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ELECTRONIC DISTRACTION IN THE OPERATING ROOM: A MAJOR SAFETY ISSUE

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ABSTRACT:

The past decade has seen an increase in the use and availability of electronic devices, including computers and personal electronic devices, in the health care setting. Hospitals have invested significantly in electronic medical records and ensuring the availability of Wi-Fi and cellular networks throughout their institution. It remains to be seen if this increased accessibility has led to improved patient safety, or reduced medical errors, but it has led to a new, unanticipated, problem which may impact patient safety and professionalism.

The operating room (OR) is a complex and rapidly changing environment with high cognitive load tasks requiring teamwork and communication between team members and technology. Distractions, no matter how minor, have the possibility of causing errors which could result in patient harm. In this brief review the authors discuss potential sources of distractions in the operating room, explore some methods that have addressed this issue, and outline ways to limit electronic distractions.

INTRODUCTION

Delivery of modern health care is synonymous with the use and acceptance of the latest technology. From the offices of primary care physicians to the operating rooms and to the most sophisticated intensive care units, one sees the proliferation of electronic devices, including computers, laptops, or other mobile devices. Hospitals and outpatient clinics alike have spent billions of dollars on the introduction of electronic medical records (EMR) in hopes of reducing medical errors and increasing patient safety. EMR was traditionally only available on computers or laptops but is now available on portable personal devices such as tablets and mobile phones. It remains to be seen if this increased accessibility has led to improved patient safety, or reduced medical errors, but it has led to a new, unanticipated, problem which may impact patient safety and professionalism.

The term "distracted doctoring" was coined in a 2011 New York Times front page article[1] by Matt Richtel following

The last decade has seen a proliferation of PEDs, such as smartphones and tablets, in our society.

an editorial in Anesthesiology News earlier that year. The article received extensive media attention and brought this issue to the forefront for many. The following year Emergency Care Research Institute (ECRI) identified distractions from smartphones and other mobile devices as one of the top 10 health technology hazards for the very first time.[2]

The operating room (OR) is a complex and rapidly changing environment with high cognitive load tasks requiring teamwork and communication between team members and technology. Distractions, no matter how minor, have the possibility of causing errors which could result in patient harm.

Studying distractions in the healthcare setting, including the operating room, has taken off in the last 10 to 15 years. There are ongoing research efforts by multiple investigators in varying settings currently studying the role of distractions and trialing methods to limit its effects.

In this brief review, we discuss potential sources of distractions in the operating room, explore some methods which have addressed this issue, and end with suggestions on how to limit electronic distractions.

The need for distraction

Health care professionals are, in this day and age, burdened by many demands and often with not enough time to meet them. There is a constant pressure to see more patients, to see them faster, and to document more information in the EMR which can be time consuming. Several sociological studies have explored how working in such environments leads to an increase in stress and inattention and particularly an increase in distraction.[3,4]

Distraction becomes a coping mechanism as a consequence of stress and eventually develops into an addiction.[5] New technology in the form of personal electronic devices (PEDs), such as smartphones and tablets, have provided additional outlets for this addiction. These devices are easily accessible and serve as an outlet for distraction to cope with stress – to check that email, text message, latest blog post, breaking news in the media, or the latest tweet.

PEDs and Social Media

At the heart of the problem of "distracted doctoring" is the embrace by our society of personal electronic devices (PEDs). The last decade has seen a proliferation of PEDs, such as smartphones and tablets, in our society. These devices have dramatically changed the way we communicate. There has been a significant shift from face to face verbal communication to device-based interactions.

The impact of PEDs, and the ability of the internet to connect us all through social media, can be seen all around us. One only needs to look around momentarily and can observe the majority of people on public transit, in shopping centers, and in any public place holding a PED. Health care professionals and hospitals are not immune to this phenomenon. Looking in the hallways of a hospital, intensive care units, and operating rooms you will see staff engaged on their PEDs.

Social media sites such as Facebook, Instagram, Pinterest, LinkedIn, and Twitter have millions of users. A 2016 report by the Pew Research Center reported that up to 68% of all U.S. adults are on Facebook, 28% are on Instagram, 26% use Pinterest, 25% are on LinkedIn and 21% use Twitter. The workplace has not been immune to the effects related to the rise in the use of social media. Up to 40% of American workers report using social media for personal reasons at work and this number drops down to 30% if employers have policies regarding at-work social media use. Among those 34% use social media to take a mental break from their job and 27% to connect with family and friends while at work.[6]

"Distracted Doctoring" is a relatively recently recognized phenomenon and there is ongoing new research in this area.

Similarly, just over 22 million Canadians are on social media with 75% of them using Facebook and YouTube. There are 7.5 million Canadian Twitter users and 8.5 million Canadians using Instagram. In 2016, Canadians spent an average of 107 minutes per day accessing social networks.[7]

Lessons from Distracted Driving

"Distracted Doctoring" is a relatively recently recognized phenomenon and there is ongoing new research in this area. Much research has, however, been conducted in the field of distracted driving for many decades. This research is, in many ways, applicable to the problem of electronic distractions in the health care setting and we can learn much from it. The distracted driving literature documents some remarkable examples of the effects of distraction on driving. For example, a study compared sober drivers using a hands-free phone and drivers under the influence of alcohol with a blood alcohol level near the legal limit. The study found that drivers who were intoxicated by alcohol were more attentive to the roads than the drivers using a hands-free phone.[8]

Other researchers have used neuroimaging, such as functional magnetic resonance imaging (fMRI), to measure cerebral blood flow, which is used as a surrogate marker for brain activity. Just and colleagues[9] asked participants to steer a vehicle along a curving virtual road either undisturbed or while listening to spoken sentences that they judged as true or false. They found cerebral blood flow shifts from areas of the brain associated with visualizing the road and making decisions to areas associated with listening and speaking when a driver is required to listen and speak as well as drive. These findings show that mental resources are drawn away from driving and this produces deterioration in driving performance even when not holding or dialing a phone.

It is not surprising then that the National Safety Council of the United States reports cell phone use while driving leads to 1.1 million crashes each year and nearly 341,000 injuries occur each year from accidents caused by texting while driving.[10] Similarly, Ontario reported that in 2013, one person is injured in a distracted-driving collision every half hour and that deaths from collisions caused by distracted driving have doubled since 2000.[11]

The implications of decades of distracted driving research are clear and equally concerning when applied to the health care environment. If talking can detract from a relatively simple task and result in potentially fatal consequences similar distraction in a high risk and high complexity environment, such as the operating room, has profound implications for patient safety and patient outcomes.

Examples of distractions

There are numerous examples of people being distracted by their cellular phones with some comical outcomes. In 2011 a woman was reportedly sending a text message to her friend while walking across a mall when she failed to see a fountain directly in front of her and she stumbled over the retaining wall and into the fountain.[12] A video of the incident was captured by security cameras and now lives in infamy on YouTube.[13] Similarly another woman, who was walking on a pier in South Bend, Indiana, fell off the edge while using her phone to text. She had to be fished out of the water by her husband and a bystander.[14]

Sources of Distraction in the OR

There are many sources of both intrinsic and extrinsic distraction in the operating room. Examples of intrinsic distractions include noises and alarms from surgical and anaesthetic equipment, necessary communication between the operating room staff (surgeons, anaesthesiologists, nurses, technicians, etc.), and staffing shift changes. Extrinsic sources include cell phones, pagers, computers, PEDs, calls from outside the OR, communication not relevant to the case, and visitors and traffic in and throughout the OR.

ELECTRONIC DISTRACTION (cont.)

A growing source of distraction are PEDs used to make phone calls, send text messages, and for social media, e-mail and other forms of electronic communication. The urge to constantly check PEDs is now beginning to be recognized as an addiction.[15]

Use of PEDs in the Health Care Setting

In this electronic age, with the availability of Wi-Fi and cellular networks in hospitals, there no longer exist physical borders or boundaries between professional and personal time. One alarming study found that over half (55.6%) of perfusionists admitted to using smartphones for personal business during cardiopulmonary bypass surgeries. Of those admitting use, 49.2% sent text messages, 21% accessed e-mail, 15.1% browsed the internet, and 3.1% posted on social networking websites.[16,17] Interestingly, in this same study 78.3% of perfusionists surveyed expressed concern that the use of PEDs for personal business during this procedure posted a potentially significant safety risk to patients. In another study, 54% of anesthesia residents and certified registered nurse anaesthetists were found to access their computers in the operating room even while they were aware they were being observed.[18]

The CAGE questionnaire (acronym for Cut, Annoyed, Guilty, Eye-opener) is a highly validated tool used in alcohol addiction.[19] At the University of Rochester, the authors have used a modified CAGE questionnaire, where drinks was replaced with PEDs (see Table 1),[15] to survey audiences at local and national meetings. The survey results showed a general trend that younger demographics tend to score higher on the CAGE questionnaire. A score of 2 or more can be used to identify health care professionals who

Table 1: University of Rochester Modified CAGE Questionnaire

	Question	Point
C	Have you ever felt you needed to Cut down on the use of your PED?	1
A	Have people Annoyed you by criticizing your use of your PED?	1
G	Have you felt Guilty about your overuse of your PED at work?	1
E	Do you reach for your PED first thing in the morning? (Eye-opener)	1

PED: Personal Electronic Device

may benefit from additional help with the prevention of distraction from PEDs similar to a score.

In a recent survey, conducted through the Association of Anesthesiology Core Program Director's list server, of over 600 anaesthesiologists, anaesthesiology residents, and certified registered nurse anesthetists (CRNAs), in the United States, the modified CAGE questionnaire (Table 1) results found that 21% of respondents were found to have a score of 2 or more.[20]

Morbidity and Mortality

Adverse events, including fatalities, associated with PED use have also been reported. A patient was left partially paralyzed after the neurosurgeon took personal calls on his wireless headset while operating.[18] Additionally, a Dallas anaesthesiologist was alleged to be on his phone or iPad, while managing a patient under anaesthesia, and failed to notice that the patient had low blood oxygen levels which resulted in the death of that patient.[21] These examples may seem extreme, or rare, but they illustrate the fatal consequences of distraction in the perioperative setting.

Limiting Distractions in the OR

Policy Statements

In the past few years several associations and societies have come to recognize the role that PEDs may play in distraction in the operating room and have released policy statements regarding their use.

The 2017 ORNAC Standards states "Personal electronic devices may distract the surgical team. Healthcare facilities should have policies in place to guide the use of personal electronic devices when they are required in the operating room (Putnam, 2015)."[22] In 2014, the Association of periOperative Registered Nurses (AORN) updated its position statement on managing distractions and noise during perioperative patient care to include PEDs.[23]

In 2015, the American Society of Anesthesiologists (ASA) issued a statement on distractions. Although it does not specifically mention PEDs, it reminds anaesthesiologists that they have "…professional obligation to minimize the risk of avoidable or unavoidable distractions diverting their attention from the care of their patients." [24]

In 2016, American College of Surgeons (ACS) published a statement on distractions in the operating room which recognized PEDs as sources of distraction and came up with considerations for appropriate usage.[25] ACS recognized that undisciplined use of smartphones in the operating room, by surgeons or other members of the surgical team, may pose a distraction and compromise patient care. The policy statement included 10 considerations for smartphone use in the OR that included only engaging in urgent or emergent outside communication during an operation, silencing ring tones, forwarding incoming calls to the OR desk or to a hardwired telephone in the OR.

Hospital policies

There is a paucity of information when it comes to individual hospital policies regarding the use of smartphones. Hospital policies, if they do exist, are often times not known to the operating room staff or enforcement is variable.

Sterile Cockpit

There are many comparisons made between the aviation world and health care. One of the strategies borrowed from aviation has been the concept of a "sterile cockpit". In aviation, this protocol refers to critical periods of high risk and high mental workload which include taxiing, take off, landing and flying below 10,000 feet. During this period, all communication in the cockpit is limited only to information necessary to operate the plane. Any other sources of distraction, such as eating, non-relevant reading materials, or any other activity which may distract a crew member, is prohibited.

This concept is, however, not entirely translational to the operating room. In aviation there are well defined moments (take off, landing, taxing, etc.) that are applicable to any aircraft, flight plan, and cockpit crew. In the operating room there are only a few moments, such as the time out at the beginning of the surgery or the post-operative debrief, that are common to all surgical procedures and applicable to medical professionals in the operating room. Various team members (anaesthesiologists, surgeons, and nurses) have critical moments which

may not coincide with one another's. For example, induction and emergence from general anaesthesia are critical moments for the anaesthesiologist. The surgeon may consider certain portions of the surgery to be critical while the nursing staff may consider the surgical instrument count to be critical.

Studies have looked at defining critical phases by procedure type. One such application are surgeries requiring cardio-pulmonary bypass (CPB), where specific events, rather than time intervals, were defined as critical. Critical events applicable to CPB surgery included ensuring activated clotting time was adequate, bypass circuit check, initiation of CPB, application of aortic cross clamp, cardioplegia administration, removal of aortic cross clamp, and termination of CPB. This study showed communication breakdowns decreased by 50%.[26]

A similar study looked at breast reconstruction surgery, using a deep inferior epigastric perforator flap, where nine critical events were identified. Identification of the stages, assignment of tasks for each team member, and standardization of the processes led to improvements in interdisciplinary communication and enhanced efficiency which ultimately led to decreases in operating time and costs.[27] This approach holds promise.

Education

Formal studies with larger populations of health care professionals need to be conducted to fully understand and validate the rise in electronic distraction and its impact on patient care and safety. The authors, however, believe that the key to limiting and changing this behaviour will be education.

Health care educators must develop curriculum across all fields of health care. This includes professionals from the full spectrum of health care including, but not limited to, physicians, nurses, therapists, technologists, perfusionists. This curriculum should be flexible, modified and customized to each distinct health care environment from an office based setting to the complex operating rooms. The curriculum should focus on identification and recognition of PEDs as sources of distraction with the potential to cause patient harm.

In 2012, the authors developed a curriculum, at the University of Rochester Medical Center, to address the growing problem of distraction caused by PEDs with an emphasis on the potential benfit to patient safety. This involved a series of online modules which are part of the orientation program for all new staff with clinical duties and patient contact. Additionally, these modules are included as part of the annual in-service program that is mandatory for all staff in order to renew clinical privileges.

CONCLUSION

The operating room is a high risk, complex, rapidly changing environment which requires the utmost attention and vigilance from staff while caring for the patient. Research has shown that distraction can adversely affect patient safety. The proliferation of PEDs and the availability of Wi-Fi and cellular networks in the operating rooms can be a potentially potent source of distraction. Although these advances allow for rapid access to medical and clinical information, which can improve patient care, these same devices also serve as conduits for social media, the reading of personal e-mails, and other distracted behaviour. Many national societies and associations have started to recognize this problem and release policy statements and guidelines.

This is a complex problem that requires input from all stakeholders. Hospitals, institutions, and educators need to implement educational programs and methods to reinforce such programs for all employees and students. Through this education we are hopeful that issues of professionalism and patient safety will be addressed and that behaviour will be modified through knowledge and self-awareness.

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