

Distractions in the Anesthesia Work Environment: Impact on Patient Safety? Report of a Meeting Sponsored by the Anesthesia Patient Safety Foundation

Distractions in the perioperative work environment can adversely affect vigilance, situation awareness, and the ability to respond promptly to changes in the patient's condition and pose a risk to patient safety. The Anesthesia Patient Safety Foundation (APSF) believes that the role of all types of distractions, and their potential adverse effects, needs to be addressed through open discussion, education, research, policy, and possibly other interventions. To make progress in this area, APSF convened a conference entitled "Distractions in the Anesthesia Work Environment: Impact on Patient Safety" in Phoenix, Arizona, on September 7, 2016, comoderated by the authors. Robert Stoelting, APSF immediate past president, welcomed over 100 participants who represented anesthesia professionals, surgeons, operating room (OR) and perioperative nurses, the nuclear power and surface transportation industries, and risk management. The goals of the conference were to (1) delineate the most important types of external and self-induced distractions occurring in anesthesia professionals' different work environments, (2) identify those distractions most likely to pose patient safety risks (ie, high-risk distractions), and (3) develop recommendations for decreasing the incidence of high-risk distractions and to reduce the risk to patient safety when distractions of all types occur.

The conference started with a series of informational presentations by diverse stakeholders with associated audience response polls followed by panel discussions and small group breakout sessions.

EVIDENCE AND DISCUSSION

When considering distractions, they should be distinguished from those that are externally imposed rather than those that are internally motivated. External distractions, which derive from many sources, can be patient care related (eg, a device alarm, repositioning the patient for the surgeon) or unrelated to patient care (a nurse asking about your weekend). When an external distraction has disrupted ongoing thoughts or actions, it is an interruption. The anesthesia professional can choose to immediately react to, defer responding to, or ignore external distractions. Internal distractions, those initiated by and under the complete control of the anesthesia professional, may be patient care related (eg, looking up lab results on the electronic medical record) or patient care unrelated (texting a friend about dinner plans).

There are limited data available on the role of distracted behavior causing patient harm. The American Society of Anesthesiologists Closed Claim database reports 10 (of 5822) injury claims related to distraction in the operating

room (OR).¹ The majority of these claims included reading printed materials, phone calls, and loud music.

The presentations addressed the different types of distractions:

1. **Patient Care Related.** Distractions inherent in the clinical work we do can be related either to the current case or another (previous or future) patient. They are more likely to be externally created and thus often present as an interruption. David Gaba (Stanford/VA Palo Alto) suggested that such distractions were an important source of patient safety risk. For example, unpredictable breaks in care continuity can compromise prospective memory, which puts clinicians at significant risk for lapses in vigilance and missing or delayed responses to critical activities. He stressed the importance of considering "attention allocation" when evaluating the impact of interruptions and distractions. Matt Weinger (Vanderbilt/VA Tennessee Valley) noted that a prior study had shown the potential "attention consumption" of the intraoperative use of transesophageal echocardiography by primary anesthesia care professionals.² Jason Slagle (Vanderbilt) presented as yet unpublished new observational data demonstrating a combined 54% prevalence of patient care- and nonpatient care-related distractions; externally distracting patient care activities were more commonly related to nonroutine events than personal or educational distractions.
2. **Technology.** Weinger emphasized the high distraction risk from technology failure and usability problems. In several studies, technology has been a contributor to about 40% all anesthesia nonroutine events. Technology can cause distraction when it fails or is unavailable, is time-consuming use (eg, health information technology), is mentally absorbing use (eg, total energy expenditure),³ or interrupts workflow (eg, false alarms).⁴ David Reich (Mount Sinai) described the electronic health record as a source of distraction because of increased connectivity and access to information, the misalignment of technology demands and clinical workflows, and increased time demands for often low-value data entry. Cohen underscored the excessive data entry requirements in non-OR environments, often as much as 3–4 hours of additional "documentation time," and the distractions and misinformation that can result from workarounds for HIT-induced inefficiency, such as indiscriminant cutting and pasting of information from prior encounters.
3. **Noise and Alarms.** Many of the presenters mentioned excessive noise as a significant distraction. Joseph Schlesinger (Vanderbilt) noted the finding that 85%–99% of alarms do not require clinical intervention.⁵ The high frequency of false alarms and clinicians' responses to address them can be a significant distraction. He also addressed the impact of unmodulated music and the lack of oversight that anesthesia professionals have in regulating play, particularly during

critical periods of care. Linda Groah (Association of periOperative Registered Nurses) noted that the average noise levels in the OR (66 dB) routinely exceeded Environmental Protection Agency–recommended thresholds (45 dB) and could be even higher during some surgical procedures.^{6,7} Schlesinger highlighted the dangers of alarm fatigue, the effort required to differentiate true from false alarms, and the safety compromising behavior of those who inappropriately adjust alarm thresholds or volumes. The absence of clinician input and standardized, evidence-based design criteria in the development of the technology user interface were noted to be common causes for these high-risk distractions.

4. **Interpersonal Dynamics.** Several speakers described how individual’s disruptive behavior, failures of teamwork, and an OR culture that is not conducive to safe practice all facilitate significant distractions that adversely affect patient safety. David Birnbach (University of Miami) reinforced how a hostile work environment can adversely affect anesthesia professionals’ situational awareness, communication, and teamwork. The presence of hierarchical gradients has been shown to exacerbate distractions through fear of speaking up and poor prioritization of care activities.⁸ Lynn Reede (American Association of Nurse Anesthetists) described distraction dynamics as an interplay of personal, environmental, and team-related elements. She stressed the negative impact on safe patient care of inattention to staff wellness, a toxic culture, or practice standards that do not address vigilance and distraction management.

5. **Personal (Self-Induced) Distractions.** Slagle and Groah highlighted the increasing contribution of personal electronic devices (PEDs) to distraction. PEDs have been added to ECRI’s list of Top Ten Health Technology Hazards.⁹ Groah also noted the infection risk that PEDs pose when handled in proximity to sterile areas, as well as Health Insurance Portability and Accountability Act–related confidentiality concerns when accessing and sharing sensitive information. David Hoyt (American College of Surgeons) reinforced the PED contribution to noise and distraction, particularly when used for nonemergent and nonpatient care activities. Richard Thomas (Preferred Physicians) provided a medicolegal perspective on PEDs, noting that vigilance is a stated cornerstone of anesthesia practice and that defense-favorable verdicts were unlikely when PED use was introduced as evidence for lack of vigilance, irrespective of purpose. He stressed that PED usage data were discoverable, and that consequences of PED-related plaintiff verdicts went beyond compensatory damages, including licensing sanctions, National Practitioner Data Bank reporting, and unfavorable media coverage.

Some presenters discussed distractions affecting different roles and occurring in different environments including nonmedical domains.

1. **The Distracted Surgeon.** Kristin Chrouser (University of Minnesota) noted the high prevalence of distractions of our surgical colleagues, ranging from 14 to 33 distractions per case.¹⁰ Many of these distractions were related to lapses in teamwork and communication,

Table 1. Attitudes About Distractions	
Statement to Which Audience Members^a Responded	Agreement (/Total Responding)
Even in the absence of causal relationship, PED use that was temporally associated with an adverse event will be much more difficult to defend	100% (/91)
Fatigue and sleep deprivation impact emotional resilience and cognitive function thus increasing the risk of error and injury	98% (/87)
Minimizing the potential impact of inherent distractions to patient care is as important as addressing distractions of greater “notoriety” such as personal electronic devices	95% (/85)
Culture and environment in the OR are an underappreciated distraction that may impact patient safety	94% (/89)
Interpersonal dynamics are important distractions in the OR	94% (/88)
The source and implication of potential distractions on anesthesia care in non-OR settings are often different than those encountered in the traditional OR environment	93% (/91)
Workplace violence and disruptive behavior cause distractions due to concerns for personal safety as well as by creating a negative emotional and physical response	93% (/87)
It is difficult to quantify the precise effects of personal electronic device use on patient care	92% (/85)
It may be useful to incorporate recommendations from nonmedical sources when creating policies on distractions	92% (/77)
A reluctance to admit that one needs help in caring for a patient can result in life-threatening distractions in the OR	91% (/89)
Anesthesia work environment distractions must be minimized to decrease the risk of human error	87% (/77)
User interfaces are often designed without adequate understanding of clinicians’ needs during actual patient care	85% (/82)
Technology-related problems result in a high incidence of distractions during patient care	84% (/85)
Some nonpatient care activities, such as checking the monthly clinical schedule or preparing for subsequent cases, are acceptable intraoperative activities and must be allowed	83% (/86)
There is limited evidence to support conclusions regarding the impact of nonpatient care–related activities in the OR	81% (/88)
I feel comfortable proceeding with elective surgery if the anesthesia electronic medical record was experiencing downtime	69% (/90)
I am satisfied with the electronic medical record workflows as currently implemented	21% (/89)
I can “multitask” without performance decrement	13% (/76)
Music should not be played in the OR	12% (/85)

Abbreviations: OR, operating room; PED, personal electronic device.

^aThe 112 attendees consisted of 81 physicians, 10 nurse anesthetists, 4 PhDs, 2 anesthesia assistants, 2 nurses, 1 pharmacist, 1 lawyer, and 10 other stakeholder individuals. The attendees represented academic medical centers, private practice groups, professional societies, or associations. More detailed demographics of the participants were not available.

equipment and instrument problems, excessive noise, and resident training. Hoyt highlighted the distractive potential of environmental noise, traffic in and out of the OR, surgical equipment, phones, alarms, and misguided music.

2. Distractions Outside the OR. Neal Cohen (University of California, San Francisco) pointed out that we understand less about distractions in non-OR anesthesia environments such as interventional procedure areas and intensive care units. Distracting conditions in non-OR anesthesia locations can be accentuated by the different patient populations served, less familiar and less standardized care processes and environments, ill-defined roles and responsibilities of team members, and communication challenges inherent to these locations.
3. Lessons From Other Industries. Analogies between patient care and driving were made by David Strayer (University of Utah). Sixty-six percent of the more than 31,000 US car crash fatalities each year are related to distractions that occurred within

6 seconds before the accident.¹¹ He showed that humans do not actually multitask but rather, in 98% of individuals, the brain switches between activities even if they are on different “channels” (eg, auditory and visual).^{12,13} Task switching was less efficient than focused attention on a single task, and in driving studies, secondary tasks were significant distractions to successful driving.^{14,15} Strayer shared research that texting while driving induced a very high task workload, decreasing attention for the longest time (compared, eg, with telephone conversations) and resulting in performance decrements that were more significant than driving while drunk.¹⁶⁻¹⁸ Bruce Hallbert (Idaho National Laboratory) showcased the nuclear power industry’s intense focus on mitigating all sources of distraction, particularly in the main control room. The nuclear power industry supports a formal national program in distraction discovery, management, and reduction. Control room operators are not allowed to have any PED while on shift

Table 2. Attitudes About Possible Interventions

Statements About Possible Interventions	Agreement (/Total Responding)
Policy statements should include the goal of educating medical staff about distractions from personal electronic devices and its potential devastating effect on patient safety	94% (/77)
Distraction policies must balance the benefits of having access to electronic devices with the potential safety risks posed by inappropriate use	94% (/76)
Leadership support and a multidisciplinary team is essential for developing and implementing a plan that reduces distractions and the level of noise in the OR	93% (/82)
Adopt a sterile cockpit approach because it is most relevant to OR distractions during high-risk portions of the operation	89% (/81)
APSF should develop multidisciplinary guidance to promote more effective management of distractions	88% (/77)
Given the multifactorial nature of distractions, policies should be developed locally to allow for flexibility based on the groups or facilities unique circumstances	83% (/86)
National standards should be developed by professional societies to promote more effective management of distractions in the procedural and surgical environments of patient care	74% (/72)
The anesthesia professional should control the acoustic environment in the OR	48% (/88)
All facilities should provide work-only electronic devices that do not allow any nonprofessional use	40% (/82)
Personal electronic device use or reading in the OR should be forbidden	30% (/86)
Adopt a zero-tolerance policy for personal electronic device/reading in the anesthesia work environment	14% (/73)

Abbreviations: APSF, Anesthesia Patient Safety Foundation; OR, operating room.

Table 3. Recommendations With Associated Potential Specific Interventions

Recommendation	Potential Interventions
Eliminate unnecessary clinical distractions and modulate unavoidable distractions	Use the “Sterile Cockpit” approach during critical periods, prioritize alarms; define clearly what is not permitted on facility-provided computers
Minimize avoidable distractions	Create and uphold a well-defined, risk-stratified policy for acceptable and unacceptable use of personal electronic devices
Reduce environmental noise	Select and modulate the volume of music played in clinical environments
Address factors that can worsen the effects of distractions	Develop and promulgate best practice stress and fatigue/sleep deprivation management strategies
Apply human factors engineering to improve technologies	Distraction potential should be a factor considered in the design and implementation of all medical technology used in perioperative and procedural settings
Build a culture of safety and high reliability	Greater use of teamwork, communication, and conflict resolution training; especially via simulation-based methods
Deploy professional society guidelines and toolkits	Disseminate the materials already developed by AANA, ACS, AORN, and ASA
Develop and implement local policies and guidelines	Create local guidelines and policies informed by national guidelines and best practices
Prioritize compliance and accountability	Increase local measurement, reporting, and appropriate consequences for deviation from local distraction management
Intensify research	Conduct research on, for example, generational differences in comfort with technology or the impact of educational interventions on distraction occurrence and effect
Learn more from other industries	Multidisciplinary collaborations to facilitate research, education, and policy development

Abbreviations: AANA, American Association of Nurse Anesthetists; ACS, American College of Surgeons; AORN, Association of periOperative Registered Nurses; ASA, American Society of Anesthesiologists.

and instead are issued highly controlled devices that support only allowed work. He underscored the risk of becoming complacent with distraction management when there is a misperception of workplace stability and safety.

RECOMMENDATIONS

Based on the presentations, small group breakout sessions, subsequent discussions, and audience polling (Tables 1 and 2), this diverse group of stakeholders put forward a broad portfolio of recommendations (Table 3). In summary, departmental and OR leaders may see the greatest return-on-investment by focusing change efforts on restricting the personal use of PEDs in the OR through policies and culture change. In parallel, there is benefit to addressing provider fatigue, workplace violence and disruptive behavior, and technology-related distractions.

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