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Managing Oral Health: Knowledge and Perceptions of California Advanced Practice Registered Nurses

Eileen K Fry-Bowers[1]* and Paul Gavaza[2]

[1]Hahn School of Nursing and Health Science, University of San Diego, USA
[2]School of Pharmacy, Loma Linda University, USA

Introduction

In 2000, the United States (U.S.) Surgeon General's Report identified dental disease as a silent epidemic and linked an individual's oral health to their overall health and well-being [1]. Shortly thereafter, a public-private partnership, A National Call to Action to Promote Oral Health, was developed for the purpose of integrating efforts to facilitate improvement of the nation's health through oral health activities [2]. Subsequent reports, as well as the inclusion of oral health as one of the Healthy People 2020 Leading Health Indicators continue to affirm the significance of oral health as an important population health matter [3-5]. Although oral health has improved for many over the past decade, oral diseases remain prevalent across the country, particularly among vulnerable and underserved populations, including poor children, racial and ethnic minorities, and older adults [4,5].

Dental caries, more commonly known as tooth decay, are more common than asthma among children ages 5 to 17, affecting nearly 60% of children, and it remains a common chronic disease across the life span [1]. Poor oral health has also been associated with adverse pregnancy outcomes, respiratory disease, cardiovascular disease, cancer and diabetes [3]. Growing evidence reveals a potential bidirectional relationship between periodontal disease and several systemic diseases [4]. Notably, American workers lose more than 164 million hours of work annually due to dental disease or dental visits alone, and children lose approximately 51 million hours of school due to dental-related illnesses [1].

Knowledge of Oral Health among Nursing Professionals

While tooth decay is a highly preventable disease, uneven and limited access to oral health care and dental coverage, as well as inadequate oral health literacy among the U.S. population, contribute to the persistence of poor oral health. Significantly, the lack of attention to oral health by many non-dental health care professionals who remain unaware of the risk factors and preventive approaches for many oral diseases, or who have not been educated or trained in providing basic oral health care further compounds the problem. Clemmens and Kerr noted that "oral health has not been a high nursing priority in the past" and urged the profession to "Increase nursing's awareness, knowledge, and skill about the significance that oral health holds" [6]. Even so, the training of nurses in oral health and hygiene remains highly variable and inadequate [3]. Advanced practice registered nurses (APRNs), have been identified as having an important role to play in oral health care as well as overall health care, particularly in primary care settings [7]. Until recently, APRN education has lacked a defined oral health curriculum with a set of oral health clinical competencies [8-10].

There is limited research examining nurses' and more specifically, APRNs' knowledge, and practice behavior regarding oral health care. Fellona and DeVore surveyed nurses at U.S. primary care nursing centers regarding oral health screening, education and referral services [11]. While nearly half (49%) of the respondents reported screening patients for gum infections or oral lesions, patient education was lacking. Only 20 percent taught patients about oral cancer self-examination, 19 percent taught about the effects of xerostomia and 38 percent educated patients about the benefits of fluoride. Moreover, nearly a third reported a lack of patient referral for treatment for conditions such as dental decay, gum infections, missing teeth, oral lesions, oral pain or oral trauma.

In a more recent investigation, Ward and colleagues (2010) surveyed 200 primary medical care providers to determine their practice behaviors, attitudes, opinions, and knowledge regarding the link between periodontal disease and systemic disease. Among the 137 respondents, 123 of whom were nurse practitioners (NPs), only 22 percent reported routine screening patients for periodontal disease. Significantly, when the providers possessed a positive attitude regarding previous training on this matter, they were significantly more likely to screen patients for periodontal disease; however, considerable variance among respondents' knowledge regarding the link between periodontal disease and systemic disease existed. In addition, if a practitioner believed oral health care screening for periodontal disease was within the defined scope of practice and specific oral health screening protocols were available the likelihood of screening for periodontal disease increased. While approximately 86 percent of respondents thought there was a relationship between oral and systemic inflammatory markers and that treatment for

***Corresponding author:** Eileen K Fry-Bowers, PhD, JD, RN, CPNP, Associate Professor, Hahn School of Nursing and Health Science, University of San Diego, 5998 Alcala Park, HSN 216, San Diego, CA 92110, Tel: 619-260-2964/951-323-2356, E-mail: efrybowers@sandiego.edu; efrybowers@gmail.com

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periodontal disease or diabetes had a positive impact on both diseases, 69 percent of individuals incorrectly believed that diabetes caused periodontal disease or periodontal disease caused diabetes. Conversely, 94 percent of individuals recognized the value of treating periodontal disease in the reduction of cardiovascular events [12].

Similarly, Wooten and team assessed oral health knowledge, opinions and clinical practice behaviors among NPs and certified nurse midwives (CNMs) who provided prenatal care services in North Carolina. Only 32 percent of those surveyed reported providing dental screenings as part of prenatal services, and while the majority of respondents answered basic oral health questions correctly, only 41 percent reported receiving training to provide an oral health exam. Further, when asked to report the single most important reason for not providing an oral health exam, 20 percent indicated that it was the responsibility of dental professionals [13]. Finally, in the single study examining physician assistant (PA) and NP perspectives and self-perceived levels of skill in performing a set of oral health competencies, fewer than half of the respondents felt competence in this area [14].

While educational efforts now exist to prepare APRNs (the focus of this study), with competencies to prioritize evidence-based oral healthcare across the life span in a variety of settings [8], much remains unknown about current APRN workforce perspectives or practices on this matter. An improved understanding of what APRNs currently know about oral health and the provision of oral health care can guide the development and implementation of basic and continuing education oral health curriculum and competencies, and encourage collaboration between APRNs and dental health professionals. Therefore, the purposes of this study were as follows:

1. To describe APRNs' knowledge regarding the relationship between a patient's oral health and overall health status and well-being;

2. To assess perceptions of practices used by APRNs in the provision of oral health care to their patients; and

3. To examine APRNs' views regarding the integration of oral health into practice and health care services.

Methods

This descriptive cross-sectional study used a postal survey between February and April 2015 to assess APRNs' knowledge, perceptions and practices regarding oral health. The study sample of 1,400 Advanced Practice Registered Nurses (APRNs) was randomly selected from a publicly available database of licensed APRNs, (NPs and Clinical Nurse Specialists (CNS)), in the state of California, which was provided by the California Department of Consumer Affairs. A cover letter informed the APRNs that the survey was confidential. Only the research team had access to individual responses. Completion of the survey and return via postage paid envelope of the survey constituted consent to participate. As an incentive, APRNs who participated were eligible to enter a drawing for a touch screen tablet or one of 10 gift cards to an on-line retailer worth $25.00 each. An appropriate university-based Institutional Review Board (IRB) reviewed and deemed this study exempt.

Survey Instrument

The APRNs' knowledge and perceptions of oral health care were assessed using a 47-item questionnaire created by the investigators specifically for this study, which was based upon existing oral health literature. Five nursing and pharmacy researchers assessed the tool for content and face validity. Specifically, 34 of the items on the survey measured APRNs' knowledge and opinions regarding the influence of oral health on overall patient health and well-being along with the APRNs self-reported practices integrating oral health into patient care. Twenty-six of these items were measured using a bipolar Likert response scale anchored by 1 = strongly disagree and 5 = strongly agree; 3 = Neutral (see table 1 and table 2). The remaining six (6) knowledge items were measured on a true/false/don't know scale. Twelve items captured demographic and practice characteristics. Finally, a comment section gave the participants an opportunity to provide any additional information regarding the relationship between oral and overall health.

Table 1: Nurses' opinions on oral health.

Item (n = 288)	Mean (SD)	Disagree/ Strongly disagree N (%)	Neutral N (%)	Agree/ Strongly agree N (%)
a. Oral health is often regarded as less important than other health needs of patients.	3.71 (1.03)	48 (16.7)	21 (7.3)	219 (76.0)
f. Dental cavities and periodontal diseases are generally thought of as infections by physicians (n = 289).	3.13 (1.12)	103 (35.6)	62 (21.5)	124 (42.9)
c. Dental cavities and periodontal disease are generally thought of as infections by APRNs (n = 289).	3.25 (1.08)	83 (28.7)	63 (21.8)	143 (49.5)
d. Little time is devoted to oral health topics in nursing education.	4.03 (0.95)	28 (9.7)	29 (10.1)	231 (80.2)
e. The dental discipline remains relatively segregated from other healthcare disciplines (n = 289).	4.10 (0.84)	21 (7.3)	22 (7.6)	246 (85.1)
f. The separation of dental and other primary health care disciplines has grown overtime.	3.57 (3.90)	60 (20.8)	119 (41.3)	109 (37.9)
g. Many doctors regard oral health as an important component of overall medical care.	3.21 (0.96)	77 (26.7)	87 (30.2)	124 (43.1)
h. I generally regard oral health as an important component of overall medical care.	4.28 (0.76)	7 (2.5)	26 (9.0)	255 (88.5)
i. I always warn patients that their oral health can be compromised by certain medications.	3.29 (1.11)	84 (29.2)	66 (22.9)	138 (47.9)
j. Many immunosuppressive drugs are prescribed for people with dental conditions that can result in serious septicemias (n = 287).	3.55 (0.81)	18 (6.3)	127 (44.3)	142 (49.5)
k. I have adequate knowledge of the interaction between oral health and treatment/ management of many diseases (n = 289).	2.80 (1.04)	141 (42.6)	61 (21.1)	87 (30.1)
a. Dentists rarely consider the medical ramifications of the oral health care they provide (n = 286).	2.64 (0.93)	141 (49.3)	93 (32.5)	52 (18.2)
b. Many medications are prescribed without consideration of their oral health ramifications (n = 289).	3.79 (0.80)	27 (9.3)	46 (15.9)	216 (74.7)
c. The drug labels of most drugs that can have xerostomic (dry mouth) effects do not contain information on their potential impacts on oral health (n = 289).	3.82 (0.79)	21 (7.3)	57 (19.8)	210 (72.7)
d. The inadvertent prescribing of medicines that can have xerostomic effects without considering oral health implications is a major problem.	3.82 (2.38)	16 (5.6)	91 (31.6)	181 (62.8)
e. Patients taking medicines that can have xerostomic effects are adequately informed about the importance of maintaining dental health while taking the medications.	2.43 (0.92)	187 (64.9)	59 (20.5)	42 (14.6)
f. APRNs prescribing immunosuppressive and cytotoxic pharmaceuticals infrequently inquire about a patient's dental status.	3.10 (0.87)	66 (22.9)	135 (46.9)	87 (30.2)
g. APRNs prescribing immunosuppressive and cytotoxic pharmaceuticals rarely advise patients about the importance of maintaining dental health while taking the medications.	2.97 (0.86)	83 (28.8)	132 (45.8)	73 (25.3)

Table 2: APRNs' opinions.

Item (n = 288)	Mean (SD)	Disagree/Strongly disagree N (%)	Neutral N (%)	Agree/ Strongly agree N (%)
a. Oral health should be more closely regarded as an important component of overall medical care.	4.54 (0.56)	4 (1.4)	-	284 (98.6)
b. Dentistry should be identified as a medical sub-specialty (n = 287).	3.98 (0.88)	15 (5.2)	60 (20.9)	212 (73.9)
c. Drug labels need to clarify that the most common dental diseases are infections (n = 286).	4.46 (4.32)	6 (2.1)	54 (18.9)	224 (78.3)
d. Medicare should cover medically essential dental care/services.	4.70 (0.56)	2 (0.7)	6 (2.1)	280 (97.2)
e. Medicaid should cover medically essential dental care/services (n = 286).	4.70 (0.55)	1 (0.3)	10 (3.5)	275 (96.2)
f. Drug labels should be modified as necessary to improve patients' understanding of the relationship between oral disease and risk of medical complications.	4.48 (0.60)	2 (0.7)	9 (3.1)	277 (96.2)
g. There is a need for more inter-professional care by primary care providers in managing the oral and overall health concerns of patients (n = 287).	4.68 (3.04)	3 (1.0)	6 (2.1)	278 (96.9)
h. There is need for improved integration of dentistry with other primary health care services (n = 287).	4.51 (0.65)	3 (1.1)	11 (3.8)	273(95.1)

Table 3: Demographic characteristics of APRNs.

APRN responses (n)	Mean	(SD)
Age, n = 279	55.3	Range 27-77 yrs
Number of years practicing as APRN, n = 284	14.7	- 10.9
Number of years in nursing total, n = 284	24.7	- 13
Hours of practice per week at primary site of employment	31.9	- 13.1
	n	**%**
Gender, n = 286		
Female	265	92.5
Male	21	7.3
Race / Ethnicity, n = 286		
African American/non-Hispanic black	15	5.2
American Indian/Alaska native	1	0.3
Asian American/Pacific islander	50	17.5
Caucasian/non-Hispanic white	181	63.3
Mexican American/Hispanic	23	8
Other	16	5.5
Professional certification, n = 257		
American association of critical-care nurses	8	3.1
American nurses credentialing center	146	56.8
National certification corporation	14	5.4
Pediatric nursing certification board	22	8.6
Other	67	26.1
Highest academic degree held, n = 286		
Bachelor of science (BS)	3	1
Bachelor of science in nursing (BSN)	11	3.8
Doctor of nursing practice (DNP)	13	4.5
Doctor of philosophy (phd)	16	5.6
Master of science (MS)	42	14.7
Master of science in nursing (MSN)	173	60.5
Post-master's certificate	26	9.1

Data Analysis

Analysis consisted of calculating descriptive statistics (e.g., means, standard deviations, and frequency counts) for all study variables. The analysis conducted used the Statistical Package for Social Sciences® (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0 Armonk, NY: IBM Corp.). We collapsed disagree and strongly disagree to disagree/strongly disagree as well as agree and strongly agree to agree/strongly agree.

Results

APRN responses (N = 289) were received, resulting in a response rate of nearly 21 percent. Study respondents were predominantly female (n = 265, 92.5%) and Caucasian/non-Hispanic white (n = 181, 63.3%) with an average age of 52.1 (SD = 12.5) years. Most identified as primary care NPs (n = 198, 68.5%) but acute care NPs (n = 39, 13.4%) and CNSs (n = 33, 11.3%) responded as well. Respondents worked in a number of settings including primary care practices (n = 107, 31.8%), specialty outpatient care (n = 51, 18.1%), acute care (n = 50, 17.7%) and community/public health settings (n = 32, 11.4%), with most of these located in an urban setting (n = 153, 54.3%). Finally, a majority of the respondents reported a Master of Science (MS) or Master of Science in Nursing (MSN) as their highest academic degree held (n = 215, 75.2%), were nationally certified (n = 257, 88.9%), and the average length of time practicing in APRN role was 14.7 years (SD 10.9) (Table 3). The demographic characteristics of APRNs (Table 3) provide specific details.

Oral Health and its Relationship to Health Status

An overwhelming majority of respondents acknowledged the truth of the statement, "poor dental health can compromise the ability of patients to achieve good medical outcomes" (n = 284, 98.6%) and understood that "the oral cavity and its functions can be adversely affected by many pharmaceuticals used in treating systemic conditions" (n = 260, 91.2%) (Table 4). Further, a vast majority also accepted as true that "the risk of medical complications from bacterial dental infections increases among individuals who are immunocompromised by diseases or medications" (n = 283, 98.6%; table 4).

In response to the statement, "dental cavities and periodontal diseases are infections," approximately 19 percent either disagreed (n = 27, 9.4%) or answered "don't know" (n = 27, 9.4%). Moreover, one fifth of respondents answered "don't know" about whether the "use of many pharmaceuticals among individuals with oral infections poses an increased risk of medical complications" (n = 59, 20.5%; table 4). Less than half either agreed/strongly agreed that use of immunosuppressive drugs in patients with dental disease can result in serious septicemia (n = 142, 49.5%; table 1).

Notably, nearly half disagreed/strongly disagreed (n = 141, 48.8%) with the statement "I have adequate knowledge of interaction between oral health and treatment/management of many diseases" and most agreed/strongly agreed that "Little time is devoted to oral health topics in nursing education" (n = 231, 80.2%; table 3).

Practices Regarding Oral Health

Less than half of APRNs acknowledged that they always notified patients that their oral health could be compromised by the use of certain medications (n = 138, 47.9%). More specifically, only about a quarter of APRNs advised patients about the importance of maintaining dental health while taking immunosuppressive or cytotoxic medications (n = 73, 25.4%) and less than 15 percent (n = 42, 14.6%) agreed that patients taking medications with xerostomic (dry mouth) effects were adequately informed about the consequences for oral health (Table 1). Notably, approximately three-quarters of the respondents agreed/strongly agreed (n = 216, 74.7%) that many medications were prescribed without consideration of their impact on oral health and the majority (n = 181, 62.8%) concurred that

Table 4: APRNs knowledge of oral health issues.

Item (n = 288)	True N (%)	False N (%)	Don't know N (%)
a. The use of many pharmaceuticals among individuals with oral infections poses an increased risk of medical complications.	221 (76.7)	8 (2.8)	59 (20.5)
b. Most Americans receive basic dental care that they need.	18 (6.3)	254 (88.1)	16 (5.6)
b. The risk of medical complications from bacterial dental infections increases among individuals who are immunocompromised by diseases or medications (n = 287).	283 (98.6)	3 (1.0)	1 (0.3)
c. Dental cavities and periodontal diseases are infections (n = 286).	232 (81.1)	27 (9.4)	27 (9.4)
d. The oral cavity and its functions can be adversely affected by many pharmaceuticals used in treating systemic conditions (n = 285).	260 (91.2)	4 (1.4)	21 (7.4)
e. Poor dental health can compromise the ability of patients to achieve good medical outcomes.	284 (98.6)	-	4 (1.4)

prescribing medications without such consideration constituted a major problem. Finally, most respondents agreed/strongly agreed that the information labels of most drugs that have xerostomic effects contain inadequate information regarding the potential impact on oral health (n = 210, 72.7%; table 1).

Integrating Oral Health Care into Practice

Most respondents recognized a need to more closely regard oral health care as a component of overall medical care (n = 284, 98.7%) (Table 2). In addition, they supported the need for increased inter-professional care for managing the oral and overall health concerns of patients (n = 278, 96.5%). With regard to specific activities, they agreed/strongly agreed (n = 277, 96.2%) that pharmaceutical information labels should be modified to improve patients' understanding of the relationship between oral disease and the risk of medical complications associated with medication use. Finally, a majority of respondents agreed/strongly agreed that government-sponsored health insurance (e.g., Medicare (n = 280, 97.2%), Medicaid (n = 275, 96.2%) should cover medically essential dental care/services (Table 2).

Discussion

Improving oral health is an important population health goal and although some gains have been made over the last decade in response to various initiatives, poor oral health persists among many populations and periodontal disease continues to be associated with many systemic conditions [15]. While most of our California APRN (CA APRNs) respondents acknowledge the existence of relationships between oral health, systemic diseases and overall well-being, substantial numbers of these health care providers continue to have a limited understanding of risk factors and preventive approaches for many oral diseases. Compared to the findings of others [12,13] the findings of this study revealed CA APRNs strongly recognize the link between oral health and systemic health. However, as in previous studies [11,13], CA APRNs indicated lack of knowledge and skills on oral health care. This is most evident with regard to the prescribing of pharmaceutical agents, where many APRNs indicated that lack of knowledge and provider practice regarding patient education compromised patient's oral health, which has important implications for the large number of patients, prescribed these medications.

Nearly 70 percent of Americans take at least one prescription drug, more than half (51.6%) take two, and over one fifth (21.2%) receive prescriptions for 5 or more medications [16]. Hundreds of these prescriptions, as well as over-the-counter medications, across drug classes cause or exacerbate xerostomia, including antihypertensives, antidepressants, analgesics, antipsychotics, tranquilizers, diuretics, and antihistamines [17]. Xerostomia results in cracked lips, split skin at the corners of the mouth, difficulty eating and swallowing dry foods, altered salivary pH, increased plaque, tooth decay and gum disease. In addition, certain prescription drugs such as phenytoin, cyclosporine and various calcium channel blockers cause gingival overgrowth and inflammation. Many medications have immunosuppressive effects, which predispose patients to dental infections or exacerbate existing infections [1].

In addition, the respondents of this study also recognized a need for drug information labels to be modified to clarify the relationship between side effects such as xerostomia and oral health. The safe prescribing and use of medications with possible oral health complications depends on the quality, breadth and clarity of medication information that APRN professionals and patients receive [18]. In absence of, or in order to supplement education by APRN providers, many patients rely on the information provided by pharmaceutical manufacturers [19]. Shortcomings in drug labels, such as a failure to clarify that dental caries and periodontal diseases are bacterial infections, which can be exacerbated by a drug's side effects, can contribute to unsafe use of medications and result in potentially avoidable complications.

Another important finding revealed in this study is that while these APRNs clearly acknowledged the role of oral health in overall health status, many do not feel well prepared to manage oral health and systemic disease processes concomitantly. Notably, a large majority of APRNs indicated oral health topics were not adequately addressed in nursing education. Respondents agreed that there is a significant need for improved interprofessional collaboration to integrate oral health into overall health care. These results are consistent with the findings of others [4,7] and suggest that while there is indeed a concerted national effort to "put the mouth back in the head" [7], gaps in education and training persist. In addition, few studies document the extent to which current oral health-related educational goals are being achieved; however, showing great promise is the Oral Health Nursing Education and Practice (OHNEP) program (http://www.ohnep.org). This is a national initiative aimed at preparing a nursing workforce with competencies to "prioritize oral disease prevention and health promotion, provide oral evidence-based oral healthcare in a variety of settings, and collaborate in interprofessional teams across the healthcare system" [5]. In addition, the National Network for Oral Health Access (NNOHA) has implemented interprofessional oral health core clinical competencies (IPOHCCCs) in three health centers across the country with the goal of using a sustainable-systems approach to integrate oral health and primary care through interprofessional collaborative practice (http://www.nnoha.org/resources/clinical-excellence/integrate-care/). The development and evaluation of additional curriculum innovations in oral health professional education remains and efforts that demonstrate an ability to improve access to appropriate oral health care should be rapidly scaled and spread.

Limitations

Although we randomly selected potential participants, our final sample consisted of individuals licensed in California who were willing to complete the survey. Given a response rate of approximately 20 percent, those APRNs who decided to participate may be particularly sensitive to the issue of oral health, which reduces the generalizability of our findings. In addition, given the small numbers for each category of APRN and practice specialty, we were unable to make any comparisons or infer information with regard to knowledge and perceptions of practice between respondents. However, even with

these limitations, the study reinforced the need to make changes in APRN education and practice along with interpersonal initiative to address oral health needs in this country.

Conclusion

Oral health is integral to and inseparable from one's overall health. In fact, mounting evidence reveals a potential bidirectional relationship between periodontal disease and several systemic diseases [3]. In addition, oral diseases remain prevalent across the country, and vulnerable and underserved populations, including poor children, racial and ethnic minorities, and older adults are at a higher risk [15]. Oral health care problems need to be recognized and actions taken. Routine health screenings and care a priority, yet many APRNs feel ill equipped to meet a patient's oral health needs. Increased oral health education in basic and advanced practice nursing programs, as well as more attention to interprofessional collaboration regarding oral health, could assist APRNs in the acquisition of oral health competencies. Finally, interprofessional education and practice teams need to conduct outcomes research to evaluate these educational strategies to ensure that the additional knowledge, skills, and actions translate into improved oral health for all populations a priority focus.

Author Contributions

Dr. Fry-Bowers and Dr. Gavaza both conceived of and developed the research project. Dr. Gavaza developed the instrument and coordinated data collection. Both authors analyzed the data. Dr. Fry-Bowers wrote the initial draft of the manuscript and both authors revised the manuscript for final submission.

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