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**VARIABILITY EXISTS BETWEEN CREDIT UNITS DEDICATED TO DENTAL
AND CLINICAL SCIENCES IN DENTAL SCHOOLS ACROSS THE UNITED
STATES**

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INTRODUCTION

It has long been described that to become an expert in something, it requires 10,000 hours, or ten years of preparation.¹ This initial proposition helped pave the way for a plethora of research into the field of study regarding *deliberate practice*. *Deliberate practice* involves goal directed activities, that tend to be repetitive, with feedback, and is the way to reach high levels of expertise.² It is often studied in the field of psychology, and the conclusions are regularly consistent regarding *deliberate practice* in all fields ranging from chess, to music, to medical education: increased quality Credit units is associated with increased mastery.^{3,4}

This type of training follows a formal structure: repetitive performance of intended cognitive or psychomotor skills, rigorous skills assessment, and specific informative feedback.³ The majority of investigations into this field demonstrate that more Credit units and increased practice leads to an improved ability to execute the target skillset at a high level.^{1, 3-5} When evaluating the best 120 scientists of the 20th century, it was found that on average, 10 years elapsed between their *first* publication and *best* publication.⁴ The idea of *deliberate*

practice is not dissimilar to the intended goal of formal curriculum structure that already exists in the majority of United States (US) dental schools.

PERSPECTIVE

The purpose of this paper is to compare the US dental schools for variability in clock hours in teaching Dental and Clinical Sciences – this includes didactic, lab and clinical training. For the international audience of this journal, we will use the term “Credit Unit” which also represents clock hours. Certainly, evaluating the quality of those Credit Units would be valuable but is much more complex and beyond the scope of this assessment. The current paper aims to highlight the need for the Commission on Dental Accreditation (CODA) to clearly define and then prescribe minimum limits for the number of Credit units in the core Dental and Clinical Science subjects in US dental schools.

A comprehensive annual survey is conducted by the American Dental Association (ADA) among all the US Dental Schools, which are accredited by the CODA. The survey is sent out to all US dental school Deans in mid-August and is due by November of the same year.⁶ **Volume 4 of the survey involves curriculum format and Credit units and Table 1 is an adaptation of the same.** The purpose of the ADA study is to monitor accredited pre-doctoral programs.

This article utilizes Volume 4 which is publicly available data that focuses on the number of Credit units spent in Dental and Clinical Science education in each pre-doctoral program across the US. The Credit units survey from 2010-11 was utilized, as it is the most recent data available. The analysis tool, JMP, was utilized to visualize variability, upper and lower limits as well as standard deviation.

The current article highlights a large amount of variation in Credit units of training among core clinical subjects in accredited dental schools around the US. For example, the upper limit for Credit units of Removable and Fixed Prosthodontics teaching was 1,319 and the lower limit was 128. The Credit unit measurement from the ADA data includes clinical, didactic and all other forms of teaching. Is it reasonable to assume that the students receiving 128 Credit units of training on this subject are equally well prepared as the group receiving 1,319? The authors of this article argue that one cannot assume consistency in training and clinical preparedness with such large amounts of variability.

Various other fields of education do enforce strict requirements on educational Credit unit. For example, Massachusetts' General Law states that both private and public schools must have 900 and 990 Credit units in a school year for elementary and secondary schools, respectively.⁷ The Commission on Accreditation For Dietetics Education requires a minimum of 1200 supervised hours, in order to be eligible to become a registered dietitian.⁸ However, no such stipulation exists in the field of dental education.

More Credit units alone does not always equal success. Learning is a multifactorial process, and it has been demonstrated that the amount of time devoted to activities specifically targeted at aspects of performance that need improvement is more important than just the concrete numbers of hours practiced.^{3, 5} An investigation that evaluated deliberate practice in medical students found that students gradually learn how to make more efficient use of their time and resources.³ A caveat to this is that individuals in medicine have been shown to have poor self-assessment ability, and those with increased self-assessment achieved higher scores on examination.^{9, 10} The aptitude to develop and sustain self assessment skills through dental school would be critical to maximizing increased Credit units by targeting those Credit units at needed

areas of improvement.

There has been a consistent demonstration in all other fields of an association between increased Credit units and improved performance.^{1, 3, 4} However, this association has not been described in the dental education literature. In addition, the amount of Credit units that each dental school utilizes in its curriculum has not been previously described. There are currently 65 dental schools in the US and each has a unique approach to training dentists. Although the accreditation process is becoming more and more rigorous, CODA does not specify “how” a school should teach dentistry. Rather, CODA evaluates whether there is integrity in the way education, assessment and remediation are delivered. But, there is a lot of variability between schools and it is unknown if all students are getting the same quality and quantity of education. Moreover, CODA is beginning to consider various international schools for accreditation and strong consideration must be given to setting guidelines for Credit units of training to limit variability. Recall that any graduate from a CODA accredited school can seek licensure in the United States – it is, therefore, a matter of patient safety to prioritize a rigorous accreditation process.

Three important limitations of this evaluation should be considered when reviewing the findings. Firstly, the Dental and Clinical science topics were subject to interpretation by those completing the survey at each school which could have introduced error. The findings could be a reflection of differences in interpretation, rather than a true difference between US dental schools. Additionally, the last subject in the ADA Credit units survey is “Other Dental and Clinical Sciences” and demonstrates a large amount of variability (upper limit of 6,205 and lower limit of 859). This miscellaneous category could have been misused by some as a catch-all and reflect errors in the other topics. However, the enormous amount of variability among all clinical subjects must be reflected

upon. The fact that CODA does not make guidelines for the number of Credit units spent teaching in each subject area should be re-evaluated. The third limitation is that our data does not capture self directed study hours – a limitation because Dental School curricular are moving toward more self directed experiences with Flipped Classrooms and Problem Based Learning.

CODA is the only authorized organization in the US to accredit dental schools and it's mission is “to serve the oral health care needs of the public through the development and administration of standards that foster continuous quality improvement of dental and dental related educational programs.”¹¹ The word standard means “a level of quality” or “that which is considered acceptable or desirable.” An important question to consider for the dental community is whether the average dental patient would consider a dentist who attended the school delivering 1,410 Credit units of Operative Dentistry to be the same standard as a graduate of the school delivering 129 (see table 1). Recall that this ADA survey on Credit units is publicly available data that any patient could access.

CONCLUSION

CODA must consider studying, defining and setting minimum standards for the number of Credit units dedicated to core subjects like Operative Dentistry. This would add an additional important detail in providing oversight to dental schools which is particularly pertinent as several international schools seek CODA accreditation.

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TABLE 1. Upper and Lower limits of Credit Units per subject across all United States Dental Schools

SUBJECT	UPPER LIMIT OF CREDIT UNITS	LOWER LIMIT OF CREDIT UNITS
PHYS EVAL/ DATA COLLEC	298	9
ORAL& MAX RADIOLOGY	270	32
GENERAL MED EMERGENCIES	70	4

DENTAL EMERGENCIES	556	2
ORAL DIAG & TREAT PLAN	454	32
ORAL MEDICINE	156	2
ORAL & MAX PATHOLOGY	282	35
OROFACIAL PAIN & DYSFUN	60	1
ANES/ PAIN & ANXTY CNTRL	230	9
PERIODONTICS	520	38
ENDODONTICS	402	48
ORAL & MAX SURGERY	496	4
HOSPITAL DENTISTRY	162	1
BIOMATERIALS SCIENCE	189	12
OPERATIVE DENTISTRY	1,410	137
ESTHETIC DENTISTRY	220	4
PROSTHO: FIXED & REMOVABLE	1,319	161
OCCCLUSION	220	18
IMPLANT DENTISTRY	120	7
PEDIATRIC DENTISTRY	313	46
ORTHODONTICS	303	11
DPH AND PREVENTION	252	12

COMM-BASED PATIENT CARE	990	0
OTHER DENT/ CLIN SCI	2,738	1

*Adapted from Report 4 of the American Dental Association data on Clock Hours¹² for 2010-2011.

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