



BUILDING THE FUTURE: Educating the 21st Century Physician

Report of the Blue Ribbon Commission for the Advancement of Osteopathic Medical Education

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The views and recommendations expressed in this report reflect the discussions of the Blue Ribbon Commission for the Advancement of Osteopathic Medical Education and do not necessarily reflect the official opinion of the American Association of Colleges of Osteopathic Medicine, the American Osteopathic Association, individual members of the Blue Ribbon Commission, or members' home institutions.

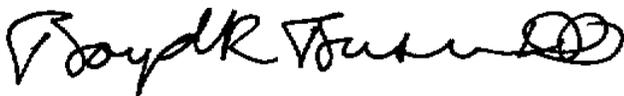
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LETTER FROM THE BLUE RIBBON COMMISSION CO-CHAIRS

The Blue Ribbon Commission for the Advancement of Osteopathic Medical Education (BRC) was jointly impanelled by the American Osteopathic Association (AOA) and the American Association of Colleges of Osteopathic Medicine (AACOM), with additional financial support from the Josiah F. Macy, Jr., Foundation. The Commission consisted of thought leaders from across the spectrum of the osteopathic medical profession, including experts in both undergraduate and graduate medical education, as well as physicians in training. The first meeting was held in June 2011, and over the ensuing 18 months, the Commission and its Steering Committee worked diligently on developing an innovative model of physician education to address the primary care medical needs for this country. The Commission's work is highlighted in a report that clearly defines the roadmap to educating the physician for the 21st century.

There are many contributors to thank for this work. The members of the BRC invested thousands of combined hours in face-to-face meetings, preparation, document review, and commentary. The BRC Steering Committee met frequently, participated in numerous conference calls, reviewed product, edited documents, and provided necessary guidance to advance the process. In addition, active contributions from George Thibault, MD, and Clement Bezold, PhD, who both presented to the Commission and participated in our deliberations, helped to shape the final proposal. We also offer thanks to external experts and reviewers who provided valuable input and feedback to this process. We thank the leadership of AACOM and AOA for having the confidence to entrust us with the duties of co-chairing the Commission. This work could not have been completed without the excellent support of AOA and AACOM staff. Finally, Joshua Mintz and his colleagues served as key facilitators to assist the commissioners through the deliberative process and to document our results.

We believe this report will serve as the foundation for defining the education process for physicians in the 21st century. There is much work that remains to ultimately implement the innovations described in this report, but it is clear that these recommendations will improve the medical education process, address the medical needs of our nation, and most importantly, better serve each and every patient.



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TABLE OF CONTENTS

Section	Page
Executive Summary: Building the Future: <i>Educating the 21st Century Physician</i>	5
The Need for Change in Physician Training	11
A Competency-based Model for Medical Education	15
Piloting the <i>Pathway</i>	18
Implications of the <i>Pathway</i> for Intertwined Components of the Osteopathic Medical Education Process	20
The Call to Action	23
Membership of the Blue Ribbon Commission and Acknowledgements	25
Appendices	29
References	32

EXECUTIVE SUMMARY

Building the Future: *Educating the 21st Century Physician*

The osteopathic medical profession plays an important role in our nation's health care system. Osteopathic physicians comprise a significant percentage of the physician workforce, with one in five U.S. medical students attending an osteopathic medical college in 2012. The growth in the size and number of osteopathic medical colleges, and the profession's long-standing experience in providing community-based, primary care education, positions osteopathic medicine to play a key leadership role in preparing the physician workforce to meet the needs of the American health care system in the 21st century.

As the practice of medicine and the design of the health care delivery system continue to change, so too must our model for physician education. The traditional approach to medical education developed by Abraham Flexner more than 100 years ago is increasingly anachronistic in today's health care environment. As our health care system increasingly focuses on technology-managed, team-based, patient-centered primary care* and population health, many medical schools continue to prepare a disproportionate number of hospital-based specialists through a high-cost and time-intensive educational model that increasingly has been called into question from within and outside of the medical education community.

To respond to our nation's need for a robust primary care physician workforce, the American Osteopathic Association (AOA) and the American Association of Colleges of Osteopathic Medicine (AACOM) established the **Blue Ribbon Commission for the Advancement of Osteopathic Medical Education** (BRC). The BRC was created to envision a new model for medical education grounded in osteopathic principles and practices that will better prepare physicians for success in today's health care environment.

Osteopathic medicine is built upon four core principles that have guided the profession for more than 100 years.

- The body is a unit with interdependent systems, and the health of the patient reflects a dynamic interaction of body, mind, and spirit.
- The body has inherent capacities for self-regulation, self-healing, and health maintenance.
- Structure and function are reciprocally interrelated.
- Rational patient care is based on an understanding of body unity, self-regulation, and the interrelationship of structure and function.

* Primary care is defined by the Institute of Medicine as the provision of "integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community." Primary care fields include general and family practice, general internal medicine, and general pediatrics. National Research Council. *Defining Primary Care: An Interim Report*. Washington, DC: The National Academies Press, 1994.

The new model responds to suggestions from the osteopathic medical profession, as well as the U.S. Congress, key federal agencies, foundations, and key thought leaders throughout medical education to address the physician workforce shortage and increase the primary care workforce by: focusing the medical school curricula on the training of primary care physicians; facilitating a seamless transition from medical school to primary care residency education; and increasing the number of medical school faculty physicians who can serve as role models for primary care careers.^{1,2,3,4,5,6,7}

The membership of the BRC is broadly representative of osteopathic medicine, reflecting the practice community, professional organizations, medical colleges, accreditation organizations, and state licensing boards. The opinions and recommendations presented in this White Paper reflect the discussions of the BRC as an independent commission and do not necessarily express the views of the American Osteopathic Association or American Association of Colleges of Osteopathic Medicine.

The BRC was charged to:

- Assess the evolving U.S. health care environment and envision the future health care needs of the American public;
- Articulate a vision of a contemporary, 21st century osteopathic physician who is positioned to meet the needs of the evolving U.S. health care environment;
- Identify the abilities that this physician would possess; and
- Envision a new educational model to prepare this physician for practice.

A NEW PATHWAY

In response to this charge, the BRC recommends the creation of a new educational model, the *Pathway*, to produce board-eligible, practice-ready osteopathic primary care physicians who possess the abilities needed for success in today's high-quality, high-value, outcomes-based health care environment and evolving delivery systems.

The *Pathway* is defined by the following five principles:

1. **It will prepare osteopathic physicians for primary care practice, incorporating traditional osteopathic principles and practices.** The future of primary care practice will be grounded in patient-centered care and will largely encompass population health as a means of improving the overall quality and efficiency of care. These physicians will be trained to deliver tech-savvy, team-based patient care and will be proficient in prevention, health care systems planning, and leadership. They will learn to work in settings where Americans seek the majority of health care services, such as primary care offices; outpatient ambulatory care clinics; and long-term care, homebound care, and transitional living facilities for the elderly and individuals with special needs.⁸

2. **It will be built upon a competency-based curriculum** centered on the biomedical, behavioral, and clinical science foundations of osteopathic primary care medical practice. Competencies will be identified to guide the design and implementation of the *Pathway*, and outcomes specific for medical education will be established to assess graduates' readiness for professional practice.⁹ An initial outline of the proposed competencies is included later in this summary.
3. **It will consist of a continuous, longitudinal educational experience.** Clinical experiences would begin in the student's first year of training and would continue with increasing levels of responsibility across the duration of the program. While the creation of a single medical education experience beginning at matriculation and ending with certifying board eligibility would be preferred, the BRC believes that working within the existing medical education structure is a more realistic strategy for implementing the new educational model at the current time. As such, the BRC recommends that an integrated medical education continuum with a seamless transition between undergraduate medical education (UME) and graduate medical education (GME) be established. By creating a seamless transition between UME and GME, it will be possible to eliminate redundancies and inefficiencies in the medical education process, resulting in cost reductions and time savings.
4. **It will be administered by the Colleges of Osteopathic Medicine (COMs) in collaboration with their residency program partners within the framework of the Osteopathic Postdoctoral Training Institutions (OPTIs).**[†] The clinical experiences will occur in "the wide variety of environments in which health care is practiced,"¹⁰ including both hospital and ambulatory community-based settings. Community-based sites, such as integrated health systems, community health centers, and large practice groups, will provide optimal environments for experiential learning in primary care. A strong partnership between the COM and the GME sites are essential for the success of this effort. The collaboration between the GME programs and the COMs will also provide an increased opportunity for mentoring by primary care providers who will assess the residents' progress toward competency.
5. **It will focus on health care delivery science**, including the principles of the high-quality, high-value, outcomes-based health care environment (such as Accountable Care Organizations and Patient-Centered Medical Homes[‡]); health care team leadership; analytic skills; health policy; health information technology; quality assurance; and patient safety.

[†] All osteopathic graduate medical education programs are part of an Osteopathic Postdoctoral Training Institution (OPTI). Each OPTI is a community-based training consortium comprising at least one college of osteopathic medicine and one hospital and may include additional hospitals and ambulatory training facilities. By building medical education partnerships, OPTIs enhance educational quality, facilitate sharing of educational resources, provide faculty development, foster cooperative training programs, support community-based medical education, encourage clinical research, and create strong linkages among medical schools, teaching hospitals, and ambulatory training facilities.

[‡] Accountable Care Organizations and Patient-centered Medical Homes are two current examples of longitudinal and comprehensive primary care-based and integrated delivery models. Although the name and specifics of the delivery model

Upon completion of the *Pathway*, graduates would be board-eligible[§] and ready for practice as an osteopathic primary care physician and leader of the interprofessional health care team. Depending on the design of the *Pathway* program, it is possible that graduates may also gain a Certificate of Achievement based on the attainment of specific competencies beyond the traditional model of medical education. This Certificate would help to distinguish further the competency of graduates.

It is envisioned that a highly qualified and motivated student could complete this educational program in as few as five years. A shift to a competency-based educational model could also create opportunities for students who wish to pursue medical education on a part-time basis, including those students who are economically unable to pursue medical education full time.

Although the goal of the *Pathway* is to prepare students for primary care practice, it is understood that some graduates may elect to participate in additional specialty training, and this model should position them well for continued training. As one BRC member noted: *As a profession, we would prepare better specialists if all physicians had a stronger foundation in primary care and population health.*

A COMPETENCY-BASED MODEL OF MEDICAL EDUCATION

The *Pathway* will be built upon a **competency-based curriculum** centered on the biomedical, behavioral, and clinical science foundations of osteopathic primary care medical practice. The model will build upon the seven competency domains of osteopathic medical education,^{**} with particular emphasis on the knowledge, skill, and capacities needed for success in today's primary care health care environment. The competencies will provide trainees with a strong foundation in the biomedical sciences, experiential learning in patient examination, diagnosis and treatment planning, and the ability to implement diagnostic and therapeutic procedures consistent with primary care practice as defined by the osteopathic medical profession.

Many of the items included are consistent with the National Board of Osteopathic Medical Examiners (NBOME) core competency domains for the practice of osteopathic medicine and AACOM's Core

may evolve and change over time, the shift to high-quality, high-value health care will be a core aspect of the health care delivery system moving forward.

§ During the piloting of the *Pathway*, it is envisioned that students would sit for an existing board such as Family Practice or Internal Medicine through a partnership with the certifying organizations for these specialties. Over time, the osteopathic medical community can determine whether a new board based on the specific competencies listed within this field of study is appropriate or if, as certifying organizations move toward competency-based (versus time-based) boards, the *Pathway* effectively prepares students for success on existing primary care-focused boards.

** Osteopathic medical education requires the following Fundamental Osteopathic Medicine Competency Domains: Osteopathic Principles and Practice, Medical Knowledge, Patient Care, Interpersonal and Communication Skills, Professionalism, Practice-Based Learning and Improvement, and Systems-Based Practice. These competency domains are specifically articulated for training by the Commission on Osteopathic College Accreditation for medical student training, by the American Osteopathic Association for graduate medical education, and by the National Board of Osteopathic Medical Examiners for licensure examinations.

Competencies for Medical Students, as well as core competencies identified by the American Hospital Association, the Accreditation Council for Graduate Medical Education Milestone Project, the American College of Osteopathic Internists, the Royal College CanMEDS Physician Competency Framework, and the Interprofessional Education Collaborative.^{11,12,13,14,15} It is recognized that the inventory is preliminary and must be further refined so that measureable outcomes can be defined.

The list of competencies also identifies personal attributes and behaviors expected of the 21st century osteopathic primary care physician. These behavioral competencies are consistent with the “focus on professional identity formation – the development of professional values, actions, and aspirations” identified by Cooke, Irby, and O’Brien as the “backbone of medical education.”¹⁶

Table 1: New Knowledge and Capacities for the 21st Century Osteopathic Primary Care Physician

Foundational Knowledge and Associated Capacities

1. Osteopathic principles and practices.
2. Patient-centered primary care delivered predominantly in community-based and outpatient ambulatory care environments.
3. The role and function of high-quality, high-value health care delivery models such as longitudinal and comprehensive primary care-based and integrated delivery models (e.g., Patient-centered Medical Homes and Accountable Care Organizations).
4. Health care management, health care financing, and health policy.
5. Systems-based practice and the implementation of quality assurance and patient safety principles and processes.
6. Leadership capabilities, including leading an interprofessional health care team and managing change.
7. Data management, analysis, and the use of health information technology to facilitate patient care, patient management, and monitoring of care and services.
8. Principles of population health, including health and wellness promotion, disease prevention, risk assessment, patient education strategies, and principles of health literacy.
9. Principles of aging, health issues of the long-term elderly, and communication with the elderly.
10. Design and conduct of clinical and educational research, interpretation and application of biomedical and translational research, participation in practice-based research, evidence-based practice, and appraising the effectiveness of diagnostic tests and therapeutic interventions.
11. Cultural competency and sociology of diversity, work with diverse patient and provider populations and environments, and alternative health care practices and beliefs.

Personal Attributes and Other Behavioral and Contextual Capacities

1. Leadership skills and team skills, including capacity to be a "team player," working with a variety of different health professionals, shared decision making, collaboration abilities, and team-

building skills.

2. Proficiency in working with people, including communication skills, empathy, compassion, open-mindedness, personal adaptability, and the ability to share the decision-making process with patients.
3. Appreciation for, and capacity to employ, social and behavioral sciences in medical practice.
4. Professionalism and adherence to ethical principles.
5. Altruism and patient advocacy.
6. Problem solving and critical thinking.
7. Willingness to be integrated into the communities in which they practice.
8. Understanding of the idea of continuity in following up with patients and treating them thoroughly.
9. Dedication to quality, performance improvement, and continuous learning.
10. Capacity for self-assessment and critical appraisal.
11. Capacity to serve as primary care role model, teacher, and mentor.

MOVING FORWARD

Now is the time for action. It is clear that the U.S. medical education system must be reconstructed to better meet the changing health care needs of our nation. The osteopathic medical profession can and should lead that change.

There is a need for reform and innovation within medical education and physician training to address the medical needs of all Americans in the 21st century. By developing this new educational paradigm for training physicians, the osteopathic profession will address the needs of the changing health care environment and provide leadership to the nation's evolving health care system.

The BRC recommends the creation of a new educational model to produce board-eligible, practice-ready osteopathic primary care physicians who possess the competencies needed for success in today's high-quality, high-value, outcomes-based health care environment and evolving delivery systems and who are ready to serve as leaders of the interprofessional health care team.

The BRC recommends that the *Pathway* model be piloted by a limited number of COMs and their residency program partners and be evaluated before more widespread adoption. Individual colleges would develop the model as an optional track for a select and highly qualified group of scholars with an expressed commitment to a primary care career. The curriculum and educational model would be developed by the individual colleges based on the five principles of the *Pathway* and the proposed competencies.

After assessing the efficacy of this educational option in several colleges, the outcomes of these pilot efforts can be detailed in terms of design innovations, operational heuristics, and student outcomes. The analysis of these metrics will be done within the osteopathic medicine community under

coordination of the colleges, the AOA, and AACOM. Based on the results of this analysis, the further application of the *Pathway* for all of osteopathic medical education could be explored.

Although there are many factors to consider prior to full implementation, the innovation presented herein demonstrates that osteopathic medicine, building upon its existing strengths and capacities, is poised to provide much-needed leadership for the U.S. medical education system.

The members of the BRC believe that by implementing this new educational model, osteopathic medicine can be the change that others hope will happen.

BUILDING THE FUTURE: THE NEED FOR CHANGE IN PHYSICIAN TRAINING

In 1972, a World Health Organization commission assessed that health professions education is inextricably linked with the health service system. When questions arise about the delivery of service, so do questions about the training of health care providers.¹⁷

Over the past several years, there has been a growing call for a comprehensive evaluation and restructuring of UME and GME. In 2010, the need for re-examining medical education was highlighted in the Carnegie Foundation report *Educating Physicians: A Call for Reform of Medical School and Residency*.¹⁸ The study identified three critical questions facing the medical profession:

- How can we improve medical education?
- Can we produce competent and compassionate physicians more efficiently and effectively?
- How can we reorganize medical education to produce physicians able to achieve better health care outcomes for the American people?"

In November 2011, the Council on Graduate Medical Education (COGME) recommended to the U.S. Senate and the Health Services and Resource Administration that the Association of American Medical Colleges and AACOM jointly conduct a comprehensive review of medical education. This review was spurred by the current status of health care delivery services and ultimately was to lead to the development of new approaches for medical education in the United States. It is intended as a collaborative effort with accrediting agencies, the American Board of Medical Specialties, the AOA Bureau of Osteopathic Specialists, and the Federation of State Medical Boards.¹⁹

The proposed COGME review process is intended to:

- streamline physician training;
- increase the efficiency of physician education;
- improve the quality of medical education;
- develop new strategies for competency-based evaluation;
- increase the numbers of physicians being trained; and
- develop new approaches to team-based training.

COGME proposed that this reform effort could substantially reduce the cost of undergraduate and graduate medical education and create a physician workforce more attuned to the needs of the American public. The importance and urgency of this effort was reinforced in December 2011, when a bipartisan group of seven U.S. Senators requested that the Institute of Medicine convene a panel to examine "the governance and financing of the GME system and potential reforms."²⁰

Collectively, the goal of these efforts is to better align the nation's medical education system with the evolving health care needs of the nation. In the coming years, our nation's health care system will be challenged, in part as a result of our past success in increasing life expectancy. As medicine has improved, the incidence of many previously acute fatal health conditions has declined, resulting in

longer lives and contributing to dramatic growth in the elderly population and an epidemic of chronic diseases. In addition, the upcoming years will bring an influx of millions of newly insured patients entering the health care system as a result of the Affordable Care Act. These challenges are heightened by the inadequate number and geographic distribution of primary care physicians and other health professionals, access barriers to health care, and significant reductions in financial resources for both health care services and education. Several of these challenges are explored in detail on the pages that follow and serve as the rationale for developing a new model of physician training.

Health Care Provider Workforce Shortage

A 2011 health policy report projected that the United States will experience a physician shortage of 130,000 by 2025.²¹ Primary care medicine will face the largest workforce shortage— an estimated 50%—reflecting the 30% decrease of medical school graduates entering the primary care fields from 2000-2010.²² With these shortages in mind, a number of health-focused organizations have recommended that the nation’s health care system maintain its current ratio of 250 doctors for every 100,000 people in order to meet health care needs. Given increasing life expectancy, population growth, an aging demographic, and the increased incidence of chronic disease, a substantial expansion in the numbers of physicians would be required to maintain current physician-to-population levels, and dramatic changes in the focus and process of physician education would be required.^{23,24}

Upwardly Spiraling Educational Costs

The cost of health professions education, including osteopathic medicine, has increased dramatically in the United States. This increase has caused many potential students to reconsider their educational options due to cost constraints. Of those individuals who do complete health professions training, many must surmount debt loads that influence their practice decisions toward more financially lucrative specialties and venues. The mean self-reported medical education indebtedness of 2012 medical school graduates exceeds \$200,000 for osteopathic graduates²⁵ and \$166,000 for allopathic graduates.²⁶

Expanding Duration of Training

Similar to the cost, the length of time required to train the future osteopathic physician has increased markedly over the past 20 years. Additional requirements and expectations for students and residents have been added, prolonging the time it takes for a clinician to become practice-ready. The increased training has resulted in increased costs for students in the form of expanded tuition and fees, all of which have been shown to contribute to the shortages in primary care providers.²⁷

The length and format of health professions education remain grounded in time-based education, where the duration of training remains a primary outcome measure. Specific to medical education, arguments have been made that all areas of the medical education continuum, from premedical training to subspecialty fellowships, can be shortened without jeopardizing physician competence or quality of care. Currently, the average time in college, medical school, residency, and fellowship to train a subspecialty physician is 14 years. It has

been posited that this could be reduced by approximately 30% in time while maintaining quality.²⁸

In recent years, educators have increasingly questioned the value of time-based education. In 2011, U.S. Secretary of Education Arne Duncan stated that “The century-old practice of awarding degrees based on seat time in a classroom, rather than on demonstrated competence, is now at odds with a world in which the Internet offers perpetual opportunities for learning and gaining skills at your own pace.”²⁹ A shift to competency-based medical education, with clear and defined benchmarks of academic progress, would position osteopathic medical education as a leader in this educational movement.

Lack of Diversity in the Health Professions Workforce

The effect of the high cost of education and the length of training serve as potential barriers to a health professions career for many people. Most profoundly affected by these barriers are economically challenged students, including academically qualified underrepresented minorities (URM) (Black or African-American, Hispanic or Latino, and American Indian). More than 40,000 URM students graduate annually with science degrees from U.S. universities, yet only 4,000 seek entry into the health professions.³⁰ Our health care system needs diversity in its health professions workforce. Both equity and adequacy of health care is the issue. It has been demonstrated clearly that a diverse health care workforce leads to improved access for racial and ethnic minorities, greater patient satisfaction, and a better educational experience for health professions students.^{31,32,33} In spite of substantial national efforts to enhance URM participation in health professions education over the past 40 years, progress is slow, and the ethnic diversity of the health professions, including osteopathic medicine, does not come close to approximating the demographics of the United States in 2013.

Need for New Competencies for Today’s Health Care Landscape

The inefficiencies of medical school education have been recognized for decades.^{34,35,36} Although efforts have been made to increase the efficiency of the existing curriculum through the compression of the curriculum, few schools have redefined the core knowledge base and skills their graduates will require for success in today’s health care environment. The training of future physicians will need to include the management of health care systems, competency in patient-centered care and population health, comprehension of health care policy, development of analytic skills, ability to utilize and implement information technology, and leadership and collaboration capacities with other health professionals.

Although there has been a strong desire at both the national and institutional levels to incentivize more medical students to pursue careers in primary care medicine, few curricular models have been successful in meeting this goal to date. Currently, osteopathic and allopathic students receive conflicting messages about the role and value of primary care during their undergraduate medical education. GME experiences further segment the physician workforce, as the majority of graduates pursue specialty training, resulting in the current 70/30 ratio between specialist and primary care physicians. Despite a 35% increase in allopathic and osteopathic medical school enrollment over the

past 12 years, much of which was based on a stated purpose of increasing the number of primary care physicians, the trend toward specialization for graduates has continued.³⁷

Osteopathic medicine, rooted in community-based practice with a primary care focus, is well situated to lead reform efforts with an innovative model of physician education. The *Pathway* model would produce a board-eligible, practice-ready physician in a more efficient manner than the current model of physician training, thereby contributing to the primary care physician workforce needed for our nation's future.

BUILDING THE FUTURE: A COMPETENCY-BASED MODEL FOR MEDICAL EDUCATION

The first step in developing an innovative training program of this caliber is to standardize learning outcomes and general competencies that trainees will be expected to demonstrate for progression and completion of the program.^{38,39,40} Physicians in the *Pathway* will be trained differently than the current educational model, given the expectation that these individuals will be board certification-eligible and practice-ready at the completion of their educational experience. In addition to providing high-quality, patient-centered care grounded in osteopathic principles and practices, graduates will possess knowledge of subjects including the principles of high-quality, high-value health care delivery models; health care team leadership; data analytics; health policy; population health; health information technology; quality assurance; and patient safety. By carefully defining the competencies or outcomes measures that these physicians must achieve, the osteopathic medical community can assure that graduates are well prepared for practice and able to deliver high-quality, comprehensive patient care.

A competency-based curriculum has three features that are different from what most health care providers and educators have experienced:

1. The curriculum itself is based on the analysis of contemporary and predicted future health care needs of the public as well on the associated responsibilities of practitioners in the field;
2. Competency-based programs are designed to advance trainees based on their capabilities and demonstrated readiness rather than on their time spent in the program; and
3. Competency-based programs are sequentially structured so trainees progress through foundational (didactic), laboratory learning (simulation), and clinical experiences (authentic performance).⁴¹

In developing the competencies for this program, four questions described by Smith and Long^{42,43} related to competency-based health professions education curriculum should be considered:

1. What reference standards and data sources can be used to determine the competencies necessary for professional practice?
2. What knowledge, skills, and professional/personal values and attributes should trainees possess at the time of graduation so they will be ready for the next level of training or be prepared to serve as an independently functioning entry-level health care practitioner?
3. What learning experiences will enable trainees to acquire these competencies?
4. How can faculty know if trainees have attained these competencies? What proof, or evidence, is needed to establish that a trainee has attained competency?

The BRC recommends that the planning and design of the *Pathway* be firmly established on these principles. Specifically, the advancement and progression of trainees would be based on their readiness (not time in the program) and their ability to pass through sequenced assessment techniques of their knowledge, skills, and values. Authentic assessment techniques of these types have been thoroughly described and are the foundation of competency measurement in the health professions.^{44,45,46,47}

Competencies for the 21st Century Osteopathic Primary Care Physician

Based on a review of existing competency documents and interviews with key thought leaders within osteopathic and allopathic medicine, the BRC developed the following initial inventory of “core knowledge and capacities for the 21st century osteopathic physician” (Table 1).

Many of the items included are consistent with the NBOME core competency domains for the practice of osteopathic medicine, AACOM’s Core Competencies for Medical Students, as well as core competencies identified by the American Hospital Association, the Accreditation Council for Graduate Medical Education Milestone Project, the American College of Osteopathic Internists, the Royal College CanMEDS Physician Competency Framework, and the Interprofessional Education Collaborative.^{48,49,50,51,52} The inventory is preliminary and must be made more specific in terms of the competencies themselves, so that measureable outcomes can be defined.

The inventory is a **preliminary representation** of the knowledge and capacities for the 21st century osteopathic primary care physician, with emphasis on the **new capacities** that will guide curriculum design. These new capacities will require creation of new assessment strategies to measure competency acquisition. The inventory is focused on providing the trainees with a strong foundation in the biomedical sciences (with focus on applied pathophysiology), experiential learning in patient examination, diagnosis and treatment planning, and the ability to implement diagnostic and therapeutic procedures consistent with primary care practice as defined by the osteopathic medical profession.

The list of competencies also identifies personal attributes and behaviors expected of the 21st century osteopathic physician. These behavioral competencies are consistent with the “focus on professional identity formation—the development of professional values, actions, and aspirations” identified by Cooke, Irby, and O’Brien as the “backbone of medical education.”⁵³

Table 1: New Knowledge and Capacities for the 21st Century Osteopathic Primary Care Physician

Foundational Knowledge and Associated Capacities

1. Osteopathic principles and practices.
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6. Leadership capabilities, including leading an interprofessional health care team and managing change.
7. Data management, analysis and the use of health information technology to facilitate patient care, patient management, and monitoring of care and services.
8. Principles of population health, including health and wellness promotion, disease prevention, risk assessment, patient education strategies, and principles of health literacy.
9. Principles of aging, health issues of the long-term elderly, and communication with the elderly.
10. Design and conduct of clinical and educational research, interpretation and application of biomedical and translational research, participation in practice-based research, evidence-based practice, and appraising the effectiveness of diagnostic tests and therapeutic interventions.
11. Cultural competency and sociology of diversity, work with diverse patient and provider populations and environments, and alternative health care practices and beliefs.

Personal Attributes and Other Behavioral and Contextual Capacities

1. Leadership skills and team skills, including capacity to be a "team player," working with a variety of different health professionals, shared decision making, collaboration abilities, and team building skills.
2. Proficiency in working with people, including communication skills, empathy, compassion, open-mindedness, personal adaptability, and the ability to share the decision-making process with patients.
3. Appreciation for, and capacity to employ, social and behavioral sciences in medical practice.
4. Professionalism and adherence to ethical principles.
5. Altruism and patient advocacy.
6. Problem solving and critical thinking.
7. Willingness to be integrated into the communities in which they practice.
8. Understanding of the idea of continuity in following up with patients and treating them thoroughly.
9. Dedication to quality, performance improvement, and continuous learning.
10. Capacity for self-assessment and critical appraisal.
11. Capacity to serve as primary care role model, teacher, and mentor.

BUILDING THE FUTURE: *PILOTING THE PATHWAY*

The BRC recommends that this new educational paradigm be piloted by a limited number of COMs and evaluated before more widespread adoption. Individual colleges would develop the *Pathway* as an optional track for a select and highly qualified group of scholars with an expressed commitment to a primary care career.

Curriculum

The curriculum and educational model would be developed by the individual colleges based on the five principles and proposed competencies. COMs may desire to design the program to align with the specific training needs of local or regional partners such as integrated systems, medical homes, medical groups, and community health centers.

Admissions

Students entering the *Pathway* would be admitted based upon appropriate academic preparedness as well as demonstrated problem-solving abilities, team-based leadership skills, community-oriented accomplishments, and other attributes necessary to succeed as an osteopathic physician. Applicants/students who are likely to be successful in the *Pathway* will present a distinctive profile in medical education.

There is not a single approach for preparation to enter the *Pathway* to becoming a physician. Applicants certainly will be academically qualified with strong grounding in the basic sciences, but a background in the social sciences will prepare them to make sense of the policy implications of a changing health care environment, and a background in the humanities will help to shape their approach to interacting with patients and colleagues on interprofessional health care teams.

As always, osteopathic medical schools will look beyond academic qualifications and background to identify candidates for the *Pathway*. Meaningful work and volunteer experiences in health care and social services will contribute to an applicant's qualifications. A demonstrated understanding of and commitment to primary care medicine that serves individual patients and the broader population must be factors in identifying and guiding the selection of appropriate candidates.

Faculty Development

A competency-based approach to medical education requires a modified skill set for educators. The *Pathway* model requires significant oversight and frequent assessment of learners. This assessment is often individual, requiring one-on-one evaluation of a student's skills and level of achievement. This move from "blind" testing of learners to individual oversight can be difficult if assessment structures are not established and educators are not prepared. While a competency-based curriculum often has learning points broken down to the smallest

measurable component, mastery of each component is only a partial achievement of competency.

The educational focus needs to shift from teaching needed material to embedding a demonstration of the learner's abilities into the process. In developing a much more granular assessment of learning, faculty will need significant training and commitment. Once the initial curriculum is determined and the needed competencies are established, faculty will assist students in acquiring the abilities that have been outlined. Learning communities with the tutelage of trained educators can develop, where frequent feedback can be given and assessment of future development can occur. Active learning is an integral part of how current osteopathic physicians are trained; therefore active learning will need a larger presence in the new model. However, new ways of assessing students and embedding feedback into educational activities for the full continuum will need to be developed.

Evaluation

Early institutional adopters of these programs would collect implementation and outcomes assessment data which would then be analyzed by the whole of the osteopathic community. A variety of potential metrics to assess the outcomes of the new educational model was identified during the BRC process and is outlined in Appendix Table 2. Additional assessments may be based on Kirkpatrick's Hierarchy of Educational Outcomes (Appendix Table 3), which is widely employed to measure training outcomes.⁵⁴

After assessing the efficacy of the *Pathway* model in several colleges, the outcomes of these pilot efforts can be detailed in terms of design innovations, operational heuristics, and student outcomes. The evaluation should consider both short-term educational outcomes and longer-term outcomes related to graduates' practice choices and activities. The analysis of these metrics will be done within the osteopathic medicine community under coordination of the colleges, the AOA, and AACOM. Based on the results of this analysis, the further application of the educational model for all of osteopathic medical education could be explored.

BUILDING THE FUTURE: IMPLICATIONS OF THE PATHWAY FOR THE INTERTWINED COMPONENTS OF THE OSTEOPATHIC MEDICAL EDUCATION PROCESS

There are a number of stakeholders within osteopathic medicine that may be affected or impacted by the *Pathway* proposal. Most notable among those groups are those involved with the education, licensure, certification, and infrastructure of osteopathic medicine.

To move forward proactively, the BRC is sensitive to the many intertwined issues from these groups and others that can either facilitate or impinge educational changes. Implicit within this new curricular model and paradigm are six major domains that need to be considered and addressed prior to the successful implementation of this type of program.

1. **Licensure.** Physicians educated in the *Pathway* program would need to be eligible to take and be prepared to pass licensure exams prior to independent practice. It was determined by the BRC that the COMLEX licensure exam is unlikely to be an impediment to graduates, as they would be trained just as thoroughly as their counterparts from traditional programs. This training would be under the auspices of the individual COMs and OPTIs and would meet competency standards consistent with existing graduate training, as well as additional standards specific to this new model. The students in these programs would be supervised and monitored throughout their training, ensuring calibration for licensure exams and subsequent practice.
2. **Accreditation.** Programs adopting this new educational model would need to be eligible for accreditation. As described, the UME component of the proposed model would be delivered by Commission on Osteopathic College Accreditation (COCA)-accredited schools, and the GME component would meet the residency requirement established by the AOA. By ensuring that both components of the continuum individually meet the necessary requirements, the overall continuum would fulfill accreditation standards. That said, the BRC believes an integrated accrediting body for the full educational continuum would better serve this training model and should be given consideration in the future.
3. **Governance and board certification.** Graduates of these programs would need to be eligible for board certification. During the piloting of the concept, it is envisioned that students would sit for an existing board such as Family Practice or Internal Medicine through a partnership with the certifying organizations for these specialties. Over time, the osteopathic medical community can determine whether a new board or a conjoined board, based on the specific competencies listed within this field of study, is appropriate. As certifying organizations move toward competency-based (versus time-based) boards, the *Pathway* model should effectively prepare students for success on existing primary care-focused boards.

4. **Financial considerations.** Funding streams to support this new educational model will be needed. Although there is some hope that the current focus on changes to GME funding could result in increased support for community-based, primary care residencies that would be aligned with the goals of this effort, it is more likely that current GME funding models will be limited and potentially reduced in the years ahead. As such, several members of the BRC noted that it would be preferable to fund this program outside of the traditional Centers for Medicare & Medicaid Services (CMS) funding streams for GME.

While a more formal cost-benefit analysis is needed, the BRC believes that there is a clear return on investment for support from CMS and other funders. For example, the significant resources health care systems invest in “re-training” physicians to be successful in their integrated, team-based environments could be redirected to support programs that would produce the type of physicians these groups desire. Major employers (such as those who are members of the Patient Centered Primary Care Collaborative) would see a return through the reduction in their health care costs by supporting programs that produce physicians focused on prevention and primary care.

Outcomes data should be tracked on key measures to compare graduates of the new program versus traditional programs to demonstrate the return on investment of this new educational model for training physicians (both in terms of cost effectiveness and health outcomes).

The new model would also need to demonstrate a financial return for students pursuing this *Pathway* versus specialty training. The greatest incentive would be changes to the payment system to reward primary care providers (some of which are incorporated in the new care delivery models). Other financial incentives for students include reduced tuition or full scholarships for students in these programs, reduced student debt, additional earnings potential from entering the workforce earlier, and additional loan repayment programs. All of these incentives would need to be tied to the obligation to practice primary care and/or in underserved communities for a specified period of time.

5. **The regulatory environment.** The regulatory environment includes state practice acts (medical licensure), federal government regulations, and hospital and insurance company credentialing requirements. State practice acts will need to be reviewed to ensure that the proposed competency-based residency meets eligibility for practice in all states. This may best be done by involving the Federation of State Medical Boards (FSMB). Discussions with CMS about GME funding, including determining whether non-CMS funded GME programs count against an individual’s GME eligibility are also needed. On the practice side, major hospital systems and insurance companies should be consulted to ensure their willingness to credential graduates from a competency-based residency program.

6. **Public relations.** Given the boldness of this proposal, a well thought-out public relations campaign will be needed for the roll-out of this effort to address any potential threats it poses to some existing groups, and to build early support among key stakeholders (e.g., AOA and AACOM boards, the Institute of Medicine Committee on the Governance and Financing of Graduate Medical Education, federal agencies and advisory panels, national foundations, major employers, health care systems and hospitals, and the osteopathic medical education community, including current and prospective students).

BUILDING THE FUTURE: THE CALL TO ACTION

Now is the time for action. It is clear that the U.S. medical education system must be reconstructed to better meet the changing structure and health care needs of our nation. The osteopathic medical profession can and should lead that change.

The development of this forward-thinking model is a response to the need for reform and innovation within medical education and physician training to address the medical needs of all Americans in the 21st century. By developing this new approach to educating physicians, the osteopathic profession will address the needs of the changing health care environment and provide leadership to the nation's evolving health care system.

The BRC recommends the creation of a new, competency-based educational model to produce board-eligible, practice-ready osteopathic primary care physicians who possess the competencies needed for success in today's high-quality, high-value, outcomes-based health care environment and evolving delivery systems, and who are ready to serve as leaders of the interprofessional health care team.

The BRC recommends that the *Pathway* be piloted by a limited number of COMs and their residency program partners and be evaluated before more widespread adoption. Individual colleges would develop the model as an optional track for a select and highly qualified group of scholars with an expressed commitment to a primary care career. The curriculum and educational model would be developed by the individual colleges based on the five principles of the *Pathway* and the proposed competencies.

After assessing the efficacy of this educational option in several colleges, the outcomes of these pilot efforts can be detailed in terms of design innovations, operational heuristics, and student outcomes. The analysis of these metrics will be done within the osteopathic medicine community under coordination of the colleges, the AOA and AACOM. Based on the results of this analysis, the further application of the *Pathway* model for all of osteopathic medical education could be explored.

The success of the *Pathway* is dependent upon the support and engagement of a large number of stakeholders and organizations. The BRC calls on the following groups to take action in order to turn the vision outlined in this White Paper into a reality:

- The AOA and AACOM to endorse the vision laid out in this report and provide leadership in promoting and advancing the adoption of this new educational model.
- The COMs and their residency program partners to discuss the opportunities for innovation in medical education created by the *Pathway* model, and to apply to be a pilot site.
- The funding community (government, corporate, and philanthropic) to provide initial funding to support planning, design, implementation, and evaluation of pilot efforts.

- The osteopathic medical education governance system, including COCA, Council of Postdoctoral Training, the AOA Board of Specialties, osteopathic specialty boards and societies, NBOME, FSME, and other stakeholders, to create an environment in which the pilot of the competency-based *Pathway* model can be successful.
- The health care delivery system, including integrated health care systems, community health centers, teaching health centers, large corporations, insurance companies, state primary care initiatives, and others committed to the importance of patient-centered primary care to serve as champions of this new educational model that will prepare physicians for success in today's health care environment.

Although there are a number of domains to consider prior to full implementation, the innovation presented herein demonstrates that osteopathic medicine, building upon its existing strengths and capacities, is poised to provide much-needed leadership for the U.S. medical education system.

The members of the BRC believe that in creating and implementing this new educational model, osteopathic medicine can be the change that others hope will happen.

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The Blue Ribbon Commission would like to acknowledge* the following individuals who participated in key informant interviews and/or offered comments and perspectives that helped inform our thinking in the development of this report.

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APPENDIX TABLE 1: CURRENT OSTEOPATHIC CORE COMPETENCIES

<i>National Board of Osteopathic Medical Examiners. Fundamental Osteopathic Medicine Competency Domains: Guidelines for Osteopathic Medicine Licensure and the Practice of Osteopathic Medicine. NBOME. June 2011.</i>	
Domain	Competency
1. Osteopathic Philosophy and Osteopathic Manipulative Medicine	Physicians are expected to demonstrate and apply knowledge of accepted standards in Osteopathic Manipulative Treatment (OMT) appropriate to their specialty, remain dedicated to life-long learning, and to practice habits in osteopathic philosophy and manipulative medicine.
2. Medical Knowledge	Physicians are expected to demonstrate and apply knowledge of accepted standards of clinical medicine in their respective specialty area, remain current with new developments in medicine, and participate in life-long learning activities, including research.
3. Patient Care	Physicians must demonstrate the ability to effectively treat patients and provide medical care that incorporates the philosophy, patient empathy, awareness of behavioral issues, the incorporation of preventive medicine, and health promotion.
4. Interpersonal and Communication Skills	Physicians are expected to demonstrate interpersonal and communication skills that enable them to establish and maintain professional relationships with patients, families, and other members of the health care team.
5. Professionalism	Physicians are expected to uphold the Osteopathic Oath in the conduct of their professional activities that promote advocacy of patient welfare, adherence to ethical principles, collaboration with health professionals, life-long learning, and sensitivity to a diverse patient population. Physicians should be cognizant of their own physical and mental health in order to effectively care for patients.
6. Practice-Based Learning and Improvement	Physicians must demonstrate the ability to critically evaluate their methods of clinical practice, integrate evidence-based medicine into patient care, show an understanding of research methods, and improve patient care practices.
7. Systems-Based Practice	Physicians are expected to demonstrate an understanding of health care delivery systems, provide effective and qualitative patient care within the system, and practice cost-effective medicine.

APPENDIX TABLE 2: POTENTIAL EVIDENCE FOR ASSESSMENT OF THE *PATHWAY*

Outcome Level	Types of Evidence
Societal Results	<ul style="list-style-type: none"> • U.S. population health indicators for all components of society • Health outcomes for underserved populations and communities • Attainment of outcomes mandated by Affordable Care Act • Geographic distribution of <i>Pathway</i> graduates in comparison to traditional COM graduates • Analysis of cost indicators relative to patients' health outcomes for <i>Pathway</i> graduates versus traditionally trained physicians • Demographic and economic profiles of <i>Pathway</i> applicants and matriculants in comparison to traditional medical school graduates
Institutional Results	<ul style="list-style-type: none"> • Comparison of <i>Pathway</i> student application, matriculation, attrition, and graduation data to traditional COM curricula • % of COM students participating in a <i>Pathway</i> curriculum • % of COMs implementing a <i>Pathway</i> curriculum • % of COMs who sustain and/or expand <i>Pathway</i> curricula • % of <i>Pathway</i> curricula that are discontinued and appraisal of reasons • Evaluation of <i>Pathway</i> by parent university/institution • \$ spent on <i>Pathway</i> education by students and COMs in comparison to traditional OME • % of <i>Pathway</i> graduates who become leaders of primary care teams • Comparison of curriculum characteristics between <i>Pathway</i> and traditional COMs
Trainee Behavior	<ul style="list-style-type: none"> • % of <i>Pathway</i> graduates who establish primary care practices in comparison to practice patterns of traditional COM graduates • Board certification numbers and types for <i>Pathway</i> graduates vs. traditional COM graduates • Indices of primary care activity and methods by <i>Pathway</i> graduates, including referral patterns • Clinical and cost outcomes in osteopathic-led primary care teams • % of malpractice suits filed against <i>Pathway</i> graduates vs. traditional medical school graduates • % of complaints to state boards filed for <i>Pathway</i> graduates vs. traditional medical school graduates
Trainee Learning	<ul style="list-style-type: none"> • <i>Pathway</i> student performance on NBOME COMLEX • <i>Pathway</i> student performance as indicated by COM-administered assessments (didactic and clinical performance assessments) • <i>Pathway</i> student attrition and within-program incidence of remediation • Students' average number of years to complete <i>Pathway</i> • % of <i>Pathway</i> graduates who secure subsequent (post-<i>Pathway</i>) residency programs • External examination to measure capacity for team-based and point-of-service care and population health issues
Reaction: Trainee attitudes, intentions and confidence, and attitudes of other stakeholders with roles in training	<ul style="list-style-type: none"> • Patient satisfaction with care provided by <i>Pathway</i> trainees • Perception of osteopathic physicians by patients and health providers • <i>Pathway</i> students' interest in specialization versus primary care • Perceptions of residency directors about <i>Pathway</i> graduates • Perceptions of <i>Pathway</i> faculty about the curricular model
Reaction: Trainee and trainer satisfaction	<ul style="list-style-type: none"> • Trainee opinions: confidence level in skills, satisfaction with educational quality, and perception of readiness for primary care practice • Surveys of <i>Pathway</i> alumni 5 and 10 years after graduation

APPENDIX TABLE 3: KIRKPATRICK'S HIERARCHY OF EDUCATIONAL OUTCOMES AND EVIDENCE

Outcome Level	Types of Evidence
Societal Results: Impact of educational programs on social goals, values and priorities	In the realm of health care, indicators of the public's health, patterns of disease, use of health care resources, attainment of public health goals and standards
Institutional Results: Changes that influence an organization's or profession's goals, values, culture, infrastructure, or planning and assessment processes	Meaningful and sustained changes in institutional planning, goals, priorities, measures of operational efficiency, performance and productivity outcomes, or improved data collection and analysis; also: changes in curriculum goals, content, and focus for educational institutions
Behavior: Changes in trainees pertaining to application of acquired capacities, professional roles, career choices, career outcomes	Evidence that trainees can transfer newly learned skills into the workplace; changes in trainees' decision-making, evidence pertaining to career choices and future professional development of trainees; evidence of job performance
Learning: Modification of knowledge or skills	Evidence of the acquisition of concepts, procedural skills and communication skills. Measured during the training program.
Reaction: Trainees' attitudes, intentions and confidence; attitudes of other stakeholders with roles in the training	Evidence of trainee attitudes about the value and application of learned skills; evidence of trainee intentions to use a skill or evidence of confidence in using the skill effectively
Reaction: Trainees' and trainers' satisfaction with educational experiences	Participants' perspectives on the training: its organization, presentation, content, learning methods, and overall quality, including assessment of the environment for learning

REFERENCES

1. December 21, 2011. United States Senate letter to the Institute of Medicine. (<http://www.aacom.org/resources/e-news/ome/2012-01/Documents/Senate-Letter-to-IOM.pdf>). Accessed March 1, 2012.
2. Igelhart JK. Health Policy Report: The uncertain future of medical education and graduate medical education. NEJM Online. September 7, 2011. (<http://www.nejm.org/doi/full/10.1056/NEJMhpr1107519>). Accessed March 1, 2012.
3. Hopkins K. 10 medical schools that lead to the most debt. U.S. News and World Report. April 14, 2011. (<http://www.usnews.com/education/best-graduate-schools/articles/2011/04/14/10-medical-schools-that-lead-to-most-debt>). Accessed March 1, 2012.
4. Ensuring an Effective Physician Workforce for the United States: Recommendations for Reforming Graduate Medical Education to Meet the Needs of the Public. Josiah Macy Jr. Foundation, May 2011.
5. Council on Graduate Medical Education: Twentieth Report: Advancing Primary Care. 2010.
6. GAO: US Government Accountability Office. Primary Care Professionals: Recent Supply Trends, projections That, And Valuation of Services, February 12, 2008.
7. Association of American Medical Colleges. Physician shortages to worsen without increases in residency training. (https://www.aamc.org/download/150584/data/physician_shortages_factsheet.pdf). Accessed February 3, 2012.
8. Schwartz MD, Basco WT, Grey MR, Elmore JG, Rubenstein A. Rekindling student interest in generalist careers. *Ann Intern Med.* 2005;142:715-724.
9. The Sociology of Professional Training and Health Manpower: Summary Report. Geneva, Switzerland: World Health Organization, Working Panel on Professional Training, 1972.
10. Combes JR, Arespachoga E. Lifelong Learning Physician Competency Development. American Hospital Association's Physician Leadership Forum, Chicago. June 2012.
11. National Board of Osteopathic Medical Examiners; June 2011. (<http://www.nbome.org/docs/NBOME%20Fundamental%20Osteopathic%20Medical%20Competencies.pdf>). Accessed February 12, 2012.
12. Combes JR, Arespachoga E. Lifelong Learning Physician Competency Development. American Hospital Association's Physician Leadership Forum, Chicago. June 2012.

13. Royal College of Physicians and Surgeons of Canada. CanMEDS: better standards, better physicians, better care. (<http://www.royalcollege.ca/portal/page/portal/rc/canmeds>). Accessed February 13, 2013.
14. Interprofessional Education Collaborative (IPEC). Core Competencies for Interprofessional Collaborative Practice. (<http://www.aacom.org/InfoFor/educators/ipe/Documents/CCrpt11-19-11.pdf>). Accessed February 14, 2013.
15. AACOM Core Competency Liaison Group. Osteopathic Core Competencies for Medical Students. August 2012. American Association of Colleges of Osteopathic Medicine. (<http://www.aacom.org/InfoFor/educators/mec/cc/Documents/CoreCompetencyReport2012.pdf>). Accessed February 16, 2013.
16. Cooke M, Irby DM, O'Brien BC. Summary of Educating Physicians: A Call for Reform of Medical Education. Carnegie Foundation for the Advancement of Teaching. (<http://www.carnegiefoundation.org/elibrary/summary-educating-physicians>). Accessed July 17, 2012.
17. November 16, 2011. Council on Graduate Medical Education Letter to Congress. (<http://www.hrsa.gov/advisorycommittees/bhpradvisory/cogme/Publications/letter111611.pdf>). Accessed February 15, 2012.
18. Cooke M, Irby DM, O'Brien BC. Summary of Educating Physicians: A Call for Reform of Medical Education. Carnegie Foundation for the Advancement of Teaching. (<http://www.carnegiefoundation.org/elibrary/summary-educating-physicians>). Accessed July 17, 2012.
19. December 21, 2011. United States Senate letter to the Institute of Medicine. (<http://www.aacom.org/resources/e-news/ome/2012-01/Documents/Senate-Letter-to-IOM.pdf>). Accessed March 1, 2012.
20. Igelhart JK. Health Policy Report: The uncertain future of medical education and graduate medical education. NEJM Online. September 7, 2011. (<http://www.nejm.org/doi/full/10.1056/NEJMhpr1107519>). Accessed March 1, 2012.
21. Association of American Medical Colleges. Physician shortages to worsen without increases in residency training. (https://www.aamc.org/download/150584/data/physician_shortages_factsheet.pdf). Accessed February 3, 2012.
22. Sargen M, Hooker RS, Cooper RA. Gaps in the supply of physicians, advanced practice nurses, and physician assistants. J Am Coll Surg. 2011;212:991-9.

23. Ensuring an Effective Physician Workforce for America: Recommendations for an Accountable Graduate Medical Education System. Summary of the Josiah Macy Jr. Foundation–Association of Academic Health Centers conference on graduate medical education, Atlanta, October 2010. New York: Josiah Macy Jr. Foundation, 2010.
24. Hopkins K. 10 medical schools that lead to the most debt. US News and World Report. April 14, 2011. (<http://www.usnews.com/education/best-graduate-schools/articles/2011/04/14/10-medical-schools-that-lead-to-most-debt>). Accessed March 1, 2012.
25. American Association of Colleges of Osteopathic Medicine. AACOM 2011-12 Academic Year Graduating Seniors Survey Summary Report. (<http://www.aacom.org/InfoFor/educators/naome/appprocess/Documents/AACOM%202011-12%20Graduating%20Seniors%20Survey%20Summary%20Report.pdf>). Accessed February 26, 2013.
26. Association of American Medical Colleges. Medical Student Education: Debt, Costs, and Loan Repayment Fact Card. (<https://www.aamc.org/download/152968/data/debtfactcard.pdf>). Accessed February 26, 2013.
27. Sargen M, Hooker RS, Cooper RA. Gaps in the supply of physicians, advanced practice nurses, and physician assistants. *J Am Coll Surg.* 2011;212:991-9.
28. Emanuel EJ, Fuchs VR. Shortening medical training by 30%. *JAMA.* 2012;307(11):1143-1144.
29. Duncan A. Beyond the Iron Triangle: Containing the Cost of College and Student Debt. Remarks of U.S. Secretary of Education Arne Duncan to the annual Federal Student Aid conference, Las Vegas, Nevada. November 29, 2011. (<http://www.ed.gov/news/speeches/beyond-iron-triangle-containing-cost-college-and-student-debt>). Accessed February 21, 2013.
30. Woolfolk M, Price S. Dental education: evolving student trends. *J Dent Educ.*2012; 76:51-64.
31. Perez T, Hattis P, Barnett K. Health Professions Accreditation and Diversity: A Review of Current Standards and Processes. W.K. Kellogg Foundation, May 2007.
32. Institute of Medicine. *In the Nation’s Compelling Interest: Ensuring Diversity in the Health Care Workforce.* Washington, DC: National Academy of Sciences, 2004.
33. Sullivan Commission. *Missing Persons: Minorities in the Health Professions.* Washington, DC. 2004.
34. Walling MB, Merando A. The fourth year of medical education: a literature review. *Acad Med.* 2010;85(11):1698-1704.

35. Johnson RD, Hiss RG, Johnson TM, Vanselow NA, Strass JK. A senior-year experience similar to an internship. *J Med Educ.* 1976;51:170-122.
36. Hueston WJ, Koopman RJ, Chessman AW. A suggested fourth-year curriculum for medical students planning on entering family medicine. *Fam Med* 2004;36(2):118-122.
37. Hopkins K. 10 medical schools that lead to the most debt. *US News and World Report.* April 14, 2011. (<http://www.usnews.com/education/best-graduate-schools/articles/2011/04/14/10-medical-schools-that-lead-to-most-debt>). Accessed March 1, 2012.
38. Hendricson WD, Kleffner JH. Curricular and instructional implications of competency-based education. *J Dent Educ.* 1998; 62(2): 183-196.
39. National Board of Osteopathic Medical Examiners; June 2011. (<http://www.nbome.org/docs/NBOME%20Fundamental%20Osteopathic%20Medical%20Competencies.pdf>). Accessed February 12, 2012.
40. Cooke M, Irby DM, O'Brien BC. Summary of Educating Physicians: A Call for Reform of Medical Education. Carnegie Foundation for the Advancement of Teaching. (<http://www.carnegiefoundation.org/elibrary/summary-educating-physicians>). Accessed July 17, 2012.
41. Woolfolk M, Price S. Dental education: evolving student trends. *J Dent Educ.*2012; 76:51-64.
42. Smith SR, Dollase R. AMEE Guide No. 14: Outcome-based Education. Part 2: Planning, implementing and evaluating a competency-based curriculum. *Med Teacher.* 1999;21 (6):15-22.
43. Long DM. Competency-based residency training: the next advance in graduate medical education. *Acad Med.* 2000; 75(12):1178-1183.
44. Albino JEN, Young S, Neumann L, Kramer G, Andrieu S, Henson L, Horn B, Hendricson W. Assessing students' competency: best practice recommendations in the performance assessment literature. *J Dent Educ.* 2008;72(12):1405-1435.
45. Epstein RM, Hunderd EM. Defining and assessing professional competence. *JAMA.* 2002; 287(2):226-235.
46. Shumway JM, Harden RM. AMEE Guide No. 25: The assessment of learning outcomes for the competent and reflective physician. *Med Teacher.* 2003;25(6):569-584.
47. Smith SR, Dollase RH, Boss JA. Assessing students' performance in a competency-based curriculum. *Acad Med.* 2003;78:97-107.

48. National Board of Osteopathic Medical Examiners; June 2011. (<http://www.nbome.org/docs/NBOME%20Fundamental%20Osteopathic%20Medical%20Competencies.pdf>). Accessed February 12, 2012.
49. Combes JR, Arespachoga E. Lifelong Learning Physician Competency Development. American Hospital Association's Physician Leadership Forum, Chicago. June 2012.
50. Royal College of Physicians and Surgeons of Canada. CanMEDS: better standards, better physicians, better care. (<http://www.royalcollege.ca/portal/page/portal/rc/canmeds>). Accessed February 13, 2013.
51. Interprofessional Education Collaborative (IPEC). Core Competencies for Interprofessional Collaborative Practice. (<http://www.aacom.org/InfoFor/educators/ipe/Documents/CCrpt11-19-11.pdf>). Accessed February 14, 2013.
52. AACOM Core Competency Liaison Group. Osteopathic Core Competencies for Medical Students. August 2012. American Association of Colleges of Osteopathic Medicine. (<http://www.aacom.org/InfoFor/educators/mec/cc/Documents/CoreCompetencyReport2012.pdf>). Accessed February 16, 2013.
53. Cooke M, Irby DM, O'Brien BC. Summary of Educating Physicians: A Call for Reform of Medical Education. Carnegie Foundation for the Advancement of Teaching. (<http://www.carnegiefoundation.org/elibrary/summary-educating-physicians>). Accessed July 17, 2012.
54. Kirkpatrick DL. Evaluating Training Programs: The Four Levels. San Francisco: Berrett-Koehler Publishers, 1997.