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# Residency Education in Oral and Maxillofacial Surgery: A New Curriculum Framework



Leon A. Assael, DMD<sup>a,b,c,\*</sup>

## KEYWORDS

- Education • Oral and maxillofacial surgery • The quadruple aim • Core competencies • Milestones • Workforce

## KEY POINTS

- The Oral Health in America Report of the National Institutes of Health and actions of the American Council on Graduate Medical Education are recrafting a new framework for structuring and adapting oral and maxillofacial surgery (OMS) programs.
- Advances in surgical technology, the public use (and misuse) of formerly arcane and sequestered medical information, and social media's acceleration toward the Metaverse are a few of the trends that will transform OMS surgical education.
- Essential understanding of oral diseases and observations made in primary care medical settings, taught in part in the academic medical setting by OMS, can substantially bridge the medical/dental divide in health.
- Achieving the quadruple aim in OMS practice: improving the patient care experience, improved population health outcomes, cost efficiency in health care, with a good health care team experience is a concept that must be initiated and promulgated in our residency programs.

Although residents, program directors, and faculty may consider oral and maxillofacial surgery (OMS) residencies as stable and unfettered bastions, every program now exists in an environment of transformation unlike anything in the past in the United States. Changes in American society accelerated by the COVID-19 pandemic are impacting health-care education and demanding a comprehensive understanding and response in our programs and standards.

Profound changes in higher education in the United States are now impacting surgical education, dental education, medical education, and the university education. Due to its position in the hospital as a certificate program, OMS residency education has remained somewhat insulated from the brunt of these changes, until now. Changes in the medical school curriculum are requiring a considered and substantial response

in the construct of MD integrated programs. OMS curriculum and the structure and function of residency programs will soon transform to accommodate this environment and, perhaps, to benefit from it. The affiliated universities and their dental schools are in a new landscape of financial responsibility and societal relevance. The accreditation standards of the Commission on Dental Accreditation (CODA) are as well being influenced by the US Department of Education and the political landscape to reflect this changing environment.

Advances in surgical technology, the public use (and misuse) of formerly arcane and sequestered medical information, and social media's acceleration toward the Metaverse are a few of the trends that will transform OMS surgical education. Multiple users of medical information: the public, payers, lawyers, business leaders, social media

<sup>a</sup> Department of Restorative and Preventive Dentistry, University of California San Francisco; <sup>b</sup> University of Minnesota; <sup>c</sup> Oral and Maxillofacial Surgery, Oregon Health & Science University

\* 8150 Northeast Hidden Cove Road, Bainbridge Island, WA 98110.

E-mail addresses: [leonassael@gmail.com](mailto:leonassael@gmail.com); [leon.assael@ucsf.edu](mailto:leon.assael@ucsf.edu)

influencers, decision makers, surgeons, faculty, staff, and so forth are all accessing the same informatics/social media environment creating currents that effect care and surgical education in, as yet, unimaginable ways.

These changes in the characteristics of the US public, the demands of patient care, the altered epidemiology of OMS diseases, and the perceived public need for care are evolving in ways that do not match the current structure of clinical education in OMS. The purpose of this article is to consider some of those major transformations and how OMS residencies might react to them and thereby improve OMS education.

### **ORAL HEALTH IN AMERICA: IMPLICATIONS FOR ORAL AND MAXILLOFACIAL SURGERY EDUCATION**

The NIDCR has influenced our understanding of trends in oral diseases with the publication of *Oral Health in America: Advances and Challenges*, a 20-year follow-up on the surgeon's general report on oral health.<sup>1</sup> The report describes how a greater understanding of the oral microbiome has given a detailed analysis of the pathogenesis, prevention, and treatment of the 3 major oral diseases: caries, periodontal disease, and oral cancer. It describes the need for oral health education to integrate its programs and workforce into an interprofessional practice setting, along with a common electronic health record, and integrated medical/dental practice models. The report indicates the inexorable role that oral health must play in advancing health in America.

The implications of this report for OMS education are enormous. This begins with an understanding that OMS residencies stand as the single greatest oral health education resource to further the aims of this report. Currently, OMS departments in academic health centers advance the goals of this report, with its integrated dental/medical education model, its essential role in trauma and oncology care, and educational programs that are comfortable as an integrated component of graduate health sciences education. In addition, OMS residencies have the opportunity to further their role as educational resources to medical surgical residencies and medical schools, most importantly in those medical specialties that have the greatest impact on health: primary care, pediatrics, and behavioral health. Essential understanding of oral diseases and observations made in primary care medical settings, taught in part in the academic medical setting by OMS, can substantially bridge the medical/dental divide in health.<sup>2</sup>

The report indicates that in the United States, gains in oral health have advanced, then stalled. Gains have been due to advances in the understanding of the pathogenesis, and subsequent treatment of major oral diseases. As examples, minimally invasive caries management, remineralization, as well as therapy altering the microbiome are substantially reducing tooth loss with further gains to come. However, further advancement of technology and workforce are *not* the current principal barriers to achieving further gains in oral health.

Oral health disparities now produce most oral disease and untreated/inadequately treated disease among all causes. Oral health is now achieved due mostly to overcoming social and economic factors, not technological or biological factors. Simply, oral health disparities are due mainly to the financial barriers to achieving oral health. These barriers are produced, importantly, not only by individual finances but also by public policy decisions such as the exclusion of dental services in Medicare, cultural barriers, and family structure barriers. To consider the impact of these societal changes, address the issue of elective third molar removal, which depends strongly on a patient with private dental insurance who use those services. Today a greater number of Americans than ever, including a greater number of minorities have private medical and dental insurance.<sup>3</sup> Yet there has been a continuous decline in utilization of oral health care services in adults since the Great Recession.<sup>4</sup> Although the impact of these factors exists in all aspects of health care, it is greatest in oral health. Vujicic and colleagues, at the American Dental Association Center for Health Policy has documented that dental care presents the single greatest financial barrier to patients among all health services.<sup>5</sup>

Although OMS residencies cannot do more than accommodate to this environment of poor access to care, education in OMS must see itself as an essential asset in addressing oral health disparities and the other findings of the *Oral Health in America* National Institute of Dental and Craniofacial Research (NIDCR) report. Existing tools in clinical education and practice can be used to advance access to care. As a means to influence clinical practice, OMS residencies must respond by providing care that reduces the patient's financial burden in pursuit of improved patient outcomes (the Quadruple Aim). In addition, using the American Council on Graduate Medical Education (ACGME) core competencies for resident education for example, for "systems based practice" can be a means of teaching and practicing improved health outcomes through navigation of

a complex system of health care delivery. By demonstrating the value of OMS care to the patient, the demand curve for OMS services will improve positively influencing patients and health-care system decisions. Although not an obvious contention, the OMS curriculum is a key tool in that effort.

## **A NEW FRAMEWORK FOR ORAL AND MAXILLOFACIAL SURGERY CURRICULUM**

### ***The Quadruple Aim***

Achieving the quadruple aim in OMS practice: improving the patient care experience, improved population health outcomes, cost efficiency in health care, with a good health care team experience is a concept that must be initiated and promulgated in our residency programs. In the didactic program, case conferences can be used to explore care options and assess outcomes based on the features of the quadruple aim. Departmental care audits that look at length of stay, operating room time, readmissions, complications, and other typical quality measures can examine progress in the quadruple aim as a multifactorial evaluation. Assessing the satisfaction with the care model of both patients and the care team (residents, faculty, and staff), using verifiable survey tools, can be used to improve according to program-specific quadruple aim benchmarks that can be initiated and evolved.<sup>6</sup> Simulation models using standardized cases can support understanding of the care team in making evidence-based decisions that support these goals.

As a simple example, a critical question in OMS residency training might be whether closed reduction and maxillomandibular fixation or open reduction with stable internal fixation is better treatment of a given mandible fracture. A quadruple aim-oriented case conference addressing this would consider which method provides a better patient experience with regard to pain, activities of daily living, patient safety, return to work, and so forth. Which method is better with regard to cost, length of stay, operating room time need for readmission/reoperation, and so forth? Which method can be provided in a variety of settings across populations that might require such treatment? What are the care team knowledge and skill needs for each method? Which method provides the safest and most satisfying team experience? The quadruple aims provide a useful framework to build quality and critically assess clinical care in OMS residencies. It can provide a lifelong framework for residents in clinical decision-making.

The quadruple aim can thus be considered as a framework for components of the didactic

program of OMS residencies. Components of the teaching program that are influenced by the quadruple aim include the following:

1. Improving the patient experience: Programs should review their teaching (in the clinical setting and with supporting didactics), of history taking, motivational interviewing, delivering difficult information to the patient, family dynamics in health care, cultural awareness, child life programs, step down services, discharge planning, rehab services, dietary counseling, smoking cessation, and pain control/opioid use. These curriculum components can all be framed around improving the patient experience and thereby producing more effective care outcomes.
2. Cost efficiency: Didactics in the economics of point of service care, ambulatory surgery, operating room efficiency, minimally invasive care, a balanced approach in assessing health outcomes, and evidence-based medical decisions are, in part, framed around the cost of care. Providing an understanding that clinical care decisions produce a cost/benefit to patients and health systems is a necessary analysis for OMS education. Understanding that all diagnostic and treatment plans whether for elective or urgent treatment depend on cost analysis is a difficult but essential lesson for trainees.
3. Population health: The robust team needed to care for oral cancer, craniofacial trauma, mass pandemics, craniofacial disorders, and oral facial pain among others must be taught in the context of community need. Where are such centers needed and how are they structured to respond effectively? How is OMS an essential component of population health in those teams? How do OMS surgical interventions positively influence communities and economies? Understanding population health trends will help direct educational content as in the examples of Human Papilloma Virus (HPV)-related head and neck cancer, use of antiosteoclastic drugs, or the opioid epidemic.
4. The health-care team experience: As an addition to the triple aim, health-care policy makers are finally recognizing that the health-care team is being adversely affected in today's complex health systems. Although the effects of the COVID 19 pandemic are obvious, demands in the logistics of health-care education such as the enormous human energy expenditure of the electronic health record, accreditation of hospitals and residencies, as well as the oversight of regulators have placed exceptional strain on the health-care team in the

years leading up to the pandemic. This has resulted in a steady increase in burnout, career change, and early retirement.<sup>7</sup> Resident faculty and staff wellness, avoiding burnout, alcohol and substance abuse, mental health resources, the exigencies of dealing in uncertainty and failure in clinical practice,<sup>8</sup> building a constructive and effective care team are components of didactics that can complement the other goals of the quadruple aim. Periodic department wide didactic conferences, including clinical, research, laboratory, and clerical staff can support clinical care improvements, whereas building a more effective team. Institution wide programs can further address these issues but only with the active participation of the OMS team.

### **ACGME Core Competencies**

The ACGME core competencies were developed to provide a framework for all graduate medical education programs to achieve their objectives both for the program and for individual residents. They recognize that there are common components to all physician education that must be achieved in creating a capable clinician. ACGME core competencies provide a checklist for the components of residency education that should be incorporated into all components of the educational program. To review, The American Council on Graduate Medical Education promulgated the core competencies for physician training in 1999. These are considered to be essential common components of all residency and fellowship programs and are in current use across more than 135 program types.<sup>9</sup> Unfortunately, these remain to be embraced in graduate dental education or by CODA accreditation of OMS programs.

Although the American Dental Education Association adopted competencies for the new general dentist in 2008 (including the domains of critical thinking, professionalism, communication and interpersonal skills, health promotion, practice management and informatics, and patient care), these are not sufficient to match the needs of our hospital-based, health systems integrated OMS residencies.<sup>10</sup> ACGME core competencies are a current essential need for OMS residency curriculum, program evaluation, and assessing the competencies of enrollees and graduates. Achievement of these competencies can be assessed through the acquisition of Milestones (competency based developmental outcomes: knowledge, skills, attitudes, and performance measures) that can be described throughout training from novice, to unsupervised practice.<sup>11</sup>

The 6 ACGME core-competencies and their relevance to OMS education are as follows:

1. *Practice based learning and improvement:* Dental students have scant experience with practice-based learning in that they are educated mostly in student-based clinics. For the first time in their education, OMS Post Graduate Year (PGY)1 residents become a part of a care team that must provide patient-centered, efficient, and effective care. Graduates of OMS programs must have achieved milestones that position them to lead such practices. To achieve this, the best-positioned OMS residencies are those that create ideal practice models, across the spectrum of societal and clinical need, and led by faculty clinicians with exceptional clinical and leadership capacity.
2. *Patient care and procedural skills:* OMS education remains strongly focused on the development of these skills but is just now coming to terms with how to measure them. A framework of entrusted professional activities (EPAs) is under consideration but is yet to be constructed in OMS. In orthopedics, a list of 285 EPAs were made and consolidated to 49.<sup>12</sup> These must now undergo peer review for validity and subsequently the development of milestones for achieving these EPAs. In pediatric medicine, the Pediatric Milestone Project is identifying and validating EPAs for the purpose of creating a framework useful for resident assessment, resident progression, appointment and privileging, program assessment, and accreditation.<sup>13</sup> Subsequently, development plus validation of the outcomes of the EPA and milestone program must be made for OMS. This is an enormous task for any specialty but it might provide the only reasonable pathway for truly assessing patient care and procedural skill.
3. *Systems based practice:* Understanding health payment systems, the organization of hospitals, practices, and other health-care delivery entities, the utilization of the electronic health record and global health systems are among the competencies needed in the OMS resident. Experiential learning in a health systems environment as well as incorporating as learners into OMS practice that are a part of health systems are means of gaining this core OMS competency. Because of its bridging of dental and medical/surgical health systems, this task is particularly vexing for OMS residencies. OMS residents need to improve their understanding of the health systems in which they reside.

Experiential activities with medical boards, quality improvement activities, operating room/ Emergency Department (ED) committees as well as didactic programs on the health system are needed to gain an understanding of the practitioner's role in health systems. Rotations in private and other community-based OMS practices should gain resident understanding of oral health systems as well.

4. *Medical knowledge*: The entire purpose of acquired clinical didactic knowledge is to support a decision affecting the care of a patient. Utilization of didactic knowledge in OMS has been transformed by Informatics, which relies on how the most valid relevant information is acquired and used in preference to how much information is retained. Creating a balance between what knowledge can be recounted by a resident and what can be acquired and used in a valid way in real time is a necessary challenge to support health-care decisions in clinical OMS practice. Knowledge must be sufficient to ask the right clinical questions but it remains an unreliable means of making clinical decisions. Residents must learn to continuously access contemporary knowledge in clinical practice and make evidence-based clinical care decisions using concurrent knowledge affected by their own clinical experience and the experiences of the care team.
5. *Interpersonal and communication skills*: Dental students do not obtain the extensive skills of medical students in patient interviews, history taking, and counseling. Residencies in OMS benefit from introduction to clinical medicine courses as well as medicine rotations to support communication skills. Communication in clinical OMS practice exists not only to obtain and relate information but also to positively influence behavior in patients, colleagues, and the clinical care team. Motivational interviewing, developed by Miller and Rollnick has had a strong contemporary influence on health science education. It is a means of providing a structured directed patient history/interview style that supports goals that improve health: support patient compliance, self-improvement, and patient satisfaction.<sup>14</sup> Communication should have a defined palette of expected outcomes. Operating suite communication, including subjects such as the "pause," surgical site confirmation, clear reciprocal communication of instructions between the surgeon and care team, and the "handoff" are skills that must be continuously practiced and taught.

6. *Professionalism*: Professionalism in our time is a rapidly evolving area and a markedly sensitive one: considering how society is wrestling in a very active way with race, gender, conflict of interest, dual commitment, meaning of consent, economic and social status, nationality, religion, financial responsibility, corporate relations, clinical research ethics, animal research ethics, corporate responsibility, multiculturalism, aggressive behaviors substance abuse, and morality among a panoply of domains that impact professionalism. Although these are currently buffeting all medical surgical training, OMS may be particularly in need of addressing professionalism in a contemporary manner. This is due to the small size of our programs, challenges in sustaining a diverse OMS environment, and the highly specialized role our programs play in medical surgical education. OMS residencies need to access all the programs and capacities of the institution's professionalism education and support programs through the Graduate Medical Education and Medical Staff offices among others. Joint programs across Graduate Medical Education (GME) residencies are needed to support professionalism in OMS programs.

### ***Evolving Clinical Education***

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Much of CODA clinical education requirements have remained relatively unchanged for decades. Advances in scope of practice for OMS is often occurring beyond the residency programs toward fellowships, most importantly in oncology, reconstruction, cosmetic surgery, trauma, and pediatric/craniofacial OMS. The volume of experience in core areas of OMS education is facing challenges. Needed additional training and ability in implant dentistry, orthognathic surgery, cosmetic surgery, and anesthesia among others have been mostly achieved via continuing medical education.

The requirements for clinical education are driven by CODA requirements and the perceived needs of the practicing community expressed through the American Association of Oral and Maxillofacial Surgeons (AAOMS) and American Board of Oral and Maxillofacial Surgery (ABOMS). This has resulted in challenges and skewing of clinical experiences in OMS programs. For example, ambulatory anesthesia education may not be well matched to the clinical need in our programs for clinical care. Although our CODA standards insist on a high need for pediatric anesthesia services for oral surgery, the need for children to have a general anesthetic for an ambulatory procedure has diminished sharply,

especially for very young children. This is due to the sharply diminished prevalence of early childhood caries as well as the higher restoration of primary teeth.<sup>15</sup> Programs are often left to complete the numerical requirement for pediatric cases by providing anesthesia services for non-OMS surgical procedures.

Clinical care in OMS programs and societal/practice needs are often ill matched. For example, although management of edentulism with surgical interventions remains a core requirement of dental education and OMS training in CODA standards, the prevalence of edentulism in the United States is decreasing from 19% in 1958–1959 to 4.9% today.<sup>16</sup> Based on demographic progression, edentulism will be 2.6% by 2050. With periodontal disease tooth loss 4 times higher in smokers, the continued decreased use of tobacco could drive edentulism yet lower.<sup>17</sup> How can the scope of practice and residency requirements evolve in this setting? As an example, with 97% of today's older Scandinavians already with functionally opposing dentition, the need turns toward maintaining dentition from effects of chronic degenerative diseases and the use of tooth replacement including implants having a more esthetic than functional advantage with regard to societal need has changed the approach to partial edentulism in that setting. A 70-year-old patient with abfraction, degenerative crown lengthening, and so forth in an environment where they would be expected to remain dentate all their life has different treatment planning indications than the patient of the past with failing teeth due to caries and periodontal disease. As safety net institutions, OMS residents are not often given access to older patients with need for esthetic implant reconstruction. Programs must consider individualized solutions to address deficits in clinical case exposure such as these.

To honestly advance clinical education, consideration should be given to discarding the myths regarding competency in the OMS graduate. Among these myths are the contention that *all* residents can or should be competent in all aspects of the specialty, or all aspects of the construct of residencies described above. It is better to believe that all residents will be capable of practicing surgery (with the literal definition of “practicing” intended). A broadly experienced, intelligent, inquisitive, dexterous, and committed new OMS is all that is needed to become a lifelong learner and better surgeon every year they are in practice.

### ***Adapting to the Changing University***

Of the 99 accredited US OMS programs, all but 17 civilian programs are sponsored directly by

American Universities.<sup>18</sup> These university programs have full-time faculty with university appointments with the full rights and responsibilities associated with university life. OMS residents, staff, and patients also function within the parameters of the university. In contrast, the 17 hospital-sponsored programs mostly have affiliation contracts for faculty in which they are granted full-time geographic appointment, whereas residents, staff, and patients remain the responsibility of the sponsoring hospital.

American universities are in crisis with virtually every aspect of their programs open for revision. They now consider themselves “too expensive, ineffective, and impractical” for today's students.<sup>19</sup> The cost and duration of programs/the value proposition of higher education, the role of faculty, requirements, degree structure, the budget, community engagement, and relevance of programs are in question.

The university environment of today is more intrusive than ever, although sometimes to good effect. Virtually every accreditation standard is governed by the university structure. Internal accreditations, regional accreditation, and university audits are influencing OMS programs today. The medical schools and dental schools are considered critical and, often, contributory components of the budget. Here are some examples, and their impact on programs:

Admissions to residency are subject to oversight regarding the diversity of applicants and enrollees in OMS. The impact of graduates on their communities and states, often scrutinized with objective data, is required. Especially public universities and their boards are vested in those who are being trained in OMS and what are their career paths.

The program culture in surgical residencies is under review. An emphasis on ensuring a humanistic environment for training is now densely entrenched in higher education. This includes the “Hidden Curriculum” in which the activities and career goals of residents is influenced by a subculture not consistent with that of the parent university.

Universities expect the incorporation of adult learning theory into the construct of programs. This includes items such as maintaining attendance records, using active learning methods such as the flipped classroom and experiential learning, objective and reproducible methods of resident assessment, counseling, and remediation.

A scholarly work product is expected of both faculty and residents. Being an academic resource for baccalaureate level programs and to

community colleges for clinical rotations, career planning, or research projects with faculty is often demanded.

As a resource, the university offers extensive opportunity for advancing the art of teaching and learning, for interprofessional education opportunities, and for liaisons with other academic units as diverse as business and fine arts.

The medical school remains the most important of all university units for OMS, and it is undergoing changes that require structural changes in both 4-year and 6-year programs. The main ones relate to the loss of basic medical science hours and advancement of clinical experiences into the first and second years of the curriculum. In addition, a greater focus on behavioral sciences, communication skills, and cultural awareness has taken many of the hours formerly devoted to Basic Medical Sciences (BMS). Adapting this into combined OMS MD programs is the critical challenge of many programs today.

### ***Adapting to a Changing Workforce and Practice Model***

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Physicians, dentists, and OMS are all more likely to be employed by a health system than ever before. Such systems are creating horizontally and vertically integrated delivery models. In medicine, horizontal integration has created large groups with members selecting those components of their practice based on the needs of the system and their individual needs. Vertical integration has created specialized team members in physician assistants, nurses, technicians, and administrators for oral health dental hygiene, dental assisting, and dental therapy. In the vertically integrated health setting where the physician is not the employer role of the doctor is no longer the autocratic head of the team but rather the chief facilitator, and not necessarily the most knowledgeable or technically capable team member.

### ***Adapting to Changing Technology***

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Exemplified by the acronym MAMAA (Microsoft, Apple, Meta/formerly Facebook Amazon and Alphabet/formerly Google), a changing technology has produced the largest economic, social, and technological entities on the planet. These offer great opportunities for surgical education that will continue to accelerate rapidly. Some examples for now seem destined to transform much of conventional education and practice in the near future, overtaking earlier change and forever altering OMS:

The Metaverse provides opportunity for advanced simulation in surgical practice so

realistic that the learner is globalized and may no longer be only OMS residents. Such cases of surgical simulation learning when developed may be sold as (nonfungible tokens, initially designed to sell artwork or music). Learners across continents can interact with faculty, including surgical experts to participate in virtual surgery. Such learning environments are not democratized but instead will come at considerable economic cost and value to users and generators of surgical education.

The democratized aspect of the Metaverse will be for education that has been commoditized such as anatomy, pathology, or biochemistry. The challenge to achieve clinical medical and dental education in the Metaverse will be overcome but likely at considerable cost. These Metaverse programs, if organized into a Massive Open Online Courses will reduce the unit cost of participating, globalizing, and level accessing to higher education and specifically for access into advanced training.

The concept of grades is being altered by the gamification of didactic and clinical learning in which there are not simply game winners and losers but a pathway for most learners to achieve milestones on the path toward competency. Instead of a grade, criterion-based assessments allow for every trainee to achieve and be recognized for each milestone.

Although the physical capabilities of surgical robotics are quite advanced, enhancement in next generation robots will be via artificial intelligence. A robot that can outperform a human surgeon must be able to outthink the surgeon as well. Defense systems, autonomous drones, and Tesla automobiles are among the systems developing such changes now. Surgery is not far behind.

### ***A New Program Structure: Learning and Practice Communities***

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The demands of residency education on program directors, faculty, and residents already far exceed the capacity of any program to conform let alone excel in this emerging environment. Programs can no longer be expected to be replicas of one another. Accreditation standards and the expectations of residents and faculty must adapt to the notion that programs will differ substantially in their capacity and desire to embrace all the change that is occurring.

OMS should consider the development of learning and practice communities, which due to technology can offer far greater depth and resources to all programs. The seeds of this change have occurred in admissions, in learning software (such as the Big 10 Sakai educational software



platform project), and in online learning. More formal liaisons among OMS programs and with other medical, surgical, and dental education programs will improve education while not exceeding the capacity of OMS educators and the home institution clinical practicum. Such change would further be supported through the development of a universal electronic health record, extension of licensure that supports telemedicine and joint faculty appointments.

The implication of this education model is that it will support improvement in education with greater globalization and access to more advanced sub-specialized training. It will additionally support a new practice model of health systems based practice, OMS practicing within the parameters of the policy makers, the payers, and public need. It remains to be seen whether the future of OMS education, enabled by MAMAA, will be a sustainable advantage in OMS education over the simpler times and technologies our faculty know so well.

## DISCLOSURE

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