

# Local Anesthetic Injections Practice: “Right of Passage” or “Unnecessary Risks”

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## Abstract

The goal of this paper is to stimulate discussion within the dental education community concerning teaching / learning strategies employed during the initial injection experience for dental students. To gather information about approaches to teaching local anesthesia injection technique, we developed a survey that requested information from United States (U.S.) dental schools about the local anesthetic didactic curriculum and the students’ actual experiences during initial injection “practice”. The core question driving this research was: what are the risks versus benefits of having students inject each other during their initial learning experiences?

**Keywords:** Teaching Method

**Author Designed Keyword:** Injection

## Introduction

Historically, the experience of administering local anesthesia injections to classmates during the first or second year of dental school has been a cornerstone “transition into the profession” for thousands of dental students. However, questions have been raised about the ethical, legal and safety implications of this long-standing right of passage. 1, 2, 3 The survey reported in this paper was designed to expand our understanding of dental school practices related to some of these considerations. The key findings of the survey are presented followed by a description of an alternative technique for developing dental students’ capacity to provide safe and effective local anesthetic injections for patients.

## Methods

In 2014 – 2015, the authors developed and distributed a 20-question survey to elicit practices and perceptions related to teaching injection techniques for local anesthetics. The survey questions addressed various concerns that have been raised in the dental and medical literature about conventional methods for local anesthesia instruction, and also requested “what, when and

how” curricular information for local anesthesia and injection techniques. The survey was initially sent to the Dean of each U.S. dental school in July 2014, with a follow-up request in early 2015. The Dean was asked to forward the survey to the faculty members who were responsible for teaching Local Anesthesia and injection techniques to dental students. After two administrations, responses were obtained from 38 dental schools out of the 64 schools active at that time for a response rate of 59%.

## Results

Responses for survey questions appear below.

### 1. When is the Local Anesthesia course conducted prior to the students’ initial injection experience?

**Table 1 \*15**

Table 1	
Year / Semester	N
1 <sup>st</sup> Year Fall	0
1 <sup>st</sup> Year Spring	6
1 <sup>st</sup> Year Summer	3
1 <sup>st</sup> Year – no semester indicated	2
2 <sup>nd</sup> Year Fall	12
2 <sup>nd</sup> Year Spring	13
2 <sup>nd</sup> Year Summer	1
2 <sup>nd</sup> Year – no semester indicated	1

### 2. How many lecture hours are devoted to local anesthesia?

30 of the 38 respondents answered this question. The mean number of curriculum hours reported by these 30 schools was 15.4 hours. The range was two hours to 55 hours.

**Table 2 \*16**

Year / Semester	N
1 <sup>st</sup> Year Fall	0
1 <sup>st</sup> Year Spring	2
1 <sup>st</sup> Year Summer	0
1 <sup>st</sup> Year – no semester indicated	2
2 <sup>nd</sup> Year Fall	10
2 <sup>nd</sup> Year Spring	16
2 <sup>nd</sup> Year Summer	6
2 <sup>nd</sup> Year – no semester indicated	2

**3. When do the students give their first injections?**

**4. To whom do the students give their first local anesthetic injections?**

**Table 3 \*17**

Options	N
Each other (other students)	34
Paid patients	0
Patients in the clinic	2
Other students & patients	1
No response	1

**Questions 5 – 9**

**Table 4 \*18**

Questions	Yes	No	No Response
5. If the students inject each other, is there an option to refuse, and what is the option? (See list of options below)	23	11	4
6. Do all students have an active dental chart with a complete medical history?	29	4	5
7. Are vital signs taken before the injections are given?	22	10	6
8. Is an informed consent signed and if yes, what is the reason given for the injections? (See list of reasons below)	16	11	11
9. Are the Health Insurance Portability and Accountability Act (HIPAA) guidelines and confidentiality of students’ medical information guaranteed?	38	0	0

**Question 5: What are options if a student declines to give local anesthesia (LA) injection?**

**Table 5 \*19**

Options	N
Injections not received if student has medical condition	5
Not mandatory, students do not have to participate	3
Student must find patient or volunteer to inject	2
Student must demonstrate / show landmarks on a simulator	2
Never had a student refuse	1

**Question 8: Reasons given for LA injection on informed consent form.**

The most frequent response was: “performed for educational purposes” Number of responses to question (N=6).

**10. Which LA injections are given? (respondents could select multiple options)**

**Table 6 \*20**

Injection Type	N
Inferior alveolar	35
Posterior superior alveolar	32
Palatal injections	28
Middle superior alveolar	24
Anterior superior alveolar	21
Other – various injection types and combinations reported	11
No response	1

**11. Are the injections given at the same appointment?**

**Table 7 \*21**

Options	Yes
Given at same appointment	22
Opportunity for additional appointments	9
Both (same appointment & additional appointment)	4
No response	3

**12. Is there an opportunity for students to repeat the injection technique (i.e., obtain more practice)?**

Twenty-eight respondents indicated yes (74%), while nine said no (24%) and one school did not answer.

**13. What type of entry is used in the dental chart if students inject other students?**

**Table 8 \*22**

Chart Entry	Type
Subjective, Objective, Assessment, Plan (S.O.A.P) note	13
Narrative entry	12
No entry is made in the chart	12
No response	1

**14. Have there been any long-term problems with students receiving practice injections?**

Thirty respondents (79%) that they had never encountered medical problems, while seven (19%) reported infrequent complications including hematoma, trismus & syncope, and one school did not respond.

**15. How are pregnant students managed?**

**Table 9 \*23**

Option	N
Do not receive injection (“give but do not receive”)	18
Expected to find a volunteer substitute (sub) to take their place	4
Individual decision to refuse injection	3
Delay until after pregnancy	2
Receive injection with Obstetrician (OB) consent	1
2nd and 3rd trimester only	1
Simulate injection on instructor	1
Pregnant students can safely receive LA injection	1
Never had a pregnant student participate in injection lab	1
No response	5

**Has your institution changed its method of LA injection training in recent years?**

Nine respondents (23%) reported that their school had changed the approach to teaching local anesthetic injections, with 27 (71%) answering no, and two schools did not respond. The schools that reported a change identified these modifications:

- Mentoring by senior students
- 2nd years assist in Oral and Maxillofacial Surgery (OMS) and give supervised injections
- Eliminated use of mirror retractor
- Implemented simulations with manikins in preclinical lab
- Now require signed informed consent form by student receiving injection

**Questions 17 – 19.**

**Table 10 \*24**

Questions	Yes	No	No Response Or Other
17. Do your students practice Nitrous Oxide / Oxygen sedation on each other prior to patient administration?	33	1 <sup>a</sup>	5 <sup>b</sup>
18. Do your students practice intravenous (IV) access on each other?	5	33	0
19. If “yes” for # 18, are any medications administered through the IV?	All responded “no”.		

a = only select students who are going into OMS residency

b = simulation on a manikin

**20. Comments on the teaching of local anesthetic injection technique, in your school or in the overall profession.**

Ten comments were provided, which addressed the benefits of preclinical simulation exercises for injection technique (n=5), described the local anesthesia curriculum at the respondents’ schools (3) and supported the benefits of students injecting students (2) as a training method.

In summary, the majority of responding dental schools (34/38; 89%) reported that students injecting other students is a primary learning activity for this skill, local anesthesia training and initial injections primarily occur in the second year before students begin patient care, vital signs are monitored in 62% of schools (22 of 32 with 6 non-responses) and informed consent is obtained in 16 of the 27 schools (59%) that answered this question. The majority of schools (23/34; 68% with four non-responses) allowed dental students to opt out of peer injections. All respondents indicated that their school complies with Health Insurance Portability and Accountability Act (HIPAA) and medical information confidentiality guidelines.

**Discussion**

The University of Texas Health Science Center at San Antonio School of Dentistry (UTHSCSA-SOD) Oral and Maxillofacial Surgery Department has developed a curriculum that is an improvement over our previous practices, and which diverges from the approach to local anesthetic injection training at most other dental schools. We modified how our students get their first experience of giving injections, which removes potential risks of student on student clinical practice, complies with HIPAA guidelines and improves the preclinical experience by offering multiple opportunities to “practice” injections. Our philosophy is that our students do not have to receive an injection in order to appreciate how it feels, and thus, be proficient in providing good local anesthesia. We also eliminated the need for students to have a full dental/medical work up before practicing injection techniques and eliminated the risk of permanent numbness or

other altered sensations among the injected students. We do not bend any documentation rules regarding drug administration. Students do not have any part of their private medical history exposed to the rest of the class or to faculty.

We also expanded the format to our Nitrous Oxide course to avoid exposing our students to the same problematic situations. That is, giving nitrous just to experience the feeling, which is illegal for dentists to do once licensed. Lab exercises where students practice intravenous access on each other have been eliminated. A onetime IV stick under perfect conditions does not enhance clinical readiness to manage an emergency where IV access is necessary under less than optimal conditions. These changes evolved in context with a significant modification of our overall clinical education format as described below.

Approximately ten years ago, UTHSCSA SOD redirected its clinical program from one focused on the dental student as an isolated individual, simulating a solo private practice model, to a “Group Practice” educational model focusing on comprehensive dental care. Prior to this time, junior students showed up on the first day of clinic and were given a group of patient charts, a list of procedural and other clinical requirements and told to get busy. During the junior year, the students worked primarily under the supervision of specialty-trained faculty. There was help available, but the students were left to their own devices to manage the process. During the fourth year, senior students were assigned to clinical groups under the supervision of General Dentists where they again worked individually to complete stipulated clinical requirements and accumulate procedural points in order to gain a broad spectrum of skills.

Dissatisfaction with the solo practice model led to the implementation of a group practice model for both years. The junior and senior classes are now divided into 8 General Practice Groups (GPGs), which are vertically integrated with approximately 12 third year and 12 fourth year students. Students within each GPG work with a small cadre of faculty assigned permanently to that GPG so that students’ progress is guided and monitored closely. Along with the daily clinical activity, students rotate to various clinics to gain a broad clinical exposure, necessary for competent entry-level general dentistry.

Parallel to the development of the GPG format, the Department of Oral and Maxillofacial Surgery also made major changes in its curriculum. One of the most dramatic changes was to discontinue all student-on-student practice. We stopped having students practice injections on each other, administer nitrous oxide to each other and practice intravenous access on each other. What follows describes our journey away from the historic “Right of Passage” of dental students giving/receiving injections to classmates, to our present protocol for the initial injection experience.

Prior to the changes in our curriculum, UTHSCSA-SOD students had a classic introduction to local anesthesia. As freshmen, the students learned anatomy and physiology via didactic classes and limited anatomic dissection in the gross anatomy lab. For

many years during the last stages of the anatomy lab, faculty from Oral and Maxillofacial Surgery presented a brief overview of local anesthetic injection techniques. This reinforced what students learned during their Local Anesthesia course. The students then went to the lab where they injected cadaver heads with the help of volunteer senior students and OMS faculty. The dissections allowed the students to see the tract of the injection needles. This exercise was discontinued due to the limited number of OMS faculty available to supervise this lab.

During the second year of the curriculum, sophomore students gave their first “real” injections to each other. This was accomplished during a lab in the Patient Evaluation course where they practiced intraoral examinations. General Dentistry faculty directed this exercise. Once the exam was complete, the injections were given including a maxillary infiltration in the bicuspid region, one inferior alveolar nerve block and one palatal infiltration. These three “sticks” were the sum total of students’ experience before they were expected to give injections to patients. A major problem was that OMS Faculty, who taught the Local Anesthesia course, were not involved with the practice sessions.

During this time, the Department of Oral and Maxillofacial Surgery significantly modified its curriculum. Lecture hours were discontinued to provide more time for students to rotate through the Oral Surgery clinics. Additionally, remaining lectures were converted to small group seminars for many topics.

The Local Anesthetic and Medical Emergency Management courses in the second year were combined and the revised curriculum focused on the clinical aspect of giving local anesthetic injections. Basic neurophysiology and pharmacokinetics are reviewed along with the armaments and scenarios of possible patient reactions to injections. Each of the individual blocks or infiltrations primarily used in the practice of dentistry are reviewed multiple times. This course is scheduled early in the fall semester so the material is fresh in the students’ mind when they do rotations in the clinic. Early in August, the sophomore students are scheduled 2 students at a time for a clinic rotation where they provide their first injections for patients in the following manner. The students are first taken into an operatory and syringe set up is demonstrated. Students then assemble the syringe, load and unload the syringe until they are comfortable. Next, sophomore students are sent into the operatory to watch an injection being given by an upperclassman. Sophomores follow with a secondary injection for the patient. Generally, the primary injection is Lidocaine with Epinephrine (EPI) and the secondary injection is with Mepivacaine plain. The exact medications used for the individual patients are determined following a thorough review of the patient’s history by the faculty responsible for the case. Once the sophomore has given an injection they move to another patient to perform another injection under supervision. The goal is to provide the second year students with as many “injection experiences” as possible. The sophomore students are encouraged to do as many injections as they are able and to return to the Oral Surgery Clinic when they have free time to give more

injections. The minimum scheduled injection experiences are: one morning or afternoon session during the fall semester and one morning or afternoon session during the spring semester. During the second rotation for injections we encourage the sophomores to give the primary injections so that they can see the results of their injections. The upperclassmen are available to supplement injections as needed.

### **Conclusion**

We presented one alternative for dental students to practice injections that has been successful at our school. Our process removes the student on student clinical interaction and the potential for post injection sequelae. We have expanded the curriculum to include the nitrous oxide training where students learn to assemble the equipment, but do not administer nitrous to

each other. Lastly, we eliminated the one time IV stick because we see no clinical justification beyond enabling students to say “I’ve done one”. We believe there is not a universally right or wrong way to accomplish injection training. However, is the “RIGHT OF PASSAGE” really worth the risks when there are so many other less risky options to accomplish the same outcome?

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