

2016

# Oral manifestations of menopause: an interprofessional intervention for dental hygiene and physician assistant students

Windy L. Rothmund  
*Eastern Washington University*

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ORAL MANIFESTATIONS OF MENOPAUSE IPE

Oral Manifestations of Menopause: An Interprofessional Intervention for  
Dental Hygiene and Physician Assistant Students

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Masters of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Windy L Rothmund

Spring 2016

Major Professor:

Ann O'Kelley Wetmore

ORAL MANIFESTATIONS OF MENOPAUSE IPE

THESIS OF Windy L Rothmund APPROVED BY

\_\_\_\_\_ DATE \_\_\_\_\_  
ANN O’KELLEY WETMORE, MSDH, GRADUATE STUDY  
COMMITTEE

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MERRI JONES, MSDH, GRADUATE STUDY COMMITTEE

\_\_\_\_\_ DATE \_\_\_\_\_  
MICHAEL SMITH, DHEd, MPAS, PA-C, GRADUATE STUDY  
COMMITTEE

MASTER'S THESIS

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## Human Subjects Approvals

**Institutional Review Board  
for Human Subjects Research**

OGRD - SHW 210

DEC 17 2015

**Application for Exemption**

Return original and two copies to: Grants Office, 210 Showalter

Rec'd - Grants Office

Principal Investigator/Title/Department /Address/Phone/email <b>Windy Rothmund, RDH, BSDH Graduate Student Dental Hygiene Department</b>	Responsible Project Investigator/Department/Phone/email (faculty or staff supervisor required if PI is a student) <b>Ann O'Kelley Wetmore, RDH, MSDH Assistant Professor/Program Director EWU Dental Hygiene Department 301 N. Riverpoint Box E Spokane, WA 99202 509-828-1321 awetmore@ewu.edu</b>
Title of Project <b>Oral Manifestations of Menopause: Interprofessional Education of Dental Hygiene &amp; Physician Assistant Students</b>	
For students only: Is this research being done to meet a course, thesis or other academic requirement? (please specify) If not, why is it being done? <b>Yes, this research is for thesis credit completion of DNHY 600.</b>	
Project anticipated starting date <b>January 23, 2015</b> Anticipated termination date <b>January 23, 2016</b>	
Funding: Non-funded <input checked="" type="checkbox"/> Internal funding <input type="checkbox"/> External funding <input type="checkbox"/>	
Funding status: proposal in preparation <input type="checkbox"/> pending agency decision <input type="checkbox"/> funded <input type="checkbox"/>	
Funding Agency (if applicable): _____ Grant or Contract Number: _____	

Check the type of exemption applicable to the project  
1. \_\_\_\_\_ 2.  3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_ None \_\_\_\_\_

Why should this project be considered exempt? **This study will administer coded surveys. The primary investigator will be the only investigator with access to codes that identify participants. Surveys could be considered for IRB Exempt status because they do not disrupt or manipulate subjects' normal life experiences and will not incorporate any form of intrusive procedures.**

Please state the purpose and methodology of the research:

**This study will use a mixed-methods pretest/posttest design with a convenience sample of physician assistant (PA) students and dental hygiene (DH) students surveyed before and after an interprofessional learning experience. Teams of first year PA and second and third year DH students will be organized into small homogenous groups of 6 or 7 members and provided a case study educational module for treating menopausal women. The module will use a problem based case study utilizing a pseudo-standardized patient (SP) that will include decision making, critical thinking, and reflective learning experience. Each IPE team will develop treatment options and determine best practice on how to provide comprehensive patient-centered care. Interprofessional Education Collaborative (IPEC) core competencies will be incorporated within the training, student lesson plan, and assessment tools. The competency domains that will be focused on include Roles/Responsibilities for Collaborative Practice and Interprofessional Communication (IPEC, 2011).**

**The study will seek to determine if the implementation of an IPE module on oral care for the menopausal woman. (1) explore if an IPE intervention educating PA and DH students about oral health and menopause, results in gained knowledge, (2) evaluate outcomes of IPE between the two professions, and (3) evaluate PA and DH students' confidence in applying newly learned skills and knowledge with a SP and case-based learning.**

**All students will complete a demographic survey. See Attachment A. Prior to and upon completion of module, students will complete a pre and post survey using the Readiness for Interprofessional Learning Scale (RIPLS) to determine students' level of understanding of teamwork and collaboration, negative and positive professional identity, and roles and responsibilities. See Attachment B. In addition to the RIPLS survey an additional PI-designed Patient Care Plan Worksheet which utilizes the A.D.P.L.E.D process of care will be completed by each student team. See Attachment C. Finally, a PI-designed Likert-type survey will be included to evaluate the instructor and the study. See Attachment D.**

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Describe the procedures: what specifically will subjects do? If data are anonymous, describe the data gathering procedure for insuring anonymity. **Because the PI is a graduate student at Eastern Washington University (EWU), the Institutional Review Board (IRB) for Eastern Washington (EWU) must be informed of this study. The PI has communicated with the University of Washington (U of W) because Dr. Michael B. Smith, assistant professor in the U of W MEDEX Physician Assistant Program, is the third thesis committee member related to this research and may be involved in publishing findings of this study. Dr. Smith will not be gaining consent nor will he have access to any identifiable data, therefore U of W IRB has indicated that no approval is needed on their part since U of W is not involved in human subjects research. See Attachment E.**

**The PI is a graduate student in the EWU Master of Science in Dental Hygiene Program, and has access to PA and DH students attending respective programs on the Riverpoint Campus in Spokane. Therefore, a convenience sample will be obtained by enlisting volunteer PA and DH students enrolled in these programs. See Figure 1 for study overview.**

**Step 1 Communicate with Faculty.** The PI will communicate with EWU DH and U of W MEDEX PA faculty to determine the best time for each discipline to participate in a study orientation provided by the PI, and obtain consent for voluntary participation. Both DH and PA students are required by program standards to complete a certain amount of IPE annually. Recommendations will be made by both DH and PA faculty for students to participate in the PI's study.

**Step 2 Study Informational Meeting with Students.** Students will receive a letter informing them of the study and inviting them to attend an informative meeting. **See Attachment F.** The PI will present a short PowerPoint® presentation introducing the proposed study to attending students. The PI will answer any questions relating to the study components, content, roles and responsibilities, time expected to complete both portions of the study, information on how students will be evaluated. Following the informational presentation and answering questions and concerns, the PI will explain the consent process. Students who volunteer to participate in the study will sign two consent forms, one to keep and one for study records; **See Attachment N.** Each student will receive a snack following the informational meeting. The PI will meet with students personally to explain the study and gain consent, if they are unable to attend the informational meeting.

**Step 3 Preparation of tests, surveys, handouts, and worksheets.**

The PI will disburse a demographic questionnaire, modified RIPLS pretest, and PI designed multiple-choice oral manifestations of menopause pretest to enrolled participants attending a study workshop. The RIPLS posttest, knowledge posttest, and Instructor/Study Evaluation form will be developed using Excel® 2013 for Windows® on the PI's personal laptop. Additionally, a patient care plan worksheet, debriefing questions, case studies, and SP scripts will be developed on the PI's laptop.

Each student will be assigned an identification code based on their discipline and a random number such as, PA-01 or DH-25.

**Step 4 SP training.** In the first 10 minutes of a mutually agreed upon time for a training program, the PI will review the case study with the SP and allow the SP to ask questions of the PI. Next, 40 minutes will be used for education using role-play between the SP and PI to practice the interaction that will take place with participants during the actual study. During role-play, the PI will conduct interactive questioning designed to test the SP and ensure ability to respond to a wide range of questions with accuracy and consistency. Training and extensive experience as an educator allows the SP to inform participants how they are perceived, their effectiveness, and improvements that can be made all from the patient's perspective. Finally, the last 10 minutes will be used to debrief and answer questions. Training will be completed no more than two weeks prior to study implementation, to ensure knowledge retention.

**Step 5 SP Workshop, Pretest, Surveys.** For pragmatic purposes two separate workshop dates will be offered in order to accommodate students and gain participation. A third workshop will be added if needed to accommodate additional students. **See Attachment G** for workshop procedures and time frame.

Names from a master list of workshop participants will be divided into DH and PA disciplines, and drawn randomly for IPE team assignment, and equal representation of both professions. Personalized manila envelopes will be prepared for each participant that include the following content: IPE participation certificate, thank-you note, handouts, and a colored badge indicating the team they have been chosen for.

The PI will arrive one hour early to set up the classroom and rehearse with the SP, on the day of implementation. Classroom setup includes ensuring proper number of chairs and arrangement of tables to suit five teams of six participants. Manila envelopes for each participant will be placed at tables corresponding to team color. Each table will be clearly marked with a sign, indicating team color. A sheet will be posted inside the classroom indicating team assignment of each participant; Only first names will be used, unless last initial is needed in the case of same first name.

The workshops will be held in Winter Quarter/Spring Semester 2016. Participants are invited to come early for dinner and refreshments. Upon arriving at the planned workshop, and prior to educational activities, participants will be asked to be seated with their assigned team to maximize interprofessional grouping at each table. Once seated, the PI will determine if each team member is seated as assigned, encourage team member introductions, and ask teams to assign a team leader. Educational activities will begin with orientation of the workshop including learning objectives, procedures, IPE A.D.P.I.E.D. process of care, and discussion of potential interprofessional roles and responsibilities. **See Attachment H.** Learning objectives for the workshop include:

- Demonstrate increased knowledge regarding oral manifestations of menopause

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- Demonstrate collaborative decision making by developing a patient care plan based on given information
- Demonstrate knowledge of the roles and responsibilities of PA and SH in treating menopausal patients by analyzing a given case study and SP profile
- Develop effective interprofessional and patient communication skills by participating in an SP case study
- Apply knowledge of menopausal oral care to a case study
- Demonstrate patient centered care in treatment planning
- Appreciate how this education experience may affect your confidence in treating oral manifestations in menopausal women by participating in debriefing

Following Workshop orientation, participants will be given instructions for initial assessments and given 20 minutes to complete a) demographic survey; See Attachment A, b) knowledge pretest; See Attachment K, and c) RIPLS pretest; See Attachment B.

Next, participants will engage in a 45 minute lecture and PowerPoint presentation. Then they will be asked to examine the following handouts contained in their personal manila envelope: a) case study; See Attachment I, b) workshop procedures; See Attachment, c) Interprofessional A.D.P.I.E.D. process of care; See Attachment J, and c) patient care plan worksheet; See Attachment C. Each team will have five minutes to huddle in order to prioritize tasks based on the given case study and prepare for SP presentation. Next, the SP will present the case study profile to participants. Then, interprofessional teams will be given ten minutes to review case study and SP information in order to formulate questions for interviewing the SP. Ten minutes is allotted for team leaders to interview the SP regarding preventive and chronic care needs or questions related to oral health, oral health awareness, and knowledge of oral health link to systemic conditions. Teams will be allowed 15 minutes to create a comprehensive, collaborative patient care plan based on knowledge gained from the presented in the workshop, SP interview, and discussion with team members.

**Step 6 Posttests and Debriefing.** Following completion of the SP case study activity, participants will be asked to complete a knowledge posttest; See Attachment L, a RIPLS posttest; See Attachment E, and an Instructor/Study Evaluation; See Attachment D. Finally, a debriefing will take place in which participant responses to questions asked by the PI, and SP feedback will be recorded on video for analysis. See Attachment M. Debriefing allows participants, SP, and PI to review what happened during the workshop and reflect on the meaning, and help them achieve learning objectives.

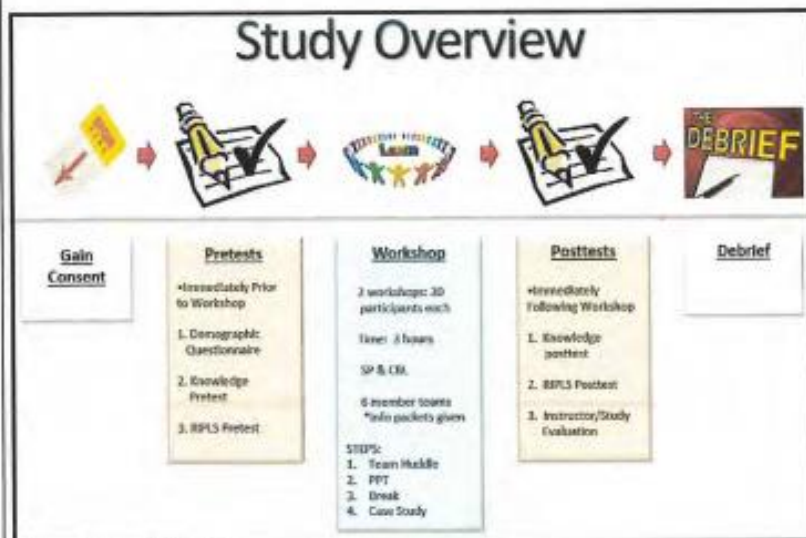


Figure 1. Study Overview

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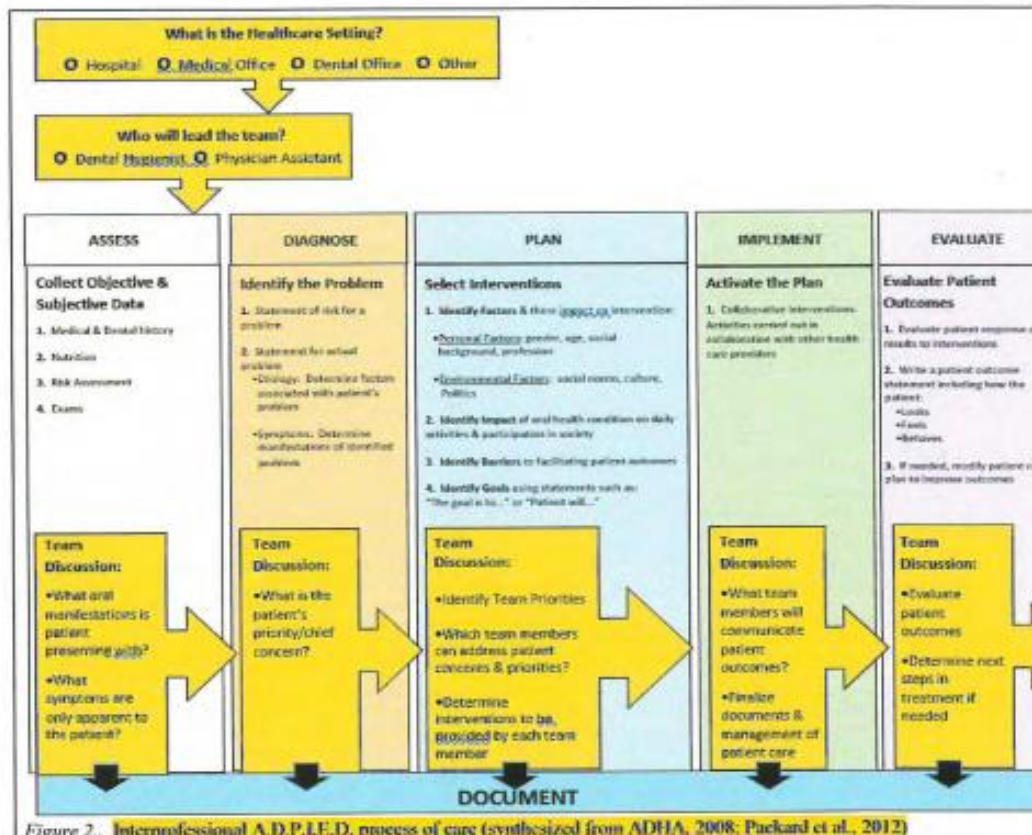


Figure 2. Interprofessional A.D.P.I.E.D. process of care (synthesized from ADHA, 2008; Paekard et al., 2012)

The information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and University regulations and ethical standards.

Signature, Principal Investigator(s) *Windy Rothmund* Date 12-17-15

Recommendations and Action \_\_\_\_\_ Date \_\_\_\_\_ Approve/Disapprove \_\_\_\_\_

Faculty Sponsor (for student) *Ann Kelley Wetmore* 12-17-2015 approve

Dept IRB Representative or Dept Chair *Ann Kelley Wetmore* 12-17-2015 approve

Institutional Review Board *Jessie A. Keller* 1-23-16 approve

Conditions: *as above* Approved from 1-23-16 To 1-23-17



## ORAL MANIFESTATIONS OF MENOPAUSE IPE

On Mon, Dec 14, 2015 at 8:20 AM, Laurie E. Berger  
<[lberger@uw.edu](mailto:lberger@uw.edu)> wrote:

Hi Windy,

It doesn't sound like the UW is engaged in human subjects research, so no approval from us is needed.

Take care,  
Laurie

**Laurie E. Berger, MA, CIP**  
Team Operations Lead – IRB A, Human Subjects Division  
4333 Brooklyn Ave NE, Box 359470, Seattle, WA 98195  
p: 206.543.3033 f: 206.543.9218 [lberger@uw.edu](mailto:lberger@uw.edu)  
<image001.gif>

\*Please note that we cannot guarantee the confidentiality of email.\*

**From:** Windy Rothmund (<mailto:windyrothmund@yahoo.com>)  
**Sent:** Friday, December 11, 2015 6:10 PM  
**To:** Laurie E. Berger; Ann Wetmore  
**Subject:** RE: IRB inquiry

Laurie,

No, he will not be obtaining consent. Only I will personally be gaining participate consent. No, he will not have access to identifiable data. He will be informing students of the availability of the research, but will not be interacting with them other otherwise.

Thanks, Windy

[Sent from Yahoo Mail on Android](#)

On Fri, Dec 11, 2015 at 2:42 PM, Laurie E. Berger  
<[lberger@uw.edu](mailto:lberger@uw.edu)> wrote:

Hi Windy,

Will Dr. Smith be obtaining consent from subjects, have access to identifiable research data, or interact with subjects for research purposes (other than to simply inform them of the availability of the research)?

Laurie

**Laurie E. Berger, MA, CIP**  
Team Operations Lead – IRB A, Human Subjects Division  
4333 Brooklyn Ave NE, Box 359470, Seattle, WA 98195  
p: 206.543.3033 f: 206.543.9218 [lberger@uw.edu](mailto:lberger@uw.edu)  
<image001.gif>

---

**From:** windyrothmund (<mailto:windyrothmund@yahoo.com>)  
**Sent:** Thursday, December 10, 2015 2:33 PM  
**To:** Laurie E. Berger  
**Subject:** RE: IRB inquiry

Laurie,

Dr. Michael Smith's students will be participating in the study and as my third thesis committee member, he may publish findings of this study with me.

Windy

Sent from my Verizon Wireless 4G LTE smartphone  
----- Original message -----  
**From:** "Laurie E. Berger" <[lberger@uw.edu](mailto:lberger@uw.edu)>  
**Date:** 12/9/2015 9:17 AM (GMT-08:00)  
**To:** Windy Rothmund <[windyrothmund@yahoo.com](mailto:windyrothmund@yahoo.com)>  
**Subject:** RE: IRB inquiry

Hi Windy,

What exactly will Dr. Smith be doing for this research?

Laurie

**Laurie E. Berger, MA, CIP**  
Team Operations Lead – IRB A, Human Subjects Division  
4333 Brooklyn Ave NE, Box 359470, Seattle, WA 98195  
p: 206.543.3033 f: 206.543.9218 [lberger@uw.edu](mailto:lberger@uw.edu)

\*Please note that we cannot guarantee the confidentiality of email.\*

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**From:** Windy Rothmund [<mailto:windyrothmund@yahoo.com>]  
**Sent:** Wednesday, December 09, 2015 7:58 AM  
**To:** Laurie E. Berger  
**Subject:** Re: IRB inquiry

Laurie,

I would like to clarify that a University of Washington professor, Michael Smith, is involved in this research and may be involved in future publishing of the is research.

Windy

[Sent from Yahoo Mail on Android](#)

On Thu, Dec 3, 2015 at 12:48 PM, Windy Rothmund  
<[windyrothmund@yahoo.com](mailto:windyrothmund@yahoo.com)> wrote:

Ms. Berger,

I am a graduate student at Eastern Washington University in the Dental Hygiene Department. My thesis topic "Oral Health and Menopause: IPE between physician assistant and dental hygiene students" was recently approved by my thesis committee, which includes Michael Smith a professor in the MEDEX PA program in Spokane on the Riverpoint Campus. I am seeking information from you about what steps to take to get IRB approval from University of Washington. IRB is currently being submitted to Eastern Washington University, as the study is planned for implementation in late January 2016. Thank you for your time.

Sincerely,  
Windy Rothmund, RDH, MSDH Candidate  
(509) 879-0431

[Sent from Yahoo Mail on Android](#)

### **Abstract**

**Purpose:** Interprofessional education (IPE) is a means of fostering integration and collaboration between health care professions. This study evaluated the effect of an IPE educational module on the oral manifestations of menopause.

**Methods:** This mixed-method study used a convenience sample of dental hygiene (DH) and physician assistants (PA) students. Pre- and posttests collected quantitative data using a modified Readiness for Interprofessional Learning Survey (RIPLS), and a PI-designed knowledge of menopause test to determine students' attitudes and learning. Students participated in a one-time workshop that included an educational lecture and a case study exercise using a pseudo-standardized patient. Students worked in preselected groups, representing both disciplines, to create a patient care plan addressing oral manifestations of menopause. Qualitative data was collected from student comments.

**Results:** Study results indicate an increase in participants' knowledge of oral manifestations of menopause. Additionally, results suggest improved attitudes toward interprofessional teamwork and collaboration, professional identity, roles and responsibilities and interprofessional communication. Finally, data shows facilitation of gained confidence in applying new skills related to oral manifestations of menopause.

**Conclusion:** Implementation of an IPE intervention demonstrated correlation between an IPE experience and participants' attitudes, learning, and confidence. Patients experiencing menopause are prone to oral manifestation. Therefore, preparing students to meet the needs of menopausal women may ultimately decrease oral discomfort and improve quality of life.

### **Acknowledgements**

I would like to thank my thesis committee members, Eastern Washington University dental hygiene students and faculty, and University of Washington physician assistant students and faculty for their continued support and commitment. First, I would like to acknowledge Professor Ann O'Kelley Wetmore, MSDH, EWU Program Director. As thesis chair, she has provided continuous guidance, encouragement, and one-on-one mentoring promoting personal and academic growth. Next, I wish to acknowledge Professor Merri Jones, MSDH, of EWU for sharing her love of research and showing commitment to my success. Finally, I would like to acknowledge Michael B. Smith, DHEd, MPAS, PA-C of University of Washington who welcomed my research and remained a positive influence throughout the experience.

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## **Introduction/Literature Review**

### **Introduction to the Research Question**

Research supports Interprofessional Education (IPE) as a means of fostering integration and collaboration between medical and dental providers (Thistlethwaite, 2012). The current definition of IPE by the World Health Organization (WHO) in 2010 is, “Interprofessional education occurs when two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes” (p. 13). A call to action by Vanderbilt, Istringhausen, and Bonwell (2013) describes the need for dental hygienists (DHs) to be included in IPE, and is supported because no IPE curricula exists between dental hygiene (DH) and physician assistant (PA) programs (Anderson, Smith, & Brown, 2013).

The use of standardized patients (SP) and case-based learning (CBL) in health care training programs is a teaching method shown to improve students’ confidence within a non-threatening environment (Russell, Comello, & Wright, 2007; Singleton et al., 2014). Standardized patients are actors trained to portray patients in a simulated clinical setting (Singleton et al., 2014). Case-based learning is a method that introduces case studies to students following completion of a related lecture or lab, allowing new learning to be applied to real-life scenarios (Russell et al., 2007). The use of SP and CBL improves students’ communication, interviewing, and clinical skills (Bolstad, Shen, Covelli, & Torpey, 2012; Long-Bellil et al., 2011; Russel et al., 2007). Research

indicates CBL is commonly used in DH and PA curriculum (Cragun et al., 2012; Scott, 2012; Vaughan, DeBiase, & Gibson-Howell, 1998). Calhoun, Vrbin, and Grzybicki (2008) determined the majority of accredited PA programs use SPs. However, little evidence is found regarding use of SPs in DH education, and is limited to tobacco dependence counseling (Brame, Martin, Tavoc, Stein, & Curran, 2012; Singleton et al., 2014). There are insufficient studies available regarding use of SPs and CBL in menopause/oral health training across health care disciplines.

Menopause marks a significant point of change in a woman's life, due to numerous physiological effects (Mutneja, Dhawan, Raina, & Sharma, 2012). Although some women are asymptomatic, up to 85% experience physical manifestations (Goodman, Cobin, Ginzburg, Katz, & Woode, 2011), including those in the oral cavity (Suri & Suri, 2014). Oral manifestations associated with menopause vary from those that are painful such as burning mouth syndrome (BMS) to those that are not, such as periodontal disease and alveolar bone loss (Suri & Suri, 2014). Suri & Suri (2014) discuss how lack of guidelines related to oral health and menopause may affect treatment. The United States (U.S.) Department of Health and Human Services (HHS) (2014) suggests DHs and physician assistants (PAs) may routinely be in contact with women experiencing the effects of menopause, putting them in a position to assist patients in oral health management.

With the average American woman experiencing menopause at age 51, and living to an average age of 80 (National Institute on Aging [NIA], 2015), oral health conditions related to menopause must be addressed. A comprehensive review of literature revealed

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no single source provides comprehensive information. Most sources, including websites and peer-reviewed journals regarding menopause, focus on symptoms of menopause, such as hot flashes, and debate over use of menopausal hormone therapy (MHT). The term “menopausal hormone therapy” used by the American Congress of Obstetricians and Gynecologists (ACOG) (2014), National Institutes of Health (NIH, 2015), and American Association on Clinical Endocrinologists (AACE) (Randel, 2012) was chosen for this study because it replaces the previous term “hormone replacement therapy” (U.S. DHHS, Office on Women’s Health, 2010). Many sources make a good case for integration of medicine and dentistry including concentration on prevention, whole body care, and improved communication (Anderson et al., 2013; Glicker, 2014; Gourley, 2014; Hertweck et al., 2012). However, Schmitt, DeWitt, Baldwin, and Reeves, (2011) argue the historical separation of medicine and dentistry within the U.S. health care system cannot be changed without beginning at the root of the issue.

Interprofessional education is a proven means of fostering integration and collaboration between medical and dental providers (Fewster-Thuente & Velsor-Friedrich, 2008; Nisbet, Lee, Kumar, Thistlethwaite, & Dunston, 2011; Schmitt et al., 2011). Currently, DHs are experts in the delivery of comprehensive primary care services related to oral health (American Dental Hygienists’ Association [ADHA], 2014b). One measure to manage the surge in America’s health care workload is the PA. Although expanding the scope of practice of existing providers is debated as a better option than creating new workforce models, PAs have proven their ability to provide safe, quality patient care (Thistlethwaite, 2012). Cohen (2013) noted PA’s accessibility and infiltration into every area of medicine puts them in a prime position to promote

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health and make profound changes in health care delivery. This suggests PAs are routinely in contact with women as they transition through menopause. Because some oral conditions such as periodontal disease and alveolar bone loss are not painful, patients may be completely unaware they have active periodontitis (Palomo, Chitguppi, Buencamino, Santos, & Thacker, 2013). Therefore, the purpose of this study was to examine use of IPE between DH and PA students providing comprehensive care for the menopausal patient.

This theoretical framework supported the need to:

1. Explore if an IPE intervention educating DHs and PAs students about oral health and menopause resulted in gained knowledge.
2. Evaluate outcomes of IPE between the two professions.
3. Evaluate DH and PA students' confidence in applying newly learned skills and knowledge with pseudo-SP and CBL.

### **Statement of Problem**

Approximately 65 million women in the U.S. are subject to oral conditions related to menopause (U.S. Census Bureau, 2012), with 43% of these women experiencing oral pain and discomfort, compared to only 6% of premenopausal women (Wardrop, Hailes, Burger, & Reade, 1989). Further research indicates 45% of menopausal women without general symptoms suffer from oral manifestations, while 60% with general symptoms also experience oral manifestations (Ben Aryeh et al., 1996). Oral manifestations reported include dry mouth, viscous saliva, increased caries, altered or unpleasant taste, ulcerations, BMS, trigeminal nerve pain, periodontal disease, osteoporotic jaw, and loss

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of alveolar bone height (Frutos, Rodriguez, Miralles, & Machuca, 2002; Paganini-Hill, 2006; Mutneja et al., 2012).

The Institute of Medicine (IOM) report, “Advancing Oral Health in America” states, “Oral health has been shown to be inextricable from overall health, yet oral health care is still largely treated as separate and distinct from broader health care in terms of financing, education, sites of care, and workforce” (IOM, 2011, p. 1). Improving the role of medical providers in oral health care is crucial since many conditions manifest in the oral cavity (IOM, 2011), including those related to menopause (Suri & Suri, 2014). Interprofessional education is a proven means of nurturing collaboration among health care professionals; a growing body of evidence supports IPE improves collaborative practice and patient care (IOM, 2015). Studies regarding IPE and collaboration between PAs and DHs report increased competency in performing oral health assessment and identifying oral health conditions (Anderson, et al., 2013; Anderson, Smith, & Maseman, 2011; Chadbourne & Boyd, 2012; Lavigne, 1999).

Despite PAs being in the position to impact oral health care, the majority of PA curricula focus primarily on recognizing oral diseases, and providing referral to the appropriate specialist or provider (Cohen, 2013). Many reports indicate lack of training inhibits PAs and medical providers from providing oral care services (Jacques et al., 2010; Lewis, Grossman, Domoto, & Deyo, 2000; Romano-Clarke, Caspary, Boulter, Keels, & Krol, 2007). Additionally, the online oral health curriculum, Smiles for Life, (Clark et al., 2010) used by most PA programs contains little content related to menopause and oral health. Anticipated physician workforce shortages are expected to expand PA’s roles and services related to women’s health (Farrow, Lawrence, &

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Schulkin, 2014), suggesting the need for greater knowledge regarding menopause and oral health. With necessary training, PAs have potential to provide more comprehensive and higher quality oral health services (Cohen, 2013).

A DH is a licensed primary care provider, considered an expert in the field of dental hygiene. Their expertise puts them in a position to assess patient risk and counsel patients about oral health conditions (Darby & Walsh, 2015). Furthermore, DHs are educated to assess, plan, implement, and evaluate effects of oral health on overall health (ADHA, 2008). Research indicates inclusion of women's oral health topics in DH curricula has increased over the years, yet more experience in real-world settings (Gibson-Howell, 2010), additional training in oral manifestations of menopause (Murray & Fried, 1999), and more IPE opportunities are still needed (Wilder, Thomas, & Jared, 2008).

First, Gibson-Howell (2010) reports on two separate surveys, sent to DH program directors in 2001 and 2007, regarding women's general and oral health topics. The 2001 survey was mailed to 256 DH program directors from certificate, associate, and bachelor degree programs in the U.S. The response rate of 62.1% ( $N=159$ ), primarily represents certificate and associate programs ( $n=111$ ), as they make up the majority of programs. The 2007 survey was sent to 288 DH program directors with a response rate of 25.34% ( $N=73$ ), again the majority from certificate and associate degree programs ( $n=52$ ).

Comparison of the two surveys indicates the following:

- More DH faculty completed continuing education on women's general health topics in 2007 than 2001.



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- Increased inclusion of women's general and oral health issues in 2007, including menopause and oral health topics such as periodontal health, effects of hormones on gingival/periodontal health, and oral effects of medications.
- Bachelor degree programs may include more content on women's health topics in required courses, implying graduates of these programs have greater knowledge.

Gibson-Howell (2010) notes the importance of applying constructivist theory when teaching women's health topics, by allowing students to apply learned knowledge. Student-centered clinical experiences are one example given to increase learners' acquisition and retention of knowledge.

Complementary to research by Gibson-Howell (2010), a study conducted by Murray and Fried (1999) assessed DHs knowledge of menopause and associated oral manifestations by mailing a self-administered survey to a random sample of 100 DHs in Connecticut. Of the 56 returned surveys 46 were usable, and the majority of respondents were graduates of certificate or associate DH programs. Fifty-four percent of respondents ( $n=25$ ) scored 75% or above in general knowledge of menopause, and only 7% ( $n=3$ ) scored 75% or above in knowledge of oral manifestations (Murray & Fried, 1999). These findings imply the need for additional training regarding menopause and associated oral manifestations in DH programs.

Finally, a national study of DH program directors found even though 99% ( $n=173$ ) agree DH students play an important role in assessing oral-systemic connections

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in collaborative patient care, only 4% ( $n=7$ ) report teaching IPE courses with such content (Wilder et al., 2008a). Wilder et al. (2008a) state the following:

These data indicate that there is an opportunity for dental hygiene to take the lead in developing alliances with physicians, nurses, nurse practitioners, health educators, and others who can assist in assessing and referring patients who have risk factors for oral-systemic disease. (p. 678)

Hence, suggesting IPE between DH and PA students is crucial as the role of primary care providers continues to expand.

Given their interaction with patients, PAs and DHs are most likely to encounter patients at risk for oral complications due to menopause. This is true now more than ever with the emergence of the Advanced Dental Hygiene Practitioner (ADHP), a mid-level dental provider based on expanding the scope of DHs (Stolberg, Brickle, & Darby, 2011). Evidence cited by Anderson, et al. (2013) supports the need for IPE between DHs and PAs, “To date, no education criteria have been reported between DH and PA programs” (p. 23). The college campus, often home to numerous health disciplines, provides an opportunity to develop, implement, and evaluate IPE models (Gourley, 2014). Because DH and PA programs are housed in the same building on the Spokane Campus, an opportunity exists to expand IPE, setting an example for institutions nationwide.

### **Overview of Research**

Interprofessional education is a proven means of improving collaboration among various health care professions (Interprofessional Education Collaborative [IPEC], 2011a) dating back to the 1900’s (Baldwin, 2012). However, the IOM (1972) was the first to categorize and define IPE. Although interest in IPE has differed over the years, an

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increasing body of evidence supports the need for IPE between DHs and PAs (IOM, 2011; IOM, 2015). “Many health professionals know little to nothing about oral health. Oral health is, for the most part, missing from the education and training of health care professionals such as...physician assistants” (IOM, 2011). The WHO report, “Framework for Action on Interprofessional Education and Collaborative Practice,” encourages IPE as a means to prepare a workforce able to provide collaborative, team-based, patient-centered care (WHO, 2010).

Interprofessional education between DHs and PAs is especially important now as women from the “baby boomer” generation transition through menopause (U.S. Census Bureau, 2012). Although recommendations have been made for treating oral menopausal symptoms such as xerostomia, BMS, and periodontitis (Meurman, Tarkkila, & Tiitinen, 2009), there are no oral care guidelines for menopause (Suri & Suri, 2014). The few recommendations found in the literature generally advise regular dental visits, professional cleanings, basic oral care instruction (Frutos et al., 2002; Saba, 1999), fluoride use (Shifren & Gass, 2014; Shigli & Giri, 2015), and maintaining a balanced diet including adequate vitamin D and calcium (Shigli & Giri, 2015). Dental hygienists and PAs are often the first to provide diagnostic and therapeutic services (American Academy of Physician Assistants [AAPA], 2014; Notgarnie, 2012). This initial contact gives DHs and PAs opportunities to lead by promoting prevention of oral conditions and overall systemic health (Glicker, 2013; Notgarnie, 2012). In order to elucidate further, the following review of literature regarding IPE, menopause, and the role of DHs and PAs provides evidence warranting the study of IPE between DH and PA students regarding oral health and menopause.

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**Rationale for IPE.** The majority of health care professionals and educators agree services provided by only one provider may not be adequate to achieve and improve the overall health of the patient (Mertz et al., 2011). Demographic changes including aging population, increased longevity, and need for management of long-term health conditions necessitates a change of focus from acute services to chronic care services with preventive education and team-based care (Thistlethwaite, 2012). Poor communication among health care providers compromises the quality and safety of patient care (Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013; The Joint Commission, 2014). Thistlethwaite (2012) effectively describes today's health care delivery needs, "We must acknowledge that some blurring of roles will and should occur as many communities do not have access to the full repertoire of the health and social care workforce" (p. 61).

The U.S. health care system is the most expensive in the entire world, estimated to account for 20% of gross domestic product by 2020 (Center for Medicare and Medicaid Services, 2015). The need to improve the nation's health care system is addressed by the Institute of Health Care Improvement (IHI) "Triple Aim," launched in 2007. The "Triple Aim" framework describes an approach to optimize health system performance with the three specific aims of a) improving the health care experience, b) improving the health of the population and, c) reducing the cost of health care (IHI, 2015). The IHI, an independent, non-profit organization leading innovation in global health care improvement, promotes accountability for all three dimensions of the "Triple Aim" (IHI, 2015) (see Figure 1, for "Triple Aim" rationale).

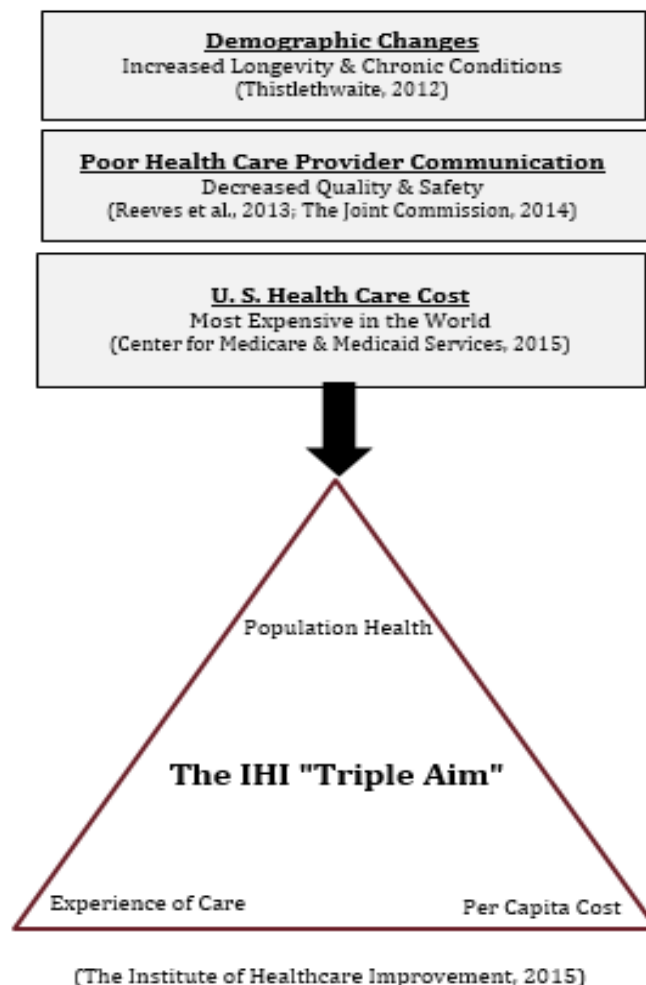
Additionally, the Patient Protection and Affordable Care Act (PPACA), commonly known as the Affordable Care Act (ACA), is a U.S. federal statute signed into

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law in 2010 (PPACA, 2010). The PPACA represents a dramatic overhaul of America's health care system, increasing the quality and availability of medical care (PPACA, 2010). The PPACA promises improved insurance coverage and access to preventive care, care coordination, and public health (Koh, Blakey, & Roper, 2014). The Centers for Disease Control and Prevention (CDC) reports the number of uninsured Americans fell by more than 11 million since the PPACA was signed into law in 2010 (Associated Press, 2015). Significant increases in medical coverage among adults (Associated Press, 2015) and studies indicating more adults seek care from primary care medical providers (Healthy People 2010, 2000), indicates the need for IPE and sharing the burden of patient care across health care disciplines.

The PPACA is propelling rapid changes in the health care paradigm (Haber, 2014), suggesting the need to change health care delivery and health care workforce education. The rationale for IPE is to prepare health care students to work with a multitude of professionals and gain understanding of roles in collaborative care (Thistlethwaite, 2012). Creation of curricula grounded in team-based, patient-centered health care delivery (Thistlethwaite, 2012) prepares graduates from health care training programs to deliver on the IHI "Triple Aim" through interprofessional (IP) collaboration (Haber, 2014). Research validates that oral-systemic health is a catalyst for creating IPE between medical and dental professions (Glicker, 2014; Haber, 2014; Reeves et al., 2013). "Oral health provides the perfect exemplar for building interprofessional education and practice, as optimal care delivery requires a coordinated effort on the part of both medical and dental providers" (Glicker, 2014, p. 32).

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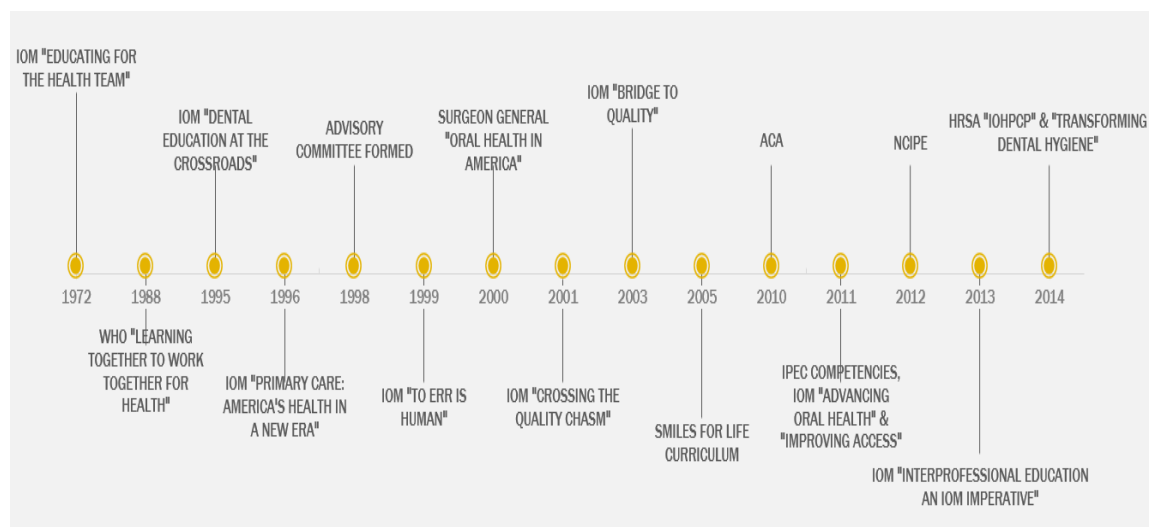
*Figure 1.* Rationale for IHI “Triple Aim”

**Historical aspects and significance of IPE.** The concept of IPE is not new. Health care leaders and educators have evaluated IPE with varying enthusiasm for decades (Brandt, 2014; National Center for Interprofessional Practice and Education [NCIPE], 2015a). The changing concept and drivers of IPE and of IPE and oral health have created the foundation for present-day IPE (see Figure 2, for a historical perspective of IPE and oral health initiatives).

**1900’s-1950’s.** The concept of IPE traces back to the early 1900’s when Dr. Richard Cabot of Massachusetts General Hospital called for, “Teamwork of the doctor,

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the educator, and the social worker” (Baldwin, 2012, p. 7). However, the actions of Cherkasky and Silver from Montefiore Hospital in New York, and those of Deisher and Baldwin, are often credited for developing the modern day IPE model (Baldwin, 2007). Cherkasky did not believe in assessing and treating only the diseased part of the patient. Instead, he considered systemic relationships, and promoted treating each patient as a whole (Cherkasky, 1949). Deisher and Baldwin developed an early IPE model in the late 1940’s and early 1950’s by uniting faculty and students from nine professions, at the University of Washington Child Health Center, to engage in IPE and practice (Baldwin, 2007; Baldwin, 2012). Still other researchers called for a paradigm shift in health care education, toward IPE (Garrett, 1955; Whitehouse, 1951) with the impetus being communication and teamwork. Garrett (1955) and Whitehouse (1951) suggested sharing information and responsibility, setting common goals, collaborating and cooperating, and improving communication within a health care team would improve patient outcomes.



*Figure 2. Historical Perspective of IPE and Oral Health Initiatives 1972-2014*

**1960’s.** In the 1960’s, additional developments were made toward IPE when President Johnson introduced programs including “Great Society” and “War on Poverty”

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(Baldwin, 2007). The surge of funding from these programs led to the creation of Medicare, Medicaid, and neighborhood health care centers to improve access to care (Baldwin, 2007). Baldwin (2007) notes guidelines for these health centers promoted IPE by stating,

New ways should be sought to develop, train, and utilize a health team that is innovative in both structure and function. The concept of supporting staff should go beyond the traditional roles and might include physician's assistants...and others who contribute a firsthand understanding of the neighborhood and its people (Community Action Program, 1969, p. 2).

Furthermore, the Association of American Medical Colleges (AAMC) provides strong support for IPE in the 1965 landmark "Coggeshall Report" (Baldwin, 2007; Coggeshall, 1965). This AAMC report recommends emphasis on the role of educational institutions in implementing IPE and expanding the scope of allied health workers (Coggeshall, 1965).

*1970's.* As times changed, the number of health care education institutions increased, as did specialization in medicine and dentistry and new workforce models, including the PA (Brandt, 2014; Hooker & Muchow, 2014). The first meeting of the IOM in 1972 responded to these changes in the resulting report, "Educating for the Health Team" (IOM, 1972). This initial IOM report promoted IPE in health care training programs as a means to improve health care outcomes and meet patient needs (IOM, 1972; Schmitt et al., 2011). "The ultimate goal of interdisciplinary education and health care teams must be to better utilize health manpower in order to make available health



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care that is more comprehensive, effective, and compassionate” (IOM, 1972, p. 23). This initial IOM report was the first to categorize IPE and define it as the following:

- Students from more than one health profession taught by faculty from one health profession.
- Students in one health profession taught by faculty from more than one profession.
- Students from more than one health profession taught by faculty from one or more profession (IOM, 1972, p. 6).

“Educating for the Health Team,” was a catalyst garnering federal funding for IPE under the Comprehensive Health Manpower Training Act 1971 (IOM, 1972).

Federal funding encouraged enrollment in health care professional training programs as a means of addressing provider shortages (The Comprehensive Health Manpower Training Act, 1971). Nevada’s Health Science Program served as an example by adopting IPE curriculum, and prompting other health-science training programs across the U.S. to follow (Baldwin, 2007; Baldwin, 2012). The interest in IPE slowly faded due to a) lack of evidence IPE led to improved patient outcomes, b) limited funding, and c) the fact IPE programs were small and elective (NCIPE, 2015a; Schmitt et al., 2011).

**1980’s.** Coordination of care to reduce health care costs was the impetus for IPE in the 1980’s, with funding from both federal and private sources (Brandt, 2014; Mitchell, Nesbitt, & Young, 2010). The Health Maintenance Organization (HMO) movement focused on controlling access and cost of care, and creating a single point of entry into health care (Brandt, 2014; Mueller, 1974). The IOM found despite known methods to prevent and reduce oral diseases, the unmet need for oral health services was

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substantial. This led the IOM to examine oral health issues, and consider including dental services in national health insurance plans (IOM, 1980). Dental hygienists are named in the 1980 IOM report, “Public Policy Options for Better Dental Health,” as oral care providers able to provide preventive oral care (IOM, 1980). Most IPE attempts in the 1980’s failed due to cost, lack of incentive, and little evidence of improved outcomes (Brandt, 2014). Changes began to take place in 1987 as the establishment of the Centre for the Advancement of Interprofessional Education (CAIPE) in the United Kingdom encouraged IPE on a global level, defined IPE, and brought IPE initiatives together (CAIPE, 2015). The WHO reinforced the need for IPE in 1998 by releasing two reports, “Continuing Education for Physicians” (WHO, 1973) and “Learning Together to Work Together for Health” (WHO, 1988). These reports led to the implementation of IPE in many health care training programs (Hertweck et al., 2012).

*1990’s.* The 1990’s brought the quality and safety movement, as solid evidence verified IPE resulted in better patient outcomes (Barr, Koppel, Reeves, Hammick, & Freeth, 2005). Furthermore, research validated IPE promotes patient-centered care, reduces health care cost, enhances respect and understanding of roles and responsibilities of various health care disciplines, and decreases errors through improved communication (Barr et al., 2005; Baldwin, 2010; Chen, Williams, & Gardner, 2013; Fewster-Thuente & Velsor-Friedrich, 2008; Mitchell et al., 2010). Concurrently, the documentation of widespread errors associated with injury and death led to adoption of formal sentinel event policy by The Joint Commission to help hospitals learn from adverse events and improve patient safety (The Joint Commission, 2014). Sentinel event data revealed common root causes of adverse events are linked to poor communication and lack of

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collaborative care planning (The Joint Commission, 2014). Several reports released in the 1990's advocate for IPE and integration of dentistry into the overall health care system including, "Dental Education at the Crossroads: Challenges and Change" (IOM, 1995), "Primary Care: America's Health in a New Era" (IOM, 1996), "Recreating Health Professionals Practice for a New Century" (PEW Health Professions Commission, 1998), and "To Err is Human" (IOM, 1999).

**2000's.** The new millennium saw significant change spurred by the Surgeon General's report, "Oral Health in America" (U.S. HHS, 2000). The landmark report alerted Americans oral health is integral to overall health, and suggested greater collaboration as a means to increase oral health awareness. Furthermore, the report promoted oral health education for non-dental health care providers, addressed increased life expectancy, and the negative effects of menopause on the oral cavity. The U.S. HHS (2000) states, "During the past decade, women's health has emerged as a significant issue in the nation's health agenda" (p. 77). In the early part of the new millennium, the IOM followed up on an earlier report, "To Err is Human", (IOM, 1999) with two additional reports entitled "Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century" (IOM, 2001) and "Health Professions Education: A Bridge to Quality" (IOM, 2003). Both call for reform of health professions education and breakdown of professional silos as a means to improve the quality and safety of patient care. These reports conclude IPE is important in all health care disciplines. "Health Professions Education: A Bridge to Quality," identified seven core competencies for health professionals' education including patient-centered care, evidence-based practice, quality improvement, patient safety, informatics, teamwork, and collaboration (IOM, 2003). In

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response, a national online oral health curriculum, Smiles for Life, was launched in 2005 (Clark et al., 2010), and oral health competencies became a focus in medical education (AAMC, 2008; Mouradian et al., 2008; Mouradian et al., 2005).

**Current aspects and significance of IPE.** New models for health care delivery, economics, and societal needs including living better and longer, drive IPE today (Alfano, 2012; Health Resources and Services Administration [HRSA], 2014b; Schmitt et al., 2011; Thistlethwaite, 2012). Unlike earlier phases of IPE and oral health proposals, efforts of national, international, and global organizations, initiatives, and training programs bolster support for IPE. They include the U.S. HHS, IPEC, the U.S. National Oral Health Alliance (NOHA), the National Interprofessional Initiative on Oral Health (NIOH), the National Network of Oral Health Access (NNOHA), global and international organizations, and Smiles for Life and IHI Open School online training programs.

**National organizations for IPE and oral health.** National organizations include the U.S. HHS which oversees Health Resources and Services Administration (HRSA), the Advisory Committee on Training in Primary Care Medicine (ACTPCMD), the NCIPE, the PPACA, Healthy People 2020, and IPEC, NOHA, NIOH, and NNOHA.

*The U.S. Department of Health and Human Services.* The leading agency of the U.S. HHS for improving access to health care services by training health professionals and improving systems of care is HRSA (HRSA, 2015). In 2009, the U.S. HHS introduced the, “U.S. Department of Health and Human Services Oral Health Initiative 2010,” showing commitment to improving oral health (American College of Physicians, 2010). The initiative included enhanced oral health messages in products, campaigns,

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and websites by the Office on Women's Health, and two IOM reports published in 2011. The first IOM report, "Advancing Oral Health in America," (IOM, 2011a), focused on issues of access to oral health services (IOM 2011a). The second, "Improving Access to Oral Health Care for Vulnerable and Underserved Populations," (IOM, 2011b), evaluated the health care delivery system and looked at ways to promote preventive oral health care and improve oral health literacy (IOM, 2011b). Both reports made recommendations for action and described oral health core competencies for health care providers (IOM, 2011a; IOM, 2011b). In 2014, HRSA released two significant reports, "Integrating Oral Health and Primary Care Practice" (HRSA, 2014a) and "Transforming Dental Hygiene Education: Proud Past, Unlimited Future" (HRSA, 2014b).

The first report, "Integrating Oral Health and Primary Care Practice," disseminated oral health core competencies aimed at guiding oral health integration in health care programs, including a shift from HEENT to HEENOT exam (HRSA, 2014a). The HEENOT or head, eyes, ears, nose, oral cavity throat examination represents a paradigm shift transitioning providers from the traditional HEENT or head, eyes, ears, nose, throat examination to one requiring examination of teeth, gums, mucosa, tongue, and palate (Haber et al., 2015). Haber et al. (2015) report exposure of nursing, dental, and medical students at New York University to HEENOT exam in classroom, clinical, and simulation IPE experiences resulted in greater dental-primary care referrals. Therefore, indicating use of HEENOT examinations prepares a primary care workforce that comprehends the impact of oral health on overall health (Haber et al., 2015).

The second report released in May 2014, "Transforming Dental Hygiene Education: Proud Past, Unlimited Future", discussed IPE and HRSA's plan to expand

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oral health services and integrate oral health into primary care settings (HRSA, 2014b). The report, based on the testimony of leaders representing public health, DH, dentistry, nursing, pharmacy, and PA, called for transformation of DH education and access to care (HRSA, 2014b). Ruth Ballweg, director of MEDEX Northwest PA Program encouraged DHs to, "...explore areas where their services were especially needed, first by 'minding the gaps', where people are not getting care" (HRSA, 2014b, p.22). This statement resonates with the fact that DHs are poised to monitor and prevent oral manifestations of menopause.

The ACTPCMD was authorized by the, "Health Professions Education Partnership Act of 1998," to gain insight and objectives from primary health care providers and educators (ACTPCMD, 2010). The committee advises the U.S. Congress and makes recommendations to the U.S. HHS about policy and program development relating to the HRSA Bureau of Health Workforce, family medicine, general internal medicine, general pediatrics, general dentistry, pediatric dentistry, and PA programs (ACTPCMD, 2010). In 2010, the ACTPCMD released, "The Redesign of Primary Care with Implications for Training", a report recommending increased emphasis on IPE training programs and patient centered medical home (PCMH) model of health care delivery (ACTPCMD, 2010). The PCMH model is designed to provide comprehensive team-based care led by a physician (Grant Makers in Health, 2012).

Established in 2012, the NCIPE is a public-private partnership with the ultimate goal of transforming health care and overcoming the decades old struggle for IPE (Chen et al., 2013; NCIPE, 2015b). The NCIPE is the only organization in the U.S., designated by HRSA as a center to provide leadership, scholarship, evidence, coordination, and

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national visibility to advance IPE and IP practice (NCIPE, 2015a). The goal of the NCIPE is to create a new, shared responsibility called the “Nexus,” by aligning the needs and interests of education and health care practice (NCIPE, 2015a). As the first data repository focused on IPE and collaborative practice, the National Center Data Repository (NCDR) is an essential component of the “Nexus” (NCIPE, 2015a). The “Nexus” aims at closing the gap between how health providers are educated, and the knowledge and skills needed to achieve the “Triple Aim” (NCIPE, 2015a).

The PPACA (2010) is a significant driver of health system transformation improving coverage for preventive services including higher quality care for aging women (Cuellar, Simmons, & Finegold, 2012). Preventive services including well-woman visits, mammograms, and bone mass measurement for women at risk for osteoporosis are covered (Cuellar et al., 2012). Although the PPACA (2010) does not include oral care services as part of improved women’s health benefits, it does support teamwork and IPE, use of non-physician providers, and new models of collaborative health care delivery (PPACA, 2010).

Healthy People, introduced four decades ago, serves as a “public health road map” for the nation by specifying health goals and making recommendations to improve health for each decade (Koh et al., 2014, p. 2475). Healthy People 2020 (HP2020) includes 42 topic areas and over 1000 specific objectives to promote health and prevent disease (Koh et al., 2014). Leading Health Indicators bring attention to the leading causes of preventable death and injury (Koh et al., 2014); they include oral health concerns, and suggest enhancing the role of non-dental health professionals (IOM, 2011b). Although many Leading Health Indicators have been met, those pertaining to

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oral health, such as the indicator for dental visits, have not been met (Koh et al., 2014) and are moving away from the HP2020 target (HP2020, 2015).

*Interprofessional Education Collaborative (IPEC).* The IPEC panel is a privately funded group formed in 2009 when national health profession education associations united with a shared vision to promote IPE (IPEC, 2011a; IPEC 2011b). Founding associations include the American Association of Colleges of Nursing (AACN), American Association of Colleges of Osteopathic Medicine (AACOM), American Association of Colleges of Pharmacy (AACP), Association of American Medical Colleges (AAMC), American Dental Education Association (ADEA), and the Association of Schools and Programs of Public Health (ASPPH) (IPEC, 2011a; IPEC 2011b). Recent institutional members include the American Association of Colleges of Podiatric Medicine (AACPM), American Council of Academic Physical Therapy (ACAPT), American Occupational Therapy Association (AOTA), American Psychological Association (APA), Association of American Veterinary Medical Colleges (AAVMC), Association of Schools and Colleges of Optometry (ASCO), Association of Schools of Allied Health Professional (ASAHP), Council on Social Work Education (CSWE), and Physician Assistant Education Association (PAEA) (IPEC, 2016). The IPEC Expert Panel has successfully disseminated core competencies, guiding the development of IPE curricula in health professional training programs across the nation (Valachovic, 2014).

*The U.S. National Oral Health Alliance.* Founded in 2007, the NOHA is a non-profit organization comprised of diverse stakeholders with a focus on improving oral health through prevention and treatment (NOHA, 2015). The NOHA states,



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“Individually and together we have the opportunity to make oral health a critical part of our nation’s understanding of health” (NOHA, 2014, p. 3). The NOHA presented an oral health care delivery framework entitled, “Emerging Framework for Action,” at the Seventh Leadership Colloquium (NOHA, 2014). This framework focused on a) shifting to an integrated model for oral health care prevention and delivery, b) empowering through oral health literacy and awareness, and c) ensuring a diverse, collaborative, and oral health competent workforce as a means to drive change in health policy, establish trust, and develop common ground (NOHA, 2014).

*The National Interprofessional Initiative on Oral Health.* The NIIOH is a joint effort of the American Academy of Physician Assistants (AAPA), Physician Assistants for Oral Health, and National Commission on certification of Physician Assistants Health Foundation, emerging from work done by participants of the 2008 through 2013 Symposia on Oral Health and Primary Care (NIIOH, 2011). The mission of this group of funders and health care professionals is eradication of dental disease by engaging primary care providers to be a) alert to their patient’s oral health needs, b) ready and willing to deliver oral health preventive services to patients of all ages, c) effective at partnering with dental specialists, and d) able to learn from, with, and about each other (NIIOH, 2011). The NIIOH was instrumental in the creation of the Smiles for Life national IP curriculum, developed for primary care providers including PAs. In addition, the NIIOH supports, “PA Leadership Initiative in Oral Health,” which meets annually to improve PA’s impact on reducing oral health disparities (Lord, 2015). The NIIOH believes primary care providers are in a position to promote oral health if educated to counsel patients and prevent, detect, arrest, and refer oral disease (NIIOH, 2011).

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*The National Network for Oral Health Access.* A group of dental directors from federally qualified community health centers (FQHCs) founded the NNOHA in 1991. The NNOHA provides training, resources, and supporting initiatives. In 2012, HRSA partnered with the NNOHA to conduct a pilot of oral health clinical competencies identified in by the 2011 IOM report, “Improving Access to Oral Health Care for Vulnerable and Underserved Populations.” The “Interprofessional Core Clinical Competency Pilot Project” includes competencies aimed at a) training non-dental primary care providers to increase oral health screenings and preventive services, b) increasing oral health integration into primary care, c) improving IP collaborative practice, d) enhancing coordination of care between medical and dental providers, and e) developing sustainable approaches to changing health care delivery.

***Global and international organizations.*** Global and international organizations aimed at promoting IPE include the WHO, IOM, All Together Better Health (ATHB), and Collaborating Across Borders (CAB). Initially in 2010, the WHO released, “Framework for Action on Interprofessional Education and Collaborative Practice” (WHO, 2010). This report reviewed the status of IP collaboration around the world, and identified influential mechanisms shaping IPE. “After almost 50 years of inquiry, there is now sufficient evidence to indicate interprofessional education enables effective collaborative practice which in turn optimizes health-services, strengthens health systems and improves health outcomes” (WHO, 2010, p.18). The WHO also formed the “Health Professionals Global Network” (HPGN) in 2009 (Barr, 2010). The HPGN hosts web-based debates with participants representing over 100 countries.

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Growth has continued following the first debates in 2010 discussing IPE among 293 participants representing 44 countries (HPGN, 2010).

Second, the IOM and IPEC formed the, “Global Forum on Innovation in Health Professionals Education,” the first global forum for health professional education sponsored by IOM and IPEC (Cuff, 2013). Recent reports released by the IOM promoting IPE include, “An IOM Imperative: Interprofessional Education” (McNeal, 2012) and “Measuring the Impact of Interprofessional Education (IPE) on Collaborative Practice and Patient Outcomes” (IOM, 2015).

Third, organizations including ATHB and CAB are influential in the redesign of health care education and the health care system. All Together Better Health brings together attendees from nearly 20 countries around the world, including the MEDEX Northwest PA Program, to compare IP efforts and improve health care delivery (ATBH, 2014). Collaborating Across Borders unites members of the Canadian Interprofessional Health Collaborative (CIHC) and the American Interprofessional Health Collaborative (AIHC), allowing IPE initiatives to be shared (Mitchell et al., 2010).

***Training programs.*** Training programs leading the transformation in oral-systemic health and IPE include Smiles for Life online oral health training modules (Clark et al., 2010) and IHI Open School (IHI, 2015). The Smiles for Life curriculum, developed by the NIIOH and the Society of Teachers of Family Medicine in 2005, is currently the most comprehensive oral health curriculum available to primary care providers, including PAs (Clark et al., 2010). This curriculum used in PA education consists of eight 45-minute modules covering core areas of oral health (Clark et al., 2010), with brief mention of menopause. The IHI Open School offers online courses

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focusing on overall improvement of the health care system, including safety and leadership (IHI, 2015).

As IPE efforts continue, Lancet Commissions caution professional competencies do not meet patient needs resulting in, "...a slow burning crisis" (Frenk et al., 2010, p. 8). Outdated and unchanged curricula and professional silos are blamed for the crisis (Frenk et al., 2010). The professional silos of medicine and dentistry are the consequence of, "separate training programs, professional identities, payment structures, and delivery systems" (Hummel, Phillips, Holt, & Hayes, 2015, p.10). Echoing the Surgeon General's, "Oral Care in America" (U.S. HHS, 2000), the IOM calls for enhancing the role of non-dental health care providers, and including PAs as a means of improving access to oral health in America (IOM, 2011a; IOM, 2011b). An additional IOM report, "Interprofessional Education: An IOM Imperative" (McNeal, 2012) and workshop summary, "Interprofessional Education for Collaboration: Learning How to Improve Models Across the Continuum of Education to Practice" (Cuff, 2013), continue to push for IPE. The ADHA report, "Dental Hygiene at the Crossroads of Change" (2011) states, "Collaborative leaders engage people and groups to work toward common goals that rise above their traditional roles, disciplines and past experience and beliefs" (Rhea & Bettles, 2011, p. 1), suggesting the benefits of DHs engaging with other professions, like PAs. Many health care training programs have integrated elements of IPE into curricula, yet many barriers inhibit progress (Chen et al., 2013). Barriers to implementing IPE include absence of role models, cost, resistance to change, and logistical barriers including classroom space and time in curriculum (IPEC, 2011a).

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**IPE core competencies.** A competency is defined as, “a general statement detailing the desired knowledge and skills of students graduating from a course or program” (Hartel & Foegeding, 2006, p. 69). Although IPEC core competencies are the most widely accepted for IPE, it should be noted numerous organizations have developed IPE core competencies including the PEW Health Professions Commission (1998), IOM (2003), and the Accreditation Council on Graduate Medical Education (IPEC, 2011b).

The IPEC expert panel released two reports in 2011, “Team-Based Competencies: Building a Shared Foundation for Education and Clinical Practice” (IPEC, 2011a) and “Core Competencies for Interprofessional Collaborative Practice”, specifying IPE core competencies (IPEC, 2011b). These reports defined the skills and behaviors needed for effective participation in collaborative and team-based care (IPEC, 2011). The core competencies established by IPEC build on competencies developed by IOM in 2003, as well as those defined by universities in the U.S. (IPEC, 2011).

Panel experts believe the paradigm must shift away from educational silos in order to foster collaboration and communication needed to deliver safe, quality, efficient care to meet the needs of today’s population (IPEC, 2011). Action strategies of IPEC include communication and dissemination, developing IP faculty and resources, strengthening metrics and research, developing new collaborative academic practices and community learning sites, and advancing policy changes (IPEC, 2011). The IPEC expert panel envisions a future where patients receive collaborative, coordinated care from an IP team (IPEC, 2011).

Moreover, in 2011 the IPEC panel identified four competency domains including values and ethics, roles and responsibilities for collaborative practice, IP communication,

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and teamwork and team-based care (see Figure 3, for IPEC competency domains).

Beyond the four competency domains is a subset of 38 competencies across the domains, offering additional information for implementation (IPEC, 2011). This study concentrates on IPEC competency domain 2: roles and responsibilities and domain 3: IP communication (see Figure 4, for IPEC competency domain 2; see Figure 5, for IPEC competency domain 3). Strengthening core competencies for IP collaborative practice across all health professions is necessary in order to integrate essential content into all health care curricula, guide development of learning objectives and assessment, and provide a foundation promoting lifelong IP learning and evaluation (IPEC, 2011). Moving past static, profession-specific curricula prepares students for the workforce.

Competency Domain	General Competency Statement
<b>1:</b> Values/Ethics for Interprofessional Practice	<b>VE:</b> Work with individuals of other professions to maintain a climate of mutual respect and shared values.
<b>2:</b> Roles/Responsibilities	<b>RR:</b> Use the knowledge of one's own roles and those of other professions to appropriately assess and address the healthcare needs of the patients and populations served.
<b>3:</b> Interprofessional Communication	<b>CC:</b> Communicate with patients, families, communities, and other health professionals in a responsive and responsible manner that supports a team approach to the maintenance of health and the treatment of disease.
<b>4:</b> Teams and Teamwork	<b>TT:</b> Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan and deliver patient-/population-centered care that is safe, timely, efficient, effective, and equitable.

*Figure 3.* Interprofessional Collaborative Practice Competency Domains (IPEC, 2011)

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<b>Domain 2: Roles and Responsibilities.</b> Use the knowledge of one's own role and those of other professions to appropriately assess and address the healthcare needs of the patients and populations served	
<b>RR1</b>	Communicate one's roles and responsibilities clearly to patients, families, and other professionals.
<b>RR2</b>	Recognize one's limitations in skills, knowledge, and abilities.
<b>RR3</b>	Engage diverse healthcare professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet specific patient care needs.
<b>RR4</b>	Explain the roles and responsibilities of other care providers and how the team works together to provide care.
<b>RR5</b>	Use the full scope of knowledge, skills, and abilities of available health professionals and healthcare workers to provide care that is safe, timely, efficient, effective, and equitable.
<b>RR6</b>	Communicate with team members to clarify each member's responsibility in executing components of the treatment plan or public health intervention.
<b>RR7</b>	Forge interdependent relationships with other professions to improve care and advance learning.
<b>RR8</b>	Engage in continuous professional and interprofessional development to enhance team performance.
<b>RR9</b>	Use unique and complementary abilities of all members of the team to optimize patient care.

*Figure 4.* IPEC Competency Domain 2: Specific Roles and Responsibilities  
Competencies (IPEC, 2011)

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<b>Domain 3: Interprofessional Communication.</b> Communicate with patients, families, communities, and other health professionals in a responsive and responsible manner that supports a team approach to the maintenance of health and the treatment of disease	
<b>CC1</b>	Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussion and interactions that enhance team function.
<b>CC2</b>	Organize and communicate information with patients, families, and healthcare team members in a form that is understandable, avoiding discipline-specific terminology when possible.
<b>CC3</b>	Express one's knowledge and opinions to team members involved in patient care with confidence, clarity, and respect, working to ensure common understanding of information and treatment and care decisions.
<b>CC4</b>	Listen actively, and encourage ideas and opinions of other team members.
<b>CC5</b>	Give timely, sensitive, instructive feedback to others about their performance on the team, responding respectfully as a team member to feedback from others.
<b>CC6</b>	Use respectful language, appropriate for a given difficult situation, crucial conversation, or interprofessional conflict.
<b>CC7</b>	Recognize how one's own uniqueness, including experience level, expertise, culture, power, and hierarchy within the healthcare team, contributes to effective communication, conflict resolution, and positive interprofessional working relationships.
<b>CC8</b>	Communicate consistently the importance of teamwork in patient-centered and community-focused care.

*Figure 5.* IPEC Competency Domain 3: Specific Interprofessional Communication Competencies (IPEC, 2011)



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***IPE learning outcomes.*** Outcomes, different from competencies, are defined as, “very specific statements that describe exactly what a student will be able to do in some measurable way” (Hartel & Foegeding, 2006, p. 69). Courses typically contain more outcomes than competencies, and competencies often have several specific learning objectives (Bresciani, 2001). Attitudes and values are not considered learning outcomes, nor are program outcomes unless they assess learning (Bresciani, 2001).

Clearly articulated learning outcomes serve as a basis for evaluating the effectiveness of teaching and learning methods (Bresciani, 2001). Literature proposes all health professions should achieve IP outcomes associated with IPE (Thistlethwaite & Moran, 2010). Changes in health care delivery models, such as the PCMH, have prompted emphasis on IPE in learning outcomes related to accreditation. (Thistlethwaite, 2012). Currently, the Commission on Dental Accreditation (CODA) standards for dental hygiene programs and ARC-PA standards for PA programs mandate objectives and or standards for teamwork and knowledge of professional roles (CODA, 2013; ARC-PA, 2010). Accreditation standards for PAs specify, “The curriculum must include instruction to prepare students to work collaboratively in interprofessional patient centered teams” (ARC-PA, 2010, p. 16, B1.08). Accreditation standards for DH state, “Graduates must be competent in interpersonal and communication skills to effectively interact with diverse population groups and other members of the health care team” (CODA, 2013, p. 24, 2-15).

Although the most common goal mentioned for IPE is to improve teamwork, other outcomes include improved teamwork, understanding roles and responsibilities of other professionals, improved communication and understanding differences in

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terminology, ability to critically reflect on position within a team, emphasized patient-centered care, and understanding stereotyping and how it affects team collaboration (General Medical Council, 2009; Thistlethwaite & Moran, 2010) (see Figure 6, for IPE outcomes).

IPE Outcomes
1. Improved Teamwork
2. Understanding Roles and Responsibilities of Other Professionals
3. Improved Communication & Understanding Differences in Terminology
4. Ability to Critically Reflect on Position Within a Team
5. Emphasize Patient-Centered Care
6. Understand Stereotyping & How it Affects Team Collaboration
Synthesized From: General Medical Council (2009); Thistlethwaite (2010)

*Figure 6.* IPE Outcomes (General Medical Council, 2009; Thistlethwaite & Moran, 2010)

Notably, a recent review of literature indicates students in health care training programs are not adequately prepared for oral health promotion and assessment, due to lack of oral health competencies (Chadbourne & Boyd, 2012). Chadbourne and Boyd (2012) conducted a study assessing the ability of DH faculty in delivering oral health content to PA and nursing students. A pre- and posttest was administered to both PA and nursing students ( $N=207$ ). Student composition in the study was 64% ( $n=136$ ) PA students and 36% ( $n=71$ ) nursing students. Comparison of pre- and posttest outcomes

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assessing oral health knowledge, perceived level of confidence in oral health assessment, and effectiveness of the content presented, indicate greater understanding of oral health, increased confidence assessing oral health, and effective delivery of oral health content (Chadbourne & Boyd, 2012) (see Figure 7, for study data). Outcomes of the Chadbourne and Boyd study demonstrate student improvements including:

1. Improved understanding of oral health and disease.
2. Increased confidence in identifying and assessing oral health problems.
3. Ability of DHs to deliver oral health content to other health care disciplines including PA
4. Identification of the importance of linking IPEC competency domains into IPE efforts.

Chadbourne and Boyd (2012) found, “The success of this interdisciplinary experience serves as a building block in the development of a model for integrating oral health content in other health professions” (p.337). Therefore, this study utilizing DHs to present oral health content to PAs and nursing students serves as a foundation for this study where a dental hygienist presented oral health content related to menopause to DH and PA students.

Question Type	Pretest		Posttest	
	Mean Score	<i>n</i>	Mean Score	<i>n</i>
Oral health knowledge	77%	159	88%	182
Perceived level of competence in oral health assessment	33%	68	86%	177
Effectiveness of DH faculty in presenting oral health content			96%	198

*Figure 7.* Chadbourne & Boyd Study (2012): Pretest/Posttest data reported by PA and nursing students

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**Evaluation of IPE.** The development of valid, reliable, and feasible evaluation of IPE outcomes remains a significant challenge for educators in health care professional programs, especially those related to teamwork and collaborative practice skills (Hammick & Anderson, 2009; Nisbet et al., 2011; Thistlethwaite, 2012). Course work and portfolios, including group and peer assessment, are commonly used to evaluate teamwork, roles, and responsibilities (Nisbet et al., 2011; Thistlethwaite, 2012). However, students' skills and knowledge are often evaluated individually and lack long-term evaluation (Nisbet et al., 2011; Thistlethwaite, 2012). Nisbet et al. (2011) acknowledge IPE outcomes are generally limited to participant satisfaction, and complicated by the inconsistency of measurement tools and the diversity of initiatives (Davidson, Smith, Dodd, Smith, & O'Loughlan, 2008; Thistlethwaite, 2012). Evaluation tools in this study included a modified "Readiness for Interprofessional Learning Scale" (RIPLS) with an integrated demographic survey, menopause knowledge pre- and posttest, patient care plan worksheet utilizing A.D.P.I.E.D. process of care and "Interprofessional Team Reasoning Framework" (IPTRF), instructor/study evaluation, and debriefing.

**RIPLS survey.** The RIPLS is commonly used in DH and PA programs to assess differences in readiness for IPE between students because of ease of use and reliability (Hertweck et al., 2012; Gourley, 2014; Segal-Gidan, Walsh, Lie, Cha Chi, & Lohenry, 2014). Developed by Parsell and Bligh (1999) and revised by McFadyen, Webster, and Maclaren (2005), RIPLS is a survey designed to evaluate students' attitudes and perceptions regarding IPE. The RIPLS consists of 19-items divided into four subscales, and uses a 5-point Likert scale (McFadyen et al., 2005). The four subscales are teamwork and collaboration, negative professional identity, positive professional identity,

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and roles and responsibilities (see Figure 8, for RIPLS subscales). The following studies demonstrate the use of RIPLS in IPE between health care disciplines in ways similar to this study including a single IPE event, and use of Wilcoxon signed-rank test. First, Wakely, Brown, and Burrows (2013) examined use of RIPLS in a relatively short-term study, using Wilcoxon signed-rank test to determine significant improvements in posttest scores. Second, Giuliani et al. (2014) indicated positive RIPLS scores may be obtained during a single IPE simulation event between health care disciplines.

RIPLS Subscales	Items	Possible Score (min-max)
1. Teamwork & Collaboration	1-9	9-45
2. Negative Professional Identity	10-12	3-15
3. Positive Professional Identity	13-16	4-20
4. Roles and Responsibilities	17-19	3-15

*Figure 8.* RIPLS Subscales (McFadyen et al., 2005)

Wakely et al. (2013) used RIPLS to evaluate IPE modules designed to facilitate clinical problem solving between medical, nursing, dietetic, occupational therapy, radiography, speech pathology, physiotherapy, and pharmacy students ( $N=105$ ). Pretest and posttest were completed by 36% of students ( $n=38$ ) representative of all initial health disciplines (Wakely et al., 2013). Students attended an average of 1.6 training modules, resulting in a mean of 4.5 hours of IPE training (Wakely et al., 2013). Analysis using Wilcoxon signed-rank test indicated significant improvement in post RIPLS scores ( $p < 0.05$ ) in teamwork and collaboration, negative professional identity, and positive professional identity domains (Wakely et al., 2013). However, no change was observed in the median RIPLS score for the roles and responsibilities domain (Wakely et al., 2013) (see Figure 9, for study data).

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A final study by Giuliani et al. (2014) used RIPLS to evaluate a single simulation event involving five simulation scenarios between students in radiology disciplines ( $N=21$ ). Although no specific data is given regarding RIPLS, results indicate positive perceptions overall and improvement in posttest scores (Giuliani, 2014) (see figure 10, for study data).

RIPLS Domain	RIPLS median (min-max range)		Z	p Value	r
	Pretest	Posttest			
Teamwork and Collaboration based on negative ranks	38.5 (31-45)	41.0 (34-45)	-3.365	0.001	-0.386
Negative Professional Identity reverse scored responses/based on positive ranks	6.0 (3-15)	5.0 (3-8)	-2.323	0.02	-0.266
Positive Professional Identity based on negative ranks	16.0 (11-20)	16.5 (5-20)	-2.026	0.043	-0.232
Roles and Responsibilities reverse scored responses/based on positive ranks	6.0 (3-15)	6.0 (5-9)	-1.204	0.228	-0.138

Figure 9. Wakely et al. (2013) Study: Comparison of pretest and posttest RIPLS scores using  $U$

RIPLS		
	Pre-IPE	Post-IPE
$N$	21	21
$\bar{x}$	83.5	85.2

Figure 10. Giuliani et al. (2014) Study: RIPLS pretest and posttest scores

**Patient care plan worksheet.** A patient care plan is a record keeping tool that documents the process of patient care, promotes accountability, aids in meeting legal and accreditation requirements, and is used for billing treatment (Keenan, Yakel, Tschannen,

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& Mandeville, 2008). Keenan et al. (2008) discuss the important role of the patient care plan in improving continuity, quality and efficiency of care, and patient safety by promoting communication within and between health care disciplines. An acronym for assessing, diagnosing, planning, implementing, evaluating, and documenting, A.D.P.I.E.D., (ADHA, 2008), is a process of care commonly used in medicine (Hirokawa, Daub, Lovell, Smith, Davis, & Beck, 2012) and dentistry (ADHA, 2008) for patient care plan development.

*A.D.P.I.E.D. process of care.* This process provides a framework for meeting patient's individual needs, identifying patient's health status, and determining health risks that may be prevented, reduced, or eliminated (ADHA, 2008) (see Figure 11, for A.D.P.I.E.D. process of care). The first phase in the A.D.P.I.E.D process of care is assessment. Assessment involves collection, analysis, and documentation of objective data regarding oral and general health (ADHA, 2008). This includes documentation of a medical or oral condition that the patient may be unaware of (College of Dental Hygienists of Ontario, 2013), such as oral manifestations of menopause. Assessment includes personal profile information, oral health history, medical health history, comprehensive clinical evaluations, and risk assessment. The second phase is diagnosis which identifies existing or potential oral or systemic health problems, and links data collected in the assessment phase to proposed treatment (ADHA, 2008). The third phase is planning in which diagnoses are prioritized, patient-centered goals and outcomes are considered, and a planned sequence of treatment actions including patient participation is outlined (ADHA, 2008). Planning is based on assessment, diagnosis, and scientific evidence (ADHA, 2008). The fourth phase is implementation or delivery of care services

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based on the care plan, and establishment of consent. Implementation includes management, prevention, patient education, and needed procedures (ADHA, 2008). The fifth phase is evaluation where the process of care is reviewed and outcomes are assessed. Practitioners evaluate measurable assessment criteria, and then communicate and collaborate with other providers to determine additional patient needs (ADHA, 2008). The final phase is documentation of all collected data. This includes complete and accurate recording of all components of the process of care, treatment planned and treatment provided, recommendations, and patient-clinician interactions (ADHA, 2008). The following studies illustrate the use of the A.D.P.I.E.D process of care.

Hirokawa et al. (2012) conducted a simulation study of nursing students ( $N=12$ ) seeking a Bachelor of Science degree. Although this study focused on communication patterns between nursing students, a primary expectation was for teams of students to recognize and initiate needed patient care using the A.D.P.I.E.D. process in the correct sequence. A qualitative study of tobacco dependence counseling in U.S. DH programs ( $N=19$ ) found the A.D.P.I.E.D. process is commonly used as a framework for students' clinical encounters (Koerber, Davis, & Newton, 2012). This study showed promise in integrating tobacco dependence counseling into the A.D.P.I.E.D. process used in clinical education (Koerber et al., 2012). This data suggests integration of oral manifestations of menopause into the A.D.P.I.E.D. process may also show promise in clinical learning.



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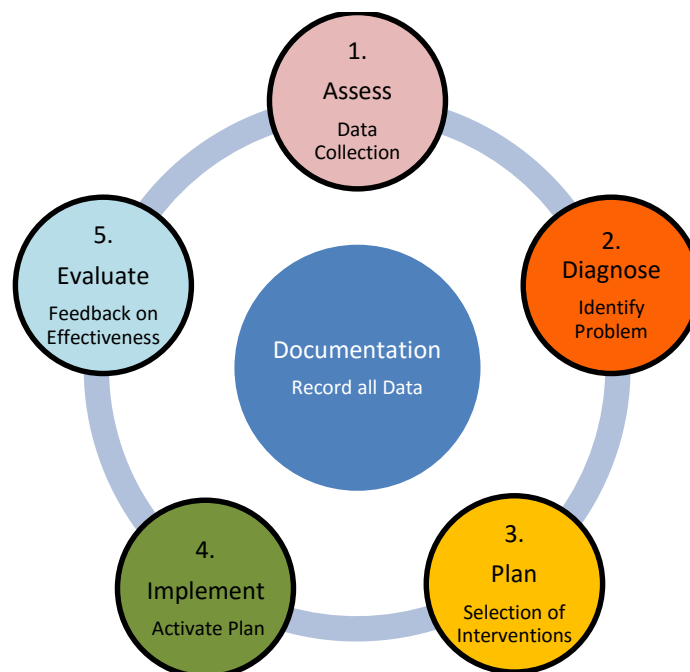


Figure 11. A.D.P.I.E.D. process of care (ADHA, 2008)

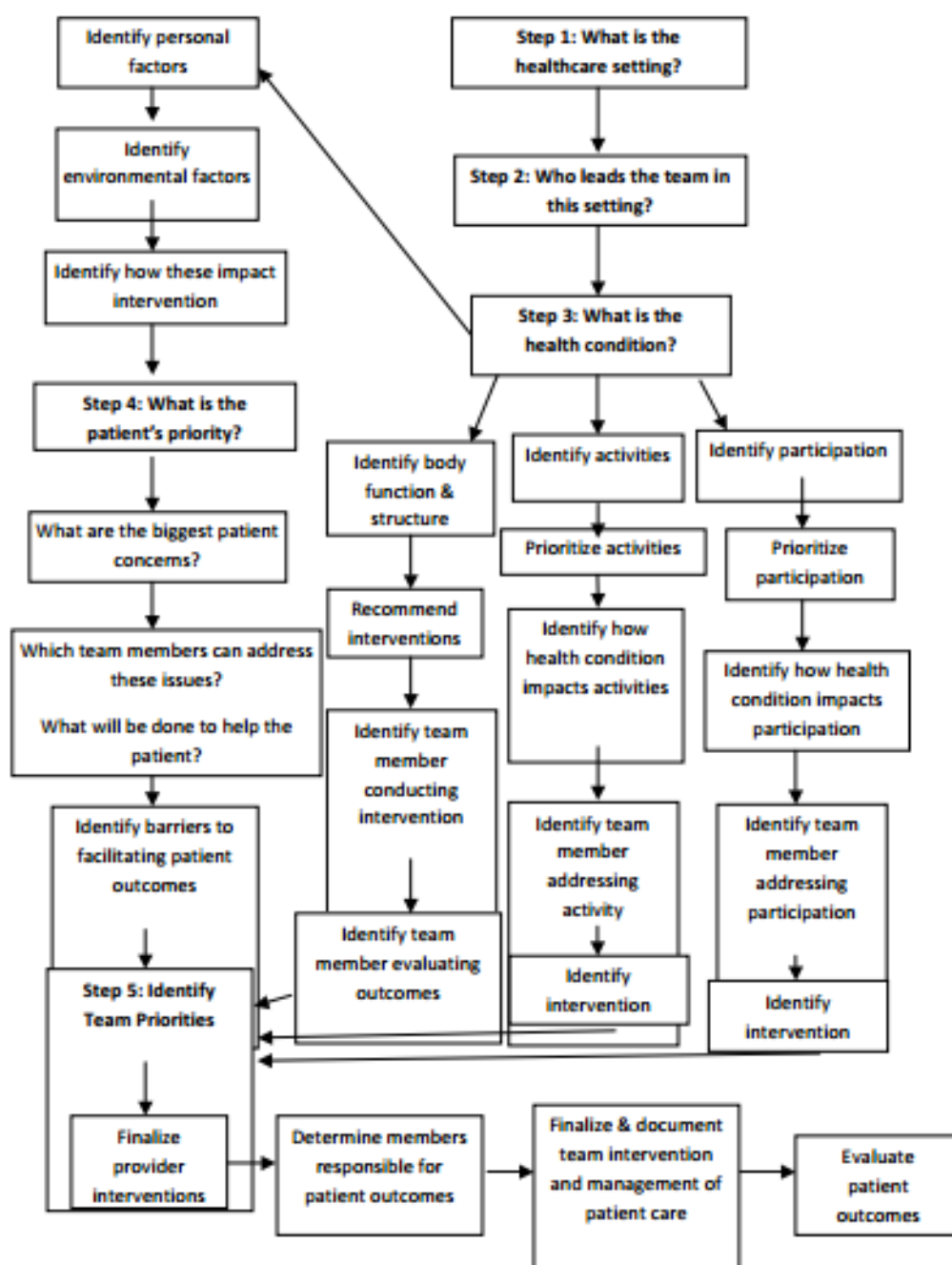
*IPTRF algorithm.* The IPTRF is an algorithm developed to facilitate CBL in health professional education (Packard et al., 2012). (see Figure 12, for IPTRF framework). An expert panel of faculty with interest in IPE created the IPTRF based on the International Classification of Functioning, Disability, and Health (ICF) developed by the WHO (Packard et al., 2012). The IPTRF enables students to analyze, deconstruct, discuss, and formulate a care plan for a SP case study (Packard et al., 2012). A study of student health care teams, using the IPTRF to create care plans based on given studies, provides support for this study. Packard et al. (2012) describe the effectiveness of the IPTRF in improving students' perceptions of team skills, and measuring changes in knowledge, skills, and attitudes.

In 2012, dental, medical, nursing, occupational therapy, pharmacy, and physical therapy students participated in a study to determine effectiveness of IPTRF in facilitating IPE. Participants ( $N=18$ ) randomly divided into three equal groups, were

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given 45 minutes to create and present a care plan based on a given case study. Students in group one ( $n=6$ ) created a care plan using only a given case. Group two ( $n=6$ ) created a care plan using a given case study and IPTRF. Group three ( $n=6$ ) created a care plan after viewing IPTRF orientation videos, using a given case study, and IPTRF. Facilitator intervention was not allowed, except to inform students of minutes remaining to complete care plan. A grading rubric used by facilitators measured collaboration, communication, and values and ethics. Results indicate IPTRF is independently associated with improved perceptions of team skills, therefore providing students with a framework that improves perceptions of teamwork and measures changes in knowledge, skills, and attitudes. Researchers advise instructors provide students and facilitators IPTRF orientation, and provide a website with sample case studies and framework teaching tools. In this study the PI utilized a modified version of the IPTRF combined with the A.D.P.I.E.D process of care.

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## Definitions of Terminology:

- Body function/structure – anatomy and physiology of the body parts (i.e., signs and symptoms, lab values, test results/diagnostics, medications, etc.)
- Activities – activities of daily living (i.e., dressing, bathing, etc.)
- Participation – roles like work, parenting, etc.
- Personal factors – factors like gender, age, education, social background, profession, etc.
- Environmental factors – social norms, culture, politics, etc.

Figure 12. Interprofessional Team Reasoning Framework (Packard et al., 2012)

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**IPE educational pedagogy.** Learning theories provide a foundation for educational pedagogy, offering verified teaching strategies to facilitate learning and insight into how students learn (Ertmer & Newby, 1993). Educational pedagogy, based on decades of research by numerous theorists, provides strong argument for changes in curriculum and teaching methods to meet the needs of students (Crawford et al., 2007). Core educational theories include behaviorism, cognitivism, constructivism (Ertmer & Newby, 1993), and andragogy (Knowles, 1980). Knowledge of various theories is essential in aligning content, teaching strategies, and techniques with learner needs (Ertmer & Newby, 1993). Reviewing literature regarding IPE pedagogy illustrates the use of various learning theories applicable to this study, and demonstrates how lecture and CBL facilitate DH and PA learning.

Behaviorism emerged as a leading education theory in the 1900's, shaped by theorists such as Thorndike, Watson, Skinner, and Pavlov (Schunk, 1996). Behaviorism facilitates mastery of content through recollection of facts, application of explanations, and automatic performance of tasks (Ertmer & Newby, 1993). Behaviorism is embedded in current teaching strategies and includes producing measurable outcomes, learner assessments, and use of prompts and cues (Ertmer & Newby, 1993).

The shift of learning theory toward cognitivism began in the late 1950's, as psychologists and educators focused on complex cognitive processes including problem solving, reasoning, information processing, and concept formation (Ertmer & Newby, 1993). Theorists contributing to cognitivism include Piaget, Lewin, Bruner, Engestrom, Gagne, and Vygotsky. Cognitivism includes use of instructional explanations, demonstrations, and corrective feedback (Ertmer & Newby, 1993). Additionally,

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cognitivism emphasizes active learner involvement, structuring and organizing information, and learning environments allowing students to recall and link prior knowledge to current tasks (Ertmer & Newby, 1993).

Constructivism is rooted in many viewpoints including those of Dewey, Bruner, Merrill, and Goodman (Ertmer & Newby, 1993). This theory is founded on the belief that learning occurs through active and meaningful experiences in the environment, and is not only from acquisition of knowledge as in behaviorism and cognitivism (Ertmer & Newby, 1993). Instruction encourages students to elaborate and interpret information and not simply recall facts (Ertmer & Newby, 1993). Constructivism proposes instructors show students how to build and evaluate knowledge that promotes collaboration, and design meaningful instructional experiences (Ertmer & Newby, 1993).

Understanding how adults learn is imperative in college level teaching (Beavers, 1999). Malcolm Knowles pioneered andragogy or adult learning, which focuses on the value of the learning process, by using collaborative and problem-based learning (PBL) rather than didactic (Beavers, 1999). In PBL, learning begins with a problem without pre-delivery of knowledge, and learning occurs as the problem is solved (Clouston, Westcott, Whitcombe, Riley, & Matheson, 2010). The focus of PBL is developing communication skills, team skills, along with acquisition of knowledge (Clouston et al., 2010). However, in this proposed study CBL, based on the principles of PBL, was chosen because it allows for pre-delivery of knowledge and clinical practice (Russell et al., 2007).

Critics indicate interactive teaching methods, including CBL, best meet the needs of adult learning as well as IPE because each involve students doing and thinking,

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thereby increasing knowledge retention (Eison, 2010; Knight & Wood, 2005; McManus, 2001; Prince, 2004; Thistlethwaite, 2015). Knight and Wood (2005) report on the success of adding active learning to lecture in an upper-level biology course. Students taught with in-class activities, collaborative group work, in-class formative assessment, and group discussion in addition to lecture ( $N=78$ ) learned more, averaging nearly 10% higher on posttest scores than the lecture only control group ( $N=74$ ) (Knight & Wood, 2005). Hence, in this study the PI employed numerous learning theories to facilitate active, collaborative, adult learning.

***Case-based learning.*** Case-based learning is a common learning approach in IPE (Thistlethwaite, 2015), and has been used for more than 100 years to link didactic and clinical training (DeMarco, Hayward, & Lynch, 2002). This approach introduces case studies to students following completion of a related lecture or lab, allowing new learning to be applied to real-life scenarios (Russell et al., 2007). Knowledge and skills applied in CBL include clinical reasoning, critical thinking, problem solving, reflective learning, and IP communication (Russel et al., 2007) (see Figure 13, for knowledge and skills applied in CBL).

Knowledge and Skills Applied In CBL
1. Clinical Reasoning
2. Critical Thinking
3. Problem Solving
4. Reflective Learning
5. Interpersonal Communication

*Figure 13.* Knowledge and Skills Applied in CBL (Russel et al., 2007)

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A qualitative study by DeMarco et al. (2002), replicating prior research by Hayward and Cairns (1998), evaluated experiences of nursing students ( $N=7$ ) using CBL. Over a 10-week period, students participated in a one-hour, weekly, CBL experience using small groups. The six thematic grouping that emerged regarding student experiences in CBL include motivation, real-world learning, knowledge development, emerging from within, and group dynamic issues. First, researchers found student motivation was both intrinsic, such as realism of case study and group relationships, and extrinsic, such as completing assignments. Second, working collaboratively to solve a case study required students to develop skills needed in the real-world including critical thinking, problem solving, prioritization, working with others, and appreciation of roles. Next, working with cases increased students' confidence in a) knowledge of the content, b) success in group work, and c) looking at a problem from different angles, processing it, and using critical thinking to reach a solution (DeMarco et al., 2002; Hayward & Cairns, 1998). These findings support research by Shulman (1986) and Schön (1983, 1987) that CBL allows students to reflect and examine reasoning related to actions (DeMarco et al., 2002). Third, CBL encourages bi-directional acquisition of knowledge between classroom and clinical settings, adding realism to the assignment and allowing students to view themselves in a professional role (DeMarco et al., 2002). Hayward and Cairns (1998) note students participating in CBL experience opportunities to 'brainstorm' and learn from peers. Other benefits of CBL, such as "emerging from within," include stimulation of self-reflection, individualizing professional growth, and valuing the advantages of multiple perspectives (DeMarco et al., 2002). DeMarco et al. (2002) link these emerging qualities to experiential learning defined by Kolb (1984). Kolb (1984)

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believes knowledge is created through reflection and observation of experiences that defy the learner's expectations from multiple perspectives, thereby changing the learner's perspective. The final theme noted by DeMarco et al. (2002) was group dynamics issues. Analysis of data determined a major benefit of CBL is the group experience; citing working collaboratively accomplishes more and achieves better outcomes (DeMarco et al., 2002). The original study by Hayward and Cairns (1998) found students developed strategies for learning from others, conflict resolution, accepting others' ideas, and providing constructive criticism.

Evidence shows CBL is routinely used to teach DHs how to communicate oral-systemic associations to patients (Vaughan et al., 1998; Wilder et al., 2008). A survey of DH programs ( $N=141$ ) investigated the extent of CBL use (Vaughan et al., 1998). Resulting data indicate the majority, 69.5% ( $n=98$ ), use the CBL approach, especially in clinic, community dental health, and dental science courses (Vaughan et al., 1998). Additionally, a recent event funded by HRSA, through the Teaching Oral-Systemic Health (TOSH) grant, utilized case studies and SP to teach students from medicine, nursing, and dental disciplines ( $N=400$ ) about the link between oral and systemic health (HRSA, 2014b).

Christenson (2014) effectively illustrates the use of CBL for a single learning experience in an IPE study of oral care for cancer patients between nursing and DH students ( $N=64$ ). Nursing ( $n=30$ ) and DH ( $n=34$ ) students organized into small groups were given a case study in conjunction with a pseudo-simulation module. The case study provided students with opportunities to enhance decision-making, critical thinking, and reflective learning (Christenson, 2014). Each group developed treatment options, and



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determined how to deliver comprehensive patient-centered care based on the case study presented (Christensen, 2014). Findings of this study revealed nursing and DH students' knowledge of oral care for cancer patients, as well as communication skills and attitudes toward IP collaboration, increased as a result of the module (Christensen, 2014).

**Standardized patients.** Harden, Stevenson, Downie, and Wilson (1975) first introduced the concept of SP, giving students the opportunity to apply newly acquired skills and knowledge. A SP is an actor trained to simulate a real-life patient encounter, allowing students hands-on clinical training without risk of patient harm (Konkle-Parker, Cramer, & Hamill, 2002). Each SP uses a script instructing proper response to questions including personal and health history, signs and symptoms, and expected lines of questioning (Konkle-Parker et al., 2002). Standardized patients undergo training and script rehearsal until their answers ensure student interactions will be consistent (Konkle-Parker et al., 2002). Studies in both DH and PA education provide significant evidence of the effectiveness of SPs (Brame et al., 2012; Langen, Hanson, Fien, & Parkhurst, 2011). This study utilized a pseudo-standardized patient due to lack of resources and availability of a true standardized patient with rigorous university training.

Feeley, Anker, Soriano, and Friedman (2010) demonstrate the use of SPs in a one-time student experience, as in this study. Medical students ( $N=170$ ) in the intervention found value in using SPs for communication training and health education promotion (Feeley et al., 2010). The use of SPs was also found to be safe and effective for evaluating the content of a health provider's patient message regarding a specific health concern prior to delivery on a real patient (Feeley et al., 2010). Feeley et al. (2010)

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state, “Students were challenged not only to memorize facts..., but to successfully and accurately reproduce the knowledge when faced with a standardized patient” (p. 258).

**Women’s health and IPE.** Health is defined as, “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (WHO, 1946, p. 100). The PPACA (2000) proposed prevention and treatment of oral diseases and conditions in women requires intervention from both dental and medical providers. First, the 2013 National Health Interview Survey reported only 63.5% of women 18 and older visiting a dentist in the last year (National Center for Health Statistics, 2014). Second, recent CDC data reported prevalence of periodontal disease in women at 38.4% (CDC, 2015). Several barriers influence utilization of oral care services including cost, inability to find services, and the lack of perceived need (HRSA, 2011; Mueller et al., 1998). The following synthesis of research illustrates the need for greater collaboration and IPE regarding women’s health.

Men and women face many of the same health challenges (WHO, 2009). However, there are many conditions specific to women that may have a negative impact on health (WHO, 2009). A recent call to action addresses the need for IP research regarding oral-systemic etiology specifically related to women, including menopause (DeBate et al., 2014). Daley et al. (2013) state, “Oral-systemic etiologies solely or disproportionately affect women’s health; however, little communication between and among disciplines occurs” (Daley et al., 2013, p. 299).

A study by Price et al. (2014) also reveals little emphasis on IPE promoting women’s oral health. These researchers evaluated the effectiveness of personalized oral health education (POHE) given by dental students during a one-day IPE women’s health

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promotion event consisting of seven stations such as nutrition counseling, and oral health education (Price et al., 2014). Stated objectives included assessing women participants' ( $N=165$ ) knowledge of the link between oral health and cardiovascular disease, disseminating information about oral-systemic linkages, encouraging comprehensive dental examinations, and evaluating POHE outcomes (Price et al., 2014). The average age of women participating in this study was 55, also a significant age for addressing oral manifestations related to menopause as in this study. Researchers utilized a "Transtheoretical Model of Change" approach to transition dental students away from the traditional "silos" separating medicine and dentistry (Price et al., 2014).

Developed by Prochaska and DiClemente in the 1970's, "Transtheoretical Model of Change," describes how individuals intentionally modify negative behaviors or acquire positive behaviors (Prochaska & DiClemente, 1983; Shinitzky & Kub, 2001). The model consists of five stages of change including:

1. Precontemplation: patient is unwilling to change/ does not recognize problem
2. Contemplation: patient considers change by weighing pros and cons
3. Preparation: patient commits to change and is motivated
4. Action: patient changes behavior
5. Maintenance: patient focuses on lifestyle changes to avoid relapse

Price et al. (2014), used the transtheoretical model to ensure needs of women participating in the health promotion event were met, by allowing dental students to aid at-risk patients in moving forward along the behavioral change continuum (Price et al., 2014). The study by Price et al. (2014) indicates the transtheoretical model may

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effectively change women's behavior in terms of oral-systemic connection, and was therefore utilized in this study.

Additionally, Price et al. (2014) developed a standardized script, used by dental students and faculty, to provide consistent content on oral health topics (Price et al., 2014). All women participating in the study completed a pre-intervention survey, POHE intervention, and post-intervention survey ( $N=165$ ). Results indicated patients' knowledge of oral-systemic health associations increased following IPE. Given the majority of women participants saw a dentist regularly, researchers were surprised to find 68% ( $n=112$ ) lacked awareness of the oral-systemic link, 25% ( $n=42$ ) did not understand effects of smoking on oral health, and 68% ( $n=112$ ) were unaware xerostomia is associated with medications related to systemic conditions. Resulting data infers oral health professionals may not be providing adequate care for women at-risk for oral manifestations related to systemic conditions. Additionally, there is a need for non-dental health care providers to examine the oral cavity, and ensure oral-systemic connections are part of patient care (Price et al., 2014). These are valid concerns in regards to identifying oral-systemic association in menopausal women.

**Menopause.** Menopause is defined as, "the time in a woman's life, usually between age 45 and 55 years, when the ovaries stop producing eggs (ovulating) and menstrual periods end" (Casper, 2015, p. 1). During menopause, the ovaries begin producing less estrogen, a hormone regulating menstruation, and less progesterone, which helps prepare the body for pregnancy (Jones et al., 2007). Menopause may be artificially induced by cancer therapy, nutritional deficiency, or surgery including total hysterectomy (Jones, Eichenwald, & Hall, 2007; Mutneja et al., 2012). Women

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undergoing partial hysterectomy where one or both ovaries are not removed still produced estrogen and are therefore unlikely to experience early onset of menopause, even though they no longer menstruate (Jones et al., 2007). Jones et al. (2007) explain the term menopause commonly describes the event as well as the years following. Therefore, the terms menopause and menopausal in this study refer to women who have ceased menses.

Menopausal women experience hot flashes, night sweats, insomnia, moodiness, problems focusing and learning, fat accumulation, vaginal dryness, osteoporosis, overactive bladder, stiff and achy joints and muscles (NIA, 2015), and oral manifestations (Suri & Suri, 2014). Evidence suggests health care providers be mindful of both systemic and oral conditions in menopausal women (Suri & Suri, 2014). Statistics indicate approximately 3000 women turn 50 years-of-age each day in the U.S. (Goodman, Cobin, Ginzburg, Katz, & Woode, 2011), and more than one-third live an average of 25-30 years after menopause (Friedlander, 2002). Santen, Loprinzi, & Casper (2015) provide evidence for all primary care professionals to provide comprehensive care to women during menopause by stating, “Up to 80% develop hot flashes (the most common menopausal symptom), but only 20 to 30% seek medical attention and treatment” (p. 1). Although there is no definitive test to diagnose menopause, a blood test to determine a rise in follicle stimulating hormone (FSH) may be used (Jones et al., 2007). A physician or PA has the ability to diagnose menopause (AAPA, 2010a; AAPA, 2010b).

*Oral manifestations of menopause.* Menopause leads to many changes in a woman’s body including those related to oral health (Suri & Suri, 2014). Manifestations

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of menopause present signs and symptoms specific to the oral cavity (see Figure 14, for oral manifestation of menopause). Additionally, menopause is associated with a higher incidence of Sjogrens syndrome, pemphigus vulgaris (Friedlander, 2002), lichen planus, and benign pemphigoid (Frutos et al., 2002).

<b>Oral Manifestations of Menopause</b>
1. Gingivostomatitis
2. Desquamative Gingivitis
3. Periodontitis
4. Osteoporosis
5. Xerostomia
6. Burning Mouth Syndrome & Altered Taste
7. Trigeminal Neuralgia

*Figure 14.* Oral Manifestations of Menopause (Synthesized from Dutt et al., 2013; Farronato et al., 2012; Mutneja et al., 2012)

Wardrop et al. (1989) studied the relationship between oral discomfort and menopause. The study included menopausal women ( $N=149$ ) divided into three groups. First, results of the study found the prevalence of oral discomfort was significantly higher in menopausal (43%) versus premenopausal woman (6%), revealing oral discomfort is a common symptom of menopause. Second, 29% ( $n=43$ ) complained of xerostomia, 15% ( $n=22$ ) oral ulceration, 6% ( $n=9$ ) BMS, and 4% ( $n=6$ ) altered taste. Third, results showed an association between oral discomfort and psychological symptoms in menopausal women. Finally, oral discomfort is often without obvious clinical signs, and is usually resolved with MHT. However, the role of MHT in relieving oral signs and symptoms related to menopause is controversial because it does not work for all women (Meurman et al., 2009).

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A recent study comparing patient perception to clinical findings in menopausal women ( $N=94$ ) reveals, of the 97.8% of women who perceive gum health ( $n=92$ ), 62.8% ( $n=59$ ) have moderate to severe attachment loss (Palomo et al., 2013). All participants took part in a 30-45 minute “awareness and education session” following a clinical exam where radiographs, clinical findings, risk factors for oral disease, plaque index, and the role of bacteria in oral disease were evaluated (Palomo et al., 2013, p. 226). Interviews conducted on randomly selected participants ( $n=20$ ) revealed a need to prioritize oral education in menopausal patients (Palomo et al., 2013). Furthermore, Palomo et al. (2013) point out menopausal women are vigilant in seeking prevention and treatment for osteoporosis, demonstrating a potential for the same drive in oral health disease prevention and treatment, if made aware and educated.

A report by Yalcin, Gurgan, and Gul (2006) evaluating menopausal women ( $N=348$ ) found only 23% ( $n=80$ ) were using hormones compared to 77% ( $n=267$ ) not taking hormones. Dental examination determined xerostomia, edentulism, decay, and periodontal status were significantly better in hormone users (see Figure 15, for study data). These findings illustrate the urgency for identification, education, and treatment of oral health manifestations associated with menopause. Sex hormones including estrogen, progesterone, and testosterone are directly related to these changes (Güncü, Tözüm, & Çaglayan, 2005).

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	Hormone Therapy	No Hormone Therapy
Women	n =80	n =267
Xerostomia	n =39	n =182
Edentualism	n =29	n =105
Decayed, Missing, Filled Teeth		higher than hormone group
Periodontal Status		higher than hormone group

Figure 15. Yalcin et al. (2006) Study: Comparison of oral health status in menopausal women taking MHT, and not taking MHT

*Periodontium.* The gingiva, periodontal ligament, cementum, and alveolar bone comprise the supporting structures of the teeth, known as the periodontium (Suri & Suri, 2014). Menopausal women are prone to an exaggerated response to oral biofilm resulting in greater bleeding on probing, loss of alveolar bone height, decreased bone mineral density (BMD) of alveolar crestal and subcrestal bone, and tooth loss (Friedlander, 2002). Risk factors for periodontitis include oral biofilm accumulation and abnormal host response, resulting from systemic disease or smoking (Page & Beck, 1997).

Menopausal gingivostomatitis is a condition affecting the gingiva, but not the connective tissue attachment or underlying bone support. Menopausal gingivostomatitis, associated with decreased saliva, is characterized by dry, shiny gingiva that bleeds easily and ranges in color from abnormally pale to very erythematous (Friedlander, 2002). Another form of gingivitis seen in menopause is desquamative gingivitis (Agha-Hosseini & Mirzaii-Dizgah, 2011). Desquamative gingivitis is characterized by erythema, erosion, vesicles, and sloughing in the gingiva (Agha-Hosseini & Mirzaii-Dizgah, 2011). Since keratinocytes are absent, tissues are soft and easily irritated (Agha-Hosseini & Mirzaii-Dizgah, 2011).



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Periodontitis is an inflammatory disease caused by oral bacteria, resulting in loss of connective tissue attachment and alveolar bone support (Pizzo et al., 2011).

Periodontitis is a disease without symptoms until late in the disease process when teeth loosen and abscess (Grover, More, Singh, & Grover, 2014). Homeostasis of the periodontium involves many factors including the endocrine system and associated sex hormones (Mariotti & Mawhinney, 2013). The effects of sex hormones produced by the endocrine system manifest in the endothelium, gingival epithelium, and connective tissue cells located in the gingiva, periodontal ligament (PDL), alveolar bone, and cementum (Apoorva & Suchetha, 2010; Mariotti & Mawhinney, 2013). Therefore, localized receptors for these hormones located in periodontal tissues as well as oral flora play a key role in host susceptibility, linking these hormones to periodontal pathogenesis (Kim & Amar, 2006; Mariotti & Mawhinney, 2013; Mutneja et al., 2012; Suri & Suri, 2014). Güncü et al. (2005) describe numerous clinical changes occurring in oral tissues during menopause (see Figure 16, for clinical oral changes of menopause).

<b>Clinical Oral Changes of Menopause</b>
1. Reduction in epithelial keratinization
2. Reduction in salivary gland flow
3. Drying of oral tissues
4. Redness/abnormal paleness of gingiva
5. Bleeding on probing and brushing

*Figure 16.* Clinical Oral Changes of Menopause (Güncü et al., 2005)

Estrogen levels affect the oral mucosa, periodontal tissues, and alveolar bone (Markou, Eleana, Lazaros, & Antonios, 2009). Estrogen receptors in both osteoclasts and osteoblasts respond to decreased estrogen in menopause (Dempster & Lindsay, 1993). Osteoclasts increase activity level as estrogen decreases resulting in increased production

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of inflammatory cytokines, whereas osteoblast activity decreases (Dempster & Lindsay, 1993). Additionally, endotoxins released from oral biofilm stimulate production of cytokines resulting in enhanced osteoclast activity and bone resorption, thus supporting the need for patient oral care education (Grover et al., 2014). Estrogen deficiency is also associated with increased activity of immune cells such as macrophages and monocytes (Grover et al., 2014). Additional estrogen receptors are located in periosteal fibroblasts in the lamina propria (Aufdemorte & Sheridan, 1981) and fibroblasts in the PDL (Nanba et al., 1989), indicating sex hormones directly affect the periodontium (Mascarenhas, Gapski, Al-Shammari, & Wang, 2003). Therefore, proposing sufficient estrogen levels are essential to periodontal health (Mascarenhas, Gapski, Al-Shammari, & Wang, 2003). Research supports the use of MHT in reducing tooth loss, periodontal disease, tooth loss, improvement of oral function, aesthetics, and self-esteem (Paganini-Hill, 2006).

Seventy-five percent of adults in the U.S. have undiagnosed periodontal disease associated with systemic problems, including osteoporosis (Duley, Fitzpatrick, Zornosa, & Barnes, 2012). Both periodontitis and osteoporosis are silent, bone resorptive diseases (Grover et al., 2014). Systemic bone loss is a risk indicator of periodontitis, and low BMD is associated with tooth loss (Grover et al., 2014). However, researchers contend osteoporosis is not an etiological factor in periodontitis (Grover et al., 2014).

Recently, researchers found a strong association between the “Fracture Assessment Risk Tool” (FRAX) scores and periodontal disease, suggesting it may be a reliable indicator of periodontal disease (Alli, Bhandal, Thacker, & Palomo, 2015). The FRAX assessment, developed by the WHO, is a validated tool accounting for risk factors such as height, weight, previous fractures, rheumatoid arthritis, smoking habits, and

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diabetes in order to calculate a 10-year probability for fracture (Shuler, Conjeski, Kendall, & Salava, 2012; WHO, n.d.). Many of these same risk factors are also associated with periodontal disease (Alli et al., 2015).

*Oral osteoporosis.* Farronato, Maspero, Folegatti, and Giannini (2012) discovered menopausal osteoporosis affects 30% of women over the age of 60. This is primarily because low levels of estrogen in menopause reduce calcium resorption and increase calcium excretion (Farronato et al., 2012), thereby reducing overall BMD (Pizzo et al., 2011). Estrogen deficiency alters bone growth, maturation, and turnover by increasing osteoclast activity and decreasing osteoblast activity (Dempster & Lindsay, 1993). Therefore, women with low BMD are more susceptible to periodontal disease (Shifren & Gass, 2014) due to reduced BMD in the maxilla and mandible (Buencamino, Palomo, & Thacker, 2009; Pizzo et al., 2011), overall decrease in alveolar bone mineral density, and increased susceptibility to alveolar bone loss (Friedlander, 2002). Bone destruction in the mandibular and maxillary alveolar processes, which anchor the teeth, is common (Grover et al., 2014). This destruction may lead to edentulism and significant resorption of alveolar ridges, leaving them unsuitable for a denture or implants (Kribbs, 1990). Bone loss is most rapid during early menopause (Friedlander, 2002), and tooth loss is seen most frequently in the maxilla (Shifren & Gass, 2014).

Oral biofilm levels and estrogen deficiency are primary etiological factors in oral bone loss, yet pathogenic research is ongoing to determine the exact link between osteoporosis, periodontal disease, and tooth loss (Buencamino et al., 2009). Research by Kribbs (1990) demonstrates women with advanced osteoporosis are three times more likely to experience tooth loss, when compared to healthy women of the same age. A

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systematic review of MHT and dental outcomes by Allen, Monroe, Connelly, Cintron, and Ross (2000) assessed 20 studies involving over 13,000 menopausal women. The review of literature found menopausal women with osteoporosis receiving MHT, had fewer adverse dental outcomes (Allen et al., 2000). Since osteoporotic jaws are usually not suitable for dental implants or prosthetic devices, such as dentures and partials, treatment improving dental outcomes is imperative (Paganini-Hill, 2006).

*Xerostomia*. Defined as the subjective sensation of oral dryness (Grover et al., 2014, p.3), oral discomfort associated with xerostomia occurs in 43% of menopausal women compared to 6% of premenopausal women (Nederfors, Isaksson, Mörnstad, & Dahlöf, 1997). Xerostomia is associated with stomatodynia (painful mouth), temporomandibular disorder (TMD), diffuse gingival atrophy, bitter taste, halitosis, oral ulcerations (Grover et al., 2014), dental caries, periodontal disease, and oral candidiasis (Friedlander, 2002; Lopez, Perez, & Soriano, 2011; Suri & Suri, 2014).

Decreased estrogen in menopause affects oral tissues in the same way it does the rest of the body (Suri & Suri, 2014). Oral mucosa and vaginal mucosa are similar in histology and response to sex hormones (Suri & Suri, 2014). Therefore, sex hormone receptors in oral mucosa and salivary glands are affected much like those in vaginal mucosa (Suri & Suri, 2014), both experiencing decreased quality and quantity of secretions (Farronato et al., 2012). Because saliva is the primary defense mechanism in the oral cavity, a decrease in flow negatively affects teeth and oral mucosa (Meurman et al., 2009). A reduction in salivary flow may also lead to prolific colonization of oral bacteria, and increased likelihood for systemic implications (Meurman et al., 2009). Meurman et al. (2009) emphasize the feeling of xerostomia is subjective and does not

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always correlate with actual salivary output, since the volume of saliva varies between women. In fact, researchers found many menopausal women report a decrease in salivary flow, yet hyposialia is present in only one-third (Lopez et al., 2011). A study of menopausal women ( $N=348$ ) found xerostomia was less frequent in those receiving MHT (Yalcin et al., 2006).

*Burning mouth syndrome.* Burning mouth syndrome (BMS), a chronic condition occurring in 12% to 18% of menopausal women (Sun et al., 2013), is directly related to decreased estrogen (Grover et al., 2014). The appearance of normal, healthy mucosa makes BMS difficult to diagnose and not well understood (Saba, 1999). Also known as glossodynia or stomatodynia, BMS is a painful, bilateral burning sensation in the lips, tongue, palate, and areas of denture support (Dutt, Chaudhary, & Kumar, 2013; Saba, 1999). BMS is most prevalent in the anterior two-thirds of the tongue (Dahiya, Kamal, Kumar, Gupta, & Chaudhary, 2013). Grover et al. (2014) found multiple sites may be affected simultaneously including the a) anterior two-thirds, dorsum and lateral border of the tongue, b) anterior hard palate, and c) mucosa of the lower lip. Unremitting oral burning and pain occur deep in the oral tissues, like a hot coffee burn (Grover et al., 2014). Symptoms may appear spontaneously or gradually, and are often associated with a bitter taste sensation (Farronato et al., 2012; Grover et al., 2014). Concurrently, many women experience xerostomia, altered perceptions of taste in salty, peppery, or sour foods (dysgeusia), halitosis, difficulty swallowing, and facial or dental pain (Shigli & Giri, 2015). Symptoms typically worsen over the day, and persist for months or even years (Grover et al., 2014). However, BMS seldom interferes with sleep and never

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worsens (Sun et al., 2013). Manifestations of BMS may affect eating habits and cause extreme thirst (Saba, 1999).

Clinical diagnosis of BMS relies on detailed medical and dental histories, absence of findings in physical and laboratory examinations, and exclusion of other conditions (Sun et al., 2013). Burning mouth syndrome is classified into primary and secondary forms (Scala, Checchi, Montevecchi, Marini, & Giamberardino, 2003). Primary BMS affects 35% of women, and is idiopathic because local and systemic causes are not identifiable (Scala et al., 2003). A neuropathological cause is likely, but diagnosis depends on exclusion of possible etiological factors (Scala et al., 2003). Secondary BMS, affecting 55% of women, is caused by local, systemic, and psychological factors (Scala et al., 2003). Treatment of secondary BMS depends on identifying and eliminating the exact causative factor (Scala et al., 2003). Local causative factors include poorly fitting prosthesis, parafunctional habits such as tongue thrust and lip sucking, dental anomalies, allergic reactions, infection, chemical factors, galvanism, taste alteration, and xerostomia (Lopez-Jornet, Camacho-Alonso, Andujar-Mateos, Sanchez-Siles, & Gomez-Garcia, 2010). Menopause is included as a systemic factor along with diabetes, hypothyroidism, deficiencies in vitamin B complex, iron, zinc, anemia, gastrointestinal anomalies, medication, and Sjogrens syndrome (Lopez-Jornet et al., 2010).

Burning mouth syndrome is classified into three types, but Type I is most common in menopausal women (Scala et al., 2003). Type I BMS is characterized by a burning sensation that intensifies throughout the day, with peak intensity in the evening (Scala et al., 2003). Type II BMS displays continuous symptoms throughout the day, and

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sleep is affected (Scala et al., 2003). Type III BMS, often associated with allergic reaction, displays intermittent symptoms (Scala et al., 2003). If signs and symptoms continue following removal of causative factor, further treatment is needed (Scala et al., 2003).

*Trigeminal neuralgia.* Trigeminal neuralgia, frequently associated with menopause, is caused by compression of the superior cerebellar artery on any of the trigeminal nerve branches (Friedlander, 2002). Characterized by a severe, unilateral, shock-like pain, trigeminal neuralgia usually occurs in the middle to lower third of the face (Friedlander, 2002). Patients may believe they have a toothache and seek dental treatment (Friedlander, 2002), suggesting comprehensive assessment of menopausal women is crucial.

*Oral health management in menopause.* Management of oral health in menopause includes collaboration between medical and dental providers regarding oral health assessment, counseling patients about modifiable risk factors, evaluation for MHT, and testing BMD. The type of treatment depends on several factors including symptoms, medical history, and personal preferences (Jones et al., 2007). Oral management of menopausal patients begins with a thorough health history (Dutt et al., 2013) and HEENOT exam (Haber et al., 2015), followed by periodontal and dental assessments. Assessments include radiographs, periodontal charting, plaque index, sialometry (test for quantity and quality of saliva flow), and counseling for modifiable risk factors such as smoking and alcohol consumption (Dutt et al., 2013; Lopez et al., 2011).

Strauss et al. (2013) studied a convenience sample of patients at risk or currently receiving care for diabetes at New York University periodontics and implant clinic.

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Patients completing the diabetes knowledge assessment ( $N=111$ ) were 56% female ( $n=62$ ) and averaged 56.6 years of age, also representing women at risk for oral manifestations of menopause. Surprisingly only 11.7% ( $n=13$ ) knew diabetes increased the likelihood of developing periodontal disease. Additional information, provided by 109 of the 111 patients, shows 59.1% ( $n=64$ ) of those with diabetes were initially diagnosed by a health care provider. In light of the number of systemic conditions that go undiagnosed, researchers express the need for health care providers to perform comprehensive assessment of risk factors in individuals at risk (Strauss et al., 2013). This recommendation suggests screening may identify women at risk for oral manifestations related to menopause, and allow for collaboration with other health care providers. Results of the study concluded DHs are in an ideal position to provide comprehensive care and precise information to patients regarding oral-systemic conditions (Strauss et al., 2013).

Furthermore, Nasseh, Greenberg, Vujcic, and Glick (2014) developed a model based on existing literature regarding medication adherence, chronic disease prevalence, and behavior health, to calculate one-year savings in health care spending associated with implementation of medical screenings in the dental office. Results of the study, estimated before labor costs and using an 83% referral completion rate, show \$102.6 million in health care system savings over a one-year period when screenings for diabetes, hypercholesterolemia, and hypertension are performed in the dental office (Nasseh et al., 2014). As the number of women transitioning through menopause increases (U.S. Census Bureau, 2012) it may also be assumed the prevalence of undiagnosed chronic oral conditions may increase as well, resulting in greater cost.



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Therefore, Nasseh et al. (2014) propose oral health providers possess greater potential for detection, monitoring, and prevention of chronic conditions.

Menopausal hormone therapy, as estrogen alone or in combination with progestin, is commonly used to manage the manifestations of menopause affecting BMD and quality of life (Lewis, 2013). The Federal Drug Administration (FDA) has approved MHT for treatment of moderate to severe vasomotor menopausal symptoms, osteoporosis, and vaginal dryness (Goodman et al., 2011). However, the effects of MHT on gingival inflammation and bleeding (Pizzo et al., 2011; Saba, 1999), gingival attachment, and probing depths (Pizzo et al., 2011) are controversial. Estrogen alone is used only after hysterectomy (Goodman et al., 2011). Estrogen in combination with progestin is used in women with a uterus to reduce the risk of endometrial and colon cancers, yet consequently increases risk of breast cancer (Goodman et al., 2011).

Alternatives to MHT include selective serotonin reuptake inhibitors (SSRI's), selective serotonin and norepinephrine reuptake inhibitors, clonidine, and gabapentin for relief of vasomotor symptoms (ACOG, 2014). The only non-hormonal FDA approved medications include paroxetine to treat vasomotor symptoms and ospemifene to treat vaginal dryness (Lewis, 2013).

The American Congress of Obstetricians and Gynecologists (2014) cautions all medications have potential side effects and associated risks. Therefore, providers and patients should weigh risks and benefits, and individualize care by using the lowest dose for the shortest duration (ACOG, 2014). Systemic MHT with estrogen alone or in combination with progestin is currently the most effective approach for treating vasomotor symptoms such as hot flashes (ACOG, 2014) (see Figure 17, for FDA

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contraindications to MHT). The ACOG advises data does not support the use of progestin alone, testosterone, compounded bioidentical hormones, phytoestrogens, or herbal supplements such as black cohosh (ACOG, 2014). Additionally, the ACOG recommends layering clothes, lowering the room temperature, consuming cold drinks frequently, and using non-estrogen, water-based or silicone-based lubricants (ACOG, 2014).

<b>FDA Contraindications to Hormone Therapy</b>
1. Current, past, or suspected breast cancer
2. Known or suspected estrogen-sensitive malignant conditions
3. Undiagnosed genital bleeding
4. Untreated endometrial hyperplasia
5. Previous idiopathic or current venous thromboembolism
6. Active or recent myocardial infarction
7. Untreated hypertension
8. Active liver disease
9. Known sensitivity to HT
10. Porphyria cutanea tarda (absolute contraindication)

Figure 17. The FDA contraindications to MHT (Lewis, 2013)

**Menopause oral health treatment guidelines.** Treatment for oral manifestations of menopause centers on MHT, oral hygiene, and modifiable risk factors (Buencamino et al., 2009 Frutos et al., 2002) (see Figure 18, for basic menopause oral health guidelines). Management of oral manifestations includes oral care, modifiable risk counseling, and treatment specific to each condition (see Figure 19, for management guidelines for specific oral manifestations). Differential diagnosis must be considered to determine true etiology and eliminate the possibility of serious underlying factors (Saba, 1999).

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It is important to introduce adequate oral hygiene aids to maintain low levels of oral biofilm (Dutt et al., 2013). Oral hygiene instruction for menopausal women begins with tooth brushing and flossing morning, night, and after meals (Farronato et al., 2012). A powered toothbrush is most effective at oral biofilm removal, and often has a built in two-minute timer to ensure adequate brushing (O'Rourke, 2012). A manual toothbrush or powered toothbrush head should be replaced every 3-4 months or when bristles are splayed (Bhardwaj & Bhardwaj, 2012). Adjunct homecare tools may include an interdental brush or rubber tip stimulator (Farronato et al., 2012). Fluoride products in various forms may be utilized including toothpaste, mouth rinse, and varnish (Dutt et al., 2013). Chlorhexidine gluconate mouth rinse is the most effective chemotherapeutic agent for reducing oral bacteria and biofilm and preventing dental caries, by reducing *Streptococcus mutans* levels (Frutos et al., 2002).

Patient counseling regarding nutrition and modifiable risk factors should address smoking, alcohol use, caffeine consumption, salt intake, and stress reduction (Buencamino et al., 2009; National Osteoporosis Foundation [NOF], n.d.). Regular medical and dental visits allow for early detection, monitoring, and treatment of oral conditions related to menopause, and evaluation for other possible underlying factors affecting oral health (Saba, 1999).

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<b>Basic Menopause Oral Health Guidelines</b>	
<b>Oral Care</b>	Regular Dental Visits every 3, 4, or 6 months are directed Electric Toothbrush w/ head replacement every 3-4 months Toothbrushing morning, night & after meals Flossing morning, night, & after meals Adjunct Tools: interdental brush Fluoride Toothpaste, Rinse, Varnish Chlorhexidine Gluconate Rinse
<b>Modifiable Risks</b>	Smoking Alcohol Consumption Caffeine Salt intake Nutrition Exercise Level Stress Level

*Figure 18.* Basic Menopause Oral Health Guidelines (Synthesized from Dutt et al., 2013; Frutos et al., 2002; Greenberg et al., 2008; Loe, 2000; Lopez et al., 2011; Portillo, 2002)

*Periodontal management.* Regular maintenance visits with the DH or periodontist are essential for reinforcing oral care instruction, monitoring health history, and maintaining periodontal health (Darby & Walsh, 2015). Frequency allows practitioners to access and monitor bone health with radiographs, and tissue health with periodontal probing and gingival assessment (Darby & Walsh, 2015). Periodontal maintenance visits at three to four month intervals are standard of practice following non-surgical periodontal therapy (Darby & Walsh, 2015). Additional medical intervention may include MHT or other medications (Suri & Suri, 2014). Research indicates oral tissues respond best to conjugated MHT (Suri & Suri, 2014), and desquamative gingivitis responds well to corticosteroids (Farronato et al., 2012).

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*Oral osteoporosis management.* Regular dental visits are essential in detection and management of oral osteoporosis because panoramic radiography (Watanabe, Farman, Watanabe, & Issa, 2008) and digitized periapical radiographs (Friedlander, 2002), used routinely in dental offices, may differentiate between individuals with high and low BMD. Researchers determined the panoramic radiograph is an important tool in osteoporosis diagnosis because it reveals alveolar bone resorption and reduced thickness in mandibular cortical bone (Watanabe et al., 2008). Additionally, radiographic features of oral osteoporosis include radiolucency in the mandible and maxilla and thinning of the cortical bone (Watanabe et al., 2008). Mandibular inferior cortical bone width less than three millimeters may be indicative of osteoporosis (Watanabe et al., 2008). Osteoporosis screening is encouraged for menopausal patients (Wisconsin Women's Health Foundation, 2014).

A healthy lifestyle with a well-balanced diet including 1,500 to 2,000 milligrams of calcium daily, 800-1,000 IUs vitamin D daily, physical exercise, and regular dental visits is advised (Buencamino et al., 2009; NOF, 2015). The NOF (2015) recommends consuming caffeine, alcohol, and salt in moderation because they affect calcium absorption and excretion. Other factors associated with increased risk of osteoporosis include family history, smoking, fair complexion, and medications such as steroids (Friedlander, 2002). Treatment of oral osteoporosis often coincides with systemic treatment which may include calcium and vitamin D supplements, anti-osteoporotic medications such as bisphosphonates (BP) (Lin & Lane, 2003), parathyroid hormone, raloxifene, and estrogen (Nayak, Roberts, & Greenspan, 2011). Estrogen only or combined MHT is advised for short-term use in cases of persistent oral symptoms (Suri

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& Suri, 2014). However, Apoorva and Suchetha (2010) found, of the small number of women receiving MHT, many fear cancer, irregular bleeding, or other side effects that often affect compliance. BPs such as alendronate (Jeffcoat, Cizza, Shih, Genco, & Lombardi, 2007; Rocha, Malacara, Sanchez-Marin, Vazquez de la Torre, & Fajardo, 2004) and risedronate (Palomo, Bissada, & Liu, 2005) have been shown to improve periodontal status, yet research is ongoing (Bhardwaj & Bhardwaj, 2012). Differential diagnosis for osteoporosis caused by menopause includes hyperparathyroidism, hyperthyroidism, hypogonadism, medications, vitamin D deficiency, organ transplantation, gastrointestinal diseases, hematologic diseases, Cushing's syndrome, and idiopathic hypercalciuria (Hudec & Camacho, 2013).

Bisphosphonates are drugs used for prevention and treatment of osteoporosis, Paget's disease, and metastatic bone conditions (Polymeri, Kodovazenitis, Polymeris, & Kombol, 2015). Commonly prescribed BPs include alendronate (Fosamax®), risedronate (Actonel®), and ibandronate (Boniva®). BPs' affinity for bone and ability to treat osteoporosis has opened the possibility for future use in managing periodontal disease (Tenenbaum, Shelemay, Girard, Zohar, & Fritz, 2002). These BP drugs inhibit bone turnover and remodeling by inhibiting osteoclast function (Lopez et al., 2011). Therefore, BP therapy may be beneficial to the periodontium (Bhardwaj & Bhardwaj, 2012). Research suggests BP therapy improves non-surgical periodontal therapy (NSPT) outcomes and may serve as an appropriate adjunct for treatment of periodontal disease and preservation of periodontal bone mass (Lane et al., 2005). Alendronate increases bone turnover and improves periodontal status in menopausal women (Rocha et al, 2004). Risedronate therapy in menopausal women appears to reduce oral biofilm accumulation,

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reduce gingival inflammation and attachment loss, decrease periodontal pocket depth, and improve alveolar bone levels (Palomo et al., 2005). Currently, an effective dose regimen and targeted delivery system needed for positive outcomes, and not leading to Bisphosphonate-associated osteonecrosis (BRONJ), have not been developed for slowing the progression of periodontal disease (Palomo, Liu, & Bissada, 2007).

Bisphosphonate-associated osteonecrosis (BRONJ) defined as, “the presence of exposed bone in the maxillofacial region that does not heal within eight weeks after identification by a health care provider” (Montgomery, Bracey, & Suva, 2011, p. 2), is seen in patients treated with oral and intravenous BP (Lopez et al., 2011). Depending on the length of time taking oral BP, risk of BRONJ ranges from 1: 10,000 to less than 1:100,000 patients (Montgomery et al., 2011). Risk of BRONJ in oral cancer patients treated with high-dose intravenous BPs is substantially higher, ranging from 1:10 to 1:100 patients (Montgomery et al., 2011). However, a direct causal link between BP therapy and BRONJ has not been established due to insufficient evidence (Montgomery et al., 2011). BRONJ is more common in the mandible, and characterized by the spontaneous appearance of necrotic bone or appearance following invasive surgical dental procedures (Lopez et al., 2011; Polymeri et al., 2015). The AAOM (2008) reports this condition may not cause pain until the exposed bone becomes infected, and may lead to numbness in the jaw.

Preventive treatment includes antibiotic prophylaxis 1 day prior and 3-7 days following dental procedures, chlorhexidine rinse, and systemic antibiotics pre and post tooth extraction to reduce risk of BRONJ (Hellstein et al., 2011). Current treatment for BRONJ includes antiseptic rinses, systemic antibiotics, and removal of necrotic bone,

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with a focus on controlling pain and preventing infection; therefore, prevention is crucial (AAOM, 2008). The severity of BRONJ justifies the need for a thorough medical and dental history on every patient in order to identify those at high risk (Polymeri, 2015). The American Dental Association (ADA) advises basing clinical recommendations on the specific type of BP therapy being administered (Hellstein, et al., 2011).

The ADA recommends treating a patient with active dental or periodontal disease, despite the risk for BRONJ, because the consequences of no treatment usually outweigh the risk of developing BRONJ (Hellstein et al., 2011). An oral health program including proper homecare practices and dental care appears to be the best approach for reducing BRONJ risk (Hellstein et al., 2011). Good communication between medical and dental providers and the patient is vital in care planning (Hellstein et al., 2011). It is important for the medical provider prescribing or planning to prescribe BP therapy to inform the patient and their dental provider of the risks (Hellstein et al., 2011). It is the responsibility of the dental provider to discuss risk and benefits of dental care because the patient may not be aware (Hellstein et al., 2011). Additionally, the dental provider should inform the patient of dental treatment needed, alternative treatments, risk of BRONJ, and risks associated with discontinuing BP therapy for any period of time (Hellstein et al., 2011).

A non-cancer patient's risk of developing BRONJ appears to be low, but it is difficult to predict risk as there are no validated diagnostic techniques available to determine patients with increased risk (Hellstein et al., 2011). Risk factors for BRONJ include use of BPs for more than two years, being over the age of 65, periodontitis, diabetes, tobacco use, wearing dentures, and possibly corticosteroid use (Hellstein et al.,



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2011). Any patient on BP therapy is at risk for developing BRONJ by means of denture irritation or food trauma. However, there is no evidence that malocclusion or mastication increases BRONJ risk. Most cases occur after invasive procedures including tooth extraction or oral surgery (AAOM, 2008). If a patient is on BP therapy the following should be considered (AAOM, 2008; Hellstein et al., 2011)

- Oral BPs can result in BRONJ, but the risk is much lower than systemic BPs
- The risk of developing BRONJ may be reduced but not eliminated
- Discontinuing BP therapy does not eliminate risk for BRONJ and may negatively impact outcomes of low bone mass treatment
- The possibility of multifocal involvements should be avoided
- Preventive and restorative treatments including endodontic therapy are preferred to extraction
- All emergency dental treatment including but not limited to active abscess, purulent periodontal pockets, severe periodontitis, and periapical pathoses involving medullary bone are risk factors for BRONJ and should be treated immediately, even if multiple quadrants are involved
- When dental pathoses are not evident treatment should be carried out one sextant at a time to evaluate healing
- Patients should be fully informed of BRONJ risk, discussion with patient documented regarding risks and benefits of treatment, and consent form signed
- Patients should contact their dentist promptly if any oral problems develop

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All routine restorative procedures should aim to limit the impact on bone, and ill-fitting prosthetic appliances should be adjusted immediately to avoid ulceration and bone exposure (Hellstein et al., 2011). Endodontic therapy is preferable to extraction, but manipulation beyond the apex is not recommended (Hellstein et al., 2011). In general, patients on BP therapy should receive appropriate non-surgical periodontal therapy combined with a four to six-week re-evaluation (Hellstein et al., 2011). The ADA notes surgical periodontal therapy is not contraindicated, but minimal dento-alveolar manipulation is preferred (Hellstein et al., 2011). The orthodontist must be aware and vigilant for the potential risk of BRONJ caused by altering bone, and realize movement may take longer (Hellstein et al., 2011). Frequent professional cleanings and oral assessment, oral hygiene and biofilm control, smoking cessation, and limited alcohol consumption are vital to prevent BRONJ (AAOM, 2008). Preservation of teeth with root canal or other conservative approaches is advised over extraction (AAOM, 2008); dental treatment should be limited to essential procedures (Khan, 2010).

*Xerostomia management and caries prevention.* Xerostomia management and caries prevention includes the use of MHT (Dutt et al., 2013), sipping water frequently, saliva substitutes, sugar free gum or mints, xylitol products, sialogogues, fluoride products (Frutos et al., 2002; Greenberg, Glick, Ship, & Burket, 2008; Lopez et al., 2011; Portillo, 2002), low carbohydrate diet, tooth brushing and flossing (Loe, 2000), and chlorhexidine gluconate oral rinse (Lopez et al., 2011). Researchers indicate menopausal women may experience difficulty removing dentures and allergies to metal or acrylic bases in dentures and oral prostheses (Bhatia, Bhatia, Jain, & Jadon, 2013). Meurman et

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al. (2009) also caution using antidepressants to treat hot flashes may worsen xerostomia symptoms. Differential diagnosis includes xerostomia caused by medication, diabetes, hypothyroidism, head and neck radiation, surgical removal of salivary glands, and Sjogrens syndrome (Cassolato & Turnbull, 2004).

*Burning mouth syndrome management.* Oral mucosa associated with BMS appears normal, making diagnosis difficult (Suri & Suri, 2014). Even though no specific treatment exists for BMS (Farronato et al., 2012), vitamins, zinc, MHT, capsaicin, alpha-lipoic acid, clonazepam, antidepressants, psychotherapy and behavioral feedback are utilized (Sun et al., 2013). However, management commonly includes MHT (Suri & Suri, 2014) and/or low-dose topical or systemic clonazepam (Dutt et al., 2013). Furthermore, data indicates conjugated estrogen is more effective with 7 out of 10 women experiencing BMS symptom relief, compared to 12 out of 22 taking estrogen alone (Volpe et al., 1991). The benefit from MHT may relate to the presence or absence of estrogen receptors in the oral epithelium (Forabosco et al., 1992).

The clinician should explain and support without promises or optimism, as the patient must accept and live with BMS (Frutos et al., 2002). Differential diagnosis includes serious conditions such as anemia, leukemia, severe vitamin deficiency, undiagnosed diabetes, oral candidiasis (Saba, 1999), lichen planus, or viral infection (Suri & Suri, 2014), Sjogrens syndrome, post-radiation treatment of head and neck region, anxiety, depression, personality disorder, ill-fitting denture, or allergic reaction such as those to related to acrylic denture base material (Shigli & Giri, 2015).

*Trigeminal neuralgia management.* Grover et al. (2014) advise office protocol to reduce anxiety and stress in menopausal women, including short appointments.

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Trigeminal neuralgia may affect denture retention and procedures requiring impressions, or recording jaw relationship (Chiramana & Ashok, 2010). Differential diagnosis includes other neurologic disorders such as Alzheimer's disease (Friedlander, 2002).

<b>Additional Management Guidelines for Specific Oral Manifestations</b>	
<b>Periorthium</b>	Hormone Therapy Corticosteroids for Desquamative Gingivitis
<b>Oral Osteoporosis</b>	Radiographs: Bitewings, Periapicals, & Panoramic 1,500-2,000 mg Calcium Daily 800-1,000 Ius Vitamin D Daily Medications & Therapies coincide with systemic treatment Osteoporosis Screening
<b>Xerostomia &amp; Caries</b>	Sialometry Sipping Water Frequently Saliva Substitues Sialogogues Sugar Free Mints/Gum Xylitol Mints/Gum/Oral Patches Prescription 1.1% Sodium Fluoride Toothpaste Fluoride Varnish Hormone Therapy
<b>BMS</b>	Vitamins Zinc Hormone Therapy Clonazepam Systemic or Topical Antidepressants Capsaicin Alpha-Lipoic Acid Psychotherapy Behavioral Feedback
<b>Trigeminal Neuralgia</b>	Stress and Anxiety Reduction Short appointments

Synthesized From: Buencamino et al., 2009; Dutt et al., 2013; Farronato et al., 2012; Friedlander, 2002; Frutos et al., 2002; Greenberg et al., 2008; Grover et al., 2014; Lopez et al., 2011; NDF, 2015; Portillo, 2002; Sun et al., 2013; Suri & Suri, 2014; Watanabe et al., 2008)

*Figure 19.* Management Guidelines for Specific Oral Manifestations

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**Role of the DH and PA.** Hendricson and Cohen (2001) recognized, “The most pressing oral health issues are no longer purely dental in nature but fall into the overlapping educational and patient care environment of physicians, dentists, and other health care providers” (p. 1188). The link between oral and systemic diseases and conditions is an impetus for IPE, especially between DH and PA disciplines. However, only 4% of DH programs participate in IPE with other health care disciplines (Wilder et al., 2008). Literature regarding IPE specifically between DH and PA students is limited, as IPE research has a more general focus on dental, medical, and nursing students. Additionally, there is a paucity of research regarding menopause in IPE between DH and PA students. To identify how DHs and PAs play a role in caring for a menopausal patient, the expertise and scope of practice for these health care providers must be established. Both primary care professions are in a position to facilitate the implementation of collaborative, patient-centered care in America’s health care system (ADHA, 2014b; AAPA, 2010a; AAPA, 2010b). Although degree options are available, this study focuses on Bachelor of Science in Dental Hygiene degreed DH students and a combination of Bachelor and Master of Clinical Health Services degreed PA students (see Figure 20, for DH and PA education in the U.S.).

<b>EDUCATION</b>		
	<b>Dental Hygienist</b>	<b>Physician Assistant</b>
<b>Degree Options</b>	Certificate <b>Associate *</b> Bachelor Master	Certificate Associate Bachelor <b>Master *</b>
<b>Number of Programs</b>	335	196
<b>*indicates most common degree obtained</b>		

Figure 20. DH and PA Education in the U.S. (ADHA, 2014b; ARC-PA, 2015)

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Comparison of Education: Bachelor DH & Bachelor and Master PA		
	DH	PA
<b>Length of Program</b>	5 Semesters	Bachelor: 8 quarters Master: 9 quarters
<b>Clinical Hours</b>	623 dental hygiene clinic 228 restorative clinic plus additional non-calculated rotations	4 month preceptorship in family medicine 6 one-month clerkships in other areas of medicine
<b>Courses</b>	Head & Neck Anatomy Radiography Pathophysiology Pharmacology Dental Anatomy Pre-Clinic Preventive Dentistry Histology/Embryology Pain Control Management of Medically Comprised Patient Clinic Principles of Restorative Dentistry Periodontology Oral & General Pathology Research & Methods Community Dental Health Teaching Practicum Restorative Clinic Ethics & Jurisprudence Capstone	Anatomy & Physiology Basic Science in Clinical Medicine Pathophysiology Basic Clinical Skills Behavioral Medicine I, II, III Professional Role Development I, II Technical Skills I,II,III Adult Medicine I,II Maternal & Child Health I,II Principles of Patient Management 1,11 Emergency Medicine I,II Investigative Skills Focused Study Course  <u>Master's Students also complete:</u> Investigative Skills Capstone Project Either MEDEX 540, 541, 542, or 543

*Figure 21.* Comparison of Baccalaureate DH & Graduate PA programs (Eastern Washington University, 2015; MEDEX Northwest, 2015)

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***Role of the DH.*** The DH profession is based on a foundation of prevention and preventive oral health dating back over 100 years (Milling, 2010). In fact, dental nurses began preventing oral disease in the 1880's by means of oral prophylaxis (Milling, 2010). By the early 1900's the DH profession was focused on health outcomes and measuring how programs effect oral health (HRSA, 2014b), as the first DH education program was established (ADHA, 2015a).

Today DHs are primary care experts in oral care assessment, examination, and therapeutic and educational services related to oral health (ADHA, 2014b). Although the scope of DH has evolved over the years and new mid-level dental providers have emerged, the complementary expertise of DHs and dentists contribute to optimal patient care (ADHA, 2014b). Seiler and Howard (2015) propose DHs are in a position to promote the "Triple Aim", by screening for chronic disease in the dental office.

***DH education.*** Although the majority of DH degrees are obtained from associate degree programs, entry-level programs also include certificate and baccalaureate degree programs housed in technical schools, community colleges, and universities (ADHA, 2014b). All 335 entry-level programs in the U.S. are accredited by the Commission on Dental Accreditation (CODA), and require an average of 2,932 hours of curriculum including 659 hours of supervised clinical DH instruction (ADHA, 2014b). General education courses include English, speech, psychology, and sociology. Required courses incorporate basic sciences such as general chemistry, anatomy and physiology, biochemistry, microbiology, pathology, nutrition, and pharmacology. Dental science courses include dental anatomy, head and neck anatomy, oral embryology and histology, oral pathology, radiography, periodontology, pain control, dental materials, oral health

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education/preventive counseling, patient management, clinical dental hygiene, community dental health, medical and dental emergencies, and supervised instruction in pre-clinical and clinical practice (ADHA, 2014b). Mandatory prerequisite courses for the Eastern Washington University Dental Hygiene Program (2015) include:

- Two semesters of Anatomy and Physiology with lab
- Organic, inorganic, and biochemistry
- Microbiology with lab
- Nutrition
- English 101
- Psychology 100
- Interpersonal Communication
- Computer literacy

All prerequisite courses must be completed within five years of application to the program. Although the minimum grade-point-average (GPA) to apply is 2.0, the average accepted GPA is 3.8 (Eastern Washington University, 2015) (see Figure 21, for comparison of Eastern Washington University DH and MEDEX Northwest PA programs by length, clinical hours, and courses).

Dental hygiene programs align with basic core competencies established by ADEA emphasizing curriculum content that prepares students to work as part of a health care team (ADEA, 2005). In terms of education regarding oral-systemic link that may include the topic of menopause, research reveals between two and four hours of didactic curriculum is devoted to content regarding aging and osteoporosis (Wilder et al., 2008).



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*Certification and licensure.* Currently, there are more than 185,000 DHs registered in the U.S. (ADHA, 2015b). Dental hygienists are graduates of accredited DH education programs who have passed national board and state licensure exams. The majority of DHs work as clinicians in private dental practices, and are limited by scope of practice in providing care to underserved populations (Gibson-Howell & Hicks, 2010). Although continuing education is required by all states, the number of credits varies by state (ADHA, 2014c).

*Scope of practice.* Scope of practice for DHs is not nationally standardized. Therefore, role expectations are very diverse from state to state (Gibson-Howell & Hicks, 2010). Dental hygiene is the science and practice of diagnosing, preventing, and treating oral diseases and conditions for the promotion of overall systemic health (Gibson-Howell & Hicks, 2010). This process includes the DH process of care assessment, diagnosis, planning, implementation, evaluation, and documentation referred to as A.D.P.I.E.D. (ADHA, 2008). Assessment is the process of gathering general health and oral health information, medical history, medications, and current patient concerns (Gibson-Howell & Hicks, 2010). Examination is the systematic inspection of head, neck, and mouth for indications of disease, including a) radiographs, b) intraoral/extraoral exam and cancer screening, c) periodontal charting, d) plaque index, and e) caries evaluation (Gibson-Howell & Hicks, 2010). Dental hygienists perform assessments and examinations leading to a DH diagnosis and contribute to the dentists' diagnosis and treatment planning (Gibson-Howell & Hicks, 2010). Therapies administered by DHs include nitrous oxide analgesia and local anesthetic; removal of oral biofilm and calculus; taking impressions, fabricating, and delivering bleaching and fluoride trays; application of

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fluoride and antimicrobial agents; placement and polishing of restorations; and placement of sealants, although scope of practice varies by state (ADHA, 2014d). Preventive education includes nutritional counseling, oral care instruction, modifiable risk counseling, and relaying information about the oral-systemic connection (ADHA, 2014b).

In 37 states, DHs are licensed to provide direct access to care, in order to address oral care disparities (ADHA, 2014d). Direct access to care allows DHs to assess oral health, initiate treatment based on patient need, and maintain a provider-patient relationship (ADHA, 2014d). Although specific authorization or presence of a dentist is not needed, an agreement with a dentist is required in most states (ADHA, 2014d). Dental hygienists must practice under the supervision of a licensed dentist even if employed by a hospital, board of education, public or private school, county board, board of health, public or charitable institutions, or in dental offices; exceptions include health care facilities, senior centers, and school sealant programs where scope of practice is limited (Washington State Department of Health [WSDOH], 2015a) (see Figure 22, for Washington State scope of practice and supervision of DHs).

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<b>Dental Hygiene Scope of Practice: Washington State</b>
<b>General Supervision (DDS not at location)</b>
<ul style="list-style-type: none"> <li>▪ Oral inspection &amp; measuring periodontal pockets <b>Without Diagnosis</b></li> <li>▪ Patient education in oral hygiene</li> <li>▪ Take intra-oral and extra-oral radiographs</li> <li>▪ Apply topical preventive or prophylactic agents</li> <li>▪ Polish and smooth restorations</li> <li>▪ Oral prophylaxis &amp; removal of deposits and stains from teeth</li> <li>▪ Record health histories</li> <li>▪ Take and record blood pressure &amp; vital signs</li> <li>▪ Perform subgingival &amp; supragingival scaling</li> <li>▪ Perform root planing</li> <li>▪ Apply sealants</li> <li>▪ Apply topical anesthetic agents</li> <li>▪ Care for homebound patients outside a clinical setting</li> </ul>
<b>Close Supervision (DDS in the office)</b>
<ul style="list-style-type: none"> <li>▪ Perform soft-tissue curettage</li> <li>▪ Administer nitrous oxide analgesia</li> <li>▪ Administer local anesthetic</li> <li>▪ Take impressions, fabricate, and deliver bleaching &amp; fluoride trays</li> <li>▪ Place antimicrobial agents</li> <li>▪ Place and carve restorations into the cavity prepared by the dentist &amp; adjust contacts and occlusion</li> </ul>
<b>No Supervision</b>
<ul style="list-style-type: none"> <li>▪ Healthcare Facilities and Senior Centers Services allowed: remove deposits &amp; stain from teeth, apply topical preventive or prophylactic agents, apply topical anesthetic agents, polish &amp; smooth restorations, perform root planing and soft-tissue curettage</li> <li>▪ Community-based sealant programs in schools: Services allowed: assess for and apply sealants &amp; fluoride varnish, remove deposits and stains <b>Without Diagnosis</b></li> </ul>
<b>NOT within Scope</b>
<ul style="list-style-type: none"> <li>▪ Surgical removal of tissue in the oral cavity</li> <li>▪ Prescribe drugs or medications requiring the written order or prescription of a DDS or MD, except placing antimicrobial agents under close supervision</li> <li>▪ Diagnosis and treatment planning</li> <li>▪ Take impressions of the teeth or jaw or their relationship for fabricating any intra-oral restoration, appliance, prosthesis</li> </ul>
Sources: WAC 246-817-550; WAC 246-817-560; WAC 246-817-520; WAC 246-814-020; RCW 18.29.056; RCW 18.29.058; RCW 18.29.220; RCW 18.29.050

Figure 22. Washington State Dental Hygiene Scope of Practice

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As many as 15 states are considering, implementing, or piloting new oral health workforce models (Vanderbilt et al., 2013). Currently, mid-level oral health workforce models are recognized in Maine, Minnesota, and tribal lands in Alaska (ADHA, 2014e). States introducing DH mid-level provider models to legislature include Connecticut, Kansas, Vermont, Washington, Massachusetts, New Hampshire, and New Mexico (ADHA, 2014e). Despite substantial proof DH's role can be expanded (Nielson-Thompson, & Brine, 1997), and IOM (1995) recommendations for more productive use of allied dental personnel, change has been slow. The National Governors' Association (2014) report, "The Role of Dental Hygienists in Providing Access to Oral Health Care," promotes expanding the scope and function of DHs as of means of increasing access to dental care. Additionally, HRSA (2014b) recognizes the important role DHs play in improving access to oral health care, as they promote their strategic plan to expand oral health services and integrate DH into primary care settings. In the 2014 HRSA report, "Transforming Dental Hygiene Education," Ruth Ballweg director of MEDEX Northwest PA Program, points out the similarities between PAs and DHs. Ballweg proposes advanced education gives DHs many more opportunities, and encourages DHs to train other providers about oral health (HRSA, 2014b).

*Dental hygienists and IPE.* Accreditation standards for DH programs promote collaboration with other health care providers stating, "The dental hygienist functions as a member of the dental team and plays a significant role in the delivery of comprehensive patient health care" (CODA, 2013, p. 23). Wilder et al. (2008) released a position paper evaluating the rationale for IPE in dentistry and arguing educational reform incorporating IPE has been slow. Swanson Jaecks (2009) proposes DHs are in a position to initiate

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communication within the dental team and with medical providers regarding patient care; “Of all the dental team members, dental hygienists regularly spend the most time with patients” (Swanson Jaecks, 2009, p. 85). Wilder et al. (2008) suggests, “Looking beyond our profession and collaborating with other providers are the best ways to expand oral health care out of the silo” (p. 678).

Ann Battrell, executive director of the ADHA, describes isolation of DH programs as a “long-standing educational barrier” (HRSA, 2014b, p. 14). Swanson Jaecks (2009) contends IPE needs to become a standard expectation in dental and medical education revealing, “...dental hygienists perceive their role in interdisciplinary collaboration as valuable, both now and in the future. However, current experience in collaboration is limited” (p. 84). Dental hygienists are committed to IP collaboration and reframing DH education (Gurenlian, 2010). Additionally, DH’s proficiency in oral disease prevention allows them to collaborate with health care professionals with expertise in other areas, and promote patient-centered health care delivery (MacDonald et al., 2011); suggesting IPE between DHs and PAs, as in this study, would be beneficial and productive.

A call to action by Vanderbilt et al. (2013) advocates DH programs in the U.S. be included in IPE in order to gain knowledge and exposure prior to entering the workforce. The report targets nursing, pharmacy, dentistry, medicine, allied health, and social work programs (Vanderbilt et al., 2013). Additionally, the report proposes inclusion of DH students promotes oral health and potentially better patient care (Vanderbilt et al., 2013). Vanderbilt et al. (2013) contend despite the recent push for IPE programs, “These programs conveniently leave out dental hygiene” (Vanderbilt et al., 2013, p. 228). Of the

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small number of programs teaching oral-systemic IPE curriculum, an even smaller number report DH students conducting a project or patient education related to menopause (Wilder et al., 2008). The demands on DHs are changing as roles and responsibilities evolve, making collaboration with other health care disciplines necessary as the delivery of health care continues to change (Lavigne, 1999).

Studies demonstrate DHs ability to work with other health care disciplines in the identification and treatment of conditions affecting both oral and systemic health (Munro, Felton, & McIntosh, 2002; Nishimura, Takahashi, & Takahashi, 2007). In particular, a study by Lavigne (1999) describes a three-phase IPE pilot project between DHs, PAs, and physical therapy (PT) students using PBL on real and simulated patients at Wichita State University in Kansas. All three disciplines attended four, one-hour information sessions to learn about respective professions. Participants were surprised by how much they did not know about the other professions, and became more convinced they could all work together as a team (Lavigne, 1999). Lavigne notes the similarities between DHs and PAs, such as certain aspects of education and working under some form of supervision by dentists or physicians. It was found that all three disciplines follow a process of care model involving patient assessment, care plan formulation and implementation, and evaluation of outcomes like the DHs (Lavigne, 1999). Although therapeutic focus differs between professions, all disciplines recognized the importance of a thorough health history as well as assessment of physiological status, demographics, beliefs, and attitudes. An equal number of students from each profession ( $N=15$ ) volunteered to continue with the second and third phases of the study. The second phase involved students working in five IPE teams of three assessing actual patients. In each

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team, DHs performed intraoral/extraoral and periodontal examinations. Physician Assistants and PT confirmed medical histories and performed temporo-mandibular joint (TMJ) assessments. The third phase involved moving patients to examining rooms where PA and PT students performed physical assessment of all body systems, based on PBL formatted case studies. Following completion, students cooperatively evaluated findings from all assessments to determine diagnosis and create a care plan. Results of phases two and three revealed 100 % ( $n=15$ ) of students found PBL effective in IPE. Furthermore, 93% ( $n=14$ ) reported improved problem solving skills, 98% ( $n=15$ ) claimed improved ability to work in teams, and 98 % ( $n=15$ ) reported learning more about other disciplines. Lavigne (1999) indicates this study presents a viable option for IPE between PAs, PTs, and DHs. Although it may not be practical to collaborate to the extent presented, such an experience allows providers to learn more about respective health care disciplines. Lavigne states, “When this learning takes place, dental hygienists will be more likely to seek collaboration from other disciplines when planning the care of their clients” (p. 13). An example collaboration scenario between a DHs and PAs is provided regarding treatment of a mutual patient with a systemic condition also suffering from painful oral ulcerations. In this scenario, Lavigne notes the importance of communicating medications and treatment protocols prescribed by each provider to avoid overlap. Lavigne also addresses the importance of such collaborations as DHs assume more responsibilities in response to access to care and strive to improve quality of care.

In addition, New York University (NYU) is nationally recognized for forming an alliance between dental and nursing students, including nurse practitioners with similarities to PAs (New York University, 2015). The shared goal of advancing both oral

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and general health outcomes through IPE has given NYU the opportunity to reinforce the oral-systemic link and breakdown the silos of medicine and dentistry. Collaborative competencies include patient assessment, identification of oral-systemic associations, diagnosis, IP treatment planning, and evaluation of patient outcomes. Specifically, integrated case seminars give nurse practitioners and DH students the opportunity to collaborate and present cases. Interprofessional education has allowed disciplines to expand oral health knowledge and skills by working together. Interprofessional education at NYU is expected to increase collaboration and referral following graduation.

**Role of the PA.** It has been more than 50 years since a shortage of physicians and inadequate access to basic health care services (Mittman, Cawley, & Fenn, 2002) led to the introduction of PAs as a measure to manage the surge in America's health care workload (American Academy of Family Physicians [AAFP] and American Academy of Physician Assistants [AAPA], 2011). Demand for health care services has expanded PA work settings beyond emergency rooms, primary care, and surgery (HRSA, 2014b). Today, PAs are found in all fields of medicine, enhancing exposure to potential collaborators (HRSA, 2014b). The AAFP and AAPA (2011) acknowledge PAs play a critical role in improving access to care, promoting IPE, as well as IP teams. Physician assistants are well respected in the medical community, and demonstrate new workforce models are effective in improving access to care (Thistlethwaite, 2012). The effectiveness of the physician and PA team is traced to similarities in education and utilization of each other's strengths (AAFP & AAPA, 2011; Pew Health Professions Commission, 1998). Research verifies PAs are cost-effective and patients are satisfied (Dower & Christian, 2009; Hooker, Cipher, & Sekscenski, 2005; Roblin et al., 2004).



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*PA education.* Educational programs for PAs include didactic and clinical courses, with the focus and intensity of medical school curriculum (MEDEX, 2015; AAPA, 2010a; AAPA 2010b). A PA is described as a graduate of an accredited program who is authorized to practice medicine under supervision of a licensed physician (AAFP & AAPA, 2011). As of April 2015, the ARC-PA accredits 196 PA programs in the U.S. (ARC-PA, 2015). The 196 programs include certificate, associate degree, bachelor's degree, and master's degree options. However, the majority of PA programs are master's level (ARC-PA, 2015) and average 26 months (Physician Assistant Education Association [PAEA], 2014). Most PA students have earned a bachelor's degree and nearly 3 years of health care experience prior to admittance (PAEA, 2014). Specifically, the MEDEX Northwest PA Program requires a) minimum of 2,000 hours of paid clinical experience, averaging 6.5 years, b) a minimum 2.7 GPA in all prerequisite courses for BCHS students and 3.0 GPA for MCHS students, and c) prerequisites completed within the last 5 to 7 years (MEDEX, 2015). Prerequisite courses specific to MEDEX include:

- Two Anatomy and Physiology
- General Biology
- Microbiology
- One Chemistry
- Statistics
- Two English Courses 100 level of higher, one must be a composition course
- Recommended: biochemistry, genetics, and social sciences

The MEDEX Northwest PA Program is a hybrid site, offering both Bachelor of Clinical Health Services (BCHS) and Master of Clinical Health Services (MCHS) degrees.

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Prerequisite science courses are the same for either degree. However, MCHS students must also have a prior bachelor's degree and complete Graduate Record Examinations (GRE) testing (MEDEX, 2015).

The first year of PA education teaches broad medical principles with a focus on clinical application (MEDEX, 2015; AAPA, 2010a; AAPA, 2010b). Classroom and lab coursework teaches basic sciences including anatomy and physiology, biochemistry, pharmacology, physical diagnosis, pathophysiology, microbiology, clinical laboratory sciences, behavioral sciences, and medical ethics. The second year allows students hands-on clinical training in a variety of inpatient and outpatient settings. Rotations include family medicine, internal medicine, obstetrics and gynecology, pediatrics, general surgery, emergency medicine, and psychiatry (AAPA, 2010a). Prior to graduation, PA students complete more than 2000 hours of supervised clinical practice (MEDEX, 2015; AAPA, 2010a; AAPA, 2010b).

*Certification and licensure.* All states require PAs to be licensed. Following graduation and prior to practicing, an individual must pass the Physician Assistant National Certifying Exam and obtain state licensure (AAFP & AAPA, 2011). Additionally, licensed PAs must complete 100 continuing education credits every two years, and take a recertification exam every 6 years (AAFP & AAPA, 2011). The number of PAs has risen from 250 in 1970 to 84,064 in 2013, practicing in nearly every kind of medicine (Hooker & Muchow, 2014).

*Scope of practice.* Scope of practice for PAs includes diagnostic, therapeutic, and preventive care (AAFP & AAPA, 2011) (see Figure 23, for PA scope of practice in Washington State. The individual PA's education, experience, state law, policy, and

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delegation of duties determine their scope of practice (AAFP & AAPA, 2011). The supervising physician's scope of practice and degree of delegation are the primary determinants of PA's scope of practice, including prescriptive authority (AAFP & AAPA, 2011). Together the physician and PA work together using a team approach to determine scope of practice based on skill and needs of patients, and sharing legal and ethical responsibility (AAFP & AAPA, 2011).

<b>Physician Assistant Scope of Practice: Washington State</b>
<b>General Supervision (physician not at location)</b>
<ul style="list-style-type: none"> <li>• Take medical histories</li> <li>• Perform physical examinations</li> <li>• Order and interpret lab tests</li> <li>• Diagnose and treat illnesses</li> <li>• Prescribe, order, administer, and dispense legend drugs &amp; Schedule II-V controlled substances</li> <li>• Counsel patients</li> <li>• Assist in surgery</li> <li>• Refer patients to specialists, health facilities, agencies, resources</li> </ul>
*Note that remote sites may require telecommunication with MD
<b>NOT Within Scope</b>
<ul style="list-style-type: none"> <li>• Optical services beyond routine vision screening</li> <li>• Dental or Dental Hygiene services</li> <li>• Chiropractic services</li> </ul>
Sources: RCW 18.71A.010; WSDOH, 2015

Figure 23. Washington State Physician Assistant Scope of Practice

*PAs in private practice.* Thirty-six percent of PAs practice in primary care specialties including family/general practice, internal/general medicine, pediatrics, OB/GYN, occupational medicine or a related area (AAPA, 2010a; Association of Family Practice Physician Assistants [AFPPA], 2015; MEDEX, 2015) (see Figure 24, for PA private practice settings). In these settings the PA may perform diagnostic, therapeutic,

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preventative, and health maintenance services under physician supervision, even in remote sites (RCW 18.71A.010). Physician assistants in primary care treat a diverse patient group including elderly, children, families, underserved, and veterans (AAPA, 2010a). The supervising physician determines which procedures may be performed and the degree of supervision (WSDOH, 2015b). The PA must practice in the area of medicine that is within the physician's scope of expertise and practice (WSDOH, 2015b).

<b>Physician Assistant: Private Practice Settings</b>
<ul style="list-style-type: none"> <li>• Family Medicine</li> <li>• Internal/General Medicine</li> <li>• Pediatrics</li> <li>• OB/GYN</li> <li>• Occupational Medicine</li> <li>• Psychiatry</li> <li>• Medical subspecialties</li> </ul>

Figure 24. Physician Assistant: Private Practice Settings (AFPPA, 2015; MEDEX, 2015)

*PAs in emergency medicine.* PAs practicing in emergency medicine are highly skilled professionals employed by hospitals, medical practices, or hospital medical groups (AAPA, 201b) who practice in nearly all medical and surgical specialties. (AAPA, 2010b; Society of Emergency Medicine Physician Assistants [SEMPA], 2015) (see Figure 25, for PA emergency medicine settings). The majority practice in emergency departments, inpatient services, operating rooms, outpatient units, and critical care/intensive care units (AAPA, 2010b). State law and hospital policy (AAPA, 2010b) define PA supervision. All states allow remote site supervision by physicians via telecommunication (AAPA, 2010b). Joint Commission Standards and Medicare's Conditions of Participation (AAPA, 2010b) also affect hospitals. Nearly 40% of PAs

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practice primarily in hospitals, and another 20% part-time (AAPA, 2010b). Emergency medicine PAs may provide care in various settings as noted in Figure 25.

<b>Physician Assistant: Emergency Medicine Settings</b>
<ul style="list-style-type: none"> <li>• Emergency Departments</li> <li>• Critical Care Units</li> <li>• Urgent Care</li> <li>• Solo Provider in Rural Emergency Department</li> <li>• Level 1 Trauma Centers</li> <li>• Observation Centers</li> <li>• Chest Pain Centers</li> <li>• Pre-hospital Situations</li> <li>• Ground or Air Transport</li> <li>• Education, Teaching, and Administrative Functions</li> </ul>

*Figure 25.* Physician Assistant: Emergency Medicine Settings (SEMPA, 2015)

*PAs and IPE.* Accreditation standards for PA education reflect a paradigm shift by stating, “The curriculum must include instruction to prepare students to work collaboratively in interprofessional patient centered teams” (Accreditation Standards for Physician Assistant Education, 2010, p. 16, B1.08). The AAFP and AAPA (2011) encourage innovative education programs fostering IP practice to adequately prepare PAs to work in interdisciplinary teams and provide optimal patient care. Such education programs may include joint coursework and incorporate clinical experience into PA curricula (AAFP & AAPA, 2011). The AAPA 2014-2015 policy manual notes PAs should take a role in ensuring patient care is evidence-based, coordinated, integrated, and interdisciplinary (p. 57, HP-3800.1.1). The University of Washington MEDEX Northwest PA training site located on the Riverpoint Campus with Washington State University (WSU) and Eastern Washington University (EWU) with a multitude of other

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health professions programs, allows the opportunity to participate in various IPE experiences (MEDEX, 2015).

Bowser, Sivahop, & Glicken (2013) studied the impact of an oral health curriculum on PA's knowledge ( $N=40$ ). A lecture introduced caries etiology and prevention, oral-systemic connection, HEENOT exam, and oral pathology to PAs in their first year of training followed by a two-hour clinical IPE with third year dental students and dental faculty. Dental faculty and students conducted a supervised, hands-on experience in oral health prevention and diagnosis including physical exam skills and fluoride varnish application, where PA students practiced skills on each other (Bowser et al., 2013). A written six-item survey, administered at three separate points in the study, assessed baseline knowledge and attitude regarding oral health, the oral-systemic connection, oral examination skill, the PA's role in oral health, and perception of the benefits of IPE (Bowser et al., 2013). The first survey was given before the introductory lecture ( $n=40$ ), the second was given after the IPE workshop ( $n=40$ ), and the third was completed two years later ( $n=36$ ). Results indicated both PAs and dental students benefitted from IPE interaction and PA's knowledge increased regarding caries risk assessment, fluoride varnish application, patient education, and dental referral (Bowser et al., 2013). Knowledge retention was high when tested two years after the IPE workshop, and the majority of knowledge showed an increase relative to baseline. A one-tailed unpaired *t*-test confirmed significant knowledge increase on both post workshop study ( $p < .03$ ) and two-year post intervention survey ( $p < .02$ ).

An earlier study of first year PA students, by Bowser, Sivahop, and Glicken presented at the 2012 PAEA Annual Education Forum, also showed an increase in the

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oral health knowledge and retention (Bowser et al., 2012). In particular, PA students gained knowledge of oral systemic health connection, became more proficient in oral exams, and attained understanding of the PA's role in oral health (Bowser et al., 2012).

A more recent study by Nalliah, Eve, & Simon (2015) reinforced the fact that PA's knowledge of oral health is limited, making it a major access to care opportunity. The study focused on an IP, peer-to-peer oral health training program for PA students ( $N=64$ ). Dental students ( $n=10$ ) trained PAs to perform oral health and oral cancer screenings. A post intervention survey found training increased PA's competence in delivering oral cancer and oral health screenings.

A 2011 study by Anderson et al. evaluated the implementation of oral health curriculum and IPE by DH faculty, with the goal of identifying aspects of curricula most important to PA students' knowledge of oral health. Both didactic and clinical experiences were offered to PA students ( $N=43$ ). Data collected using a pre- and posttest evaluated students' perceptions of their ability to comprehend oral health curriculum. Results of the study indicated perceptions oral health knowledge, competency, and ability to recognize signs and symptoms of oral diseases improved. The topics with the greatest perceived change included monitoring and impact of medications on oral tissues, recognition of referable caries and oral lesions, and identification of signs and symptoms of periodontal disease. Researchers concluded PAs perceived improvement in oral health competency and ability to identify signs and symptoms of oral disease with potential systemic impact (Anderson et al., 2011).

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### **Summary**

Despite a long history of varying enthusiasm surrounding IPE, current efforts and establishment of IPE and oral health core competencies are transforming the curricula of health care disciplines. Research suggests IPE between DHs and PAs, using CBL and SPs, is an effective means of improving communication and understanding of roles and responsibilities between disciplines, expanding oral health knowledge and skills related to menopause, reducing health care cost, and improving patient outcomes. Because DHs and PAs are frequently in a position to care for menopausal women, enhancing knowledge and skills regarding menopause is vital. This is especially true as the role of DHs and PAs continue to expand, along with the number of women experiencing the discomfort of oral manifestations associated with menopause.



## **Methodology**

### **Research Method or Design**

A mixed-method pre- and posttest design evaluated the comparative relationship between PA and DH students related to an educational intervention. Upon informed consent, participants were invited to attend a three-hour workshop held in Room #278 in the Health Sciences Building at EWU Spokane Campus (see Appendix A, for lesson plan). First, participants individually completed a demographic survey, menopause knowledge pretest, and a modified RIPLS pretest providing baseline measurements. Next, participants listened to a PowerPoint® presentation regarding IPE and oral manifestations of menopause (see Appendix B, for PowerPoint® outline), and worked in an IP team to create a patient care plan based on a given case study and pseudo-SP presentation. Workshop participants were assigned to a heterogeneous team of approximately six members representing both PA and DH disciplines as equally as possible. Menopause knowledge pre- and posttest items were designed to evaluate participants' change in knowledge of oral manifestations of menopause and the oral-systemic health connection; the modified RIPLS assessed changes in perception of IPE. Additionally, patient care plan worksheets, comments on test and survey forms, and debriefing questions were used to collect qualitative data (see Figure 26, for study overview).

One pseudo-SP was used in this study. The pseudo-SP was the PI's thesis chair and co-investigator, and fit the criteria of being of menopausal age required for this study. The pseudo-SP was employed to promote student practice in IPE, risk assessment, patient

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assessment and counseling, and care planning with increased comfort (Konkle-Parker et al., 2002). Due to financial constraints of the PI and time constraints of the participants, only one pseudo-SP was utilized in this intervention. Additionally, for pragmatic purposes, the pseudo-SP did not undergo the numerous hours of training required to be a true SP. Therefore, the SP in this study was considered a pseudo-SP trained to present a case study to students, respond to questioning regarding the patient profile, and provide general feedback during debriefing (Konkle-Parker et al., 2002). Pseudo-SP training for this study entailed a one-hour PI-designed course explaining case study content and reviewing a written script. The written script specified signs and symptoms, how to respond to various lines of questioning by providing responses with dialogue, believable patient history of the presenting problem, and other personal information that allowed the pseudo-SP to answer questions participants asked (Konkle-Parker et al., 2002). This training let the pseudo-SP provide support to participants in progressing through the case study by giving prompts related to focal symptoms and manifestations, resulting in the development of a patient care plan. Additionally, pseudo-SP improved fidelity within the study by simulating a typical patient encounter (Konkle-Parker et al., 2002) (see Appendix C, for pseudo-SP script).



Figure 26. Study Overview

Case study development involved the following steps: creation of a list of signs and symptoms, establishment of demographic characteristics, and determination of questions that may arise (Konkle-Parker et al., 2002). Realism and believability are important in case studies that focus on interviewing, communication, collaboration, and understanding of professional roles and responsibilities (Konkle-Parker et al., 2002). Consideration of the level of fidelity or realism found in the pseudo-SP workshop, the opportunity for problem-solving (Wilson & Klein, 2012), and experiential learning (Wallace, 2007) were important design features. The case study challenged participants in the pseudo-SP workshop, while allowing success.

The workshop utilized one case study addressing xerostomia, periodontitis, and oral osteoporosis. Participants did not receive prior knowledge of workshop content or

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the case study presented in the workshop. The case study format and use of pseudo-SP encouraged participants to assess a multitude of factors, provide patient education and counseling, and develop a collaborative care plan as a team. Each IP team recorded findings, diagnosis, and treatment on a patient care plan worksheet used to collect qualitative data (see Appendix D, for patient care plan worksheet). The case study content was based on information from the literature review, and represented a patient requiring assessment and appropriate intervention. The patient scenario was complex and required expertise from both DH and PA professionals for the best outcomes. Figure 27 highlights the Workshop pseudo-SP case scenario.

### **Workshop Pseudo-SP Case Scenario**

55-year-old widow complaining of xerostomia. Risk factors include smoking, drinking, stress, poor nutrition, and onset of menopause. Oral Diagnosis: Xerostomia, Chronic Moderate-Severe Periodontitis, and Osteoporosis in Mandible.

*Figure 27. Workshop Pseudo-SP Case Scenario*

The PI stimulated problem solving by including a list of questions, based on the A.D.P.I.E.D. process of care, asked as participants evaluated the case study (see Figure 30, for IP A.D.P.I.E.D. process of care). Problem solving questions included the following (Dentalelle Tutoring, 2014).

- What data do I need to collect?
- What is the diagnosis; wellness, at risk, or actual?
- What are the desired outcomes; what interventions will achieve them?
- How will I carry out my plan?
- What are the outcomes?

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- What information should be shared with DHs or PAs? (patient's problem list, current medications and allergy list, specific reason for referral, and statement that patient is healthy enough to undergo routine dental procedures); notification patient has been scheduled, the date, summary of findings and treatment plan need to be shared with the referring provider and included in the patient's health record (Hummel et al., 2015).

### **Procedures**

**Human subjects' protection/informed consent.** Participants, pseudo-SP, and investigators participating in this study were assured of protection against harm both mentally and physically. Study participants were not expected to partake in any activities beyond their capabilities or level of training. Participation was voluntary for all students, but encouraged by programmatic IPE requirements. Consent forms were signed by all participating in the study (see Appendix E, for participant consent form). Information regarding this study was kept in the PI's personal password protected computer. Confidentiality was ensured to all participants, including the pseudo-SP. Once consent forms were signed, a coded number was assigned to each participant in order to match pre- and posttest and other assignments to each participant to ensure validity and respondent confidentiality. Additionally, all PA students were identified by the color orange and DH students by the color purple on all documents including consent forms, surveys, etc. Students in both programs were free to choose if they wished to participate or not participate. All participants had the freedom to withdraw from the study at any point on their own volition without notice or consequence. The PI is a graduate student at EWU and in order to fulfill EWU IRB requirements, the EWU IRB was asked to

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approve this study. In addition, because the PA participants were students at the University of Washington the PI submitted proposal documents to the U of W IRB for approval. The PI requested an expedited review for this study based on EWU and U of W human subjects' protocols.

**Sample source, plan, sample size, description of setting.** Following informative meetings with students, a purposive sample of first year PA and second and third year DH students attending respective health science programs on the Riverpoint Campus in Spokane, Washington were enrolled. Convenience sampling was used due to lack of resources to draw a large enough sample for random selection of study participants. Information sheets informing students of this educational intervention were provided to students at a brief study orientation, and returned to PI or respective program coordinators upon completion for collection by the PI (see Appendix F, for participant invitation letter). Inclusion criteria included a) current enrollment in U of W MEDEX PA program or EWU DH program, and b) at a point in their program where they have had clinical exposure. Students not meeting these inclusionary requirements were not invited to participate. There are approximately 30 first year PA, 30 second year DH, and 30 third year DH students. The PI recruited as many students as possible using a link to a Sign-up Genius© account through EWU DH Program; 27 DH and 11 PA students signed up for the study. The capacity of this workshop met the needs of all students interested in participating in this study. However, additional workshops will be offered in the future based on interest. Each team participating in the study workshop was newly formed, and PA and DH participants did not have any prior experience working together.

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**Variables.** The independent variable was the IPE educational intervention, utilizing a case study and pseudo-SP. The intervention content addressed learning outcomes with a focus on IPEC core competencies of roles and responsibilities and IP communication. The dependent variables were based on the learning objectives including:

- Knowledge regarding oral manifestations of menopause
- Understanding of the roles & responsibilities of PAs and DHs in treating menopausal women by analyzing a given case study and pseudo-SP profile
- Improved IP and patient communication skills
- Effective collaborative decision
- Gained confidence in treating oral manifestations in menopausal women using an IP approach

Knowledge of oral manifestations of menopause was assessed using a PI-designed multiple choice test (see Appendix G, for menopause knowledge pretest). The modified RIPLS pre- and posttest determined whether participants met the two IPEC competencies, and their perceptions of IPE (see Appendix H, for RIPLS questionnaire). The patient care plan worksheet was used to evaluate collaborative decision-making (see Appendix D, for patient care plan worksheet). Gained confidence was measured by debriefing data (see Appendix I, for debriefing questions).

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**Instruments.** The PI used several tools to gather quantitative and qualitative data as well as demographics. The PI used the existing research as noted in the literature review to choose reliable and valid instruments. In the following paragraphs, each instrument is discussed.

**Modified RIPLS survey.** A modified RIPLS was employed as a pre- and posttest to evaluate the influence of educational intervention on participant's attitudes and perceptions of IPE. The modified RIPLS collected information regarding the two IPEC competencies that were the focus of this study, which included IP communication and roles and responsibilities (see Figure 28, for RIPLS items used to assess roles and responsibilities; see Figure 29, for RIPLS items used to assess interprofessional communication).

Domain 2 Roles/Responsibilities	RR: Use the knowledge of one' own role and those of other professions to appropriately assess and address the healthcare needs of the patient and populations served.	RIPLS Items
RR 1	Communicate one' role and responsibilities clearly to patients, families, and other professionals	1, 3, 9, 13, 18
RR2	Recognize one's limitations in skills, knowledge, and abilities	1, 2, 3, 6, 9, 10, 11, 13, 15, 19
RR3	Forge interdependent relationships with other professions to improve care and advance learning	1, 2, 3, 8, 10, 11, 13, 14, 15
RR4	Use unique and complementary abilities of all members of the team to optimize patient care	1, 2, 3, 15, 16

Figure 28. RIPLS items used to assess IPEC Core Competencies for IPE: Roles and Responsibilities (IPEC, 2011b)



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Domain 3 Interprofessional Communication	CC: Communicate with patients, families, communities, and other health professionals in a responsive and responsible manner that supports team approach to the maintenance of health and the treatment of disease.	RIPLS items
CC 3	Express one's knowledge and opinions to team members involved in patient care with confidence, clarity, and respect, working to ensure common understanding of information and treatment and care decisions.	2, 3, 5, 7, 13, 14
CC 4	Listen actively, and encourage ideas and opinions of other team members.	7, 9, 10, 13, 14
CC 6	Use respectful language appropriate for a given difficult situation, crucial conversation, or interprofessional conflict	7, 14, 15, 16
CC 7	Recognize how one's own uniqueness, including experience level, expertise, culture, power and hierarchy within the healthcare team, contributes to effective communication, conflict resolution, and positive interprofessional working relationships.	1, 4, 5, 6, 8, 9, 12, 18, 19
CC 8	Communicate consistently the importance of team work in patient-centered and community-focused care.	1, 2, 13, 15

*Figure 29.* RIPLS items used to assess IPEC Core Competencies for IPE:

Interprofessional Communication (IPEC, 2011b)

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The RIPLS is a 19-item survey with four subscales, using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5) (McFadyen et al., 2005). The RIPLS is a proven instrument found to be valid and reliable for evaluating IPE (McFadyen, Webster, Maclaren, 2006). The modified RIPLS is based on the original design by Parsell and Bligh (1999) and revised design by McFadyen et al. (2005).

Modifications involved removing the demographic questions on the first portion of the survey, changing terminology to fit the PA and DH cohort completing the evaluation, and including questions specifically related to study learning objectives. All modifications made to the RIPLS pre- and posttest were discussed with and analyzed by DH and PA faculty. Two of the four original subscales assessed included teamwork and collaboration, and roles and responsibilities (see Figure 8, for RIPLS subscales; see Appendix H, for RIPLS questionnaire).

First, the teamwork and collaboration subscale assessed participant's attitudes and perceptions about collaboration with other disciplines. A high score was desired and suggested participants agreed with the statements (Hertweck et al., 2012). Second, the negative professional identity items evaluated participant's response to negative statements about working with other disciplines. A low score was desired for these questions that are reverse scored (Hertweck et al., 2012). Next, positive professional identity items showed if the participant valued working other disciplines. A high score was desired and showed willingness to participate in IPE (Hertweck et al., 2012). Last, roles and responsibilities evaluated the participant's understanding of roles as a primary health care provider. A low score was desired for these questions that are also reverse scored. These two subscales provided data to assess changes in the two IPEC

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competencies that were evaluated. Individual responses to each item were recorded for analysis, since the unit of analysis for the RIPLS is individual.

***Demographic survey.*** A PI-designed demographic survey and a modified RIPLS provided descriptive statistics of the sample. This demographic survey included questions regarding age, gender, race, professional discipline, years of clinical experience, and prior experiences (see Appendix J, for demographic survey).

***Menopause knowledge pre- and posttest:*** A multiple-choice pre- and posttest evaluated for changes in knowledge regarding oral manifestations of menopause; pre- and posttest evaluation were used to strengthen study results. The pre- and posttest consisted of different questions, but were based on and equally represented the same four subsections of content and 16 questions (see Appendix G, for pretest; see Appendix Q for posttest). The knowledge test subsections included:

- Women's health and IPE: Question #1
- Menopause systemic manifestations: Question #2
- Oral manifestations: Questions #3-#10
- Oral health management in menopause: Questions #11-#16

***Patient care plan worksheet.*** A patient care plan worksheet was completed by each IP team using a PI-designed IP A.D.P.I.E.D. process of care (see Appendix K, for IP A.D.P.I.E.D. process of care handout), synthesized from the IPTRF algorithm (Packard et al., 2012), and A.D.P.I.E.D. process of care (ADHA, 2008) (see Figure 11, for A.D.P.I.E.D. process of car; see Figure 12, for IPTRF framework). The care plan was based on pseudo-SP presentation of a PI-designed case study, and included documentation of all findings and orders. the expectation was teams would identify the

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patient's oral problems by interacting with the pseudo-SP, team members, and provided materials. The purpose of the patient care plan worksheet was to make data entry easier, and provide qualitative data (Hummel et al., 2015). The IP A.D.P.I.E.D. process was intended to provide participants guidance on how PAs and DHs might share patient responsibility (see Figure 30, for IP A.D.P.I.E.D. process of care).

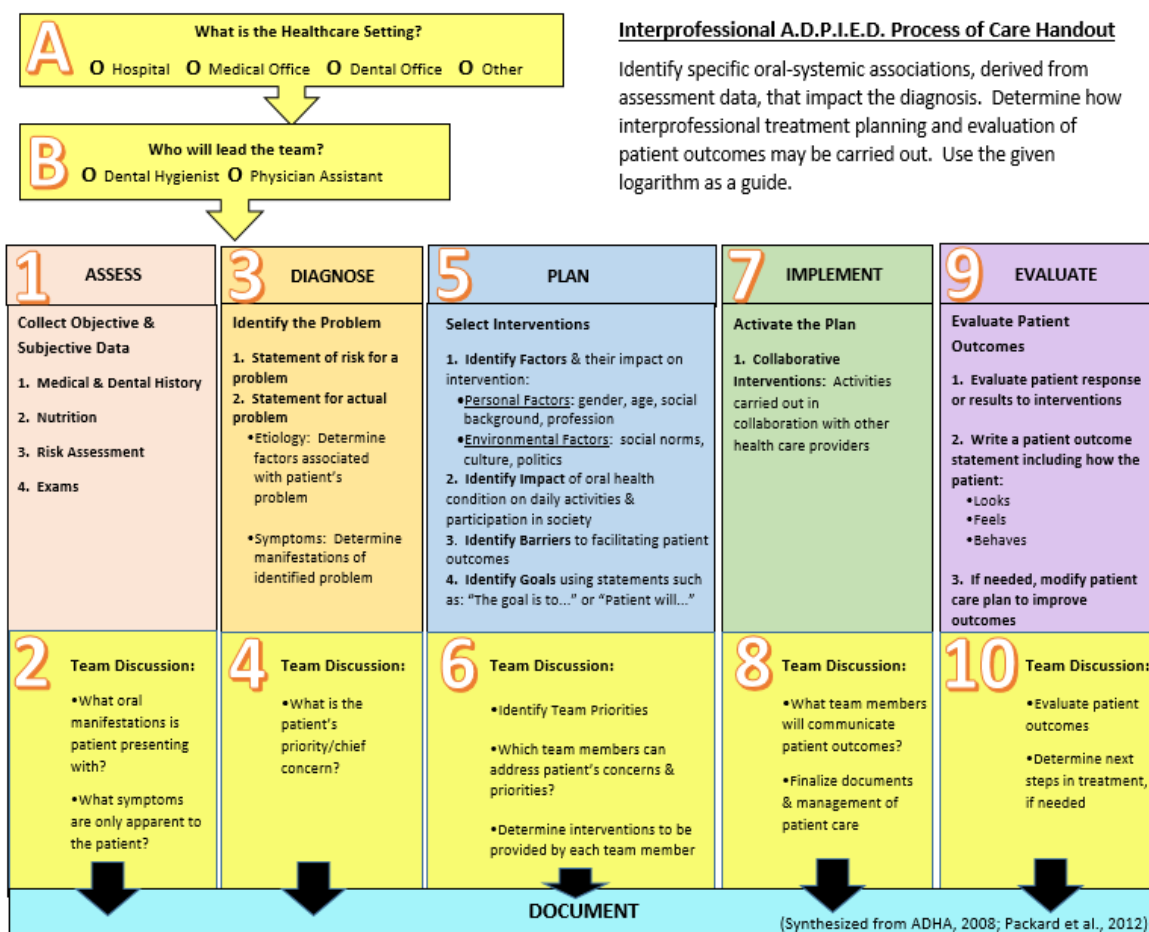


Figure 30. Interprofessional A.D.P.I.E.D. process of care (synthesized from ADHA, 2008; Packard et al., 2012)

**Instructor/study evaluation.** An instructor/study evaluation was utilized. This evaluation using a 5-point Likert scale and comment box, evaluated materials and media

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used in the study as well as instructor performance (see Appendix L, for instructor/study evaluation).

**Debriefing.** Data was collected via video recording of participant debriefing. Analysis for themes within the debriefing provided a measure of participants' confidence in IP patient care regarding oral manifestations of menopause, likeliness to use knowledge gained from this study in the future, and feelings about the use of pseudo-SP. The debriefing process was vital for stimulating participant reflection and building on strengths and sense of positive self-esteem, which may translate to development and change in practices (Kilminster et al., 2004).

**Equipment.** The PI reserved a classroom at the study site that was equipped with a dental chair, a screen, and projector required for PowerPoint® presentation used in the workshop. The PI's personal laptop was used for creation and analysis of all documents, instruments, and workshop module. The PI provided a thumb drive exclusively used for study content and data. All printed consent forms, handouts, tests, and mechanical pencils were provided to participants by the PI. The pseudo-SP received a written script developed by the PI for use during pseudo-SP training and workshop activities. All participants had access to the same educational intervention made possible by a PowerPoint® presentation, and use of the same case study and pseudo-SP during the workshop.

**Steps to implementation.** Following proposal and IRB approval by EWU and U of W, the PI implemented the study in several stages. The steps to implementation took into consideration the time constraints, and responsibilities of all faculty and participants involved.

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***Step 1 communicate with faculty.*** The PI communicated with EWU DH and U of W MEDEX PA faculty to determine the best time for each discipline to participate in a study orientation provided by the PI, in which consent for voluntary participation was obtained. Both DH and PA students were required by program standards to complete a certain amount of IPE annually. Recommendations were made by both DH and PA faculty for students to participate in the PI's study.

***Step 2 study informational meeting with students.*** Students received a letter informing them of the study and inviting them to attend an informative meeting (see Appendix M, for letter to participants). The PI presented a short PowerPoint® presentation introducing the proposed study to attending students. The PI answered questions relating to the study components, content, roles and responsibilities, time expected to complete the study, and information on how students would be evaluated. Following the informational presentation and answering questions and concerns, the PI explained the consent process. Students who volunteered to participate in the study signed a consent form. Each student received a snack following the informational meeting. The PI informed students of the opportunity to meet personally to explain the study and gain consent, if they are unable to attend the informational meeting. At the workshop, the PI gave each participant a copy of their consent form to keep as a record.

***Step 3 preparation of tests, surveys, handouts, and worksheets.*** On the evening of the implementation, the PI disbursed a demographic survey, modified RIPLS pre- and posttest, menopause knowledge pre- and posttest, and instructor/study evaluation to enrolled participants attending the study workshop. Additionally, a patient care plan worksheet, debriefing questions, case studies, and pseudo-SP scripts were developed and

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disbursed. All materials were developed on the PI's personal laptop using Excel© 2013 and Word© 2013 for Windows®.

**Step 4 pseudo-SP training.** In the first 10 minutes of a mutually agreed upon time for a training program, the PI reviewed the case study with the pseudo-SP and allowed the PI to answer questions. Next, 40 minutes were allotted for education using role-play between the pseudo-SP and PI to practice the interaction that would take place with participants during the actual study. During role-play, the PI conducted interactive questioning designed to test the pseudo-SP and ensure ability to respond to a wide range of questions with accuracy and consistency (Konkle-Parker et al., 2002). Training and extensive experience as an educator allowed the pseudo-SP to inform participants how they were perceived, their effectiveness, and improvements that could be made, all from the patient's perspective (Sharp, Pearce, Konen, & Knudson, 1996). Finally, the last 10 minutes were used to debrief and answer questions. Training was completed within two weeks prior to study implementation, to ensure knowledge retention (see Appendix C, for pseudo-SP script).

**Step 5 pseudo-SP workshop.** For pragmatic purposes an evening workshop was offered, in order to accommodate students and gain participation (see Figure 31, for workshop procedures and time frame).

Each student was assigned an identification code based on their discipline and a number, such as PA-01 or DH-25. Names from a master list of workshop participants were divided into DH and PA disciplines, and drawn randomly for IPE team assignment and equal representation of both professions (see Appendix N, for assignment of teams for workshop). Personalized manila envelopes were prepared for each participant that

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included the following content: IPE participation certificate, thank-you note, handouts, tests, and a colored name badge indicating their assigned team.

The PI arrived one hour early to set up the classroom and accommodate participants, on the day of implementation. Classroom setup included ensuring proper number of chairs and arrangement of tables to accommodate up to 50 participants. A manila envelope for each participant was placed at a table corresponding to team color. Each table was clearly marked with a sign, indicating team color. A sheet was posted inside the classroom indicating team assignment for each participant; only first names and last initials were used.

The workshop was held on February 11, 2016. Participants were invited to come early for dinner and refreshments. Upon arriving at the planned workshop, and prior to educational activities, participants were asked to be seated with their assigned team to maximize IP grouping at each table. Once seated, the PI confirmed each team member was seated as assigned, encouraged team member introductions, and asked teams to assign a team leader. Upon completion of pretests, educational activities began with orientation of the workshop including learning objectives, procedures, and discussion of potential IP roles and responsibilities (see Appendix O, for workshop procedures).

Orientation was followed by a PowerPoint® presentation educating participants about assessment, diagnosis, and collaborative management of oral manifestations of menopause (see Appendix B, for PowerPoint® outline). Learning objectives for the workshop included:

- Demonstrating increased knowledge regarding oral manifestations of menopause



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- Demonstrating collaborative decision-making by developing a patient care plan based on given information
- Demonstrating knowledge of the roles and responsibilities of PAs and DHs in treating menopausal patients by analyzing a given case study and pseudo-SP profile
- Developing effective IP and patient communication skills by participating in a pseudo-SP case study
- Applying knowledge of menopausal oral care to a case study
- Demonstrating patient-centered care in treatment planning
- Appreciating how this education experience may affect confidence in treating oral manifestations in menopausal women by participating in debriefing

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<b>Workshop Procedures</b>	<b>Time Allotted</b>	<b>Time Frame</b>
<b>Arrival</b> *Room #278 in the Health Sciences Building *Find Your Name on Posted List for Team Assignment *Find Team Table *Get Food	40 min	5:00-5:40
<b>Team Huddle</b> *Put on Name Badge *Introductions *Appoint Team Leader *Look at Materials in your Packet	5 min	5:40-5:45
<b>Complete Initial Assessments</b> *Demographic Survey *Menopause Knowledge Pre-test *RIPLs Pre-test	30 min	5:45-6:15
<b>Watch/Listen to Workshop Orientation</b> *Review of Learning Objectives *Review of Procedures *Review of Handouts	5 min	6:15-6:20
<b>Watch/Listen to PowerPoint Presentation</b> *Interprofessional Education *Menopause *Menopause Oral Manifestations & Treatment *Role of DH & PA *Interprofessional A.D.P.I.E.D. process of care	45 min	6:20-7:05
<b>Break</b>	5 min	7:05-7:10
<b>Case Study</b> *Read Case Study *Listen to Standardized Patient (SP) *Develop Questions for SP *Team Leaders Interview SP *Complete Patient Care Plan Worksheet using Interprofessional A.D.P.I.E.D. process of care	40 min	7:10-7:50
<b>Complete Final Assessments</b> *Menopause Knowledge Post-test *RIPLs Post-test *Instructor/Study Evaluation	30 min	7:50-8:20
<b>Debriefing</b> *Participate in a videotaped debriefing	10 min	8:20-8:30

Figure 31. Workshop Procedures

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Following PowerPoint® presentation and a short intermission, the PI instructed participants to remove the following handouts from their personal manila envelope: a) case study (see Appendix P, for case study), b) IP A.D.P.I.E.D. process of care (see Appendix K, for IP A.D.P.I.E.D. process of care), and c) patient care plan worksheet (see Appendix D, for patient care plan worksheet). Following orientation to these documents, each team was given five minutes to prioritize tasks based on the given case study and prepare for pseudo-SP presentation. For the next 10 minutes, the pseudo-SP presented the case study profile to participants. Immediately following, IP teams were given ten minutes to review the case study and pseudo-SP information in order to formulate questions for interviewing the pseudo-SP. Ten minutes were allotted for team leaders to interview the pseudo-SP regarding preventive and chronic care needs or questions related to oral health, oral health awareness, and knowledge of oral health link to systemic conditions. Teams were allowed 15 minutes to create a comprehensive, collaborative patient care plan based on knowledge gained from the information presented in the workshop, pseudo-SP interview, and discussion with team members.

**Step 6 posttests and debriefing.** Following completion of the pseudo-SP case study activity, the PI instructed participants to remove the following handouts from their personal manila envelope a) menopause knowledge posttest (see Appendix Q, for menopause knowledge posttest), b) modified RIPLS posttest (see Appendix H, for RIPLS questionnaire), c) instructor/study evaluation (see Appendix L, for instructor/study evaluation). Finally, a debriefing took place where participant responses to questions asked by the PI, and pseudo-SP feedback were recorded on video for analysis. Debriefing allowed participants, pseudo-SP, and PI to review what happened during the

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workshop, reflect on the meaning (Beauchesne & Douglas, 2011), and helped participants achieve learning objectives (Galvan, 2008).

## Results

### Description of Sample

The PI recruited DH students from EWU and PA students from U of W, enrolled in respective programs on the Riverpoint Campus in Spokane, WA. Thesis committee members from EWU and U of W provided contact information for respective DH and PA students. The EWU DH program director emailed all second and third year DH students ( $N=63$ ), and a U of W professor emailed all PA students ( $N=29$ ) inviting them to attend separate informational meetings regarding this study. All students completing a consent form ( $N=54$ ) were emailed a link to enroll in the study through Sign-up Genius®, via an online membership used by EWU DH program. Of those students completing consent forms, 74% were DH students ( $n=40$ ) and 26% were PA students ( $n=14$ ). Of those who enrolled in the study through Sign-up Genius®, 69% were DH students ( $n=27$ ) and 31% were PA students ( $n=12$ ). Subsequently, 36 students attended the study workshop, 69% were DH students ( $n=25$ ), and 31% were PA students ( $n=11$ ). DH representation in this study was 40%, with 25 out of a total of 63 students choosing to participate; PA representation was 38%, with 11 out of a total of 29 students choosing to participate. This shows approximate equality in the representation of each profession in this study.

According to the demographic survey completed prior to study implementation, 83% ( $n=30$ ) of participants identified as female, and 17% ( $n=6$ ) male; all male participants were PAs. The overall age range reported was 21 to 54 years of age, representing a mean age of 27. The majority, 86% ( $n=31$ ), represented Caucasian ethnicity; the minority represented American Asian/Pacific Islander, 11% ( $n=4$ ), and

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Hispanic, 3% ( $n=1$ ). Over half of the participants, 58% ( $n=21$ ), did not have clinical experience prior to matriculation into their respective programs; the majority of those participants without prior clinical experience were DHs ( $n=20$ ). The majority of participants, 86% ( $n=31$ ), did not have prior experience treating a menopausal patient; this figure represents DHs ( $n=21$ ) and PAs ( $n=10$ ). All participants ( $n=36$ ) reported having prior IPE experience, and 67% ( $n=24$ ) also had experience treating oral conditions; this figure represents DHs ( $n=21$ ) and PAs ( $n=3$ ) (see Table 1, for demographic characteristics).

Table 1

*Demographic Characteristics*

Characteristic	DH ( $n=25$ )	PA ( $n=11$ )
Gender		
Female	100% ( $n=25$ )	45% ( $n=5$ )
Male	0	55% ( $n=6$ )
Age		
21-24	84% ( $n=21$ )	0
25-28	12% ( $n=3$ )	27% ( $n=3$ )
29-33	4% ( $n=1$ )	27% ( $n=3$ )
35-54	0	45% ( $n=5$ )
Race		
Caucasian	80% ( $n=20$ )	100% ( $n=11$ )
Hispanic	16% ( $n=4$ )	0
Asian American/ Pacific Islander	4% ( $n=1$ )	0
Prior Clinical Experience		
Yes	20% ( $n=5$ )	91% ( $n=10$ )
No	80% ( $n=20$ )	9% ( $n=1$ )
Prior Menopause Experience		
Yes	16% ( $n=4$ )	9% ( $n=1$ )
No	84% ( $n=21$ )	91% ( $n=10$ )
Prior IPE Experience		
Yes	100% ( $n=25$ )	100% ( $n=11$ )
No	0	0
Experience Treating Oral Conditions		
Yes	84% ( $n=21$ )	27% ( $n=3$ )
No	16% ( $n=4$ )	73% ( $n=8$ )

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**Statistical Analysis**

Initial data was collected from a demographic survey, modified RIPLS, and menopause knowledge pretest. Posttest data was obtained from an instructor/study evaluation, modified RIPLS, and menopause knowledge posttest. All surveys and tests were fully completed, so no data was omitted. The response data represents 69% ( $n=25$ ) DH students and 31% ( $n=11$ ) PA students.

The PI entered all data into Excel© 2016 and transferred it to SPSS® Version 23 for analysis. Data was collected and stored on a password-protected computer. The statistical analysis and results are organized according to the study hypotheses.

**First hypothesis.** For the first research question, “Can an IPE intervention educating DH and PA students about oral health and menopause result in gained knowledge?”, a paired  $t$ -test compared change in knowledge of menopause and its oral manifestations from pre- to posttest. The menopause knowledge pre- and posttest scores were the dependent variables within the same population, therefore a paired  $t$ -test was used for data analysis of test scores for a) combined DH and PA scores, b) only DH scores, and c) only PA scores.

Results from combined scores show an increase in the mean score from 9.7 at pretest to 11.7 at posttest, indicating a two-point increase following the study (see Table 2, for combined DH and PA descriptive statistics for PI-designed menopause knowledge pretest/posttest). The combined scores of DHs and PAs were higher on the posttest ( $t=5.86$ ,  $p < 0.00$ ), therefore the null hypothesis ( $H_0: \bar{x}_1 = \bar{x}_2$ ) is rejected (see Table 3, for combined DH and PA paired  $t$ -test data for PI-designed menopause knowledge

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pretest/posttest). Menopause knowledge scores for DHs only suggest a mean increase from 10.04 to 11.48 (see Table 4, for DH descriptive statistics for PI-designed menopause knowledge pretest/posttest). Analysis using the paired  $t$ -test indicated higher scores on the posttest ( $t=-2.356, p < .027$ ); null hypothesis is rejected (see Table 5, for DH paired  $t$ -test for PI-designed knowledge of menopause pretest/posttest). Scores for PAs only show a mean score increase from 8.91 to 12.09 (see Table 6, for PA descriptive statistics for PI-designed menopause knowledge pretest/posttest). Results of the paired  $t$ -test reveal much higher scores on the posttest ( $t=-5.172, p < .000$ ); rejecting null hypothesis, once again (see Table 7, for PA paired  $t$ -test for PI-designed knowledge of menopause pretest/posttest).

Rejection of the null hypothesis indicates statistical significant difference between combined menopause knowledge pretest and posttest scores, DH only scores, and PA only scores; therefore, reinforcing data of mean score increases. It is especially important to note that PA's knowledge of menopause mean scores increased by the greatest margin from pretest to posttest (+3.18) vs. mean DH score increase (+1.44) (see Table 4, for DH descriptive statistics for PI-designed menopause knowledge pretest/posttest; see Table 6, for PA descriptive statistics for PI-designed menopause knowledge pretest/posttest).

Table 2

*Combined DH and PA Descriptive Statistics for PI-Designed Menopause Knowledge Pretest/Posttest*

Measure	$n$	$M$	$SD$	$SEM$
Pretest	36	9.7	1.77	.295
Posttest	36	11.7	1.59	.264



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Table 3

*Combined DH and PA Paired t-test for PI-Designed Knowledge of Menopause Pretest/Posttest*

<i>n</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>	<i>LL</i>	<i>UL</i>	<i>t</i>	<i>df</i>	Sig. (2-tailed)
36	-1.972	2.02	.337	-2.656	-1.288	-5.855	35	.000*

*Note.* Confidence interval 95%; LL=lower limit; UL=upper limit

\* $p < .05$ .

Table 4

*DH Descriptive Statistics for PI-Designed Menopause Knowledge Pretest/Posttest*

Measure	<i>n</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>
Pretest	25	10.04	1.74	.349
Posttest	25	11.48	1.61	.322

Table 5

*DH Paired t-test for PI-Designed Knowledge of Menopause Pretest/Posttest*

<i>n</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>	<i>LL</i>	<i>UL</i>	<i>t</i>	<i>df</i>	Sig. (2-tailed)
25	-1.440	3.06	.611	-2.702	-0.178	-2.356	24	.027*

*Note.* Confidence interval 95%; LL=lower limit; UL=upper limit

\* $p < .05$

Table 6

*PA Descriptive Statistics for PI-Designed Menopause Knowledge Pretest/Posttest*

Measure	<i>n</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>
Pretest	11	8.91	1.64	.495
Posttest	11	12.09	1.51	.456

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Table 7

*PA Paired t-test for PI-Designed Knowledge of Menopause Pretest/Posttest*

<i>n</i>	<i>M</i>	<i>SD</i>	<i>SEM</i>	<i>LL</i>	<i>UL</i>	<i>t</i>	<i>df</i>	Sig. (2-tailed)
11	-3.182	2.04	.615	-4.553	-4.553	-5.172	10	.000*

*Note.* Confidence interval 95%; LL=lower limit; UL=upper limit

\* $p < .05$ .

**Second hypothesis.** The Wilcoxon signed-rank test analyzed pre- and posttest modified RIPLS scores in order to test the second hypothesis, “Can an IPE module on oral manifestations of menopause improve DH and PA student’s attitudes and perceptions about IPE? In particular, can IPE improve DH and PA student’s attitudes and perceptions in two IPEC domains, roles and responsibilities and IP communication skills? Overall positive differences between pre- and posttest modified RIPLS mean scores suggest an increase in students’ attitudes and perceptions of IPE following the study. However, statistical significance is only seen for questions 3, 8, 9 in the teamwork and collaboration subscale, questions 14 and 15, in the positive professional identity subscale, and question 17, in the roles and responsibilities subscale (see Table 8 for PI-designed modified RIPLS pretest/posttest comparison of individual questions).

Table 8

*PI-Designed Modified RIPLS Pretest Posttest Comparison of Individual Questions*

RIPLS Item	<i>n</i>	Possible Score	Pretest		Posttest		<i>Z</i>	<i>p</i>
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
1. Learning with other students will make me a more effective member of a health care team	36	5	4.67	.535	4.67	.478	.000 <sup>b</sup>	1.000

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Table 8 (cont'd)

*PI-Designed Modified RIPLS Pretest Posttest Comparison of Individual Questions*

RIPLS Item	n	Possible Score	Pretest		Posttest		Z	p
			M	SD	M	SD		
2. Patients would ultimately benefit if health care students worked together	36	5	4.83	.378	4.86	.351	-.577 <sup>b</sup>	.564
3. Shared learning with other health care students will increase my ability to understand clinical problems	36	5	4.47	.696	4.75	.554	-2.500 <sup>b</sup>	.012*
4. Communication skills should be learned with other health care students	36	5	4.53	.506	4.61	.549	-.832 <sup>b</sup>	.405
5. Team-working skills are vital for all health care students to learn	36	5	4.78	.422	4.81	.401	-.378 <sup>b</sup>	.705
6. Shared learning will help me to understand my own professional limitations	36	5	4.47	.506	4.50	.609	-.277 <sup>b</sup>	.782
7. Learning between health care students before licensure would improve working relationships after licensure	36	5	4.61	.494	4.61	.549	.000 <sup>b</sup>	1.000
8. Shared learning will help me to think positively about other health care professions	36	5	4.31	.710	4.64	.543	-2.676 <sup>b</sup>	.007*
9. For small-group learning to work, students need to respect and trust each other	36	5	4.64	.543	4.78	.422	-2.236 <sup>b</sup>	.025*

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Table 8 (cont'd)

*PI-Designed Modified RIPLS Pretest Posttest Comparison of Individual Questions*

RIPLS Item	<i>n</i>	Total Possible Score	Pretest		Posttest		<i>Z</i>	<i>p</i>
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
10. I don't want to waste my time learning to with other health care students before licensure	36	5	4.53	.609	4.50	.655	-.302 <sup>b</sup>	.763
11. It is not necessary for undergraduate/postgraduate health care students to learn together	36	5	4.19	.822	4.36	.683	-1.500 <sup>b</sup>	.134
12. Clinical problem solving can only be learned effectively with students from my own program	36	5	4.31	.749	4.22	.898	-.302 <sup>b</sup>	.763
13. Shared learning with other health care students will help me to communicate better with patients and other professionals	36	5	4.44	.607	4.61	.494	-1.897 <sup>b</sup>	.058
14. I would welcome the opportunity to work on small group projects with other health care students	36	5	3.94	.826	4.22	.866	-2.673 <sup>b</sup>	.008*
15. I would welcome the opportunity to share some generic lectures, tutorials, or workshops with other health care students	36	5	4.14	.683	4.44	.607	-2.668 <sup>b</sup>	.008*
16. Shared learning and practice will help me clarify the nature of patients' problems	36	5	4.19	.710	4.36	.762	-1.732 <sup>b</sup>	.083
17. Shared learning before and after licensure will not help me become a better team worker	36	5	4.25	.692	4.58	.554	-3.000 <sup>b</sup>	.003*

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

Table 8 (cont'd)

*PI-Designed Modified RIPLS Pretest Posttest Comparison of Individual Questions*

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RIPLS Item	<i>n</i>	Total Possible Score	Pretest		Posttest		<i>Z</i>	<i>p</i>
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
18. I am not sure what my professional role will be/is	36	5	4.25	.937	4.25	.806	-.332 <sup>b</sup>	.740
19. I have to acquire much more knowledge and skill than other students	36	5	3.78	.637	3.64	.899	-1.091 <sup>b</sup>	.275

*Note.* *Z* (<sup>b</sup> Based on negative ranks)

Asymptotic Significance (2-tailed) *p* value

\**p* < .05

A Wilcoxon signed-rank test analyzed ordinal data collected from the modified RIPLS to determine whether the study improved perceptions of IPE. Analysis on the four individual RIPLS subscales included a) teamwork and collaboration, b) negative professional identify, c) positive professional identity, and d) roles and responsibilities. Significant changes in perceptions of IPE were indicated in two of the four subscales, teamwork and collaboration ( $p=.015$ ) and positive professional identity ( $p=.005$ ). The mean rank, in the teamwork and collaboration subscale, in favor of the posttest was 42.25, while the mean rank of the pretest was 41.28. In addition, the *Z*-score was computed for raw scores from the teamwork and collaboration subscale. The *Z*-score (-2.428) indicates an increase in perceptions regarding teamwork and collaboration following intervention. The positive professional identity subscale also shows a mean increase from 16.72 to 17.61. Furthermore, the *Z*-score was computed for the positive professional identity subscale. The *Z*-score (-2.802) indicates an increase in perceptions

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

regarding positive professional identity (see Table 9, for pretest/posttest comparison of modified RIPLS subscales).

Table 9

*Wilcoxon Signed-rank Test Modified RIPLS Subscales Pretest/Posttest Comparison*

Subscale	Items	Possible Score	Pretest		Posttest		Z	p
			M	SD	M	SD		
Teamwork and Collaboration	1-9	45	41.28	3.318	42.25	3.281	-2.428 <sup>b</sup>	.015*
Negative Professional Identity	10-12	15	13.00	1.724	13.14	1.823	-.721 <sup>b</sup>	.471
Positive Professional Identity	13-16	20	16.72	2.250	17.61	2.284	-2.802 <sup>b</sup>	.005*
Roles and Responsibilities	17-19	15	12.22	1.551	12.47	1.464	-.849 <sup>b</sup>	.396

*Note.* Z (<sup>b</sup> Based on negative ranks)

Asymptotic Significance (2-tailed) *p* value

\**p* < .05

Finally, analysis using the Wilcoxon signed-rank test determined changes in perceptions regarding two IPEC domains, roles and responsibilities and IP communication. Data indicates mean increases in all posttest scores, but only statistical significance in seven of nine IPEC sub-domains; RR1 (*p*=.013), RR2 (*p*=.015), RR3 (*p*=.000), RR4 (*p*=.009), CC3 (*p*=.019), CC4 (*p*=.006), CC6 (*p*=.015). Data for CC7 and CC8 did not indicate statistical significance, therefore null hypothesis ( $H_0: m=m_0$ ) is rejected for all sub-domains, with the exception of CC7 and CC8 (see table 10, for changes in IPEC domains RR and CC from pre- to posttest). There were no additional comments provided by participants on modified RIPLS pre- and posttests.

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Table 10

*Modified RIPLS Questions Determining Changes in IPEC Core Competency Domains Roles and Responsibilities (RR) and Interprofessional Communication (CC)*

IPEC Domain	n	RIPLS Items	Possible Score	Pretest		Posttest		Z	p
				M	SD	M	SD		
RR1	36	1,3,9,13,18	25	22.36	2.016	23.03	1.890	-2.474 <sup>b</sup>	.013*
RR2	36	1,2,3,6,9,10,11,13,15,19	50	44.06	3.601	45.31	3.454	-2.438 <sup>b</sup>	.015*
RR3	36	1,2,3,8,10,11,13,14,15	45	39.47	3.895	41.41	3.549	-3.572 <sup>b</sup>	.000*
RR4	36	1,2,3,15,16	25	22.31	2.227	23.08	2.143	-2.602 <sup>b</sup>	.009*
CC3	36	2,3,5,7,13,14	30	27.08	2.260	27.78	2.380	-2.336 <sup>b</sup>	.019*
CC4	36	7,9,10,13,14	25	22.14	2.100	22.81	2.095	-2.737 <sup>b</sup>	.006*
CC6	36	7,14,15,16	20	16.89	2.148	17.61	2.296	-2.427 <sup>b</sup>	.015*
CC7	36	1,4,5,6,8,9,12,18,19	45	39.36	3.053	40.06	3.338	-1.291 <sup>b</sup>	.197
CC8	36	1,2,13,15	20	18.08	1.592	18.56	1.557	-1.928 <sup>b</sup>	.054

Note. Z (<sup>b</sup> Based on negative ranks)

Asymptotic Significance (2-tailed) p value

\*p < .05

**Third hypothesis.** An instructor/study evaluation, IPE care plan exercise, and videotaped debriefing data answered the third hypothesis, “Can an IPE workshop utilizing pseudo-SP and CBL facilitate gained confidence of participants in applying new skills related to the oral manifestations of menopause?”.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

Table 11

## Instructor/Study Evaluation Descriptive Data

<i>N</i>	Possible score	Min	Max	<i>M</i>	<i>SD</i>
36	20	14	20	17.40	2.018

Descriptive statistics indicate positive response to the instructor/study evaluation, with a mean score of 17.40, indicating increased confidence of participants in applying new skills related to the oral manifestations of menopause (see Table 11, for instructor/study descriptive data). In addition, written responses on the instructor/study evaluation were also positive, therefore suggesting gained confidence (see Table 12, for participant comments from instructor/study evaluation).

Table 12

*Comments to Instructor/Study Evaluation*

Thematic Category	Key terms	Responses
Struggles	Materials OR struggle OR knowledge	As a DH student the material made sense, but it seemed as though some of the PA students struggled a little since they didn't have previous knowledge.
	Unsure OR shy OR unworried	The PAs weren't too sure how to help. They didn't have any major concerns. I don't know if they were shy or really weren't worried.
	Learning OR oral exam	It may have been helpful to learn what a dental hygiene oral exam entails, and if there are any tips for PAs, like things DHs wish the primary care provider did.



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Table 12 (cont'd)

*Comments to Instructor/Study Evaluation*

Thematic Category	Key terms	Responses
Compliments	Great OR thorough OR organized	Great job! Very thorough and organized!
	Great OR thought out OR organized OR interactive	Great, well thought out, very organized, and interactive.
	Great OR touchy subject	Great presentation on a touchy subject.

Next, team care plans were evaluated. Participants worked in one of six teams to construct an IPE care plan based on a given case study and pseudo-SP interaction. The majority of teams (four) had six members consisting of two PA students and four DH students. Exceptions were the purple team with two PAs and 3 DHs and yellow team with one PA and five DHs. The correct oral diagnoses for the pseudo-SP case study patient were xerostomia, oral osteoporosis, and periodontitis. These were correctly identified by two of the six teams (purple and yellow). However, 100% of teams (six) correctly identified at least one of the correct diagnoses. The complete list of risk factors for the pseudo-SP patient included menopause, nutrition, alcohol, smoking, caffeine, salt, stress, lack of sleep, infrequent dental/medical visits, and poor homecare. Three teams (50%) identified at least half of the risk factors, and the remaining groups correctly identified at least three. Barriers for the pseudo-SP patient included low medical/dental IQ, finances, and environmental factors. Four teams (67%) identified at least one barrier,

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

and two teams supplied no data. Goals for the pseudo-SP patient were patient education and medical/dental care. All six teams (100%) correctly identified the patient goals. Finally, 83% of teams (five) described follow-up care; the yellow team did not supply data. Qualitative data from the IPE care plan exercise suggests facilitation of gained confidence in applying skills learned in this study (see Table 13, for IPE team care plan data).

Finally, coded debriefing data indicates gained confidence in treatment of the oral manifestations of menopause as indicated by the response, “I feel more confident about menopause and the oral manifestations of it.” Facilitation of gained confidence in applying new skills related to the oral manifestations of menopause is also verified by comments such as, “As a dental hygienist, I will refer more to the PA/physician” and, “As a midlevel care provider, I will ask patients to bring this up to their dentist and their dental hygienist because the dental hygienist may have more time to spend with the patient” (see Table 14, for debriefing responses).

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Table 13

*IPE Team Care Plan Data*

Green Team	PA (n=2)	DH (n=4)
Diagnosis	Xerostomia, Periodontitis, Menopause	
Risk Factors	Alcohol, Smoking, Caffeine, Salt, Stress, Lack of sleep, Menopause, Xerostomia	
Barriers	Low medical/dental IQ, Finances, Insurance	
Goals	Smoking cessation, Medical visit, Periodontist visit, Oral health education	
Follow-up	Phone after initial visit, 1-2 month clinic visit, evaluate goals, note how pt. looks, feels, behaves, adjust goals	
Purple Team	PA (n=2)	DH (n=3)
Diagnosis	Osteoporosis in mandible, Periodontitis, Xerostomia, Menopause	
Risk Factors	Nutrition, GERD, Smoking, Menopause	
Barriers	Finances	
Goals	Improve homecare and nutrition, Use Biotene®, See MD	
Follow-up	Encourage follow-up, Initial NSPT in 1 month	
Red Team	PA (n=2)	DH (n=4)
Diagnosis	Xerostomia	
Risk Factors	Xerostomia, GERD, Nutrition, Smoking, Alcohol, Low calcium/Vitamin D intake	
Barriers	Employment in fast food restaurant	
Goals	Use saliva stimulating products, CBT, consider smoking/alcohol cessation, hydrate with water, See periodontist, See physician: BMD, thyroid test, MHT evaluation	
Follow-up	Establish three month recare	
Yellow Team	PA (n=1)	DH (n=5)
Diagnosis	Xerostomia, Osteoporosis in mandible, Periodontitis, Caries, Bruxism	

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

Table 13 (cont'd)

*IPE Team Care Plan Data*

Risk Factors	Family history of cancer, Alcohol, Smoking, Nutrition, Age, Stress, Infrequent health care visits
Barriers	No data
Goals	Use Biotene® and Xylitol products, OHI and nutrition education, See physician, See periodontist
Follow-up	No data
<hr/>	
Orange Team	PA (n=2) DH (n=4)
Diagnosis	Nutrition, Smoking, Alcohol, Depression, Obesity, Lack of sleep
Risk Factors	Infrequent health care visits
Barriers	No data
Goals	Complete NSPT and restorative, Use Biotene® and Xylitol Products, Smoking/Alcohol cessation, CBT, Lifestyle changes, See physician: labs, blood count, BP, cholesterol, A1C
Follow-up	Re-evaluation in 4-6 weeks following NSPT
<hr/>	
Blue Team	PA (n=2) DH (n=4)
Diagnosis	Menopause, Periodontitis
Risk Factors	Nutrition, Alcohol, Smoking, Poor homecare, GERD
Barriers	Work and home environments
Goals	Nutritional counseling, New social group, Smoking Cessation, More sleep, Hydration, Hormone education, See physician: blood work, BMD test, liver function
Follow-up	Dental: PSE, referral, evaluation, homecare, xerostomia check; Medical: test results, alcohol and smoking check, CBT, possible meds

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Table 14

*Coded Debriefing Responses*

Thematic Category	Key terms	Responses
Clarification of roles	Patient interview OR questioning	DH: I wouldn't have asked the questions the PAs asked.
	Disciplines OR testing	DH: There are other tests the PAs would do.
	Disciplines OR patient counseling overlap OR multiple providers	DH: There is a lot of overlap with tobacco cessation and nutrition counseling. We are ingrained as dental hygienists to include this counseling in appointments but PAs also stress it, which is cool to have multiple providers stress the same areas.
	Sharing more knowledge of disciplines	PA: I would have really liked to share with the DHs what our PA standards are for exams and compare them to the dental hygiene exam standards to see the crossover and share tips like, "Hey, look for this..." that we may not have known to look for.
Pseudo-SP	Patient interview OR low dental/medical IQ OR communication between disciplines	DH: I think it was a lot of fun, and will help us remember that we have a lot of patients like that, that don't understand nutrition and just don't understand what is really going on. So, I think it is good for us to learn how to communicate and recognize those things.
	Interactive OR collaboration OR communication	DH: The SP made it more interactive. Instead of just sitting here trying to figure something out on paper, we had someone to talk and a specialist (PA) who was helpful.
Knowledge and Confidence	Increased Confidence OR provider knowledge base OR interaction OR communication	PA: I feel that understanding the knowledge base of the other side makes it easier to interact, or even know what kinds of things you would talk about.
	Increased confidence OR patient interview OR DH referral	PA: As a midlevel care provider, I will ask patients to bring this up to their dentist and their dental hygienist because the dental hygienist may have more time to spend with the patient.
	Increased Knowledge OR menopause OR oral manifestations	DH: I feel more knowledgeable about menopause and the oral manifestations of it.

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Table 14 (cont'd)

*Coded Debriefing Responses*

Thematic Category	Key terms	Responses
Knowledge and Confidence	Increased knowledge and confidence OR scope of practice OR unsure about collaboration	DH: If you don't know a PA personally, it's more difficult to refer a patient, without that connection. It has helped a lot to get to know the PAs and their scope of practice.
	Increased knowledge OR oral-systemic link	DH: I will be able to recognize what I am seeing in the mouth and making the link that it could be associated with menopause and understand that.
Future Collaboration		PA: Asking our patients about oral health and referring them to the dentist.
		DH: As a dental hygienist, I will refer more to the PA/physician.
		PA: It would be nice if there was better communication between medical and dental providers. For example, if you have referred a patient twice to the dentist for x, y, z concerns, and then you never hear what or if anything happened. It would be nice if there were a communication tool.
		PA: When we send a referral to a dentist office we attach information, is there a note the dental office usually sends back to confirm they have seen the patient?
		DH: I would like to see communication where we explain the concerns the dental providers have expressed, as a working note. Especially, if there is a problem we can solve together with the medical provider, like a centralized IT system.
		PA: I think it is hard to step up and make that call to the dental provider when you are crazy running around the office trying to see your 20 patients a day. Working in a specialty practice, we always send our notes out to the patient's general physician. It would be nice if dentistry would send us a note and say, "Hey, this patient hasn't seen their medical provider in three years," and refer them back to the medical provider for evaluation.

## **Discussion**

### **Summary of Major Findings**

Scores from the menopause knowledge pre- and posttest demonstrated a significant increase in gained knowledge of participants regarding the oral manifestations of menopause. Comparison of pre- and posttest modified RIPLS scores suggested an improvement in participants' attitudes and perceptions of IP teamwork and collaboration and positive professional identity. Analysis of IPEC domains suggested improvements in roles and responsibilities (RR) and IP communication (CC). Qualitative data from IPE care plans and debriefing data verified facilitation of gained confidence in applying new skills related to oral manifestations of menopause. Analysis of anecdotal data inferred participants in this study found the workshop aided in increasing knowledge, skills, and confidence needed to treat oral manifestations of menopause.

### **Discussion**

This study explored the effects of an intervention consisting of a lecture and pseudo-SP case study on the oral manifestations of menopause. Results of this study suggest implementation of an IPE workshop on oral manifestations of menopause a) imparts new knowledge, b) gives participants the opportunity to communicate in small groups and improve attitudes and perceptions toward IPE, and c) facilitates gained confidence of participants in applying new skills related to the oral manifestations of menopause.

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**Interprofessional oral care for menopausal patients.** This IPE university-based study provided an excellent opportunity to bring attention to the oral manifestations associated with menopause and the relationship to overall health. The results clearly show an increase in participants' knowledge of oral health for the menopausal patient after completing this one-time workshop. These findings are consistent with the findings of a one-time study by Christenson (2014) demonstrating the positive effects of a single learning intervention. Results of this study are also supported by the research of Bowser et al. (2012), Bowser et al. (2013), and Nalliah et al. (2015) who found both PA and dental students benefit from IPE interaction.

Prior to this study the majority of participants demonstrated lack of awareness in the following areas a) oral health manifestations of menopause, and b) oral health management in menopause, as measured by menopause knowledge pretest. These findings were surprising given 84% of DHs ( $n=21$ ) and 38% of PAs ( $n=3$ ) reported experience treating oral conditions (see Table 1, for demographic characteristics). Previous research suggests lack of training inhibits PAs from providing oral care services (Jacques et al., 2010; Lewis et al., 2000; Romano-Clarke et al., 2007; IOM, 2011). Prior research by Murray and Fried (1999) indicates DHs need more training regarding the oral manifestations of menopause. Therefore, it may be inferred if PAs are not trained to provide oral care services and DHs are not trained to recognize and manage the oral manifestations of menopause, they may also omit discussions about the oral manifestations of menopause. This study supports prior research by Nasseh et al. (2014) reporting oral health providers possess greater potential for detection, monitoring, and prevention of chronic conditions. Findings from this study also suggest successful



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reinforcement of the importance of assessing menopausal patients for oral manifestations of menopause among the participants. Equally important, the participants learned how oral manifestations of menopause are linked to overall health including osteoporosis, vaginal dryness, and the contributing effects of medications.

This IPE study improved DH and PA students' knowledge regarding oral manifestations of menopause, with greatest improvement seen in PAs. Pretest results compared to posttest results provide evidence of student learning, supporting previous research by Knight and Wood (2005) regarding the addition of active learning to lecture results in higher posttest knowledge scores. The workshop content consisted of information necessary for participants to increase scores on the posttest. In general, the success of this systematically planned and executed oral health intervention is demonstrated by the statistically significant increase in participants' knowledge on the oral manifestations of menopause after participating in the workshop.

**Interprofessional education.** This IPE study provided participants an opportunity to practice IP communication skills and learn about each other's roles and responsibilities. Utilizing a PI-designed IP A.D.P.I.E.D. process of care adapted from the IPTRF framework and A.D.P.I.E.D. process of care, DH and PA students collaborated to create a patient care plan and provide patient-centered care with a focus on assessing and treating oral manifestations of menopause.

The modified RIPLS, frequently used in DH and PA programs, evaluated students' attitudes and perceptions regarding IPE (Hertweck et al., 2012; Gourley, 2014; Segal-Gidan et al., 2014). Specific subscale domains of the RIPLS include teamwork and collaboration, negative professional identity, positive professional identity, and roles and

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responsibilities. Measured aspects of students' attitudes and perceptions toward IPE showed significant improvement in IP teamwork and collaboration and positive professional identity.

Overall, there was no significant change in negative professional identity or roles and responsibilities domains. However, 1 of 3 questions (number 17) in the roles and responsibilities domain showed statistical significance. Wakely et al. (2013) had similar findings, reporting significant changes in all subscales except roles and responsibilities. The lack of significant change in negative professional identity and roles and responsibilities domains may be because initial scores were already high, or because it was a one-time study limited to a three-hour time allotment. Although, research by Giuliani et al. (2014) indicates positive results may come from a one-time event.

As groups were monitored by the PI during the IPE care plan creation, it was noted that although the majority of groups had constructive interaction between DHs and PAs, there were some struggles as corroborated by anecdotal data from the instructor/study evaluation. The effectiveness of the group work may have been affected by student fatigue because the majority of students started courses at 7:00 am, and group care plan creation did not begin until 7:10 pm. Due to time constraints the full scope of practice of DHs and PAs was not discussed, and clinical skills were not demonstrated. Anecdotal data supports that students want to collaborate, but they do not know how. In fact, a PA noted in debriefing, "I would have really liked to share with the dental hygienists what our PA standards are for exams and compare them to the dental hygiene exam standards to see the crossover and share tips...". More information about scope of practice for DHs and PAs may aid in changing students' perceptions that they must

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acquire more knowledge and skill than other students. Lastly, discomfort talking about certain women's health issues, like vaginal dryness, may have also affected team performance.

The study aligned with two IPEC competency domains, including roles and responsibilities and IP communication. The roles and responsibilities domain focuses on using the knowledge of one's own roles and those of other professions to appropriately assess and address the health care needs of the patients and populations served (IPEC, 2011). The IP communication domain focuses on communicating with patients, families, communities, and other health professionals in a responsive and responsible manner that supports a team approach to the maintenance of health and the treatment of disease (IPEC, 2011). Strengthening these core competencies aids in integrating essential content in health care training, guides development of learning objectives and assessments, and promotes lifelong IP learning and evaluation (IPEC, 2011). Pre- and posttest scores align with findings of Christenson (2014) and demonstrate significant growth in IP communication and understanding roles and responsibilities. Although no IPE curricula exists between DH and PA programs (Anderson, Smith, & Brown, 2013), this study validates improvements in IP communication and understanding of roles and responsibilities may enhance the desire to and opportunities for DHs and PAs to work interprofessionally in practice.

**Pseudo-standardized patient and case-based learning.** Becoming a competent health care provider requires more than acquiring knowledge and skills, it also requires confidence in ability to provide care. This study aimed to evaluate how a pseudo-SP experience would affect students' confidence in counseling menopausal women. Among

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many advantages of this IPE study was the opportunity for DH and PA students to work together in promoting women's oral health; this aligns with Gibson-Howell (2010) showing application of students' knowledge increases learners' acquisition and retention of knowledge.

Working with the pseudo-SP provided a powerful learning experience and gave participants the opportunity to try out different strategies in a safe environment. The pseudo-SP CBL group care plan exercise demonstrated these groups of students were able to share the responsibilities of menopausal patient care. This one-time study supports results similar to Feeley et al. (2010) who found value in using pseudo-SP for communication training and health education promotion. Findings are strengthened further by DeMarco et al. (2002) and Hayward and Cairns (1998) who found when students work collaboratively to solve a case study, they are required to develop skills needed in the real-world such as critical thinking, problem solving, prioritization, working with others, and appreciation of roles. Specifically, these studies support working on a case study facilitates students' gained confidence in their knowledge of content, success in group work, and ability to look at a problem from various viewpoints, process it, and use critical thinking to reach a solution (DeMarco et al., 2002; Hayward & Cairns, 1998).

Research by Lavigne (1999) also supports study results suggesting collaborating with other disciplines encourages greater communication, leading to improved access to care and overall quality of care. A primary goal of the pseudo-SP CBL exercise was for DH and PA students to participate actively in developing a care plan. In addition, groups were encouraged to use the provided lecture outline containing oral care guidelines for

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menopause. The use of oral care guidelines was important to this study because of prior research by Suri and Suri (2014) indicating no oral care guidelines exist for menopause.

Care plan data revealed participants were able to function as a team, even with little familiarity to each other. Results support small group, case-based learning using a pseudo-SP aids in knowledge acquisition as well as confidence in application of new skills. This study's findings support previous findings by Brame et al. (2012), Russell, Comello, and Wright (2007), and Singleton et al. (2014) that case-based learning and SP positively impact students' confidence, understanding, and communication and clinical skills. Use of pseudo-SP and CBL using the PI-designed IP A.D.P.I.E.D. process of care algorithm triggered the decision points called for in the care plan. As with research by Koerber et al. (2012), this study demonstrates integration of oral manifestations of menopause into the A.D.P.I.E.D. process of care. Furthermore, the algorithm provided a framework for students to improve perceptions of teamwork, and measure changes in knowledge, skills, and attitudes. However, the orientation given for this algorithm was brief and therefore students seemed to struggle initially to understand the sequence of the algorithm. Although time constraints did not allow for group presentation of IPE care plans and discussion, it may have contributed to greater knowledge and confidence. Additional orientation and training in class or online with sample case studies and algorithm teaching tools may have aided participants in using this tool to its full extent, as advised by Packard et al. (2012).

Debriefing data supports this workshop permeated the silos separating medicine and dentistry, providing hope that a new generation of practitioners will develop professional identities and categorizations that deconstruct traditional roles. Data from

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the instructor/study evaluation validates previous findings by Chadbourne and Boyd (2012) suggesting DHs are able to successfully deliver oral health content to other health care disciplines.

### **Limitations**

While these findings add to the literature, this study is not without limitations. Data was collected from a one-time study of a small sample, which precludes broad generalization. By participating voluntarily in the study participants demonstrated intrinsic motivation to participate in IPE and learn more about oral manifestations of menopause. Furthermore, students received IPE credit for attending. It should be noted there was an unequal distribution of students representing DH and PA professions in each team. This imbalance may not have authentically represented the IP team dynamic in a real clinical setting. Teams also had varying levels of didactic and clinical experience. Lastly, although responses were confidential, students may have felt pressure to rate the PI performance high due to previous interactions. However, this study focused on increasing knowledge of the oral manifestations of menopause, enhancing teamwork and communication between DHs and PAs, and facilitating confidence in applying new skills. Significant change in knowledge, perceptions, and confidence are positive indicators of this study's effect. All of these limitations could be considered for areas of future research.

### **Recommendations/Suggestions for Future Research**

The results of this study suggest DH and PA programs include more women's health content in curricula using SP/pseudo-SP and CBL to prepare students for team-based, patient-centered chronic care management. It is also recommended that PA

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curricula include additional oral health content and experiences. Additional IPE experiences, allowing DH and other health care disciplines to learn about, from and with each other have potential to improve knowledge, perceptions, and confidence in patient care. Inclusion of such content and experiences supports delivery of IHI “Triple Aim” including focus on increased longevity and chronic care, quality and safety, and reduction in health care cost.

On debriefing, participants identified several shortcomings to note in future research on this topic. Participants felt that more than a one-time study was needed to further foster confidence in treating oral manifestations of menopause. Therefore, a clinical IPE orientation of respective professions is recommended to allow DH and PA students to compare oral examination standards and gain understanding of each discipline’s knowledge base. Next, long-term studies are recommended to determine if knowledge and skills gained from a one-time intervention regarding oral manifestations of menopause translate to practice following graduation; possibly achieved by conducting a follow-up survey of participants in practice. Future research is also recommended to solidify oral care guidelines for menopause and further evaluate effectiveness of the PI-designed IP A.D.P.I.E.D. process of care algorithm. Additionally, research to replicate this study with a larger more diverse group of students, including other healthcare professions is recommended for future studies. Lastly, it is recommended that changes in knowledge of 2<sup>nd</sup> year DH students be compared with 3<sup>rd</sup> year students to evaluate statistical significance and determine the ideal point in the curriculum to introduce IPE.

### **Conclusions**

The results of this IPE study were positive and allowed DH and PA students to experience IPE and expand their oral health knowledge, skills, and confidence regarding menopause by working together. Participants approved of the IPE learning approach, and data verifies that DHs and PAs knowledge increased, perceptions and attitudes toward IPE improved, and confidence in applying new skills was facilitated. Despite all participants reporting prior IPE experience, study data supports significant changes in perceptions of IPE following this intervention, speaking to the strength of this study module. This IPE study is unique for several reasons. First, it unites the efforts of two universities (EWU and U of W) and professions (DH and PA). Second, the IPE intervention used CBL and pseudo-SP in training DHs and PAs about oral manifestations of menopause using PI-designed IP A.D.P.I.E.D. process of care algorithm and PI-designed menopause oral health guidelines. This study provides the tools and the opportunity to help DHs and PAs begin the process of IP collaboration. Improvements in oral manifestations of menopause training for both medical and dental providers that increases knowledge, skills, and facilitates confidence could ultimately improve diagnosis, treatment, and overall oral health in women. Study findings support the need for a paradigm shift in training of medical and dental providers. This shift should emphasize assessment of women's oral health and treatment of the whole patient to optimize health outcomes, reduce the number of undiagnosed chronic oral conditions, and decrease overall health care spending. This paradigm shift is needed now more than



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ever, as DHs and PAs are more likely to encounter patients at risk for, or suffering from oral manifestations of menopause.

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## ORAL MANIFESTATIONS OF MENOPAUSE IPE

### Appendix A Lesson Plan

#### Learning Outcomes

On completion of this module, the learner will be able to:

- Demonstrate increased knowledge regarding oral manifestations of menopause
- Demonstrate collaborative decision-making by developing a patient care plan based on given information
- Demonstrate knowledge of the roles and responsibilities of PAs and DHs in treating menopausal patients by analyzing a given case study and pseudo-SP profile
- Develop effective interprofessional and patient communication skills by participating in a pseudo-SP case study
- Apply knowledge of menopausal oral care to a case study
- Demonstrate patient-centered care in treatment planning
- Appreciate how this education experience may affect your confidence in treating oral manifestations in menopausal women by participating in debriefing

#### Teaching Methods/Strategies

##### Learning

- Knowledge of IPE and oral care of menopausal patient
- Skills: Communication and team work
- Activities: Communication and teamwork, pseudo-SP, case study project

##### Teaching Methods

- Lecture with PowerPoint® covering IPE, oral care and the menopausal patient, teamwork, and professional roles in caring from menopausal women.
- Tutorials: Training on IP collaboration, oral care for the menopausal patient, training on use of IP A.D.P.I.E.D. process of care, and case study training

#### Learning Activities

- Active classroom discussion through lecture
- Interaction and questioning of pseudo-SP within a team
- Case study of menopausal patient care using IP A.D.P.I.E.D. process of care
- Group discussion and debriefing following case study and posttest

#### Resources

##### Handouts

- Workshop Procedures, “Appendix O”
- Lecture PowerPoint® Outline, “Appendix “B”
- Case study, “Appendix P”
- IP A.D.P.I.E.D. process of care, “Appendix J”
- Patient Care Plan Worksheet, “Appendix C”

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

## Assessments for Student Learning Outcomes:

Learning Outcomes		Teaching Strategy	Learner Activity	Assessing for Learning
Knowledge	Demonstrate increased knowledge regarding oral manifestations of menopause	Lecture PPT Discussion	Learning linking concepts	Active discussion, group case study project
Explore learning	Demonstrate collaborative decision-making	Teamwork and discussion	Providing multiple perspectives through discussion	Active discussion and Group case study project
Apply Learning	Demonstrate knowledge of the roles & responsibilities of PAs and DHs in treating menopausal women	Team discussion	Case study; linking concepts through case study and discussion	Active discussion, group case study project, modified RIPLS
Apply Learning	Develop effective interprofessional and patient communication skills	Team discussion	Interpret knowledge	Group case study project
Apply Learning	Apply knowledge of menopausal oral care to a case study	Problem solving, group case study	Synthesis and transformation of knowledge	Group case study project
Application of new skill	Demonstrate patient centered care in treatment planning	Presentation and group discussion of case study treatment plans	Apply concepts that transform knowledge	Discussion of group case study projects and Debriefing
Reflection	Appreciate how this educational module will affect confidence in treating oral manifestations in menopausal	Debriefing questions to initiate response and reflection	Reflect on concepts learned and future application in practice	Debriefing

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

Lesson Plan

Windy Rothmund

Title/ Lab or Lecture	Oral Manifestations of Menopause IPE Workshop						
Topic	Menopause, Oral Health, IPE						
General Goal/ Competency	Increase Knowledge of oral effects of menopause and improve collaborative skills						
<b>Specific Instructional Objectives</b>	Teacher Activities		Time Frame	Learner Activities	Time Frame	Resources, Materials, and Technology	
	<b>Pre-Instructional</b>	<b>Develop Preparation Materials/Activities</b> 1. Prepare: •Participant Consent Form •Participant Invitation Letter •Menopause Knowledge Pre & Posttests with answer key •Modified RIPLS • Instructor/Study Evaluation Form •Demographic Survey •Patient Care Plan Worksheet •Debriefing Questions • SP Case Study & Script •Workshop Procedures •IPE Certificate •Thank-you notes	12 hours			1. Thesis and referenced sources 2. Laptop & thumb drive 3. Manilla envelopes, paper, printer ink 4. 30+ orange highlighters to mark work done by PA & 30+ purple highlighters to mark work done by DH	
confidence in treating oral manifestations in menopausal women by participating in a debriefing		2. Assemble & Label Participant Manilla Envelopes filled with Materials for Study Workshop marked with participant code number inside the flap (example: PA-1, DH-25)  3. Create Voice-over PPT for workshop presentation  4. Conduct SP Training  5. Evaluate availability of room #278 & availability of PA & DH students  6. Get dinner food for workshop  7. Greet participants & make sure seated in proper group, color labels on shirt, introduce each other, & appoint team leader	2 hours  12 hours  60 min  60 min  60 min  10 min		1. Get Food & Find group  2. Team Huddle: Find your team & appoint team leader 3. Look at materials in provided packet Introductions	10 min  5 min	5. 60+ Mechanical pencils & ink pens  6. Food, plates, silverware, napkins & bottled water for participants  7. Room #278  8. SP/Ann

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

		7. Proctor exams	30 min	<del>4. Complete</del> Demographic Survey, Knowledge pretest, RIPLs pretest.	30 min	
<b>Instructional</b>	<b>List of planned evidence-based active learning strategies</b>					
	1. Workshop orientation, review of procedures & L.O.s	5 min	1. Listen to orientation	5 min	1. Personal Laptop	
	2. PPT presentation Re: IPE, ADPIED, IPTRF, menopause, oral manifestation and treatment	45 min	2. Watch PPT	45 min	2. Thumb drive with PPT	
	3. Break	5 min	Break	5 min	3. Manilla envelopes filled with participant forms, worksheets etc.	
	4. Introduce & oversee SP case study	40 min	3. Read case study	5 min	4. SP & SP Script	
			4. Listen to SP	5 min		
			5. Develop Questions for SP	5 min		
			6. Team leaders interview SP	10 min		

		5. Oversee collaborative Care Plan development	20 min	7. Develop Patient Care Plan	15 min	
	<b>Evaluation tools</b>			<b>Evaluation</b>		
	1. Menopause knowledge pre- & posttest	15 min each	1. Complete knowledge posttest, RIPLs posttest, Instructor/Study evaluation form	30 min total	1. Knowledge pre & posttest Keys	
	2. RIPLs pre- & posttest	10 min each			2. Figure showing IPEC competencies addressed by each RIPLs question	
	3. Instructor/Study evaluation Survey	5 min			3. Patient Care Plan Worksheet Key	
	4. Patient Care Plan Worksheet	15 min		15 min		
	5. Debriefing Questions	10 min	2. Videotaped debriefing	10 min	3. List of Debriefing questions 4. Video camera & tripod	

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

	<b>Evaluation of Teaching</b> Analysis of: 1. Videotaped debriefing 2. Instructor/Study Survey 3. Pre & Posttest Results	6 hours	<b>Evaluation</b> Instructor/Study Survey	5 min	1. Video tape of debriefing 2. Graded pre and posttests 3. Evaluated Instructor/Study Survey
Post-Instructional	<b>Teacher Activities</b> 1. Grade/ Evaluate Tests, Worksheets etc. 2. Analyze Quantitative Data 3. Categorize & code debriefing data & other qualitative data gathered from other tests, worksheets, etc. 4. Analyze Qualitative data 5. Record & report all data	4 hours 4 hours 4 hours 4 hours 4 hours	<b>Homework Reflection</b> 1. Debriefing	15 min	1. All tests, worksheets etc. 2. Debriefing questions 3. Laptop 4. Thumb drive 5. Excel 6. Debriefing video



ORAL MANIFESTATIONS OF MENOPAUSE IPE

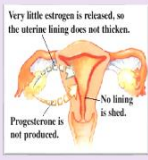
Appendix B  
Workshop PowerPoint® Outline

<p><b>Welcome</b></p> <ul style="list-style-type: none"> <li>Find your Team</li> <li>Find Manila Envelope With Your Materials</li> <li>Put On Your Name Tag</li> <li>Enjoy Dinner</li> <li>Huddle w/ Team Members: Choose a Team Leader</li> <li>Workshop Begins at 5:30</li> </ul> <p>What's in the Envelope?</p>	<p>Oral Health Manifestations of Menopause: Interprofessional Education of Dental Hygiene &amp; Physician Assistant Students</p> <p>A Study Presented By Windy Rothmund, BSDH, MSDH Candidate</p>	<p><b>Workshop Topics</b></p> <p>1. Interprofessional Education (IPE)</p> <p>2. Oral Manifestations of Menopause</p>
<p>1</p>	<p>2</p>	<p>3</p>
<p><b>Standardized Patients &amp; Case-Based Learning</b></p> <ul style="list-style-type: none"> <li>Case-based learning is a method that introduces case studies to students following completion of a related lecture or lab, so new learning may be applied to real-life scenarios</li> <li>Standardized patients are actors trained to portray patients in a simulated clinical setting</li> </ul>	<p><b>Workshop Overview</b></p>	<p><b>Pre-test Instructions</b></p> <ol style="list-style-type: none"> <li>Place all personal belongings under your table or front of classroom</li> <li>Tests must be completed solely by each individual participant</li> <li>30 minutes is allotted to complete all pre-tests</li> <li>Remove Pretests from Manila Envelope (GREEN Packet)             <ul style="list-style-type: none"> <li>Demographic Survey</li> <li>RIPLS Pre-test</li> <li>Menopause Knowledge Pre-test</li> </ul> </li> <li>Give completed test packet to instructor</li> </ol>
<p>4</p>	<p>5</p>	<p>6</p>
<p><b>Workshop Learning Objectives</b></p> <ul style="list-style-type: none"> <li>Develop effective communication skills with other health care disciplines</li> <li>Demonstrate collaborative decision making by developing a patient care plan based on given information</li> <li>Demonstrate understanding of the roles &amp; responsibilities of DH &amp; PA in treating menopausal women as a team by analyzing a given case study &amp; Standardized Patient (SP)</li> </ul>	<p><b>Menopause</b></p>	<p><b>65 Million</b></p>
<p>7</p>	<p>8</p>	<p>9</p>
<p><b>43%</b></p> <p>Experience Oral Discomfort in Menopause</p> <p>Often <u>Without</u> Clinical Signs</p>	<p><b>1 in 3</b></p> <p>Live 25-30 years after onset</p>	<p>✓ Recommendations</p> <p>✗ Oral Care Guidelines</p>
<p>10</p>	<p>11</p>	<p>12</p>

ORAL MANIFESTATIONS OF MENOPAUSE IPE

### Menopause: What is it?

- End of menstrual periods
- Average age 51
- No period for 1+ years
- In this study menopause is used to describe the event as well as the years following



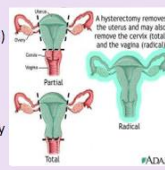
References: Casper, 2012, p. 1  
Image Source: www.fda.gov

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### Menopause: Why Does it Occur?

- Natural Aging Process (45-55)
- Cancer Therapy
- Nutritional Deficiency
- Hysterectomy-Oophorectomy



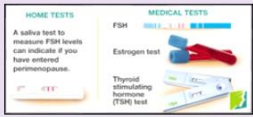
References: Stroh et al., 2010; Murray et al., 2012  
Image Source: www.fda.gov

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### Menopause: Diagnosis

- **PA** have ability to **diagnose** menopause
- **No definitive test** to diagnose menopause




References: BMJ 2016; 354: f2077  
Image Source: www.bmj.com

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### Menopause: Systemic Manifestations

- Hot Flashes
- Night Sweats
- Insomnia
- Moodiness
- Problems Focusing & Learning
- Fat Accumulation
- Vaginal Dryness
- Osteoporosis
- Overactive Bladder
- Stiff/Achy Joints & Muscles
- Oral Manifestations




References: MA 2015, Fall & Fall, 2014  
Image Source: www.orthomolecular.com

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### Menopause: Systemic Manifestations

- **80%** of menopausal women develop hot flashes
- Only **25%** seek medical attention and treatment
- What does this tell us?



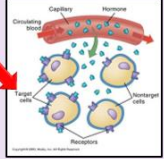
References: MA 2015, Fall & Fall, 2014  
Image Source: www.orthomolecular.com

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### Menopause: Sex Hormones

- Hormones bind to receptors on target cells
- Produce regulatory changes within the target cell

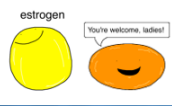


References: Kim & Anus, 2006; Marshall & Moorhead, 2015; Murray et al., 2012; Fall & Fall, 2014  
Image Source: www.orthomolecular.com

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### Menopausal Hormone Therapy (MHT)




References: American Journal of Therapeutics and Geriatrics 2012, 2013  
Image Source: www.orthomolecular.com

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### Menopausal Hormone Therapy (MHT)

- Estrogen alone or in combination w/ progestin
- Be aware of FDA Contraindications
- FDA approved for:
  - Osteoporosis
  - Moderate-Severe Vasomotor Symptoms
  - Vaginal Dryness



References: American Journal of Therapeutics and Geriatrics 2012, 2013  
Image Source: www.orthomolecular.com

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### Menopausal Hormone Therapy (MHT)

**Cautions for MHT:**

- Weigh Risks & Benefits
- Individualize Care
- Lowest Dose
- Shortest Duration



References: Stroh et al., 2010  
Image Source: www.orthomolecular.com



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### Menopausal Hormone Therapy (MHT)

**Data does not support:**

- Use of progestin alone
- Testosterone
- Compounded bioidentical hormones
- Phytoestrogens
- Herbal supplements (Black Cohosh)

References: American Journal of Therapeutics and Geriatrics 2012, 2013  
Image Source: www.orthomolecular.com

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### Menopausal Hormone Therapy (MHT) Alternatives

**Vasomotor Symptoms**

- SSRI's & SSNRI's
- Clonidine
- Gabapentin
- Paroxetine (FDA approved)

**Vaginal Dryness**

- Ospemifene (FDA approved)





References: MA 2014  
Image Source: www.orthomolecular.com

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### Oral Manifestations of Menopause



References: MA 2014  
Image Source: www.orthomolecular.com

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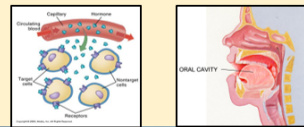


ORAL MANIFESTATIONS OF MENOPAUSE IPE

### Menopause: Oral Manifestations

**Estrogen Levels Effect:**

- Oral Mucosa
- Periodontal Tissues
- Alveolar Bone




References: Haddad et al., 2003  
Image Source: <http://www.oralcancer.com>

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### Menopause: Oral Manifestations

**Sex Hormones manifest in:**

- **Endothelium**
- **Gingival Epithelium**
- **Gingival Connective Tissue**
  - Periodontal Ligament
  - Alveolar Bone
  - Cementum

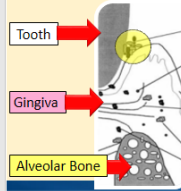


References: Estroff & Nalbandian, 2010; Appene & Suckale, 2010  
Image Source: <http://www.dentoblog.com>

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### Menopause: Oral Manifestations

**Influence of Sex Hormones on the Periodontium**




- Microbial Changes:**
  - ↑ Anaerobic Bacteria
- Vascular Changes:**
  - ↑ Gingival capillary dilation & permeability
- Cellular Changes:**
  - Stimulates endothelial cells
  - ↓ keratinization
  - ↓ Collagen production
- Immune Changes:**
  - ↑ monocytes & macrophages
  - ↓ T cells and B lymphocytes

References: Appene & Suckale, 2010  
Image Source: Appene & Suckale, 2010

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### Menopause: Clinical Oral Changes

- Reduced Epithelial Keratinization
- Reduced Salivary Gland Flow
- Increased Immune Cell Activity



↓


- Dry Oral Tissues
- Bleeding w/ Brushing & Probing
- Red or Abnormally Pale Gingiva

References: Simon et al., 2014; Sasaki et al., 2009  
Image Source: <http://www.oralcancer.com>

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### Menopause: Oral Manifestations

- Xerostomia (Most Common Oral Complaint)
- Gingivostomatitis
- Desquamative Gingivitis
- Periodontitis
- Osteoporosis
- Burning Mouth Syndrome
- Trigeminal Neuralgia



References: Shi et al., 2011; Ferrarini et al., 2012; Malgara et al., 2012  
Image Source: <http://www.oralcancer.com>

29 ☆

### Menopause: Oral Manifestations

**Xerostomia**

- The feeling of xerostomia is SUBJECTIVE & does not always correlate with actual salivary output
- Associated with Mouth Pain, TMD, Diffuse Gingival Atrophy, Bitter Taste, Halitosis, Oral Ulcerations, Dental Caries, Periodontal Disease, and Oral Candidiasis




References: Colburn, 1977; Simon et al., 2014; Lipp et al., 2011; Meehan et al., 2006; Yeh & Liu, 2014  
Image Source: <http://www.oralcancer.com>

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### Menopause: Oral Manifestations

**Gingivostomatitis**

- Associated with decreased saliva
- Affects Gingiva
  - Color range
  - Dry & Shiny
  - Bleeds Easily



References: Ferrarini, 2012  
Image Source: <http://www.oralcancer.com>


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### Menopause: Oral Manifestations

**Desquamative Gingivitis**

Gingiva:

- Erythema
- Erosion
- Vesicles
- Sloughing



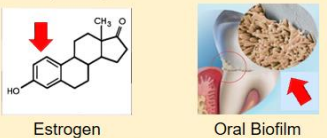
References: Agha-Hosseini & Elwood-Deegan, 2011  
Image Source: <http://www.oralcancer.com>

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### Menopause: Oral Manifestations

**Oral Bone Loss: Periodontitis**

**Primary Etiological Factors:**



Estrogen      Oral Biofilm


References: Takamata et al., 2008  
Image Source: <http://www.oralcancer.com>

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### Menopause: Oral Manifestations

**Periodontitis**

- Inflammatory disease caused by oral bacteria
- Loss of Connective Tissue Attachment & Bone
- Silent Bone Resorptive Disease
- Associated with Systemic Bone Loss




References: Wozniak et al., 2011; Sorensen et al., 2014  
Image Source: <http://www.oralcancer.com>

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### Menopause: Oral Manifestations

**Periodontitis**

- 98% of menopausal women perceive gum health
- 60% have moderate to severe periodontitis



References: Takamata et al., 2008  
Image Source: <http://www.oralcancer.com>


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### Menopause: Oral Manifestations

**Periodontitis**

**Estrogen Deficiency associated with:**

- Increased inflammatory cytokine production
- Increased blood immune cell activity



Monocytes      Macrophages

References: Sorensen & Christ, 1995; Simon et al., 2014  
Image Source: <http://www.oralcancer.com>

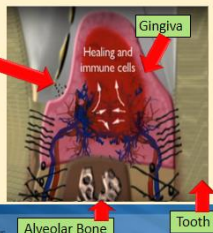
36 ☆

ORAL MANIFESTATIONS OF MENOPAUSE IPE

### Menopause: Oral Manifestations

#### Periodontitis

**Biofilm & Calculus**



Chronic inflammation in gingiva leads to tissue and bone destruction

Healing and immune cells

Alveolar Bone

Tooth

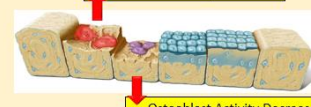
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### Menopause: Oral Manifestations

#### Oral Bone Loss

Estrogen receptors in BOTH Osteoclasts & Osteoblasts

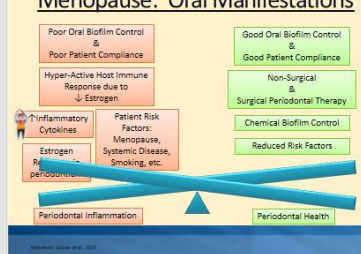
Osteoclast Activity Increases



Osteoblast Activity Decreases

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### Menopause: Oral Manifestations



Poor Oral Biofilm Control & Poor Patient Compliance

Hyper-Active Host Immune Response due to ↓ Estrogen

↑ Inflammatory Cytokines

Estrogen

Periodontitis

Good Oral Biofilm Control & Good Patient Compliance

Non-Surgical & Surgical Periodontal Therapy

Chemical Biofilm Control

Reduced Risk Factors

Periodontal Health

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### Menopause: Oral Manifestations

#### Oral Osteoporosis


- Endotoxins in Biofilm = Stimulate Osteoclasts
- Associated with Systemic Bone Loss & ↓ Estrogen



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### Menopause: Oral Manifestations

#### Oral Osteoporosis



Osteoporosis

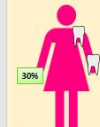
Healthy

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### Menopause: Oral Manifestations

#### Oral Osteoporosis

- 30% of women over 60 affected by menopausal osteoporosis
- Women with advanced systemic osteoporosis are 3x more likely to experience tooth loss



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### Menopause: Oral Manifestations

#### Burning Mouth Syndrome

Defined as a neuropathic condition perpetuated by the following contributing factors:

- Systemic
- Local Oral
- Psychological




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### Menopause: Oral Manifestations

#### Burning Mouth Syndrome

- Painful, unremitting, deep, bilateral burning sensation in Lips, Tongue, Palate, Cheeks, Throat & Areas of Denture Support
- Painful ulcerations are **NOT** Associated with BMS
- Mucosa Appears Healthy

Most prevalent in Anterior Tongue



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### Menopause: Oral Manifestations

#### Burning Mouth Syndrome

Characteristics of Symptoms:

- No apparent cause
- Appear spontaneously or gradually
- Progressive: typically worsen over the day
- Chronic: persist for months or years
- Seldom interfere w/ sleep
- Never worsen
- Affect eating habits
- Cause thirst

PAIN is the most important symptom of BMS




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### Menopause: Oral Manifestations

#### Burning Mouth Syndrome

**Associated with:**

- Halitosis
- Xerostomia
- Itchy mouth
- Difficulty swallowing
- Facial or dental pain
- Altered perception of taste
  - Salty, Peppery, Sour



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### Menopause: Oral Manifestations

#### Burning Mouth Syndrome

Diagnosis based on:

- Detailed medical & dental history
- Absence of finding in physical & lab exams
- Exclusion of other conditions

BMS is classified as underdiagnosed & poorly managed



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### Menopause: Oral Manifestations


#### Trigeminal Neuralgia

Characterized by:

- Severe, unilateral pain in the Middle to Lower Third of the face

Associated with:

- Poor denture retention



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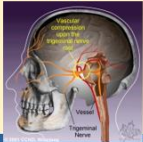
ORAL MANIFESTATIONS OF MENOPAUSE IPE

### Menopause: Oral Manifestations

**Trigeminal Neuralgia**

Associated with:

- Compression of Superior Cerebellar Artery on Trigeminal Nerve Branches




Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>

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### General Oral Health Management in Menopause



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>


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### General Oral Health Management in Menopause

**Medical-Dental Collaboration Includes:**

- Thorough medical/dental history
- Oral health assessment (HEENOT/perio-dental)
- Modifiable risk counseling
- Evaluation for Menopausal Hormone Therapy
- Testing for BMD
- Periodontal evaluation prior to Bisphosphonate Therapy



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>


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### General Oral Health Management in Menopause

**Assessments**

- Oral Exam
- Radiographs
- Periodontal Charting
- Plaque Index
- Sialometry
- Modifiable Risks



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>


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### General Oral Health Management in Menopause

**Management Centers on:**

- MHT
- Oral Hygiene
- Regular Dental Visits
- Modifiable Risk Factors
- Treatment Specific to Condition
- Differential Diagnosis



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>


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### General Oral Health Management in Menopause

**Modifiable Risks**

- Smoking
- Alcohol
- Nutrition
- Caffeine
- Salt
- Exercise
- Stress



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>

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### General Oral Health Management in Menopause

**Basic Menopause Oral Health Guidelines**

- Regular Dental Visits
- Electric Toothbrush
- Brushing & Flossing 2+ times/day
- Fluoride Toothpaste, Rinse, Varnish
- Chlorhexidine Gluconate Rinse
- Adjunct Tools



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>

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### Specific Oral Health Management in Menopause



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>



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### Specific Oral Health Management in Menopause

**Periodontium**

- Periodontal Disease: **MHT**
- Desquamative Gingivitis: **Corticosteroids**

Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>


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### Specific Oral Health Management in Menopause

**Oral Osteoporosis**

- **Radiographs:** ↑ Radiographs
- **Calcium:** 1,500-2,000mg Daily
- **Vitamin D:** 800-100 IU daily
- **Medications & Therapies** coincide with systemic treatment (BRONJ risk)
- **Osteoporosis Screening**



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>

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### Bisphosphonates & the Oral Cavity

- BPs promote bone turnover and remodeling by ↓ OSTEOLAST function
- Risk for developing BRONJ significantly lower with Oral BPs than Systemic BPs
- Discontinuing BPs **DOES NOT** eliminate risk of BRONJ




Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>

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### Bisphosphonates & the Oral Cavity

- Risk factors for BRONJ:
  - Use of BPs for 2+ years & over 65
  - Diabetes
  - Tobacco
  - Periodontitis
  - Denture irritation
  - Food trauma



Reference: Gendron et al., 2007  
Image Source: <http://www.kenhub.com/en/library/anatomy/image/14944/Trigeminal-Neuralgia>

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ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Specific Oral Health Management in Menopause**

**Xerostomia & Caries**

- Sialometry
- Sipping Water Frequently
- Saliva Substitutes & Sialogogues
- Prescription 1.1% NaF2 Toothpaste
- Xylitol Mints, Gum, Oral Patches
- Sugar Free Mints/Gum
- Fluoride Varnish
- MHT



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**Specific Oral Health Management in Menopause**

**1 Burning Mouth Syndrome**

- Start by treating systemic conditions
- Assess nutritional deficiencies
- Assess estrogen deficiency
- Oral Homecare



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**Specific Oral Health Management in Menopause**

**2 Burning Mouth Syndrome**  
If partially successful or not successful

- **Treat local factors**
  - Inflammatory conditions
  - Xerostomia
- **Treat infection**
  - Antibiotic
  - Antifungal
  - Antiviral



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**Specific Oral Health Management in Menopause**

**3 Burning Mouth Syndrome**  
If partially successful or not successful

- MHT (50%)
- Clonazepam Systemic or Topical (40%)
- Supplements & Antioxidant Therapy (Alpha-Lipoic Acid)
- High Fluid Diet
- Antidepressants
- Topical Capsaicin
- Cognitive Behavioral Therapy




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**Specific Oral Health Management in Menopause**

**4 Burning Mouth Syndrome**

- Patients should be monitored & re-evaluated for several months after treatment




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**Specific Oral Health Management in Menopause**

**Trigeminal Neuralgia**

- Stress & Anxiety Reduction
- Short Appointments




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With increasing longevity DH & PA will encounter more aging patients...

Therefore, understanding how menopause effects the oral cavity is essential to quality of life...

With continuing education, DH & PA can provide superior evidence-based, individualized care to menopausal women.



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**5 Minute Break**

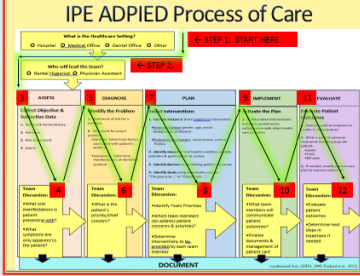
68

**SP Case Study Procedures**

1. Evaluate given case study as a team
2. Listen to the SP verbal profile presentation
3. Develop interview questions for SP as a team
4. Team leaders question SP
5. Formulate a collaborative patient care plan

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**IPE ADPIED Process of Care**



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**Patient Care Plan Worksheet**

Assessment	Diagnosis	Planning	Implementation	Evaluation	Documentation
Subjective History	Medical History	Subjective History	Subjective History	Subjective History	Subjective History
Objective History	Medical History	Subjective History	Subjective History	Subjective History	Subjective History

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**Post-test Instructions**

1. Place all personal belongings under your table or at the front of the classroom
2. Tests must be completed solely by each individual study participant
3. 30 minutes is allotted to complete all post-tests
4. Remove Posttests from Manila Envelope (RED Packet)
  - Instructor/Study Evaluation
  - Menopause Knowledge Post-test
  - RIPLS Post-test
5. Upon completion of testing
  - Place completed tests in Manila Envelope
  - Write your Participant ID number on the Envelope
  - Seal the envelope

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**Study Debriefing**  
(this will be videotaped)



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**Thank-you for Participating!**

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### **Appendix C** **Pseudo-SP Script**

**Case History:**

Barbara Jones, a 55-year-old Caucasian female patient arrives at the office for a new patient exam. She is postmenopausal, with intact ovaries, and takes no prescription medications. Her last physical exam was 2 years ago, and her last dental visit was 3 years ago. Patient health history indicates cigarette smoking and alcohol consumption. Her husband passed away 3 years ago. She works full-time as a night manager of a local fast food restaurant. She shares an apartment with her daughter and grandchild.

**Pseudo-SP Script:**

During the patient interview the patient states, “I have smoked one pack of cigarettes a day for the last 30 years. I go drinking with friends about 5 times a week to get away from all the stress in my life. I usually drink four to five drinks when I go out. When asked by the provider when her oral symptoms began she reports, I stopped having a period six months ago, and my mouth has become more painful and dry since then. I don’t have time to exercise because I watch my two-year-old granddaughter during the day, while my daughter is at work.”

**Chief Complaint:** Xerostomia**Pseudo-SP Script:**

“My mouth is dry and I feel thirsty all the time”

**Social History:** Her husband passed away 3 years ago, she works full-time as a night manager of a local fast food restaurant. She shares an apartment with her daughter and grandchild. Her parents both had dentures by age 60. She feels it is inevitable that she will lose her teeth as well.

**Pseudo-SP Script:**

“Life has been difficult since my husband passed away 3 years ago, but having my daughter and her child move in with me has helped. I work nights as a manager at a fast food restaurant. My parents both had dentures by the age of 60, so I am sure no matter what I do, I will lose my teeth too in a few years.”

**Nutritional History:** Since her husband passed away, she has not felt like cooking. She tends to eat a lot of food from her work at a fast food restaurant. She tends to eat soft carbohydrates like bread and pasta because missing teeth make eating hard and crunchy foods difficult. She rarely eats fruits and vegetables.

**Pseudo-SP Script:**

“I don’t tend to cook very much anymore. I like to eat hamburgers, fries, and sandwiches from my work because it is so easy. I tend to sip on pop while I am at work and drink coffee with cream and sugar when I am at home.”

**Medical History:** Experienced menopause two years ago, and went to her physician for help with hot flashes. She chose not to take Menopausal Hormone Therapy at the time.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

Instead she takes Black Cohosh, an over-the-counter herb to treat hot flashes with some success.

Pseudo-SP Script:

“I went to the doctor a couple years ago when I went through menopause and started having hot flashes. I was afraid to start menopausal hormone therapy, because of the risks. I take Black Cohosh to help with the hot flashes.”

**Dental History:** Multiple restorations and extractions. Patient received routine care prior to her husband’s death three years ago. She had been referred to the periodontist at that time, but did not go due to cost. She does not experience anxiety in the dental setting.

Pseudo-SP Script:

“I have spent a lot of time at the dentist over the years, haven’t been to the dentist since my husband passed away and I lost his dental insurance. When I was at the dentist 3 years-ago they told me I had gum disease and needed to go see a gum specialist, but it sounded too expensive. The hygienist cleaned my teeth the best she could, but let me know that gum surgery would be best. I am not convinced that I have gum disease because my gums never hurt.”

### Clinical Assessment Data:

- **Extraoral:** No significant findings
- **Intraoral:** Dry fissured tongue, limited saliva flow, Class I canine occlusion.
- **Radiographic:** Generalized severe horizontal and vertical bone loss. Several missing posterior teeth. Multiple large posterior restorations. Third molars No. 1, 17, and 32 are fully erupted.
- **Periodontal Charting:** Several missing teeth. Multiple failing large posterior amalgam restorations. Generalized recession.
- **Caries Risk Assessment:** extreme risk due to imbalance of protective and pathologic factors, and xerostomia. High risk for root caries due to recession, xerostomia, poor nutrition, lack of home care, and lack of routine dental care.
- **Oral hygiene Behaviors:** Does not floss because it makes her gums bleed. Uses a medium-bristled manual toothbrush 2x/day. Uses Listerine mouth rinse 2x/day.
- **Oral deposits:** Generalized heavy gumline biofilm; Generalized heavy subgingival calculus and moderate supragingival calculus deposits.
- **Periodontal:** Generalized heavy bleeding on probing. 4-5mm interproximal posterior probe readings with localized 6 mm pockets around No. 1 and No. 15. Generalized 5-6mm recession. Class II posterior furcations. Classification: Generalized severe chronic periodontitis (9-12mm Calculated Attachment Loss).



Participant ID: \_\_\_\_\_ Participant ID: \_\_\_\_\_ Participant ID: \_\_\_\_\_ Participant ID: \_\_\_\_\_ Participant ID: \_\_\_\_\_

**Patient Care Plan Worksheet**

**Appendix D  
Patient Care Plan Worksheet**

<b>Team Color:</b>					
<b>Assessment</b>	<b>Diagnosis</b>	<b>Planning</b>	<b>Implementation</b>	<b>Evaluation</b>	<b>Documentation</b>
Subjective Data:	Problem Statement:	Goal/Outcomes:	Collaborative Intervention & Rationale:	Status of goal/outcomes:	Complete & Accurate recording of all data:
Objective Data:	Etiology:	Symptoms:			
<b>NOTES:</b>					

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix E**  
**Participant Consent Form**

**Title:** Oral Health Manifestations of Menopause: Interprofessional Education of Dental Hygiene & Physician Assistant Students

**Principle Investigator and Co-Investigator**

Windy Rothmund, RDH, BSDH  
Graduate Student  
Dental Hygiene Department  
Eastern Washington University  
14611 W. Heavenly Horse Lane  
Spokane, WA 99224  
[windyrothmund@eagles.ewu.edu](mailto:windyrothmund@eagles.ewu.edu)

Ann O’Kelley Wetmore  
Assistant Professor/Program Director  
Dental Hygiene Department  
Eastern Washington University  
310 N. Riverpoint Blvd Box E  
Spokane, WA 99217  
[awetmore@ewu.edu](mailto:awetmore@ewu.edu)

**Purpose and Benefits**

The purpose of this study is to determine effective interprofessional (IPE) teaching models for health care teams that include dental hygiene and physician assistant students. The study will seek to determine if there are benefits for interprofessional health care teams specifically providing care for menopausal women. Comprehensive, patient-centered health care requires collaboration across disciplines. Physician assistants and dental hygienists are primary health care providers. Dental hygienists are experts in the delivery of comprehensive oral care services. Physician assistants are proven health care providers that increase accessibility to medical care and infiltrate every area of medicine. Menopausal women depend on quality medical and dental care, whether or not the providers view themselves as a collaborative health care team. Research supports IPE as a means of fostering integration and collaboration between medical and dental providers (Thistlethwaite, 2012). With approximately 65 million women in the U.S. subject to oral conditions related to menopause (U.S. Census Bureau, 2012), IPE is a clear way to develop health care providers who are better prepared to support population needs.

**Procedures**

If you choose to participate in this study, you will consent for the following data to be used in this research study:

- Your Modified Readiness for Interprofessional Learning Scale (RIPLS) scores
- Your self-reported demographic data including major program, gender, age, race/ethnicity, and prior clinical and IPE experience
- Menopause knowledge pre- and posttest scores
- Patient care plan worksheet data
- Instructor/study evaluation
- Answers and comments to debriefing questions recorded on videotape to be used for data

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

### **BENEFITS**

The anticipated benefit of this study is the opportunity for all participants to participate in an IPE learning experience. Student who choose to participate in this study also have the opportunity to document research participation on their professional resume. The anticipated benefit to society is the possibility for improved quality of care and patient outcomes as a result of the understanding the importance of collaboration in providing care for menopausal women.

### **RISKS**

This study is minimal risk. Any potential risks from the study are not any different than those encountered in daily life.

### **OTHER INFORMATION**

Your participation in this study is **VOLUNTARY**. There will be no consequences or retaliation for your decision not to participate in the study. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without prejudice. You will not be personally identified in any report or publications that may result from this study. Only the Principal Investigator and her Faculty Supervisor, Ann O’Kelley Wetmore, will know your identity. All your information will be kept confidential and neither your name nor any other information that could identify you will be revealed in this study. Any personal information about you that is gathered during this study will remain confidential to every extent of the law. A unique identification code will be used to identify you in the study and only the principal investigator will know your name. Your identity will remain anonymous. There is no cost to participate, and you will be informed of study results.

### **QUESTIONS:**

Windy Rothmund will be glad to answer any questions regarding the study at any time and may be reached at 509-879-0431 or email [windyrothmund@eagles.ewu.edu](mailto:windyrothmund@eagles.ewu.edu)

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Signature of Principle Investigator

Date

The study described above has been explained to me, and I voluntarily consent to participate in the study. I have had an opportunity to ask questions about this study. I understand that by signing this form I am not waiving my legal rights. I understand that if I decide to take part in this research study, a copy of this signed consent form will be given to me.

---

Signature of Subject

Date

---

Printed Name

Date

If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Ruth Galm, Human Protection Administrator, 509-359-6567, [rgalm@ewu.edu](mailto:rgalm@ewu.edu)

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix F**  
**Participant Invitation Letter**

Dear Dental Hygiene and Physician Assistant Students,

My name is Windy Rothmund, and I am currently enrolled as a Master of Science in Dental Hygiene student at Eastern Washington University (EWU). I am working with my thesis chair, Professor Ann O’Kelley Wetmore, on my thesis implementation required for graduation. My topic is “Oral Manifestations of Menopause: An Interprofessional Intervention for Dental Hygiene & Physician Assistant Students.” My thesis specifically focuses on dental hygiene and physician assistant students working together to identify and treat the oral manifestations of menopause and associated oral-systemic links. I would like to invite you to participate in this IPE study. The results of this study may positively impact menopausal women, and improve participants’ understanding of their role in oral-systemic care associated with menopause.

The implementation of my thesis includes a 3-hour workshop covering assessment, diagnosis, planning, implementation, evaluation, and documentation of the oral manifestations of menopause and associated oral-systemic links. The workshop also addresses practical ways for dental hygienists and physician assistants to collaborate. Participants will gain an understanding of interprofessional education, interprofessional communication, and roles and responsibilities in caring for menopausal patients.

Students will be asked to fill out a brief demographic survey and complete pre- and posttests, listen to an educational presentation, and work within a team to develop a patient care plan based on a case study. For pragmatic purposes, an online sign-up will be used to offer students two separate dates in order to accommodate 50 students at each workshop. A third workshop will be offered if needed to meet student demand. Participants will receive IPE credit and be given a certificate of completion to add to their portfolio. Dinner and refreshments will be provided at each workshop.

Participation is voluntary and the decision to not participate will in no way affect student’s grades or academic status. The data collected from this study will be kept confidential and only the research team will have access to the information. The identity of all participants will remain anonymous. All participants will be informed of study results. If you have any questions regarding this research study, please contact me at [windyrothmund@eagles.ewu.edu](mailto:windyrothmund@eagles.ewu.edu) or Professor Ann O’Kelley Wetmore at [awetmore@ewu.edu](mailto:awetmore@ewu.edu). If you chose to participate or would like to find out more regarding this project, you are invited to attend an informative meeting to obtain additional study information and consent form.

Sincerely,  
Windy Rothmund, RDH, BSDH, MSDH Candidate

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix G**  
**Menopause Knowledge Pretest****Participant ID:** \_\_\_ - \_\_\_

1. Statistics indicate \_\_\_\_\_ of women will live 25-30 more years after menopause?  
 A. 1 out of 3  
 B. 1 out of 50  
 C. 1 out of 100
2. Which of the following is associated with aging and NOT associated with systemic? manifestation of menopause?  
 A. Insomnia  
 B. Fat Accumulation  
 C. Tinnitus
3. Manifestations of menopause present signs and symptoms specific to the oral cavity including  
 A. Gingivostomatitis, desquamative gingivitis, burning mouth syndrome  
 B. Sjogrens syndrome, pemphigus vulgaris, benign pemphigoid  
 C. Lichen planus, geographic tongue, hairy leukoplakia
4. Research suggests the majority of menopausal women believe they have healthy gums, but \_\_\_\_\_% actually **have** moderate to severe gum disease.  
 A. 10%  
 B. 25%  
 C. 60%
5. Clinical oral changes of menopause include all the following **EXCEPT**  
 A. Reduced salivary flow  
 B. Bleeding and probing and brushing  
 C. Increased epithelial keratinization
6. Estrogen receptors in \_\_\_\_\_ respond to decreased estrogen in menopause.  
 A. Osteoblasts  
 B. Osteoclasts  
 C. both osteoblast and osteoclasts
7. Which of the following is NOT a primary etiological factor in oral bone loss for menopausal women?  
 A. Estrogen deficiency  
 B. Oral biofilm  
 C. Bruxism
8. Xerostomia is associated with the following  
 A. Temporomandibular Disorder, periodontal disease, oral ulcerations  
 B. Severe unilateral pain in the face  
 C. Bisphosphonate related osteonecrotic jaw
9. Burning Mouth Syndrome is characterized by  
 A. Painful, bilateral burning sensation in the lips, tongue, palate, & areas of denture support  
 B. Appearance of abnormally pale mucosa  
 C. Appearance of red, irritated mucosa

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

10. Trigeminal neuralgia associated with menopause results from
- A. Decreased activity of estrogen receptors in trigeminal nerve branches
  - B. Compression of the Superior Cerebellar Artery on trigeminal nerve branches
  - C. Increased activity of estrogen receptors in trigeminal nerve branches
11. Essential components of periodontal management in menopause include all the following **EXCEPT**?
- A. Regular visits to the dental hygienist or periodontist
  - B. Oral care instruction and modifiable risk counseling
  - C. Seating patient in the Trendelenburg position during dental procedures
12. Which of the following statements are **NOT** true regarding use of bisphosphonates (BPs)
- A. BPs inhibit bone turnover and remodeling by inhibiting osteoclast function
  - B. BPs promote bone turnover and remodeling by increasing osteoclast function
  - C. BPs are associated with osteonecrosis of the jaws
13. Risk factors for Bisphosphonate-related osteonecrosis of the jaw (BRONJ) include all the following **EXCEPT**
- A. Use of BPs for more than 2 years and over age 65
  - B. Diabetes, tobacco use, periodontitis
  - C. Cheek biting, tongue thrust, lingual or palatal tori
14. Xerostomia management & caries prevention may include all the following **EXCEPT**
- A. Prescribing menopausal hormone therapy (MHT)
  - B. Prescribing Chlorhexidine Gluconate mouth rinse and xylitol products
  - C. Not evaluating current medications and determining possible changes
15. Burning Mouth Syndrome (BMS) management may include all the following **EXCEPT**
- A. Low-dose topical or systemic clonazepam
  - B. Hydrochlorothiazide
  - C. Menopausal hormone therapy (MHT)
16. The following are associated with trigeminal neuralgia in menopausal women **EXCEPT**
- A. Anxiety and stress of dental appointments
  - B. Swelling of the tongue
  - C. Poor denture retention

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix H****Readiness for Interprofessional Learning Scale (RIPLS) Questionnaire****Participant ID:** \_\_\_ - \_\_\_

The purpose of this questionnaire is to examine the attitude of health care students toward interprofessional learning.

Circle one response for each statement that best reflects your opinion.		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	Learning with other students will make me a more effective member of a health care team	5	4	3	2	1
2	Patients would ultimately benefit if health care students worked together	5	4	3	2	1
3	Shared learning with other health care students will increase my ability to understand clinical problems	5	4	3	2	1
4	Communication skills should be learned with other health care students	5	4	3	2	1
5	Team-working skills are vital for all health care students to learn	5	4	3	2	1
6	Shared learning will help me to understand my own professional limitations	5	4	3	2	1
7	Learning between healthcare students before licensure would improve working relationships after licensure	5	4	3	2	1
8	Shared learning will help me to think positively about other health care professionals	5	4	3	2	1
9	For small-group learning to work, students need to respect and trust each other	5	4	3	2	1
10	I don't want to waste my time learning with other health care students before licensure	5	4	3	2	1
11	It is not necessary for undergraduate/postgraduate healthcare students to learn together	5	4	3	2	1

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

12	Clinical problem solving can only be learned effectively with students from my own program	5	4	3	2	1
13	Shared learning with other health care professionals will help me to communicate better with patients and other professionals	5	4	3	2	1
14	I would welcome the opportunity to work on small group projects with other health care students	5	4	3	2	1
15	I would welcome the opportunity to share some generic lectures, tutorials, or workshops with other health care students	5	4	3	2	1
16	Shared learning and practice will help me clarify the nature of patients' problems	5	4	3	2	1
17	Shared learning before and after licensure will not help me become a better team worker	5	4	3	2	1
18	I am not sure what my professional role will be/is	5	4	3	2	1
19	I have to acquire much more knowledge and skill than other students	5	4	3	2	1

**If you have any further comments regarding interprofessional education please enter them in the box below**

Adapted for use from Parsell & Bligh (1999) and McFadyen, Webster, & Maclaren (2005)



## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix I**  
**Debriefing Questions**

1. How do you feel after this experience?
2. How likely are you to use knowledge and skill gained from this workshop in the future?
3. How do you feel about using Standardized Patients in IPE training?
4. How confident do you feel about collaborating with DHs & PAs regarding oral manifestations of menopause?
5. Do you feel this collaborative approach between DHs & PAs will become more common in the future?

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix J****Dental Hygienist and Physician Assistant Demographic Survey**

Participant ID: \_\_\_ - \_\_\_

1. **Professional Discipline: (check one)**     DH Student     PA Student
2. **Gender: (check one)**     Male     Female
3. **Age** \_\_\_\_\_ (write number)
4. **Race/Ethnicity: (check one)**
- |   |  |
|---|--|
| <input type="radio"/> Caucasian                       | <input type="radio"/> Hispanic                       |
| <input type="radio"/> African American                | <input type="radio"/> American Indian/Alaskan Native |
| <input type="radio"/> Asian American/Pacific Islander | <input type="radio"/> Other                          |

**Prior Experience:**

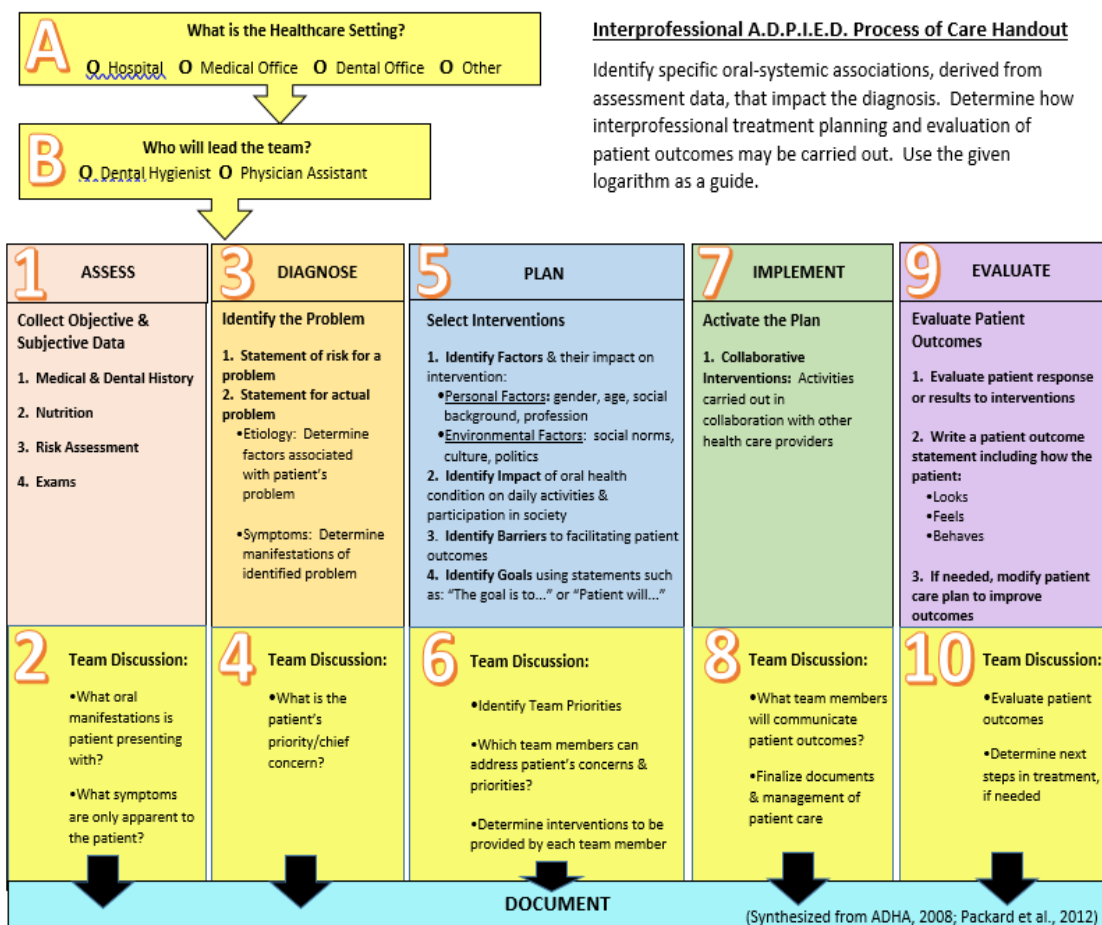
5. **Did you had any clinical experience prior to starting your program?**  
 No     Yes    If you answered YES indicate number of years \_\_\_\_\_
6. **Do you have prior experience in treating menopausal women?**  
 No     Yes    If yes describe: \_\_\_\_\_
7. **Do you have experience treating oral conditions?**  
 No     Yes    If yes describe: \_\_\_\_\_
8. **Have you had any Interprofessional Education (IPE) experience prior to this study?**  
 No     Yes    If yes describe: \_\_\_\_\_

\*Please use the back of this sheet if needed

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

## Appendix K

### Interprofessional A.D.P.I.E.D Process of Care Handout



### ASSESSMENT:

#### How to do it:

- Gather thorough medical and dental health history
- Determine dietary history
- Perform a risk assessment
- Perform clinical examinations  
 PAs: HEENOT including cancer screening and physical exam  
 DHs: EO/IO including cancer screening, periodontal exam, radiographs, caries exam, and plaque assessment
- Collect subjective data provided by the patient like "I feel...".
- Risk assessment and screening for oral symptoms may start with a few simple questions to determine symptoms of xerostomia, pain or bleeding in the mouth, oral hygiene, dietary habits, length of time since last dental visit (Calhoun et al., 2008).
- A patient screening positive for any risk assessment questions is flagged for further evaluation and basic intervention (Calhoun et al., 2008).

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

- A provider performs an oral exam (as part of HEENOT for PAs) to assess salivary flow, oral hygiene, caries, recession, periodontal inflammation, and examination of oral mucosa and tongue for signs of disease.
- Does the patient have signs/symptoms of oral disease? Do changes need to be made to the patient's medications to protect saliva, teeth, and gums to optimize oral health? Does the patient need referral to medical/dental provider? Does the patient require education including oral hygiene instruction, fluoride use, dietary counseling, tobacco, alcohol, or drug dependency counseling, or behavior change to protect oral health? (Hummel et al., 2015).
- Record assessment data on patient care plan worksheet.

### **DIAGNOSIS:**

#### **How to do it:**

- Determine if patient is well, at risk or has a problem. Document etiologies and related factors.
- Record data on patient care plan worksheet.

### **PLANNING:**

#### **How to do it:**

- Select interventions: counseling/anticipatory guidance, preventive services such as a cleaning or NSPT, restorative treatment, referral to periodontist for periodontal treatment, referral to physician/PA to evaluate bone mineral density and need for menopausal hormone therapy, product recommendations such as Chlorhexidine, xylitol, fluoride
- Work with patient to set goals.
- Gain consent for treatment.
- Use statements like "The goal is..." or "The patient will..."
- Record planning data on patient care plan worksheet.

### **IMPLEMENTATION:**

#### **How to do it:**

- Review gathered information and share results with the patient to determine course of action.
- Includes direct care, teaching, counseling, coordination, collaboration, health promotion, disease prevention, and health maintenance.
- Categorized as independent interventions & rationale, dependent interventions & rationale, and collaborative interventions & rationale.
- Use scripting to deliver a positive, short, clear, concise message regarding recommended behavior such as, "It is important for you to brush for 2 minutes twice a day, concentrating on the gumline, using fluoride toothpaste. You should also floss at least once a day, preferably at night." Scripted information may be given in after visit summaries (Hummel et al., 2015.).
- Record implementation data on patient care plan worksheet.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

### **EVALUATION:**

#### **How to do it:**

- Evaluate effectiveness of plan: Gather data to determine if problem has been resolved; if problem has not been resolved, reassess for the cause, redefine the problem, redefine outcomes, and change interventions.
- Major outcomes to consider include changes in levels and types of oral bacteria, incidence of tooth loss associated with periodontitis and low BMD, incidence of oral discomfort that is undiagnosed or overlooked in menopausal women, improved oral hygiene during menopause.
- Also evaluate how patient looks, feels, and behaves.
- Record evaluation findings on patient care plan worksheet.

### **DOCUMENTATION:**

#### **How to do it:**

- Document findings collected from A.D.P.I.E.D process of care including phone calls, prescriptions, and orders on the patient care plan worksheet.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix L**  
**Instructor/Study Evaluation****Participant ID:** \_\_\_ - \_\_\_**Circle one response for each question that best reflects your opinion****1. The teaching methods used in this study were helpful and effective.**

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

**2. The instructor provided me with a variety of learning materials and activities to promote my learning of oral manifestations of menopause.**

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

**3. This study helped me develop skills to perform necessary tasks collaboratively with dental hygiene/PA providers.**

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

**4. This instructor covered critical content necessary for the mastery of IPE and knowledge of oral manifestation of menopause.**

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

**Please write any additional comments in the box provided**

--

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix M**  
**Letter to Participants**

Dear Dental Hygiene and Physician Assistant Students,

My name is Windy Rothmund, and I am currently a Master of Science in Dental Hygiene student with Eastern Washington University (EWU). I am working with my thesis chair, Professor Ann O’Kelley Wetmore, Dental Hygiene Assistant Professor/Program Director on my thesis implementation which is part of my graduate requirements. My topic is “Oral Health Manifestations of Menopause: Interprofessional Education of Dental Hygiene & Physician Assistant Students”. My thesis specifically focuses on dental hygiene and physician assistant students working together in treating menopausal women, addressing oral health, and potential oral manifestations associated with menopause. I would like to invite you to participate in this study. The result of this study could positively impact menopausal women and improve participants understanding of their role in caring for menopausal women.

The implementation of my thesis study will include a 3-hour informative instruction covering oral manifestations that may occur during menopause and what health care providers can do as a team to address oral health needs of cancer patients. Participants will gain understanding of what interprofessional practice is, how to use it, and how to facilitate interprofessional communication. Participants will learn how valuable their role is as a partner in patient-centered care.

Participants will be asked to fill out a brief demographic survey and pre and post surveys, participate in module discussions, and participate as a team member on a case study activity. For 19 survey items, questions such as “Learning with students will help me become a more effective member of a health care team”, you will rate your feelings from 5 to 1, with 5 being strongly agree and 1 strongly disagree. Sixteen multiple choice questions will assess your knowledge of oral manifestations of menopause such as, “Burning mouth syndrome is characterized by; a) painful bilateral burning sensation, b) appearance of abnormally pale mucosa, or c) appearance of red, irritated mucosa”. Each participant will be given a certificate of completion to add to their resume. Dinner and beverages will be provided prior to the study workshop and snacks and beverages will be provided throughout the workshop.

Participation in this study is voluntary and the decision to not participate will in no way affect students’ grades or academic status. The data collected from this study will be kept confidential and only the research team will have access to the information. If you have any questions regarding this research study, please contact me; Windy Rothmund at (509) 879-0431 or email [windyrothmund@eagles.ewu.edu](mailto:windyrothmund@eagles.ewu.edu) or Professor Ann O’Kelley Wetmore at (509) 828-1321 or [awetmore@ewu.edu](mailto:awetmore@ewu.edu). If you choose to participate or would like to find out more regarding this project, you are invited to attend an informative meeting to obtain information study information and a consent form.

Sincerely,  
Windy Rothmund, RDH, BSDH

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix N**  
**Assignment of Teams for Workshop**

**Instructions:**

1. Find your team color
2. Go to team table
3. Get Manila Envelope with Handouts & Materials
4. Do a team member introductions/huddle
5. Assign a team leader

<b>TEAM COLOR</b>	<b>DH</b>	<b>PA</b>
<b>RED</b>	DH-02, DH-34, DH-08, DH-09	PA-02, PA-25
<b>GREEN</b>	DH-03, DH-17, DH-30, DH-16, DH-23	PA-05, PA-27
<b>YELLOW</b>	DH-04, DH-18, DH-31, DH-25, DH-22	PA-30
<b>BLUE</b>	DH-05, DH-19, DH-28, DH-11	PA-10, PA-01
<b>PURPLE</b>	DH-06, DH-21, DH-37	PA-13, PA-15
<b>ORANGE</b>	DH-38, DH-07, DH-24 DH-39	PA-16, PA-20



## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix O**  
**Workshop Procedures**

<b>Workshop Procedures</b>	<b>Time Allotted</b>	<b>Time Frame</b>
<b>Arrival</b> *Room #278 in the Health Sciences Building *Find Your Name on Posted List for Team Assignment *Find Team Table *Get Food	40 min	5:00-5:40
<b>Team Huddle</b> *Put on Name Badge *Introductions *Appoint Team Leader *Look at Materials in your Packet	5 min	5:40-5:45
<b>Complete Initial Assessments</b> *Demographic Survey *Menopause Knowledge Pre-test *RIPLs Pre-test	30 min	5:45-6:15
<b>Watch/Listen to Workshop Orientation</b> *Review of Learning Objectives *Review of Procedures *Review of Handouts	5 min	6:15-6:20
<b>Watch/Listen to PowerPoint Presentation</b> *Interprofessional Education *Menopause *Menopause Oral Manifestations & Treatment *Role of DH & PA *Interprofessional A.D.P.I.E.D. process of care	45 min	6:20-7:05
<b>Break</b>	5 min	7:05-7:10
<b>Case Study</b> *Read Case Study *Listen to Standardized Patient (SP) *Develop Questions for SP *Team Leaders Interview SP *Complete Patient Care Plan Worksheet using Interprofessional A.D.P.I.E.D. process of care	40 min	7:10-7:50
<b>Complete Final Assessments</b> *Menopause Knowledge Post-test *RIPLs Post-test *Instructor/Study Evaluation	30 min	7:50-8:20
<b>Debriefing</b> *Participate in a videotaped debriefing	10 min	8:20-8:30

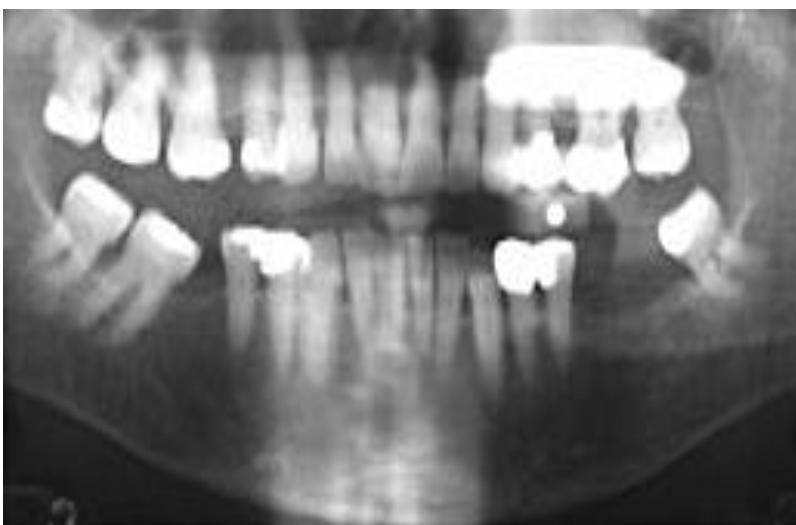
## ORAL MANIFESTATIONS OF MENOPAUSE IPE

### Appendix P Case Study

PATIENT NAME: Barbara Jones  
AGE: 55  
HEIGHT: 5' 3"  
WEIGHT: 150 lbs.

BLOOD PRESSURE: 110/80  
PULSE RATE: 70 bpm  
RESPIRATION: 15 rpm

1. Under care of physician:  
No
2. Hospitalized within the last 5 years: No
3. Medical Conditions:  
None
4. Current Medications:  
Black Cohosh
5. Smokes or uses tobacco products: Yes
6. Alcohol use: Yes
7. Alcohol use: YES



**Chief Complaint:** Xerostomia

**Medical History:** Experienced menopause two years ago, and went to her physician for help with hot flashes. She chose not to take hormone therapy at the time.

**Dental History:** Multiple restorations and extractions. Patient received routine care prior to her husband's death three years ago. She had been referred to the periodontist at that time, but did not go due to cost. She does not experience anxiety in the dental setting.

**Nutritional History:** Since her husband passed away, she has not felt like cooking. She tends to eat a lot of food from her work at a fast food restaurant.

**Social History:** Her husband passed away 3 years ago, she works full-time as a night manager of a local fast food restaurant. She shares an apartment with her daughter and grandchild. Her parents both had dentures by age 60.

		PERIODONTAL CHART																		
		NAME <u>Barbara Jones</u>																INIT		
PROBE	DATE																	1	2	3
	DATE																	1	2	3
	DATE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
FACIAL	R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
	L	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
LINGUAL	R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
	L	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
Upper Mobility	PROBE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
	PROBE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
Lower Mobility	PROBE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
	PROBE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2	3
FACIAL	R	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	1	2	3
	L	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	1	2	3
LINGUAL	R	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	1	2	3
	L	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	1	2	3
DATE	1	5/15/15																1	2	3
DATE	2																	1	2	3
DATE	3																	1	2	3

SIGNIFICANT FINDINGS

- Generalized BOP - Class II posterior furcations. 9-12mm CAL
- Classification: Generalized severe chronic periodontitis



Case Study Radiograph

Image Source: dentalcare.com



## Case Study Intraoral Photograph

Image Source: [https://openi.nlm.nih.gov/imgs/512/287/3267234/3267234\\_TODENTJ-6-8\\_F4.png](https://openi.nlm.nih.gov/imgs/512/287/3267234/3267234_TODENTJ-6-8_F4.png)



## Case Study Intraoral Photograph

Image Source: <http://flintdentalsmiles.com>



## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**Appendix Q**  
**Menopause Knowledge Posttest****Participant ID:** \_\_\_ - \_\_\_

1. Statistics indicate 80% of menopausal women develop hot flashes. What percentage of these women seek medical attention and treatment?
  - A. 5%
  - B. 25%
  - C. 60%
2. Which of the following is **NOT** associated with natural or artificial induction of menopause?
  - A. Nutritional Deficiency
  - B. Partial Hysterectomy
  - C. Cancer Therapy
3. Research suggests the most common oral complaint of menopausal women is
  - A. Oral ulceration
  - B. Burning Mouth Syndrome
  - C. Xerostomia
4. The sex hormones effect all the following oral structures **EXCEPT**
  - A. Gingival epithelium
  - B. Periodontal ligament
  - C. Enamel
5. Estrogen deficiency is associated with \_\_\_\_\_ activity of the immune cells such as macrophages and monocytes.
  - A. Increased
  - B. Decreased
  - C. No change in
6. Menopausal osteoporosis due to low levels of estrogen reduces calcium resorption & increased calcium excretion in \_\_\_\_% of women over the age of 60.
  - A. 5%
  - B. 30%
  - C. 70%
7. Research demonstrates that women with advanced osteoporosis are \_\_\_\_\_times more likely to experience tooth loss, when compared to healthy women of the same age.
  - A. 0 times
  - B. 3 times
  - C. 10 times
8. The feeling of xerostomia is
  - A. Subjective & does NOT always correlate with actual salivary output
  - B. Objective & always correlates with actual salivary output
  - C. Subjective & always correlates with actual salivary output

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

9. Which of the following are **NOT** associated with Burning Mouth Syndrome (BMS)
- A. Xerostomia & difficulty swallowing
  - B. Altered perception of taste & halitosis
  - C. Painful ulcerations
10. Trigeminal neuralgia is characterized by the following
- A. Severe, unilateral pain in the middle to lower third of the face
  - B. Moderate, bilateral pain in middle to lower third of face
  - C. Severe, bilateral pain in middle to lower third of face
11. Factors related to periodontal management for menopausal women include the following **EXCEPT**
- A. Smoking and alcohol consumption
  - B. Level of sodium lauryl sulfate in toothpaste
  - C. Caffeine and salt intake
12. Which of the following statements are **NOT** true regarding use of bisphosphonates (BPs)?
- A. BPs inhibit bone turnover by promoting osteoblast function.
  - B. BPs inhibit bone turnover & remodeling by inhibiting osteoclast function.
  - C. Research suggests BP therapy may improve periodontal status.
13. Which of the following statements are **NOT** true regarding Bisphosphonate-related osteonecrosis of the jaw (BRONJ)?
- A. Patients on BP therapy are at risk for developing BRONJ by means of denture irritation or food trauma.
  - B. Oral BPs can result in BRONJ, but the risk is much lower than systemic BPs
  - C. Discontinuing BP therapy eliminates the risk for BRONJ
14. Xerostomia management & caries prevention may include all the following **EXCEPT**
- A. Recommending xylitol & fluoride products
  - B. Determining differential diagnosis for cause of xerostomia
  - C. Recommending saline mouth rinse
15. Burning Mouth Syndrome (BMS) management may include all the following **EXCEPT**
- A. Nifedipine
  - B. Menopausal hormone therapy (MHT)
  - C. Antidepressants
16. The following are associated with trigeminal neuralgia in menopausal women **EXCEPT**
- A. Long dental appointments
  - B. Supine positioning during dental treatment
  - C. Poor denture retention

**Curriculum Vitae****Windy Rothmund, RDH, BSDH, MSDH (C)****14611 W. Heavenly Horse Lane • Spokane, WA 99224 • (509) 879-0431****EDUCATION:**

- 2014-2016            Master of Science in Dental Hygiene,  
Eastern Washington University, Cheney, WA
- 1995-1997           Bachelor of Science in Dental Hygiene,  
Eastern Washington University, Cheney, WA
- 1993-1995           Associate of Arts Degree,  
Spokane Falls Community College, Spokane, WA

**LICENSURE & ENDORSEMENT:**

- 1997-present        Washington State Dental Hygiene License
- 2007-present        Washington State Sealant and Varnish Endorsement

**CLINICAL EXPERIENCE:**

- 2009-2010           Registered Dental Hygienist  
Dr. Jason Kolashinski, Spokane, WA
- 1999-2001           Registered Dental Hygienist  
Dr. Kevin King & Dr. Andrew Wurtz



## ORAL MANIFESTATIONS OF MENOPAUSE IPE

1997-2010 Registered Dental Hygienist  
Dr. Mary Smith

1997-2010 Registered Dental Hygienist  
Dental Contacts

**TEACHING RESPONSIBILITIES:**

2016 Clinical Instructor, Department of Dental Hygiene, Eastern  
Washington University, Spokane, WA

January 2016 Guest Lecturer, Department of Dental Hygiene,  
Eastern Washington University,  
Community Dental Health DNHY 461: School-  
based Sealant and Varnish Program Guidelines interactive  
PowerPoint presentation utilizing "Poll Everywhere"  
audience polling system to prepare 3<sup>rd</sup> year students for  
Washington State endorsement examination.

January 2016 Guest Lecturer, Department of Dental Hygiene,  
Eastern Washington University,  
Community Dental Health DNHY 461: Virtual

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

Education Day three-hour workshop educating 3<sup>rd</sup> year DH students about roles in advocacy and the legislative process.

November 2014      Guest Lecturer, Department of Health Science and Public Health, Eastern Washington University,  
Master of Public Health, Advanced Health Policy Seminar  
Course: Utilized pre-study reading assignments, interactive PowerPoint presentation, and classroom discussion with Washington State representative, Marcus Riccelli, to educate students about mid-level dental providers and the best approach for drafting a bill to pilot mid-level dental providers in Washington State.

**CURRICULAR DEVELOPMENT:**

April 2016            Course Development, Department of Dental Hygiene, Eastern Washington University,  
Collaborated with faculty and fellow MSDH student to develop a condensed dental restorative course to meet demand of out-of-state dental hygienists needing to expand functions to prepare for WREB board examination.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

- January 2016      Advocacy How-to Guide, Department of Dental Hygiene,  
Eastern Washington University,  
Developed a legislative advocacy guide for Washington  
State Dental Hygienists detailing the what, why, and how of  
advocacy lobbying, and the legislative process.
- December 2015    Course Development, Department of Dental Hygiene,  
Eastern Washington University,  
Collaborated with faculty to develop a new syllabus for  
Community Dental Health Experiences 461S, as the  
department transitions from a quarter to a semester system.
- December 2014    Website Development, Department of Dental Hygiene,  
Eastern Washington University,  
Conceptualized and developed an interactive website aimed  
at educating citizens and professionals about mid-level  
dental providers.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**PRESENTATIONS:**

- February 2016      Workshop: Department of Dental Hygiene,  
Eastern Washington University,  
Oral manifestations of menopause three-hour IPE  
workshop educating EWU dental hygiene students and  
University of Washington physician assistant students about  
the connection between women's systemic health and the  
oral cavity.
- October 2015      Spokane Public Schools, District-wide Career Fair:  
Collaborated and mentored a newly matriculated MSDH  
student,  
for this all day event, presenting dental career options to 5<sup>th</sup>  
grade students at the Spokane Convention Center. Utilized  
table-clinic, hands-on blood pressure and instrumentation  
stations, and interactive nutrition presentation.
- May 2015          North Spokane Women's Clinic, Lunch-and-Learn:  
"Oral Health as Part of Women's Health Across the Lifespan"  
educating OBGyn and health care providers about  
connections between women's oral health and systemic  
health.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

- April 2015                      Spokane Public Schools, Career Fair Presenter:  
“Career Discovery Day” speaker in a classroom setting educating youth at Garry Middle School about careers in dentistry using interactive teaching methods, hands-on activities, and individual attention.
- January 2015                      Spokane Public Schools, Career Fair Presenter:  
Dental career presenter in a morning session for grade school children and evening session for families at Salk Middle School. Utilized interactive table-clinic, including video presentation of dental career options and human anatomy model to educate about connection between oral health and systemic health.
- December 2014                      Conference Presenter: Eastern Washington University,  
Primary speaker in a break-out group at the, “Get Connected Conference”, promoting diversity in health care to high school students.
- November 2014                      Presenter: Student American Dental Hygienists’ Association,  
Department of Dental Hygiene, Eastern Washington University, Primary speaker educating students about ADHA membership and advantages of mid-level dental providers.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**SERVICE IN THE COMMUNITY:**

- 2014-2015 Washington State Smile Survey, Primary Data Recorder, Volunteer working with Spokane Public Health Department and calibrated dental hygienists to accurately record oral health data for Head Start/ECEAP and grade school children in the Spokane region.
- February 2015 Smiles for Vets Day, Department of Dental Hygiene, Eastern Washington University, Educating and providing dental hygiene services to veterans in need.
- September 2014 Recovering Smiles, Department of Dental Hygiene, Eastern Washington University, Oral health screener, connecting individuals in drug recovery to oral care services.
- 2010-present Spokane Public Schools, Volunteer: Vision screening facilitator, interactive classroom oral health presenter, classroom volunteer.

## ORAL MANIFESTATIONS OF MENOPAUSE IPE

**PROFESSIONAL ASSOCIATIONS:**

- 1997-present      American Dental Hygienists' Association
- 1997-present      Washington State Dental Hygienists' Association
- 1997-present      Eastern Washington State Dental Hygienists' Society
- 2014-present      American Dental Education Association

**HONORS & AWARDS:**

- 1997                Sigma Phi Alpha Dental Hygiene Honor Society,  
Alpha Mu Chapter,  
Eastern Washington University, Cheney, WA
- 1997                Summa Cum Laude, Department of Dental Hygiene,  
Eastern Washington University, Cheney, WA