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Clinicians' views on periodontal coding

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Clinicians' Views on Periodontal Coding

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From: Sarah Keller, Chair, Institutional Review Board for Human Subjects Research

Date: April 15, 2013

Subject: Review of HS-4234 *Clinicians' Views on Periodontal Coding*

Human subjects protocol HS-4234 *Clinicians' Views on Periodontal Coding* has been determined to be exempt from further review according to federal regulations for the Protection of Human Subjects under CFR Title 45, Part 46.101(b)(1-6). Research qualifying for an exemption is valid for a period of one year, to April 10, 2014. If you wish to continue gathering data for the study after that date you must file a Renewal of Approval application *prior to its expiration*, otherwise the project will be closed and you would need to submit a new application for IRB review if you wish to continue the research.

A signed, approved copy of your application is enclosed.

If subsequent to initial approval the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departures from the original proposal must be approved by the appropriate IRB review process before the protocol may be altered. A Change of Protocol application must be submitted to the IRB for any substantial change in protocol.

If you have additional questions please contact me at 359-7039; fax 359-2474: email: skeller@ewu.edu. It would be helpful if you would refer to HS-4234 if there were further correspondence as we file everything under this number. Thank you.

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Abstract

Recommendations to alter the current dental coding system maintained by the American Dental Association (ADA) have been suggested by American Dental Education Association (ADEA), the American Dental Hygienists' Association (ADHA), and explored in various dental education and public health settings. However there is no research surveying dentists and dental hygienists in a regional format on what their opinions are concerning the current system and potential addition of diagnostic codes. This study was conducted primarily as a small-scale; quantitative non-experimental, descriptive, cross-sectional survey. A binary style survey was implemented using an Internet survey site and face-to-face interactions. The survey was distributed to dentists and dental hygienists in different dental practice settings including: private practice; managed care; corporate dental; public health; and education. The descriptive cross-sectional survey responses were analyzed as a whole to measure the attitudes of dentists and dental hygienists on the CDT codes pertaining to periodontal disease. In addition, data analysis determined if there were correlations based on: practice type; rural or metro geographic area; age; education; years in practice; and role of practitioner. Results show the participants (a) are not satisfied with the current coding system, (b) think periodontal treatment codes are lacking, (c) would support the addition to diagnostic codes, (d) believe accurate treatment tracking is impended by the current system, (e) would most likely not want to be finically impacted by the addition of diagnostic codes, (f) think their revenue is negatively impacted by the current system. These outcomes support an overhaul to the current coding system and an opening for more research to validate needed changes.

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List of Abbreviations

AAP- American Academy of Periodontology

ABE- American Board of Endodontics

ADA- American Dental Association

ADEA-American Dental Education Association

ADHA- American Dental Hygienists' Association

CAC- Code Advisory Committee

CDC- Center of Disease Control

CDT-Current Dental Terminology

COHRI- Consortium for Oral health Related Informatics

CRC- Code Revision Committee

EWU- Eastern Washington University

FMD- Full mouth debridement

ICD- International Classification of Diseases

ICD-DA – International Classification of Diseases to Dentistry and Stomatology

IP- Internet Protocol

IRB- Institutional Review Board

LPS – Lipopolysaccharide

NHANES-- National Health and Nutrition Examination Survey

NPR – National Public Radio

SNODENT – Systematized Nomenclature of Dentistry

WHO – World Health Organization

Introduction

Introduction to the Research Question

Dental and medical codes are used to describe a condition, disease, and treatment or diagnostic procedure in a precise way for universal communication. In 1998, the American Dental Hygienists' Association (ADHA) published a position paper stating the existing dental coding system should be revised to "correspond to the American Academy of Periodontology's (AAP) classification of periodontal diseases" (ADHA, 1998, pg.3). No progression has been made to link classifications with the coding system in the 14 years since the publishing of the previously mentioned paper; and no further reports have been published specifically looking at the views of dentists and dental hygienists in the United States on current dental treatment and diagnostic coding systems.

In the first Surgeon General's Report on Oral Health published in 2000, 60.5% of adults in the US had 2mm or more loss of periodontal attachment based on National Health and Nutrition Examination Survey (NHANES) data, indicating a high presence of periodontitis. The report also acknowledges the systemic link between periodontitis and overall health (U. S. Department of Health and Human Services, National Institutes of Health, 2000). Questions arose in 2010 concerning the accuracy of how data was gathered by NHANES pertaining to the prevalence of periodontitis in the American populations. The NHANES, which supplies data used for reports such as the Surgeon General's report, estimates prevalence of periodontitis could be up to 50% higher than previously thought (Eke, Thornton-Evans, Wei, Borgnakke, & Dye, 2010; R. C. Williams et al., 2008).

Even with reported high incidence of periodontitis in the American population, the most commonly billed code in dentistry is for an adult prophylaxis (K. R. Miller, 2010). It is stated that gaps in current diagnosis and insurance codes are making disease tracking more difficult (Leake, Main, & Sabbah, 1999). In the recent past, associations and consortiums have issued statements supporting changes in the current system specifically in regards to the lack of diagnostic codes. Groups such as the ADHA and the Consortium for Oral Health Related Informatics (COHRI) (Kalenderian et al., 2011) both have issued statements in support of changes in the current system. To this date, there is no published literature reporting clinicians' thoughts and opinions on any changes or additions to the current dental coding system.

Background of Study

Dentists and dental hygienists use treatment codes daily to report services performed for reimbursement by third party payers and for internal and external tracking of services rendered. Dental professionals are limited to the existing codes published by the American Dental Association (ADA) in the Current Dental Terminology (CDT) manual. The 2013, CDT manual does not include diagnostic codes or periodontal codes in cohesion with the AAP classification of periodontal disease specifically.

Through a historical analysis of treatment codes used and changes in treatment codes, variations in care patterns can be detected; these deviations cause questions regarding suitability of dental hygiene care (Leake, Main, & Sabbah, 1999). Without diagnostic codes documenting prior conditions of the patient before treatment is rendered, effectiveness of care and epidemiology cannot be researched with accuracy (Leake, Main, & Sabbah, 1999). By adding diagnostic codes, the ADHA and COHRI predict an improvement in diagnosis

and disease prevention among the general populations (American Dental Hygienists' Association, 2012). In the early 1970's, patterns emerged showing research on the under treatment of periodontal disease. A documented trend of under treatment and a lack in standard of care was seen (Bailit & Manning, 1988). This research investigated the opinions of practitioners on altering the existing dental coding system included in the CDT manual for dental professionals and the public.

Statement of the Problem

The CDT manual is a publication of the most current dental codes that dental clinicians in the US including dentists and dental hygienists can utilize for billing and documentation. Documented proposals for revisions to the CDT manual codes are published by the ADA (American Dental Association, Code Revision Committee, 2007-2012). Since February of 2007, clinicians have requested expanded codes specifically in the area of periodontal therapies and diagnostics (American Dental Association, Code Revision Committee, 2007-2012). Each time the Code Revision Committee (CRC) has declined these requests. Common requests are made pertaining to dental hygiene therapies, specifically expanded periodontal therapy codes and diagnostic coding pertaining to periodontal exams such as the act of periodontal charting (American Dental Association, Code Revision Committee, 2007-2012).

Significance of the Study

This study explored the opinions of dental care providers on the current coding system and may influence liability and epidemiology (C. Miller, 2011). Current research showing high prevalence of periodontal disease conflicts with reports of billed treatment of services rendered in dental offices in the US (Voinea-Griffin et al., 2010). By surveying

clinicians, this Principle Investigator tested existing theories of the ADHA that dental codes should mirror the AAP periodontal classifications and COHRI in the need for diagnostic codes.

Research Questions

1) Do dentists and dental hygienists from the states of Oregon and Washington support the utilization of diagnostic codes related to periodontal classification?
2) Do dentists and dental hygienists from the states of Oregon and Washington think current periodontal therapy codes are sufficient for documenting treatment of periodontal diseases with differing severity?
3) Is there a difference of opinions for sufficiency of current coding system amongst dentists and dental hygienists based on demographics?
4) Is there a difference of opinions for utilization of diagnostic codes amongst of dentists and dental hygienists based on demographics?

Overview of the Methodology

This study was conducted primarily as a small-scale; quantitative non-experimental, descriptive, cross-sectional research study. A binary style survey was implemented using an Internet survey site and face-to-face interactions. The survey was distributed to dentists and dental hygienists in different dental practice settings including: private practice, managed care, corporate dental, public health, and education. The descriptive cross-sectional survey responses were analyzed as a whole to measure the attitudes of dentists and dental hygienists on the CDT codes pertaining to periodontal disease. In addition, data was analyzed to determine if there were correlations based on practice type, rural or metro geographic area, age, education, years in practice, and role of practitioner.

A network sample also known as snowball sampling of dentists and dental hygienists was primarily used to achieve a sample size representative of dental hygienists and dentists actively practicing in the states of Oregon and Washington. Dental hygienists were included in this study due to expanded practice laws in Oregon and Washington regarding patient care and diagnosis. In Oregon for instance a licensed dental hygienist can diagnose and treatment plan for dental hygiene services (Oregon Administrative Rules, 2013). Thus the current coding system can greatly affect their day-to-day practice. The target number of responses was 500, based on the number of dentists and dental hygienist actively living and licensed in the states of Oregon and Washington.

Definition of Key Terms and Operational Definitions

Diagnostic codes- a combination of numbers and letters used to identify a condition, disease, or etiology (Napier, Bruelheide, Demann, & Haug, 2008a).

Treatment codes- a combination of numbers and letters used to identify a procedure or management modality (Leake, Main, & Sabbah, 1999).

Network sampling- nonprobability sampling method that includes a snowballing technique that takes advantage of social networks and the fact that friends tend to hold characteristics in common. Subjects meeting the sample criteria are asked to assist in locating others with singular characteristics (Burns N., 2009).

Inflammatory response- a vascular and cellular reaction. These reactions are mediated by chemical factors derived from plasma proteins or cells (Gurenlian, 2009) .

Systemic link- the suggested interrelationship between oral infection, inflammation and systemic health via research (Gurenlian, 2009).

Dental Calculus- mineralized bacterial plaque, covered on its external surface by nominalized, living bacterial plaque (Nield-Gehrig J.S., 2007).

Bacterial Plaque- a biofilm that adheres tenaciously to tooth surfaces, restorations, and prosthetic appliances in the mouth (Nield-Gehrig J.S., 2007).

Composites restorations- a dental composite restoration has traditionally indicated a mixture of silicate glass particles with an acrylic monomer that is polymerized during application, and then used to fill a prepared cavity in a tooth structure. Commonly called composites (Sturdevant C.D, Roberson T.M, Heymann H.O., Sturdevant J.R., 1995).

Amalgam restorations- is an alloy made by mixing mercury with silver-tin then used to fill a prepared cavity in a tooth structure(Sturdevant C.D, Roberson T.M, Heymann H.O., Sturdevant J.R., 1995).

Summary

Dental professionals have expressed a need for modified treatment codes by submitting written requests to the CRC according to meeting minutes published by the ADA (American Dental Association, Code Revision Committee, 2007-2012). In the past requests were commonly declined with little or no explanation especially when concerning codes related to periodontal disease and its (American Dental Association, Code Revision Committee, 2007-2012). The hypothesized outcome from the survey is that clinicians will want more specific periodontal treatment codes mimicking the stages of periodontal disease.

Review of the Literature

Overview of Research

In the forward of their book "Periodontal Disease and Overall Health: A Clinician's Guide" Drs. Robert J. Genco and Ray C. Williams (2010) discuss the historical relationship of oral health to overall health dating back to ancient Greece and continuing to today(Genco & Williams, 2012). Being healthy or not affects the productivity and quality of life, especially for the 108 million Americans without dental insurance (Fisher-Owens et al., 2008). An increase in disease states in all stages of periodontal disease has been reported in recent years. The Center for Disease Control (CDC) estimates up to 80% of Americans have some stage of periodontitis (CDC, 2002) and the NHANES estimates the prevalence could be up to 50% higher than previously thought (Eke, Thornton-Evans, Wei, Borgnakke, & Dye, 2010). The importance of identifying and treating periodontal disease is more valued with the continued research linking periodontal disease, especially the inflammation process, to overall health (R. C. Williams et al., 2008).

Related or Theoretical Frameworks and Supporting Research

As an entity the worldwide medical profession has been tracking diseases and deaths since the 19th century (Napier, Bruelheide, Demann, & Haug, 2008b). Even though the current medical coding lists dental related diseases and deaths, the current dental health coding structure in the US does not track its own diagnoses of oral diseases with the same accuracy. A few platforms for dental diagnostic codes have been created and used in closed systems such as dental schools and public health clinics but no broad-spectrum outline has been introduced and accepted by the dental community as a whole (Napier, Bruelheide,

Demann, & Haug, 2008b). The support for the addition of diagnostic codes and changes in the current treatment coding system has been expressed not only by professional associations rally cries but also by clinicians submitting coding change requests (Kalenderian et al., 2011; ADHA, 1998). The current coding related to periodontal disease in particular had been criticized, manipulated and formally requested to be modified (ADHA, 1998; Lamoli, 2009; American Dental Association, Code Revision Committee, 2007-2012). No change has been made to the existing system or even talks of major modifications to its current structure or the addition of diagnostic codes. In addition, no research has been conducted to see if a representative proportion of the dental professional population supports any changes. The following literature review supports the need for inquiry into the opinion trends of dental professionals relating its importance the current dental coding system in relation to the general health of the US public

Implications of Periodontal Disease. Research supporting the theory of periodontal disease affecting systemic conditions and overall health began appearing in medical journals in the early 1980s with Dr. Robert Genco's (1982) study linking oral health and diabetes. Studies followed introducing the theories of a link between periodontal disease and heart disease, pre-term low birth weight babies, respiratory infection, osteoporosis, breast cancer and male fertility (Mattila et al., 1989; Offenbacher et al., 1996; Scannapieco, 1999; Wactawski-Wende et al., 1996; B. Söder et al., 2011; Klinge, 2009; Klinger, Hain, Yaffe, & Schonberger, 2011). Inflammatory pathways triggered by periodontal infections are currently the most supported models for understanding the systemic disease periodontal disease link (Loos, 2005). The area with the strongest correlation between periodontal disease and a systemic link is the bi- directional relationship between periodontitis and

diabetes (Mealey & Oates, 2006). Although there is evidence implicating periodontal infection with cardiovascular disease and pregnancy complications, studies on the direct parallels are not conclusive (Otomo-Corgel, Pucher, Rethman, & Reynolds, 2012).

Diabetes and periodontitis are bidirectional and are related inversely to each other found in an AAP commissioned review of the last 20 years of research including 146 published articles. (Mealey & Oates, 2006). Diabetes affects the host response to bacteria in the oral cavity by increasing inflammation thus causing greater bone loss. This is a result of a decreased number of osteoblasts and an increase in osteoclasts thus increasing the speed and breadth of bone density loss. Due to the increase of gram-negative bacteria associated with periodontitis, a higher vascularity of the periodontium and increase of inflammatory mediators are activated. One of these mediators, TNF-α, is responsible for inhibiting lipid uptake and upsetting insulin response thus decreasing insulin's effect on controlling glucose from the blood stream (Shoelson, Lee, & Goldfine, 2006).

Additionally, in the late eighties, research linking heart disease, specifically acute myocardial infarctions, and periodontal disease was published (Mattila et al., 1989). Since the primary study, research showing links between periodontitis and atherosclerotic diseases can be seen via analyses of health population surveys showing patients with periodontitis are four times more likely to have a form of atherosclerotic disease (Arber, 1999). More recently, studies confirm a modest correlation (Lockhart et al., 2012; Scannapieco, Bush, & Paju, 2003) Theories based on inflammatory responses to endotoxins, specifically lipopolysaccharide (LPS) released by gram-negative bacteria increasing coagulation in periodontitis, are the most current models being used to explain the link (Page, 1998).

Periodontal infections in pregnant women can cause a cascade of inflammatory based immune responses leading to complications in pregnancy such as; preterm birth, low birth weight babies, preeclampsia, and fetal death including stillbirths according to Offenbacher's seminal research (Offenbacher et al., 1996). In the case of preterm labor, the supported theory is the bacterial infection of the oral cavity causes and exposes the placenta to inflammation markers instigating a fetal inflammatory response leading to early contractions and labor with a ratio of 4 out 7 women going into preterm labor when these markers are present (Bobetsis, Barros, & Offenbacher, 2006).

The CDC has endorsed not only the periodontal–systemic link but also the need for better disease identification (Eke & Genco, 2007). They developed the Periodontal Disease Surveillance project to explore ideas and options for disease tracking (Eke & Genco, 2007). Better disease tracking has the possibility of being accomplished through the introduction of diagnostic and expanded treatment codes (Leake, 2002a). The combination of altered treatment codes for periodontal disease with the addition of diagnostic codes has the potential to add more depth to the disease tracking and treatment success rates. By breaking down the treatment codes into disease classifications the potential for better review of success in treatment based on stage of disease and its contributing factors (ADHA, 1998). For example, a dental clinic would be able to review non-surgical periodontal therapy (scaling and root planing) cases to quantify success and failure rates for moderate periodontally involved cases that are not seen by a periodontist.

Medical coding in other health care fields. In contrast to dentistry where the clinician is reimbursed from third party payers based on treatment codes, in medicine the health care provider is paid according to diagnostic and treatment codes (C. Miller, 2011).

The current system used in medicine for coding is the International Classification of Disease (ICD) volume 10; this system is modified and maintained by the World Health Organization (WHO) (J. M. White et al., 2011). The history of coding began in the late 19th century in England in an attempt to show statistical patterns in death among children under the age of six. The system has grown to include a number based reference list of diseases coded and classified for surgical, diagnostic, and therapy procedures. With 500 million claims filed to third party payers such as insurance companies each year the ICD has been successful in creating a way of communicating in a methodical and short format resulting in limiting mistakes (Napier, Bruelheide, Demann, & Haug, 2008b). Appendix D shows an example of one section of the death and mortality section based external cause of injuries.

Diagnostic Codes. Currently in the US formal dental care system, diagnostic codes have limited use with only two available codes for identifying periodontal disease during patient treatment planning, implementation of care, or documentation (CDT 2013). In a few educational institutions, such as the University of California San Francisco (UCSF), experimental systems have been created and used; however, there has been no widespread acceptance or use by the ADA or insurance industry (Leake, 2002a). These experimental models have shown benefits such as uniformity of language and documentation, supporting evidence of treatment plan, traceability of trends in disease outbreak and prevention, as well as tracking success and failure of treatments (C. Miller, 2011).

The CDT manual and its terminology is the only coding system the Health Insurance Portability and Accountability Act (HIPAA) recognizes for insurance claims and used primarily for re-imbursement (ADA, 2000). In the existing system, a patient's disease or

lack of is classified by their treatment, not the diagnosis of the dentist or dental hygienist. Research supporting the use of diagnostic codes lists benefits such as:

- Increasing documentation of disease conditions (Leake, Main, & Sabbah, 1999)
- Assisting communication of diagnosis between patients and other clinicians that aids treatment success as well as tracking of failures (Kalenderian et al., 2011)
- Documentation of public health disease trends (Kalenderian et al., 2011)
- Teaching the relationship between diseases and treatments within dental school settings (J. M. White et al., 2011)
- Enabling outcomes tracking (Kalenderian et al., 2011)
- Facilitating data sharing (Kalenderian et al., 2011)
- Evaluation of disease patterns (Kalenderian et al., 2011)
- Evaluation of treatments (Kalenderian et al., 2011)
- Evaluation of disease outcomes (Kalenderian et al., 2011)
- Prevention of lawsuits for failure to diagnose (C. Miller, 2011).

Diagnostic codes have been actively used in the western medicine model since the 1950's to classify diseases, disorders, signs, and symptoms (J. M. White et al., 2011). In dentistry, there is no current, wide spread, accepted model for diagnostic codes. Various countries, organizations, and educational bodies have developed diagnostic-coding systems for dentistry that lack wide acceptance and use (J. M. White et al., 2011). Current diagnostic coding systems include the WHO International Classification of Diseases to Dentistry and Stomatology (ICD-DA), the Toronto system of North York Community Dental Services, Z-Codes, EZ-Codes, the ADA Systematized Nomenclature of Dentistry (SNODENT), the Hemprich, the Gregg and Boyd, and Winston-Salem code systems (Leake, 2002a).

Table 1

Dental Diagnostic Coding Systems

Name	Creator	Explanation
ICD-DA	WHO	A terminology-based system envisioned being an international system for coding oral conditions. Originally created to classify causes of mortality and later expanded to include diagnosis in morbidity (ICD, 2004). It is a division of the ICD used by the medical field. The primary ICD does include some oral conditions but are limited and periodontitis is categorized under diseases of the gastrointestinal tract. (ICD 12)
Toronto System	North York Community Dental Services, school based clinic in Canada	To help in post care analysis of appropriateness of care provided by clinicians. A numeric four-digit system was created to allow data to be input and analyzed by computers to provide better data for future program planning and review of systems and care provided. Clinic doctors created a diagnosis log for two weeks. This system was created from the initial list of sixty common codes and further simplification was made until the four-digit code system was created (Leake, 2002b). o 1st digit identifies the main group of conditions, for example caries o 2nd digit the category of conditions within the main group, for example white lesion o 3rd digit type of tooth. i.e. primary or permanent o 4th digit extent of the condition, i.e. number of teeth affected (Leake, 2002a)
Z-codes	UCSF with modifications by Creighton University	A combination of the ICD-DA and the Toronto system, Its purpose was to be utilized with Electronic Health Records (EHR) and integrated with current CDT system; 1,158 diagnostic terms were categorized. Included categories were health, diseases, conditions, problems, disorders, deformities, and findings. (Kalenderian et al., 2011).

EZ Codes	COHRI	Modification of Z-codes to be used by dental institutions utilizing the Z-codes as a base then building with the AAP and ABE diagnosis trees. The final system consisting of 13 categories, 78 subcategories and 1,158 diagnostic terms can be related to current CDT procedure codes. The goals of the EZ Codes system during creation were to be able to: 1. Be used by all COHRI members 2. Be easy to use and inclusive of existing technology 3. Loaded into a EHR system 4. Have a hierarchy organization 5. Be rapidly implemented (Kalenderian et al., 2011)
SNODENT	ADA	A system originating from a comprehensive medical pathology and veterinarian process categorizing diagnosis of disease and conditions by body system and etiology. There are over 6,000 terms of diagnosis, signs, symptoms, and complaints in this system. Goal of developing a diagnostic system with uniform terminology complimenting the SNOMED system in medicine. SNOMED was written to be able to record dental diagnosis, outcomes, and document co-morbidity modeling after other fields of medicine (Atkinson, Zeller, & Shah, 2002). Currently being revised and preliminary field tests of SNODENT II are being conducted. The development of this system has been a fifteen-year undertaking and has not yielded a usable product for either education or clinical practices (Kalenderian et al., 2011).
Hemprich	Oral Surgeon Association	An oral and maxilla-facial surgery system consisting of 126 alphanumeric codes (Leake, 2002a).
Gregg & Boyd	United Kingdom	A pediatric diagnosis system for identification of needs to be referred for further treatment (Leake, Main, & Sabbah, 1999).

Winston-Salem	Code system is patient condition based but lacked the ability to be specific in location in the oral cavity (Leake, Main, & Sabbah, 1999).

(ICD, 2004; Leake, 2002 a&b; Kalenderian et al., 2011;Leake, Main, & Sabbah, 1999)

As a whole, the diagnostic codes in the CDT manual are from the perspective of the process of evaluation not the diagnosis of conditions. Clinicians are limited to coding diagnosis of hygiene treatment into the following codes according to the 2013 CDT Manual.

Table 2

CDT Diagnostic Codes

Code	Name	Definition
D0180	Comprehensive periodontal evaluation	New or established patient: This procedure is indicated for patients showing signs or symptoms of periodontal disease and for patients with risk factors such as smoking or diabetes. It includes evaluation and recording of the patient's dental and medical history and general health assessment. It may include the evaluation and recording of dental caries, missing or unerupted teeth, restorations, occlusal relationships, and oral cancer evaluation." (ADA, "CDT2013", 2012,p.7)
D0421	Genetic test for susceptibility to oral diseases	Sample collection for the purpose of certified laboratory analysis to detect specific genetic variations associated with increased susceptibility for oral diseases such as severe periodontal disease." (ADA, "CDT 2013", 2012,p.10)

(ADA, "CDT 2013", 2012)

With the addition of better and more specific diagnostic codes, treatment codes would need to be more specific in order to identify the treatment of a specific diagnosis. A disconnect also exists between the AAP classifications and CDT manual treatment codes for periodontal disease and can be seen by comparing the recognized categories in each. The AAP classification of periodontal diseases consists of eight main categories and 130 sub-categories describing the origins of the periodontal disease process and progress (Armitage, 1999). In the current dental coding system, clinicians are limited to coding dental hygiene therapies into the following seven codes from the most recent CDT manual published in 2013.

Table 3

CDT Manual Dental Hygiene Treatment Codes

Code	Name	Definition
D1110	Prophylaxis-adult	Removal of plaque, calculus, and stains from the tooth structure in the permanent and transitional dentition. It is intended to control local irrigational factors." (ADA, "CDT2013", 2012,p.13)
D1120	Prophylaxis-child	Removal of plaque, calculus, and stains from the tooth structures in the primary and transitional dentition. It is intended to control local irrigational factors." (ADA, "CDT2013", 2012,p.13)

D4341	Periodontal scaling and root planing	Four or more teeth per quadrant: This procedure involves instrumentation of the crown and root surfaces of the teeth to remove plaque and calculus from these surfaces. It is indicated for the patients with periodontal disease and is therapeutic, not prophylactic in nature. Root planning is the definitive procedure designed for the removal of cementum and dentin that is rough, and/or permeated by calculus or contaminated with the toxins or microorganisms. Some soft tissue removal occurs. This procedure may be used as a definitive treatment in some stages of periodontal disease and/or as a part of pre-surgical procedures in others." (ADA, "CDT2013", 2012,p.34)
D4342	Periodontal scaling and root planing	One to three teeth per teeth per quadrant: This procedure involves instrumentation of the crown and root surfaces of the teeth to remove plaque and calculus from these surfaces. It is indicated for the patients with periodontal disease and is therapeutic, not prophylactic in nature. Root planing is the definitive procedure designed for the removal of cementum and dentin that is rough, and/or permeated by calculus or contaminated with the toxins or microorganisms. Some soft tissue removal occurs. This procedure may be used as a definitive treatment in some stages of periodontal disease and/or as a part of pre-surgical procedures in others." (ADA, "CDT2013", 2012,p.34)

D4355	Full mouth debridement (FMD)	To enable comprehensive evaluation and diagnosis The gross removal of plaque and calculus that interferes with the ability of the dentist to perform a comprehensive oral evaluation. This preliminary procedure does not preclude the need for additional procedures." (ADA, "CDT2013", 2012,p.35)
D4910	Periodontal maintenance	This procedure is instituted following periodontal therapy and continues at varying intervals, determined by the clinical evaluation of the dentist, for the life of the dentition or any implant replacements. It includes removal of the bacterial plaque and calculus from the supragingival and subgingival regions, site specific scaling and root planing where indicated, and polishing the teeth. If new or recurring periodontal disease appears, additional diagnostic and treatment procedures must be considered." (ADA, "CDT2013", 2012,p.35)
D4999	Unspecified periodontal procedure, by report	Use for procedure, which is not adequately, described by a code. Describe procedure." (ADA, "CDT2013", 2012,p.35)

(ADA, CDT2013)

Periodontal Disease Types and Classifications. Severity of periodontal disease is categorized into classifications varying from gingivitis to advanced periodontitis. These case types are useful for communication and treatment planning but do not identify etiology (AAP, 2000). The AAP Disease Case types consist of the five categories with the focus being primarily for insurance billing purposes:

Case Type I: Gingivitis

Case Type II: Slight Chronic Periodontitis

Case Type III: Moderate Chronic Periodontitis

Case Type IV: Advanced Chronic Periodontitis

Case Type V: Refractory Periodontitis

A second system of periodontal classifications was developed by the AAP in 1997 and agreed upon at the 1999 World Workshop in Periodontics. The goal was to give clinicians and epidemiologists a framework to organize the health care needs of patients and populations (Appendix B) (Armitage, 1999). Neither system is directly related to the current dental coding system with treatment planning only based on healthy or diseased with no classification of severity or cause. Dr. Craig S. Miller, DMD, MS editor of Oral Medicine Section states that not having diagnostic codes and only treatment codes leads to failures to diagnose in dentistry, meaning that these well-meaning periodontal classifications have not served their purpose (C. Miller, 2011).

Code Revision Process. The ADA publishes the CDT manual and establishes what codes can be billed to insurance carriers. These codes are currently on a cycle of being revised every two years by the ADA's, CRC (Napier, Bruelheide, Demann, & Haug, 2008a). The creation of the treatment codes was mandated and accepted by HIPAA (Napier & et al., 2008). Since 2007, clinicians have requested expanded codes specifically in the area of periodontal therapies (ADA, 2011). Each time the CRC has declined these requests. An example of one such meetings table with the rejection reasons shown is included as Appendix C. One of the most common requests pertaining to dental hygiene therapies is the addition of a code for the treatment of gingivitis or difficult prophylaxis. (2000, ADA). Of the eight published CRC reports ranging from 2007-2013, requests by clinicians pertaining

to altering or creating a code aimed at treating gingivitis were declined six times (ADA, 2011).

History of CDT Manual and Revisions. The first CDT manual was published in 1991 and is currently on their ninth edition as of 2013. One of the most debated and altered coding sections pertain to prophylaxis codes. Historically the CDT manual has included different treatment modalities including difficult prophylaxis, extended prophylaxis, and periodontal scaling in the presence of inflammation. These codes have all been deleted from subsequent manuals (Forgas-Brockmann, 1998). In CDT-1 a code for the treatment of gingivitis existed named *periodontal scaling in the presence of inflammatio*n (Forgas-Brockmann, 1998). This code was intended for patients with generalized active gingivitis and required therapy to eliminate and prevent the progression to periodontitis (Forgas-Brockmann, 1998). In CDT 2, this code was deleted because of alleged misuse (Forgas-Brockmann, 1998). It was then brought back after many complaints by clinicians only to be removed again by the ADA's CRC with strong support from the insurance industry (Forgas-Brockmann, 1998).

Beginning in 2007, a log has been maintained on the ADA website listing both the adopted revisions and suggested revisions submitted at each meeting (American Dental Association, Code Revision Committee, 2007-2012). This data shows with the exception of the February 2009 meeting, a modification concerning the current adult prophylaxis code has been submitted for consideration at each meeting, and every year it has been declined by the committee (American Dental Association, Code Revision Committee, 2007-2012). To date there is still no billing code for the treatment of gingivitis, which is considered a

precursor to periodontitis and listed as the first case types in both insurance and epidemiology classifications (Armitage, 1999).

In January of 2012, the ADA announced changes to the current CRC. A new committee was formed called the Code Advisory Committee (CAC). In the past complaints concerning the CRC were made not only against the process of reviewing and voting on code revisions but also on keeping the CDT manuals progressive. The CAC will have representatives from a broader base of dental professionals including five current or past CRC members, nine representatives from the dental specialties organizations, one from the Academy of General Dentistry, five members from the payer organizations i.e. Insurance companies, and one member from the American Dental Education Association (ADEA). This new committee's first meeting was held February 10-11, 2012. Committee members reviewed 136 requests compared to only 37 reviewed in the last CRC meeting (Soderlund, 2012). New published meeting notes from the CRC which has now changed its name to Code Maintenance Committee (CMC) show that at their last meeting on February 28-March 1 2013 show that they voted on 100 topics and accepted an never before seen number of recommendations at 55 accepts, 38 declines and 7 others. Also include vote numbers and recommendations such as "other" with notes assigning members to subcommittee to investigate topics and report back. Even with the progress of late there is still no discussion on adding diagnostic codes or wide spread polling of the dental community to survey their attitudes towards change in the current system. Below is a table showing published recommendations dating back to 2007 pertaining to periodontics and preventive hygiene services (American Dental Association, Code Revision Committee, 2007-2012).

Table 4

Code Revision Recommendations & Outcomes

Date	#	Type	Name	Action	Reason
02/2007	PRE-001-/9/1	Add	Difficult prophylaxis	Decline	There are no widely accepted standards for a difficult prophylaxis. The current Code on Dental Procedures and Nomenclature adequately describes this procedure.
08/2007	PRE-0020 9/2	Add	Prophylaxis re-evaluation and treatment	Decline	The Committee determined that existing procedure codes already provide for this treatment. This submission bundles a procedure with an evaluation which may create confusion
08/2007	PER-007-9/2	Add	Periodontal Charting & Recording	Decline	The Committee did not find a need to create a code for this apart from the existing procedures in which it is included
08/2007	PER-008-9/2	Revise	D4355	With-drawn	Revise nomenclature and descriptor so there is no requirement that an oral evaluation may only occur after the debridement procedure.
02/2008	DIA-010-9/3	Add	Counseling to individual at high risk for gum disease	Decline	The CRC believes the procedure described in the request is not sufficiently unique from another current procedure to warrant its own code.
02/2008	DIA-012-9/3	Add	Periodontal Risk Assessment	Decline	The CRC did not find at this time the documentation provided with the submission nor other readily available resources substantiated sufficient demand for the procedure code requested.

02/2008	PRE-004-9/3	Add	Generalized supragingival and subgingival scaling under the presence of inflammation without the loss of clinical attachment	Decline	The CRC believes the procedure described in the request is not sufficiently unique from another current procedure to warrant its own code. Further, the CRC believes the procedure described is adequately reported using D1110
02/2009	PER-002a-1/1	Add	Periodontal service-laser therapy, per site	Decline	These requests as written are confusing and vague. It is not possible to determine whether the proposed codes reflect unique procedures unrelated to existing coded procedures. The intent and scope of these procedures, rather than the instrument used (laser) must be better defined. It is unclear what is meant by “per site” in submission. Current convention dictates use of or one to three teeth per quad or four or more teeth per quad.
02/2009	PER-002b-1/1	Add	Periodontal service-laser therapy, per site	Decline	See above response
08/2009	DIA-001-1/2	Add	Periodontal Risk Assessment	Decline	It is the opinion of the CRC that risk assessment is a component of an oral evaluation and the methods, including risk assessment tools, which factor into the dentists decision as to appropriate care are left to the individual dentist. At this time the committee feels that there is not a validated periodontal risk assessment tool

08/2009	DIA-002-1/2	Revise D0180 comprehensive perio eval	Add re-evaluation after therapy to description	Decline	It is the opinion of the CRC that the current code describes a comprehensive perio eval and the addition of the re-evaluation would confuse the use of this code
08/2009	PER-001-1/2	Add	Prophylaxis-half mouth or One arch prophylaxis	Decline	It is the opinion of the CRC that the current descriptors of the prophylaxis code are intentionally non-specific as to the number of teeth and level of difficulty involved in the procedure, and therefore maybe used to document the situation described in the request.
08/2009	PER-003-1/2	Revise	D4355 FMD-Add completion of oral evaluation and add concurrent reporting of an oral examination	Decline	The prevailing CRC view is that it is important to retain the current descriptor language “interfere with” to properly describe the service rendered.
08/2011	PER-003-3/2	Add	Periodontal scaling and root planning, per sextant	Decline	
02/2012	PER-0030 1/3	Revise	D1110- Adult prophylaxis to include “may include the use of dental floss and/or another interdental cleaner between teeth”	Decline	The CRC was unanimous in its decision not to approve the request for the following reason: The submission does not add clarity or improve the understanding to the current code.

02/2012	PER-001-1/3	Add	Difficult Prophylaxis- Excess bleeding due to inflammation, moderate to heavy almost generalized sub calculus and/or almost generalized supra but doesn't interfere with probing.	Decline	The committee was unanimous in its decision not to approve this request for the following reasons: 1) The submitted requests differ from an existing code procedure only in the level of difficulty. A new code is not necessary because the level of difficulty or complexity is expected to vary for any given dental procedure; existing individual codes intentionally account for these variances. 2) There is no widely accepted standard definition of a difficult prophylaxis.
02/2012	PRE-0030 1/3	Revise	D1120- Child Prophylaxis to include “under the age 15”	Decline	The CRC was unanimous in its decision not to approve the request for the following reason: The inclusion of patient age is not consistent with other procedure code nomenclatures or descriptors in other parts of the CDT
2013*	PER-01	Add	Gingival decontaminati on	Decline	No specific procedure is described in the submission. Decontamination is a general term.
2013*	PER-02	Add	Mini-recall/site specific perio maintenance	Decline	This procedure maybe documented and reported under D4910

2013*	PER-04	Add	Gingival irrigation per-quad	Accept	Irrigation of gingival pockets with medicinal agents. Not to be used with mouth rinses or non-invasive chemical debridement.
2013*	PER-05	Add	Laser de-epithelialization in conjunction with decontamination of the root surface and de-cortication of bony support	Other	Subcommittee has been assigned and will report at next meeting for further discussion

(American Dental Association, Code Revision Committee, 2007-2012).

* The 2013 requests are still in draft form and not finalized.

Alternatives to accepted traditional dental codes. With the perspective that gingivitis is the precursor of periodontal disease, some private practice dentists and dental corporations have implemented soft tissue management programs as a tool focusing on maximizing the profits of their practices. Depending on the disease state, or lack thereof, a patient would be recommended adjunct products, services, and recall frequency. Some of these programs have utilized practices that are not evidence-based resulting in abuse of codes (Limoli, 2009).

The D4355 FMD code has a history of misuse (Blair, 2011). Treatment protocols for using FMD at initial treatment of moderate to severe gingivitis exist; Tom Limoli of Limoli and Associates calls these *California Plans* (Limoli, 2009). These systems give the clinician extra time for gross calculus removal and subgingival irrigation, which is often added in even though it lacks clinical evidence for efficacy. The patient given and commonly charged for oral hygiene instructions with the dispensing electric toothbrushes and prescription

fluoride or antimicrobial products based on a standard of care not a patient centered treatment plan(Limoli, 2009)&Aspen 2010). A follow up visit would be scheduled to evaluate healing and decide on a recall schedule; thus using the code as a treatment modality. Boards of dentistry and coding experts have disputed the use of the FMD code in this manner (Lamoli, 2009). The intention of the FMD code is to be used only when the patient presents with an excessive amount of calculus and plaque and a full examination cannot be performed without first removing the debris (Cahoon, 2006). To clarify, this code is for clearing the visual and instrument field for an exam, not for dental hygiene therapy. The misuse of the FMD code stems from the deletion of the scaling in the presence of inflammation code in the CDT 2 manual (Lamoli, 2009).

Insurance. Since the 1970's public and private dental insurance have helped increase access to care by decreasing the financial burden to the patients it covers. In 1984 dental insurance coverage for full time employees was at an all-time high with estimates hovering around 75% (B. A. White, 2012). In 2011, the average had dropped to 37% of full time employees participating in dental benefits through their employers (B. A. White, 2012). Having dental insurance is related to better oral health showing less attachment loss, active caries, and missing teeth compared to those individuals without private insurance (Stancil, Li, Hyman, Reid, & Reichman, 2005).

On March 6, 2011 the National Public Radio (NPR) network broadcasted an interview with Dr. Greg Bloche a health policy analysts highlighting his book "The Hippocratic Myth." Bloche's research suggests modern medicine compromises the Hippocratic Oath with pressure from health insurance companies on rationing care due to cost and coverage (Bloche, 2011). An example of this in dentistry can be seen in regards to

a common clause in dental coverage exempting the coverage of posterior composites. By not covering or reducing coverage of this common restorative procedure the insurance companies are directly influencing patient care by making the patient pay higher fees and limiting the dental professionals' right to decide what they deem appropriate care (Pagano, 2012). A second report out of Europe discusses this further in relating the decrease of placements and education of amalgam restorations worldwide (Correa et al., 2012) and how it does not relate proportionally with the high number of existing amalgam fillings the researchers found. The researchers concluded this phenomenon is due to insurance coverage being higher for posterior amalgams verses composite restorations giving an example of how the insurance industry has influenced patient care (Correa et al., 2012).

Summary

With soaring rates of periodontitis being reported (Eke, Thornton-Evans, Wei, Borgnakke, & Dye, 2010, R. C. Williams et al., 2008) and high percentages of insurance claims for periodontal disease prevention not disease treatments being filed using the current CDT codes (K. R. Miller, 2010) a disconnect can be witnessed. Dental offices and corporations are creating their own alternates around the current system (Limoli, 2009&Aspen 2010). While consortiums and dental associations make official statements supporting change to the dental coding system no surveys have been conducted asking the opinion of dentists and dental hygienists (ADHA, 1998, Kalenderian et al., 2011).

In conclusion, the PI was not able to locate empirical data on the views of practitioners about how periodontal therapy is coded for diagnosis and treatment in relation to the classifications of periodontal disease as defined by the AAP. This study's findings could provide a platform for future work, specifically in documentation and insurance

codes. Additionally, study results could present prospective researchers with practical data on the clinician's perspective regarding the importance of CDT codes in developing treatment plans.

Methodology

The purpose of this research was to identify opinion trends among dentists and dental hygienists in Washington and Oregon toward current dental coding systems. Background research shows support of additional/revisions to existing codes by organizations, such as COHRI (Kalenderian et al., 2011). The PI used a survey to question clinicians and evaluate their responses regarding dental coding in relationship to location, and years in practice, practice type, education, and profession.

Design

A quasi-experimental cross-sectional design was utilized in this study. The online survey tool Survey Monkey® and identical paper surveys with closed ended items were implemented to gather response and demographic data to determine if dentists and dental hygienists in Oregon and Washington support modifications to insurance codes including the addition of diagnostic codes.

Research Questions. The following research questions were addressed:

1) Do dentists and dental hygienists from the states of Oregon and Washington support the utilization of diagnostic codes related to periodontal classification?
2) Do dentists and dental hygienists from the states of Oregon and Washington think current periodontal therapy codes are sufficient for documenting treatment of periodontal diseases with differing severity?
3) Is there a difference of opinions for sufficiency of current coding system amongst dentists and dental hygienists based on demographics?

4) Is there a difference of opinions for utilization of diagnostic codes amongst of dentists and dental hygienists based on demographics?

Research Hypotheses. The following two null and alternative hypothesizes were used to answer the proposed research questions:

- H0- Average number of dentists and dental hygienists who support the utilization of diagnostic codes is equal to those who do not.
- Ha- Population proportion of dentists and dental hygienists who support the utilization of diagnostic codes is greater than the ones that do not.
- H0- Average number of dentists and dental hygienists who support the sufficiency of the current coding system is equal to those that do not.
- Ha- Population proportion of dentists and dental hygienists who support the sufficiency of the current coding system is less than those that do not.

Variables.

A partial correlation analysis was performed to determine if there is a statistical significant relationship between the opinion of the participants and the following demographic variables.

- Role of practitioner (dentist or dental hygienist)
- Location (city and state)
- Years in practice (categories 0-5,5-10,10-15, 15-20, 20+)
- Education
- Age (categories 18-25, 25-35, 35-45, 50+)
- Practice type
    - Private practice

- Multi-provider practice
- Managed care
- Corporate dental
- Education
- Public Health

The primary data was analyzed to find the frequency distribution of the following ordinal and nominal variables:

- Satisfaction with dental codes (Binary one question)
- Support of utilization of diagnostic codes (Binary one question)
- Impacted types of therapy due to insufficient coding (Multiple choice one question
- Value of dental diagnostic codes (Likert scale selection ranging from very helpful to unhelpful, one question)
- Barriers in the current coding system (Multiple choice selection, one question)
- Willingness to incur the expenses to incorporate these new codes (categorical selection ranging from 0%- greater than 25%. one question)
- Perception of loss of revenue due to current coding system (categorical selection ranging from 0% to greater than 50%, one question)

These response variables were analyzed for differences in opinions among the dentist and dental hygienist survey participants.

Description of Setting

The goal was to survey dentists and dental hygienists in the states of Oregon and Washington to identify opinion trends concerning the current dental coding system. Oregon and Washington were chosen for pragmatic purposes including convenient location.

Furthermore, the electronic platform of survey collection was selected for convenience and the option for participants to answer questions in private. The use of paper surveys was used at local dental hygiene meetings.

It is important to note laws concerning dental hygiene scope of practice are considered more progressive in Washington and Oregon because dental hygienists are allowed to diagnose in Oregon as well as have expanded practice options and work under general supervision of the dentist in both states. Due to these expanded scopes of practice, dentists and dental hygienists could have the opportunity to be impacted by the alteration of the current coding system? National insurance carrier plans are used in both Oregon and Washington thus allowing some representation of the US as a whole.

Sample

This study used a network sample also known as snowball sample of dental practitioners from Oregon and Washington as a relatable representative sample of all dental practitioners in the United States. The initial contacts were a convenience sample then snowballed to locate other participants. The benefit in this type of sampling is the anonymity is stronger due to not having to obtain personal information for a larger body of participants. This sample can be considered representative of the larger population of the United States due to equalizing factors of all practitioners being limited by the same CDT codes, ADA mandated education accreditation standards, and national insurance providers. Testing for geographic bias was done between WA and OR to help determine national applicability.

Human subjects' protection. The PI gained approval for this study from Eastern Washington University (EWU) Institutional Review Board (IRB) with exempt status. The

survey had total anonymity through the Survey Monkey® program and partially through face-to-face interaction but both methods had a consent option. . With each survey link emailed to participants or handed to in person, an introduction was made explaining the purpose of the study and IRB approval along with Survey Monkeys' ® privacy policy statement. Prior to starting the survey a consent form was displayed. Responding to the survey was considered consent with all participation being considered voluntary and respondents being able to stop and withdraw from the survey at any time. The survey respondents had the opportunity to remain completely anonymous and have their Internet Protocol (IP) address disabled. Survey Monkey® emailed raw data to the PI in encrypted formats to a password-protected account. All respondent identities were anonymous if they chose to be and none of their computer identification such as IPL numbers was gathered during the process. All passwords and data gathered was stored on a password-protected laptop and stored in a private residence with an ADT security system.

Sample source. The state of Oregon has 2,818 dentists and 3,067 dental hygienists as of July 2011 according to the Oregon Board of Dentistry. The Washington State Oral Health Care Worker Report of 2009 states Washington has 4,443 dentists and 5,014 dental hygienists.

Criteria for sample selection. The participants were either a dentist or a dental hygienist licensed in the states of Washington or Oregon. A diversity of demographics was sought to have participants from different education levels and practice types including private practice, multi-provider practices, managed care, corporate dental, education, and public health.

Sampling plan. Snowball sampling was used to recruit participants. Emailed invitations were sent to educational institutions, ADHA and ADA component chapter presidents, dental hygiene and dental school program directors, public health clinic managers, dental management staff, and dental corporate leaders asking them to forward the survey to dentists and dental hygienists in Oregon and Washington states. Social media sites were used to recruit participants such as Facebook, and LinkedIn using dental professional groups. Professional webpages such as the ADHA, ADA, and, Colgate Oral Health Advisor was used to post invitations to the survey link. A third component utilizing paper copies of the survey was used at local dental hygiene meetings such as the ADHA component meetings in the Greater Portland Oregon area to gather surveys by hand and then entered by the PI into Survey Monkey ®. The survey link took voluntary interested participants to Survey Monkey ®, an Internet based survey site. Limited face-to-face interactions were conducted at dental component meetings and conventions inviting interested professionals to fill in a paper version of the survey for later input into Survey Monkey® by the PI. The PI read from the same script used on the Internet platform surveys and did not answer any questions thus reducing any bias. The goal was to reach a variety of dental professionals in different fields without having to gather their personal data.

Each of the practitioners who agreed to participate via social media or personal invitation clicked on the provided link directing them to an electronic survey hosted by Survey Monkey® asking specific questions regarding their perspective on the current state of dental coding and their personal demographics. Data collected was analyzed to determine the overall estimated percentage of dental practitioners' satisfaction rates with the current

coding system. Trends in any areas of practice the participants believe is being impacted by the current system were analyzed.

Sample size. To achieve a sample size representative of dental hygienists and dentists actively practicing in Oregon and Washington states assuming a sampling error of $\pm$5%, ($p<0.05$) with a confidence level of 95%, a sample size of approximately 500 respondents was projected to keep the error terms small and the confidence interval meaningful. The PI continued study enrollment until 60 days had lapsed since the first response due to time constraints. The survey stop date was June 30, 2013 achieving a sample size of 106.

Data Collection

Methods. The gathered responses were collected and downloaded online via the survey site, Survey Monkey®. The survey link was also posted on blogs and dental related forums on the Internet, including Facebook, LinkedIn, and the ADHA webpage. Paper copies of the survey were used by the PI at local dental meetings such as ADHA component meetings in the Greater Portland Oregon area to gather responses completed with pen or pencil and input into Survey Monkey ®. Any participants who completed the survey but did not qualify based on their reporting of not being a licensed dentist or dental hygienists in the states of Oregon and Washington were eliminated before final analysis. By choosing to utilize online survey programs such as Survey Monkey ® advantages range from extended possible populations to cost control (Fricker Jr. & Schonlau, 2002).

Instruments. A literature review was conducted identifying areas in need of further investigation regarding the current coding system utilized in the US. The PI designed survey items based on recommendations by the ADHA (ADHA, 1998,) and COHI research

(Kalenderian et al., 2011) on changing the current coding system to include diagnostic codes and more specific codes pertaining to periodontal disease. (Appendix A). Questions were chosen based on lack of existing literature and minimally available publishing's based in an opinion/editorial context that expressed frustration from a clinician's perspective of the current coding system. Available literature is mostly based on school and public health based clinics not accounting for average general practitioners' opinions. Additionally demographic data about each participant was collected as well as descriptive data on the participant's attitudes. Participants were notified if the item had more than one response with a note to check all that apply.

The Survey Monkey® program was set to collect responses from each participant and allow the PI to enter results from paper surveys completed with pen or pencil by participants. The collected data was only accessed through a username and password controls that only the PI had access.

Reliability and validity. In order to confirm the validity of the survey graduate students from EWU's dental hygiene department were sent a survey asking for feedback with a 24-hour window to respond. By using binary questions directly related to the null hypothesis the validity of the survey questions was seen and thus in the end results. By setting a p value of $p \leq .05$ to determine significance level null hypothesis was proven. Finally, all face-to-face surveys and online surveys did follow the same script in order to assure reliability.

Procedure. Upon approval by the EWU IRB, the initial survey link was posted on blogs and dental related forums on the Internet, including Facebook, LinkedIn, and the ADHA webpage. On April 11, 2013, the first survey invitation was emailed out and the 60-

day survey time lapse began. Participation and final submission of survey was considered consent from the respondents. No coercion or payment was made to the participants. Minimal risks from this study would be if the respondents felt coerced or are worried about sharing their opinions. The same exact survey with introduction and disclaimer was printed. These paper copies of the survey were distributed by the PI at local ADHA component meetings in the Greater Portland Oregon area. Participants at these meetings completed surveys with pen or pencil. The PI handed out the surveys and had participants slip completed surveys into an envelope with other completed surveys mingled within. No identifying markers were asked for on the paper surveys. Participants were asked on a separate piece of paper if they would like to leave their email addresses for follow up information regarding the outcomes and/or an emailed version of the survey for them to forward to their personal qualifying network. All paper copy surveys completed in this manner were input into Survey Monkey ® by the PI and then destroyed. Consent was considered if the respondents return the surveys to the PI. The ideology behind network sampling, or snowballing strategy is qualified participants often know other qualified participants and pass the survey information along. It also has been shown to uncover hidden groups of qualified participants and that may begin with a small group of convenience sampling method. During the 60 days of the survey, the PI also invited fellow attendees from local dental professional meetings and conventions to participate. The PI monitored responses during the survey period to assure there were representative populations of dentists and dental hygienists from both Oregon and Washington. Lack of responses from dentists changed the focus to improving response rates to gain a more representative sample. Participants who included their email addresses received follow up

thank you letters and the results of the study. At closure of the study period statistical analysis was started by exporting data from Survey Monkey® in Excel© spreadsheet format. Data from the spreadsheet was imported into a predictive statistical analytical software program by IBM called SPSS version 6, and indicated tests were run.

Statistical Analysis

In order to assess the initial questions of whether or not dental codes are sufficient and if diagnostic codes are supported a two dimensional cross classification table was constructed and utilized to test the null hypotheses 1) Average number of dentists and dental hygienists who support the utilization of diagnostic codes is equal to those who do not and 2) Average number of dentists and dental hygienists who support the sufficiency of the current coding system is equal to those that do not. H0: p (finding the codes sufficient) = P (codes are not sufficient) and H0: p (supporting diagnostic codes) = P (not supporting diagnostic codes). This was tested against the alternative one-sided hypothesizes 1) Population proportion of dentists and dental hygienists who support the utilization of diagnostic codes is greater than the ones that do not. 2) Population proportion of dentists and dental hygienists who support the sufficiency of the current coding system is less than those that do not. Ha: P (finding the code sufficient) > P (codes are not sufficient) and Ha: P (supporting diagnostic codes) > P (not supporting diagnostic codes). Further, 95% confidence intervals were constructed around the probability of a practitioner believing current dental codes are not sufficient. For those whose response indicated dental codes were insufficient, a second hypothesis test and confidence interval was constructed around the probability of a practitioner who believes the current coding system is not sufficient also believes diagnostic codes are necessary.

Descriptive statistics were used including frequency distribution, box plot, and mean for the practitioners' opinion on coding. When time had lapsed on the survey results were analyzed using a Chi square method testing the null hypothesis versus the alternative hypothesis giving p values in order to evaluate the null hypothesis.

Lastly, logistic regressions were utilized to determine if specific segments of the dental population have statistically significant differing beliefs in the adequacy of the coding system and the areas of greatest impact.

Summary

This study used a cross-sectional designed survey via an Internet survey platform, Survey Monkey®, with the addition of paper surveys input by hand into the Survey Monkey® for data collection. Dentists and dental hygienists in the states of Oregon and Washington from different dental practices settings including: private practice, managed care, corporate dental, public health and education were enrolled as participants using a network sampling method. Survey responses were analyzed for correlations based on demographics including practice type and geographic location, role of practitioner, years in practice, education, and age. The survey responses were used to quantitatively measure the attitudes of dentists and dental hygienists and potential impacted areas due to lack of diagnostic codes

Results

Introduction

The goal of this research was to test the theories of the ADHA and ADEA against the attitudes of dental hygienists and dentists in the states of Oregon and Washington, pertaining to the current dental coding system and its adequacy. The PI attempted to survey as many dentists and dental hygienists through a snowball-sampling method in order to enhance the existing body of research. The following chapter will summarize the results of this mostly Internet based clinician focused survey in the following sections; description of sample, statistical analysis, and summary.

Description of Sample

For pragmatic purposes, the participants of the survey were dentists and dental hygienists licensed and residing in the states of Oregon and Washington. No bias was placed on type of practice or hours of practice. A snowball-sampling plan was used based on the principle investigator's (PI) personal contact list using Internet based technologies such as social media to gather qualifying participants.

The resulting sample consisted of 106 completed surveys stored in the Survey Monkey ® program. Only seven surveys were hand gathered by the PI at dental meetings and conventions, the remaining 99 were Internet based. Of the 13 questions on the survey, six were focused on demographics. See Table 5

Table 5

Role of practitioner demographics (N=105)

Practitioner Type	Response Percent	N
Dentist	9.5%	10
Dental Hygienist	90.5%	95

Demographics. Of the 105 responses to the role of the practitioner question 90.5% (*n*=95) were dental hygienists. Each participant could choose one answer to describe their role. One participant chose to skip this question. Of the 104 dentists and dental hygienists the average respondent lived in urban Washington State. Each participant was able to choose more than one option in order to describe their lifestyle setting. Two participants did not answer the question. See Table 6.

Table 6

Geographic location demographics (N=171)

Geographic location	Response Percent	*N*
Urban	63.5%	66
Rural	20.2%	21
OR	22.1%	23
WA	58.7%	61

Of the 104 respondents to this demographic question the largest category answered in regards to years in practice was 20 plus years with 47.1% (*n*=49). Each participant was only able to choose one answer to describe the years in practice range that fits him or her best. Two respondents opted out of the question. See Table 7.

Table 7

Years in practice demographics (N=104)

Years in Practice	Response Percent	*N*
0-5	18.3%	19
5-10	14.4%	15
10-15	10.6%	11
15-20	9.6%	10
20+	47.1%	49

Of the 103 responses to the age range question 36.9% (*n*=38) was the most common answer. Each participant was only able to choose one answer to describe the age range that fits him or her best. The average age range was 51-60 years of age, which coincides, with the average years in practice being over 20 plus years. Three participants choose to skip this question. See Table 8.

Table 8

Age demographics (N=103)

Age	Response Percent	*N*
20-30	21.4%	22
31-40	15.5%	16
41-50	18.4%	19
51-60	36.9%	38
60+	7.8%	8

Of the 105 responses to the highest education achieved question 55% (*n*=58) were dental hygienists with baccalaureate degrees; these were solely dental hygienists due to the entry level education for dentists is a doctorate. Each participant was only able to choose one answer to choose the education describing them best. One participant did not answer the question. See Table 9

Table 9

Highest level of education demographics (N=105)

Education Level	Response Percent	*N*
Certificate	1.0%	1
Associate Degree	15.2%	16
Baccalaureate Degree	55.2%	58
Master's Degree	19.0%	20
DDS/DMD	8.6%	9
Specialist	1.0%	1
PhD	0.0%	0
Other	0.0%	0

Of the 105 responses to the practice setting type question private practice was most commonly chosen option with 55.2% (n=58). Each participant was only able to choose one answer for the career setting question that describes him or her best. One participant chose to skip this question. See Table 10.

Table 10

Primary Practice demographics (N=105)

Primary Practice	Response Percent	*N*
Private practice	55.2%	58
Multi-provider practice	10.5%	11
Managed care	2.9%	3
Corporate dental	1.9%	2
Education	16.2%	17
Public Health	9.5%	10
Other	2.9%	3
None	1.0%	1

The average respondent to this survey was a 51-60 year old dental hygienist with a baccalaureate who had been practicing 20 or more years in private practice in an urban area of Washington State. These demographics were analyzed with the survey answers to identify any possible trends in the opinions of certain demographics.

Statistical Analysis

The statistical analysis is organized around each hypothesis relating to the four research questions. Additionally, for some research questions descriptive statistics for survey questions (SQ) related to the research question are reported**.**

Support of diagnostic codes related to periodontal classifications. Do dentists and dental hygienists from the states of Oregon and Washington support the utilization of diagnostic codes related to periodontal classification?

Descriptive statistics from Survey Monkey® for following SQ1 "Are you satisfied with the current coding system CDT?" were of 99 responses, 62 answered no (*n*=11). To summarize for SQ1, analysis provided by Survey Monkey® suggests a larger portion of dentists and dental hygienists are not happy with the current coding system 62.6% (*n*=63) than are 37.4% (*n*=38). See Figure 1.

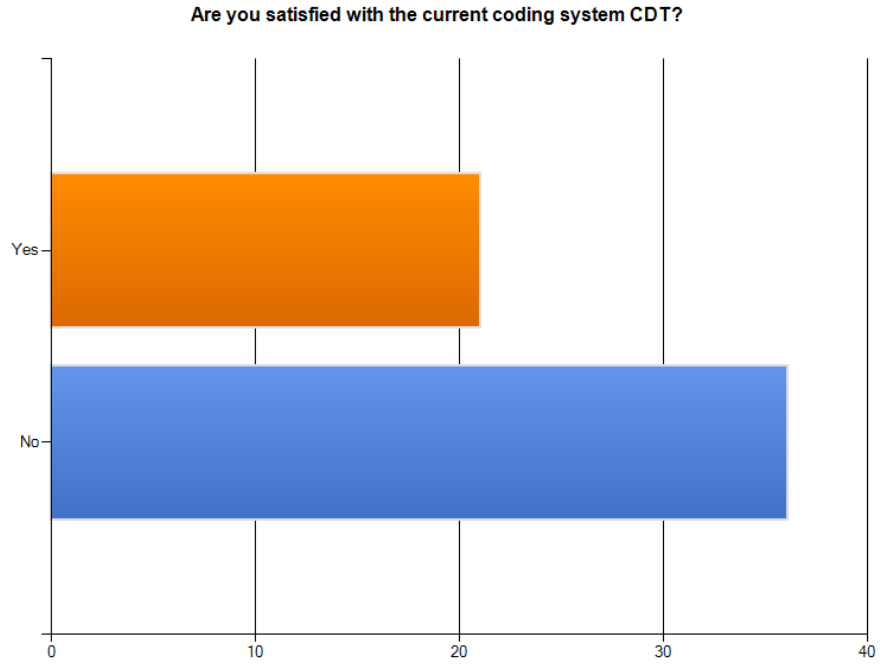

Figure 1. Satisfaction with current coding system, *N*=99

SQ 2. "Please rank the following areas of the current coding system on how adequate you feel they are represented in the current CDT coding system." Of the 96 responses to SQ2 28.57% ranked (*n*=26) diagnostic codes the most adequate with restorative coming in second and third with 24.28% (*n*=22) due to that clinicians were ranking each category for its adequacy the same number of participants ranked it the second and third most adequate and then periodontics at fourth with 25.27% (*n*=23), endodontics fifth at 27.4% (*n*=25), oral surgery sixth with 35.16% (*n*=32), and orthodontics last with 41.7%

(*n*=38). The last two options were other and none and were ranked the least adequate. The ranking does not coincide with the comments left in the open-ended section and in conjunction with other comments on the survey leads the PI to believe the ranking system in Survey Monkey® was not accurate or understood by participants. Thus making the answers provided in SQ2 not useful this finding will be discussed further in the limitations section. See Figure 2.

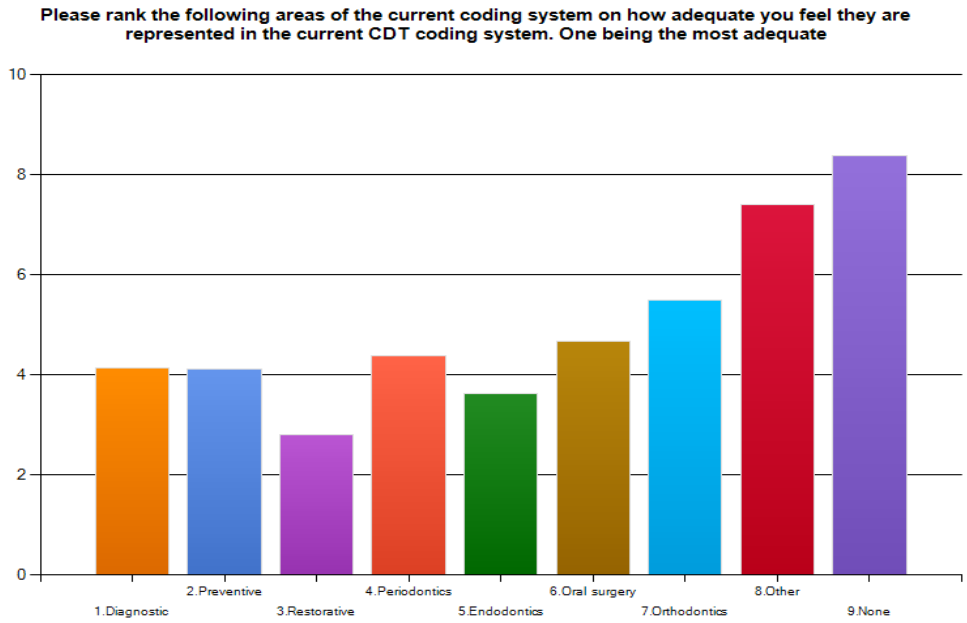

Figure 2. Ranking for adequacy. *N*=91

SQ 3. "Do you think that diagnostic codes could be beneficial in the practice of dentistry?" Figure 3 shows of the 103 responses to SQ3 specifically on if diagnostics codes would be beneficial in dentistry 91.3% (*n*=94) respondents said yes. In ranking adequacy of diagnostic codes SQ3 received a 4 on a 1-9 scale with the 1 being the most adequate.

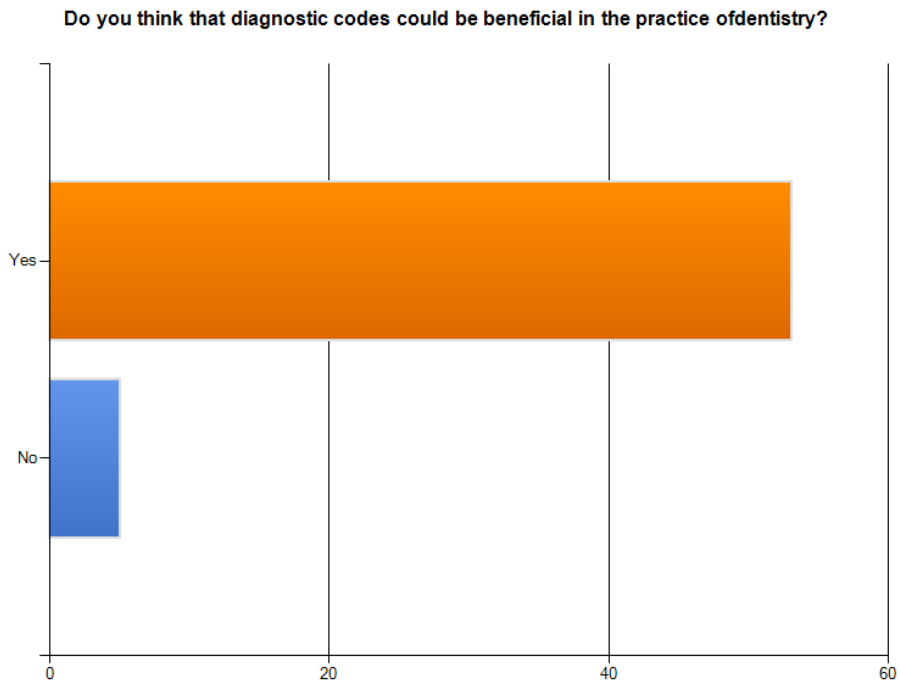

Figure 3. Benefit of diagnostic codes. *N*=103

SQ4. "Please rank the following areas that the current coding system prevents you from receiving or achieving any of the following or choose none." Accurate treatment tracking ranked number one with 35.4% (*n*= 34), complaint with financially being reimbursed as second at 43.7% (*n*=42), and epidemiology tracking third with 51% (*n*=49). Other and none filled in the last two rankings neither being significant. See Figure 4.

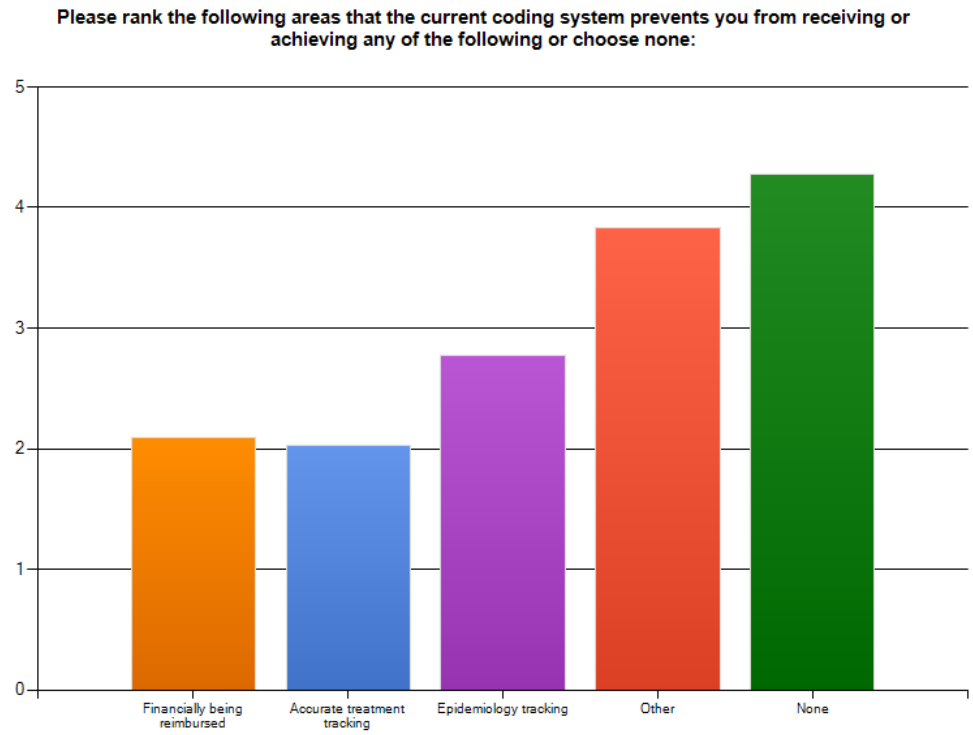

Figure 4. Ranking for prevention. *N*=96

SQ 5. "If a more accurate coding were introduced how much of the expenses would you be willing to incur to incorporate these new codes?" The majority of clinicians reported not wanting to incur any expenses with modifying the current system with 43% (*n*=43) saying that at 0 of their gross income would they add to their current system and 19% (*n*=19) would incur an expense of up to 5% of gross income. Twenty-nine percent (*n*=29) chose the N/A option meaning these respondents did not feel this question applied to their work situation. See Figure 5.

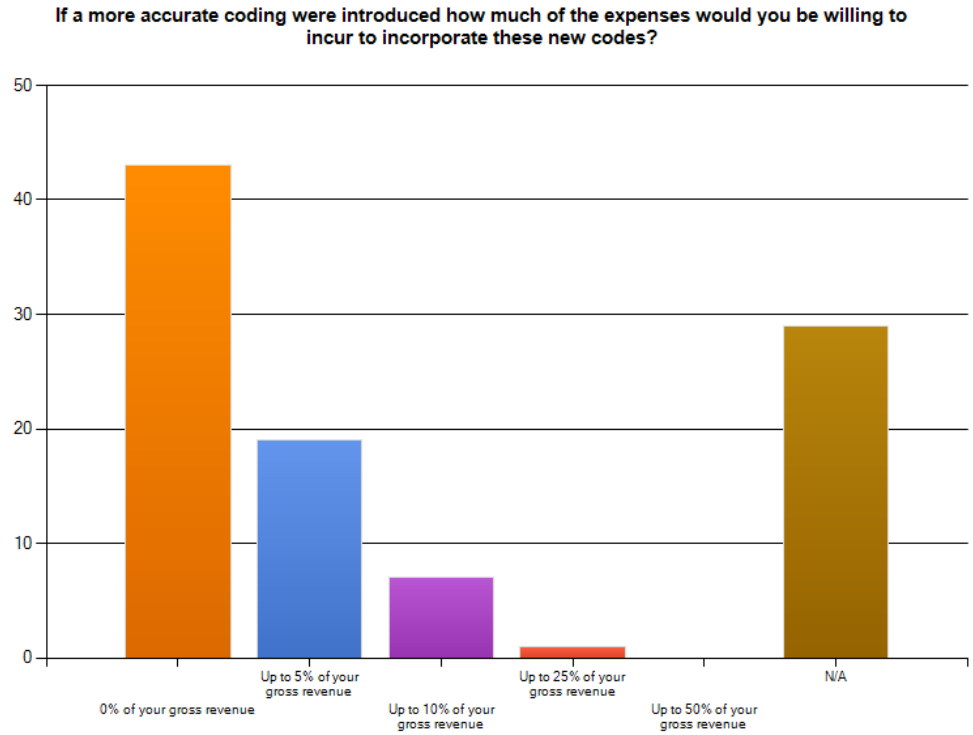

Figure 5. Ranking of willingness to incur expenses. *N*=99

SQ6. "What percent of your revenue do you feel is missed due to coding inaccuracy in the current system?" The majority of participants answered they feel they are missing some revenue due to the current coding system. Figure 6 illustrates 71.42% (*n*=70) stated that a percent of their revenue, ranging from 5% to over 50%, is lost due to the current CDT billing structure based on treatment alone. Only 6.12% (*n*=6) thought they had no losses and 22.45% (*n*=22) answered N/A.

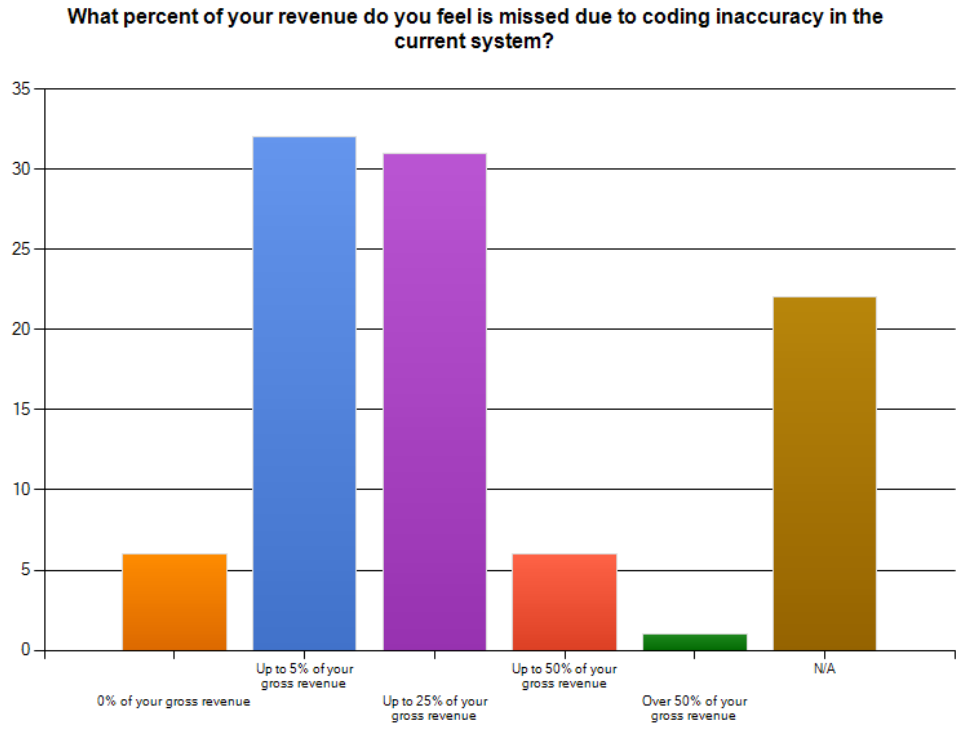

Figure 6. Ranking of missed revenue. *N*=98

The following reports the formal statistical analysis performed based upon the original four research questions: "Do dentists and dental hygienists from the states of Oregon and Washington support the utilization of diagnostic codes related to periodontal classification?" The following will be used to answer the proposed research questions.

More Dental professions in the United States find the diagnostic codes sufficient. Utilizing 99 responses with 7 abstentions from SQ1 Are you satisfied with the current coding system?, 37.4% (*n*=37) support no modifications while 62.6 %(*n*=62) support modifications.

$H_{0:}$ Proportion that are satisfied with the current coding system > Proportion that are not satisfied with the current coding system

H_a: Proportion that are satisfied with the current coding system <= Proportion that are not satisfied with the current coding system

The hypothesis test for a small sample proportion for a mean with unknown population standard deviation utilizes the t-statistic. In this case the *t*-statistic calculates as -2.59 thus the resulting *p*-value is approximately equal to 0.0048 and therefore Ho is rejected in favor of Ha. That is, the probability of observing 37.4% (*n*=37) of the individuals sampled being satisfied with the current coding system when if in fact the true population proportion of individuals who are satisfied with the current coding system is greater or equal to 50% is less than 0.48% chance.

More Dental professionals in the United States do not support modifications to insurance codes including the addition of diagnostic codes than do support modifications. Utilizing 103 responses with 3 abstentions from SQ3, do you think that diagnostic codes could be beneficial in the practice of dentistry?, 8.7% (*n*=9) support no modifications while 91.3 %(*n*=94) support modifications.

H_0Proportion that support no modifications > Proportion support modifications

H_a: Proportion that support no modifications <= Proportion support modifications

The hypothesis test for a small sample proportion for a mean with unknown population standard deviation utilizes the t-statistic. In this case the *t*-statistic calculates as -8.2186 thus the resulting *p*-value is approximately equal to 0.0000 and therefore Ho is rejected in favor of Ha. That is, the probability of observing 8.7% (*n*=9) of the individuals sampled not being in favor of modifications to coding system if in fact the true population proportion of individuals who are not in favor of modifications to coding system is greater than 50% is less than 0.0000 percent chance. Further, of those respondents who indicated

diagnostic codes would be beneficial, 41% (*n*=41) indicated they were not willing to sacrifice gross revenue, 31% (*n*=41) abstained from response, and 28% (*n*=28) indicated they would sacrifice 5% or more of their gross revenue.

Periodontal Codes sufficient for documenting disease. Do dentists and dental hygienists from the states of Oregon and Washington think current periodontal therapy codes are sufficient for documenting treatment of periodontal diseases with differing severity? No null hypothesis could be tested due to technical failure of electronic survey that was linked to this survey question. Qualitative research does support that clinicians are not happy with codes pertaining to periodontal therapy based off of comments left in open area section of survey.

Sufficiency and Utilization of codes related to demographics. Is there a difference of opinions for sufficiency of current coding system amongst dentists and dental hygienists based on demographics? No significance was established due to the larger majority of responses were from dental hygienists 90.5% **(***n*=95**)** compared to 9.5% (*n*=10) dentists. For research question 3 the null could not be proven because the demographics was not specific. Is there a difference of opinions for utilization of diagnostic codes amongst of dentists and dental hygienists based on demographics? No significance was found due to the larger majority of responses being in favor of diagnostic codes 91.3% (*n*=94) compared to 8.7% (*n*=9) against adding diagnostic codes.

Discussion

Summary of Major Findings

A thorough literature review found little information indicating the opinions of dentists and dental hygienists pertaining to the current dental coding system. Research previously conducted and published was focused in educational settings in the United States and socialized medicine public health focused clinics in Canada. A quasi-experimental cross-sectional design was used to gather opinions from dentists and dental hygienists on the status of the current coding system. Survey Monkey ® and paper surveys with closed ended items were implemented to gather response and demographic data to determine if dentists and dental hygienists in Oregon and Washington support modifications to insurance codes including the addition of diagnostic codes. The ultimate goal was to answer the following research questions: 1) Do dentists and dental hygienists from the states of Oregon and Washington support the utilization of diagnostic codes related to periodontal classification? 2) Do dentists and dental hygienists from the states of Oregon and Washington think current periodontal therapy codes are sufficient for documenting treatment of periodontal diseases with differing severity? 3) Is there a difference of opinions for sufficiency of current coding system amongst dentists and dental hygienists based on demographics? 4) Is there a difference of opinions for utilization of diagnostic codes amongst of dentists and dental hygienists based on demographics?

An assessment of the gathered survey data identified the following themes. More dentists and dental hygienists are not satisfied with the current coding system than are satisfied with the codes. Some of the comments in the open ended section of the survey

stated the current system is out of date and needs more codes in order to track care better. In addition, respondents would like to have codes merged with medical codes along with more specific codes for dental hygiene services developed.

The majority of respondents felt diagnostic codes should be used in dentistry. Further comments relating to diagnostic codes suggested participants want to see a similar system for diagnostic codes like that used in medicine. Additionally, some felt diagnostic codes may increase administrative costs and busy work. Responses related there are an inconsistency in codes and diagnostics and is an area that needs improvement.

The topic mentioned most but not related directly to the foci of this study was that knowing and using dental codes was not a responsibility of a dental hygienist, seven stating coding was not part of their job or was the responsibility of someone else in the office. Of interest, the PI was emailed by two different dental hygienists saying they are unfamiliar with dental coding due to their jobs being in education not clinical dental hygiene.

Discussion

The results of this research give an idea of the current attitude and opinions of oral health practitioners, mostly dental hygienists, in the states of Oregon and Washington. The overwhelming theme of the literature review is clinicians are not happy with the current coding system. The following discussion will be organized around the four research questions including significance and relationship to previous research with separate sections for assumptions, explanations of unanticipated findings, and implications.

1) **Do dentists and dental hygienists from the states of Oregon and Washington support the utilization of diagnostic codes related to periodontal classification?**

Significance. The null hypothesis was rejected therefore the majority of dentists and dental hygienists surveyed are not happy with the current CDT coding system. Thousands of claims and documentation of completed procedures are submitted daily in Oregon and Washington State and the clinicians whose name is attached to these procedures are not satisfied with their options for coding. An overwhelming number of respondents felt diagnostic codes would be beneficial. This can be seen as significant due to the only instances of diagnostic codes being used and suggested was in academic and public health settings. The majority of the respondents to this survey work in private-practice, 55.24% (*n*=58), which is common work place environment for dentists and dental hygienists and allows for a common ground to test CDT code revision. Most dental hygienists surveyed had been working in the field for more than 20 years 47.1%(*n*=49). Their dissatisfaction can be related to having gained knowledge of the coding system from time on the job and working around practice management groups. Comments supporting this finding are:

- "As a hygienist who likes to practice evidence based dentistry, I have found that most private practices drill into teeth that could be treated with fluoride products to remineralize them to the point that they would not have to be cut into. I think having diagnosis codes to follow, backed up by radiographs, would help dentists treat people more conservatively (if they really want to and are not just in it to make as much money as they can.) The computer program my employer uses is called "AxiUm" and requires a diagnosis code along with a treatment code. You should check it out. I do believe University of Washington also uses that program, along with some other very prestigious schools in the US. It's a very complicated program, but once you get used to it, it's great."

- "I am currently working on my double emphasis MSDH and have found in the literature that the inadequacies of the dental coding system in need of sweeping reform to improve quality assurance in diagnostics, periodontal therapies, patient education, etc. and feel the codes should be more but reasonably detailed and use consistent language to improve inter-professional communication. Very best wishes with your research"
- "I think adding diagnostic codes would just create more busy work. You'd have to submit both the diagnostic code and the treatment code to the insurance company. If they don't line up or you make a mistake, your claim would be denied. I think it would increase the administrative costs."
- "I think they do the worse on dx codes and it effects me in the periodontal tx area"
- Would like to see more diagnostic codes much like medical uses

Evidence shows the benefit of diagnostic codes but unfortunately the majority does not want to incur any expense to utilize them. This can be asserted from the responses that clinicians would see the benefit in adding diagnostic codes. An interesting aspect is that over 25% (*n*=27) would incur some expenses to add the diagnostic codes and almost another 29% (*n*=29) did not think payment was included in their role in the dental office. This suggests the possibility that a larger group could agree to taking on some expenses to add diagnostic codes than first thought. The fact that 29% (*n*=29) did not think this question applied to them ties into the comments stating treatment coding and billing was not part of a dental hygienist's duties. Of the comments that directly spoke of diagnostic codes:

- "Coding is difficult. You need some sort of order to qualify and classify treatment but insurance needs to let the practitioner treat the patient according to their needs and not according to what insurance will pay."
- "I think adding diagnostic codes would just create more busy work. You'd have to submit both the diagnostic code and the treatment code to the insurance company. If they don't line up or you make a mistake, your claim would be denied. I think it would increase the administrative costs."
- "This survey isn't that relative to an RDH because I don't know any of the codes for the specialties nor what problems they present. I also don't know how these codes impact me financially. I work on a salary."

The current system already has financial repercussions to the dental provider thus any changes will also affect dentists and dental hygienists either positively or negatively. A majority of respondents felt they were missing potential revenue due to the inadequacy of the current CDT**.** Such high feelings of being financially impacted from the current system can influence patient care, provider utilization of dental codes, and the handling of insurance claims. This may affect treatment planning, direct patient care, and access to care for patients, and even increase risks of fraud that relates to liability for a clinician.

Relationships to previous research. These findings support the research of the experimental models implementation of diagnostic codes in public health and educational settings (C. Miller, 2011). The benefits seen with the addition of diagnostic codes can also be linked to the comments in the open ended section of the survey in regards to increasing documentation of disease conditions, assisting communication, teaching relationships between diseases and treatments, enabling outcome tracking, evaluation of treatments

(Leake, Main & Sabbah,1999; Kalenderian et al.,2011) With the addition of better and more specific diagnostic codes, treatment codes would need to be more specific in order to identify the treatment of a specific diagnosis. This highlights the divide between the current codes for periodontal disease and the AAP classifications (American Dental Association, Code Revision Committee, 2007-2012).

Explanations of unanticipated findings. The idea or attitude that dental coding and documentation of treatment given was not part of the average dental hygienist's job duties but more the front office personnel was a surprising result of this survey. Oregon and Washington States have a long history of expanded practice options for dental hygienists. They can work independently and own their own dental hygiene service based businesses. In addition, the addition of a mid-level dental provider with a foundation in dental hygiene being sought nationally will have an impact on the practice of dentistry. If there is to be a mid-level practitioner for dentistry then an understanding of how the current dental coding system will need to be introduced for the purpose of billing. The attitude that this is not part of a dental hygienist's job may be linked to lack of education on the current system or placidity of viewing dental hygiene as job and not career or profession. The lack of responses from dentists may also be related to low level of education in dental school on the coding system. In the medical filed there are people dedicated to just coding and the physician is not doing the coding or aware of its specifics. A similar job function may have to be created in the dental field if board change is made to the current system.

2) Do dentists and dental hygienists from the states of Oregon and Washington think current periodontal therapy codes are sufficient for documenting treatment of periodontal diseases with differing severity?

Significance. The ranking system for the adequacy of the current CDT was confusing for the majority of the participants, which limited the significance of this data. From the open-ended portion of the survey participants left comments denoting a trend in options regarding the lack of diversity in periodontal codes. The PI believes these comments listed below reflect the true nature of the participant's feelings more than the ranking system:

- "perio codes need more options"
- "I can say that it would be nice to have more options than just "SPT/prophy/debridement" for what we do. More specifically, there should be several different codes for prophy depending on the difficulty level of the patient."
- "What do I do with gingivitis? 1110 which says healthy. How about some subgroup scaling but no pockets? 1110. How about 4 appts to clean, no perio...beats me if not a 4342 or 4341. Frustrating. 12 yr old with calculus?"
- "Specific codes for dental hygiene services provided directly to patients in practice settings being created and adopted need to be developed"

A relationship between the dissatisfaction of the periodontal therapy codes and the want for better treatment tracking can be made because accurate treatment tracking ranked highest and is an indication clinicians are concerned about the care they provide. Treatment tracking is suggestive of reflective learning patterns and the want to have better treatment outcomes versus just being worried about financial reimbursement. Comments pertaining to this were as follows:

- Codes are out dated for current evidence based practice

- To a degree we could track things with the # we have, but certainly could use a few more. Finally some #'s are coming out for services done by hygienist so they won't say that the service was outside our scope of practice.....as things change (laws) there will need to be more!
- When the doctors provide an exam in our chair, I wish they were responsible for getting credited for their coding

Relationships to previous research. The want for expanded codes specifically related to periodontal therapy has been shown in the literature review of the CDT code review process and the specific requests pertaining to adding codes for gingivitis (ADA, 2011) or more specific periodontal codes mirroring the AAP periodontal classification as suggested by the ADHA (ADHA, 1998, pg.3). This lack of accurate codes in regards to periodontal disease was evident in the respondent's comments and in research that discusses the misuse of codes such as the FMD (Lamoli, 2009). Furthermore, the lack of adequate periodontal codes may impact the proper treatment of disease thus impacting the entire body. This is shown in Dr. Robert Genco's research on the periodontal systemic health link in 1982 and has been foundational in the medical communities growing understanding of whole body health. The CDCs later endorsement of the periodontal-systemic link also gave the theory authenticity in 2007. Better treatment tracking was cited in research with respect to tracking success and failures for better communication among clinicians (Kalenderian et al., 2011) and to prevent lawsuits for failure to diagnose (C. Miller, 2011).

With better treatment tracking a clinician, insurance company, or even an association or institution may monitor when and if certain treatment options are better in certain situations. This has the potential to decrease disease such as recurrent caries and relapsing

periodontitis. There is no previous research that specifically discusses the financial implications of adding diagnostic codes to the current coding system. What do exist are studies linking treatment planning and implementation to insurance payout (Correa et al., 2012). By limiting coverage and making patients increase out of pocket expenses, insurance companies directly influence the dental professionals' treatment plans (Pagano, 2012). Clinician's frustrations with the current system can be seen in the historical review of the CRC code change process and the past responses pertaining to suggested changes to the system (American Dental Association, Code Revision Committee, 2007-2012). With the answer to suggested changes being *no* more times than *yes* a possible pattern of "working the system" can be seen especially with soft tissue programs (Limoli, 2009) This directly correlates to research showing the current system is inadequate and needs to be changed and the general population of dentists and dental hygienists are dissatisfied with its lack of accuracy. These clinicians' displeasure may be related to how in the past the CRC was petitioned repeatedly for years to expand clinical codes and be more current with current diagnostic and treatment paradigms (ADA 2011). The opinions of the population surveyed also align with the ADHA published position paper stating the existing dental coding system should be revised to "correspond to the American Academy of Periodontology's (AAP) classification of periodontal diseases" (ADHA, 1998, pg.3).

Assumptions. The PI assumed that due to the repeated requests for expanded periodontal therapy codes to the CRC that the general population of dentists and dental hygienists would want more expanded codes.

3) Is there a difference of opinions for sufficiency of current coding system amongst dentists and dental hygienists based on demographics?

Significance. No significance can be made due to that the larger majority of responses were from dental hygienists some 90.5% (*n*=95) compared to 9.5% (*n*=10) dentists. One can assume that due to the researcher being dental hygienists and having a larger circle of influence within the dental hygiene community more dental hygienists answered the survey. Also due to that dentists may not be aware of the current coding system due to lack of job focus or education. To attempt to even out the population distribution the PI reached out to dental associations in both Oregon and Washington states and also smaller study clubs but no success was made. No literature was available to reference in regards to this subject matter.

4) Is there a difference of opinions for utilization of diagnostic codes amongst of dentists and dental hygienists based on demographics?

Significance. No significance can be made due to that the larger majority of responses were in favor of diagnostic codes 91.3% (*n*=94) compared to 8.7% (*n*=9) against. A slight margin of baccalaureate dental hygienists indicated greater dissatisfaction. This was statistically insufficient but could be used to show a trend there may need to be more education on the current coding system by possibly adding to current CODA educational requirements or an elevated entry-level option for dental hygiene. Washington and Oregon states also have a long history of offering baccalaureate dental hygiene degrees at their universities and degree completion programs for associate level dental hygienists thus increasing the number of baccalaureate dental hygienists in the area. States that offer a majority of Associate Degrees may demonstrate more apathy in the belief that it is an essential part of their role in the dental team.

Implications. Major findings of this study are dentists and dental hygienists are not satisfied with the current coding system, and would like to see the addition of diagnostic codes and more expanded periodontal codes. They currently believe they are being negatively impacted financially but are not willing to incur any expenses to alter the coding system.

Dental hygienists do not understand their role in the current dental coding system. Implications for this are dental professionals need to be more active on a local and/or national level in the code revision process. In addition, it is warranted for dental practitioners to let their frustrations be known as individuals and within their associations. There is a possibility if the current coding system is changed that business owners will have to incur some expenses for training and the updates of software programs. Lastly, in order to change the attitudes and beliefs that coding does not fall within the duties of a dental hygienists' educational standards may have to be altered to include training on the implications and possible liability risk involved with in correct coding. Having correct treatment codes could be linked to the CODA standard 2-17 regards dental hygiene collecting data, assessment and findings to address the dental hygiene treatment needs and establish a care plan essentially diagnosis. The lack of responses from dentists could also indicate that they do not understand their responsibility and liability for correct dental coding. In dental education there is little information provided on the business side of dentistry, which includes insurance coding. In the medical field there is a specific job for coding alleviating the clinician from the burden. In the future, a new dental team member may need to be created that just works with diagnostic and treatment coding.

Table 11

Implications

Survey Result	Implications
Dissatisfied with the current coding system	Dental professionals will need to participate in the code revision process and let their frustrations be known as individuals and within their associations.
Want more expanded periodontal codes	Dental professionals will need to participate in the code revision process and let their frustrations be known as individuals and within their associations.
Potential for the addition of diagnostic codes	Dental professionals will need to participate in the code revision process and let their frustrations be known as individuals and within their associations.
Do not want to incur any expenses related to adding diagnostic codes	Dental professionals will have to see the benefits in the addition of expanded codes/diagnostic codes and how it can impact them.
Finances are being impacted negatively due to current system	Dental professionals will need to participate in the code revision process and let their frustrations be known as individuals and within their associations.
Dental hygienists attitudes that coding does not fall within their job duties	Entry-level dental hygiene education may need to be elevated to baccalaureate degree in order to educate work force on responsibilities with treatment claims and documentation.
Lack of dentist responses could indicate low priority of coding or lack of understanding of accountability for incorrect coding.	A specific coding personal may need to be created in the dental staff to be accountable for all coding.

Limitations

Having email addresses or even a collection of them from a listserv does not decrease the probability that the participant's address is valid; they qualify for the survey, or even check that email address frequently. The PI saw this with error messages and delayed responses in regards to the distribution of the survey. This may have decreased survey response rates especially when seeking stakeholders in the community such as program directors to access their email lists. Using a completely online formatted program for implementing the survey also became a limitation as technical glitches or the format on Survey Monkey® program created frustration. The questions that utilized a ranking option for the answers received feedback from participants that it was reshuffling their answers and did not seem to work correctly.

Snowball sample limitations include control of sample population, representativeness, and sampling bias. Due to the PI asking participants and list holders to pass along the survey link subjects are greatly limited to the network. This limits the control of distribution of the population surveyed because the PI asked others to distribute the timeliness or even follow through was beyond the PI's influence. Lastly the sample can be biased due to the fact participants nominate and forward the survey link to people they know making it highly possible those participants also share similar opinions.

Time and geographic restraints were set by the PI, which can limit the generalization of the results. Due to the survey only being distributed in Oregon and Washington States nationwide generalization may be limited. More Washington state residents participation could be a limiting factor possibly caused by EWU being located in Washington State and having name awareness. In addition, a largely disproportionate number of dental hygienists

completed the survey versus dentists, which can also skew the results generalizability among the dental community. The survey being open for responses was limited to 60 days, which may have reduced participation. Thus the time allotted may not have been long enough to reach all qualified participants in the set geographic area of Oregon and Washington states with an estimated total of 15,342 qualifying participants.

Recommendations

Study results, the current status of the dental coding system, and past research, indicates the ADA survey its' members in a broad fashion in regards to the current coding system and adding diagnostic codes. Lastly**,** a review is needed of the educational standards for entry level dental and dental hygiene programs in regards to training and responsibilities of coding diagnoses and treatment.

Suggestions for Additional Research

In the future, the following questions may add to this study. What are the educational competencies for dental hygienists that include the dental treatment coding system? Would dental hygienists in states with less baccalaureate degree programs have a different opinion on how dental coding applies to their job duties? What is the average dental practitioners' understanding of the dental coding system? Having practice management organizations conduct financial analysis of missed income from lack or incorrect codes. Large-scale surveys of dentists in the US on the current coding system would help identify larger trends and opinions regarding this matter and help relay more information to the ADA and ADEA. Including more qualitative data in the research may also uncover hidden opinion trends not seen with close- ended questions. Because of their role in the billing of dental services, exploring dental front office personnel attitudes about

the current coding system and how they see clinician's use of it may prove insightful. Lastly with a shift in the health care insurance system investigating how patients perceive the care they receive versus their dental benefits would provide another aspect of the adequacies or inadequacies of the current coding system.

Conclusions

The primary goal of this research was to assess opinions of dentists and dental hygienists regarding the current dental coding system. Research showed a long history of inadequacies in the current system and a lack of the same standards as other areas of medicine. Until dental coding is developed and upheld to the same criterion as medical coding inadequacy will be visible in understanding oral disease epidemiology and treatment success rates. In the past, dental health providers have not been held to the processes as medical providers in documenting the diagnoses and reporting treatment failures and successes. Respondents in this study showed a dislike for the current coding system and a need for change including a willingness to add diagnostic codes to the current CDT manual. Future research is needed to confirm this is not an anomaly confined to Oregon and Washington states possibly due to expanded dental hygiene practice.

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Appendix A Survey Introduction and Questions

Subject line of emails or top of paper surveys: 5 min survey on Treatment Codes!

My name is Jessica Scruggs and I am a graduate student at Eastern Washington University in Spokane, Washington. I'm currently working on my Masters of Science in Dental Hygiene degree. As a part of my thesis, I am conducting a study on the current dental coding system. Please feel free to contact me with any questions and comments that you may have. Please note this survey has been approved by Eastern Washington University's Internal Review Board (IRB) and by taking this survey you consent to be in this study. Participation is voluntary. Your name and your affiliated institution will not be identified. If you have any concerns about your rights as a participant in this research you may contact Ruth Galm, Human Protections Administrator, Office of Grant and Research Development (509)-359-7971/6567), rgalm@ewu.edu. If you have any additional, questions or comments please contact Lisa Bilich at lbilich@ewu.edu or myself jscruggs@ewu.edu

In other fields of medicine clinicians use diagnostic codes along with treatment codes for billing and disease tracking unlike in dentistry where only treatment codes are used. Research and recommendations have been made on the modifying of the current coding system used dentistry. This survey is regarding the suggestions to modify the current dental coding system and to give the dentists and dental hygienists in Oregon and Washington a voice on their opinions. Thank you for your time.

By participating in this survey you give the researcher permission to share the answers to the following questions with Eastern Washington University and in future publishing. Your consent is given by hitting submit or turn a paper copy of the following survey into the researcher.

1) Are you satisfied with the current coding system CDT 9th
    a) Yes
    b) No

**If no skip to question 3

2) Please rank the following areas of the current coding system on their inadequacy, 1 being the most inadequate or choose none.

1) Diagnostic
2) Preventive
3) Restorative
4) Periodontics
5) Endodontics
6) Oral surgery
7) Orthodontics
8) Other
9) None

3) Do you think that diagnostic codes could be beneficial?

a) Yes

b) No

*** If no skip to question 5

4) Please rank the following areas that the current coding system prevents you from receiving or achieving any of the following or choose none:

1) Financially being reimbursed
2) Accurate treatment tracking
3) Epidemiology tracking

4) Other

5) None

5) If a more accurate coding were introduced how much of the expenses would you be willing to incur to incorporate these new codes?

a) 0% of your gross revenue

b) Up to 5% of your gross revenue

c) Up to 10% of your gross revenue

d) Up to 25% of your gross revenue

e) Over 2%% of your gross revenue

6) What percent of your revenue do you feel is missed due to coding inaccuracy in the current system?

a) 0% of your gross revenue

b) Up to 5% of your gross revenue

c) Up to 25% of your gross revenue

d) Up to 50% of your gross revenue

e) Over 50% of your gross revenue

7) Role of practitioner

a) Dentist

b) Dental hygienist

8) Location (choose all that apply)

a) Urban

b) Rural

c) OR

d) WA

9) Years in practice

a) 0-5

b) 5-10

c) 10-15

d) 15-20

e) 20 +

10) Age

a) 20-30

b) 31-40

c) 41-50

d) 51-60

e) 60+

11) Highest education

a) Certificate

b) Associate Degree

c) Bachelorette Degree

d) Master's Degree

e) DDS/DMD

f) PhD

g) Other

12) Primary practice type

a) Private practice

b) Multi-provider practice

c) Managed care

d) Corporate dental

e) Education

f) Public Health

g) Other

h) None

13) Would like to share any further thoughts regarding this subject with the researcher?

(open message box for qualitative remarks)

Appendix B Periodontal Classifications

iwcp-1999-periodontitis.png 725×523 pixels 3/11/13 10:33 PM

II. Chronic Periodontitis†
  A. Localized
  B. Generalized
III. Aggressive Periodontitis†
  A. Localized
  B. Generalized
IV. Periodontitis as a Manifestation of Systemic Diseases
  A. Associated with hematological disorders
    1. Acquired neutropenia
    2. Leukemias
    3. Other
  B. Associated with genetic disorders
    1. Familial and cyclic neutropenia
    2 Down syndrome
    3. Leukocyte adhesion deficiency syndromes
    4. Papillon-Lefèvre syndrome
    5. Chediak-Higashi syndrome
    6. Histiocytosis syndromes
    7. Glycogen storage disease
    8. Infantile genetic agranulocytosis
    9. Cohen syndrome
    10. Ehlers-Danlos syndrome (Types IV and VIII)
    11. Hypophosphatasia
    12. Other
  C. Not otherwise specified (NOS)
V. Necrotizing Periodontal Diseases
  A. Necrotizing ulcerative gingivitis (NUG)
  B. Necrotizing ulcerative periodontitis (NUP)
VI. Abscesses of the Periodontium
  A. Gingival abscess
  B. Periodontal abscess
  C. Pericoronal abscess
VII. Periodontitis Associated With Endodontic Lesions
  A. Combined periodontic-endodontic lesions
VIII. Developmental or Acquired Deformities and Conditions
  A. Localized tooth-related factors that modify or predispose to plaque-induced gingival diseases/periodontitis
    1. Tooth anatomic factors
    2. Dental restorations/appliances
    3. Root fractures
    4. Cervical root resorption and cemental tears
  B. Mucogingival deformities and conditions around teeth
    1. Gingival/soft tissue recession
      a. facial or lingual surfaces
      b. interproximal (papillary)
    2. Lack of keratinized gingiva
    3. Decreased vestibular depth
    4. Aberrant frenum/muscle position
    5. Gingival excess
      a. pseudopocket
      b. inconsistent gingival margin
      c. excessive gingival display
      d. gingival enlargement (See I.A.3. and I.B.4.)
    6. Abnormal color
  C. Mucogingival deformities and conditions on edentulous ridges
    1. Vertical and/or horizontal ridge deficiency
    2. Lack of gingiva/keratinized tissue
    3. Gingival/soft tissue enlargement
    4. Aberrant frenum/muscle position
    5. Decreased vestibular depth
    6. Abnormal color
  D. Occlusal trauma
    1. Primary occlusal trauma
    2. Secondary occlusal trauma

Appendix C ADA, CRC Meeting Notes

Summary of Code Revision Committee Actions on Requested Changes to the Code on Dental Procedures and Nomenclature
Batch 1
February 2007

#	CID	Type of Request	Summary of Request	CRC Action	Action Rationale
Diagnostic D0100-D0999 (DIA)					
1.	DIA-001-9/1	Addition	Video comprehensive oral evaluation using a biometric identity kit.	Decline	Although the CRC found merit in the request, there is not yet consensus on a standard platform for such.
2.	DIA-002-9/1	Additions	Eight new codes for multiple periapical films (2, 3, 4, 5, 6, 7, 8, and 9).	Decline	The requestor failed to convince the committee that this new reporting schema would provide additional clarity to resolve a claim reporting issue. Existing codes are adequate to support reporting these procedures. The proposed new codes would complicate and confuse reporting of periapical radiographs by allowing multiple ways of reporting the same number of images.
Preventive D1000-D1999 (PRE)					
3.	PRE-001-9/1	Addition	Difficult prophylaxis.	Decline	There are no widely accepted standards for a difficult prophylaxis. The current Code on Dental Procedures and Nomenclature adequately describes this procedure.

Appendix D ICD-10-CM External Cause of Injuries Index

ICD-10-CM External Cause of Injuries Index

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | R | S | T | U | V | W

A

Abandonment (causing exposure to weather conditions) (with intent to injure or kill)NEC X58
Abuse (adult) (child) (mental) (physical) (sexual) X58
Accident (to) X58
- aircraft (in transit) (powered) —*see also* Accident, transport, aircraft
- - due to, caused by cataclysm —*see* Forces of nature, by type
- animal-rider —*see* Accident, transport, animal-rider
- animal-drawn vehicle —*see* Accident, transport, animal-drawn vehicle occupant
- automobile —*see* Accident, transport, car occupant
- bare foot water skiier V94.4
- boat, boating —*see also* Accident, watercraft
- - striking swimmer
- - - powered V94.11
- - - unpowered V94.12
- bus —*see* Accident, transport, bus occupant
- cable car, not on rails V98.0
- - on rails —*see* Accident, transport, streetcar occupant
- car —*see* Accident, transport, car occupant
- caused by, due to
- - animal NEC W64
- - chain hoist W24.0
- - cold (excessive) —*see* Exposure, cold
- - corrosive liquid, substance —*see* Table of drugs and chemicals
- - cutting or piercing instrument —*see* Contact, with, by type of instrument
- - drive belt W24.0
- - electric
- - - current —*see* Exposure, electric current
- - - motor (*see also* Contact, with, by type of machine) W31.3
- - - - current (of) W86.8
- - environmental factor NEC X58
- - explosive material —*see* Explosion
- - fire, flames —*see* Exposure, fire
- - firearm missile —*see* Discharge, firearm by type
- - heat (excessive) —*see* Heat
- - hot —*see* Contact, with, hot
- - ignition —*see* Ignition
- - lifting device W24.0
- - lightning —see subcategory T75.0
- - - causing fire —*see* Exposure, fire
- - machine, machinery —*see* Contact, with, by type of machine
- - natural factor NEC X58
- - pulley (block) W24.0
- - radiation —*see* Radiation
- - steam X13.1
- - - inhalation X13.0
- - - pipe X16
- - thunderbolt —see subcategory T75.0
- - - causing fire —*see* Exposure, fire
- - transmission device W24.1
- coach —*see* Accident, transport, bus occupant
- coal car —*see* Accident, transport, industrial vehicle occupant
- diving —*see also* Fall, into, water
- - with
- - - drowning or submersion —*see* Drowning

Curriculum Vitae

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Graduate Education:

2013	M.S.D.H.	Masters of Science in Dental Hygiene Eastern Washington University Cheney, Washington

Undergraduate Education:

2009	B.S.D.H.	Bachelor of Science in Dental Hygiene Pacific University of Oregon Forest Grove, Oregon
2005	C.D.A	Certificate of Dental Assisting Broward Community College Davie, Florida

Teaching Experiences:

Present	Oral Health Practicum BSDH Degree Completion Eastern Washington University
February 2012	Guest Dental Hygiene Faculty Eastern Washington University Cheney, Washington
May-August 2009	Teaching Externship Dental Hygiene Emphasis on Local Anesthetic Didactic and Lab

	Pacific University Oregon Forest Grove, Oregon

Academic Appointments:

June 2012- June 2013	Co-Director Dental Hygiene Degree Completion Program Eastern Washington University Spokane, WA
August 2007-2011	Cascadia Dental Career Institute Dental Assisting Instructor Head Didactic and Clinical in Radiology Vancouver, WA

Professional Experiences:

August 2012- Present	Dental Hygiene Manager Gladstone Family Dental Dr. Jeremy Kato DDS Dr. Candace Krause DMD Gladstone, OR
April 2012 – July 2012	Lead Dental Hygienist Pacific Dental Services Portland Region Portland, OR
March 2012 –Present	Independent Dental Hygiene Consultant Gladstone Family Dental Dr. Jeremy Kato DDS Dr. Candace Krause DMD Gladstone, OR
2009-2012	West Coast Manager of Dental Hygiene Aspen Dental Management
2006-2010	Lead Dental Assistant Invisalign Coordinator

	Implant Coordinator Inventory Manager OHSA coordinator Gladstone Family Dental Dr. Jeremy Kato DDS Dr. Candace Krause DMD Gladstone, OR
2005-2006	Orthodontic Assistant Restorative Assistant Family Dental Dr. Mark Mautner DDS Pembroke Pines, FL

Licensure:

2011	Hawaii Dental Hygiene #1700
2010	Nebraska Dental Hygiene #2250
2009	Washington Dental Hygiene #DH 60102846
2009	Oregon Dental Hygiene #H5692
2006	Oregon EFDA
2005	Dental Assisting National Board #295953

Certifications:

2012-Present	Standard Proficiency in Laser Dentistry Academy of Laser Dentistry Phoenix, AZ
2009-Present	Oregon Registered Dental Hygienist with Expanded functions including local anesthesia, Nitrous oxide/oxygen sedation, pit & fissure sealants and Restorative packing and carving
2009-Present	Washington Registered Dental Hygienist with Expanded functions including local anesthesia, Nitrous oxide/oxygen sedation, pit & fissure sealants and Restorative packing and carving
2009	Western Regional Examining Board
2007	Implant Coordinator Certification

	Academy of Dental Implants Orlando, FL
2007	Lumineer Certification Seattle, WA
2006	Invisalign Certification Portland, OR

Professional Organizations:

2012-Present	Dental Hygiene Advisory Board Member Eastern Washington University Dental Hygiene Degree Completion
2010-Present	American Dental Education Association
2009-Present	American Dental Hygienists' Association
2009-Present	Washington State Dental Hygienists' Association
2007-2009	American Dental Hygienists' Association Student Chapter at Pacific University of Oregon • President

Teaching Responsibilities

As an Instructor:

February 2012	**"Risk Management for Dental Hygienists"** **Scruggs J.** Eastern Washington University Spokane WA
February 2012	**"Increasing Referral Identification from the Hygiene Chair"** **Scruggs J.** Eastern Washington University Spokane WA
February 2012	**"Cultural Diversity"** **Scruggs J.** Eastern Washington University Spokane WA
June 2011	**"Better, Faster Dental Radiology"** **Scruggs J.**

Aspen Dental's Area Dental Assistants Training
Kennewick WA

May 2011 **"How am I going to see all the new patients in my crazy Schedule?"**
Scruggs J.
Aspen Dental's Arizona Regional Dental Hygiene Meeting
Phoenix, AZ

April 2011 **"Keeping it Going"**
Scruggs J.
Aspen Dental's Oregon & Washington Regional Dental Hygiene Meeting
Vancouver, WA

March 2011 **"How to create a successful schedule"**
Scruggs J.
Aspen Dental's Nebraska & Iowa Regional Dental Hygiene Meeting
Omaha, Nebraska

As an Invited Speaker:

March 2012 **"Risk Management for Dental Hygienist"**
Scruggs J.
Pacific Dental Services Hygiene Orientation
Irvine CA

March 2012 **"Green Dental Offices"**
Scruggs J. & Given by Jackson
Northern Idaho Dental Hygienists' Association
Coeur d' Alene, ID

June 2009 **"Give Kids A Smile in Washington County OR"**
Scruggs J., Caulfield B., Daniels A.,
Pacific University of Oregon, Capstone
Hillsboro, OR

September 2008 **"Give Kids A Smile in Washington County OR"**
Scruggs J., Caulfield B., Daniels A.,
Washington County Dental Association
Hillsboro, OR

October 2007 **"Invisalign"**
Guest Speaker for Invisalign Dental Assistants & Dental Hygienists
Portland OR