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Magnification Loupes in U.S. Entry-Level Dental Hygiene Programs

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MAGNIFICATION LOUPES IN U.S. ENTRY-LEVEL DENTAL HYGIENE PROGRAMS

by

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ABSTRACT

MAGNIFICATION LOUPES IN U.S. ENTRY-LEVEL DENTAL HYGIENE PROGRAMS

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Purpose: The purpose of this study was to determine policies and practices regarding magnification loupes among accredited dental hygiene programs as measured by a 31-item, self-designed questionnaire titled *Magnifying Loupes in U.S. Entry Level Dental Hygiene Programs*. In addition, the study compared policies among dental hygiene programs in two year versus four year programs in terms of requirements for the use of magnification loupes.

Methods: After institutional review board approval, the questionnaire was emailed via Survey Monkey to 303 entry-level dental hygiene programs. An overall response rate of 75% was obtained. Data were analyzed using descriptive statistics and chi-square test of independence.

Results: Results reveal the vast majority of programs do not require loupes for faculty or students with only 23% of responding schools requiring students to purchase loupes and 8% requiring faculty to use loupes. More dental hygiene programs require students to wear loupes than require faculty to wear loupes. No statistically significant differences (p-value = 0.54) in program policies were found requiring the purchase of magnifying loupes by students, based on 2-year and 4-year dental hygiene educational programs. Odds ratio (1.25) gives the likelihood of students purchasing loupes in a 2-year program as 25% higher than a 4-year program. Almost two-thirds of the respondents reported

loupes instruction as a curriculum component although most respondents spent two or less hours teaching in this area. Most programs (90%) do not plan to require students to purchase loupes in the future although the majority (72.9%) agrees or strongly agrees the proper use of loupes should be integrated in the curriculum.

Conclusions: Most respondents (98.7%) identify advantages to loupes, but clinical policies on loupes do not appear to correlate with beliefs. Educational programs in dental hygiene seem slow to adopt and require the use of loupes. Current clinical polices on loupes should be reviewed to ensure graduates experience the potential ergonomic benefits magnification brings to clinical practice during their education.

My thesis is dedicated to my loving husband and best friend, John. I am grateful for your endless love, patience, and support throughout my masters program and thesis. Thank you for always being there and wanting to make all of my dreams come true. Thanks for just being you.

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I gratefully acknowledge Professor Michele Darby for all the advice, contagious enthusiasm, and guidance all through graduate school and in the early stages of my research.

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CHAPTER I

INTRODUCTION

The high incidence of musculoskeletal injuries in dental hygienists is a well documented occupational concern. [1-6] To address this concern, The American Dental Hygienists' Association's (ADHA) National Dental Hygiene Research Agenda addresses occupational health and safety with emphasis on the "impact of exposure to environmental stressors on the health of users and methods to decrease errors...." If learned and used, one technology that may reduce environmental stressors, improve occupational health of dental hygienists, enhance treatment and improve ergonomics during patient care, is magnification loupes. Designed fundamentally to enhance the visual acuity of practitioners, magnification is promulgated to promote good posture, essentially assisting practitioners in staying in a neutral body position while providing care, resulting in reduced musculoskeletal stress. An ergonomically correct neutral body position includes a neutral position for the neck, back, shoulder, upper arm, forearm and hands, which may be achieved when properly fitted loupes are worn during clinical practice.[7,8] Appropriate depth of field, working distance and declination angle are critical to proper loupes fitting.

BACKGROUND

Magnification is also reported to enhance quality of care as better visual acuity through magnification may facilitate improved assessment of the hard and soft tissues resulting in improved diagnosis and treatment. Visual evaluation of radiographs, crown

margins, existing restorations, carious lesions and calculus detection may improve with increased image size as well as periodontal probing readings and clinical attachment levels assessments. Better visual acuity through magnification may make subtle tissue changes more discernable and improve instrument sharpening skills. Therefore, use of magnification loupes has the potential to enhance client treatment and therapeutic outcomes as well as enhance the musculoskeletal health of oral care clinicians. For these reasons, more dentists, dental specialists, and dental hygienists are utilizing loupes in private practices and educational settings.[9,10]

The inclusion of loupes education in dental hygiene curricula is important since it may enable students to better assess clinical details as well as overall oral health status of patients. In the long term it may better prepare future dental hygienists to meet the increasingly complex oral health needs of the public and influence student and faculty retention via the promotion of musculoskeletal health, quality of work, and a productive work life. However, studies in dental and dental hygiene educational programs involving magnification eyewear are limited. Those that are available report postural benefits but few have been able to document improvements in patient care.[11-18]

Maillet, Millar, Burke, Maillet, and Neish found significant postural benefits for dental hygiene students when hand-scaling and students became more proficient with the use of loupes the earlier in their education they were introduced.[12] Branson, Bray, and Gadbury-Amyot reported a relationship between dental hygiene students' posture and the use of loupes, potentially decreasing musculoskeletal problems with similar findings reported by Sunnell and MaschakIn in their study of dental hygiene students.[13,14] Leknius and Geissberger, revealed the use of loupes among dental students has been

shown to reduce clinical errors by 50%, although another study found no significant differences in the quality of cavity preparations done by dental students using loupes and dental students using safety glasses.[20,21]

Meraner and Nase's survey of teaching faculty members at a school of dentistry revealed almost one half of the faculty used loupes.[18] Most respondents indicated loupes significantly benefit occupational health and diagnostic abilities of the dentist and patient care delivered, and almost three fourths of the respondents indicated that wearing loupes should be mandatory for students in the program. Sixty-one percent of the faculty respondents reported that they always discuss the importance of loupes with students.

Thomas and Thomas explored the opinions of practicing dental hygienists on loupes and found 85% of those surveyed believed loupes were or would be advantageous while in school but most respondents did not think they should be required.[11] The respondents' perceived advantages of loupes follow: ergonomics (91.5%), improved probe readings (78.5%), calculus removal (73.3%), caries detection (64.6%), quality of care (65.2%), cosmetic restorative detection (63%), tissue evaluation (54.1%), radiographic evaluations (43.2%), instrument sharpening (42.5%), and only 1% reported no advantage. The reported disadvantages included: adjustment period (46.2%), vision dependency (31.2%), infection control (27.3%), limited depth of vision (23.6%), uncomfortable (21.4%), headache (19.1%), cost to benefit ratio (16.4%), and 16.9% reported no disadvantages.

In summary dental hygiene students can benefit from the earliest use of loupes prior to developing bad postural habits. Dental hygiene programs must teach the most effective techniques and interventions, advance best practices, and model the highest

standards of professional practice so that graduates can provide quality care and have successful professional careers. Currently, use of magnification loupes is not a content area required by accreditation standards nor is it reflected in nationally accepted dental hygiene curriculum guidelines as a best practice. However the use of magnification glasses continues to increase in dental practice settings due to potential ergonomic benefits. The literature is void of evidence that demonstrates the degree to which dental hygiene schools have embraced loupes as an essential part of entry-level education and clinical practice. This research helps fill this void and may assist faculty with making valid and reliable decisions regarding the future direction of their program's curriculum loupes policies. Consequently, a nationwide survey was needed to assess the policies and practices in the U.S. entry-level dental hygiene programs to determine whether loupes were utilized in the educational environment.

PURPOSE

The purpose of this study was to determine the policies and practices regarding magnification loupes among entry-level dental hygiene programs accredited by the Commission on Dental Accreditation of the American Dental Association, as measured by a self-designed questionnaire. In addition, the study compared policies among dental hygiene programs in two years versus four years programs in terms of requirements for the use of magnification loupes.

DEFINITION OF TERMS

Magnification loupes: A type of eye glasses with two small cylinders, one in front of each lens used for the purpose of improving clinician visibility during patient care.

Depth-of-field: The higher the power, the smaller the field size of the operating area in the mouth when viewed through loupes. The higher the magnification power, the higher the power, the smaller the field, the smaller the field.

Ergonomics: The science of improving and creating a safe work environment that will minimize or prevent work related injuries.

Dental hygiene faculty: Educators employed full or part-time by an accredited U. S. entry-level dental hygiene program within an institution of higher education.

Dental hygiene student: Students full or part-time, currently attending an accredited U. S. entry-level dental hygiene program.

Dental hygiene curriculum: The set of courses, requirements, experiences, and evaluations leading to the development of competencies required of a practicing dental hygienist, within an accredited U. S. entry-level dental hygiene program in an institution of higher education.

CHAPTER II

METHOD AND MATERIALS

A 31-item self-designed questionnaire was developed to determine polices concerning use of magnifying loupes by students and faculty in all accredited U.S. entry-level dental hygiene programs (N=303). The survey consisted of 12 yes/no questions, 6 multiple choice questions, 8 questions that were open-ended response count, 4 Likert-scale, and one comment section to allow for elaboration. Several questions with specific answers also allowed for explanation. The first section requested demographic information such as respondents' title and affiliation. The next segment solicited programs' current loupes policy for students, the estimated number of students that purchased loupes, when students should begin to wear loupes and identified all items they believed to be advantages and disadvantages of loupes. The third section pertained to faculty policies on loupes. Finally, participants gave feedback regarding ergonomics of loupes inclusion within the curriculum.

Following approval of the university institutional review board, the survey was pilot tested on 10 dental hygiene faculty. Comments and suggestions were incorporated into the final survey instrument to improve content validity and clarity. A current master list of accredited U.S. entry-level dental hygiene programs was provided by the American Dental Hygienists' Association. A cover letter and the self-designed questionnaire *Magnifying Loupes in U.S. Entry Level Dental Hygiene Programs* were distributed to each college/university, using a commercial web-based software company (Survey Monkey: www.surveymonkey.com) (see appendices A and B). The cover letter explained

the research was supported by a grant from the ADHA Institute for Oral Health, explained the purpose of the study, and requested the recipient respond to the questionnaire or forward the survey to the most qualified faculty member for completion. One week after the initial electronic mailing, a second distribution of surveys was launched to non-respondents. A third distribution of surveys was launched to non-respondents due to the fluctuating college winter breaks. The survey was closed three weeks after the third electronic mailing.

Data were collected and tabulated by Survey Monkey Software; statistical analysis was performed using JMP version 8.0.2 software. Qualitative analysis of data utilized percentages, frequency distribution, and Pearson's Chi-square test. The significance level was set at 0.05.

CHAPTER III

RESULTS

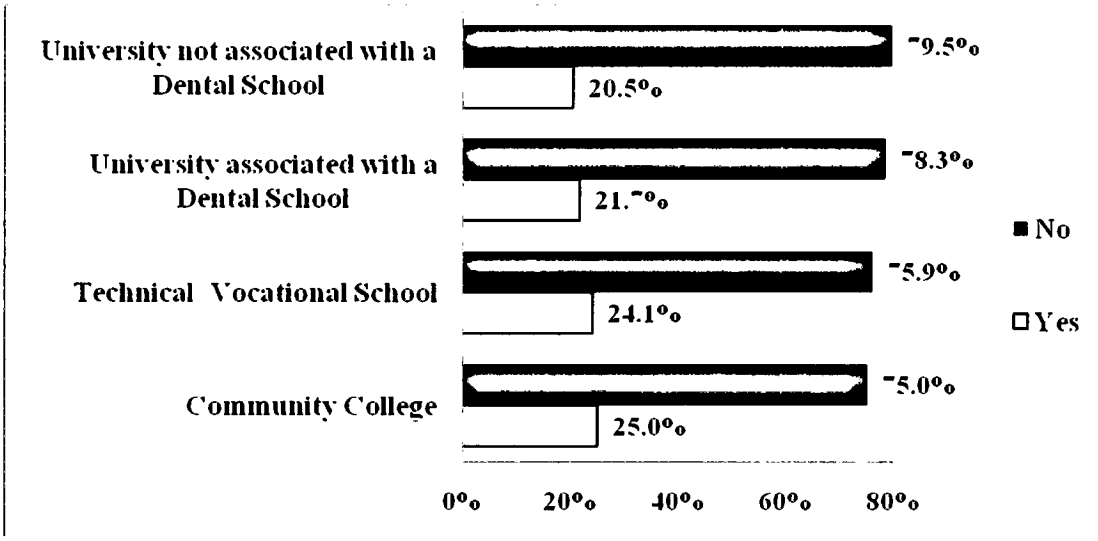
Of the 303 surveys electronically mailed, a total of 236 were returned for an overall response rate of 75% (227). Seventy two percent (165) of the respondents were from 2-year programs and 27.9% (49) 4-year programs as presented in Table 1.

Table 1. Demographics of study population

	Community College	Technical/ Vocational School	University with a Dental School	University without a Dental School	Response Totals % (number)
Certificate/Diploma	3.6% (5)	3.2% (1)	19.2% (5)	0% (0)	4.7% (11)
Associates Degree	99.3% (138)	96.8% (30)	15.4% (4)	60% (24)	83.1% (196)
Bachelor's Degree	0.7% (1)	9.7% (3)	92.3% (24)	52.5% (21)	20.8% (49)
Program Director	77% (107)	80.6% (25)	61.5% (16)	60% (24)	72.9% (172)
Clinical Coordinator	13.7% (19)	12.9% (4)	11.5% (3)	27.5% (11)	15.7% (37)
Other	12.9% (18)	16.1% (5)	26.9% (7)	25% (10)	16.9% (40)

Most respondents (76.2 %) did not require students to purchase loupes. Of the 23.8% who did require loupes purchase, 21.3% were from community colleges, 17.2% from technical/vocational schools, 17.2% were universities with dental school; and 17.2% were universities without dental school (Figure 1).

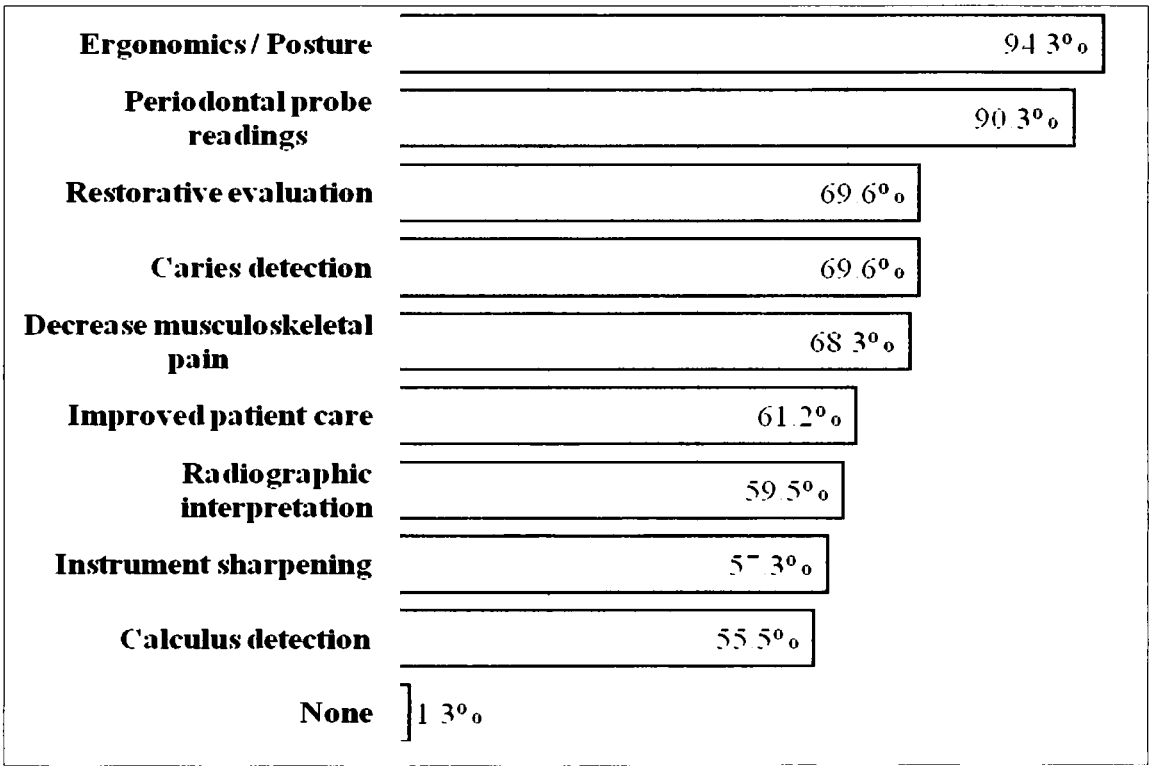
Figure 1: Dental hygiene program policy requiring loupes for students



Of the 78% of programs that do not require loupes, 35% report over half of their second year students voluntarily use loupes with another 15% report their whole second year class voluntarily uses loupes. Results reveal slightly more schools (23.8%) required purchase of loupes than mandate their actual use (20.3%). No statistically significant differences were found ($p = 0.54$) in dental hygiene educational program policies requiring the purchase of magnifying loupes by students, based on 2-year and 4-year programs. However, odds ratio (1.25) gives the likelihood of students purchasing loupes in a 2-year program as 25% higher than a 4-year program.

Almost all participants viewed ergonomics as an advantage of wearing loupes (93%) followed by improved periodontal probe readings (90.3%), caries detection (69.6%), restorative evaluation (69.6%), decreased musculoskeletal pain 68.3%, improved patient care 61.2%, radiographic interpretation 59.5%, and calculus detection (Figure 2).

Figure 2. Dental hygiene program perspectives on the advantages of loupes for students



Disadvantages identified included: expense (86.7%), adjustment time (37.2%), limited depth of field 26.1%, infection control 25.7% (Figure 3). Comments from participants are found in Table 2.

Figure 3. Dental hygiene program perspectives on the disadvantages of loupes for students

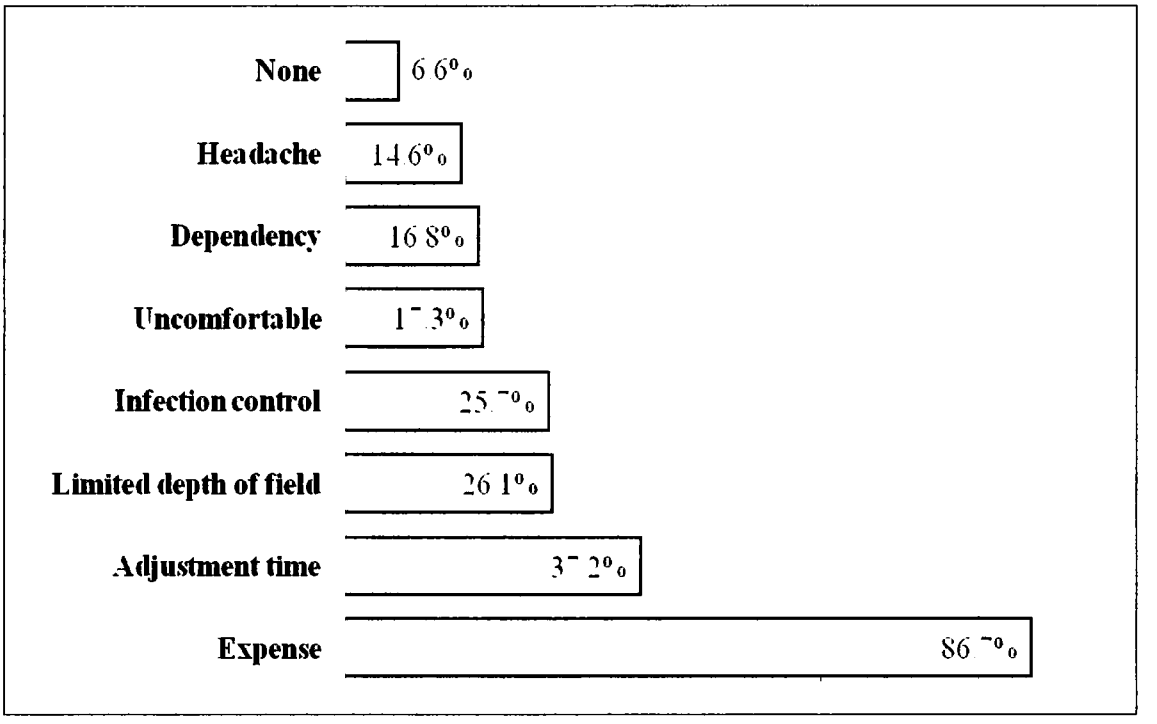
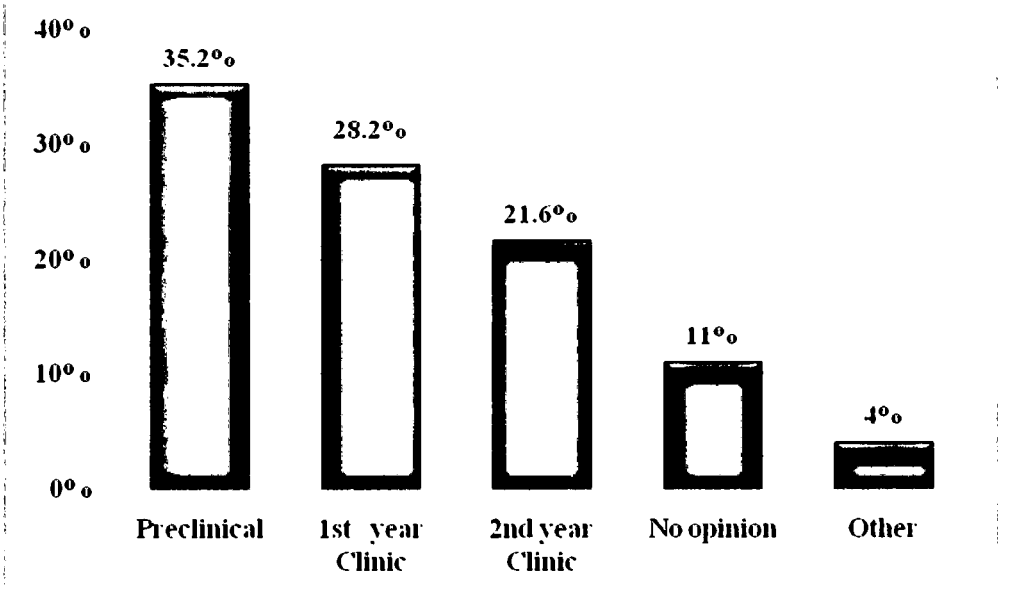


Table 2. Comments from participants on loupes usage

- Cost prohibit mandating
- Difficulty attaining consensus among faculty
- Do not required loupes but we recommend them to students
- Too much additional information for students
- Alter natural vision/ dependency
- Inhibit development of tactile sensitivity
- Which brand/company to recommend
- Arbitrator between student and company
- Implies dental hygienist need loupes to be efficient
- Some students cannot adapt
- Loupe too heavy

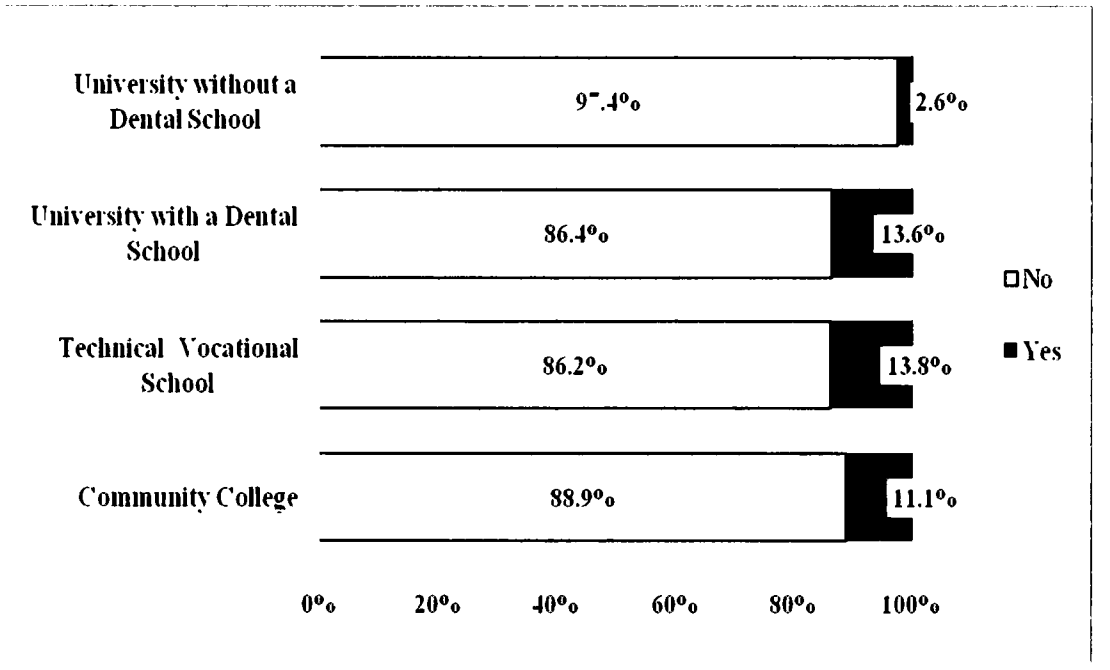
Just over one third of the respondents indicated the ideal time students should begin to wear loupes was during preclinical education; one in four respondents indicated the second year was the best time to begin to wear loupes. Combining preclinical and first year results reveals 63.4% consider students' first year ideal. Chi square results reveal a statistically significant difference between schools that require loupes and those that do not, when comparing when students should first begin to wear them ($p = <0.0001$). Of the programs that required students to purchase loupes, the majority (64.8 %) indicated pre-clinic is when students should begin wearing loupes with just under 10% indicating the senior year (Figure 4).

Figure 4. Dental hygiene program perspectives on when students should begin to wear loupes



More than half of faculty respondents indicated they always or almost always personally used loupes in clinic although an overwhelming majority of respondents (90%) indicated they did not have program polices requiring faculty to purchase and use loupes in the clinical setting. However, of the programs that required students to purchase loupes, results suggest more lenient polices for faculty, as 66% of the programs that require student to purchase loupes do not require faculty to do so. No statistically significant difference (p-value = 0.27) was found between 2-year and 4-year dental hygiene educational programs for faculty use of magnifying loupes in the clinical setting (Figure 5).

Figure 5. Dental hygiene programs requiring faculty to wear loupes



Very few institutions paid for faculty loupes with only 10% paying for full-time faculty and 3.9% for part time faculty's loupes. About 77% of participants indicated loupes were integral in private practice, while 23.2% did not see loupes as integral to in the private practice sector. Most programs (90%) do not plan to require students to purchase loupes in the near future although the majority (73%) agree and strongly agree the use of loupes are integral to the curriculum.

Most participants (62.5%) indicated they had ergonomic instruction on magnification loupes as a component in the curriculum. Of those respondents that cover the topic, almost 70% spent 2 or less hours on loupes and many relied solely on the loupes' sales representative for all loupes instruction.

With three-fourths of the respondents indicating loupes are integral to private practice, only two-thirds identified ergonomics instruction on magnification loupes as a curriculum component. Of those respondents that cover the topic, almost 70% spend two hours or less on loupes training.

CHAPTER IV

DISCUSSION

This study examined polices on magnification loupes in dental hygiene programs. Results suggest schools of dental hygiene have been slow to adopt the use of loupes in their curricula. Most schools do not require students or faculty to purchase loupes. The ergonomic benefits of loupes are well supported in the literature and concern is generated when so few schools are requiring students to wear loupes. Numerous students may be disadvantaged by not experiencing the ergonomic benefits loupes offer.

While research has documented the ergonomic benefits of loupes, few studies have documented improvements in oral diagnosis and treatment by the loupes wearer. Perhaps some schools may not have policies that require loupes due to the lack of scientific data available that demonstrate improvements in patient care as a result of magnification. Sunnell and Rucker also argue that surgical magnification may not be as important for dental hygienists due to their periodontal focus that relies on subgingival instrumentation and tactile sensitivity more than visual acuity.[17] Although this reasoning ignores the issue of posture and musculoskeletal malady, it leads to another possible explanation for this study's results where over three-quarters of the dental hygiene programs responding do not require loupes.

Another plausible explanation for low numbers of schools requiring students and faculty to wear loupes is cost. Almost all respondents cited cost as the greatest disadvantage of loupes ranging in price from $400 to $1200, The added expense may appear overwhelming in light of numerous instruments, supply, and lab fees students

must incur when enrolling in a dental hygiene program. The benefits have the potential to outweigh the cost, when years of improved ergonomics may result in fostering a longer and more productive career in clinical practice. Several respondents' comments echoed similar explanations as they cited indecision on which company to use, arbitration between students and manufacturer, difficulty attaining consensus among faculty as an obstacle, and not mandating use of loupes in the clinical setting claiming treatment benefits are not proven (Table 2).

Results suggest dental hygiene programs require loupes for students more often than faculty. This result might be explained by some faculty not viewing themselves as direct care providers and hence the need for magnification eyewear would not be as great as for students. Additionally some faculty may see their role as less demanding ergonomically since they often spend less time than students actually working in a patients' oral cavity.

Odds ratio reveal a greater probability of 2-year programs requiring students and faculty to purchase loupes than 4-year programs. A possible explanation of the student finding could be the lower cost of instrument kits and supplies in 2-year programs although this data was not obtained. Another cost factor could be related to tuition as ADA reports tuition in two year schools as substantially less on average than 4-year schools housed in universities and dental schools.[22]

Results were split concerning the best time students should begin to wear loupes. However the programs that required loupes more frequently indicated pre-clinic as the optimum time to start wearing loupes when compared to all respondents.[12] The varied findings in this study may be due to those programs that require loupes being more

familiar with how they can assist students at all levels of clinical learning since they have more experience with them compared to other schools. As suggested by Maillet et al, an early start with loupes may reinforce neutral positioning and enhance posture early in the educational process before bad habits are learned.[12] Students can become comfortable with loupes during instrumentation on typodonts prior to treating patients. Some schools may also mandate an early integration of loupes in pre-clinic since they find it beneficial to have students incur this expense at the same time as other instrument, lab fees, and supply expenses covered by outside sources such as student loans or grants. One of four respondents indicated the second year as the optimum time to start wearing loupes. Perhaps faculty believe learning pre-clinical skills such as indirect vision, tactile sensitivity and other instrumentation basics is best learned first with unmagnified vision.

One half of respondents report personally wearing loupes while teaching in the clinic which is similar to findings from a survey of dental school faculty.[19] However, only 10% of programs had polices that required faculty to wear loupes. Apparently many faculty believe the wearing of loupes have advantages but not enough to mandate their use by faculty. Faculty need to be role models for students. If program policies do not reflect that loupes are important for faculty, many students may not view loupes as advantageous enough to incur the expense unless mandated.

Of the programs currently not requiring loupes, few plan to change their policy in the future. This is unfortunate since musculoskeletal health of students and faculty could be affected. With expenses continuing to rise and budgets continuing to decrease in many institutions, it is not surprising that few schools of dental hygiene paid the cost of loupes

for faculty. If the expense was covered by the institution, predictably policies would change since respondents see many advantages to wearing loupes.

Majority of responding faculty reported they include loupes ergonomics instruction as part of the curriculum. However, the one third of respondents that do not cover this topic in their curriculum may be doing a disservice to their students. These schools may wish to evaluate their curricula to ensure coverage of this important topic so tomorrows practitioners have a full realm of options for ergonomically sound dental hygiene practices. Beach and DeBiase reported the majority of programs did not offer ergonomic education beyond patient operator positioning due to lack of room in curriculum.[16] This could be a possible reason for the low number of hours found in this study that was devoted to loupes education. Notwithstanding the overwhelming response that loupes positively impact ergonomic wellness, the majority of dental hygiene programs reported spending negligible time while some leave all the loupes ergonomic education to sales representatives.

Since proper fit is integral to the successful use of loupes, students need to be measured in the clinic with a patient in the chair to attain the proper patient to clinician distance as well as the angle of the telescopes. Curriculum therefore, should have both a clinical and a didactic component. Manufacturers of purchased loupes must be obliged to provide initial and follow up instruction as well as clinical support as needed to obtain optimum outcomes since proper loupes fitting is outside of the role of most faculty.

Clinicians often slouch or bend to enhance their visual perspective and risk serious cumulative injury. Loupes can aid in reinforcing proper ergonomics, musculoskeletal health and greater visual acuity with less eyestrain. This could result in

prolonged physical health, dental hygiene careers, and greater visual acuity resulting in enhanced patient management.

Limitations of this study include results can only be generalized to the responding population and results may not represent all dental hygiene programs. This present study did not elucidate the student perspective, which could impact results. The questionnaire did not clearly define pre-clinic from first year clinic, which may have confused respondents.

Future studies need to be conducted to determine if visual magnification improves student performance, the most optimal time loupes should be introduced into curriculum, and student opinions of the value of loupes in clinical practice. Research is also needed to investigate why faculty recognize the importance of enhanced vision with loupes but are resistant to requiring the wearing of loupes in the educational setting.

CHAPTER V

SUMMARY AND CONCLUSIONS

Most responding dental hygiene programs do not require students or faculty to purchase or use loupes. Majority of respondents believe students should begin to wear loupes in their first year. Most respondents see advantages to loupes, but clinical policies on loupes do not appear to correlate with beliefs. Educational programs in dental hygiene seem slow to adopt and require the use of loupes. Current clinical policies on loupes should be reviewed to ensure graduates experience the potential ergonomic benefits magnification brings to clinical practice during their education.

REFERENCES

1. Morse TF, Michalak-Turcotte C, Atwood-Sanders M et al. A Pilot Study of Hand and Arm Musculoskeletal Disorders in Dental Hygiene Students. *J Dent Hyg.* 2003; 77:173-179.

2. Morse T, Bruneau H, Michalak-Turcotte C, Sanders M et al. Musculoskeletal disorders of the neck and shoulder in dental hygienists and dental hygiene students. *J Dent Hyg.* 2007;81(1):10.

3. Werner RA, Hamann C, Franzblau A, Rodgers PA. Prevalence of Carpal Tunnel Syndrome and Upper Extremity Tendonitis among Dental Hygienists. *J Dent Hyg.* 2002; 76: 126-132.

4. Hayes MJ, Cockrell D, Smith DT. A systemic review of musculoskeletal disorders among dental professionals. *Int D Dent Hyg* .2009; 7:159-165.

5. Lalumandier JA, McPhee SD. Prevalence and risk factors of hand problems and carpal tunnel syndrome among dental hygienists. *J Dent Hyg.* 2001; 75: 130-133.

6. Anton D, Rosecrance J, Merlino L, Cook T. Prevalence of Musculoskeletal symptoms and carpal tunnel syndrome among dental hygienists. *Am J Ind Med.* 2002;42: 248-257.

7. Nield-Gehrig JS. Fundamentals of periodontal instrumentation and advanced root instrumentation. 6th ed. Philadelphia: Lippincott Williams & Wilkins, 2004:9–21.

8. Yee T, Crawford L, Harber P. Work environment of dental hygienists. *J Occup Environ Med.* 2005;47(6):623-632.

9. van As G. Magnification and the alternatives for microdentistry. *Compend Contin Educ Dent.* 2001;22(11A): 1008-1016.

10. Jarrett PM. (2004). Intraoperative magnification. *Microsurgery.* 2004;24(6):420-422.

11. Thomas J, Thomas FD. Dental hygienists' opinions about loupes in education. *J Dent Hyg.* 2007; 81(4):82.

12. Maillet JP, Millar AM, Burke JM, Maillet MA, Maillet WA, Neish NR. Effect of magnification loupes on dental hygiene student posture. *J Dent Ed.* 2008;72(1):33-44.

13. Branson BG, Bray KK, Gadbury-Amyot C, Holt LA, Keselyak NT, Mitchell TV et al. Effect of magnification lenses on student operator posture. *J Dent Ed,* 2004;68(3):384-389.

14. Sunell S, Maschak L. Positioning for clinical dental hygiene care: preventing back, neck and shoulder pain. *Probe*, 1996:30(6);216-21.

15. Branson BG, Williams KB, Bray KK, McIlnay SL, Dickey D. Validity and reliability of a dental operator posture assessment instrument (PAI). *J Dent Hygiene*. 2002;76(4):255–261.

16. Beach JC, DeBiase CB. Assessment of ergonomic education in dental hygiene curricula. *J Dent Ed.* 1998;62(6):421–5.

17. Sunell S, Rucker L. Surgical magnification in dental hygiene practice. *Int J Dent Hyg.* 2004; 2(1):26-35.

18. Meraner M, Nase JB. Magnification in dental practice and education: experience and attitudes of a dental school faculty. *J Dent Educ.*2008:72(6): 698-706.

19. Hagge MS. Use of surgical telescopes by senior dental students: a survey. *J Prosthod.* 2003;12(4):271-9.

20. Leknius C, Geissberger M. The effect of magnification on the performance of fixed prosthodontic procedures. *J Calif Dent Assoc.* 1995;23(12):66–70.

21. Donaldson ME, Knight GW, Guenzel PJ. The effect of magnification on student performance in pediatric operative dentistry. *J Dent Educ.* 1998;62(11):905–910.

22. American Dental Association Survey Center. 2008-09 Survey of allied dental education. Chicago, Illinois 60611, [Internet] 2009 Nov. [cited 2010 Sept]Available from: http://www.ada.org/sections/professionalResources/pdfs/survey_allied.pdf

APPENDIX A

COVER LETTER

OldDominionUNIVERSITY

Dear Dental Hygiene Director,

I am conducting a survey to document the degree to which magnification loupes are included in the U.S. entry-level dental hygiene curricula. I am interested in your perspectives regarding the value of loupes and the degree to which loupes magnification is promoted and used by students and faculty within your program.

We only want one person from your program completing the questionnaire, i.e. either you as director or your designee. Please answer the questionnaire yourself or forward this survey to the faculty member most informed about it and how loupes magnification is used in your curriculum. The questionnaire will take no more than 10 minutes to complete and submit electronically.

The survey is voluntary and responses will remain confidential. Data will be reported in group form only. Your school will not be identified at any point in the survey.

Thank you.

Sincerely,

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APPENDIX B

QUESTIONNAIRE

Magnification Loupes Usage in U.S. Entry-level Dental Hygiene Programs Questionnaire

Consent

Your involvement as a subject: You will spend approximately 10 minutes to complete this an anonymous survey.

Risks to participation: There are no anticipated risks to participation.

Benefits to participation: Although you may not receive direct benefit from your participation, future dental hygiene faculty and students may ultimately benefit from the knowledge obtained from this study.

Costs to participation: There are no costs to participation in the study, other than giving 10 minutes of your time.

Voluntary nature of your participation: Your participation in this project is voluntary and confidential.

Thank you,
Leslie McHaney Congdon, RDH, BS, MS(c)

I hereby consent to participate in the study.

□ I agree
□ I do not agree

Demographics

1. What type of dental hygiene institution best categorizes your program?

☐ Community College
☐ Technical/Vocational College
☐ University associated with a Dental School
☐ University not associated with a Dental School

2. What credential is awarded at your institution upon successful completion of the entry level dental hygiene program? (please select all that apply)

☐ Certificate/diploma
☐ Associate's Degree
☐ Bachelor's Degree

3. What position do you hold in your program?

☐ Program director
☐ Clinical coordinator
☐ Other_____(specify)

Student Policy

1. Does your program mandate that students in the clinical setting wear loupes?
☐ Yes ☐ No

2. Does your program have a policy that requires loupes for purchase by students?
☐ Yes ☐ No

3. If loupes are not required in your program, does your program plan to require loupes for students?
☐ Yes ☐ No

4. How many 1 st year students do you have?
(please write in the number

5. How many 1 st year dental hygiene students presently use loupes?
(please write in the number)

6. How many 2 nd year dental hygiene students do you have? (please write in the number)

7. How many 2 nd year dental hygiene students presently use loupes? (please write in the number)

8. What do you believe are advantages of loupes for students? (check all that apply)

☐ Periodontal probe readings
☐ Caries detection
☐ Radiographic interpretation
☐ Decrease musculoskeletal pain
☐ Instrument sharpening
☐ Restorative evaluation
☐ Improved patient care
☐ Calculus detection
☐ Ergonomics / Posture
☐ None

9. What do you believe are disadvantages of loupes for students? (check all that apply)

☐ Adjustment time
☐ Headache
☐ Uncomfortable
☐ Dependency
☐ Expense
☐ Infection control
☐ Limited depth of field
☐ None

10. Ideally, when do you believe students should begin to wear loupes?

Preclinical	1 st year Clinics	2 nd year Clinics	No opinion	Other
☐	☐	☐	☐	☐

11. Please rate the level of the semesters listed below.

Dental hygiene programs should require students to purchase loupes magnification:

	Strongly Agree	Agree	Disagree	Strongly Disagree
1 st year preclinical	☐	☐	☐	☐
1 st year clinic	☐	☐	☐	☐
2 nd year 1 st semester	☐	☐	☐	☐

Faculty Policy

1. Do you (personally) use loupes in the clinical education setting?

all the time	most of the time	sometimes	seldom	never
☐	☐	☐	☐	☐

2. Does your program require faculty in the clinical education setting to wear loupes?

☐ Yes ☐ No

3. Does your program have a policy that requires loupes for full-time faculty?

☐ Yes ☐ No

4. Does your program have a policy that requires loupes for part-time faculty?

☐ Yes ☐ No

5. Does your program cover the cost of loupes for full-time faculty in the clinical setting?

☐ Yes ☐ No

6. Does your program cover the cost of loupes for part-time faculty in the clinical setting?

☐ Yes ☐ No

7. If loupes are not required in your program, does your program plan to require loupes for full-time faculty?

☐ Yes ☐ No

8. If loupes are not required in your program, does your program plan to require loupes for part-time faculty?

☐ Yes ☐ No

9. How many full time faculty do you have?
(please write in the number)

10. How many full time faculty presently use loupes?
(please write in the number)

11. How many part-time faculty do you have?
(please write in the number)

12. How many part-time faculty presently use loupes?
(please write in the number)

13. Loupes are an integral part of private practice.

Strongly Agree	Agree	Disagree	Strongly Disagree
☐	☐	☐	☐

Loupes in the Clinical Curriculum

1. Is ergonomic instruction on magnification loupes a component in your curriculum? If yes, what are the numbers of hours?

☐ Yes ☐ No

2. Is the proper use of loupes integrated into the ergonomics unit in your entry-level curriculum? If yes, what are the numbers of hours?

☐ Yes ☐ No

3. Do you believe that the proper use of loupes should be integrated into the entry-level curriculum?

Strongly Agree	Agree	Disagree	Strongly Disagree
☐	☐	☐	☐

4. Comments:

Thank you for your participation!

VITA

LESLIE McHANEY CONGDON, RDH, BSDH, MS

PERSONAL INFORMATION

Name Leslie McHaney Congdon
Address:

LICENSURE

1998	North Carolina Board of Dentistry, Dental Hygiene License
1997	North Carolina of Dentistry, Dental Hygiene Provisional License
1992	Missouri Board of Dentistry, Dental Hygiene License
1986	Virginia Board of Dentistry, Dental Hygiene License

EDUCATION

2011	Master of Science Dental Hygiene Old Dominion University
2001	Bachelor of Science in Dental Hygiene The University of North Carolina at Chapel Hill
1986	Associate in Applied Science, Dental Hygiene Virginia Western Community College

ACADEMIC APPOINTMENTS

2004 – Present	Virginia Commonwealth University, School of Dentistry
2003 – 2004	The University of North Carolina, School of Dentistry
1999 – 2003	Guilford Technical Community College, Division of Health Sciences

CLINICAL PRACTICE

1996 – 1985	Dental Hygienist - Periodontal Offices (VA, MO, NC)
1975 – 1985	Dental Assistant – General and Periodontal Offices (VA, NY, MS)

MEMBERSHIP–SCIENTIFIC, HONORARY AND PROFESSIONAL SOCIETIES

American Dental Hygienists' Association (VA, MO, NC)
American Dental Education Association
Sigma Phi Alpha Dental Hygiene Honor Society
Alpha Eta National Honor Society for Allied Health Professionals

GRANTS

2009-2010	Principal Investigator: American Dental Hygienist Association Institute for Oral Health, "Magnifying Loupes in U.S. Entry-level Dental Hygiene Programs: Occupational Health and Safety" $3,810