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A Competency Matrix for Global Oral Health

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Abstract: The Lancet Commission on Education of Health Professionals for the 21st Century calls for enhancing health education for the needs and challenges of the 21st century to improve health status globally. To complement the Lancet report, this article makes recommendations for including core global health competencies in the education of health care professionals and specific groups of the public who are relevant to oral health in a global context in order to tackle the burden of oral diseases. Experts from various professional backgrounds developed global oral health competencies for four target groups: Group 1 was defined as dental students, residents/trainee specialists (or equivalent), and dentists; Group 2 was community health workers, dental hygienists, and dental therapists (or the equivalent); Group 3 was health professionals such as physicians, physician assistants, nurses, nurse practitioners, and pharmacists; and Group 4 was non-health professionals in the public arena such as parents, teachers, decision makers, key opinion leaders, and health and consumer advocates. Key competencies for members of each of the four target groups are presented in a matrix. The suggested competency matrix shows that many other health professions and groups in society have potentially crucial roles in the prevention, control, and management of oral diseases globally. Workforce models including a wider range of professionals working together as a team will be needed to tackle the burden of oral diseases in an integrated way in the broader context of non-communicable diseases. Further discussion and research should be conducted to validate or improve the competencies proposed here with regard to their relevance, appropriateness, and completeness.

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The Lancet Commission on Education of Health Professionals for the 21st Century set out a bold vision for adequately equipping health education for the needs and challenges of the 21st century, with the goal of alleviating the vast disparities in health status globally.[1] The key strategies of significantly increasing the number and scope of the health care workforce, as well as enhancing quality and standardizing the level of training, cannot be emphasized enough. These strategies include the acquisition of competencies responsive to local needs but connected globally. In this context, a recent World Health Organization (WHO) report on transforming health professions education calls for "health professionals who are globally competent and locally relevant."[2]

Though the Lancet Commission's report does not explicitly mention oral health professionals, most of the conclusions also apply to the global oral health workforce. The striking yet neglected burden of untreated oral diseases in low- and middle-income countries and among disadvantaged populations worldwide calls for significant changes in the way oral diseases are addressed by health services globally.[3,4] There are many cost-effective and evidence-based interventions to prevent, control, and manage oral diseases, on both the population and the patient levels. In most regions of the world, however, access to prevention and oral health care is limited due to insufficient numbers of skilled oral health professionals, aggravated by low political prioritization and generally poor awareness of oral diseases and their global impact.[5,6]

Emerging international attention to the growing burden of chronic, non-communicable diseases (NCDs) presents an opportunity to address the

neglect of global oral health through integration of oral diseases and oral health care in NCD activities that will strengthen health systems, reduce common risk factors, and address determinants of health.[7,8] In this context, we recognize the critical importance of interprofessional collaboration in global health efforts, whereby oral health professionals have roles to play in overall health and, likewise, non-oral health personnel can contribute to oral health. As a consequence, it will be important to enable other health professionals, as well as specific groups of the public, to support oral health personnel by playing important roles in basic oral health care, oral health promotion, and prevention of oral and craniofacial diseases worldwide.

This is the rationale for expanding on the work of the Lancet Commission through including global oral health and by highlighting areas for interprofessional collaboration, in order to improve general health through better oral health. This article suggests preliminary recommendations for core competencies in education of health care professionals and specific groups of the public that are relevant to oral health in a global context. This effort was initiated by the Global Oral Health Interest Group of the Consortium of Universities for Global Health (GOHIG-CUGH), which recognized the lack of a consensus on global oral health competencies as a major gap in education of health professionals. The aim of our collaboration was to propose preliminary recommendations focussing on global oral health education and related competencies as a starting point for further discussion and research that may enhance national programs for dental education, education of other health professionals, and oral health-related education of specific groups of the public. The competencies presented here may also contribute to integrating the global oral health workforce into the mainstream of health workforce discussions as well as to expanding oral health competencies to non-oral health professionals. This article therefore aims at initiating further exchange, research, and validation among educators, health planners, health professionals, and political decision makers.

Methods

Between November 2011 and August 2013, a group of experts in dental education, research, public health, and clinical practice explored the competencies that are required of diverse groups who play, or could play, important roles in the promotion and provision of global oral health interventions and the control of oral and craniofacial diseases. The experts mainly consisted of interested members of the GOHIG-CUGH. In order to ensure input from other professional groups, experienced colleagues from within and outside of the CUGH network in medicine, nursing, pharmacy, and interprofessional education were involved (all participating experts are listed in the acknowledgments). The criteria for involved experts included interest, relevant experience, and availability.

First, the target groups were divided into four categories. Due to the huge variation in defining health professions among and even within countries, the categories were not selected on the basis of rigid definitions, but rather on a generic consensus about their current and potential role in the provision of oral health services. Group 1 was defined as dental students, residents/trainee specialists (or equivalent), and dentists; Group 2 was dental hygienists, dental therapists, and community health workers (or equivalent); Group 3 was health professionals such as physicians, physician assistants, nurses, nurse practitioners, and pharmacists; and Group 4 was non-health professionals in the public arena such as parents, teachers, decision makers, key opinion leaders, and health and consumer advocates.

Expert working groups were formed, each of them responsible for working on the potential competencies for one of the target groups. The group work and consultations were conducted mostly remotely via the Internet due to the geographical spread of participating experts, but also included three face-to-face meetings. The four working groups prepared a first draft matrix of competencies for each of the target groups, taking into account existing competency frameworks and other available information. The resulting competencies list was circulated for consultation and comment among the other groups as well as selected professionals in health professions education.

In a further consolidation process within and between the working groups, a final matrix for global oral health competencies was prepared. All competencies were then rated by all working groups according to their relevance for their respective target groups by using a simple three-level rating system (not relevant/partially relevant/highly relevant) based on consensus of the experts involved.

Results

The developed matrix presents competencies in three main domains: knowledge, skills and abilities, and supporting competencies. The competency areas are also subdivided (Table 1). To group the competencies in this way, it was necessary to simplify and consolidate them and to reduce overlap among the domains. All competencies are ideally intended to be relevant and applicable internationally, which posed challenges for some working groups since the definitions, training, and scope of practice of some health professions vary significantly among countries. Additionally, the competencies are meant to facilitate interdisciplinary education and patient care by highlighting the skills and knowledge of the various groups and the relevance of oral disease to overall health.

Our proposed competency matrix is shown in Table 2 and provides full details of all competencies. The participants also rated the competencies according to their relevance for the four target groups. While many competencies listed are more or less relevant for all groups to a varying degree, others are suited more specifically to certain groups.

Group 1: Dental Students, Residents, and Dentists

The preliminary competencies suggested for this group are directly relevant to global oral health, including the skills needed to work in, conduct research on, and advocate for oral health, particularly in resource-limited settings. The general aspects related to clinical dentistry are not included as it was assumed that those aspects are regulated by national accreditation bodies and licensing agencies. The recommendations for oral health professionals focus on expanding their existing competencies, acquired during professional education and training, by adding those competencies that may not have been included but are important in a global health context as well as in providing interdisciplinary team-based care. The working group felt that there were no significant differences among dental students, residents, and dentists with regard to competencies in global oral health; rather, these competencies generally apply to all trainees and practitioners in dentistry.

Table 1. Competency matrix domains for global oral health

Number	Domain
1.	**Knowledge**
1.1.	Oral health and oral diseases
1.2.	Risk factors and determinants
2.	**Skills and abilities**
2.1.	Disease prevention and health promotion
2.2.	Disease management
2.3.	Advocacy
2.4.	Research, monitoring, and evaluation
3.	**Supporting competencies and principles**
3.1.	Interprofessional/intersectoral competencies
3.2.	Cultural and social competencies
3.3.	Professional ethics

Group 2: Community Health Workers, Dental Hygienists, and Dental Therapists

A literature review to explore global standards for training, licensing, and practicing non-dentist oral health professionals revealed a wide range among the different countries: dental assistants, dental nurses, dental aides, dental therapists, dental hygienists, public health hygienists, community health workers, and many more.[9-13] Some job titles were unique to particular countries; others could be found internationally, but the responsibilities varied. This was compounded by varying legal requirements for licensure and education found in over 200 jurisdictions.

However, the literature review showed that although there were many labels for non-dentist oral health providers, they could be grouped by their level of preventive, therapeutic, and interventional skills. This resulted in a continuum of skills that increase when moving from one professional category or competency set to the next. The continuum represents everything from basic preventive services integrated with primary health care to highly complex interdisciplinary interventions, allowing oral health services to permeate all levels of care from the community or school-based clinic to quaternary medical centers. All levels would be coordinated, and the providers would function as a team, each at the top of his or her skill set according to the local educational and licensure standards.

Table 2. Global oral health competency matrix with ratings of relevance for each group (1=not relevant, 2=partially relevant, 3=highly relevant)

Domains and Competencies			Rating			
Groups			1	2	3	4
1. Knowledge	**1.1.**	**Oral diseases**				
	1.1.1.	Explain the global burden of oral diseases with regard to prevalence, distribution, and the relationship among oral disease, population trends, and global disease patterns.	3	2	3	2
	1.1.2.	Understand the essential facts about the etiology of main oral conditions and their symptoms and signs.	3	3	3	2
	1.1.3.	Describe the impact of oral diseases on well-being and quality of life, as well as its social and economic impact.	3	3	3	2
	1.1.4.	Identify and assess relevant oral health information and make sound decisions (oral health literacy).	3	3	3	2
	1.2	**Risk factors and (social) determinants**				
	1.2.1.	Identify and describe common risk factors of oral diseases.	3	3	3	2
	1.2.2.	Identify and describe common (social) determinants of oral diseases.	3	3	3	2
	1.2.3.	Identify and describe reciprocal links among oral diseases, systemic diseases, and general health.	3	3	3	2
2. Skills and abilities	**2.1.**	**Disease prevention and health promotion**				
	2.1.1.	Conduct an assessment to define oral health needs of the population.	3	3	3	3
	2.1.2.	Understand and apply health promotion and risk reduction strategies (such as healthy eating, cessation of tobacco, and reduction of harmful alcohol use).	3	3	3	3
	2.1.3.	Promote general oral hygiene knowledge and skills, including toothbrushing twice a day with fluoride toothpaste and cleaning between the teeth.	3	3	3	2
	2.1.4.	Promote and apply other appropriate fluoride interventions.	3	3	3	2
	2.1.5.	Identify patient populations at increased risk for oral diseases and ensure regular attendance through oral health professionals.	3	3	3	2
	2.1.6.	Promote essential oral health knowledge and skills for expectant mothers and parents to enable appropriate self-care and care for their children.	3	3	3	2
	2.1.7.	Educate, counsel, recognize, and act on the links between oral health/disease and systemic health/disease.	3	2	3	2
	2.2.	**Disease management**				
	2.2.1.	Understand the burden and distribution of oral and associated diseases in specific community and country.	3	3	3	3
	2.2.2.	Understand and be familiar with the health care system in the community/country.	3	3	3	3
	2.2.3.	Identify barriers to access and use of health and oral health services (e.g., affordability, lack of insurance or providers, cultural and geographic issues); facilitate solutions to overcome them.	2	2	3	3
	2.3.	**Advocacy**				
	2.3.1.	Advocate for relevant strategies to prevent and reduce risk factors based on an advocacy strategy to identify, mobilize, and connect relevant stakeholders/actors.	3	2	3	3
	2.3.2.	Identify and advocate to address specific oral health needs and reduce inequities and health care system deficits.	3	1	2	3
	2.3.3.	Understand and utilize political processes as well as roles/functions of national/international stakeholders (e.g., use global and national policy frameworks to guide local action).	3	1	2	3
	2.3.4.	Translate research data into meaningful information tailored for communication and advocacy with specific target audiences.	3	1	2	3
	2.4.	**Research, monitoring, and evaluation**				
	2.4.1.	Identify and assess the range of global oral health research questions.	3	1	3	1
	2.4.2.	Be able to design effective and appropriate survey tools/data collection methods.	2	2	2	1
	2.4.3.	Collect, evaluate, translate, and disseminate data.	3	2	2	1
	2.4.4.	Monitor and evaluate actions taken to ensure transparency, effectiveness, and impact.	2	1	2	1

3. Supporting competencies and principles	**3.1.**	**Interprofessional/intersectoral approach**				
	3.1.1.	Demonstrate an interdisciplinary, team-oriented, integrated, and multilevel approach to patient-centered health and oral health care.	3	3	3	2
	3.1.2.	Recognize the different roles and responsibilities of medical and non-medical professionals in oral health promotion, disease prevention, and, if applicable, treatment, care, and referral.	3	3	3	2
	3.1.3.	Recognize the areas of specialization in medicine and dentistry.	3	3	3	2
	3.2.	**Cultural and social competence**				
	3.2.1.	Demonstrate ethically and culturally competent actions, and show awareness and respect in community settings, customs, differences in values, opinions, and practices, cultural norms, and medical cultures (local perceptions of oral health care, attitudes toward dental health, oral care, and seeking professional care).	3	3	3	3
	3.2.2.	Demonstrate responsive and respectful communication with patients and families, within the oral health team, and with other health professions colleagues.	3	3	3	3
	3.2.3.	Identify, evaluate, and use culturally relevant media and technology.	3	3	3	1
	3.3.	**Professional ethics**				
	3.3.1.	Demonstrate professionalism, providing service delivery according to appropriate level of training and ability and representing the profession of dentistry in a responsible manner.	3	3	3	1
	3.3.2.	Demonstrate leadership in providing information, education, and planning for oral health to non-dental professionals and community members.	3	2	2	2

Note: Group 1 was dental students, residents/trainee specialists (or equivalent), and dentists; Group 2 was community health workers, dental hygienists, and dental therapists (or the equivalent); Group 3 was health professionals such as physicians, physician assistants, nurses, nurse practitioners, and pharmacists; and Group 4 was non-health professionals in the public arena such as parents, teachers, decision makers, key opinion leaders, and health and consumer advocates.

To facilitate the integration of oral health care in primary health care, the WHO developed a "Basic Package of Oral Care" (BPOC).[14] This framework is simple, requires minimal training, and can be applied in many diverse situations including resource-poor settings lacking electricity and running water. It includes atraumatic restorative therapy (ART), oral urgent treatment (OUT), and affordable fluoride toothpaste (AFT).

The working group adopted this approach as a starting point and foundation for the described continuum of competencies (Table 3) but added two levels (the dental hygienist and the dental therapist), labelling them BPOC+ and BPOC++, respectively. The continuum adds skills at each step, which increase up to the level of the dental therapist. Each successive level usually includes the skills and knowledge of the previous level.

Again, it is recognized that these particular professional classifications may not exist in every country and that professional classifications and skill sets are subject to local licensure and educational requirements, as well as local health care systems. The working group chose these examples to represent competency steps on a continuum that might serve as a platform for interprofessional and international exchange about incorporating oral health into health systems planning.

Group 3: General Health Professionals

This group covers a wide range of non-oral health professionals such as physicians, physician assistants, pharmacists, nurses, and nurse practitioners, who may be confronted with oral conditions in their work settings. Their level of contribution to oral disease prevention and control depends largely on their training and skills, notably to address basic emergencies. Their required competencies do not differ much from those of Group 2, and the list of clinical competencies in Table 4 is very similar to the basic competency level outlined for Group 2 (see Table 3). Every health provider should have basic competence in promoting oral health and in recognizing oral disease so that he or she may reduce common risk factors for oral diseases and NCDs and improve overall health in individuals and communities.[15,16]

Table 3. Competencies for community health workers (CHWs), dental hygienists, and dental therapists with relevance rating for each group (1=not relevant, 2=partially relevant, 3=highly relevant)

Competency	CHWs BPOC	Dental Hygienists BPOC+	Dental Therapists BPOC++
1. Know and understand infection control procedures and universal precautions.	3	3	3
2. Understand and maintain client patient confidentiality.	3	3	3
3. Obtain and record health history and measure vital signs.	3	3	3
4. Provide dental screening and evaluation.	3	3	3
5. Apply caries-preventive agents such as fluorides and pit and fissure sealants.	3	3	3
6. Coordinate community oral hygiene prevention programs.	3	3	3
7. Examine the structures of the head and neck both extra- and intraorally.	2	3	3
8. Examine gingival tissues including measurement of periodontal pockets, recession, and other signs of periodontal disease.	1	3	3
9. Record and/or chart dental caries and suspicious soft tissue lesions for referral for diagnosis and treatment by an appropriate care provider.	3	3	3
10. Expose, develop, and interpret dental radiographs/images by identifying dental caries and suspicious radiopacities or radiolucencies.	1	3	3
11. Formulate a dental hygiene treatment plan.	1	3	2
12. Provide dental prophylaxis treatment including scaling and root planing and polishing.	1	3	2
13. Apply antimicrobial or desensitizing agents and topical anesthesia if applicable.	1	3	3
14. Provide local anesthesia by infiltration injection.	1	3	3
15. Perform simple permanent and temporary restorations.	1	1	3
16. Remove sutures.	1	3	3
17. Provide emergency dental care, and prescribe antibiotics and appropriate analgesic medications.	2	3	3
18. Coordinate oral health care with CHW, dental hygienist, and dentist.	3	3	3
19. Provide local anesthesia by block injection.	1	1	3
20. Perform a spectrum of restorative dentistry including atraumatic restorative procedures.	1	2	3
21. Perform simple, uncomplicated oral surgical and endodontic procedures.	1	1	3
22. Fabricate removable complete or partial dentures.	1	1	3
23. Refer to other medical or dental workforce providers as indicated for treatment of the hard or soft oral tissues.	3	3	3

Note: "BPOC" refers to the WHO-developed Basic Package of Oral Care for integration into primary health care. BPOC+ and BPOC++ refer to skills and knowledge added to the BPOC for dental hygienists and dental therapists.

Table 4. Essential clinical oral health skills for general health professionals (Group 3)

1. Demonstrate basic knowledge of dental anatomy.
2. Conduct a basic oral health history including signs and symptoms of common oral diseases.
3. Assess risk factors for oral diseases (e.g., smoking, tobacco/alcohol use, HPV, nutrition, sports, drugs, medical therapies, other diseases).
4. Perform a basic extraoral/intraoral screening exam for pathology.
5. Recognize other health issues presenting in the orofacial region, including domestic violence/child abuse, bleeding disorders, Sjögren's syndrome, leukemia, candidiasis, and oral aspects of HIV/AIDS.
6. Manage common dental emergencies such as pain, swelling, bleeding, infection, and trauma and arrange for appropriate referral if required.
7. Apply fluoride varnish for prevention of dental caries; communicate risks, benefits, and indications.
8. Provide general oral hygiene knowledge and skills, including toothbrushing twice a day with fluoride toothpaste and daily cleaning between teeth.

Group 4: Non-Health Professionals in Public Arena

The term "public" includes a range of highly diverse groups with different constituencies, roles, and agendas. It was decided to focus on specific groups of the public: those who can potentially contribute significantly to global oral health. This priority resulted in three subgroups. First is parents and teachers, who are important role models, teaching

children relevant hygiene skills that last a lifetime, creating social norms, and providing a healthy and safe environment. Health and consumer advocates made up the second subgroup. As consumers become more and more aware of and articulate about their needs and exposed risks and increasingly want to have a say, they need to be literate in health issues. Health and consumer advocates are crucial to mobilize and educate consumers and to act as important civil society voices who can put pressure on decision makers. The third subgroup is key opinion leaders and decision makers. By raising awareness and understanding of oral health, decision makers have the power to tackle the neglect of oral health in policies and interventions. All of these subgroups can positively influence the promotion of oral health and the prevention of oral diseases in their area of work and life. This is particularly relevant as the high burden of oral diseases cannot be tackled by isolated, vertical approaches (targeting a specific disease at a time) and through the oral health workforce alone (without intersectoral collaboration).

The core competencies for this group are integrated into the last column of Table 2. They focus on recognition of oral disease, the ability for effective self- and family care, and actions in the immediate environment of communities. Advocacy is an important area of activity for this group, as it represents civil society in the larger sense. Possible areas for engagement and intervention include, but are not limited to, transformation of schools to healthy places; supporting healthy workplace programs; advocating for availability of affordable and appropriate fluorides; facilitating adoption of a healthy diet and reduction of sugar consumption; promotion of injury prevention and safety measures; enacting smoking restrictions in public spaces; lobbying for inclusion of oral health into all areas of policy at all levels; and advocating for comprehensive regulation and quality control for oral and other health care settings, including infection control.

Discussion

Defining competencies is a complex undertaking, particularly when doing so for diverse target groups. Therefore, we sought to reduce the complexity of the resulting matrix in order to facilitate the practical application of the competencies, rather than aiming for a highly comprehensive and detailed set of competencies.

Furthermore, effort was made to reach out to non-dental professionals and public audiences, all in the spirit of horizontal integration (strengthening health systems and general health services to prevent, control, and treat all diseases, including oral conditions) and interprofessional collaboration, which will be increasingly required in the context of integrating oral diseases and other NCDs.[7,17] We noted that many countries train cadres of different types of health professionals together, thereby supporting the concept of a continuum of competencies and a team-based approach to delivery of care.

Our proposed preliminary competency matrix highlights very clearly that prevention, control, and management of oral diseases globally are tasks not limited to the oral health workforce; instead, many professions and groups in society have crucial roles to play. This recognition coincides with renewed international discussions about task-shifting and delegation of interventions that are traditionally provided by a dentist. In view of the global shortage of oral health professionals and dentists in particular, it will be inevitable to develop workforce models that include a wider range of professionals working together as a team. The growing need to integrate oral health care into primary health care will require an evolution of the traditional roles and competencies of dentists and related oral health professionals in the context of pragmatic, innovative solutions.[18-20] We hope that oral health professionals and their organizations will fully engage in a global discussion about the importance of an interdisciplinary, team-based health workforce of the 21st century. Such a workforce will ensure that the unmet oral health needs of millions of people around the world can be addressed through skilled and motivated professionals delivering high-quality oral health services and thus improved health status.

This study had a few limitations that should be noted. The competencies are only preliminary and exploratory in nature as they have not been field tested or validated. The involved experts and members of the public were not representative of the various groups active in global health work, but rather a convenience sample of interested persons involved in the CUGH and their respective networks. As such, they represent a joint opinion of an expert group and do not aim at representativeness in any way. Against the backdrop of these limitations, we suggest further and more representative research and validation in order to refine the proposed set of preliminary global oral health competencies, so that their relevance, appropriateness, and completeness

become stronger and thus more viable for application in educational and other settings.

Conclusion

The proposed competency matrix shows that, along with oral health professionals, many other health professions and groups in society have potentially crucial roles in the prevention, control, and management of oral diseases globally. Workforce models including a wider range of professionals working together as a team will be needed to tackle the burden of oral diseases in an integrated way in the broader context of NCDs. Due to the exploratory and preliminary nature of this matrix of competencies, we call for further discussion among experts representing relevant disciplines to elaborate and develop competencies for global oral health to enhance education of health care professionals and specific groups of the public so that the burden of oral diseases can be addressed more effectively.

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