

Prevention of Wrong-Site Tooth Extraction: Clinical Guidelines

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Wrong-site tooth extraction can be defined as the extraction of a tooth other than the one intended by the referring dentist. This adverse event continues to be one of the major reasons for filing malpractice claims against oral and maxillofacial surgeons. Most cases of wrong-site tooth extractions are preventable and can be minimized by the development of an educational program, an informative, unambiguous referral form, a pre-operative check list, and incorporation of the *Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery* into daily clinical practice.

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J Oral Maxillofac Surg 65:1793-1799, 2007

The Institute of Medicine (IOM) in November 1999, issued a report entitled *To Err is Human: Building a Safer Health System*, focusing on the issue of medical errors and patient safety.¹ It was reported that errors occur not only in hospitals but in other health care settings such as physicians' offices. These medical errors had a significant financial cost with estimates across the nation to be approximately \$37.6 billion each year. Nearly \$17 billion of those costs were associated with preventable errors. Approximately half of the expenditures for the preventable medical errors were for direct health care costs. The IOM defined medical error as "the failure to complete a planned action as intended or the use of a wrong plan to achieve an aim," whereas an adverse event was defined as "an injury caused by medical management rather than by the underlying disease or condition of the patient."

The IOM emphasized that a majority of the medical errors were systems-related rather than individual negligence or misconduct. They further stated that the key to reducing medical errors was to focus on improving the systems of delivering care and not to blame individuals.

The Joint Commission on Accreditation of Health-care Organizations (JCAHO) mandated that, effective July 1, 2004, there must be compliance with the *Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery*, by all JCAHO-accredited organizations to decrease preventable medical errors (www.jcaho.org). In development of this protocol, a consensus was reached on 8 principles (Fig 1; www.jcaho.org). In concert with these principles, the following comprise the Universal Protocol: 1) preoperative verification process; 2) marking the operative site; and 3) "time out" immediately before starting the procedure.

Wrong site surgery (including wrong-site tooth extraction) is considered a sentinel event by JCAHO. They define a sentinel event as an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Such events are termed "sentinel" because they signal the need for immediate investigation and response. As of September 30, 2005, sentinel event statistics showed that 12.5% of sentinel events involved wrong site surgery and that there was an increase in sentinel event trends. Analyses of the root causes of wrong site surgery from 1995 to 2004 and 2005 were reported and included causes such as communication, availability of information, and procedural compliance. The most common cause remains miscommunication (Fig 2; www.jcaho.org). In the *Sentinel Event ALERT*

Received from the University of California at San Francisco, San Francisco, CA.

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0278-2391/07/6509-0020\$32.00/0
doi:10.1016/j.joms.2007.04.012

Universal Protocol For Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery™

Wrong site, wrong procedure, wrong person surgery can be prevented. This universal protocol is intended to achieve that goal. It is based on the consensus of experts from the relevant clinical specialties and professional disciplines and is endorsed by more than 40 professional medical associations and organizations.

In developing this protocol, consensus was reached on the following principles:

- Wrong site, wrong procedure, wrong person surgery can and must be prevented.
- A robust approach—using multiple, complementary strategies—is necessary to achieve the goal of eliminating wrong site, wrong procedure, wrong person surgery.
- Active involvement and effective communication among all members of the surgical team is important for success.
- To the extent possible, the patient (or legally designated representative) should be involved in the process.
- Consistent implementation of a standardized approach using a universal, consensus-based protocol will be most effective.
- The protocol should be flexible enough to allow for implementation with appropriate adaptation when required to meet specific patient needs.
- A requirement for site marking should focus on cases involving right/left distinction, multiple structures (fingers, toes), or levels (spine).
- The universal protocol should be applicable or adaptable to all operative and other invasive procedures that expose patients to harm, including procedures done in settings other than the operating room.

In concert with these principles, the following steps, taken together, comprise the Universal Protocol for eliminating wrong site, wrong procedure, wrong person surgery:

- Pre-operative verification process
 - Purpose: To ensure that all of the relevant documents and studies are available prior to the start of the procedure and that they have been reviewed and are consistent with each other and with the patient's expectations and with the team's understanding of the intended patient, procedure, site and, as applicable, any implants. Missing information or discrepancies must be addressed before starting the procedure.
 - Process: An ongoing process of information gathering and verification, beginning with the determination to do the procedure, continuing through all settings and interventions involved in the preoperative preparation of the patient, up to and including the "time out" just before the start of the procedure.
- Marking the operative site
 - Purpose: To identify unambiguously the intended site of incision or insertion.
 - Process: For procedures involving right/left distinction, multiple structures (such as fingers and toes), or multiple levels (as in spinal procedures), the intended site must be marked such that the mark will be visible after the patient has been prepped and draped.
- "Time out" immediately before starting the procedure
 - Purpose: To conduct a final verification of the correct patient, procedure, site and, as applicable, implants.
 - Process: Active communication among all members of the surgical/procedure team, consistently initiated by a designated member of the team, conducted in a "fail-safe" mode, i.e., the procedure is not started until any questions or concerns are resolved.

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FIGURE 1. Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery.

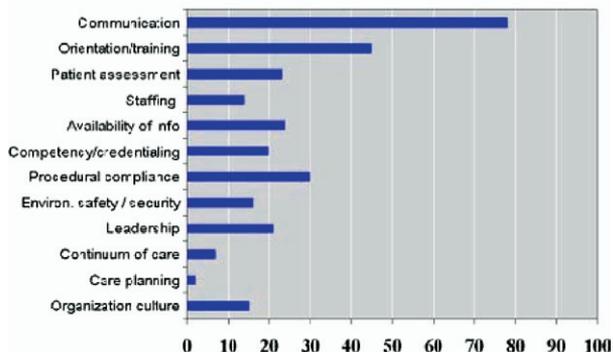
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(www.jcaho.org), they reviewed the 126 cases with root cause analysis information (of 150 overall reported cases from 1998 to 2001) and reported that 76% involved surgery on the wrong body part or site and 14% related to "dental/oral maxillofacial, cardiovascular-thoracic, ear-nose-throat, and ophthalmologic surgery."

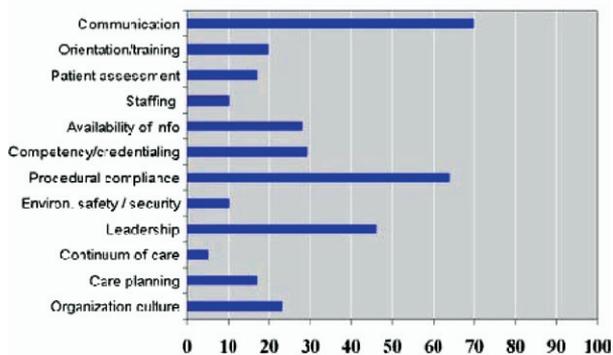
Since the report by the IOM in 1999, significant and fundamental changes regarding health care quality and patient safety have taken place throughout the country and in all aspects of patient care. National

organizations, such as the American Association of Orthopedic Surgery (AAOS), initiated an awareness campaign, Sign Your Site, in 1998 as they recognized the impact of wrong site surgery.² The American Dental Association (ADA) has supported the efforts to eliminate wrong site surgery, including wrong dental extractions. However, many of the safeguards that are in place presently effect practitioners in the hospitals and ambulatory surgery centers. This would ultimately effect oral and maxillofacial surgical procedures such as orthognathic surgery, trauma, and treat-

Root Causes of Wrong Site Surgery (1995-2004)



Root Causes of Wrong Site Surgery (2005)



(www.jcaho.org)

FIGURE 2. Root causes of wrong site surgery.

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ment of pathology. Nothing has been established for practitioners primarily in outpatient offices including specialists such as oral and maxillofacial surgeons. With the vast majority of procedures carried out in the outpatient office and more than 70% of procedures including extraction of third molars and other dental alveolar procedures,³ there is very little information for improving delivery of quality care and patient safety in the outpatient setting.

Wrong-site tooth extractions continue to be one of the major reasons for filing malpractice claims against oral and maxillofacial surgeons, despite education, training, and the requirements for risk management courses. Wrong-site tooth extraction can be defined as the extraction of a tooth other than the one intended by the referring dentist.⁴ There have been few articles reported in the literature regarding wrong-site tooth extraction,^{4,6} and it is probably underreported as are other medical errors,^{2,7,8} despite its incidence and medico-legal implications. The multiple causes of wrong-site tooth extraction and the pitfalls that pre-

cede them are readily identifiable.⁴ The most common causes include cognitive failure and miscommunication whereas the risk factors associated with wrong-site tooth extraction include multiple condemned teeth, partially erupted teeth mimicking third molars, and teeth with gross decay.⁴

Data were obtained recently from the Oral and Maxillofacial Surgeons National Insurance Company (OMSNIC), Risk Retention Group (Rosemont, IL) to characterize the nature and extent of wrong tooth or site surgery carried out by its members. OMSNIC is one of the major providers of professional liability coverage and services for oral and maxillofacial surgeons in the United States and insures approximately 4,300 oral and maxillofacial surgeons.

The main causes for malpractice claims included anesthesia from third molar extractions and implant placement, infection, and wrong-site tooth extraction. Fourteen percent of all claims reported to the company were for wrong-site tooth extractions. Unlike many of the other claims where a large percentage was defensible, 46% of all wrong-site tooth extraction claims were settled with an indemnity payment. This observation was also noted by the AAOS who reported wrong site surgery in 2% of all orthopedic surgery claims with 84% of these claims resulting in a court award to the plaintiff.² Approximately 23% of wrong-site tooth extraction cases settled before a suit was filed. An additional 37% of these claims “went away” with no indemnity payment before the suit was filed. Four percent of wrong-site tooth extraction cases proceeded to trial with 53% favorable verdicts for the plaintiff and 47% favorable for the defendant. Wrong-site tooth extraction represented 30% of the claims where indemnity payments were made (382 of 1,273). The total indemnity paid on wrong tooth or site surgery claims since the beginning of the company in 1988 was \$6,004,177.00. The total paid on wrong tooth or site surgery in 2005 was \$638,468.00.

OMSNIC reported an average of 48 practitioners per year involved in wrong tooth or site surgery with a limited number of repeat offenders. The company has identified the general root causes for wrong tooth or site surgery as internal communication problems in the surgeon’s office and problems with communication with the referring doctor/dentist. There did not seem to be a pattern regarding sites and teeth involved in wrong site surgery. Additionally, age and experience of the surgeon were not factors in wrong tooth or site surgery. Unfortunately, there has been no identifiable improvement or trend in reduction of the number of wrong site surgery claims and the numbers have stayed fairly constant despite risk management seminars and online courses sponsored by OMSNIC. The incidence of unreported wrong-site tooth extraction is unknown.

The same errors tend to recur. Preventive measures such as: 1) development of an educational program; 2) development of a standard, unambiguous, informative referral form; 3) actions at the initial consultation; and 4) actions at the surgical appointment, should be adopted by practicing oral and maxillofacial surgeons. In most cases, wrong-site tooth extraction is preventable by the incorporation of the clinical guidelines into daily practice that focus on systems-related and cognitive failures at varying levels of patient interaction. As reported by the JCAHO, the eighth principle to preventing errors recommends that the universal protocol should be applicable to "procedures done in settings other than the operating room" (Fig 1). For these reasons and the lack of outpatient guidelines for maintaining or improving patient care and safety, the purpose of this article is to increase awareness of potential medical errors in our specialty and to provide guidelines that are applicable for the outpatient practice.

Educational Program

Chang et al⁴ carried out a study to investigate the effectiveness of an educational program on the incidence of wrong-site tooth extraction in an outpatient clinic. The study design involved the collection of data from cases of wrong-site tooth extraction during 1996 to 1998. Specific educational intervention was developed from analysis of these data and implemented from 1999 to 2001. The intervention involved presentation of cases and explanation of the new clinical guidelines to staff, residents, and faculty. The annual incidence rates of erroneous extraction from 1996 to 1998 were 0.026%, 0.025%, and 0.046%, respectively. They analyzed the errors using the organizational accident model described by Vincent et al⁹ in which human decisions that result in errors may occur in 2 ways: active and latent failures. Active failures are "unsafe acts or omissions by those whose actions can have immediate adverse consequences," such as cognitive failures including memory lapse. Latent failures stem from fallible decisions and "provide conditions in which unsafe acts occur," such as inadequate supervision or inadequate systems of communication.⁹ Within the study by Chang et al,⁴ during the intervention period from 1999 to 2001 and after the educational program was implemented, a wrong-site tooth extraction did not occur in the department. Cognitive failure was reported as the most frequent form of active failure responsible for wrong-site tooth extraction, whereas communication and training were found to be major latent factors contributing to these errors. The authors analyzed their cases of wrong-site tooth extractions that were usually condemned teeth such as third molars, a partially erupted

tooth mimicking the third molar, or teeth that were grossly decayed. The surgeons "failed to interpret the order appropriately and carried out the extraction according to their intuition in a stereotypical manner."

DEPARTMENT OF ORAL AND MAXILLOFACIAL SURGERY, UCSF EXPERIENCE

From July 1, 2003 to June 30, 2005, the risk management data of the Oral and Facial Surgery Center at the University of California, San Francisco, was evaluated by review of the incident reports filed for that period. Of 9 incident reports filed, 5 (55.55%) involved wrong tooth or site surgery. Over this 2-year time period, there were 10,595 teeth extracted in 5,548 patients. The incidence of wrong tooth or site surgery was 0.047% of the number of teeth extracted and 0.090% of the number of patients. A review of the 5 cases showed that 3 of the cases were caused by miscommunication or lack of available information. The specific risk factor for these 3 cases was an erroneous referral form. The remaining 2 cases were caused by cognitive failure and inaccurate care planning. The case caused by inaccurate care planning involved a Panorex that was incorrectly labeled (left vs right).

Clinical Guidelines for Preventing Wrong Tooth/Wrong Site Surgery was developed and circulated to all the surgical faculty, residents, and staff to educate and address the issues likely to lead to wrong site surgery. A "time-out" protocol was implemented subsequently. From July 1, 2005, to May 1, 2006, there have been no reported occurrences of wrong tooth or site surgery.

An educational program for surgeons and staff on preventing wrong-site tooth extraction should include a comprehensive review of the possible pitfalls, risk factors, and the preventive office policies. Additionally, based on our institutional quality assurance data and a review of the common medico-legal concerns, we recommend and describe pre- and intra-operative protocols that are in line with the recommendations of the JCAHO.

Informative Referral Form

Development of a more informative referral slip (Fig 3) with check boxes would improve the communication between the referring dentist and the oral and maxillofacial surgeon. This would reduce any ambiguities and diminish the chances for occurrence of a medical error.

If the extraction order is ambiguous or misleading, the oral and maxillofacial surgeon should communicate with the referring dentist before scheduling or proceeding with the extraction. Based on the review

REFERRAL REQUEST
Oral and Maxillofacial Surgeon's Name
Oral & Maxillofacial Surgeon's Address
Oral & Maxillofacial Surgeon's Phone Number
Web Site

DATE _____ PATIENT _____ Date of Birth _____
 (First Name Last Name)

REFERERING DOCTOR _____
 (Name)

 (Address)

 (Phone Number) (Fax)

1. EXTRACTION: A. (Place an X through the tooth or teeth to be extracted)
 2. OTHER PROCEDURES OR COMMENTS _____

3. Reason for the referral: _____

4. Enclosures: _____
 Panorgraph _____ Full Mouth Series _____ Periapical(s) _____ Occlusal _____ Cephalometric _____ CT/MRI _____

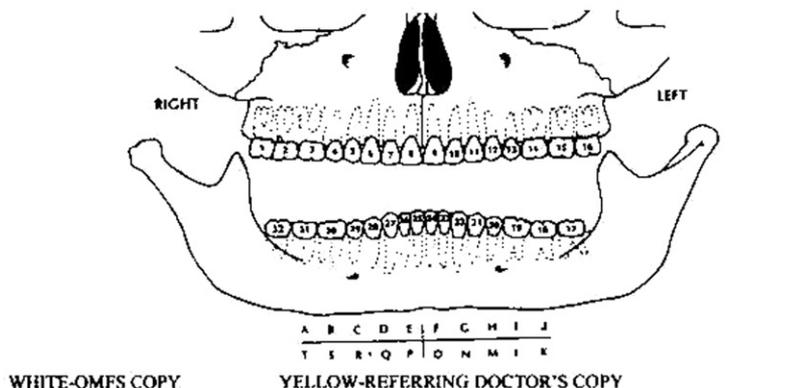


FIGURE 3. University of California at San Francisco referral form.

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of the UCSF quality assurance data and the specific cases of wrong site surgery, the oral and maxillofacial surgeon should be aware that dentists may request extraction of a tooth that may appear to be in better condition than an adjacent tooth. If there is a question regarding the extraction request, the dentist should be contacted and the discussion documented. A fax of the updated treatment request from the referring dentist is an acceptable option.

The oral and maxillofacial surgeon should be aware that missing teeth allow for drifting of teeth into different positions that can create confusion. It must be determined if the dentist meant the actual tooth number or the position of the tooth in the arch.

The use of different tooth numbering systems to annotate teeth can lead to confusion and extraction of the wrong tooth. The ADA recognizes 2 major systems for numbering teeth. The Universal/National System for the permanent dentition uses the numbers 1 to 32 designation and the upper case letters A through T are used for the deciduous dentition. The Federation Dentaire International (FDI) System uses the form of quadrant-based numerals that is a 2-digit notation for permanent and deciduous dentitions used in most other countries. An additional tooth numbering system, the Palmer Notation Method, is occasionally used in the United States by orthodontists and pediatric dentists. In this system, the mouth is divided into

Pre-Operative Checklist-Universal Protocol**Pre-operative verification process**

All relevant documents available and reviewed; consent signed, dated, and Witnessed

Intended patient, correct procedure and site (correct tooth); any missing information or discrepancies addressed before starting the procedure

Preoperative preparation of the patient complete

Implants, prostheses, etc. available

Marking the operative site on the dental diagram or x-ray

Right and left distinction, correct mounting of periapical x-rays, no extractions done since the date on the x-ray, x-ray is current, x-ray belongs to the intended patient

Referral form placed in clear view of surgeon and assistant

“Time Out” immediately before starting the procedure

Final verification of correct patient, procedure, site and, as applicable, implants

Active communication among all members of the surgical/procedure team, consistently initiated by a designated member of the team, conducted in a “failsafe” mode, i.e., the procedure is not started until any questions or concerns are resolved

Adopted and modified from “Implementation Expectations for the Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery™”, www.jcaho.org

FIGURE 4. Preoperative checklist.

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4 quadrants with numbers 1 through 8 within a quadrant symbol. In the Universal/National System, the right maxillary first premolar tooth is designated as tooth 5 but in the Palmer Notation method is designated as tooth 4, an obvious potential cause for miscommunication.

Describing the tooth/teeth to be extracted in long-hand (eg, upper right first premolar) may reduce the incidence of wrong-site tooth extraction. Longhand designation of the tooth to be removed may be transferred or used on the consent form that makes the informed consent process more understandable to the patient.

The Initial Consultation

At the consultation appointment, the oral and maxillofacial surgeon should note a brief description of the condition of the tooth (eg, extensive caries on tooth number 3) that is to be extracted and the adjacent teeth if necessary.

The patient (or the parent/guardian) should be informed about the condition and position of the tooth that is going to be extracted and the reason why it is being removed. A patient-mirror is a good method to identify and verify which tooth is going to be removed. However, patient compliance and reliability to avoid wrong site surgery is noted in only 59% of cases.¹⁰ Any confusion regarding the appropriate tooth extraction should initiate a phone call to the referring dentist/specialist.

The Surgical Appointment

The oral and maxillofacial surgeon should develop and use an extraction check-off list (Fig 4) to be reviewed by the surgeon and the assistant for every patient requiring an extraction and incorporate the JCAHO *Universal Protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery*. (Fig 1). If there are any ambiguities identified, the surgeon should clarify the treatment request with the referring dentist and should postpone the procedure rather than change the treatment plan unilaterally.

Patient identification errors can result in carrying out a tooth extraction on the wrong patient. The wrong person may be called into the surgical suite or the right name is called but the wrong person answers. Patients may have the same or similar names resulting in the wrong patient medical record being brought into the surgical suite.

With dental extractions, unlike other areas of the body, there is no practical and reliable method to mark teeth before a procedure. No ink or marker remains isolated to the specific tooth/teeth whereas floss cannot be tagged around roots, fractured, or unerupted teeth. Thus, the JCAHO and ADA have acknowledged alternatives such as marking the Panorax or a dental diagram that is visible to the surgeon.

A “time out” should be conducted to confirm the correct patient, tooth, and procedure with the assistant present at the time of the extraction (2-person rule). A favorable relationship should exist with the surgical assistant who should communicate with the

surgeon and verify the extraction of the correct tooth without fear of retribution.

The teeth should be clinically counted before placing the forceps on the tooth. The surgeon should be vigilant when there are multiple residual roots contiguous to each other as it may be difficult to ascertain to which tooth the roots belong. The referral form should also be checked to confirm the correct tooth number and position before and after the application of the forceps. If there is a prosthesis to be inserted after extraction, the surgeon should check to see that the prosthesis design is compatible with the extraction plan.

Management of Wrong-Site Tooth Extraction

It is imperative that any wrong-site tooth extraction be identified immediately for improved clinical outcome and diminished legal liability. When the wrong-site tooth extraction is identified immediately, reimplantation with subsequent endodontic therapy may enable retention of the involved tooth. Regardless of whether the error was identified immediately or delayed, disclosure of the event must be presented to the patient.^{11,12} The risk management carrier must also be notified immediately.

Medico-Legal Aspects

The surgeon should not deliberately conceal information from the patient for legal and ethical reasons and patient treatment should not proceed without informed consent. If the wrong tooth has been extracted or the wrong site operated on, it is the obligation of the surgeon to inform the patient immediately when the error has been identified. The ideal protocol is determine the options for tooth replacement, discuss those options with the referring dentist, and then advise the patient in a solution-oriented manner. It is typical for the discussion to turn to the costs of the solution. Arrangements should be made between the referring dentist and the surgeon to defer the costs of the solution to minimize the impact on the patient. In many situations of wrong tooth extraction, the immediate offer of a solution with little or no financial impact is enough to quell the patient's concerns and avoid a potential lawsuit.

Most cases of wrong-site tooth extractions are preventable and can be minimized by the development of an educational program, an informative referral form, a pre-operative checklist, and incorporation of the *Universal Protocol for Preventing Wrong Site,*

Wrong Procedure, Wrong Person Surgery into daily clinical practice.

The ADA and JCAHO concur with and recommend the following:

1. Review the dental record including the medical history, laboratory findings, appropriate charts, and dental radiographs. Indicate the tooth number(s) or mark the tooth site or surgical site on the diagram or radiograph to be included as part of the patient record.
2. Ensure that radiographs are properly oriented and visually confirm that the correct teeth or tissues have been charted.
3. Conduct a "time out" to verify patient, tooth, and procedure with the assistant present at the time of extraction (2-person rule).

In adhering to these safety principles and protocols, our goal is to improve the delivery of quality care and ensure patient safety and increase national awareness of preventable medical errors.

Acknowledgments

We thank the OMSNIC (Risk Retention Group), and Victoria J. Sterling, JD (Senior Vice President and General Counsel), and Gwendolyn Jaeger (Assistant Vice President, Claims) for their assistance in obtaining the OMSNIC data and insurance claims.

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