Undre S, McDermott J, et. al. Impact of intraoperative distractions on patient safety: a prospective descriptive study using validated instruments. *World J Surg* 2014 Apr;38[4]:751-8.)

Distraction from computers and personal electronic devices (PEDs) is also a growing concern for OR teams. The widespread use of computers in clinical settings, along with the recent rapid growth in the use of cell phones and smartphones, has contributed to a heightened focus on the potential for error and harm caused by distractions that result from the use of these devices, particularly within the OR environment. "Distracted doctoring" is a term coined by the media to describe this phenomenon.[10-12] Furthermore, distraction from smartphones and other mobile devices was identified for the first time as one of the top 10 health technology hazards for 2013 by ECRI Institute.[13]

In a 2011 study of perioperative nurses' perceptions of near-miss patient safety events (defined as deviations in care with clearly significant potential consequences), distractions and interruptions were listed as one of the most common causal factors, second only to communication between team members.[14] Also in 2011, the Association of periOperative Registered Nurses (AORN) surveyed its members to determine what they considered the highest-priority patient safety issues.[15] As a follow-up, in 2013, AORN published a set of recommendations that highlighted preventing distractions and interruptions as key strategies to address 3 of the top 10 patient safety issues identified in the survey: wrong-site surgery, retained surgical items, and specimen mismanagement errors.[16] These three event types are supported as priority focus areas in analysis of reports to the Pennsylvania Patient Safety Authority for events occurring in the OR related to distractions.

OR DISTRACTIONS IN PENNSYLVANIA

Analysis of events reported through the Authority's Pennsylvania Patient Safety Reporting System (PA-PSRS) from January 2010 through May 2013 revealed 304 reports of events occurring in the OR in which distractions and/or interruptions

Table 1. Surgery or Invasive Procedure Problems Attributed to Distractions in the Operating Room, as Reported to the Pennsylvania Patient Safety Authority, January 2010 through May 2013

EVENT SUBTYPE	NO. OF REPORTS	%
Count incorrect—equipment	39	23.1
Count incorrect—needles	27	16.0
Preparation inadequate/wrong	19	11.3
Break in sterile technique	12	7.1
Count incomplete/not performed	11	6.5
Other (specify)	11	6.5
Procedure delayed	10	5.9
Foreign body in patient	9	5.3
Wrong side (left versus right)	9	5.3
Count incorrect—sponges	7	4.1
Wrong procedure	4	2.4
Wrong patient	3	1.8
Identification missing/incorrect	2	1.2
Procedure canceled/not performed	2	1.2
Wrong site	2	1.2
Procedure not completed	1	0.6
Unintended laceration/puncture	1	0.6
Total	**169**	**100.1***

* Total percentage is greater than 100 due to rounding.

were indicated as contributing factors. The majority of these events were reported as errors related to procedures, treatments, or tests (73.7%, n = 224). Within this event type, surgery or invasive procedure problems were reported most frequently (75.4%, n = 169), followed by laboratory test problems (19.2%, n = 43).

Of the surgery or invasive procedure problems (see Table 1), the subtypes reported with greatest frequency were incorrect counts of equipment (n = 39) and incorrect needle counts (n = 27). Of note, within the subtype labeled "Other," three events involved specimen mishandling during the procedure and three events involved the use of expired products or implanted materials that were discovered after having been used as part of the procedures.

Of the 43 laboratory test problems (see Table 2), the event subtypes most frequently reported were mislabeled

specimens (n = 10), incomplete or missing specimen labels (n = 10), specimen quality problems (n = 7), and specimen delivery problems (n = 7).

Attention is warranted to all events impacted by distraction in the OR regardless of the frequency with which they are reported, due to their high potential to result in serious harm. The following are examples of Serious Events (i.e., events involving patient harm) reported through PA-PSRS associated with distraction in the OR:

— Wrong-side surgery

— Wrong-site surgery

— Transfusion of the wrong blood to the wrong patient

— Failure to remove a piece of resected bowel, requiring a return to the OR

— Injection of a patient using an unlabeled syringe and needle previously used on another patient

Table 2. Laboratory Test Problems Attributed to Distractions in the Operating Room, as Reported to the Pennsylvania Patient Safety Authority, January 2010 through May 2013

EVENT SUBTYPE	NO. OF REPORTS	%
Mislabeled specimen	10	23.3
Specimen label incomplete/missing	10	23.3
Specimen quality problem	7	16.3
Specimen delivery problem	7	16.3
Result missing or delayed	4	9.3
Other (specify)	2	4.7
Test ordered, not performed	2	4.7
Wrong test performed	1	2.3
Total	**43**	**100.2***

* Total percentage is greater than 100 due to rounding.

— Failure to notice a significant loss of evoked potential from a patient's arm during spinal surgery

— Inflation of a tourniquet applied to a patient's leg for longer than intended, resulting in neurovascular changes

DISCUSSION

The Authority has published previously on the topic of distraction, noting that hospitals can consider steps to reduce the impact of distraction by recognizing common sources of distraction and situations that are distraction-prone, identifying clinical tasks or procedures that are most likely to result in medical error and patient harm as a result of distraction, and applying specific risk reduction strategies.[17] To support hospitals in these endeavors, the Authority sought to find examples of best practices and specific tools currently in clinical use that could be shared with hospitals in Pennsylvania. The perioperative area was identified as the healthcare setting in which the most concrete work has been done to identify such practices and develop tools to address the problem of distraction.

Limiting Distraction in the OR

One approach to managing the problem of distractions in the OR is to employ primary prevention strategies to decrease the incidence of distractions. Specific strategies supported in the literature include implementing the "sterile cockpit" rule and reducing distractions from technology and noise.

"Sterile cockpit." The concept of the "sterile cockpit" comes from aviation. It describes a protocol that applies during critical periods of high mental workload and high risk, when all communication in the cockpit is restricted to information necessary for handling the plane (i.e., during taxi, takeoff, landing, and any flight operations below 10,000 feet). This rule not only prohibits nonessential conversation but also eating, reading materials not relevant to operating the plane, and any activity that "could distract any flight crewmember from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties."[18]

In order to apply the "sterile cockpit" rule in the OR, it is necessary to first define the critical phases of operative procedures during which the rule would apply. Critical phases for the OR team have been defined as briefing, time-out, and debriefing.[16,19] Difficulty lies in further identifying critical phases common to the entire team, as the tasks and their associated cognitive loads vary over the course of the procedure, with different roles experiencing higher or lower levels of mental workload at different times.[8] For instance, anesthesiologists have designated induction and emergence as critical phases in the administration of anesthesia that are analogous to takeoff and landing.[20]

But for surgeons, critical phases of an operative procedure may occur at various points during the procedure depending on the steps involved[8] (e.g., creation of an anastomosis, nerve dissection). And for nurses, surgical counts and specimen labeling are examples of critical phases.[16]

Identification of critical phases may also vary depending on the type of procedure. For example, in a study examining the feasibility of applying the "sterile cockpit" concept to cardiopulmonary bypass surgery, researchers found it was more beneficial to define critical phases according to procedure-specific events (e.g., establishment of activated clotting time, initiation of cardiopulmonary bypass, administration of cardioplegia) rather than specific time intervals. A structured communication protocol was implemented during these critical events, and miscommunications during those times were reduced by half.[8] In a similar study evaluating the use of an intraoperative pathway for deep inferior epigastric perforator flap breast reconstruction surgery, nine critical stages were identified (e.g., induction, perforator dissection/flap harvest, recipient vessel harvest). The activities for each staff member were defined for each stage, and checklists and interphase transition briefings were used to standardize processes, resulting in improved interdisciplinary communication and statistically significant reductions in OR time and costs.[21]

Reducing distractions from technology. Beyond distraction from cell phones and pagers, distraction from the use of newer technologies, such as smartphones and other PEDs, is a growing concern in healthcare.[10-12,22,23] In addition to phone calls and text messages, these devices

introduce distractions from social media, e-mail, and other forms of electronic communication. The compulsion to constantly check PEDs is being recognized as an addiction that is impacting users of these devices, not least among them healthcare providers.[24] As of this writing, AORN is updating its position statement on noise in the perioperative setting to include new suggestions for preventing distractions from PEDs during critical phases of perioperative care.[25]

Information on hospital cell phone policies is limited. Anecdotal information gathered from administrators and OR staff suggests that in hospitals that have established such policies specific to the OR setting, cell phone use is typically banned, though these policies are not strictly enforced, nor do they apply to surgeons. In general, hospitals that have established institution-wide policies regarding cell phone use tend to restrict the personal use of cell phones to non-work time in nonpatient areas.[26]

In 2008, the American College of Surgeons (ACS) issued an official statement on the use of cell phones in the operating room in which it recognized that "the undisciplined use of cellular devices in the OR—whether for telephone, e-mail, or data communication, and whether by the surgeon or by other members of the surgical team—may pose a distraction and may compromise patient care." ACS did not propose a ban on cell phone use; rather, it listed 10 considerations to guide appropriate use, including avoiding personal calls, silencing ringtones, forwarding calls, and setting a distinct alert for emergency calls.[27]

AORN has similarly recommended that OR staff leave cell phones and pagers with someone outside the procedural environment whenever possible, properly identify cell phones and pagers that must be answered, place any nonessential communication devices on mute or standby during surgery, and limit external communication to urgent or emergent conversations.[28]

While cell phones, pagers, and smartphones have introduced new distractions in the healthcare setting, these technologies may also hold the key to better handling interruptions to workflow. Clinicians prefer synchronous communication (e.g., face-to-face or telephone conversations) and engage in more of this type of communication over asynchronous communication (e.g., numeric or alphanumeric paging, text messages, voicemail). Both types of communication produce frequent interruptions, with synchronous communication being the most disruptive.[29] Asynchronous communication using newer technologies provides a way for the sender to communicate information to the receiver while allowing the receiver to review the information and respond at a later time, if appropriate, thereby decreasing interruptions to their workflow.[30,31]

Reducing distractions from noise. In addition to the types of OR noises already discussed (from verbal communication, cell phones, pagers, and PEDs), other sources of noise in the OR include music, surgical equipment, and clinical alarms. Noise has been linked to miscommunication and impaired performance, even when the noise level falls within the range of normal conversation and ambient background noise. Performance has been found to further deteriorate with higher noise levels, most notably noise from music.[32] Music is of particular concern, as more than 60% of personnel report listening to music in the OR and more than 50% prefer to listen to music at medium to high volumes.[33]

Well-designed and properly managed clinical alarms may be considered distractions or interruptions that are purposeful and share important information. Clinical alarms are intended to improve problem identification and appropriately refocus the attention of clinicians.[2] False alarms, also called nuisance alarms, are sources of noise and distraction that disrupt patient care and impair clinician performance. Aside from this direct effect, frequent false alarms can distract clinicians, causing them to fail to recognize "real" events.[34] In a review of the literature, Konkani et al. concluded that individualizing alarm settings for each patient's condition is the most direct method for decreasing false alarms. Promoting a hospital culture that emphasizes the importance of alarm customization and using smart alarms, when available, are also suggested.[35]

Reducing harm associated with clinical alarm systems has been identified as a new 2014 National Patient Safety Goal by the Joint Commission.[36] ECRI Institute has identified hazards from clinical alarms as number one on its list of the top 10 health technology hazards for 2014 and offers a free Alarm Safety Resource Site, available at https://www.ecri.org/Forms/Pages/Alarm_Safety_Resource.aspx, that contains guidance and tools to help healthcare facilities improve alarm safety.[37]

Tools to Ameliorate the Impact of Distraction in the OR

In recognition of the fact that distractions will continue to occur in the OR environment despite implementation of strategies to limit their occurrence, secondary prevention strategies to ameliorate the impact of distractions are necessary. Surgical checklists and preoperative briefings are two tools that can help the OR team achieve and maintain situational awareness and avoid and/or recover from the negative effects of distraction.

Surgical checklists. When distraction diverts attention from a primary task, the likelihood of committing an error upon return to the primary task is increased.[4] Checklists are a tool to focus the attention of the surgical team on the primary task (i.e., the operative procedure) and to aid the team in quickly regaining that focus after encountering a distraction. Checklists make explicit the minimum expected steps that comprise a complex

process and aid memory recall, particularly in situations that are distraction-prone and require high cognitive workload.[38] When used during an operative procedure, a checklist serves as an event-based cue that aids memory recall by providing information about what steps in a procedure have been completed and what steps remain to be performed.[39]

Surgical checklists have been developed by the Joint Commission,[40] the World Health Organization (WHO),[41] and AORN.[42] The Authority has also developed a preoperative checklist, which is available as part of an extensive collection of tools and resources designed to help hospitals prevent wrong-site surgeries.[43] This collection is available on the Authority's website at http://patient safetyauthority.org/EducationalTools/PatientSafetyTools/PWSS/Pages/home.aspx and includes a tool titled Actions to Satisfy Universal Protocol and WHO Surgical Safety Checklist that presents expanded advice from the Authority alongside recommendations from the Joint Commission and WHO.

Preoperative briefings. A checklist, in and of itself, does not communicate the complexity of a surgical case to all the members of the OR team. This is the purpose of a preoperative briefing. A briefing conveys "precise instructions or essential information"[44] about the primary task (i.e., the operative procedure) to all members of the surgical team. The beneficial impact of briefing on reducing distractions is illustrated in a study by Henrickson et al., which found a statistically significant (p < 0.05) decrease in surgical flow disruptions after implementing a cardiovascular-surgery-specific, multidisciplinary briefing protocol designed with input from all members of the OR team. The authors proposed that this is because a briefing promotes mindful engagement, open communication, and a shared mental model for the team. Without active participation in the briefing by all members of the team,

staff can become disengaged and "miss subtle migrations toward error during a procedure."[45] AORN specifically includes time for a briefing, time-out, and debriefing as part of the Comprehensive Surgical Checklist.[16]

Empowering the Surgical Team

It is only within a culture of patient safety, with effective teamwork, skilled leaders, and clear communication, that OR team members may feel empowered to take action to promote an environment with reduced distractions and to speak up when distraction is recognized to be impairing performance.

Teamwork training. Crew resource management (CRM) was developed by the aviation industry in 1979 in response to the devastating crash of United Airlines flight 173 that occurred as a result of distraction (the plane ran out of fuel while the flight crew was distracted by troubleshooting a problem with the landing gear).[46] CRM was later adapted to healthcare following the 1999 Institute of Medicine report *To Err Is Human: Building a Safer Health System*, in which a recommendation was made to apply aviation safety concepts to healthcare systems. CRM is a team-based training model that teaches cognitive and social skills that empower all team members to promote safety and improve performance. The training focuses on communication, decision making, interpersonal relations, team coordination, and leadership.[47]

Similar to CRM, Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) is a team-based training program that teaches skills in four domains: leadership, mutual support, situation monitoring, and communication.[48] Situation monitoring is "the process of actively scanning and assessing elements of the situation to gain information or maintain an accurate understanding of the situation in which the team functions."[49] The skills and tools

taught as part of this domain apply most directly to the challenge of managing distractions.[49]

Both CRM and TeamSTEPPS training include tools already mentioned, such as checklists and briefings. But beyond the use of these standardized processes and tools, both programs stress the importance of cross-monitoring and advocacy and assertion.[47,48]

— Cross-monitoring (i.e., "watching each other's back") is the action of "monitoring other team members by keeping track of their behavior and providing feedback [to ensure] that procedures are being followed appropriately."[49] This skill allows team members to help each other maintain focus on the primary task in the face of distraction.

— Advocacy and assertion involves speaking up about patient safety concerns, especially when the leader or other members of the team have failed to recognize the concern or do not believe the concern to be valid.[49] This skill empowers all team members, including surgeons, to speak up when they recognize a distraction or interruption is impairing performance or when they have identified the need for an intraoperative briefing because a critical phase in the procedure has been reached.

For more information on TeamSTEPPS, see "TeamSTEPPS Training."

Surgeon engagement and leadership. Lack of engagement from surgeons has been cited as a barrier to promoting a culture of patient safety in the OR. Guidelines, checklists, and protocols alone will not be effective without the input and ongoing support of surgeons.[47,50] In surveys of perioperative professionals, between 29%[51] and 43%[52] of respondents report being encouraged to speak up and report concerns during procedures. As OR team leaders, surgeons are expected to demonstrate leadership skills that are

foundational to establishing a culture of patient safety, as emphasized in CRM and TeamSTEPPS training. TeamSTEPPS training specifically notes that leaders should be able to effectively empower team members to speak up and openly challenge when appropriate and that effective leaders are responsible for ensuring that team members are sharing information, monitoring situational cues, resolving conflicts, and helping each other when needed[49]—all skills essential to both avoiding distraction and handling distraction in the OR.

RISK REDUCTION STRATEGIES

In addition to the risk reduction strategies outlined in the March 2013 *Pennsylvania Patient Safety Advisory* article "Distractions and Their Impact on Patient Safety,"[17] the following strategies are suggested for reducing distractions in the OR setting:

— Assemble multidisciplinary teams to identify critical phases in operative procedures, specific to individual teams and procedure types as necessary, that should not be interrupted.[8]

— Implement a "sterile cockpit" or "no interruption zone" protocol during critical phases of operative procedures.[8,16,19]

— Use preoperative and procedural checklists.[16,38,40,41,43]

— Design and implement a multidisciplinary briefing tool.[45]

— Use a structured communication tool, such as SBAR (Situation, Background, Assessment, Recommendation), especially during critical phases of a procedure.[45,47,48]

— Minimize communication by members of the OR team that is irrelevant to the current procedure, and limit interruptions from outside staff and other visitors to the OR.[9]

— Establish guidelines and expectations, applicable to all members of the surgical team, for the appropriate use of cell phones, pagers, smartphones, and other PEDs in the OR, and monitor for compliance.[24,26-28]

— Educate staff about electronic distraction and its potential detrimental effect on patient safety.[10-13,22-25]

— Raise awareness of the addictive component of PEDs and other technologies.[24]

— Reduce noise level in the OR whenever possible, especially during critical phases in the procedure[32,33] (e.g., limit conversation not relevant to the current procedure; lower the volume of background music; adjust surgical equipment settings to reduce excess noise, as able).

— Customize alarm settings for individual patients, and use smart alarms, when available, to reduce distraction from false or nuisance alarms.[35]

— Provide teamwork training, such as CRM or TeamSTEPPS, using case study scenarios specific to the OR.[47,48]

— Engage surgeons in patient safety teamwork training and quality improvement projects targeted to reducing distraction.[47,48,50]

— Ensure that surgeons and other OR team leaders promote a culture of patient safety, encouraging all team members to practice skills necessary for situation monitoring and to voice concerns at any point during a procedure.[47-50]

LIMITATIONS

In-depth analysis by the Authority for events occurring in the OR associated with distraction is limited by the information provided in PA-PSRS event report narratives. Much of what is known about distractions in the OR has been gained from observational studies in real or simulated OR environments. Given the complexity of the OR work environment and the ubiquity of distraction, the events reported through PA-PSRS may represent a small number of all events occurring in the OR as a result of distraction.

Additionally, distraction in the OR may contribute to procedural errors not recognized until the postoperative period (e.g., a leaking anastomosis on post-op day five), at which point the event may be reported as occurring on the postsurgical unit rather than the OR and may be attributed to other causes. At this point, the distraction that may have contributed to the procedural error may not be recognized.

CONCLUSION

Distraction is a threat to patient safety that is present in all healthcare settings. Distraction can be especially dangerous during performance of highly complex procedures that require higher levels of cognitive processing, such as those performed in the OR setting. There is a growing body of research examining the impact of distractions in the OR setting. Substantial work has been done by perioperative professional associations and patient safety agencies to create guidelines and tools that can be used in hospital

ORs to limit distraction and/or ameliorate the negative impact of distraction.

The Authority encourages hospitals to engage surgeons and form multidisciplinary teams charged with addressing the issue of distraction in the OR setting by identifying sources of distraction that may be unique to individual hospitals, surgical teams, or procedures and designing process improvements based on existing guidelines and tools. An approach that includes primary prevention (i.e., implementing strategies that decrease the occurrence of distraction in the OR environment), secondary prevention (i.e., use of tools and processes that help OR teams maintain situational awareness and avoid distraction or recover from the negative effects of distraction), and team-based training is suggested.

NOTES

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Reviewer Commentary

I firmly believe that situational awareness is an essential characteristic for operating room personnel and is key to recognizing behaviors and actions that may be appropriate at one time and distracting at a different time. I also offer the following additional thoughts and questions for the reader to consider. One, other distractions worthy of attention are those introduced by exceedingly complex, detailed, and time-consuming computer data entry required of the circulating nurse and extremes in room temperature preferred by surgeons that may be too hot or cold for other OR team members. Two, while useful, the checklist and briefing may need to be fractionated into shorter, more frequent, focused episodes utilized throughout the course of complex procedures, rather than be treated as a single obligatory task to be accomplished at the beginning of a case, then forgotten. Three, does the act of identifying critical periods mean that it is okay to engage in distracting behaviors at other noncritical periods?

Charles P. Kingsley, MD
Anesthesiologist
Hummelstown, Pennsylvania

PENNSYLVANIA PATIENT SAFETY ADVISORY

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