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Proposal of a trigger tool to assess adverse events in dental care

Proposta de um instrumento para avaliar eventos adversos em odontologia

Propuesta de un instrumento para evaluar eventos adversos en odontología

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Abstract

The aim of this study was to propose a trigger tool for research of adverse events in outpatient dentistry in Brazil. The tool was elaborated in two stages: (i) to build a preliminary set of triggers, a literature review was conducted to identify the composition of trigger tools used in other areas of health and the principal adverse events found in dentistry; (ii) to validate the preliminarily constructed triggers a panel of experts was organized using the modified Delphi method. Fourteen triggers were elaborated in a tool with explicit criteria to identify potential adverse events in dental care, essential for retrospective patient chart reviews. Studies on patient safety in dental care are still incipient when compared to other areas of health care. This study intended to contribute to the research in this field. The contribution by the literature and guidance from the expert panel allowed elaborating a set of triggers to detect adverse events in dental care, but additional studies are needed to test the instrument's validity.

Patient Safety; Dentistry; Delphi Technique; Dental Records

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Introduction

"*Health care will never be risk-free*", stated Margaret Chan [1], Chinese physician when Director-General of the World Health Organization (WHO). Dr. Chan's statement expresses the concern with adverse events, which are incidents resulting from health care that affect patients, causing them harm [2]. The problem involves harm not only to patients but also to their families and all of society [3]. The magnitude of this phenomenon became even more evident since publication of the report *To Err is Human: Building a Safer Health System* [4], showing that it is essential to take measures to minimize such events.

Numerous studies have been conducted with this purpose. According to a systematic review, an estimated 10% of all hospitalized patients suffered at least one adverse events, and 7% of these died [5]. Incidents associated with patient care were also observed in primary care, where the most frequent types of adverse events were related to diagnostic errors and management of medication [6].

Methods that aim to identify and elucidate the problem of adverse events include retrospective reviews of patient charts. The method assumes two phases: the first with triggers based on explicit criteria and the other with implicit criteria [7]. In the first phase, trained professionals selected patient charts with potential adverse events, based on a set of triggers. The presence of one or more such factors triggers the patient chart for the second phase, in which a reviewer confirms or rules out the presence of an adverse event [3].

Specifically in dentistry, some tools have been developed to assist services administration and dental practice with a focus on patient safety [8]. The issue has received little focus to date, although some studies have emerged recently [9,10,11].

The current study is thus justified by the need to expand knowledge on patient safety in dental care. The objective was to propose a trigger tool to detect potential adverse events to be used in the explicit phase of a retrospective review of patients' dental charts in the Brazilian outpatient setting. Despite some limitations, this method is considered the gold standard for detecting adverse events [12,13] and has been widely used to measure the harms resulting from health care worldwide, including in Brazil, with consistent results [14].

Method

This was a qualitative study that used the expert consensus technique and was conducted in two stages. The first involved a literature view to identify the principal adverses events resulting from dental care and the triggers for adverse events used in other areas of health, with the purpose of backing the adaptation of a preliminary dental clinic trigger tool. In the second stage, this trigger tool was assessed by an expert panel using the modified Delphi method.

To identify the principal adverse events in dental care, the following scientific databases were searched from 2000 to 2016: (i) Library of the Regional Board of Dentistry, Rio de Janeiro (CRO-RJ), Brazilian Library of Dentistry (BBO), and Latin American and Caribbean Literature in Health Sciences (LILACS) with the terms for accidents, errors, and complications associated with dental specialties and (ii) Public/Publisher MEDLINE (PubMed) with the *MeSH terms* patient safety and dental care. The search was saturated as the incidents began to appear repeatedly and no more new records appeared in the articles.

In order to identify the triggers, the following were consulted: website of the Institute for Healthcare Improvement (IHI), WHO publications, and articles that described studies of retrospective patient chart reviews. Based on the resulting information, a preliminary set of fourteen triggers was developed, seeking to include the largest amount of adverse event types with the smallest number of triggers, explaining their rationale and providing examples to facilitate understanding by the experts.

Elaboration of final triggers drew on expertise from a panel of experts from the fields of dentistry and patient safety using the modified Delphi method. The method involves the anonymous exchange of information between the experts and possibility of revising individual views [15] based on the assumption that a collective judgment, adequately conducted, is better than a single individual's opinion [16]. The changes to the original method were the authors' interactive mediation with the panel members and information exchange via email. The choice was made for interaction because the

subject addressed was highly specific and required technical explanations, especially for the experts who were less familiar with dentistry terms. The use of email facilitated the information exchange and streamlined the process.

Seven experts were invited to join the panel: five dentists who had graduated more than twenty years previously, with clinical and academic experience as well as administration of dental services, and two experts in patient safety with extensive research experience in the area.

The expert panel proceeded as follows: in the first round, the preliminarily adapted triggers were presented to the experts through an online form, where they were supposed to answer three questions for each of the fourteen triggers: (i) Is the trigger a good signal for detecting adverse events? (ii) Is the trigger consistent with the Brazilian reality? (iii) Is the trigger worded in clear language and correct terminology?

The experts' assessment was planned to follow to a Likert scale from 1 to 5, meaning: 1 (definitely not); 2 (probably not); 3 (probably yes); 4 (very probably yes); and 5 (definitely yes). There was also a box for suggestions below each of the triggers, providing the possibility for the experts to amend, add, or delete triggers. A trigger that scored 3 or more on all the questions was considered valid. A trigger that scored 1 or 2 on any of the three questions was submitted to new rounds.

The graphic depiction of the study's methodological process is in Figure 1.

The research project was approved by the Institutional Review Board of the Sergio Arouca National School of Public Health, Oswaldo Cruz Foundation (ENSP/Fiocruz), under case review 1.513.249 CEP/ENSP, April 25, 2016.

Results

The reports of incidents and complications identified in the literature review and the results of studies on adverse events from dental care served as the basis for creating a classification with the principal types of adverse events as shown next (Table 1).

Fourteen triggers were created and presented in the first round to the expert panel members. All of these fourteen were kept, and most were modified and/or received new examples. Twelve triggers were defined by consensus and two by majority vote of the experts (triggers 10 and 11).

The conclusion of the expert panel required four rounds of questions and answers from September 15 to November 6, 2016. The method allowed substantial improvement in the triggers initially proposed. The patient safety experts experienced some difficulty in the use of specific dentistry terms, but with the mediation this did not compromise the content. For the experts in dentistry, specific reading in patient safety was recommended, and they did not experience any difficulty dealing with the subject. All the panel members responded on schedule and the communication via email helped the process flow smoothly and satisfactorily throughout all four rounds.

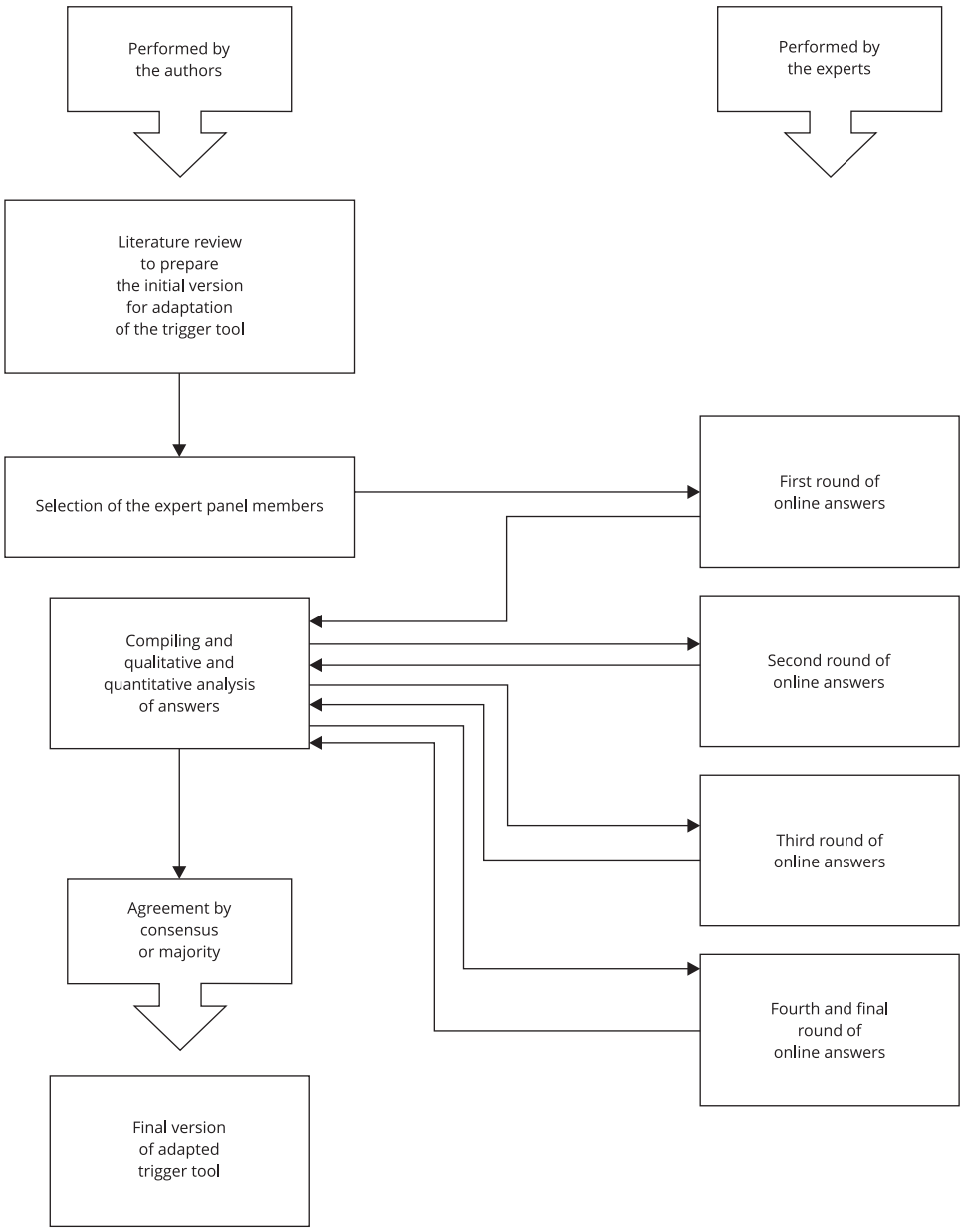
In the second round, the answers from the first round were presented with graphs and the experts' observations were described, along with the changes made due to the answers. The experts were asked to reassess the new proposal, using the same scale as before. This time, if the answer was 1 or 2 or there were disagreements, they were asked to explain the reason and suggest the changes.

In the third round, the answers given in the two previous rounds were presented again in graphs and the observations on the second round were described. The experts had still not reached a consensus on some triggers, and they were asked to respond again according to the Likert scale. For the triggers that had already reached a consensus in the two previous rounds, the experts were asked to reassess them, answering *yes* or *no* to the following question: *Is this version of the trigger adequate*? If the answer was *no*, they were supposed to suggest changes. As in the previous rounds, there was a space to include suggestions for all the triggers. Trigger 10 (death), which had received a 2 for adequacy to the Brazilian reality, could not have been reworded because it was completely straightforward, so the experts were asked whether it should be kept, and they were supposed to answer *yes* or *no* to the question: *Should this trigger be kept*? They were also asked if there should be a new round and whether it should be face-to-face or online. Two experts expressed the need for a new online round.

In the fourth round were presented the graphs of the answers of the third round, during which, of the fourteen triggers, eleven were approved unanimously. Thus, in this round three triggers

Figure 1

Study's methodological process.



Source: the authors.

remained to be defined. The experts were supposed to answer *yes* or *no* to the following: *Do you think a new round is needed*? If the majority of the experts answered *no*, this would be the last round, and the outcome would be determined by the majority. Otherwise there would be another online round. The experts felt unanimously that there was no need for another round, and the expert panel's work was thus finished.

Table 1

Classification and examples of types of adverse events in dental care.

Types of adverse events in dental care	Examples of adverse events
Infections associated with dental care	Alveolitis; peri-implantitis; root canal infection; more complex tooth infections such as Ludwig's angina.
Harm from dental intervention	Harm from foreign body aspiration/swallowing; harm from leakage or ingestion of chemical substances; decalcification of enamel or caries related to orthodontic treatment; temporomandibular joint disorders; extraction of the wrong tooth; bone and dental fractures; hemorrhage/hematoma; subcutaneous emphysema; bone and soft tissue necrosis; maxillary sinus lesion; neurological lesion; lesion to facial muscles/Bichat's fat pad; dental luxation; oral/perioral maceration/laceration/abrasion/burns; root reabsorption/perforation.
Harm from delay or failure in diagnosis	Pulp damage; sinusitis; root reabsorption; caries; periodontal diseases (gingivitis, loss of bone plate, loss of attached gingiva).
Allergy	Allergy to latex; anaphylactic shock from contact with disinfectant substances; allergy to local anesthetic.

Source: the authors.

Table 2 presents the expert panel's discussion, based on which a trigger tool was proposed (Figure 2). This information can serve as the basis for preparing a manual for use in future studies on adverse events in dental care that employ the retrospective patient chart review method.

Discussion

Support from the literature for the identification of adverse events in dental care

The literature review allowed gathering information on the incidents, specifically on adverse events in dental care.

One of the most common procedures in dental practice, namely local anesthesia, presents adverse events that vary greatly in severity and temporality. The literature includes reports of local and/or systemic alterations that range from the most common situations, like hematomas and fainting, to rarer situations like methehemoglobinemia, allergic reactions, and toxic reactions, even resulting in death [17,18,19].

Manipulating foreign bodies inside the oral cavity during dental treatment facilitates the occurrence of a type of accident with great potential to cause adverse events: swallowing and/or aspirating foreign bodies (dental fragments and pieces of fillings, fragments of impression materials, endodontic filings, drill bits, parts of dental implants, orthodontic clips). Some circumstances also favor the occurrence: age (children, elderly); motor disabilities; and some psychiatric and neurological disorders [20,21]. Importantly, patients require care in chairs that immobilize them, and dexterity is needed in case of obstruction of the upper airways to quickly unbuckle the safety belt in this type of apparatus [22].

Due to the proximity of roots in the posterior teeth, during tooth extractions or endodontic treatments, the maxillary sinus may be injured. Tooth fragments, drill bits, and endodontic materials can be pushed inside the sinus, causing inflammatory processes and even triggering chronic sinusitis, leading to the need for surgical access and removal of the foreign body using the Caldwell-Luc technique, for example [23,24].

The removal of impacted or semi-impacted third molars can result in complications and accidents, including: ulceration of the mucosa, alveolitis; dentoalveolar fractures; injuries to the adjacent teeth and/or temporomandibular joint disorders (TMJ); infections; fractured maxillary tuberosity and/or mandible; oro-antral communication; dislodging of the tooth to vital anatomical structures; and temporary or permanent paresthesia [25].

Table 2

Decisions by expert panel on triggers, rationale, and examples of situations that can be identified by each trigger.

Triggers	Rationale	Examples of situations that can be identified by the trigger
1. Need for retreatment of the same tooth or need to redo the same procedure performed less than twelve months before.	When there is no complication that is inherent to the patient (poor habits or other comorbidities), dental procedures generally last more than twelve months.	Premature contact between opposing teeth leading to: fractures of teeth or restorations; pericementitis or temporomandibular joint disorders (TMD); loss of dental implants or factures to prostheses over implant. Need for endodontic retreatment due to: insufficient disinfection of root canals; breakage of endodontic instruments and root perforations during canal treatment; unsatisfactory sterilization of instruments. Need to redo restorations due to: residual caries; dentin hypersensitivity due to mechanical exposure of dentin following inadvertent removal of dental tissue; removal of excess restoration material invading gingival sulcus and interproximal spaces.
2. Lesions occurring in the treatment setting (dental clinic or office) not caused by the dental treatment itself (e.g., falls from height or patient's body colliding with equipment/instruments)	Patient should be protected from incidents with or without harm or injuries, even those not resulting directly from the dental treatment.	Injuries produced by falls from height or colliding with equipment; ocular lesions due to lack of patient's protective goggles.
3. Procedure-related complications during dental treatment (e.g., paresthesia; extraction of wrong tooth; soft tissue lacerations; lesion from leakage of chemical substances; ocular lesion; aspiration and/or swallowing of foreign body).	Failures in manipulation of tissues, instruments, disinfectant substances, inadequate storage of substances using recipients from other products, or failure in planning may cause harm/lesions during dental treatment.	Paresthesia caused by nerve injury during tooth extraction; lesions to other teeth, whether or not leading to unplanned extraction (luxation/fracture/avulsion of other teeth; aspiration and/or swallowing of foreign body; ocular lesion due to lack of protective goggles during treatment; lesions caused by chemical substances.
4. Systemic complications during or after dental treatment.	Systemic disorder may be triggered by incomplete patient history or inadequate planning or follow-up.	Allergies/anaphylactic shock related to: latex (rubber dam, procedure gloves); local anesthetic; disinfectant substances; uncontrolled hemophilia or diabetes can present prolonged bleeding; severe anorexia nervosa induced by orthodontic treatment
5. Infections resulting from dental treatment.	Failure in the asepsis chain or in antimicrobial prophylaxis can lead to infection.	Alveolitis; infections can lead to serious complications such as Ludwig's angina; dissemination of infectious and contagious diseases.
6. Return for urgent care due to pain, edema, or other reason.	When patients feel pain or discomfort to the point of returning for urgent care or require a new unscheduled visit, they may not have been properly oriented as to what to expect while waiting for their next appointment, or something unexpected may have happened.	Painful manifestation caused by infection or excessive manipulation of the treatment site; fractured tooth wall between endodontic/prosthetic treatment sessions; soft tissue injury caused by remaining tooth fragment after temporary filling falls out; post-anesthesia traumatic ulcers in pediatric dentistry.
7. Complications related to drug prescription	Lapses/errors can lead to switched medication, and faulty patient history can lead to unexpected drug reaction.	Harmful drug-drug interaction
8. Dissatisfaction expressed or documented by patient or family (includes documents, documented complaints, conflicts between patient or family and health professionals).	Difficult patient/provider relations or communication can lead to an adverse event.	Law suits against dentists at the civil, criminal, or administrative level are not harm or adverse events per se, but the motive should be investigated.

(continues)

Table 2 (continued)

Triggers	Rationale	Examples of situations that can be identified by the trigger
9. Unforeseen change in treatment plan	Unforeseen facts that lead to a change in the course of treatment may signal the occurrence of adverse events.	Extraction of tooth that was undergoing root canal treatment; unforeseen need for endodontic treatment.
10. Death	Any death during or immediately after outpatient dental treatment is unexpected and must be investigated.	Deaths associated mainly with infection and anaphylactic shock.
11. Failure or breakage of instrument during treatment	Instrument breakage during treatment may be a contributing factor to incident.	File broken inside root canal may compromise adequate cleaning of the canal; broken drill bit may injure patient's mucosa; pieces of broken instruments can be swallowed or aspirated.
12. Caldwell-Luc surgery/access to maxillary sinus	Caldwell-Luc technique can be used to remove material inadvertently shifted into the maxillary sinus during dental treatment.	For example, filling material for root canal and drill bit can migrate into maxillary sinus during procedures.
13. Graft or use of mineral trioxide aggregate (MTA)	Mineral trioxide aggregate is used in the treatment of root perforation; grafts may be necessary to correct bone or gingival loss that may be due to complications of prior dental treatment.	Root tear or perforation during cleaning of root canal system; endodontic and periodontal infection leading to loss of buttress tissues (gingiva and bone).
14. Any other complications not included in the previous items	There are situations that totally escape expectations and that can lead to adverse events. Any other circumstances that do not fit the previous items.	Interruption of procedures in progress due to power or water shortage, e.g.: interruption of a photopolymerizable restoration or a surgical intervention.

Due to delays or failures in dental treatment, tooth infections can spread to underlying facial spaces and cause serious complications that require hospitalization, like Ludwig's angina [26].

Subcutaneous emphysema associated with tooth extraction can occur when air from the high-speed motor is forced inside the soft tissues; although rarely, the air can spread to the pterygomaxillary region and lateral pharyngeal space of the retromolar region and reach the mediastinum, with a possible fatal outcome. This access is not limited to tooth extractions, and the air can also be introduced through root canals during endodontic treatment, through the periodontal ligament or lacerations of the intraoral soft tissues [27].

Haji-Hassani et al. [28] analyzed the frequency of errors made by students in the last year of dentistry school during endodontic procedures. The authors analyzed x-rays from a total of 1,335 endodontic treatments performed from October 2011 to October 2012, and errors were observed in 880 (66%) of the cases. In this specialty, due to the tooth's anatomical complexity, accidents and complications can occur even in experienced hands [29]. One such accident that can compromise the treatment's evolution is breakage of endodontic instruments inside the root canal [30]. In addition, tears and perforations of the dental roots can also compromise the prognosis [29].

The literature review identified the need to pay closer attention to the processes used in dental care. Drug prescription is one of these processes. Drug-drug interactions can cause adverse events [31], and some medicines used by the patient deserve heightened attention, such as bisphosphonates, which can lead to maxillary osteonecrosis following invasive dental procedures [32].

Various chemical substances have the potential to harm the oral soft tissues. An example is the acid used for enamel etching, which can lead to gingival necrosis [33]. Another example is sodium hypochlorite, very useful for treating the root canal system; however, when in inadvertent contact with the tissues it can cause intense pain, edema, bruising, tissue necrosis, and paresthesia [34].

Figure 2

Proposed dental clinic trigger tool for adverse events.

Reviewer's name:			
Patient's record number:	**Date:**	**Date of analysis:**	**Check with X**
1. Need for retreatment of the same tooth or need to redo same procedure concluded less than 12 months before.			
2. Lesions occurring in the treatment setting (dental clinic/office) that were not caused by the dental treatment itself (e.g., falls from height or patient's body colliding with equipment/instruments).			
3. Complications from the procedure during dental treatment (e.g., extraction of wrong tooth; soft tissue lacerations; lesion from leakage of chemical substances; ocular lesion; aspiration and/or swallowing of foreign body).			
4. Systemic complications during or after dental treatment.			
5. Infections resulting from dental treatment.			
6. Return for urgent care due to pain, edema, or other reasons.			
7. Complications related to drug prescription.			
8. Dissatisfaction expressed or documented by patient or family (including documents, documented complaints, conflicts between patient/family and healthcare professionals).			
9. Unforeseen changes to treatment plan.			
10. Death.			
11. Instrument failure or breakage during treatment.			
12. Caldwell-Luc surgery/access to maxillary sinus.			
13. Graft or use of mineral trioxide aggregate (MTA).			
14. Any other complications not included in the previous items.			
Describe the finding that motivated the trigger's choice:			

Check with an X next to each trigger found. In the space at the end of the table, briefly describe the finding(s) and write the date on which the annotation was recorded on the patient's chart. You may find more than one trigger on the same patient chart, and you should mark all of them.

Another problem is the allergic reactions that can involve unpredictable evolution or may be related to an incomplete patient history. A common example of this type of event is allergic reaction to the latex from procedure gloves or the rubber dam used in the treatment [9].

Many adverse events can occur during orthodontic treatment, which usually lasts months, ranging from dental caries associated with the treatment to severe root reabsorption with tooth loss, temporomandibular dysfunction [35] and anorexia nervosa [9].

One specialty that relies particularly on the technique employed by the professional is implantology. Although the success of a dental implant depends on individual patient factors like tissue repair and osseointegration, the technique requires precise planning and execution. Any misstep has a significant negative impact on the procedure's outcome [36]. Various situations can contribute to treatment failure [37], including: (i) tooth extractions with limited preservation of the bone plate, with esthetic harm and the need for bone and/or mucosal grafts; (ii) labial and/or gingival paresthesia due to nerve injury; (iii) problems involving the soft tissue such as degeneration of the donor bed for autologous tissue grafts; (iv) tissue emphysema caused by inadvertent propulsion of air under the skin or mucosa; (v) harm to the blood supply of adjacent teeth, potentially leading to tooth death and damage to the implant itself; (vi) infections surrounding the implant (peri-implantitis); (vii) perforations of the sinus membrane during osteotomy to raise the maxillary sinus floor or sinus perforated by the implant; and (viii) bone fractures.

Finally, alterations in the components of the stomatognathic system can influence the body as a whole, e.g.: restorations that produce inadequate contact between opposing teeth will require adapta-

tion of the dental arches to the new articular pattern, and if this does not happen, painful reflexes can appear in the head and neck's postural muscles or even lead to dental wear and/or fractures, injury to the periodontium, or temporomandibular joint disorders [38].

The triggers that served as the basis for the study

Trigger tools have been widely used in the field of patient safety with the purpose of facilitating the detection of adverse events. Triggers are based on identifying terms in the health records that may be associated with adverse events, and based on this signaling, conducting a search to confirm whether harm occurred, besides determining the severity and contributing factors.

In the studies, trigger tools were first used in the explicit assessment phase of the *Harvard Medical Practice Study* [39]. The methodology was later replicated in other studies [14,40,41,42] and acknowledged as an important approach to document and assist the identification of patient harm.

From this perspective, since 2003 the IHI has developed a program for elaborating trigger tools which now includes a broad set for measuring adverse events in specific circumstances, for example triggers for adverse events in intensive care units and triggers for adverse events from medication in mental health services [43]. Inspired by the tool proposed by the IHI for outpatients, a study performed at the Harvard School of Dentistry adapted and tested a set of triggers for detecting adverse events in dental records ("*dental clinic trigger tools*") through a retrospective review of electronic patient records, but which would also apply to manual records, according to the authors [44].

The Harvard study [44] only considered three indicators for its trigger tool, while the IHI tools and those used in studies retrieved in the current study contain 11 to 20 triggers. The dental clinic trigger tool in the Harvard study included procedures for incision and drainage, failed implants, and multiple-visit. The authors ran the trigger tool for six months, and the triggers selected 315 records, of which 158 (50%) were positive for one or more adverse events, while of the 50 records randomly selected and assessed, 17 (34%) were positive for at least one adverse event.

A form with a set of triggers was recommended in a document published in 2010 by experts in the WHO Patient Safety Program called *Assessing and Tackling Patient Harm: A Methodological Guide for Data-poor Hospitals* [3]. This publication was targeted to researchers, quality managers, clinicians, and other professionals interested in understanding and tackling patient safety issues in hospitals. The objective was to offer devices that are not tied to the good quality of health records or to the available material and human resources, more adequate for the Brazilian reality. This helped the WHO proposal serve as a guiding thread for the triggers presented here, although other publications also served as the basis.

Conclusion

Dental care, although essentially surgical, with close contact with secretions like saliva and blood, the possibility of generating medical emergencies, requiring concentration and great manual dexterity, thus extremely dependent on the dentist's skill and working conditions, i.e., a broad set of circumstances that favor adverse events, has not evolved greatly in the field of patient safety when compared to other areas of health.

However, there is sufficient evidence to show that dental care entails risks that require patient safety interventions to improve the quality of patient care. Further, as recommended by the WHO, it is necessary to begin by measuring the harm in order to proceed to search for understanding the causes of the problem and identify appropriate solutions. A trigger tool can be quite useful for identifying adverse events in dental care.

The modified Delphi method proved quite useful for developing the tool used here and allowed for the trigger tools for adverse events already used in the hospital and outpatient setting in various areas of health to be adapted to assist in the specific detection of adverse events in dentistry. However, the triggers require testing for their validation, which was beyond the scope of this study.

Contributors

C. D. T. S. O. Corrêa and W. Mendes contributed equally with the other author to the methodology's elaboration and execution, as well as the article's elaboration and revision.

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References

1. Chan M. Patient safety: the rising star of clinical care. http://www.who.int/dg/speeches/2012/patient_safety_20121022/en/ (accessed on 16/Dec/2016).
2. World Health Organization. Conceptual framework for the International Classification for Patient Safety: final technical report. Geneva: World Health Organization; 2009.
3. World Health Organization. Assessing and tackling patient harm: a methodological guide for data-poor hospitals. Geneva: World Health Organization; 2010.
4. Institute of Medicine; Committee on Quality of Health Care in America; Kohn LT, Corrigan JM, Donaldson MS. To err is human: building a safer health system. Washington DC: National Academies Press; 2000.
5. De Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA. The incidence and nature or in-hospital adverse events: a systematic review. Qual Saf Health Care 2008; 17:216-23.
6. Marchon SG, Mendes Junior WV. Segurança do paciente na atenção primária à saúde: revisão sistemática. Cad Saúde Pública 2014; 30:1815-35.
7. Donabedian A. Explorations in quality assessment and monitoring. v. II: the criteria and standards of quality. Ann Arbor: Health Administration Press; 1982.
8. Bailey E, Tickle M, Campbell S, O'Malley L. Systematic review of patient safety interventions in dentistry. BMC Oral Health 2015; 15:152.
9. Obadan EM, Ramoni RB, Kalenderian E. Lessons learned from dental patient safety case reposts. J Am Dent Assoc 2015; 146:318-26.e2.
10. Perea-Pérez B, Labajo-González E, Santiago-Sáez A, Albarrán-Juan E, Villa-Vigil A. Analysis of 415 adverse events in dental practice in Spain from 2000 to 2010. Med Oral Patol Oral Cir Bucal 2014; 19:e500-5.
11. Maramaldi P, Walji MF, White J, Etolue J, Kahn M, Vaderhobli R, et al. How dental team members describe adverse events. J Am Dent Assoc 2016; 147:803-11.
12. Murff HJ, Patel VL, Hripcsak G, Bates DW. Detecting adverse events for patient safety research: a review of current methodologies. J Biomed Inform 2003; 36:131-43.
13. Pavão ALB, Andrade D, Mendes W, Martins M, Travassos C. Estudo de incidência de eventos adversos hospitalares, Rio de Janeiro, Brasil: avaliação da qualidade do prontuário do paciente. Rev Bras Epidemiol 2011; 14:651-61.
14. Mendes W, Martins M, Rozenfeld S, Travassos C. The assessment of adverse events in hospitals in Brazil. Int J Qual Health Care 2009; 21: 279-84.
15. Wright JTC, Giovinazzo RA. Delphi – uma ferramenta de apoio ao planejamento prospectivo. Caderno de Pesquisa em Administração 2000; 1:54-65.
16. Dalkey NC. The Delphi Method: an experimental study of group opinion. http://www.rand.org/pubs/research_memoranda/RM5888.html (accessed on 20/May/2016).
17. Montan MF, Cogo K, Bergamaschi CC, Volpato MC, Andrade ED. Mortalidade relacionada ao uso de anestésicos locais em odontologia. RGO (Porto Alegre) 2007; 55:197-202.
18. Sambrook PJ, Smith W, Elijah J, Goss AN. Severe adverse reactions to dental local anaesthetics: systemic reactions. Aust Dent J 2011; 56:148-53.
19. Pattni N. Superficial skin necrosis and neurological complications following administration of local anaesthetic: a case report. Aust Dent J 2013; 58:522-5.
20. Rico Ruiz A, Perea Pérez B, Labajo González, E, Santiago Sáez A, García Marín F. Ingestión y aspiración de cuerpos extraños en Odontología: causas y recomendaciones de actuación. Cient Dent 2011; 8:69-74.
21. Venkataraghavan K, Anantharaj A, Praveen P, Prathibha Rani S, Murali Krishnan B. Accidental ingestion of foreign object: systematic review, recommendations and report of a case. Saudi Dent J 2011; 23:177-81.
22. Wandera A, Conry JP. Aspiration and ingestion of a foreign body during dental examination by a patient with spastic quadriparesis: case report. Pediatr Dent 1993; 15:362-3.
23. Rebouças DS, Lima RRS, Rocha Junior WGP, Assis AF, Zerbinati LPS. Sinusite crônica decorrente de corpo estranho em seio maxilar – relato de caso. Revista Bahiana de Odontologia 2014; 5:131-6.

24. Cerqueira LS, Almeida AS, Rebouças DS, Sodré JS, Marchionni AMT. Remoção de corpo estranho em seio maxilar: relato de caso. Rev Bras Cir Traumatol Buco-Maxilo-Fac 2016; 16:44-7.
25. Araújo OC, Agostinho CNLF, Marinho LMRF, Rabêlo LRS, Bastos EG, Silva VC. Incidência dos acidentes e complicações em cirurgias de terceiros molares. Rev Odontol UNESP 2011; 40: 290-5.
26. Camargos FM, Meira HC, Aguiar EG, Abdo EM, Glória JR, Dias ACS. Infecções odontogênicas complexas e seu perfil epidemiológico. Rev Bras Cir Traumatol Buco-Maxilo-Fac 2016; 16:25-30.
27. Romeo U, Galanakis A, Lerario F, Daniele GM, Tenore G, Palaia G. Subcutaneous emphysema during third molar surgery: a case report. Braz Dent J 2011; 22:83-6.
28. Haji-Hassani N, Bakhshi M, Shahabi S. Frequency of iatrogenic errors through root canal treatment procedure in 1335 charts of dental patients. J Int Oral Health 2015; 7 Suppl 1:14-7.
29. Lopes PH, Siqueira JF, Elias CN. Acidentes e complicações em endodontia. In: Lopes H, organizador. Endodontia: biologia e técnica. 4ª Ed. Rio de Janeiro: Elsevier; 2015. p. 427-46.
30. Lopes PH, Elias CN, Batista MMD, Vieira VTL. Fratura dos instrumentos endodônticos: Fundamentos teóricos e práticos. In: Lopes H, organizador. Endodontia: biologia e técnica. 4ª Ed. Rio de Janeiro: Elsevier; 2015. p. 407-26.
31. Andrade ED, Ramacciato JC, Motta RHL. Interações farmacológicas adversas. In: Andrade ED, organizador. Terapêutica medicamentosa em odontologia. 3ª Ed. São Paulo: Artes Médicas; 2014. p. 78-91.
32. Oliveira MA, Martins FM, Asahi DA, Santos PSS, Gallottini M. Osteonecrose induzida por bisfosfonatos: relato de caso clínico e protocolo de atendimento. Arq Med Hosp Fac Cienc Med Santa Casa São Paulo 2014; 59:43-8.
33. Akman AC, Demiralp B, Güncü GN, Kiremitçi A, Sengün D. Necrosis of gingiva and alveolar bone caused by acid etching and its treatment with subepithelial connective tissue graft. J Can Dent Assoc 2005; 71:477-9.
34. Soares RG, Cristhiane D, Irala LED, Salles AA, Limongi O. Injeção acidental de hipoclorito de sódio na região periapical durante tratamento endodôntico: relato de caso. RSBO (Impr.) 2007; 4:17-21.
35. Talic NF. Adverse effects of orthodontic treatment: a clinical perspective. Saudi Dent J 2011; 23:55-9.
36. Rosemberg ES, Evian CI, Stern K, Waasdorp J. Falhas nos implantes: prevalência, fatores de risco, acompanhamento e prevenção. In: Froum SJ, organizador. Complicações em implantodontia oral – etiologia, prevenção e tratamento. São Paulo: Editora Santos; 2013. p. 110-7.
37. Greenstein G, Cavallaro Jr. JS. Uma seleção de complicações cirúrgicas associadas à colocação de implantes dentários: 35 relatos de casos – problemas comuns, prevenção e manuseio. In: Froum SJ, organizador. Complicações em implantodontia oral – etiologia, prevenção e tratamento. São Paulo: Editora Santos; 2013. p. 388-414.
38. Oliveira W. Disfunções temporomandibulares. São Paulo: Editora Artes Médicas; 2002.
39. Leape LL, Brennan TA, Laird N, Lawthers AG, Localio AR, Barnes BA, et al. The nature of adverse events in hospitalized patients. Results of the Harvard Medical Practice Study II. N Engl J Med 1991; 324:377-84.
40. Baker GR, Norton PG, Flintoft V, Blais R, Brown A, Cox J, et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. CMAJ 2004; 170:1678-86.
41. Michel P, Quenon JL, Sarasqueta AM, Scemama O. Comparison of three methods for estimating rates of adverse events and rates of preventable adverse events in acute care hospitals. BMJ 2004; 328:199-202.
42. Sousa P, Uva AS, Serranheira F, Leite E, Nunes C. Segurança do doente: eventos adversos em hospitais portugueses. Estudo piloto de incidência, impacte e evitabilidade. Lisboa: Escola Nacional de Saúde Pública, Universidade Nova de Lisboa; 2011.
43. Institute of Healthcare Improvement. Trigger tools. http://www.ihi.org/Topics/TriggerTools/Pages/default.aspx (accessed on 07/Apr/2016).
44. Kalenderian E, Walji MF, Tavares A, Ramoni RB. An adverse event trigger tool in dentistry: a new methodology for measuring harm in the dental office. J Am Dent Assoc 2013; 144: 808-14.

Resumo

O objetivo deste estudo foi propor um conjunto de rastreadores para a pesquisa de eventos adversos em odontologia ambulatorial no Brasil. O instrumento foi elaborado em duas etapas: (i) para construir um conjunto preliminar de rastreadores foi realizada uma revisão da literatura, a fim de identificar a composição das ferramentas de rastreamento utilizadas nas demais áreas da saúde e os principais eventos adversos encontrados em odontologia; (ii) para validar os rastreadores preliminarmente construídos foi organizado um painel de especialistas empregando o método Delphi modificado. Foram elaborados quatorze rastreadores para compor um instrumento com critérios explícitos para identificar potenciais eventos adversos no cuidado odontológico, essenciais para os estudos de revisão retrospectiva de prontuários. Pesquisas relacionadas à segurança do paciente em odontologia ainda são bastante incipientes em relação às demais áreas da saúde. Este trabalho pretendeu contribuir para a investigação nesse campo. O aporte da literatura e a ajuda da expertise do painel de especialistas permitiram a elaboração de um conjunto de rastreadores para a detecção de eventos adversos odontológicos, no entanto, são necessários estudos adicionais para testar a validade do instrumento.

Segurança do Paciente; Odontologia; Técnica Delfos; Registros Odontológicos

Resumen

El objetivo de este estudio fue proponer un conjunto de marcadores para la investigación de eventos adversos en odontología ambulatoria en Brasil. El instrumento se elaboró en dos etapas: (i) para construir un conjunto preliminar de marcadores se realizó una revisión de la literatura, a fin de identificar la composición de las herramientas de rastreo utilizadas en las demás áreas de la salud, y los principales eventos adversos encontrados en odontología; (ii) para validar los marcadores preliminarmente construidos se organizó un panel de especialistas, empleando el método Delphi modificado. Se elaboraron catorce marcadores para componer un instrumento con criterios explícitos, con el fin de identificar potenciales eventos adversos en el cuidado odontológico, esenciales para los estudios de revisión retrospectiva de registros médicos. Las investigaciones relacionadas con la seguridad del paciente en odontología todavía son bastante incipientes, en relación con las demás áreas de salud. Este trabajo pretendió contribuir a la investigación en ese campo. El aporte de la literatura y la ayuda de la pericia del panel de especialistas permitieron la elaboración de un conjunto de marcadores para la detección de eventos adversos odontológicos, sin embargo, se necesitan estudios adicionales para probar la validez del instrumento.

Seguridad del Paciente; Odontología; Técnica Delfos; Registros Odontológicos

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