

## Assessment of the Skills and Education Necessary for a Baccalaureate-Prepared Dental Hygienist to Pursue an Entry-Level Role in Clinical Research

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This project won 1st place in the ADHA Sigma Phi Alpha Journalism Award Competition, June 2010, under the baccalaureate or degree completion candidate category. Award provided by a generous grant from Johnson & Johnson Healthcare Products, Division of McNEIL PPC, Inc.

### Introduction

In 1987, the American Dental Hygienists' Association (ADHA) recognized research as 1 of 6 professional roles of the dental hygienist. The ADHA further established a research agenda promoting the advancement of the dental hygiene profession and good oral health.<sup>1</sup> Furthermore, the goal of the ADHA's Division of Research is to expand the involvement of dental hygienists in an array of oral health research initiatives focusing on health promotion and disease prevention, health services research, professional education and development, clinical dental hygiene care and occupational health and safety.<sup>1</sup> Fulfillment of these initiatives through clinical research projects led by dental hygienist investigators will not only play a crucial role in developing evidence-based treatment modalities and clinical techniques, but will also help to advance the dental hygiene profession.<sup>1</sup>

By clearly defining the skills and education required for an entry-level position in clinical research, more dental hygienists may consider this career path. Once key entrance criteria are identified, dental hygiene curricula could incorporate this knowledge into the research-related competencies, thereby encouraging new graduates to become involved in the re-

### Abstract

**Purpose:** To assess the skills and education perceived as necessary for a baccalaureate-prepared dental hygienist to pursue an entry-level role in clinical research.

**Methods:** An electronic survey was developed and distributed to 124 dental hygienists. Participants held at least a baccalaureate level of education and were currently involved in clinical research or had previous clinical research experience.

**Results:** The survey response rate was 45% (n=56). Of the 56 respondents, 71% (n=40) met all inclusion criteria. The majority of respondents agreed that the University of Michigan Degree Completion and the Society of Clinical Research Associates program competencies align with the skills and education needed to pursue an entry-level role in clinical research. Grant writing skills and the ability to prepare a manuscript for submission to a peer-reviewed journal were not perceived as necessary for an entry-level position.

**Conclusion:** Clinical research is a viable career option for dental hygienists. Obtaining a baccalaureate level of education will assist with acquiring entry-level clinical research skills. Additional education is necessary to expand clinical research opportunities. Both education and mentoring are integral components for pursuing a career in clinical research. Expanding upon the research-related competencies of dental hygiene program curricula is one avenue for achieving these recommendations.

**Keywords:** Clinical research, baccalaureate level education, dental hygienists, entry-level clinical role

This study supports the NDHRA priority area, **Professional Education and Development:** Investigate curriculum models for training and certification of competency in specialty areas (e.g., anesthesiology, developmentally disabled, forensics, geriatrics, hospital dental hygiene, oncology, pediatrics, periodontology, and public health)

search field. The objective of this study was to assess the skills and education perceived as necessary for a baccalaureate-prepared dental hygienist to pursue an entry-level role in clinical research.

## Review of the Literature

Research is a viable career option for dental hygienists.<sup>2-5</sup> In 2002, the director of the National Institutes of Health (NIH) convened a series of meetings to devise a "roadmap" for medical research in the 21st century, which included oral health.<sup>6,7</sup> The NIH Roadmap 2002 created additional clinical research opportunities for health professionals, including dental hygienists.

Today, health care is focusing on prevention. As a part of the preventive branch of dentistry, dental hygienists are well suited to contribute to this body of knowledge.<sup>5</sup> Some years ago, other health professions, such as nursing and pharmacy, recognized the importance of being major contributors to their professional body of knowledge. These health care professionals assumed central roles in clinical research projects, thereby advancing their respective fields.<sup>5</sup> Dental hygienists should also be major contributors to evidence-based dental research. Unfortunately, as a profession, this task has not been fulfilled.<sup>5</sup> Moreover, recent studies indicate a lack of interest among those in the profession toward the researcher role.<sup>8,9</sup> Is the deficit of dental hygienists involved in clinical research related to a lack of understanding of the skills necessary to pursue this career path?

During the 1970 ADHA Annual Session, focus was directed to the importance of research. Emphasis was placed on building a well-defined, well-organized body of knowledge that would promote dental hygiene education, practice and research.<sup>10</sup> The identified need for conducting a systematic approach in dental hygiene research led the ADHA to develop the National Dental Hygiene Research Agenda (NDHRA), which was formulated in 1994.<sup>10,11</sup> The NDHRA provides a guideline for research topics and is periodically revised to reflect prioritized investigational themes. The overall goals of the ADHA's Division of Research are to expand their involvement in an array of oral health research initiatives and to support association related endeavors that rely on research. The ADHA further supported these initiatives by adopting a model of evidence-based practice, whereby new research would be continually conducted, building a rigorous body of knowledge.

Pursuant of this mission, education is the most essential and integral component baccalaureate-prepared dental hygienists can gain when pursuing a

career in clinical research (Cugini, personal communication, July 2009). The baccalaureate-prepared dental hygienist possesses unique qualifications, such as educational background, patient assessment and management skills and clinical training, all of which align with the skills needed for attainment of a research role (Gilson-Layher, personal communication, July 2009).

A study conducted in 2002 supports the importance of additional education as it relates to preparing dental hygienists for research roles.<sup>12</sup> A survey of 235 program directors in the United States (77% baccalaureate and 23% non-baccalaureate), regarding the incorporation of evidence-based principles into curricula, revealed that the additional education obtained through a baccalaureate program provides more exposure to evidence-based practice and research methods. Results of the survey indicated that evidence-based principles were incorporated to some degree in both baccalaureate and non-baccalaureate programs, but to a much greater degree in baccalaureate programs.

A study conducted in Sweden in 2005 identified that additional education has an impact on the various aspects of research utilization of dental hygienists.<sup>13</sup> A randomized survey was given to 261 dental hygienists in Sweden regarding their attitudes towards research, research utilization and practices of researching new information. Among the 148 dental hygienists with 2 years of education, a more positive attitude was demonstrated toward research than the 113 hygienists with just 1 year of formal education. Also, the hygienists with more education took a more active role in researching and applying new information.

Cobban et al proposed a model of collaboration as a solution to increasing research involvement among dental hygienists.<sup>14</sup> Cobban suggests that partnerships between less experienced and more experienced dental hygiene researchers in a supportive educational setting would assist with increasing dental hygiene research efforts. The commitment of dental hygiene program directors to incorporate evidence-based principles, research-related competencies and opportunities to work with mentors to gain practical research experience will assist with laying a foundation for baccalaureate dental hygiene graduates to feasibly seek a career in research.

Although dental hygienists can gain exposure and develop research-related competency during their university education, additional training beyond the baccalaureate program will benefit the dental hygienist when choosing to pursue a career in clinical research. Advanced training can be sought through

on-the-job training opportunities, university sponsored workshops and certification programs offered through professional research organizations. The Society of Clinical Research Associates (SOCRA) and Association of Clinical Research Professionals are 2 highly respected certification organizations (Gilson-Layher, personal communication, July 2009).<sup>15,16</sup>

Though clinical research is a viable career option, a lack of knowledge exists identifying the baseline criteria necessary for a baccalaureate-prepared dental hygienist to follow this career option. The objectives of this study were to identify the skills and education perceived as necessary by experienced dental hygiene researchers to pursue an entry-level role in clinical research, and to compare survey results to research-related competencies of the University of Michigan Dental Hygiene Degree Completion e-Learning Program and the SOCRA certification program.

## Methods and Materials

A cross-sectional electronic survey was designed and distributed to dental hygiene researchers. Participants of the survey consisted of a convenience sample of 124 dental hygienists that attended the 2009 North American Dental Hygiene Research Conference. An electronically mailed letter was sent twice during a 1 week period of time. The letter described the project and its intended significance. Included in the letter was an invitation for recipients to participate in the survey via a link to SurveyMonkey.com.

Inclusion criteria included current or previous participation in clinical research and having at least a baccalaureate level of education. Two screening questions were incorporated at the start of the survey to verify that all participants met inclusion criteria. Those participants not meeting all inclusion criteria were removed from the survey.

Eleven Likert-scale survey questions were developed to assess the education, training and skills participants perceived as essential for baccalaureate-prepared dental hygienists to have when pursuing an entry-level role in clinical research. Five of the questions were derived using the University of Michigan Dental Hygiene Degree Completion e-Learning

Program competencies. Six questions were developed from the SOCRA program competencies. Two additional Likert questions were included relating to other aspects of the clinical researcher role. An open-ended question asked what education and/or skills were most helpful for the survey participants

when pursuing a career in clinical research. Two demographic questions identified the participant's educational level and whether they had obtained certification through a research certification program.

A pilot test assessing the survey for content validity was completed using dental hygiene faculty members at the University of Michigan. Modifications to the survey were made based on provided feedback. A second pilot test was then conducted using 4 dental hygienists with current and/or previous clinical research experience. Additional revisions were made based on their input. Prior to conducting the survey, the University of Michigan Institutional Review Board granted the study exemption status.

## Results

Two mailings of the survey resulted in a response rate of 45% (56 respondents). Of the 56 respondents, 71% (n=40) met the inclusion criteria (obtaining a minimum of a baccalaureate level of education and having current and/or previous clinical research experience). Of the 124 dental hygienists surveyed, 3 were unable to be contacted as a result of invalid electronic mail addresses

### Skills and Education

Respondents were asked to rate their agreement level to 13 questions regarding research-related competencies and skills that are necessary for a baccalaureate-prepared dental hygienist to pursue an entry-level role in clinical research (Table I). Of the 5 questions developed utilizing the University of Michigan Dental Hygiene Degree Completion e-Learning Program competencies, 97.5% agreed that possessing the ability to evaluate and critically analyze professional literature is necessary, while only 2.5% disagreed. The majority of respondents (97.5%) agreed that possessing knowledge of the scientific method and evidence-based decision making is necessary. Again, 2.5% disagreed. The majority of respondents (97.5%) also agreed that understanding the application of scientifically sound technologies and protocols during clinical decision making is necessary for a baccalaureate degree dental hygienist to pursue an entry-level role in clinical research. Only 2.5% disagreed. One hundred percent agreed that possessing effective communication and interpersonal skills is necessary for an entry-level role in clinical research. The majority of dental hygiene researchers (87.5%) agreed that possessing the ability to interact effectively with people of different cultures and backgrounds is necessary, whereas 12.5% were neutral regarding these skills.

Table I: Skills and education the dental hygiene researchers perceive as necessary for a baccalaureate prepared dental hygienist to pursue an entry-level role in clinical research

For an entry-level role in clinical research, the baccalaureate degreed dental hygienist needs to:					
The U of M Dental Hygiene Degree Completion E-Learning Program Competencies	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Possess competency in evaluating and critically analyzing professional literature.	87.5%	10%	0%	2.5%	0%
Possess knowledge of the scientific method and evidence-based decision making.	82.5%	15%	0%	2.5%	0%
Understand the application of scientifically sound technologies and protocols during clinical decision making.	75%	22.5%	0%	2.5%	0%
Possess effective communication and interpersonal skills.	45%	55%	0%	0%	0%
Possess the ability to interact effectively with people of different cultures and backgrounds.	50%	37.5%	12.5%	0%	0%
SOCRA Certification Program Competencies	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Be able to identify and apply the foundations and principles of clinical research ethics.	77.5%	12.5%	5%	5%	0%
Be able to demonstrate knowledge and application of laws, regulations, and standard operating procedures in regulated clinical research.	55%	25%	10%	10%	0%
Be able to distinguish and define the responsibilities of sponsors, monitors, and investigators according to the principles of the International Conference of Harmonization, Good Clinical Practice (ICH/GCP) and the Code of Federal Regulations (CFR).	35%	22.5%	30%	12.5%	0%
Be able to identify and apply regulation guidelines as they relate to informed consent, Institutional Review Boards (IRB)/Independent Ethics Committees (IEC), and financial disclosure.	62.5%	25%	2.5%	10%	0%
Possess the ability to identify the principles of study design, study closure, and record retention.	57.5%	32.5%	5%	5%	0%
Be able to demonstrate knowledge and application of safety reporting requirements as they relate to federal regulations and GCP Guidelines, such as reporting any adverse events, expected/unexpected events, or events that relate to safety in a clinical trial.	60%	25%	10%	5%	0%
Additional Questions Related to Clinical Research	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Possess the skills to prepare a manuscript for submission to a peer-reviewed journal.	27.5%	40%	15%	15%	2.5%
Possess grant writing skills.	7.7%	25.6%	41%	25.6%	0%

Of the 6 questions developed utilizing the SOCRA competencies, 90% agreed the ability to identify and apply the foundations and principles of clinical research ethics is necessary, while 5% were neutral and 5% disagreed. Eighty percent agreed that the ability to demonstrate knowledge and application of laws, regulations and standard operating procedures in regulated clinical research is a necessary skill, compared to 10% who were

neutral and 10% who disagreed. There was less agreement regarding the ability to distinguish and define the responsibilities of sponsors, monitors and investigators according to the principles of the International Conference of Harmonization, Good Clinical Practice and the Code of Federal Regulations. Slightly more than half of respondents (57.5%) agreed, compared to 30% who were neutral and 12.5% who disagreed. The ability to iden-

Table II: Responses to survey based on educational level (B=Bachelor, M=Master, PhD=Doctorate)

For an entry-level role in clinical research, the baccalaureate degreed dental hygienist needs to:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Possess competency in evaluating and critically analyzing professional literature.	B=7(*2) M=23(*1) PhD=5	B=1 M=2 PhD=1	B=0 M=0 PhD=0	B=0 M=1 PhD=0	B=0 M=0 PhD=0
Possess knowledge of the scientific method and evidence-based decision making.	B=7(*2) M=21 PhD=5	B=1 (*1) M=4 (*1) PhD=1	B=0 M=0 PhD=0	B=0 M=1 PhD=0	B=0 M=0 PhD=0
Understand the application of scientifically sound technologies and protocols during clinical decision making.	B=5(*2) M=20(*1) PhD=5	B=3(*1) M=5 PhD=1	B=0 M=0 PhD=0	B=0 M=1 PhD=0	B=0 M=0 PhD=0
Possess effective communication and interpersonal skills.	B=5(*2) M=10 PhD=3	B=3(*1) M=16(*1) PhD=3	B=0 M=0 PhD=0	B=0 M=0 PhD=0	B=0 M=0 PhD=0
Possess the ability to interact effectively with people of different cultures and backgrounds.	B=3(*2) M=13 PhD=4	B=5(*1) M=8 PhD=2	B=0 M=5(*1) PhD=0	B=0 M=0 PhD=0	B=0 M=0 PhD=0
Be able to identify and apply the foundations and principles of clinical research ethics.	B=6(*1) M=22(*1) PhD=3	B=1(*1) M=3 PhD=1	B=0 M=0 PhD=2	B=1(*1) M=1 PhD=0	B=0 M=0 PhD=0
Be able to demonstrate knowledge and application of laws, regulations, and standard operating procedures in regulated clinical research.	B=5(*1) M=17 PhD=0	B=2(*1) M=5(*1) PhD=3	B=0 M=2 PhD=2	B=1(*1) M=2 PhD=1	B=0 M=0 PhD=0
Be able to distinguish and define the responsibilities of sponsors, monitors, and investigators according to the principles of the International Conference of Harmonization, Good Clinical Practice (ICH/GCP) and the Code of Federal Regulations (CFR).	B=6(*1) M=8 PhD=0	B=1(*1) M=8 PhD=0	B=0 M=8(*1) PhD=4	B=1(*1) M=2 PhD=2	B=0 M=0 PhD=0
Be able to identify and apply regulation guidelines as they relate to informed consent, Institutional Review Boards (IRB)/Independent Ethics Committees (IEC), and financial disclosure.	B=5(*1) M=19(*1) PhD=1	B=2(*1) M=6 PhD=2	B=0 M=0 PhD=1	B=1(*1) M=1 PhD=2	B=0 M=0 PhD=0
Possess the ability to identify the principles of study design, study closure, and record retention	B=5(*1) M=16(*1) PhD=2	B=2(*1) M=9 PhD=2	B=0 M=0 PhD=2	B=1(*1) M=1 PhD=0	B=0 M=0 PhD=0
Be able to demonstrate knowledge and application of safety reporting requirements as they relate to federal regulations and GCP Guidelines, such as reporting any adverse events, expected/unexpected events, or events that relate to safety in a clinical trial	B=6(*1) M=16 PhD=2	B=1(*1) M=6 PhD=3	B=0 M=3(*1) PhD=1	B=1(*1) M=1 PhD=0	B=0 M=0 PhD=0
Possess the skills to prepare a manuscript for submission to a peer-reviewed journal.	B=4 M=7 PhD=0	B=2(*2) M=12(*1) PhD=2	B=0 M=4 PhD=2	B=2(*1) M=2 PhD=2	B=0 M=1 PhD=0
Possess grant writing skills.	B=2 M=1 PhD=0	B=3(*1) M=7 PhD=0	B=1(*1) M=11(*1) PhD=4	B=2(*1) M=6 PhD=2	B=0 M=0 PhD=0

\*Indicates the responses from those that have obtained certification through a research certification program

tify and apply regulation guidelines as they relate to informed consent, Institutional Review Boards/Independent Ethics Committees and financial disclosure, were agreed upon as necessary skills by

87.5% of respondents. This is compared to 2.5% neutral and 10% who disagree. Ninety percent agreed that possessing the ability to identify the principles of study design, study closure and record

retention are necessary. Only 5% were neutral and 5% disagreed. Eighty-five percent agreed that the knowledge and application of safety reporting requirements as they relate to federal regulations and Good Clinical Practice Guidelines, such as reporting any adverse events, expected/unexpected events or events that relate to safety in a clinical trial, is necessary. This compares to 10% neutral and 5% who disagree.

There was less agreement among the 2 additional questions related to the clinical research role. Over half of the respondents (67.5%) agreed a baccalaureate degree level dental hygienist needs to possess the skills to prepare a manuscript for submission to a peer-reviewed journal to pursue an entry-level role in clinical research. Only 15% were neutral and 17.5% disagreed. The other question assessed the importance of grant writing skills when pursuing an entry-level clinical role. Forty-one percent were neutral regarding this skill, 33.3% agreed and 25.6% disagreed.

In order to gain supplemental data regarding the necessary skills and education for a career in clinical research, the respondents were asked what education and/or skills proved most valuable for them when pursuing a career in clinical research. Of the 35 dental hygienists that responded to the question, 2 major themes emerged: education and mentoring. Education was indicated most often as valuable for pursuing a career in clinical research. The pursuit of a master's degree, obtaining clinical research certification and courses in statistics and research methodology were listed as beneficial for pursuing a clinical research role. On-the-job training, effective communication skills and clinical skills were also identified as being important for pursuing a career in clinical research (Figure 1).

### Research Certification and Educational Level Data

The majority of respondents indicated they have obtained a masters level of education (65%), whereas 20% reported having attained a baccalaureate degree and only 15% have obtained a PhD. Table II categorizes the responses by educational level and indicates the number of respondents that have obtained certification through a research certification program. An effort to analyze the survey responses in relation to educational level was attempted by biostatisticians at the University of Michigan. However, statistical analysis was not possible due to the small sample size.<sup>19</sup>

The majority of respondents (90%) indicated that they have not obtained certification through a

Figure 1: Important Components for Pursuing a Clinical Research Role



research certification program, such as SOCRA or the Association of Clinical Research Professionals. Of the 4 individuals that have obtained certification, 3 have obtained a baccalaureate degree and 1 a master's degree. There are not enough individuals in both groups (certified and non-certified) to analyze the data to determine if there is a significant difference in the responses based on certification status (Braun, personal communication, October 2009).

### Discussion

Baccalaureate-prepared dental hygienists possess the education and skills necessary to pursue an entry-level role in clinical research (Gilson-Layher, personal communication, July 2009). Research is crucial for building a well-defined and well-organized body of knowledge that will assist with promoting dental hygiene education, practice and research.<sup>10</sup> A lack of information exists regarding the education and skills necessary for baccalaureate prepared dental hygienists to pursue a role in clinical research. The survey results will assist dental hygienists by increasing an understanding of the education and skills that are necessary for pursuing an entry-level clinical research role.

Studies support the importance education plays in pursuing the clinical research role (Cugini, personal communication, July 2009).<sup>12,13</sup> The survey results demonstrate that experienced dental hygiene researchers also believe that education is integral to pursuing a clinical research role. The majority of respondents agreed that the baccalaureate prepared dental hygienist should possess the knowledge and skills addressed in both the University of Michigan Dental Hygiene Degree Completion e-Learning Program and SOCRA research-related competencies. Therefore, it can be assumed that other university programs with similar research-related competencies will prepare baccalaureate dental hygienists for

an entry-level role in clinical research. Certification through a clinical research certification program will also be beneficial for dental hygienists interested in pursuing a clinical research role.

Results from the open-ended question indicate that continuing education beyond the baccalaureate level is beneficial and may provide for additional research-related opportunities. Some respondents commented that many of the skills listed in the questions were skills obtained through education beyond the baccalaureate level and over-time with clinical research experience. The majority (65%) have obtained a minimum of a master's degree education, which may have an impact on these responses. On-the-job training was also indicated as important for pursuing a clinical research role.

The survey did not include an adequate number of individuals to explore for statistical differences between the responses of those from the 3 educational levels. Additional research involving a larger population is necessary to determine whether statistical differences exist between the responses based on educational background (Braun, personal communication, October 2009).

The importance mentoring had for the dental hygiene researchers in pursuing a clinical research role supports the proposed model of collaboration suggested by Cobban et al to increase research involvement.<sup>14</sup> Increasing opportunities for baccalaureate dental hygiene students to work with experienced dental hygiene researchers is one method for students to gain practical clinical research skills. Additional research related to dental hygiene baccalaureate programs and their mentoring opportunities for students could assist with furthering such practices.

## Conclusion

The results of this study indicate that research-related competencies, such as those incorporated in the University of Michigan Dental Hygiene Degree Completion e-Learning Program, will assist with preparing a baccalaureate dental hygienist to pursue an entry-level role in clinical research. The results also indicate that obtaining certification through a research certification program, such as SOCRA, may assist with acquiring vital education and skills necessary to pursue a clinical research role. In ad-

dition to education, obtaining the guidance of an experienced mentor also plays an important role when pursuing a career in clinical research.

This study contributes to the existing, but limited, body of knowledge regarding the clinical research role. Additional research is necessary to further gain an understanding of the clinical research role in order to increase research involvement. Further study of research-related competencies incorporated into dental hygiene program curricula may improve the education and skills obtained in these programs. Assessing the mentoring practices among baccalaureate dental hygiene programs may increase the mentoring opportunities available for students interested in a career in clinical research. Expanding research-related knowledge and skills acquired through baccalaureate programs may assist dental hygienists with understanding that research is as viable career option. Increased understanding of the skills and education necessary to pursue an entry-level role in clinical research, combined with providing experienced mentoring, may also have an impact on the clinical research involvement of baccalaureate dental hygienists. Ultimately, increased research involvement from dental hygienists will assist with addressing the NDHRA and furthering the dental hygiene profession.<sup>1</sup>

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## Acknowledgments

The authors thank Wendy Kerschbaum, RDH, MA, MPH; Christine Klausner, RDH, BSDH, MS; Mary Laylor, RDH, BSDH, MS; Pat Guenther, RDH, BSDH, MA and Carrie Bigelow-Ghaname, RDH, MS, for their assistance with pilot testing and developing the survey instrument.

This award was provided by a grant from Johnson & Johnson Healthcare Products, Division of McNEIL PPC, Inc.

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