

# Patient Safety

---

**Editors:**

Kevin Koo, MD

**Authors:**

Karen Stern, MD

**Last Updated:**

Sunday, March 5, 2023

## 1. Background

Errors in the delivery of medical care are the principal cause of inpatient mortality and morbidity, accounting for up to 98,000 deaths annually in the United States of America (USA). The notable report from 1999 "To Err is Human: Building a Safer Health System"<sup>1</sup> pioneered patient safety reform within the medical community. In this groundbreaking report, contributing factors were described such as decentralized health care delivery systems and liability concerns. They also established a four-tiered method to improve patient safety by educating, identifying errors, improving standards, and implementing the system. The aim of the report was to evaluate medical care in the United States and improve overall quality of care in the future.<sup>1</sup>

Ineffective team communication, especially in the operation room (OR), is a major root cause of these errors.<sup>2</sup> Miscommunication can be reduced by analyzing and constructing a conceptual model of effective communication in the OR. Mickan et al. described six characteristics of an effective team involving purpose, goals, leadership, communication, cohesion, and mutual respect. Incorporating these qualities into medical communities can minimize errors and improve patient safety.<sup>3</sup>

## 2. Introduction

No matter what changes health care systems encounter, one concern is constant: ensuring exceptional patient safety and care. Patient safety is ensured by utilizing safety science guidelines to accomplish a reliable and effective health care practice. Establishing educational methods for health care professionals is essential in preventing malpractice and providing the safest care possible. Current systems of patient safety education need revision in order to optimize patient experience. To do so, patient safety systems should focus on building a culture of safety that encourages communication, trust, and honesty.<sup>4</sup>

It is important to recognize that humans make errors. Failures occur either due to inappropriate methods of care or an improperly executed appropriate method of care. Error can be minimized with proper training, effective communication, and a medical system of checks and balances. Continual education regarding patient safety not only helps health care professionals, but also extends to patient well-being. Concise communication with patients instills trust and strengthens patient-provider

relationships. Establishing a medical system of checks and balances ensures that errors are more likely to be caught before they happen and that blame does not rest upon an individual.

Errors are inevitable, but having a system in place to prevent them from occurring, and remedying them when they do occur, improves overall patient safety in the health care environment.

The process to improve patient safety in health care systems is listed below:

1. Identify current issues regarding patient safety
2. Revise system, education, and training to address patient safety issues found
3. Educate health care professionals about the importance of patient safety concepts. Establish medical system of checks and balances to reduce medical error. Practical application of patient safety concepts - training
4. Patient interaction utilizing education to reduce errors

Then the process can be repeated to address errors that persist.

### **3. General Principles**

#### Part 1: Identify current issues regarding patient safety

An initial assessment of the current patient safety guidelines is necessary to remedy issues within the system. Medical error is inevitable in the health care profession, but by identifying causes and developing plans to minimize or eliminate them can help to establish an effective system that ensures patient safety. Some causes of error in health care systems are:<sup>4</sup>

- Non-continuous training and education
- Past tolerance of unsafe practice
- Lack of regulations/rules
- Gaps in communication among different healthcare providers
- Gaps in communication between healthcare providers and patients
- Unstable/unreliable systems
- Fear of admission of guilt/wrongdoing
- Human factors

#### Part 2: Revise system, education, and training to address patient safety issues found

Once the issues impeding patient safety have been identified, plans can be established to limit or eliminate them. One treatable factor is the "culture of blame" present in health care systems.

Admitting wrongdoing is often avoided for fear of being penalized. Employees should welcome the learning opportunity that mistakes can provide. The system should be modified to encourage teamwork, improve accountability, and reduce individualized blame.

There are two facets that should be addressed: process and culture of patient safety. Employees benefit from clear rules and transparent processes. The World Health Organization (WHO) has a safety checklist that should be adapted into the current system.<sup>4</sup> It clearly addresses patient safety

issues, like allergies, that can be overlooked and lead to severe consequences.<sup>4,5</sup>

The Surgical Safety checklist includes three well-defined steps where the surgical team communicates and identifies possible risks for errors.

**Step 1:** Before the induction of anesthesia - a nurse and the anesthesiologist will confirm the patient's identity, site of surgery, procedure, and check the surgical consent form.

**Step 2:** Before the skin incision - the nurse, anesthesiologist and the surgeon will confirm the role and names of the team members, reconfirm the patient's name, verify the procedure, and check the incision site. The team will also confirm whether antibiotic prophylaxis was given within the last 60 minutes. Furthermore, the surgeons, anesthesiologist, and nursing team will identify anticipated critical events, i.e.; the length of the case, possible significant blood loss, patient-specific concerns, and equipment issues.

Specifically for the urologists, this step will require that the display of essential imaging is verified, i.e.; Computerized Tomography (CT) scan for urolithiasis therapy, nephrectomy, etc.

**Step 3:** Before the patient leaves the operating room - the nurse, anesthesiologist, and surgeon will verbally confirm the name of the procedure, availability of adequate instrumentation, sponge and needle counts, specimen labelling (if applicable), issues with equipment, and key concerns for recovery and management of this patient.

## 4. Assessment of Problem and Conflict Resolution Tool

### SBAR

SBAR (Situation, Background, Assessment, and Recommendation) is an effective and efficient way to communicate important information. SBAR offers a simple way to help standardize, set expectations, and establish structure of communication.<sup>6</sup>

**Situation:** a concise statement of the problem

**Background:** pertinent and brief information related to the situation

**Assessment:** analysis and considerations of options - what you found/think

**Recommendation:** action requested/recommended - what you want

SBAR allows all parties involved in the discussion to be on the same page, proactively giving the listener necessary data and recommendations to solve the problem. A similar commonly used protocol by physicians is the SOAP note (subjective, objective, assessment and plan).

Part 3: Training - Educate health care professionals about the importance of patient safety concepts.

Establish medical system of checks and balances to reduce medical error. Practical application of patient safety concepts

The next step to improve patient safety in health care systems is to apply the updated rules to the system. Health care professionals should be trained to encourage team work, honesty, and policy adherence. If there is a checklist before each procedure, the staff needs to know how to accurately complete it and why it is important to do so. Also, utilizing "systems thinking" bonds employees and reduces gaps through productive communication. "Systems thinking" helps employees approach problem solving by seeing individual issues as parts of a whole.<sup>4</sup>

#### Part 4: Patient interaction utilizing education to reduce errors

At this point in the process, implemented changes can be used during patient interaction. Employees should be following all rules and making sure they are communicating effectively with their patients and with each other. When any errors occur, repeat the process.

## **5. Institutional Protocols and Training**

Institutions of medicine must adhere to standardized regulation regarding many aspects including the environment, imaging and radiation, laboratory processes, and more.

All medical institutions follow safety guidelines tailored to their specific needs. General requirements for an emergency hospital include medical screening exams to determine emergency medical conditions, continued treatment of emergent condition until remedied, and transfer of patient (with consent) if the hospital is unable to adequately care for the patient.<sup>7</sup> General guidelines regarding patient safety begin with verification of procedural steps such as patient identification, surgical site, positioning, and preparation.<sup>8</sup>

When the patient requires imaging or radiology, another set of guidelines exist and should be followed. Imaging guidelines vary with each site treated, and specific steps should be taken with respect to the area. The patients should be in the correct position to obtain the clearest image. The patient should also have protection from radiation if necessary.<sup>9</sup>

When the patient requires labs, careful care to verify that the correct labs are taken from the patient and that the specimen is properly labeled can reduce patient safety concerns. The Laboratory Services: National Patient Safety Goals state that the patient should be identified by two or more methods, the test results should be returned promptly to the appropriate staff member, and proper sanitation guidelines outlined by an accredited organization should be followed.<sup>10</sup>

## **6. Urological Office Procedures**

Urological procedures are transitioning from inpatient to the outpatient office setting. State regulations are being issued for office surgery, but not every state has specific protocols.<sup>11</sup> Some state regulations require facilities to be accredited through an outside organization.

Physicians performing office-based surgery must have admitting privileges at a nearby hospital or an emergent transfer agreement with a nearby hospital.<sup>12</sup> The medical staff should develop a protocol in case of an emergency to arrange transfers between the office and the hospital. Patients should consent to be transferred prior to the procedure if an unforeseen situation occurs.

Health-care workers need to be prepared for emergencies during office-based surgeries. In this situation, at least one physician should be credentialed in advanced resuscitative techniques (ATLS®, ACLS, or PALS) and must be present or immediately available until patient can be discharged from the facility. It is also important that other health care workers with direct patient contact are trained in Basic Life Support (BLS).<sup>12</sup> Resuscitative equipment must be available and compatible with patient age and size. It should also be frequently checked by facility workers.

Outpatient procedures should only be performed by a specialized, trained, and board-certified physician. When physicians are determining if a patient should undergo an outpatient procedure, strict criteria including ASA Patient Selection Physical Classification System should be used.<sup>11,12,13</sup>

For office-based surgery, physicians administering or supervising moderate to deep sedation/analgesia or general anesthesia should have the appropriate education and training to ensure patient safety.

## 7. Urological Surgical Procedures

Urological surgical procedures should adhere to the same protocol as every other surgical procedure. Health-care workers should be trained to reduce misinformation or inconsistent information that can lead to errors, such as wrong-site surgery.<sup>14</sup> The National Quality Forum has developed a list of serious reportable events, also termed “never events,” because these events are serious, typically preventable, and generally considered errors that should never occur.<sup>15</sup> The serious reportable events for surgery and invasive procedures include:

- Surgery or other invasive procedure performed on the wrong site
- Surgery or other invasive procedure performed on the wrong patient
- Wrong surgical or other invasive procedure performed on a patient
- Unintended retention of a foreign object in a patient after surgery or other invasive procedure
- Intraoperative or immediately postoperative/postprocedure death in an ASA Class 1 patient

Implementation and adherence to the following aspects of pre-, peri-, and post-procedural can help reduce and prevent the occurrence of never events.

### Scheduling the Procedure

Scheduling documents have to be carefully verified by office schedulers prior to arranging the procedure. All the requests must be written and should not be accepted if orally requested by the medical staff. An appropriated scheduling form can potentially reduce misunderstandings. Illegible handwriting, unapproved abbreviations, and cross-outs can be pitfalls if not clearly understood by office schedulers. Electronic medical records can improve the safety network, reducing misunderstandings and missing documents.<sup>16,17,18</sup>

Verification of every pertinent document such as consent, history, physicals, and surgeon orders at time of scheduling is mandatory. If any inconsistency is found within the documents during the process, office-schedulers should be instructed not to proceed to the next step without solving all

pending issues.

## Pre-operative

The preoperative visit is another opportunity to identify and correct any inconsistency or lack of information in the documentation regarding the surgical procedure. All documents should be checked during the visit and the patient should confirm identity, site of surgery, allergies, and other pertinent information if possible. If discrepancy is identified, errors must be corrected in all forms and documents prior to moving forward.

The informed consent must be received prior to the procedure and the patient must fully understand their procedure as well complications, additional procedures, placement of stents, and important alternative treatments that may be used in the present case.<sup>19,20,21,22</sup>

Marking the site of the procedure is critical in order to avoid wrong-site surgery. Preferentially, marking should be performed with patient involvement.<sup>14,23</sup> The site must be marked by a licensed practitioner who is responsible for the procedure and will be present when the procedure is performed. The marks should be unambiguous and uniform within the institution and should be semi-permanent to be visible after skin preparation and draping.<sup>24</sup>

In case marking the site is impossible due to technical or anatomical impediments(mucosal surfaces, minimal access procedures, endoscopic procedures, natural orifice procedures, etc.), the institution should have a written process to ensure that the correct site is operated on.<sup>25,26</sup> Alternatively, radiopaque markers can be used in the procedures involving fluoroscopy.<sup>25,27,28</sup>

Another important aspect of patient safety is the surgical material used during the procedure. Availability of all instruments and special materials (guide wires, laser fibers, scopes, stents, loops, prosthesis, etc.) should be verified prior to surgery and checked to ensure that they are the appropriate size for the patient.<sup>28</sup>

## Before starting the procedure

Full implementation of safety checklists in surgery has been linked to improved outcomes.<sup>4,5,29,30</sup> The World Health Organization checklist is designed to identify a potential error before it results in harm to a patient. This checklist should be followed in the appropriate manner.

In a study by Russ S. et al., more than 40% of cases had absent team members, and over 70% of team members failed to pause and focus on the checks.<sup>5</sup> Performing a time-out and implementing a check list in the operating room does not mean that the patient is safe. Team members have to adhere to the protocols and follow them with full attention. Surgical safety performance was better when surgeons led the procedure and all team members were present and paused.<sup>5</sup> After completing the time-out, it must be documented. When multiple procedures are going to be performed on the same patient by different providers, check list and time out should be performed for each procedure.

In the era of digital images, displaying the CT-scan, X-ray, and all other pertinent images during the

procedure on an auxiliary monitor can improve patient safety.<sup>31,32</sup>

The consequences of positioning related injuries are preventable but can be profound and can result in morbidity and litigation<sup>33</sup> Neurological, vascular, musculoskeletal, and pressure ulcers are the most common position related injuries in surgical patients.<sup>33,34</sup> Neurological complications can be avoided by placing forearms in neutral position or slightly supinated to minimize pressure in the cubital tunnel.<sup>35</sup> Straps should be properly placed to maintain the correct limb position during the procedure even if the surgical table is moved. The patient's head should be placed in a neutral position and the arm should not exceed abduction of more than 90° to prevent brachial plexus injury. Straps should not be too tight to avoid ischemia and compartmental syndrome. Padding under osseous prominences can help avoid pressure-related complications. Urologists must be careful to avoid possible compartment syndrome (limbs) when positioning patients for open, endoscopic, and laparoscopic surgeries.<sup>36,37,38</sup>

## **Before discharge from the facility**

Discharge planning has been shown to impact patient safety, patient outcomes, and can prevent readmissions and improve patient satisfaction.<sup>39,40,41</sup> Patient education is crucial when they are discharged home with catheters, stomas, stents, drains, or any other medical device that needs special care. Patient education can reduce complications and improve patient quality of life after surgical procedures.<sup>42,43,44</sup> Health care workers must be aware that language barriers, socioeconomic status, and age can impact patient comprehension of instructions.<sup>44,45,46</sup> Written instruction must also be provided and follow-up visits should be scheduled prior to patient discharge from the facility.

## **8. Laboratory exams, biopsies, and surgical pathology**

Office-procedures such as biopsies (prostate, skin lesion, bladder), urine cultures, and blood samples are routine in a urology clinic. The large amount of patients, multiple samples from the same patient, lack of staff, and lack of continuous education and training of health care workers may increase medical errors. Approximately 1% of general laboratory specimens are misidentified and can lead to serious harm for patients.<sup>47</sup>

For patient safety, prevention is the goal and can be accomplished by implementing strategies. Health care workers responsible for specific tasks must be educated and motivated to perform those tasks with as few errors as possible.<sup>48</sup> Written policies and protocols detailing responsibilities must be implemented along with a strategic plan to detect errors when these responsibilities are not met. Successful completion of required tasks must be documented in order to move forward, especially in those tasks that are performed as a prerequisite to others.<sup>48</sup>

To make the process as simple as possible, reduce the number of steps between collecting the samples and receiving the laboratory report. Redundancy checks must be encouraged in certain steps of the process in order to increase the chance of detecting mistakes before a therapeutic decision is made, especially when the decision is irrevocable and the potential damage caused by error cannot be undone.

From the biopsy procedure until the acquisition of the pathology report, a specimen may pass through the hands of more than twenty individuals in several workplaces.<sup>49</sup> This significantly increases the risk of a mix-up and can lead to serious diagnostic errors. Mutual control of clinicians, technicians, and secretaries is essential to prevent and detect errors. The most vulnerable steps of the biopsy process include labeling of the specimens, appropriate request forms, and accessioning of biopsy specimens.<sup>49</sup> Proper documentation of clinical diagnosis, biopsy site, and biopsy technique can help in discovering errors later in the process and can aid in verification. Awareness of the danger of specimen mix-ups is essential for preventing and detecting it.

The use of information technology for data entry, automated systems for patient identification and specimen labeling, as well as two or more identifiers during sample collection are important steps to reduce misidentification.<sup>50,50</sup> If misidentification is detected, rejection then recollection is the most suitable approach to manage the specimen. DNA analysis to assist with correct identification can be used when recollection is not available.<sup>51</sup>

## 9. Medication Safety

Medication safety can be improved by utilizing the five R's: right drug, right route, right time, right dose, and right patient. Medication errors are barriers that prevent the right patient from receiving the right drug in the right dose at the right time through the right route of administration at any stage during medication use, with or without the occurrence of adverse drug events.<sup>52</sup> Medication errors represent the largest single cause of errors in the hospital setting in the United States, and are estimated to harm at least 1.5 million patients annually.<sup>52,53</sup>

In 2009, the government spent \$30 billion in taxpayer subsidies toward the transition to digital medical records. Electronic medical records helped to decrease medication error and medication reconciliation by up to 50%.<sup>54,55</sup> Systems that use information technology, such as computerized physician order entry, automated dispensing, barcode medication administration, electronic medication reconciliation, and personal health records are vital in the prevention of medication errors.<sup>53</sup> Electronic medical records provide pharmacists with the ability to rapidly screen the medication regimens of hospitalized patients and deliver timely, point-of-care intervention when indicated.<sup>56</sup>

The most common prescribing errors are incorrect drug, incorrect dose, allergies, and drug-drug interaction. Physicians have to keep the most common mistakes in mind and frequently check for errors.

Prior to prescribing any medication, the health-care professional must choose the appropriate medication for a given situation, considering factors such as allergies, route, dose, time, and regimen. Each patient may need a different treatment plan. It is important to tailor prescriptions for individual patients, identifying allergies, pregnancy, lactation, age, co-morbidities, breastfeeding, size, and patient weight. Health-care workers must be familiar with the medications they prescribe and need to know the medications in their specialty that are associated with high risk of adverse events.

Remember the five Râ??s when prescribing and administering medication. Health-care professionals must monitor whether prescribed medication is clinically successful, does not cause harm, and is corrected when necessary.

Drug-drug interactions can lead to serious adverse events or decrease drug efficacy.<sup>57</sup> In some areas of urological practice, patients may have been on other treatments, especially elderly patients.

Prescribing health-care workers should ask patients of any use of over-the-counter medications or dietary supplements because they are frequently under reported and may cause drug-drug interactions.<sup>4</sup> Prescribing the generic name of drugs simplifies the communication among health-care workers, reducing errors. However, patients need to be educated that their medication may be called by different names (brand and generic name). Patients should be encouraged to keep a list of their medications, including both the brand and generic name of each drug.

## **10. Education and Training Medical Students and Surgical Specialty Residents**

Technological advances allowed the development of integrated endourology suites and remote monitoring supervision. The use of this technology has a potentially positive impact in residency training, efficiency, safety, and productivity. Remote monitoring and supervision was found to be highly preferred for patients undergoing urological procedures.<sup>58</sup>

New scopes, surgical devices, and minimally invasive techniques are rapidly increasing within the urological community. Concerns about device safety and training are increasing, protecting patients from harm. Devices need to be extensively evaluated in research before and after FDA approval.<sup>59,60,61,62,63</sup>

A large amount of surgical procedures are performed in non-teaching hospital environments. In teaching institutions, the participation of residents and fellows during the surgical procedure is part of the training. Even with increased duration of the procedure and increased length of stay, there is no significant difference in measured outcomes.<sup>64,65,66,67</sup>

Simulation provides a valuable means of educating medical students and residents and provides means to evaluate their skills in real-life clinical scenarios.<sup>68</sup> Simulated training in surgical procedures allows trainees to reach proficiency sooner.<sup>69,70</sup>

## **11. Conclusion**

Patient safety is a significant issue within health care systems worldwide. Currently, patient safety guidelines are general and do not exist specifically for urology. Patient safety in urology is important and should be distinguished from general guidelines because urological patients have unique procedures, processes, and staff.

To improve patient safety within medical communities, a specific process should be implemented and followed. This process consists of the following steps:

1. Identify current issues
2. Revise system, education, and training to address issues found
3. Training: Educate health care professionals about revised system
4. Application: Patient interaction utilizing education to reduce errors

The process should be adapted to fit each urological practice to best fit their needs, and doing so will help create a safer environment for the medical staff and patients.

## References

- 1 LT K, JM C, MS D. To Err is Human: Building a Safer Health System Washington (DC): National Academies Press (US); Institute of Medicine (US) Committee on Quality of Health Care in America; 2000 [cited 2015 01/06/2015].
- 2 Kim FJ, Donalilio da Silva R, Gustafson D, Nogueira L, Harlin T, Paul DL. Current issues in patient safety in surgery: a review. *Patient Safety in Surgery*. 2015 (in press).
- 3 Mickan SM, Rodger SA. Effective Health Care Teams: A Model of Six Characteristics Developed from Shared Perceptions. *Journal of Interprofessional Care*. 2005;19(4):358-70.
- 4 Organization WH. Patient Safety Curriculum Guide  
<http://www.who.int/patientsafety/education/curriculum/tools-download/en/2011> [cited 2015 01/04/2015]. Available from:  
<http://www.who.int/patientsafety/education/curriculum/tools-download/en/>.
- 5 Russ S, Rout S, Caris J, Mansell J, Davies R, Mayer E, et al. Measuring Variation in Use of the WHO Surgical Safety Checklist in the Operating Room: A Multicenter Prospective Cross-Sectional Study. *J Am Coll Surg*. 2015;220(1):1-11.e4.
- 6 SBAR Overview and Introduction SaferHealthCare.com [cited 2014 December 12].
- 7 Physicians ACoE. EMTALA 2014 [cited 2014 December 10th].
- 8 Improvement IfCS. Perioperative Protocol. Health Care Protocol.: National Guideline Clearinghouse; 2014
- 9 Health DoRUSoMaP. Imaging Protocols and Scanning Parameters 2014. Available from: <https://www.radiology.wisc.edu/sections/msk/protocols.php>.
- 10 Commission TJ. National Patient Safety Goals: Laboratory Accreditation Program. The Joint Commission; 2014.

- 11 &star; American Urological Association. Office-Based Surgery  
<https://www.auanet.org/resources/office-based-surgery/office-based-surgery.cfm>: American Urological Association; [cited 2015 01/06/2015]. Available from:  
<https://www.auanet.org/resources/office-based-surgery/office-based-surgery.cfm>.
- 12 Surgeons ACo. Patient Safety principles for Office-Based Surgery  
<https://www.facs.org/education/patient-education/patient-safety/office-based-surgery#viewport>  
[cited 2015 02/01/2015]
- 13 Saubermann AJ, Lagasse RS. Prediction of rate and severity of adverse perioperative outcomes: "normal accidents" revisited. *Mt Sinai J Med.* 2012;79(1):46-55.
- 14 Commission TJ. The Universal Protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery [http://www.jointcommission.org/standards\\_information/up.aspx](http://www.jointcommission.org/standards_information/up.aspx) [cited 2015 01/03/2015].
- 15 National Quality Forum. List of SREs.  
[http://www.qualityforum.org/Topics/SREs>List\\_of\\_SREs.aspx](http://www.qualityforum.org/Topics/SREs>List_of_SREs.aspx)
- 16 Cederholm S, Hill G, Asiimwe A, Bate A, Bhayat F, Persson Brobert G, et al. Structured Assessment for Prospective Identification of Safety Signals in Electronic Medical Records: Evaluation in the Health Improvement Network. *Drug Saf.* 2014.
- 17 Hawley G, Jackson C, Hepworth J, Wilkinson SA. Sharing of clinical data in a maternity setting: How do paper hand-held records and electronic health records compare for completeness? *BMC Health Serv Res.* 2014;14(1):650.
- 18 Alnawaiseh M, Alten F, Huelsken G, Rentmeister G, Lange M, Claes T, et al. [Implementation of electronic health records at a tertiary care eye hospital.]. *Ophthalmologe.* 2014.
- 19 &star; Duty B, Okhunov Z, Okeke Z, Smith A. Medical malpractice in endourology: analysis of closed cases from the State of New York. *J Urol.* 2012;187(2):528-32.
- 20 Angelos P. Surgical ethics and the challenge of surgical innovation. *Am J Surg.* 2014;208(6):881-5
- 21 Ashraf B, Tasnim N, Saaiq M, Zaman KU. An audit of the knowledge and attitudes of doctors towards Surgical Informed Consent (SIC). *Int J Health Policy Manag.* 2014;3(6):315-21.
- 22 Vyshka G, Seferi A, Myftari K, Halili V. Last call for informed consent: confused proxies in extra-emergency conditions. *Indian J Med Ethics.* 2014;11(4):252-4.
- 23 Pikkel D, Sharabi-Nov A, Pikkel J. The importance of side marking in preventing surgical site errors. *Int J Risk Saf Med.* 2014;26(3):133-8.

- 24 Giles SJ, Rhodes P, Clements G, Cook GA, Hayton R, Maxwell MJ, et al. Experience of wrong site surgery and surgical marking practices among clinicians in the UK. Qual Saf Health Care. 2006;15(5):363-8.
- 25 Dayuta JC, Ong LT, Pang NL, Chia SN, Tan HK, Gomez JM, et al. Process reengineering of preoperative verification, site marking and time-out for patient safety. World Hosp Health Serv. 2013;49(2):4-9.
- 26 Warren GJ, Roberts WW, Hollingsworth J, Wolf JS, Faerber GJ. Prevention of wrong site surgery during upper tract endoscopy. Urology. 2012;79(2):475-7.
- 27 Ohdaira T, Nagai H, Shoji M. Intraoperative localization of colorectal tumors in the early stages using a magnetic marking clip detector system (MMCDS). Surg Endosc. 2003;17(5):692-5.
- 28 Ahmadi SA, Slotty PJ, Schröter C, Kröpil P, Steiger HJ, Eicker SO. Marking wire placement for improved accuracy in thoracic spinal surgery. Clin Neurol Neurosurg. 2014;119:100-5.
- 29 Braham DL, Richardson AL, Malik IS. Application of the WHO surgical safety checklist outside the operating theatre: medicine can learn from surgery. Clin Med. 2014;14(5):468-74.
- 30 Treadwell JR, Lucas S, Tsou AY. Surgical checklists: a systematic review of impacts and implementation. BMJ Qual Saf. 2014;23(4):299-318.
- 31 Miller KE, Mims M, Paull DE, Williams L, Neily J, Mills PD, et al. Wrong-side thoracentesis: lessons learned from root cause analysis. JAMA Surg. 2014;149(8):774-9
- 32 Shah RK, Nussenbaum B, Kienstra M, Glenn M, Brereton J, Patel MM, et al. Wrong-site sinus surgery in otolaryngology. Otolaryngol Head Neck Surg. 2010;143(1):37-41.
- 33 Bonnaig N, Dailey S, Archdeacon M. Proper Patient Positioning and Complication Prevention in Orthopaedic Surgery. J Bone Joint Surg Am. 2014;96(13):1135-40.
- 34 Shaw LF, Chang PC, Lee JF, Kung HY, Tung TH. Incidence and predicted risk factors of pressure ulcers in surgical patients: experience at a medical center in Taipei, Taiwan. Biomed Res Int. 2014;2014:416896.
- 35 Prielipp RC, Morell RC, Walker FO, Santos CC, Bennett J, Butterworth J. Ulnar nerve pressure: influence of arm position and relationship to somatosensory evoked potentials. Anesthesiology. 1999;91(2):345-54.
- 36 &star; Raza A, Byrne D, Townell N. Lower limb (well leg) compartment syndrome after urological pelvic surgery. J Urol. 2004;171(1):5-11.
- 37 Simms MS, Terry TR. Well leg compartment syndrome after pelvic and perineal surgery in the lithotomy position. Postgrad Med J. 2005;81(958):534-6.

- 38 Akhavan A, Gainsburg DM, Stock JA. Complications associated with patient positioning in urologic surgery. *Urology*. 2010;76(6):1309-16.
- 39 Hunter T, Nelson JR, Birmingham J. Preventing readmissions through comprehensive discharge planning. *Prof Case Manag*. 2013;18(2):56-63; quiz 4-5.
- 40 Holland DE, Bowles KH. Standardized discharge planning assessments: impact on patient outcomes. *J Nurs Care Qual*. 2012;27(3):200-8.
- 41 Parkes J, Shepperd S. Discharge planning from hospital to home. *Cochrane Database Syst Rev*. 2000(4):CD000313.
- 42 Lim SH, Chan SW, Lai JH, He HG. A randomized controlled trial examining the effectiveness of a STOMA psychosocial intervention programme on the outcomes of colorectal patients with a stoma: study protocol. *J Adv Nurs*. 2014
- 43 Schell W. A review: discharge navigation and its effect on heart failure readmissions. *Prof Case Manag*. 2014;19(5):224-34.
- 44 Albrecht JS, Gruber-Baldini AL, Hirshon JM, Brown CH, Goldberg R, Rosenberg JH, et al. Hospital discharge instructions: comprehension and compliance among older adults. *J Gen Intern Med*. 2014;29(11):1491-8.
- 45 Kangovi S, Barg FK, Carter T, Levy K, Sellman J, Long JA, et al. Challenges faced by patients with low socioeconomic status during the post-hospital transition. *J Gen Intern Med*. 2014;29(2):283-9.
- 46 Atzema CL, Austin PC, Wu L, Brzozowski M, Feldman MJ, McDonnell M, et al. Speak fast, use jargon, and don't repeat yourself: a randomized trial assessing the effectiveness of online videos to supplement emergency department discharge instructions. *PLoS One*. 2013;8(11):e77057.
- 47 Lippi G, Blanckaert N, Bonini P, Green S, Kitchen S, Palicka V, et al. Causes, consequences, detection, and prevention of identification errors in laboratory diagnostics. *Clin Chem Lab Med*. 2009;47(2):143-53.
- 48 Novis DA. Detecting and preventing the occurrence of errors in the practices of laboratory medicine and anatomic pathology: 15 years' experience with the College of American Pathologists' Q-PROBES and Q-TRACKS programs. *Clin Lab Med*. 2004;24(4):965-78.
- 49 Weyers W. Confusion-specimen mix-up in dermatopathology and measures to prevent and detect it. *Dermatol Pract Concept*. 2014;4(1):27-42.
- 50 Strobel MD. The technology is there: options for preventing lab labeling and tracking errors. *MLO Med Lab Obs*. 2013;45(2):22.

- 51 Shahar T, Rozovski U, Shapira Y, Nossek E, Zelikovich B, Jossiphov J, et al. Conflicting pathology reports: a diagnostic dilemma. *J Neurosurg.* 2014;1-4.
- 52 Albarak AI, Al Rashidi EA, Fatani RK, Al Ageel SI, Mohammed R. Assessment of legibility and completeness of handwritten and electronic prescriptions. *Saudi Pharm J.* 2014;22(6):522-7.
- 53 Agrawal A. Medication errors: prevention using information technology systems. *Br J Clin Pharmacol.* 2009;67(6):681-6.
- 54 Batra R, Wolbach-Lowes J, Swindells S, Scarsi KK, Podany AT, Sayles H, et al. Impact of an electronic medical record on the incidence of antiretroviral prescription errors and HIV pharmacist reconciliation on error correction among hospitalized HIV-infected patients. *Antivir Ther.* 2015.
- 55 Beaudoin FL, Merchant RC, Janicki A, McKaig DM, Babu KM. Preventing Iatrogenic Overdose: A Review of In-Emergency Department Opioid-Related Adverse Drug Events and Medication Errors. *Ann Emerg Med.* 2014.
- 56 Peterson JF, Kripalani S, Danciu I, Harrell D, Marvanova M, Mixon AS, et al. Electronic surveillance and pharmacist intervention for vulnerable older inpatients on high-risk medication regimens. *J Am Geriatr Soc.* 2014;62(11):2148-52.
- 57 Zhang L, Reynolds KS, Zhao P, Huang SM. Drug interactions evaluation: an integrated part of risk assessment of therapeutics. *Toxicol Appl Pharmacol.* 2010;243(2):134-45.
- 58 Anderson SM, Kapp BB, Angell JM, Abd TT, Thompson NJ, Ritenour CW, et al. Remote monitoring and supervision of urology residents utilizing integrated endourology suites-a prospective study of patients' opinions. *J Endourol.* 2013;27(1):96-100.
- 59 Kim FJ, Sehrt D, da Silva RD, Gustafson D, Nogueira L, Molina WR. Evaluation of emissivity and temperature profile of laparoscopic ultrasonic devices (blades and passive jaws). *Surg Endosc.* 2014.
- 60 da Silva RD, Jaworski P, Gustafson D, Nogueira L, Kang F, Molina W, et al. How I do it: laparoscopic renal cryoablation (LRC). *Can J Urol.* 2014;21(6):7574-7.
- 61 da Silva RD, Jaworski P, Gustafson D, Nogueira L, Molina W, Kim FJ. How I do it: prostate cryoablation (PCry). *Can J Urol.* 2014;21(2):7251-4.
- 62 Molina WR, Silva IN, Donalisio da Silva R, Gustafson D, Sehrt D, Kim FJ. Influence of Saline on Temperature Profile of Laser Lithotripsy Activation. *J Endourol.* 2014.
- 63 da Silva RD, Sehrt D, Molina WR, Moss J, Park SH, Kim FJ. Significance of surgical plume obstruction during laparoscopy. *JSLS.* 2014;18(3).

- 64 Goldfarb M, Gondek S, Hodin R, Parangi S. Resident/fellow assistance in the operating room for endocrine surgery in the era of fellowships. *Surgery*. 2010;148(6):1065-71; discussion 71-2.
- 65 Seib CD, Greenblatt DY, Campbell MJ, Shen WT, Gosnell JE, Clark OH, et al. Adrenalectomy outcomes are superior with the participation of residents and fellows. *J Am Coll Surg*. 2014;219(1):53-60.
- 66 Venkat R, Valdivia PL, Guerrero MA. Resident participation and postoperative outcomes in adrenal surgery. *J Surg Res*. 2014;190(2):559-64.
- 67 Singh P, Turner EJ, Cornish J, Bhangu A, Collaborative NSR. Safety assessment of resident grade and supervision level during emergency appendectomy: analysis of a multicenter, prospective study. *Surgery*. 2014;156(1):28-38.
- 68 Nicksa GA, Anderson C, Fidler R, Stewart L. Innovative Approach Using Interprofessional Simulation to Educate Surgical Residents in Technical and Nontechnical Skills in High-Risk Clinical Scenarios. *JAMA Surg*. 2015.
- 69 Whitehurst SV, Lockrow EG, Lendvay TS, Propst AM, Dunlow SG, Rosemeyer CJ, et al. Comparison of Two Simulation Systems to Support Robotic-Assisted Surgical Training: A Pilot Study (Swine Model). *J Minim Invasive Gynecol*. 2014.
- 70 Kang SG, Ryu BJ, Yang KS, Ko YH, Cho S, Kang SH, et al. An Effective Repetitive Training Schedule to Achieve Skill Proficiency Using a Novel Robotic Virtual Reality Simulator. *J Surg Educ*. 2014.