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ORIGINAL RESEARCH

Interprofessional Oral Health Collaboration: A Survey of Knowledge and Practice Behaviors of Hospital-Based Primary Care Medical Providers in New York City

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Background: The siloed delivery of oral and medical health care in the United States has contributed to a lack of awareness of the consequences of poor oral health and has hampered effective interprofessional education and collaboration. The aim of this study was to assess the knowledge and practice behaviors of primary care medical providers in an urban safety-net hospital regarding collaboration with dentists and integration of oral health into overall health-care delivery.

Methods: A 36-item survey was designed in a web-based platform (Survey Monkey®) and electronically distributed in September 2020 to 181 primary care medical providers (physicians, nurses, physician assistants) within a municipal hospital in the Bronx, New York. The questionnaire included sections on demographics, current practices, oral health knowledge, and opinions regarding interprofessional collaboration. Descriptive statistics and bivariate analyses using the chi-square and Fisher's exact test were performed with a significance level of 0.05.

Results: The response rate was 66% (119 respondents). The vast majority (80%) reported little or no training in oral health and 85% reported no team experience with oral health professionals. Medical providers' confidence in examining the oral cavity was positively associated with previous additional training ($p = 0.001$) and with team experience ($p = 0.005$). The two most commonly reported barriers to willingness to collaborate were lack of formal relationships with dental providers (74%) and competing priorities (69%).

Conclusion: Overall, there is very limited awareness and integration of oral health into the clinical practice of medical providers at this safety-net hospital. However, those providers with previous training and team experience had greater oral health confidence. Given the critical importance of oral health to overall health, increased efforts should be directed to further educate and train medical providers and address barriers to interprofessional care.

Keywords: health promotion, interprofessional relations, oral health, oral health care, primary health care

Background

The historic separation of medical and dental professional education in the United States (US), apparent in the siloed delivery of oral and medical health care and services, has contributed to a lack of awareness of the consequences of poor oral health and has hampered effective interprofessional education (IPE) and collaboration.[1–4] This compartmentalization of care processes has also resulted in poorer overall health outcomes and higher costs for patients.[5] Those who bear the

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greatest burden of disease are vulnerable populations (ie, low-income individuals, ethnic minorities, immigrants, and individuals with disabilities) who may have low oral health literacy and limited access to care.[6,7]

There is a robust and growing body of evidence that oral health is a critical component of overall health and that poor oral health may lead to negative health outcomes including the exacerbation of chronic inflammatory diseases and conditions such as diabetes, cardiovascular disease, and pulmonary disease.[8–12] The US Surgeon General's landmark report, Oral Health in America, reminded educators and practitioners of the fundamental fact that oral diseases and disorders present a systemic burden and that health-care providers should be "ready, willing, and able to work in collaboration to provide optimal health care for their patients."[13] Yet more than 20 years since that seminal report, and despite growing awareness of oral-systemic relationships, there is still little oral health content on non-dental professional websites and slow adoption of interprofessional practices by medical providers.[14,15]

In recent years, many initiatives have been advanced in order to break down this fragmented structure and broaden interprofessional competencies in order to achieve the "triple aim" of improved patient experience of care, improved health of populations, and reduced costs.[16–19] It has been demonstrated that IPE advances collaborative practice, reduces medical errors, and enhances health outcomes of patients and populations.[20–24] The Association of American Medical Colleges (AAMC) advocated for oral health education for medical students and now expects medical students to demonstrate competence in multiple domains within oral health, such as understanding the caries and periodontal disease process and its implications for systemic health, performing oral health screenings, promoting preventive strategies, and collaborating with dental professionals.[25]

The National Call to Action to Promote Oral Health called for revamping health professions education to include oral health content as a key step towards eliminating oral health disparities.[26] National organizations including the Liaison Committee on Medical Education, the Interprofessional Education Collaborative, the World Health Organization, and the American Association of Medical Colleges have established requirements and standards for IPE which are assessed on all United States Medical Licensing Examinations.[25,27–29]

In response to two Institute of Medicine reports (Advancing Oral Health in America and Improving Access to Oral Health Care for Vulnerable and Underserved Populations) the Health Resources and Services Administration (HRSA) developed the Integration of Oral Health and Primary Care Practice (IOHPCP) initiative to expand the oral health clinical competency of primary care clinicians and to integrate oral health and primary care practice.[1,30,31] The HRSA's grants for pre- and post-doctoral dental and primary care medical training programs include a focus on enhancing training to support integration of oral health within the broader health-care delivery system and new models of training for integrated oral health and medicine or primary care. Nevertheless, in settings where both medical and dental providers work together, such as many large hospital systems in the US, there is a gap in our understanding of the significant barriers that continue to exist which hamper cooperation and integration efforts.[32]

The aim of this study was to assess the knowledge and practice behaviors of primary care medical providers regarding oral health and interprofessional collaboration at New York City Health+Hospitals/Jacobi Medical Center, a large safety-net hospital in the Bronx, New York with an embedded dental department. This hospital, one of eleven in the largest municipal hospital system in the US, serves a largely immigrant and underserved population. This study aimed to better understand the barriers that exist in this setting in order to increase awareness of the importance of oral health and to develop programs to enhance referrals and collaboration among the medical and dental services.

Methods

Study Design

This project involved the development and administration of an anonymous cross-sectional survey instrument to primary care physicians, nurses, and physician assistants at Jacobi Medical Center to examine their knowledge and practice behaviors regarding oral health and interprofessional collaboration and referral. The use of an electronic survey allowed us to have a quantitative method for collecting information from a pool of respondents with minimal time and cost. Jacobi Medical Center is part of the New York City Health + Hospitals network which is the largest public municipal health-care system in the United States and treats the largest proportions of Medicaid and

uninsured populations. The mission of Jacobi Medical Center is to serve the Bronx community by providing high-quality, cost-effective health care in a respectful way to all, regardless of income, gender identity, immigration status or ability to pay. The Jacobi Department of Dentistry is affiliated and co-located with the neighboring Albert Einstein College of Medicine in the Bronx, New York.

Participants and Recruitment

Attending physicians, internal medicine residents, nurses, and physician assistants from the primary care medical departments at Jacobi Medical Center were recruited by email for participation in the survey tool. The survey participants represented the providers potentially most amenable to IPE and collaboration with the Department of Dentistry as well as those where there were no established interprofessional referral programs.

An email link to the survey using the Survey Monkey® online software was sent to the Chair of the Department of Internal Medicine and Women's Health for distribution to their attending physicians, residents, nurses, and physician assistants. The email described the purpose of the study, the amount of time needed to complete the survey, and assurances of participant anonymity. Participation in the survey was voluntary. Time for completion of the survey was estimated as 10 minutes. The survey was distributed to 181 individuals in September 2020. Each respondent was only able to complete the survey once. There was no incentive for participants and completion of the survey implied consent.

Survey Instrument

The 36-item survey instrument was developed by trained research team members in the Department of Dentistry and included four sections on demographics, current practices, oral health knowledge, and opinions regarding interprofessional collaboration. The survey tool was piloted by four senior internal medicine physicians and four senior dental attendings. Face and content validity analyses were performed before dissemination. The demographics section included five questions which assessed respondents' individual sociodemographic information including age, sex, current role (attending, resident, nurse), medical specialty, and years of professional experience. The second section included 13 questions regarding current practices, oral health confidence, and opinions regarding interprofessional collaboration. The oral health knowledge section included 10 questions based on the Society of Teachers of Family Medicine's (STFM) Smiles for Life program.[33,34] The final section included eight questions which assessed participants' opinions and attitudes towards IPE and collaboration. Survey questions were formulated to prompt either multiple choice or 5-point Likert-scale responses ("1 = always" to "5 = never").

Data was collected in the secure Survey Monkey® platform and stored on a password-protected computer. No subject identifiers were stored. A four-week timeframe was allotted for return of the completed survey. Reminders were sent to the recipients at the end of weeks one, two, and three to encourage completion of the survey.

Statistical Analysis

Completed survey data was collected by the end of week four and exported to an Excel spreadsheet (Microsoft Corporation, Seattle, WA) and converted into a SPSS-formatted dataset (SPSS Windows version 26, Cary, NC). Descriptive statistics showing distributions of individual characteristics were performed for the survey participants overall and according to provider confidence in oral health assessment. To assess the relationship between categorical variables, the Chi-square and Fisher's exact tests were used at a 5% level of significance. The study was reviewed by the Albert Einstein College of Medicine Institutional Review Board (IRB) and was deemed exempt (#2020-12521).

Results

One hundred nineteen (119) medical providers completed the survey (66% response rate). Characteristics of study participants overall and by oral health confidence are shown in Table 1. The majority of respondents were physicians (71%), ages 25–34 (56%), and female (69%). The vast majority (80%) reported a little or no training in oral health and 85% reported no team experience with oral health professionals. Approximately one-third (35%) had not been to the dentist themselves in over a year. Medical providers' confidence in examining the oral cavity (assessed by responding to the question "How confident are you in examining the oral cavity?") was significantly associated with previous additional training ($p = 0.001$) and having had team experience ($p = 0.005$).

Current practices of medical providers, shown in Figure 1, indicate that 69% rarely or never examine a patient's oral cavity, 93% rarely or never assess a patient's fluoride intake, 83% rarely or never perform an oral cancer screening, and 64% rarely or never inquire

Table 1 Characteristics of Medical Providers Overall and by Oral Health Confidence, N = 119*

	Overall	Oral Health Confidence		
		High	Low	
	N (%)	N (%)	N (%)	p-value
Age (years)				
25–34	62 (55.9)	3 (2.7)	59 (53.2)	0.13
35–44	23 (20.7)	3 (2.7)	20 (18.0)	
45+	26 (23.4)	0 (0)	26 (23.4)	
Sex				
Male	34 (28.6)	3 (2.7)	28 (25.0)	0.44
Female	82 (68.9)	3 (2.7)	75 (67.0)	
No Response	3 (2.5)	0 (0)	3 (2.7)	
Role				
Physician	85 (71.4)	5 (4.5)	77 (68.8)	0.57
Other**	34 (28.6)	1 (0.9)	29 (25.9)	
Professional Experience (years)				
1–5	65 (54.6)	3 (2.7)	57 (51.4)	0.12
6–10	24 (20.2)	3 (2.7)	20 (18.0)	
11+	30 (25.2)	0 (0)	28 (25.2)	
Oral Health Training				
Extensive/A lot	11 (9.8)	5 (4.5)	6 (5.4)	0.001
Moderate	12 (10.7)	0 (0)	12 (10.7)	
A little	51 (45.5)	1 (0.9)	50 (44.6)	
None	38 (33.9)	0 (0)	38 (33.9)	
Oral Health Team Experience				
Yes	16 (15.2)	4 (3.8)	12 (11.4)	0.001
No	89 (84.8)	2 (1.9)	87 (82.9)	
Last dental exam				
<1 year	71 (65.1)	6 (5.5)	65 (59.6)	0.18
1–5 years	28 (25.7)	0 (0)	28 (25.7)	
>5/never	10 (9.2)	0 (0)	10 (9.2)	

Notes: *Frequencies within each variable may not add up to 119 due to sporadic missing data. **Nurse practitioner, Physician assistant.

about a patient's dental health. The mean score on the seven oral health knowledge questions, as shown in Table 2, was 64% with range from a high of 94% correct responses regarding knowledge of the systemic complications of oral infection to a low of 40% correct responses regarding knowledge of common sites for oral cancer. The three most prevalent major barriers to interprofessional collaboration, as shown in Table 3, were the lack of formal relationship between medical and dental professionals (74%), competing priorities (69%), and lack of electronic health record interoperability (48%).

Discussion

To our knowledge, this is the first study to assess the knowledge and practice behaviors of primary care providers at a large safety-net municipal hospital regarding oral health knowledge and clinical practice. Our results suggest that the majority of medical providers lacked oral health training, lacked oral health team experience, and had poor confidence in their own oral health skills. This is supported by studies demonstrating lack of confidence in performing oral health examinations by physicians as well as inconsistent oral health training in professional school.[35,36] Notably, however, the more training and team experience that medical providers had the higher their oral health confidence. However, they were deficient in clinical oral health practice behaviors, interprofessional integration, and referral to dentists.

Our findings are supported by other studies in the US that have shown that oral health knowledge improves incorporation of oral health examination into medical care as well as referral to dental providers.[34,37–40] Studies outside of the US (Malaysia, Australia, India, and Ethiopia) have also demonstrated inadequate oral health knowledge among health-care providers and a call for improvement in their training and skills.[41–43] With renewed emphasis on the impact of poor oral health on general health, oral health prevention services (ie, fluoride varnish, caries risk assessment, and anticipatory guidance) and referrals from primary care physicians in obstetrics/gynecology and chronic disease services are rising.[19] Furthermore, case studies in the US, such as "Into the Mouths of Babes," in which medical providers deliver preventive oral health-care services, have demonstrated that integration of medical and dental care increased access to and coordination of patient care.[44] Yet with the increased understanding that health and health care require a team-based approach in order to address patients' needs, this study highlights the persistent barriers that exist with regard to education, training, and workflow to promote collaboration among medical and dental professionals.

Strengths of this study include the high response rate among primary care medical providers within this hospital system. An additional strength of this study is the focus on adults, not children, as a majority of research on IPE and collaboration has focused on the pediatric population since in the US they, and not adults, have essential dental benefits. This is also the first study, to our knowledge, to examine the barriers to interprofessional collaboration

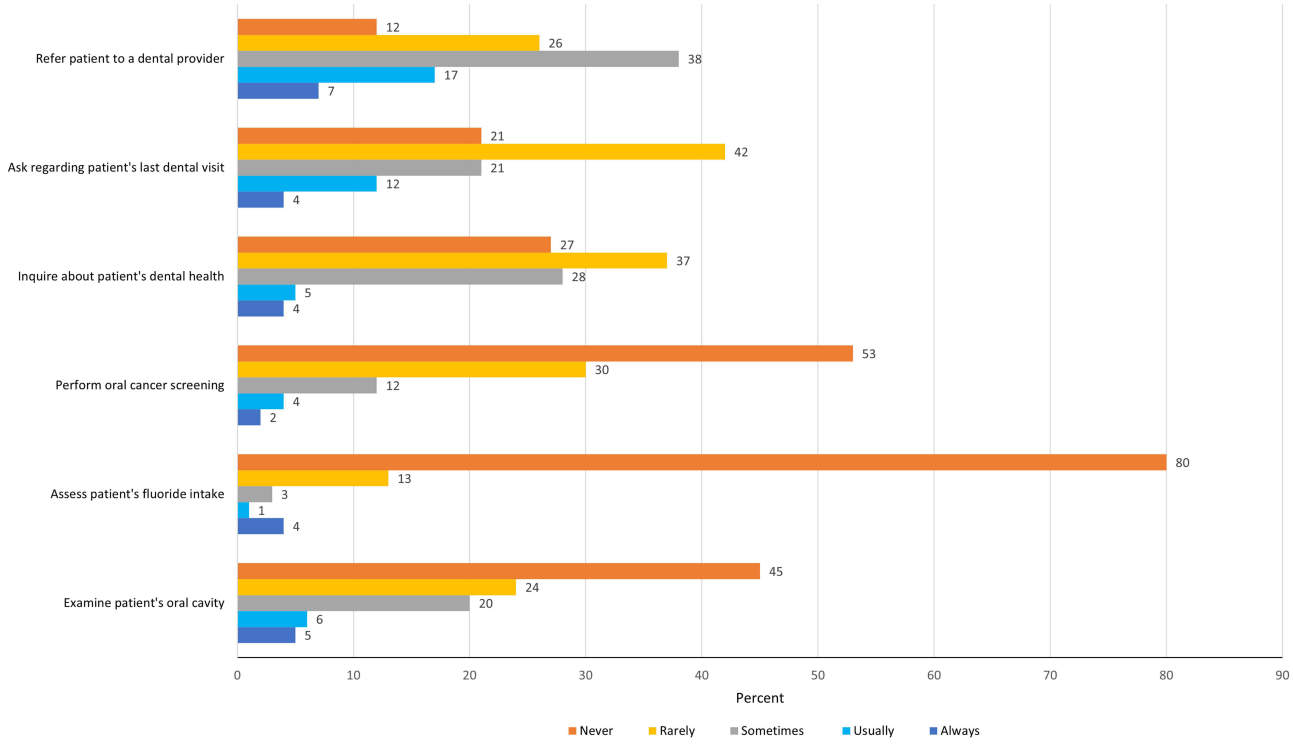

Figure 1 Current practices of survey participants, N = 119.

that exist at a large municipal safety-net hospital located in the county with the poorest overall health ranking in the entire state of New York.[45] Other strengths are the unique co-location of both medical and dental services in this study (less than one percent of dentists currently work in a hospital setting).[46] Limitations of this study include lack of generalizability of the findings as this was a single-site study as well as lack of construct validity of the survey instrument. In addition, the low sample sizes for nurses and physician assistants prevented us from more detailed analyses by role.

The results of this study suggest that increased oral health education of medical providers and improved bidirectional communication between medical providers and oral health-care team members is urgently needed. The present study found that only 54% of survey responders were aware of the common pathway between periodontal disease and diabetes, and only 42% were aware of medications that were associated with xerostomia. It is concerning that compared to an earlier analysis of oral health curricula in US residency programs, a recent program update found that less oral health is being taught.[35,47] For a hospital that serves a vulnerable patient population with multiple chronic conditions (ie, diabetes mellitus, obesity, cardiovascular disease, and HIV), such as in this study, this collaboration has even greater significance as

Table 2 Survey Responses to Oral Health Knowledge Questions, N = 119

Knowledge of:	Frequency (% Answered Correctly)
Systemic complications of oral infection	112/119 (94)
Medications linked to gingival hyperplasia	92/119 (77)
Common complications of xerostomia	92/119 (77)
Distinction between periodontal disease and gingivitis	79/119 (66)
Periodontal disease and diabetes common pathway	64/119 (54)
Medications associated with decreased salivary flow	50/119 (42)
Most common site for oral cancer	48/119 (40)
Average score = 64%	

Table 3 Barriers to Interprofessional Collaboration, N=119

Barriers	Frequency (%)
Lack of formal relationship between medical and dental providers	88/119 (74)
Competing priorities, such as time per visit	82/119 (69)
Lack of medical and dental electronic health record interoperability	57/119 (48)
Insurance/payment issues	39/119 (33)
Scope of practice issues	34/119 (29)
Lack of interest from medical providers	31/119 (26)
Lack of interest from dental providers	19/119 (16)
Lack of follow-up/monitoring	12 (119) 10

well as greater potential to address the impact of oral health on overall health.

Based on the results of this study, we have begun on-site educational seminars for medical providers regarding oral health, instruction in caries risk assessment and fluoride varnish, and have embedded dental residents in medical clinics to teach and train medical colleagues. In addition, in the dental clinic, we are providing evidence-based practices, such as chairside HbA1c screening in the dental clinic to screen for prediabetes with referral back to primary care for follow-up.[48] Other pilot studies include elective rotations for our medical students at the hospital's dental clinic as well as online didactic courses in oral health.

In addition to education and training of medical providers, we are investing in systems to integrate electronic health records and communication. Although our electronic health records are currently not integrated, we are currently under contract with a software vendor to establish an interoperable electronic health record by the end of 2022. Integration of oral health into primary care promises not only to improve patient experiences and outcomes but also to decrease costs through improved prevention and early treatment. Future studies will examine the impact and effectiveness of these improved models of integration of oral health into primary care practices, as well as patient acceptance of oral health screening as part of a medical examination.

Conclusions

The understanding that oral health is critical to overall health has led to a call for increased IPE and training of medical providers in oral disease and prevention. This study, at a municipal hospital in New York City, suggests that medical providers lack oral health training and team experience and additionally have poor confidence in their own oral health skills. Given the critical importance of oral health to overall health, and the increasing focus and requirements for oral health education and integration by national and international medical organizations, these findings support increased efforts to educate and train medical providers in order to guide and advance interprofessional collaboration and patient-centered care.

Abbreviations

US, United States; IPE, Interprofessional Education; AAMC, Association of American Medical Colleges; HRSA, Health Resources and Services Administration; IOHPCP, Oral Health and Primary Care Practice; STFM, Society of Teachers of Family Medicine; IRB, Institutional Review Board.

Data Sharing Statement

The dataset used and analyzed during this study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

All responders read a statement in the introduction to the survey instrument that declared "By completing the survey, you are consenting to participate in this study." This study was approved by the Institutional Review Board (IRB) of the Albert Einstein College of Medicine, Bronx, New York, US. The IRB number is 2020-12521.

Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the

version to be published; and agreed to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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