

## Literature review

# Use of emergency intravenous injection in dental practice

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(Received 10 November 2010, accepted 18 November 2010)

### Key words:

medical emergencies /  
dental practice /  
dental office /  
dentist /  
intravenous injection /  
dental student

**Abstract** – Medical emergencies can occur in dental practice and dental surgeons have to be able to handle them effectively. The intravenous route has long been advocated for dental surgeon in emergency. Since 2006, recommendations from the British Resuscitation Council tend to discourage this route of administration for dental practitioners in emergency. In France there is no consensus on this subject and most French dental schools still teach intravenous route in case of medical emergency.

We reviewed international literature regarding medical emergencies in dental practice since 2006 and identified those dealing with intravenous access. Half of the publications suggest or encourage the use of intravenous access. Nevertheless, most of dental surgeons do not feel confident in realizing an urgent intravenous injection. Indeed, this technique requires an intensive phase of learning and regular practice to be performed in safety and effectively. Thus, this technique is difficult to realize in a context of stress and of under-training. Dental surgeons should be familiar with other methods of administration to manage medical emergencies encountered in dental practice such as intramuscular, inhalatal, sublingual, buccal and oral. It seems necessary to encourage an European consensus on this subject in order to improve the management of medical emergencies.

### Mots clés :

urgence médicale /  
chirurgie dentaire /  
cabinet dentaire /  
dentiste /  
injection intraveineuse /  
étudiant en chirurgie  
dentaire

**Résumé – Utilisation de la voie intraveineuse lors des urgences au cabinet dentaire.** Des urgences médicales peuvent survenir lors de l'activité pratique en Médecine bucco-dentaire : les chirurgiens-dentistes doivent être capables de les prendre en charge efficacement.

L'utilisation de la voie intraveineuse est depuis longtemps proposée aux chirurgiens-dentistes en cas d'urgence médicale. Depuis 2006, les recommandations du Conseil britannique sur la Réanimation tendent à déconseiller l'utilisation de cette voie d'administration, en urgence, pour les chirurgiens-dentistes. En France, il n'existe pas de consensus sur ce sujet et la plupart des facultés dentaires françaises continuent à enseigner la voie intraveineuse pour les urgences médicales.

Nous avons revu la littérature internationale sur les urgences médicales au cabinet dentaire à partir de 2006 et identifié les articles traitant de l'accès par voie intraveineuse. La moitié des publications suggèrent ou encouragent l'utilisation de cette voie. Néanmoins, la plupart des chirurgiens-dentistes ne se sentent pas suffisamment préparés pour réaliser une injection intraveineuse en urgence. En effet, cette technique nécessite une phase intensive d'apprentissage et une pratique régulière pour être réalisée efficacement et en toute sécurité.

Comme cette technique est difficile à réaliser dans un contexte de stress – surtout s'il y a un manque d'entraînement –, les chirurgiens-dentistes devraient se familiariser avec les autres voies d'administration (voies intramusculaire, inhalée, sublinguale, buccale et orale) pour gérer les urgences médicales rencontrées au cabinet dentaire. Néanmoins, il serait bon d'arriver à un consensus européen sur ce sujet afin de standardiser la gestion des urgences médicales au cabinet dentaire

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Medical emergencies can occur in dental practice and dental surgeons have to be able to handle them effectively. Even if vasovagal syncope is the most common situation, life-threatening emergencies can occur and may require administration of systemic drugs [1-5]. The intravenous (IV) route has long been advocated for dental surgeon in emergency. Since 2006, recommendations from the British Resuscitation Council tend to discourage, this route of administration for dental practitioners in emergency context [6]. In France there is no consensus on this subject and most French dental schools still teach intravenous route in case of medical emergency.

The aim of this article is to review the international literature dealing with the management of medical emergencies in dental practice with focus on use of IV access to try to assess how often the IV option persists in present international literature. We also reviewed evidences concerning the use of IV route in this context in order to understand why intravenous injection is not the most appropriate route of administration for dental surgeon in case of medical emergency.

## Publications on medical emergencies in dental practice

We carried out a comprehensive search (last update 20 July 2010) of Medline, of international publications about medical emergencies in dental practice since 2006. We found 29 publications that we classified into six groups: prevalence of medical emergencies [3-5, 7, 8], competence/preparedness of dental surgeons or dental students [3, 8-11], equipment recommended [12-18], management of medical emergencies [16-23], formation [24-26] and specific management of cardiac arrest [9, 27-32]. Some studies can be classified in several groups.

In the 7 works about equipment recommended to face medical emergencies, 4 suggest to have some intravenous drugs [13, 16-18]. In the 8 works on the management of those situations, 4 encourage or suggest the use of IV access [16, 18, 21, 22]. Thus, IV injection remains one of the main techniques proposed for the management of medical emergencies within dental literature. Even if the British Resuscitation Council advocate against the use of IV route in emergency, there is no European or French consensus on this subject. Without a clear consensus, one may wonder if this route of administration is really advisable for dental surgeons in emergency.

## Intravenous injection learning

Even if IV injection is part of academic abilities of dental surgeons, they are not critical care providers, and the realisation of this technique is difficult in emergency. Actually, like all technical skills, it requires a phase of training before mastering. Some studies have reported learning curves for skills like epidural anesthesia or orotracheal intubation.

**Table I.** Percentage of dental surgeons who don't feel confident in performing intravenous injection.

*Tableau I. Pourcentage de chirurgien-dentistes ne se sentant pas capables de réaliser une injection intraveineuse.*

Articles	%
Arsati et al. (2010)	61.4
Müller et al. (2008)	65.5
Gupta et al. (2008)	68
Girdler et al. (1999)	52.7

One of these studies focused on learning of peripheral venous cannulation in resident's population and showed that 79 procedures ( $\pm$  47 procedures) needed to be performed to reach an acceptable success rate of 80% [33]. Furthermore, in the National Standard Curriculum for NREMT EMT-Intermediate (National Registry of Emergency Medical Technician, Emergency Medical Technicians) have to place a minimum of 25 IVs on live patients of various age groups under instructor supervision to be considered competent in this skill [34].

These data highlight that an intensive phase of training is necessary before mastering the intravenous access. To the best of our knowledge, this intensive training is not done in most of French dental schools. Furthermore, this type of skill needs to be performed regularly to maintain a level of efficiency. Medical emergencies in dental offices are infrequent, and those involving IV injection are even more rare [1-3, 5]. Lack of practice results in a loss of ability. For example, retention of easier skills like the use of automated external defibrillators is deteriorated 6 months after the initial learning [35]. Finally, we must not overlook the fact that the stress generated by this type of situation further increases the risk of failure of an untrained practitioner.

## Competences of practitioners

It is difficult to test on a large scale the competence of dental surgeons by making them realize IV on real patients or on simulators. For the last fifteen years, several studies have been published on the perception of dental surgeons regarding their competence in the management of medical emergencies. When practitioners were asked about their ability to realise an IV, most of them answered that they did not feel confident in performing it correctly (Table I) [2, 3, 8, 11]. The risk of error is increased by the fact that dentists don't feel confident in their ability to perform this technique.

## Alternatives routes

As explained in the document of the British Resuscitation Council, IV is not the only method of drug administration in emergency. Other efficient routes of administration may be used in the management of most medical emergencies occurring in dental practice such as intramuscular, oral, inhalatal, sublingual or buccal route (Table II).

**Table II.** Drugs used by alternative route of administration [6].

Tableau II. Médicaments d'urgence utilisables par d'autres voies d'administration.

Routes of administration	Drugs used
Intramuscular	glucagon, épinéphrine
Oral	aspirine
Inhalatal	salbutamol
Sublingual	trinitrine
Buccal	midazolam

Beside the lack of efficacy of a drug, dosed to an intravenous, not injected in vessels, some drugs can induce a local toxicity if not injected strictly intravenously. For example, glucose provokes tissue necrosis if it diffuses out of the vessels. Thus, the use of alternative routes with appropriate drugs permit to be sure that treatment is administrate correctly (because the technique is easy) and limits the risk of toxicity or local complications.

The only case in which there is no alternative to the IV is cardiac arrest. But in this situation, the first role of dental surgeon is to perform correct chest compressions, ventilation with oxygen, use a defibrillator and call for help precociously.

## Conclusion

Even if it persist in international dental literature, these data clearly demonstrate that the technique of IV is difficult to realise, notably in emergency, and needs a regular training to be performed effectively and safely. Most dental surgeons do not feel confident in performing it adequately and most of medical emergencies in dental offices can be handled with another route of administration. Our conclusion is in full agreement with British recommendations. We believe that IV route should not be the first-line route of administration for the management of medical emergencies in dental practice but reserved for dental surgeons practicing it regularly. We promoted the use and the teaching of alternative routes for administration of emergency systemic drugs such as intramuscular, inhalatal, sublingual, buccal and oral, in dental context.

Indeed, the European Resuscitation Council should provide European recommendations to harmonize the management of this situation by dental practitioners.

**Competing interests:** none

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