




Lessons learned from dental patient safety case reports

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Patient safety is fundamental to the delivery of high-quality dental care^{1,2} and is 1 of the 6 aims for health care organizations described by the Institute of Medicine in its 2001 report, “Crossing the Quality Chasm: A New Health System for the 21st Century.”³ Dental practitioners and dental institutions alike are committed to

 Supplemental material is available online.

care that is safe, timely, efficient, effective, equitable, and patient centered, in keeping with these aims.⁴ At the same time, error is fundamental in health care, as our medical counterparts demonstrated more than 2 decades ago,⁵⁻⁸ and errors (lapses, slips, mistakes^{8,9}) are commonplace in dentistry.¹⁰⁻¹²

Several theories have been formulated to explain the mechanism of errors and how unchecked, latent systemic factors, threats, or failures (for example, provider fatigue or inexperience, understaffing, poor supervision, faulty equipment, teamwork, vague organizational policies or procedures, and poor safety culture) can lead to the occurrence of an adverse event (unintended harm or injury to a patient due to medical or dental management

ABSTRACT

Background. Errors are commonplace in health care, including dentistry. It is imperative for dental professionals to intercept errors before they lead to an adverse event and to mitigate their effects when an adverse event occurs. This requires a systematic approach at both the profession level, encapsulated in the Agency for Healthcare Research and Quality’s patient safety initiative framework, as well as at the practice level, in which crew resource management is a tested paradigm. Supporting patient safety at both the profession and dental practice levels relies on understanding the types and causes of errors, which have not been well studied.

Methods. The authors performed a retrospective review of dental adverse events reported in the literature. Electronic bibliographic databases were searched, and data were extracted on background characteristics, incident description, case characteristics, clinic setting where adverse event originated, phase of patient care that adverse event was detected, proximal cause, type of patient harm, degree of harm, and recovery actions.

Results. The authors identified 182 publications (containing 270 cases) through their search. Delayed treatment, unnecessary treatment, or disease progression after misdiagnosis was the largest type of harm reported. Of the reviewed cases, 24.4% of those patients involved in an adverse event experienced permanent harm. One of every 10 case reports reviewed (11.1%) reported that the adverse event resulted in the death of the affected patient.

Conclusions. Published case reports provide a window into understanding the nature and extent of dental adverse events; however, the overall dearth of publications on adverse events in the dental literature points to the need for more study.

Practical Implications. Siloed and incomplete contributions to dentistry’s understanding of adverse events in the dental office are threats to dental patients’ safety. Publishing more, and more comprehensive, case reports on adverse events is recommended for dental practitioners.

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rather than his or her underlying condition^{7,9}).^{13,14} Some of these theories include the Swiss Cheese Model by James Reason¹³ and the University of Texas Threat and Error Management Model by Robert Helmreich.¹⁴ It is our imperative as dental professionals to intercept errors and identify the latent systemic factors in our dental practices before they lead to the occurrence of adverse events or mitigate their effects after an adverse event occurs.²

The dental profession can learn from the successes of other industries including aviation, oil and gas, nuclear power plants, and the military, which have developed sophisticated safety systems for minimizing errors and accidents.^{13,15} Crucial to the success of safety systems is the emphasis on regular, good quality, safety data collection, and its prompt analysis and dissemination, which fosters learning for all of those connected with the dental practice.¹⁴ Nonpunitive incident reporting systems, such as the Aviation Safety Action Program,¹⁶ which detailed incident analysis and accident investigations, and routine reviews of deidentified aggregated flight data, such as the Flight Operational Quality Assurance,¹⁷ are some examples of safety systems that enable the understanding of the nature and extent of errors, contributing conditions, and inform the development of countermeasures necessary for improving aviation safety.¹⁴ Countermeasures targeting human factors and human effectiveness through crew resource management (CRM) training have led to improved safety behaviors and attitudes among aviation workers.¹⁸ Our medical colleagues have pioneered efforts to translate these lessons into health care by establishing voluntary reporting systems¹⁹ (for example, US Food and Drug Administration adverse event reporting system,²⁰ US Pharmacopeia MEDMARX, The Joint Commission's sentinel event reporting system and national nosocomial reporting system) and adopting crew resource management training¹⁸ (for example, anesthesia crisis resource management in operating rooms, MedTeams in emergency medicine, and NeoSim in pediatrics).¹⁸ Although these safety programs and systems are siloed, they are steps in the right direction and dentistry will benefit from adapting some of these systems^{21,22} as the profession moves toward developing a comprehensive patient safety initiative.²³

With the exception of a few pioneer efforts,^{12,21,23,24} the dental profession has essentially watched from the sidelines as medicine moved toward developing patient safety initiatives. The time has now come for dentistry to commit to patient safety by systematically addressing adverse events and errors in dentistry.²³ As a first step of a dental patient safety initiative, we need to "identify the threats to dental patient safety by identifying errors and causes of patient injury associated with the delivery of dental care."^{23,25}

In the absence of a broad-based resource to capture errors, adverse events, and their causes, we turned to the

biomedical literature, an existing source of information regarding these events, which resulted in the creation of a database of events from multiple specialties across various clinical settings worldwide. Our primary objective was to characterize the types of patient safety events reported in the literature and raise awareness about identifying and tracking errors and their causes.

METHODS

We conducted a retrospective review of published case reports and case series on dental patient safety from 1970 through June 2013. This study did not involve any direct interaction with human patients.

Search methods. We searched electronic bibliographic databases (PubMed, Embase, Web of Science, and CINAHL) using the following key words: patient safety, medical errors, adverse effects, dental care, dental procedures, dental treatment, and facility. The final search date was June 30, 2013. The search yielded 4,837 publications. After the removal of duplicates, 4,729 unique articles were identified for screening.

Review process. A preliminary screening of the titles of these 4,729 articles resulted in the exclusion of 2,449 articles that were not relevant to our objective. An example of an article that was captured by our search but not relevant was "Penetrability of Dentinal Tubules in Adhesive-lined Cavity Walls."²⁶

Further exclusion of articles after abstract reviews was based on the following criteria: non-English-language publications (n = 124); nondental focus (n = 567); quality improvement focus without adverse events (n = 663); adverse events due to patients' underlying condition (n = 29); guidelines, editorials, systematic reviews, clinical trials, observational studies, opinion pieces on dental adverse events and related patient safety issues (n = 664). The final phase of the review process involved assessing the full text of the remaining 233 articles, resulting in the exclusion of 51 studies (2 non-English, 29 noncase reports, and 18 case reports without adverse events). Thus, 182 publications comprised the final selection for inclusion in the final synthesis (Figure 1).

Data extraction. Two independent reviewers (E.M.O., Sawsan Salih) extracted data from these case reports and case series using an adverse event data collection form developed by the authors. Background characteristics were collected on authors, as well as the publication year, country, citation, and, if available, the accession number (PubMed ID). Each case was further characterized as follows: incident description, case characteristics (age, sex), clinic setting where adverse event originated, phase of patient care during which the adverse event was detected,

ABBREVIATION KEY. AE: Adverse event. CRM: Crew resource management. ED: Emergency department. FDA: Food and Drug Administration. LA: Local anesthetic.

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