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ORIGINAL ARTICLE

Post-surgical emergency after-hours calls: Prevalence, concerns, and management

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Abstract

Objective: The purpose of this study was to investigate the prevalence, nature, and management of post-surgical emergency after-hours calls in a dental school setting with predoctoral students, graduate students/residents, and faculty providers.

Methods: A patient chart review (March 2018–February 2020) for post-surgical calls through the emergency after-hours pager system was conducted at the Marquette University School of Dentistry. The total number of surgical procedures, procedure type, the timing of call, operator experience, concern, and recommendation given during the call were documented.

Results: During the review period, 83 calls (from 75 patients) were recorded after 8,487 surgical procedures (1% of procedures). Patients called 5.4 ± 0.8 days postoperatively. Procedure type affected call prevalence ($p = 0.04$), with most calls made after extractions (69.9% of all calls; 1% of extractions; 58/5,725), implant placement (6%; 0.9% of implant placements; 5/530) and periodontal plastic surgery (6%; 3.1% of all plastic surgeries; 5/161). The most common concern was pain (72.3%), then swelling (36.1%), bleeding (12%), and infection (9.6%). Operator experience did not affect call prevalence. Recommendations given were next business day follow-up (79.5%), reinforcement of already given postoperative instructions (51.8%), prescription (15.7%), and hospital emergency department (ED) visit (7.2%).

Conclusions: Post-surgical emergency after-hours calls in a dental school setting occur within the first postoperative week and are rare, unrelated to operator experience, typically prompted by pain, and rarely resulting in referral to hospital ED. The use of a pager system is adequate for the management of after-hours emergencies and may reduce self-referrals to the hospital ED.

KEYWORDS

after-hours care, dental health services, emergencies, implantology, oral and maxillofacial surgery, pain, patient care management, periodontics, postoperative, postoperative complications

1 | INTRODUCTION

Hospital emergency department (ED) visits for dental-related conditions are rising. In 2010, 2.11 million people in the United States visited EDs prompted by a dental problem.¹ In 2012 and 2014, this number reached 2.18¹ and 2.43 million people,² respectively. These ED visits are attributable to various traumatic and non-traumatic dental conditions.^{3–5} With respect to non-traumatic conditions, the main experience that motivates patients to seek emergency care is pain, followed by an abscess.^{3,6} Other less common reasons are loose crowns, broken teeth, temporomandibular joint disturbances, and postoperative bleeding.^{5,6}

When non-traumatic dental emergencies are examined in the ED, the diagnoses vary from caries, pulp, and periapical conditions to gingival and periodontal conditions, mouth cellulitis, abscess, and others.⁷ ED dental patients are usually prescribed antibiotics and/or analgesics^{3,8,9} undergo minor procedures, such as abscess drainage,¹⁰ or are given advice without any intervention.¹⁰ Definitive treatment can only be given by a dentist, who is not usually a member of the ED team. Therefore, although the majority of ED dental patients cannot reach their dentist or do not have one^{3,11} an important step in the management of such patients is follow-up care at a dental office.³

Postoperative dental emergencies often wound healing-related, are unique in that these patients are registered patients of a private practice or hospital dental clinic, where they received the surgical procedure and they already have a scheduled postoperative visit. Following oral surgical procedures, patients are given postoperative information on the expected course of healing as well as wound care and hemostasis instructions.¹² Patients are informed that, during the early stages of wound healing, an inflammatory response is expected, and they may experience pain, edema, or erythema. Minor bleeding and hematoma formation may also occur.¹³ Patients are also informed of potential wound healing complications, such as infection, fever, lymphadenopathy, tissue necrosis, purulence, abscess, paresthesia, dysphagia, and others¹³ and are given an emergency contact in case of concerns.

To our knowledge, there is no study providing information specifically on after-hours calls, prompted by postoperative wound healing-related emergencies, and their management in a dental school population. The aim of this study is to investigate the prevalence, nature, and management of emergency after-hours calls following oral surgical procedures in a dental school setting with predoctoral students, graduate students/residents, and faculty providers.

2 | MATERIALS AND METHODS

2.1 | Study design

The present study is a retrospective study based on emergency phone call data retrieved from the electronic health records (EHR) of patients at the Marquette University School of Dentistry (MUSoD), in Milwaukee, Wisconsin (IRB protocol number: HR-3540, 12/19/2019).

MUSoD has a pager system for after-hours dental emergencies of registered MUSoD patients (Table 1). From 4.30 p.m. to 8:00 a.m. daily and during weekends, trained and calibrated residents and faculty are on call and receive emergency phone calls on the pager. Initially, the on-call resident reviews the patient's EHR via remote access, then discusses the emergency with the patient and determines the proper course of action. In case of a complex emergency, the on-call faculty are notified. Then, a template note (Figure 1) with details of the call is entered in the institutional EHR system (AxiUm, Exan, Las Vegas, NV, USA). For the present study, all notes for phone calls that occurred during a 2-year period, that is, between March 1, 2018, and February 29, 2020, were retrieved from the EHR.

2.2 | Study procedures

Total number and notes for phone calls that occurred during the study period were recorded. Only calls of adult patients who had undergone an oral surgical procedure at MUSoD were included. Once patient charts were verified to fulfill these requirements, charts were reviewed, and the following information was retrieved:

- Patient age and gender at the time of call
- Number of phone calls per patient
- Surgical procedure completed prior to the phone call, categorized into one of the following types:
 - Tooth extractions and implant removals, without simultaneous ridge preservation.
 - Implant site development procedures, including ridge preservation, bone regeneration, and sinus augmentation with or without tooth extractions or implant removals.
 - Implant placement and uncover procedures, including these procedures alone or with additional procedures that occurred at the implant site, such as bone grafting, soft tissue grafting, and others.
 - Surgical periodontal and peri-implant therapy, including flap procedures, resective and/or regenerative procedures, such as osseous surgery, bone grafting, guided tissue regeneration, the addition of biologic agents, or others.

TABLE 1 Marquette University School of Dentistry (MUSoD) on-call schedule assignments and responsibilities

On-call schedule assignments

- On-call time schedule: weekdays 4.30 p.m.–8 a.m., weekends, holidays
- The Associate Dean for Graduate Studies assigns one periodontal, prosthodontic, orthodontic, endodontic, or AEGD resident (receiving tuition remission stipend) and one general dentist or specialist faculty (volunteer) to be on-call for each week of the calendar year on a rotating basis. In case the on-call faculty is not reachable, the clinic director serves as the backup faculty.

On-call resident duties

- Respond to pager calls
- Access and review patient chart in AxiUm in designated laptop given to on-call resident
- Diagnose and manage emergencies over the phone
- Examine emergency patients under on-call faculty supervision at designated MUSoD clinic, if a next business day visit is recommended and school is closed
- Enter an after-hours note in the patient's chart

On-call faculty duties

- Respond to cell phone calls by on-call resident
- Advise on-call resident on the management of complex cases
- Examine emergency patients at designated MUSoD clinic, if a next business day visit is recommended and school is closed
- Prescribe medications
- Approve after-hours entered by the resident in the patient's chart

<p>After Hours Contact</p> <p>Date and Time of call: / / []AM []PM</p> <p>=====</p> <p>Patient Clinic Origin: []Undergrad []Adv. Care []Endo []Ortho []Pros []Pedo []OS []Fac Prac []Perio</p> <p>=====</p> <p>Chief Complaint:</p> <p>Edema []Yes []No Pain []Yes []No</p> <p>=====</p> <p>[] Advised patient to contact MUSoD next business day [] Patient was referred directly to hospital [] Backup Faculty was called [] Rx is needed</p> <p>=====</p> <p>Other information:</p>

FIGURE 1 Template of electronic health record note for after-hours emergency call

- Periodontal plastic surgery procedures, including autogenous or non-autogenous soft tissue grafts and/or frenectomy.
 - Crown lengthening surgery.
 - Alveoloplasty and tori removal.
 - Combination: Any combination of codes that overlap the above categories, where more than one procedure type was completed in each appointment.
 - Other procedures such as biopsy, tooth exposure for orthodontic purposes, mini-implant or temporary anchorage device placement, fibrotomy, incision and drainage of abscess, and any others that do not fall in the above categories.
 - Postoperative day of the phone call
 - Whether a postoperative visit was completed prior to the phone call
 - Operator experience (predoctoral student, graduate student/resident, faculty)
 - Concerning symptom
 - Recommendation given by the resident and faculty receiving the phone call
 - Day and findings of postoperative visit after the phone call
- Total numbers of the above types of procedures completed at MUSoD during the same time period were also

retrieved, based on the recorded site-specific Code on Dental Procedures and Nomenclature (CDT Code) as specified (Table S1). Data analysis was based on the assumption that a patient who received multiple surgical procedures at different sites during the same appointment might not be able to report the site-specific procedure that would be related to the emergency they experienced. Therefore, the total number of surgical appointments completed during this 2-year time period were categorized in the aforementioned procedure types. The total number of surgical appointments was used for statistical analysis, rather than the total number of site-specific procedures completed.

2.3 | Statistical analysis

All categorical and numerical variables were described using appropriate descriptive statistics, i.e., frequencies and percentages (categorical variables) or mean \pm standard error (normally distributed numerical variables), mode or median. Categorical variable distributions were compared using chi-square and/or Fisher exact test. For numerical variables, two groups were compared either using *t*-test for independent samples or Wilcoxon Rank Sum test; more than two groups were compared using either analysis of variance or Kruskal-Wallis test. An alpha level of 0.05 was used as a level of significance and all statistical analyses were performed using statistical software (SAS version 9.4; SAS Institute, Cary, NC).

3 | RESULTS

During the 2-year period under investigation, 8,487 surgical appointments were completed and 83 post-surgical after-hours calls were made, resulting in an overall prevalence of 1% for post-surgical after-hours emergency calls. Seventy-five patients (36 males, 39 females, $p = 0.82$), aged 51.7 ± 2.3 years, made the calls. The majority of patients (68 patients, 90.6%) called once after a procedure. Six patients called twice with concerns after the same procedure and one patient called three times.

Emergency after-hours calls were made following all procedure types (Table 2). Procedure type affected call prevalence ($p = 0.04$). Calls were received after 1% of tooth extractions/implant removals (58 out of 5,725), 1.3% of implant site development procedures (4/293), 0.9% of implant placement and uncovering procedures (5/530), 0.3% of periodontal and peri-implant therapeutic surgery (3/859), 3.1% of periodontal plastic surgery procedures (5/161), 0.5% after crown lengthening procedures (1/167), 1.5% of alveoplasty and tori removal (2/129), 0.4% of procedures combining any of the above types (2/497), and 2.3%

after procedures listed under the “other” category (3/126; apicoectomy, biopsy, abscess incision, and drainage).

When the call was used as a measurement unit, the vast majority of emergency after-hours calls were made after extractions (69.9%, $p < 0.001$). They were followed by implant placement (6%), periodontal plastic surgery (6%), implant site development (4.8%), surgical periodontal treatment (3.6%) and other procedures (3.6%), alveoplasty and tori removal (2.4%) and combination procedures (2.4%) and last, crown lengthening (1.2%).

Patients called 5.4 ± 0.8 days (median: 4 days, mode: 3 days, range: 0–49) after the procedure (Table 2). Procedure type affected call timing ($p = 0.01$). Patients called at 4 days after crown lengthening, 4 ± 1.4 days after implant site development procedures, 4.1 ± 0.5 days after extractions, 6.3 ± 5.8 after other procedures, 5 ± 2 days after alveoplasty or tori removal, 6.8 ± 2.7 days after periodontal plastic surgery, 11 ± 8 days after periodontal surgical treatment, 16.8 ± 8.5 days after implant placement, and 4.5 ± 0.5 days after combination procedures. Call timing was significantly different between extraction and implant placement procedures ($p < 0.05$).

For most calls (86%), patients had not been seen for a postoperative visit before the call. Twelve patients (12 different procedures) called following an in-person postoperative visit, with the following concerns: material loss from the surgical site ($n = 4$; soft tissue graft, bone graft, healing abutment, dry socket dressing), continuous pain ($n = 5$), infection ($n = 2$), and pus drainage noted at the surgical site ($n = 1$).

Patients called after procedures performed by predoctoral students (1%; 57/5,640), graduate students/residents (1.1%; 21/1,901) and faculty (0.5%; 5/946). The clinical experience of the provider did not affect call prevalence ($p = 0.31$). When the call was used as the measurement unit, 68.7% (57/83), 25.3% (21/83), 6% (5/83) of the calls were initiated after procedures completed by predoctoral students, graduate students/residents, and faculty, respectively ($p = 0.73$).

During each call, patients reported one or more concerning symptoms (Table 3). Patients expressed one, two, three, and four concerns in 55.4%, 32.5%, 10.8%, and 1.2% of the calls respectively. The most common concern was pain (72.3% of calls), followed by swelling (36.1%), bleeding (12%), infection (9.6%), and other concerns (8.4%). Tissue or material discharge (7.2%), fever (4.8%), suture disturbances (2.4%), sinus involvement (2.4%), dressing disturbances (1.2%), and difficulty mouth opening (1.2%) also prompted patient calls after hours. Other reported concerns were nausea and vomiting, difficulty breathing, headache, bruising, paresthesia, dry socket, and sleep disturbances. Only tissue or material discharge as a concern was distributed differently by procedure ($p < 0.01$; implant

TABLE 2 Prevalence (%) of post-surgical after-hours emergency calls among completed surgical procedures and average post-procedure timing of calls

Type of surgery	Prevalence of after-hours emergency calls <i>n/N</i> (%)	Postoperative day of the call mean ± SE (range)	Operator experience level
Tooth extractions and implant removals	58/5725 (1)	4.1 ± 0.5 (0,19)	P: 55/58 G: 2/58 F: 1/58
Implant site development surgery	4/293 (1.3)	4 ± 1.4 (0,6)	G: 4/4
Implant placement and uncover surgery	5/530 (0.9)	16.8 ± 8.5 (3,49)	G: 3/5 F: 2/5
Surgical periodontal and peri-implant therapy	3/859 (0.3)	11 ± 8 (2,27)	G: 3/3
Periodontal plastic surgery	5/161 (3.1)	6.8 ± 2.7 (0,15)	G: 5/5
Crown lengthening	1/167 (0.5)	4	G: 1/1
Alveoloplasty and tori removal	2/129 (1.5)	5 ± 2 (3,7)	F: 2/2
Combination surgery	2/497 (0.4)	4.5 ± 0.5 (4,5)	P: 2/2
Other surgery	3/126 (2.3)	6.3 ± 5.8 (0,18)	G: 3/3
Total	83/8,487 (1) <i>p</i> = 0.04	5.4 ± 0.8 (0,49)	P: 57/83 G: 21/83 F: 5/83

n = number of calls; *N* = number of corresponding procedures.

P = predoctoral student, G = graduate student/resident, F = faculty.

TABLE 3 Distribution (%) of number and type of concerns reported during post-surgical after-hours emergency calls (*n* = 83)

Concerns	Prevalence (%)
Number of concerns in each call	
1	55.4
2	32.5
3	10.8
4	1.2
Type of concern	
Pain	72.3
Swelling	36.1
Bleeding	12
Infection	9.6
Tissue or material discharge	7.2
Fever	4.8
Suture disturbances	2.4
Sinus involvement	2.4
Dressing disturbances	1.2
Mouth opening difficulty	1.2
Other	8.4

site development procedures: 2/6 calls with this complaint; implant placement and uncover surgery: 1/6 calls; periodontal plastic surgery procedures: 3/6 calls). Pain (*p* = 0.04) and tissue/material discharge (*p* < 0.01) were differentially affected by operator experience. Of the 60 pain-related calls, procedures performed by predoctoral students, graduate students/residents, and faculty accounted for 44, 11,

TABLE 4 Distribution (%) of number and type of recommendations given to patients during post-surgical after-hours emergency calls (*n* = 83)

Recommendations	Prevalence (%)
Number of recommendations in each call	
1	45.8
2	54.2
Type of recommendation	
Next business day visit	79.5
Reinforcement of postoperative instructions	51.8
Prescription	15.7
Emergency Department visit	7.2

and five calls, respectively; all six calls for tissue/material discharge were prompted after graduate student/resident procedures.

The on-call residents and faculty gave a single recommendation in 45.8% of all calls (38/83) and two recommendations in 54.2% of all calls (45/83). As seen in Table 4, the most common recommendation was the next business day visit to the clinic (79.5% of calls), followed by reinforcement of postoperative instructions (51.8%), prescription (15.7%), and ED visit (7.2%). In cases when the patient needed to be seen as soon as possible and the school was closed, the patient was referred to the ED or on-call resident and faculty examined the patient in a designated school clinic where supplies were set aside for emergency patients.

There was no difference in recommendation distribution based on procedure ($p > 0.05$). However, there was a significant difference in recommendation distribution based on the concern (pain and prescription, $p = 0.01$; swelling and prescription, $p = 0.01$; swelling and reinforcement of postoperative instruction, $p = 0.04$; infection and prescription, $p = 0.002$; bleeding and postoperative visit, $p = 0.004$; bleeding and reinforcement of postoperative instructions, $p = 0.01$).

Patients followed the recommendation of the next business day postoperative visit after 73.4% (47/64) of the calls with such recommendation (64/83). Overall, patients eventually had a postoperative visit after 69% of the calls (57/83), regardless of recommendation. Seven percent of the visits (4/57) were completed the same day of the call, 15.7% (9/57) after 1 day, 17.5% (10/57) after 2 days, 28% (16/57) after 3–4 days, 10.5% (6/57) after 5–7 days, 15.7% (9/57) between 8 and 14 days, and 5.2% (3/57) after 15 days or longer.

The postoperative visit records documented one or more findings. For most visits (52%), findings were within normal limits. Pain was present during 43% of postoperative visits, followed by swelling (25%), erythema (23.2%), dry socket (14.3%), and food impaction (12.5%). Less frequent findings included muscle disturbances (8.9%), suppuration (7.1%), abscess (3.6%), trismus (5.3%), infection (5.3%), flap necrosis (5.3%), bone exposure (3.6%), temporomandibular joint disturbances (3.6%), loose sutures (3.6%), and bruising (1.8%). Other findings that did not fall into the above categories, such as sharp bone sequestrum and missing healing abutment, accounted for 5.3% of the findings.

The postoperative visit findings were consistent with the patient-reported concern during the call for the following pairings: concern and finding of pain ($p = 0.0008$) and concern of mouth opening and finding of temporomandibular joint disturbances ($p < 0.0001$). Prevalence of suture disturbances ($p = 0.02$), pain ($p = 0.003$), and flap necrosis ($p = 0.03$) were affected by the procedure.

4 | DISCUSSION

This study is the first to report on after-hours post-surgical emergency calls and their management in a comprehensive academic dental institutional setting. The results indicate that in a dental school setting with predoctoral students, graduate students/residents, and faculty providers, post-surgical after-hours emergency calls are rare, occurring in only 1% of surgeries overall, with the overwhelming majority (72.3%) of such calls concerning postoperative pain. Periodontal plastic surgery (soft tissue grafting) procedures yielded the highest prevalence (3.1%; 5/161) of calls among all surgical procedure types, while calls following crown lengthening and periodontal and peri-implant therapeutical surgical procedures were the least common

among all specific surgical procedure types (0.5%; 1/167 and 0.3%; 3/859, respectively). Although only 1% of extraction procedures resulted in after-hours emergency calls, post-extraction calls were the most frequent ones (69.9% of all calls), reflecting the relative number of extractions performed, compared to all other procedures. Regarding management of the after-hours emergency calls, the most common recommendation was the next business day clinic visit (79.5% of calls), with only 7.2% managed by recommending an ED visit. These novel findings could help improve the postoperative care of patients undergoing dental surgical procedures and the planning necessary for postoperative emergency after-hours call management by institutions and practitioners.

The difference in the prevalence of calls between soft tissue grafting (3.1%) and flap-related procedures such as crown lengthening (0.5%) and surgical periodontal and peri-implant therapeutical procedures (0.3%) is consistent with published patient-reported outcomes¹⁴ and may be explained by differences in the degree of invasiveness between procedures. Flap-related procedures are relatively simple operations, compared to many other surgeries, and involve full-thickness envelope flap elevation, bone exposure, reduction, or regeneration, with reported complications being minimal when regenerative materials are not used.^{15,22} In contrast, soft tissue grafting typically involves two surgical sites, vertical and/or periosteal releasing incisions and elevation of partial-thickness flaps, with postoperative pain experiences originating from both donor and recipient sites^{16–19} and swelling being a common postoperative complication.^{17,20} In this context, use of vertical and periosteal releasing incisions^{21,22} extensive surgical sites,²² anesthetic volume,²² and use of regenerative materials²² are related to increased morbidity.

Two well-documented factors that negatively affect postoperative patient experiences are increased duration of surgery^{14,17,21–24} and limited operator experience.^{22,25–27} The two can be directly associated as less experienced operators take longer to complete a procedure. The likelihood of an adverse outcome,^{27–29} including increased postoperative pain,^{22,25,26} and infection³⁰ is directly correlated with operator experience level. In the present study, the frequency of postoperative patient calls did not differ among procedures performed by predoctoral students, graduate students/residents, or faculty. This may reflect appropriate faculty supervision and timely intervention when procedures are complex. Operator experience did not affect call prevalence even when the call was the measurement unit or calls were grouped by procedures performed by inexperienced (predoctoral students and graduate students/residents) and experienced clinicians (faculty) (data not shown). Therefore, the present study results may also be relevant for experienced clinicians in private practice.

Pain and swelling were the leading concerning symptoms that prompted patients to seek emergency after-hour advice following surgery. These symptoms are present during uncomplicated wound healing²³; usually, pain and swelling peak during the first and 1–2 days after surgery, respectively.^{31,32} However, when present at an excessive degree or for a prolonged duration, they may concern the patient. An indication of the significance of the concern is the fact that the same experiences are usually the main reasons patients seek ED care for dental-related problems, worldwide.^{11,33,34} In the present study, most patients with pain and swelling called within a week following the procedure and 86% of calls were from patients that had not yet been seen for a postoperative visit. Similarly, patients reporting complications following minor oral surgical procedures presented for a postoperative visit at 6 days, on average, without a prior postoperative visit.³⁵

In the current study, patients called complaining of complications following 0%–3.1% of all surgery types. The literature lacks similar studies on after-hours emergency calls following oral surgical procedures, thus precluding any direct comparisons. When complications after oral surgical procedures are recorded by the operator during scheduled postoperative visits, typically at seven days following the surgery, the complication prevalence by the procedure is much higher than in the present study, regardless of procedure type^{14,17,23}; this discrepancy suggests that patients included in the present study would not make an after-hours emergency call when experiencing an anticipated postoperative complication, such as pain or swelling, before a scheduled postoperative visit. In the current study, a call after a postoperative visit indicated continuous symptoms (pain, infection, and pus drainage) or an unexpected incident (loss of tissue or material).

Management of phone calls included four recommendation options. The most common recommendation was the next business day postoperative visit, given to over half the callers, followed by reinforcement of previously given postoperative instructions and prescriptions. The aforementioned approach is consistent with reported recommendations from the private general dental practice and dental public health service settings in the UK,^{6,36} where next business day appointment, advice only, and prescription were among the most common recommendations for after-hours emergencies handled through an on-call system managed by dentists³⁶ or a dental nurse.⁶

Despite the simplicity of such recommendations, compliance may not be high; in the present study, patients failed to follow the recommendation for a next-day visit after 26.6% of calls with such recommendations. The lack of similar studies prevents direct comparisons. Reinforcement of postoperative instructions, often the recommendation is given to patients calling because of swelling, is

a valuable approach to help minimize complications and avoid ED visits. Detailed and simply worded instructions decrease postoperative stress and complaints and increase pain relief without increasing analgesic consumption.^{12,37} Among patients who presented to the ED because of bleeding following tooth extraction or other oral surgical procedure, failure to follow postoperative instructions was considered the main cause.⁵ In the same context, only 33% of patients who received an antibiotic prescription after minor oral surgical procedures consumed the full medication course, according to one study; others consumed more or fewer pills than prescribed or used antibiotics without a prescription.³⁷

The fourth recommendation option, referral to the ED, was rare and applied to less than 0.07% of all surgical procedures under review (six of 8,487). These results indicate that the vast majority of postoperative after-hours emergencies can be handled on the phone or within the practice without referral to the hospital, thus avoiding hospital-associated costs.² Management of non-traumatic dental emergencies by prescription is consistent practice over the past decades^{8,9} and steadily increased between 1997 and 2007.⁹ Patients calling because of pain, swelling or infection were most often prescribed medications in the present study, an approach consistent with the reported majority of dental-related ED visits in the US (1997–2000) resulting in an antibiotic, narcotic and/or analgesic prescription.³⁸ Therefore, it seems that the availability of an emergency after-hours contact, specifically from the dental surgical team, in conjunction with increased patient education on the postoperative course of wound healing^{12,37} could prove valuable in reducing dental complication-related ED visits.

The present study is not without limitations. The retrospective nature of the study prevented operator standardization in terms of surgical experience (junior versus senior dental students, residents in different years of training and with unknown previous clinical experience) and mode of postoperative instruction delivery. Pre-procedure symptoms were not recorded and procedure complexity or extent could not be ascertained. Although calibrated, many different residents and/or faculty answered the phone calls and entered call notes into patient records. Relatedly, other residents and faculty examined the patients at the recommended postoperative visit and entered EHR notes. The collected data inevitably included skewed procedure distribution, with a combination of more common and less common procedures, based on institutional activities and presenting patient needs, which results in variable precision for data analysis of different procedures. Nevertheless, the novel data reported herein represent a real-life snapshot of the after-hours calls patients make when dealing with post-surgical emergencies for oral surgical procedures performed in an academic institutional setting with multiple

provider levels. The study findings could serve as the basis to pursue and evaluate improvements in aspects of oral surgical health care that could minimize the occurrence of postoperative emergencies and improve patient experiences and costs related to avoidable ED visits.

5 | CONCLUSIONS

The prevalence of post-surgical emergency after-hours calls in a multi-level academic dental setting is low. Calls are usually prompted by pain and occur within the first postoperative week. Operator experience does not affect call incidence. Concerns can be managed over the phone or in a dental school clinical setting and rarely result in referral to the hospital ED.

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CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

Vrisiis Kofina conceived the study, contributed to study implementation, data collection and analysis, data interpretation, drafting, editing, and revising the manuscript. Drake Lindholm and Abdulkareem Harunani contributed to data collection and analysis, drafting, editing, and revising the manuscript. Maharaj Singh contributed to data analysis and interpretation, drafting, editing, and revising the manuscript. Andrew Dentino and Dimitris N. Tatakis contributed to data collection, analysis, interpretation, drafting, editing, and revising the manuscript. All authors approved the final manuscript draft for submission.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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