Arriving in the OR – Maintaining a Safe Environment

This lecture is designed to describe important aspects of quality and safety measures in the OR for patients and healthcare staff. In addition, the Quality and Safety Education for Nurses (QSEN) initiative (2005) will be utilized to define quality and safety competencies for pre-licensure nursing education. For over 20 years, the Institute of Medicine Health Professions Education recommends: A Bridge to Quality, emphasizing the need for educating all health professionals with the core competencies to provide patient-centered care, work in interdisciplinary teams, employ evidence-based practice, apply quality improvement, and use informatics.

Background on Quality and Safety

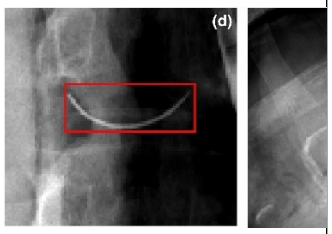
Universal protocol – Time out – identity, procedure, incision site, *consent*. Site marking, Fire risk assessment; critical concerns

Comprehensive Checklist Review

TIME-OUT
Before Skin Incision
Initiated by designated team member: **All other activities to be suspended (except in case of life-threatening emergency)**
Introduction of team members ▁ Yes **Confirmation of the following: identity, procedure, incision site, consent(s)** **▁ Yes** **Site is marked and visible ▁ Yes ▁ N/A**
Fire Risk Assessment and Discussion **▁ Yes (prevention methods implemented)** **▁ N/A**
Relevant images properly labeled and displayed ▁ **Yes ▁ N/A** **Any equipment concerns ▁ Yes ▁ N/A** **Anticipated Critical Events Surgeon: States the following:** ▁ Critical or nonroutine steps

	☁ Case duration ☁ Anticipated blood loss **Anesthesia professional:** Antibiotic prophylaxis within 1 hour before incision ☁ Yes ☁ N/A **Scrub person and RN circulator:** Sterilization indicators confirmed ☁ Yes Additional concerns ☁ Yes ☁ N/A **RN:** Documented completion of time out ☁ Yes Resources: ● Cengiz, A., Yoder, L. (2020). Assessing Nursing Students' Perceptions of the QSEN Competencies: A Systematic Review of the Literature with Implications for Academic Programs. *Worldviews on Evidence-Based Nursing- Sigma Theta Tau International*, 17:4, 275–282. https://doi.org/10.1111/wvn.12458 ● Shoemark, T., Foran, P. (2021). Identifying barriers to patient advocacy in the promotion of a safety culture: An integrative review. *Journal of Perioperative Nursing*. (34)2, 36-42. https://www.journal.acorn.org.au/jpn/vol34/iss2/6/
Electrosurgical safety (fires) 	**Electrosurgical units** deliver radiofrequency energy safely to a surgical site. • Produces three waveforms – cut, coagulation, and blend **Cut mode** – causes cellular water to heat **Coagulation mode** – causes cellular dehydration and shrinkage from heat. **Blend mode** – modulated form of cut mode and produces a higher voltage. Monopolar- cuts and coagulates larger area of tissue at an entry site, higher voltage Bi-polar – lower voltage and tissue is coagulated between both sides of the forceps. Adverse events – shocks, electromagnetic interference, fires, and burns. Strategies for safe use: • Regular inspection by biomedical engineering and perioperative personnel. • Check alarms and activation indicators to ensure the unit is operational

	• Check for fluid spills and cover any foot pedals when necessary • When performing the patient pre-operative assessment, check for jewelry or implants. • Assess the integrity of the patients' skin at the anticipated dispersive electrode site, as well as the (dispersive electrode) grounding pad site. • Post-operatively the skin assessment is documented to ensure patient safety related to the use of the ESU. Dispersive electrode placement: • Ensure the pad is in uniform contact with the skin over a well-perfused muscle mass, **avoid** scar tissue, bony prominences, skin folds, and dense hair areas. • Close to the surgical site and on the same side of the body (when able) • No metal or monitoring leads are positioned between the site of the active and dispersive electrodes • Placement should be away from any warming devices Surgical Smoke – occurs from electrosurgical units and lasers • Hazards of surgical smoke – surgical smoke is malodorous and contains toxic particulates, such as hydrogen cyanide, formaldehyde, blood fragments, and human papilloma virus, hepatitis B. ▪ Resulting conditions: headache, nausea, eye irritation, respiratory infection, cough. Carcinomas. ▪ Benzene - a Group 1 carcinogen, meaning exposure to benzene has a high potential of causing cancer in humans. • Proper evacuation device use to mitigate (smoke evacuator with a 0.1- μm filter). Electro surgery pencil that are lightweight, unrestricting and ergonomically comfortable and connect to high-efficiency particulate air filter. • Smoke evacuation policy- State legislators have passed or soon to pass surgical smoke evacuation policies and procedures. Watters, D.A., Foran, P., McKinley, S. and Campbell, G. (2022), Clearing the air on surgical plume. ANZ Journal of Surgery, 92: 57-61. https://doi.org/10.1111/ans.17340
Radiology – laser	Dosimeter - devices to monitor ionizing radiation. •**As Low as Reasonably Achievable (ALARA)**. An ALARA program involves maintaining

<table>
<tr><td>  </td><td>radiation doses to workers as far below the federal and state regulatory occupational dose limits
•Less Time spent, farthest distance away from the trigger source, and shielding from the source of radiation
•Radiation Protection Program – protects workers and patients from ionizing radiation.
Laser Safety:
•Ocular injuries can happen to any person in the room resulting from ocular exposure to the laser beam.
•Wavelength-specific filtering glasses must be worn by all persons in the room.
•Warning signage outside each entry door to the laser room must be posted.</td></tr>
<tr><td>Retained Surgical items (RSI)
  </td><td>Initial count is the baseline for all potential items that could be retained.

❖ Sharps, blades, tapes, sponges, bovie tips, sutures, Instrumentation.
❖ Distractions, noise and unnecessary interruptions should be minimized during the count to avoid errors.
❖ Counts are completed when there is any relief of the scrub or circulating RN.
❖ No counted items are removed from the room, linens, waste containers, until the patient leaves the room.
❖ Radiopaque soft goods are used for the surgical procedure and can be easily differentiated from non-radiopaque items (dressing sponges)
❖ Inspect sharps and instrumentation with removable parts for breakage or fragmentation when leaving the sterile field.
Reconciling a count discrepancy:
❖ Search the room, sterile field, drapes, tables, linen and waste receptacles.
❖ Circulating nurse and scrub tech recount
❖ Suspend the closure of the wound and remain in the OR until the item is found or determined not to be in the patient
❖ Intraoperative imaging to rule out retained item before the final closure.

This is a short letter to the editor to identify what the current data trends are showing regarding RSI (Never Events).

● Weprin, Samuel A. MD; Moore, Robert H. MD; Meyer, Dielle MD; Autorino, Riccardo MD,</td></tr>
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	PhD. Retained Surgical Items: A Changing Landscape. Journal of Patient Safety 17(1):p e41, January 2021. | DOI: 10.1097/PTS.0000000000000777
Wrong site surgery 	**2020:** 683 and 34,000 wrong site surgeries per year based upon annual rates of surgical procedures in the United States. The StartBox System intervention ● Gloystein, D., Heiges, B., Schwartz, D. (2020). Innovative Technology System to Prevent Wrong Site Surgery and Capture Near Misses: A Multi-Center Review of 487 Cases. *Frontiers in Surgery, vol.7,* doi: 10.3389/fsurg.2020.563337. ● Reducing the risks of wrong site surgery (Chart is helpful) available under Week 4 in Canvas)
Staff safety (Occupational Health and Well Being) **Needle Sticks and Sharp Injuries** 	**Trips and falls** Cords, clutter, puddles and other hazards can lead to workplace injuries – surgery is a minefield of potential tripping and slipping hazards. ● Fencl, J., Willoughby, Cl, Jackson, K. (2021). Just Culture: The Foundation of Staff Safety in the Perioperative Environment. *AORN Journal*, (113)4, 329-336. http://doi.org/10.1002/aorn.13352 **Occupational Heat stress** Dehydration, fatigue, distractions, incivility, short-term and delay memory deficits. Increased processing speed response – impulsivity. Managing heat discomfort ● Byrne, J., Luddington-Hoe, S., & Voss, J. (2020). Occupational Heat Stress, Thermal Comfort, and Cognitive Performance in the OR: An Integrative Review. *AORN Journal,* (111)5, 536-545. http://doi.org/10.1002/aorn.13009 ● Byrne, J., Luddington-Hoe, S. (2020). Theory of heat stress management: Development and application in the operating room. *Journal of Advanced Nursing.* 77:1218–1227.

	**Stop Sticks Campaign** National Occupational Research Agenda (NORA) Healthcare and Social Assistance Sector Council HSSC – NIOSH/CDC • approximately 385,000 needle sticks and other sharps-related injuries to hospital-based healthcare personnel each year (Most likely higher with COVID vaccines). • Sharps injuries are primarily associated with occupational transmission of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), but they have been implicated in the transmission of many pathogens in lab studies. • The CDC site has many links to identify what is available for the Stop Sticks Campaign https://www.cdc.gov/niosh/newsroom/feature/needlestick_disposal.html **Neutral Zone Technique** a designated area/location where sharps only may be placed and retrieved. Its purpose is to reduce the incidence of percutaneous injuries and blood exposures by reducing the occurrence of hand-to-hand transfer of sharp instruments. *Outpatient Surgery (AORN)* Short article that identifies what is being done to reduce injuries. https://www.aorn.org/outpatient-surgery/article/2017-February-safety-inside-our-sharps-safety-success
Preventing delays – On-time start 	An **on-time start** is wheeling the patients into the OR on or before the scheduled start time. If surgery is scheduled to begin at 7:15 a.m., that's when the patient needs to be in the room. If a patient is wheeled in **just 1 minute later**, the case is considered delayed. Delays or cancellations can occur in several categories: **Provider**, **facility, or patient, etc.** **Overview** by *Outpatient Surgery (AORN)*: (cost analysis is important) https://www.aorn.org/outpatient-surgery/article/2016-September-staffing-start-every-first-case-of-the-day-on-time#:~:text=Define%20%22on%2Dtime%20start%22&text=We%20define%20an%20on%2Dtime,we%20consider%20the%20case%20delayed. Quality Improvement Projects that have improved **On-Time Starts**:

	A Quality Improvement Project to Improve First Case On-time Starts in the Pediatric Operating Room **#1)** This article is a good example of a quality improvement project that **most** hospital systems conduct and place great emphasis on because of the cost factor. ● https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7339335/ **#2) Perioperative surgical home (PSH)** an opportunity for anesthesiologists to improve health care operations by reducing delay and cancellation. **American Society of Anesthesiologists recommendation:** In the PSH, the anesthesiologist manages the patient throughout the perioperative period, from the preoperative clinic through surgery and into the postoperative period. By having one point of contact, many inefficiencies that occur by passing care from one service to another can be eliminated. ● Meyers, N., Giron, S., Burkard, J. (2021). Preventing Surgical Delay and Cancellation with Patient-Centered Interventions. *Journal of PeriAnesthesia Nursing*. (36) 334-338. https://doi.org/10.1016/j.jopan.2020.10.008
Intra-operative meds 	When do we see these meds, what are they used for – what are the considerations for intra-operative medications? **Intraoperative medications**: Anesthesia Propofol (Diprivan) a sedative-hypnotic agent used to help you relax before and during general anesthesia. Lidocaine is used to reduce the intravascular pain from propofol. Vasopressors may need to increase blood pressure (fast acting) • Phenylephrine • Ephedrine Neuromuscular blocking (Paralytic) relaxes muscles during intubation • Succinylcholine (depolarizing) shorter effect time 5min • Rocuronium (non-depolarizing) longer effect time Pain relief: Morphine 2mg/ml (opioid - analgesic)

Meperidine 25mg/ml (opioid - analgesic)
Dexamethasone 4mg/ml (steroid) anti-inflammatory action
Ondansetron HCL 4mg/2ml (Zofran – antiemetic)

Volume expanders:
•Lactated Ringers most common for basic fluids (isotonic – can be used more aggressively to replace fluids, electrolytes)
•Plasmalyte or NSS (large cases – because these fluids are equally compatible to infuse with blood products.
•Albumin improves circulatory and renal function by expanding total blood volume.

•Phenylephrine drip is the most common vasopressor for low BPs.

Field medications (back table)
Ropivacaine is a long-acting amide local anesthetic (less cardiovascular and CNS toxicity)
Bupivacaine -a long acting amide, toxicity (LAST)

Agent	Max Dose w/o Epi	Max Dose w/ Epi	Duration of Action	Notes
Lidocaine	5 mg/kg	7 mg/kg	30-90 min	1% = 10 mg/ml 2% = 20 mg/ml
Bupivicaine	2.5 mg/ kg	3 mg/kg	6-8 hours	0.5% = 5 mg/ml
Mepivicaine	7 mg/kg	8 mg/kg		
Ropivacaine	3 mg/kg			

- Bupivacaine Liposome (Exparel) long- acting Anesthetic; locally injected
- Epinepherine increases muscle contractions and increases both systolic and diastolic

	blood pressure. • Ephedrine a central nervous system (CNS) stimulant used to prevent low blood pressure during anesthesia • Ketorolac (Toradol) - nonsteroidal anti-inflammatory drugs (NSAIDs) for moderate to severe pain. Gentamycin and Vancomycin powder vial (commonly used topically in the wound to decrease infections) **Irrigation solutions (surgical back table)** • Irrisept irrigation solution: contains low concentration chlorhexidine gluconate (CHG) 0.05% in sterile water for irrigation. • Povodine Iodine - a broad spectrum antiseptic irrigation solution • Peroxide - irrigation with normal saline • Heparinized saline solution is used to prevent occlusion in the arterial catheters and central venous pressure monitoring catheters **Hemostatic agents** **Tranexamic acid** (sometimes shortened to txa) is a medicine that controls bleeding. Administered both topically and IV to patients without cardiac contraindications. **Surgicel** - promotes coagulation at the wound surface and reduces blood and serous fluid loss from the wound. **Floseal -** consists of a unique combination of patented gelatin granules and human thrombin to provide fast (2 min median time to hemostasis)