Internet Use during Anesthesia Care

Does It Matter?

IN this month's issue of ANESTHESIOLOGY, Wax *et al.*[1] report an interesting and probably controversial finding concerning Internet use during anesthesia care, and its association with hemodynamic variability or aberrancies. The authors examined electronic anesthesia records from 1,061 anesthetics performed by 171 providers in a single academic medical center. For each case, use time of the Anesthesia Information Management System record-keeping module was compared with time spent in non–record-keeping activity (Internet use through the same computer system). The study was possible because the investigators' record-keeping system allowed access to the Internet, unlike some other studies in which this was not possible.

"Protracted periods with vigilance tasks, as during maintenance of anesthesia in a routine case, can … harm performance. … Driving on monotonous roads also impairs vigilance."

Variability of patient heart rate and blood pressure was measured, along with the prevalence of hypotension (mean arterial pressure < 60 mmHg), hypertension (mean arterial pressure >120 mmHg), and tachycardia (heart rate >100 beats/min), which were calculated during record-keeping and non–record-keeping intervals. Record-keeping and non–record-keeping activities were compared within cases, using a paired analysis approach, and among cases using multivariable regression.

The median non–record-keeping activity time was 14 min (interquartile range: 1–38), representing 16% (3–33%) of procedure time. Increasing amounts of non–record-keeping activity were observed in patients with lower American Society of Anesthesiologists physical status scores, those having general anesthesia, longer cases, and when an attending anesthesiologist worked as the solo anesthesia provider. The study found that non–record-keeping workstation use was not associated with greater hemodynamic variability or adverse hemodynamic outcomes (hypotension, hypertension, or tachycardia) either within or among cases.

The majority of the cases were general surgical and gynecological procedures, with low blood loss (median 50 ml) and low fluid replacement (median 1,000 ml). Hemodynamic aberrancies were rare (*e.g.*, median = 0 [0, 0]) as would be expected during anesthesia maintenance in routine cases with small fluid shifts and limited blood loss. Aberrancies related to Internet distraction might have been more apparent during more complicated cases although it is equally likely that providers would have limited Internet use in such cases. Perhaps more importantly, hemodynamic perturbations are at best only a crude indicator of vigilance. One might thus question whether they are optimal study outcomes.

The impact of non–record-keeping activity on other important variables during anesthesia maintenance was not measured. These variables included oxygen saturation, end-tidal anesthetic concentration, temperature, fluid status, team communication, and responses to surgical procedures or surgeon requests. As the authors acknowledge, the study did not assess other nonclinical activities that

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divert attention from the patient, such as talking, reading, and texting. For that matter, they were unable to monitor Internet use *via* smart phones or personal computers. And importantly, the investigators were unable to determine the nature of observed non–record-keeping activity. Internet use directly related to patient care (*i.e.*, checking lab results, entering orders, reviewing the patient's medical record, or reading case-related checklists or medical literature) obviously has profoundly different implications than "surfing" the Internet or reading and answering e-mail.

Anesthesia work does not involve continuous attention to physiological monitors and surgical conditions. Anesthesiologists glance at monitors briefly and intermittently, spending less than 5% of time looking at the monitor display.[2] Only 25% of intraoperative time is spent on monitoring the patient, with the bulk of time devoted to secondary activities.[3] Of concern, however, are distractions that might impair vigilance and affect patient safety. Distractions are common during anesthesia maintenance. Slagle and Weinger[4] observed reading of printed material in 35% of cases, occurring during maintenance of anesthesia when workload was low. Anesthesia providers spent less time talking, carrying out manual tasks and record-keeping during reading periods.[4] Reading did not affect vigilance, as measured by response time to a simulated red alarm light.[4] Other types of distractions during clinical care are numerous and include noise, interruptions, phone calls, pages, conversations, and computers.[5] Trainees may be more distracted by the additional tasks than more experienced anesthesiologists are.[6]

Vigilance, the capacity to detect and respond to changes in patient physiological condition, is a requirement for safe anesthesia care. However, vigilance is challenging and stressful[7] and declines over a prolonged duration of activity.[8] Protracted periods with vigilance tasks, as during maintenance of anesthesia in a routine case, can lead to boredom and low arousal, which harm performance.[9] In addition, boredom has been shown to lead to errors in simulation of train driving[10] and flight.[11] Driving on monotonous roads also impairs vigilance.[12] In some circumstances, vigilance and monitoring performance can be enhanced by adding tasks to break monotonous activity and promote multitasking.[13] Switching tasks, by mental "breaks" to keep focus, prevents declines in vigilance performance in some circumstances,[14] but not in others.[15] Administration of anesthesia involves multitasking and the maintenance of situational awareness.[6] Although counterintuitive, it thus remains possible that selected non–record-keeping activity by experienced anesthesiology providers enhances performance by preventing boredom and declining vigilance.

Does use of the Internet adversely impact vigilance and patient care? Is computer and Internet use any worse than reading a medical article during a routine portion of the case, by an experienced practitioner who is attuned to alarms and used to multitasking? Search of the American Society of Anesthesiologists' Closed Claims database found only 13 claims of injury related to distraction in the operating room, among 5,822 claims for adverse intraoperative events. The sources of distraction were reading printed material, talking on telephone, and loud music; the database contains no cases of computer or smart phone or Internet use. Care was judged as substandard in 91% of the distraction claims *versus* 50% of other claims($P < 0.01$). Payment was made in 83%, with a median payment of $725,937 (interquartile range: $138,063–1,655,625, adjusted to 2011 dollars).

Given the paucity of data during anesthesia care, data from education and the transportation industry are enlightening. Text messaging impairs reading performance of college students.[16] Cell phone use reduces vigilance during driving and increases the risk of automobile accidents[17]—although user characteristics including age, sex, driving experience, and driving conditions moderate risk.[18] For instance, advanced age, crowded roads, and urban location increase the risk of accidents associated with cell phone usage. Pedestrians, especially children and teenagers, are also distracted by cell phones in simulated walking experiences.[19–21]

Anecdotal reports also suggest that electronic distractions are hazardous. A 2008 train crash that killed 25 people and injured 135 was caused by an engineer who failed to notice and respond to a red light because he was sending text messages.‡ A Northwest Airlines plane flew 150 miles beyond the Minneapolis airport because the two pilots were using their laptop computers to work on complicated crew-scheduling software.§

Considerable research and anecdotal evidence thus shows that electronic distractions worsen judgment and performance. The work of Wax *et al.* suggests otherwise and is therefore provocative. Although a clever study and important initial step, it would be a mistake to conclude that their results confirm the safety of Internet use during anesthesia care (and they make no such claim). In fact, the reverse still seems more likely. Much additional study is needed to evaluate the nature of non–record-keeping activities and their impact on anesthetic performance. Future research should use sophisticated electronic and human-factors methodology to consider the effects of various types of computer and other distracting activities on vigilance and performance during simulated and actual anesthesia care. Until additional

‡ CBS News. Did texting cause deadly L.A. train crash? Available at: http://www.cbsnews.com/2100-201_162-4449292.html. Accessed July 12, 2012.

§ WMTV Madison. Update: Northwest Airline overshoots airport by 150 miles. Available at: http://www.nbc15.com/home/headlines/65663162.html. Accessed July 12, 2012.

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data are available, we suggest that intraoperative Internet use be restricted to acquiring medical information pertinent to the current patient's care.

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