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BEHAVIORAL AND SOCIAL SCIENCE FOUNDATIONS FOR FUTURE PHYSICIANS

Report of the Behavioral and Social Science Expert Panel

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Association of
American Medical Colleges

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EXECUTIVE SUMMARY

Many of the pressing health conundrums of contemporary society are particularly amenable to research inquiry based on the behavioral and social science model, ranging from seemingly intractable behavioral determinants of morbidity and mortality to patient safety and medical error reduction.

Just as there are well-established sciences and scientific communities that focus on physical and biological factors that influence health and disease, there are robust sciences and scientific communities that focus on behavioral and social factors.

Medical educators teaching the behavioral and social sciences certainly do not expect to produce sociologists or psychologists, any more than medical school teachers of cell biology expect to produce molecular biologists. The goal in providing rigorous training in social and behavioral sciences is to equip medical trainees with behavioral and social science-derived knowledge, skills, and attitudes required to practice medicine effectively.

A complete medical education must include, alongside physical and biological science, the perspectives and findings that flow from the behavioral and social sciences.

In leveraging scholarly work that establishes the importance of behavioral and social science in medicine, this report recommends explicit tools and strategies for the medical education community to use in developing meaningful student learning experiences and comprehension of human behavior to improve patient care and the health of the public.

In addition to describing several case study examples, this report outlines three methods of contextualizing learning outcomes in the behavioral and social sciences:

- Narrative Description of Student Incorporation of Behavioral and Social Sciences in Medicine
- Tabular Crosswalk of Knowledge Domains and Competency Frameworks
- Prospective Professional Activities Performance Aspirations

The report also presents a Behavioral and Social Science Matrix arraying applicable physician roles and behavioral and social science domains that can be used in the undergraduate medical education program to guide student learning, as well as in practice settings to enrich clinician decision-making and physician-patient interactions.

PREAMBLE

Health is a product of the interactions among biology, genetics, behavior, relationships, cultures, and environments. Some of medicine's most promising frontiers for improving health explore the realms of human behavior and social science. More and more disease states cannot be addressed without attention to the behavioral or social factors that cause them, erect barriers against treating them, or can ameliorate or even cure them.

Medicine now faces complex societal problems like addiction, obesity, violence, and end-of-life care, which require behavioral and social science research and interventions. To take advantage of enormous medical breakthroughs, people must trust, afford, and have meaningful access to health care. Improving the health of the public involves addressing health disparities and ensuring patient safety, as well as engaging the social and political aspects of health care governance, financing, and delivery.

HEALTH CARE CHALLENGES AMENABLE TO BEHAVIORAL AND SOCIAL SCIENCE INQUIRY

Behavioral Determinants of Morbidity and Mortality
Health and Health Care Disparities
Medical Error Reduction
Patient Safety
Primary Care Shortage
Physician Discontent and Burn-out
Unequal Access to Care

Behavioral and social science research and practice have generated significant improvements in the health of the public, reduced tobacco use and diet modifications being two prominent examples. Our deepening understanding of mind/body interactions and effective methods of changing health behavior have also led to health improvements. Biobehavioral approaches are effective in treating mental illness and substance abuse, and in managing chronic illness. The sights of behavioral and social sciences in health care are set on learning theory's contribution to neurological disease, memory research, gene-environment interactions, and influences of social integration on health (1). The sciences that undergird these areas of improvement and promise are critical ingredients in the training of future physicians.

A complete medical education must include, alongside the physical and biological science, the perspectives and findings that flow from the behavioral and social sciences. Medical educators now face the challenge of how best to teach behavioral and social sciences to students and professionals. Physicians fortified with the knowledge, skills, and attitudes outlined in this report will be equipped to provide outstanding patient care, address unanswered questions about human health, and fulfill the mandate to improve the public's health. The panel offers the recommendations that follow to guide medical educators in fulfilling their duties toward students and the patients who entrust to us their care.

I. PURPOSE

CHARGE TO THE PANEL

In 2009, the Association of American Medical Colleges (AAMC) and the Howard Hughes Medical Institute (HHMI) released a report titled the "Scientific Foundations of Future Physicians" (2), with recommended competencies related to biological, physical, genetic, molecular, and mathematical sciences, as well as foundations of knowledge and reasoning. This report helped medical schools identify targets and refine scientific educational programs. While highlighting recommendations for scientific educational

programs, the report authors emphasized the companion "…need to assess the behavioral and social science foundations for future physicians."

AAMC subsequently convened a panel of physicians, scientists, and educators with expertise in the behavioral and social sciences from U.S. medical schools to identify key competencies in these areas for medical school graduates. Panel members included participants from the AAMC/HHMI Committee, the Medical College Admissions Test Review (MR5), and principal investigators on NIH awards to enhance behavioral and social sciences in medical school. In this way, the recommendations of this report are congruent with and can contribute to ongoing progress in all these efforts. This report, "Behavioral and Social Science Foundations for Future Physicians," is the product of the panel's deliberations.

WORKING DEFINITION OF THE BEHAVIORAL AND SOCIAL SCIENCES, ADAPTED FROM THE OFFICE OF BEHAVIORAL AND SOCIAL SCIENCE RESEARCH OF THE NIH:

The Behavioral and Social Sciences are defined as the sciences of behavior, including individual psychological processes and behavioral interactions, and the sciences of social interaction, including familial, cultural, economic, and demographic. The core areas focus on the understanding of behavioral or social processes and on the uses of these processes to predict or influence health outcomes or risk factors (3).

REPORT GOALS

The panel prepared this report to help medical educators decide what to teach from the behavioral and social sciences in their curricula and how best to teach it. The nature of these bodies of knowledge—their dynamic and relational content as well as the dynamic and relational ways that one learns them—calls for more than static lists of course content or checklists of graduation requirements. Hence, in addition to endorsing proposed competency frameworks and professional roles, this report highlights pedagogic methods and performance outcomes for students as guides for faculty in designing and evaluating their curricula in behavioral and social science.

Though this document is neither intended as a mandate for pre-medical advisors, nor directed toward colleagues in health care professions other than medicine, the authors hope that the deliberations here will help in those important endeavors. As a document examining medical school curricula and written by medical educators, this report cannot speak about the training of health care professional colleagues in nursing, social work, dentistry, pharmacy, or physical and occupational therapy. However, this work proceeds with an explicit commitment to improving the effectiveness of the health care team, and the panel hopes that some of its work is deemed salient to strengthening teamwork among all health care professionals. The report endorses teaching and learning approaches that stress physicians' roles and responsibilities in building collaborative and interprofessional practice.

METHODS AND STRATEGY

Rather than promulgate another list of objectives and competencies, this report adopts the findings of two credible and authoritative reports: the Institute of Medicine's (IOM) "Enhancing the Social and Behavioral Science Content of Medical School Curricula," 2004, and the Royal College of Physicians and Surgeons of Canada's "The CanMEDS 2005 Physician Competency Framework." (See Appendix A and B.)

The Institute of Medicine's 2004 document engaged nationally prominent content experts who identified six domains of behavioral and social science content and delineated within each high- and medium-priority topics to be addressed in medical school.

The report exhaustively details specific knowledge bases and information resources important to medical student understanding (4).

The Royal College of Physicians and Surgeon of Canada, CanMEDS report (5) sets out specific roles which physicians must be trained to fulfill and the competencies that support fulfilling those roles.

A number of competency-based frameworks help guide educators in designing curricular and assessment approaches. Graduate medical education (GME) and certification programs for practicing physicians use the Accreditation Council for Graduate Medical Education's (ACGME) six general competencies (6). While using the ACGME framework in undergraduate medical education (UME) and for the behavioral and social sciences holds obvious advantages, the panel felt that ACGME's higher level, conceptual approach presented potential difficulties to educators in UME seeking to operationalize the behavioral and social sciences competencies for medical students. The panel found the CanMEDS approach of defining competencies as physician roles to be a more practical aid to medical educators for designing curriculum for medical students in the behavioral and social sciences. Because the IOM had defined the key knowledge domains in behavioral and social sciences for medicine, the panel combined those with the CanMEDS roles to produce a practical method of designing, executing, and assessing medical school teaching.

The panel arrayed these well-known and widely endorsed frameworks in teaching and practice reports as a teaching and learning Matrix, mapping the roles an effective physician fulfills in a given clinical case to the bases of knowledge and research that can support the physician or student in fulfilling that role. When a clinical case is considered with the help of the Matrix, each intersection of clinical role with knowledge domain functions as a mnemonic for the user. The user is graphically reminded of the roles that might be activated in treating the patient in a particular case. Each of the six roles intersects with each of the six domains of knowledge and research from behavioral and social science, generating thirty-six cells signifying potential clinical intervention. The user can rapidly scan the Matrix, identify the roles he or she should fulfill, and then index related specific areas of knowledge needed. A user who plots a case on the Matrix can identify behavioral and social aspects of clinical cases and match them with knowledge bases and information resources that might assist in clinical care.

The urgent challenge in this aspect of medical education is not in knowing what to teach, but in knowing how to bring about the learning climates that will support these lessons. The behavioral and social sciences provide the groundwork for clinicians to develop essential capacities related to self, peers, patients, colleagues, and the public. All future physicians should strive to develop self-knowledge, to undertake effective therapeutic relationships with individual patients, to nurture respectful alliances with student-peers and colleagues, and to respond to health needs of populations. Behavioral and social sciences contribute scientifically derived knowledge and skills to clinicians regarding self-awareness, relationships, human behavior, social and cultural systems, population sciences, and public health. The recommendations in this report speak to the many levels of intertwined professional commitments—to patients, community, and the global public as well as to self, peers, institution, and profession.

II. SCIENTIFIC FOUNDATIONS OF THE BEHAVIORAL AND SOCIAL SCIENCES

Basic and applied behavioral and social sciences provide foundational knowledge and advanced clinical applications essential for the skillful practice of medicine. Not unlike the biomedical sciences taught in medical school, the behavioral and social sciences are theory-driven, hypothesis-based, and application-producing fields of study that can account for some variance in health. In the sweep of intellectual discovery of health-related knowledge, certain behavioral and social sciences predate biomedical science by far. Yet all contribute to our contemporary efforts to improve health, from the micro-biological level through the macro-societal level. Just as there are well-established sciences and scientific communities that focus on physical and biological factors that influence health and disease, there are robust sciences and scientific communities that focus on behavioral and social factors. All sciences make a major contribution to individual health and to the long-term determinants of health.

The recent "Scientific Foundations of Future Physicians" (2) report presents an excellent summary of the physical and biological sciences foundational to the practice of medicine. More broadly, the authors provide a clear and compelling rationale for medical students to possess the curiosity, habits of mind, scientific background, skill in reasoning, and ability to nimbly use the tools of science. These foundational skills and depth of knowledge prepare future physicians to evaluate, synthesize, and create new, compelling knowledge in a broad range of scholarly areas—including the behavioral and social sciences.

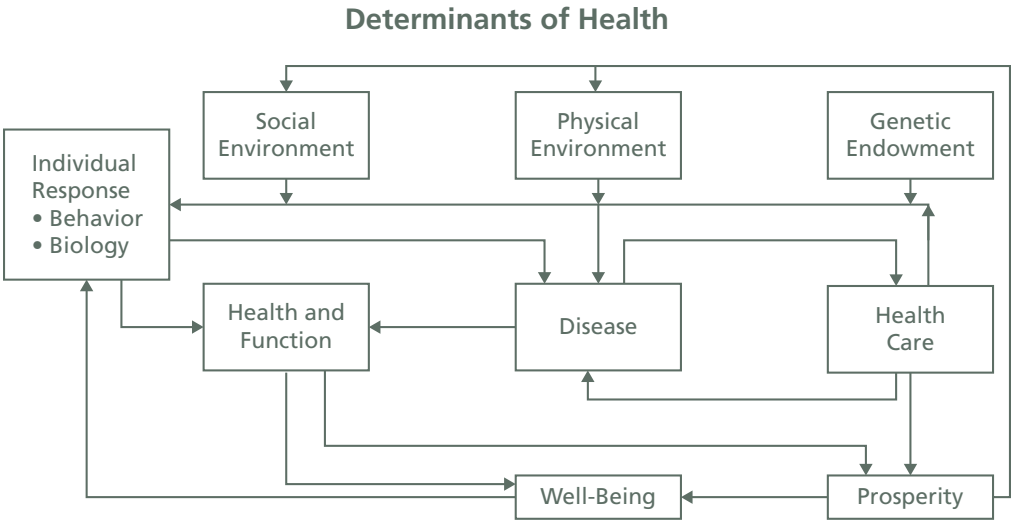

Figure 1. This representation of the complex responsive system of health illustrates the dynamic integration of behavioral and social sciences with biomedical sciences in influencing health status (4). Figure reprinted with permission. Evans, R.G, & Stoddart, G.L. (1990). "Producing health consuming health care." Social Science & Medicine, 31, 1347-1363.

THE NATURE OF BEHAVIORAL AND SOCIAL SCIENCES

The NIH Office of Behavioral and Social Sciences Research (OBBSR) was created in 1995 as a result of a growing understanding of the importance of the behavioral and social sciences to health processes and outcomes. According to OBBSR, the term "behavioral" refers to overt actions; to underlying psychological processes such as cognition, emotion, temperament, and motivation; and to biobehavioral interactions. The term "social" encompasses sociocultural, socioeconomic, and sociodemographic status; biosocial interactions; and the various levels of social context from small groups to complex cultural systems and societal influences. The core areas of this research have a major and explicit focus on the understanding of behavioral or social processes, or on the use of these processes to predict or influence health outcomes or health risk factors (3).

Levels of study include the individual, family, social group, community, society, and the population as a whole, with units of analysis spanning the molecular to the geopolitical.

Interrelatedness of Bio-factors and Social Processes

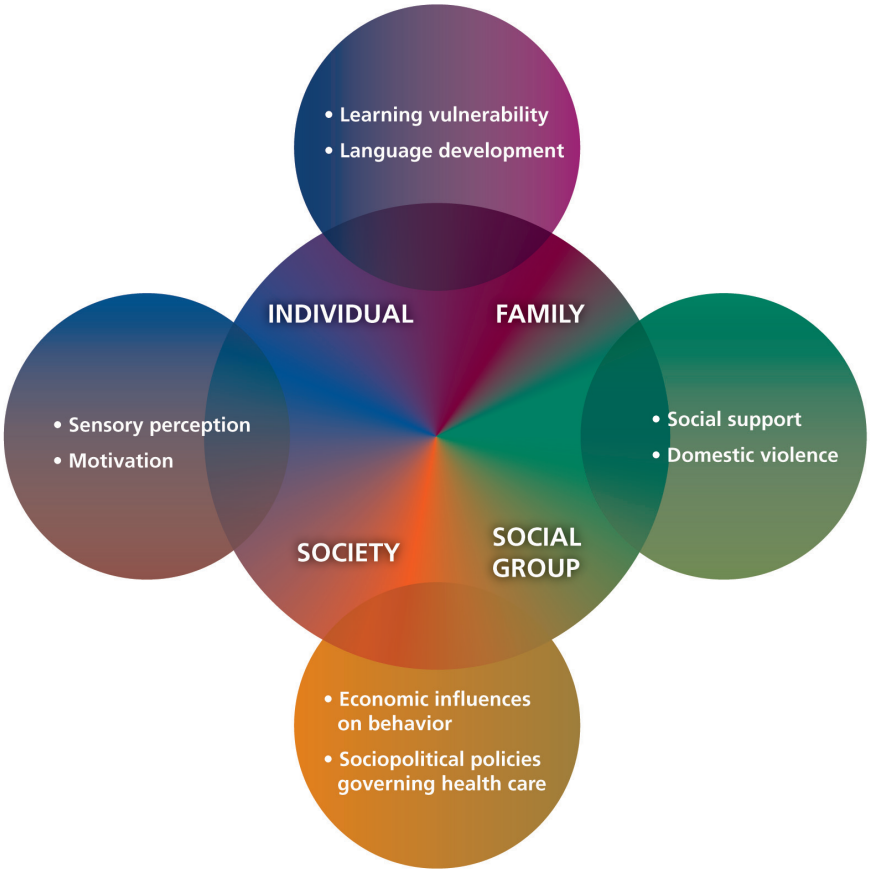

Figure 2. Examples of the interrelatedness of bio-factors and social processes include such wide-ranging topics as visual perception, emotion, motivation, learning, vulnerability, language development, social support, domestic violence, and economic influences on behavior (2).

Much of the behavioral and social sciences research that is relevant to medical practice has grown out of traditional academic fields such as anthropology, sociology, psychology, economics, communication, education, political science, public health and policy, social work, and, more recently, informatics. These disparate fields make up the foundation for behavioral and social sciences research and inform much of the applied medical applications.

While each behavioral and social science discipline carries distinctive features and offers unique contributions, applying behavioral and social sciences to medicine is a fundamentally interdisciplinary endeavor that, when effective, generates original transdisciplinary work. Behavioral and social sciences applied to medicine are often best understood through key themes (3):

Research approach

- An emphasis on theory-driven research
- The search for general principles of behavioral and social functioning

Vantage point

- The importance ascribed to a developmental, life span perspective
- An emphasis on individual variation

Content/context

- Variation across sociodemographic categories such as gender, age, and sociocultural status
- A focus on both the social and biological contexts of behavior

Given the daunting breadth of behavioral and social science, the contributions from this family of sciences can best be understood by attending to three core areas: 1) the use of behavioral and social sciences **theory**, 2) behavioral and social science **research methods**, and 3) core behavioral and social science **concepts and contributions** to the fund of medical knowledge.

Together, these three core areas introduce students to the way that behavioral and social science fields use theory and research methods to understand human behavior and the social world as they influence health and illness. Each is addressed in turn below.

These branches of science fundamentally shift the stance of the scientist from an outsider/objective view toward an engaged/responsive perspective. In terms of the philosophy of science, some work in biomedical sciences takes a "modern" reductionistic and mechanistic perspective. It asserts that cause-and-effect mechanisms are fundamental, predictive, and defining. Knowing the smallest elements of a system allows you to know the whole system. Like the biomedical sciences that focus on complex systems biology, behavioral and social sciences embrace the notion that the world is a complex responsive and interactive system. Even the scientist striving to understand the interactive system is also within it and therefore influenced by it. To the self-aware investigator, the world is ultimately not fully predictable and is a continual source of emerging and dynamic meaning. To understand and appreciate emergent properties and processes requires integrative rather than reductionistic science.

THE USE OF THEORY IN THE BEHAVIORAL AND SOCIAL SCIENCES

Behavioral and social science fields are theoretically diverse. Each discipline represents a different view or perspective on human life, with different foci and different historical trajectories. Therefore, content, theory, methods, and levels of analysis are distinct. However, all behavioral and social sciences rely on standardized data collection and interpretation techniques. Questions are framed and data are interpreted through the construction and ongoing revision of behavioral and social sciences theories.

Understanding the insights from behavioral and social science disciplines requires a basic grasp of how theories are used. Theories in behavioral and social science represent a set of cognitive tools that help the researcher see phenomena in new ways. Studying humans in complex (and often chaotic) systems is not straightforward. Therefore, theories provide a conceptual framework and a set of guiding principles that allow behavioral and social scientists to see new relationships and test ideas about how something works in the social world. Unlike the physical and biological sciences, which emphasize theoretical unity, whether or not the guiding theories are explicitly stated, the behavioral and social sciences are generally considered multi-paradigmatic—drawing, that is, on multiple theories at once. This can be disconcerting for those who expect exacting causal internal consistency from a discipline. However, most social scientists regard this as a healthy intellectual diversity that leads to new insights and productive research programs.

BEHAVIORAL AND SOCIAL SCIENCE RESEARCH METHODS AND TOOLS OF INQUIRY

The behavioral and social sciences, and any other science, have a powerful yet ever changing context that may affect generalizability and results. Behavioral and social science researchers embrace context and complexity as an essential part of their research (7). Thus, there is a limit to the value (and feasibility) of randomizing, or adjusting for contributing factors in behavioral and social science research studies.

The behavioral and social sciences have a long history of struggling with questions about how best to measure, understand, predict, and potentially change human behavior and social structures. Each behavioral and social science discipline has its own standards of scientific and ethical practice when weighing evidence and making inferences. Complex behavioral and social science theories and research methods constantly undergo refinement by a community of researchers and scholars. Their methods would be familiar to bench scientists: statistical modeling, experimental designs, and randomized clinical trials. However, methodologies might also include questionnaires, interviews, direct observations, laboratory or field experiments, standardized tests, ethnography, computer modeling, or textual analyses. It is essential for physicians who might use this information to recognize the strengths and limitations of different methodologies by sharpening their analytical sophistication and a comparative perspective in order to understand the weight of evidence for specific assertions.

The study of human life has an essentially interpretive element that requires not only finely honed quantitative measurement skills but also a well-developed qualitative sensibility that allows the researcher to observe social life and make sense of multiple

competing interpretations (8). The researcher using qualitative methods can reliably inspect and describe singular events or a small number of similar events at a granular and contextualized level. The ethnographer who conducts open-ended one-on-one interviews or focus groups with, for example, substance abusers or patients with eating disorders can learn from the ground up how a particular occurrence of a phenomenon might work. This knowledge generates hypotheses about how to examine the next iteration of the same event and, eventually, can unearth fruitful means of thinking about the phenomenon as a whole (9, 10). With increasing frequency, investigators combine quantitative and qualitative approaches in mixed-method designs, a practice encouraged by federal agencies for behavioral and social science research (11). Behavioral and social science researchers are comfortable with the understanding that human life is multivariate and explanatory factors are always competing, combining, and interacting. Therefore, the interpretation and integration of multiple explanatory factors drive much of behavioral and social science theory and practice.

Behavioral and social science researchers pursue basic science discovery, applied research, and translational science. In contrast to basic biomedical science, which uses animal models or human molecules, cells, or tissues to understand the underpinnings of human health and disease, basic behavioral and social science research may involve studies conducted in intact human beings and human populations. Basic behavioral and social science investigators focus on fundamental processes and look for enduring patterns and understandings. These basic science findings can then be applied in real-world settings to influence health.

CORE CONCEPTS AND CONTRIBUTIONS OF BEHAVIORAL AND SOCIAL SCIENCE TO MEDICAL KNOWLEDGE AND PRACTICE

Prior reports and professional organizations have produced lengthy lists of behavioral and social sciences knowledge thought to be essential to medical practice (4, 12, 13, 14). Such lists often become overwhelming yet still seem incomplete because of topic omissions, emerging new areas of importance, and the novelty of clinical situations that relate to behavioral and social science concepts or content outside the basic competencies. It is thus all the more important to compile a basic guide that illustrates essential foundational knowledge and how it is situated within the pressing issues facing medical practice and providers.

Practice Guidelines in Behavioral and Social Science

Evidence-based care recommendations in the behavioral sciences are widely available, and medical students need to understand their clinical utility. Physicians treating patients across the spectrum of organ system and age are required to master the behavioral interventions proven to improve outcomes. These interventions include screening procedures, interviewing techniques, diagnostic assessments, treatment recommendations, counseling techniques, complementary and alternative modalities, and specialist referrals. Behavioral training and skills are necessary whenever physicians discuss diagnostic findings, explain risk, and engage patients in shared decision-making. Though Table 1 provides only a fraction of the vast range of behavioral considerations that enter

the daily practice of the physician bearing direct impact on disease management and treatment decisions, medical educators should include these common illustrations as evidence of the relevance of the behavioral and social sciences to practice (15).

Table 1. Common Patient Behavioral Implications for Clinical Consideration

Lifestyle risk factor assessment and management	Motivational interviewing
Hypertension	Substance abuse
Coronary artery disease	Weight and eating disorders
Diabetes	Tobacco use
COPD	Behavioral addictions
Non-pharmacological treatment interventions	**Preventive health strategies**
Chronic pain	AIDS
Depression	Cancer
Dementia	Genetic counseling
End-of-life care	Vaccines
Insomnia	Cognitive decline

BEHAVIORAL AND SOCIAL SCIENCE ADDRESSES HEALTH CARE CHALLENGES

Over 50 percent of premature morbidity and mortality is caused by behavioral and social determinants of health such as smoking, diet, exercise, and socioeconomic status (16, 17). Health disparities and medical errors are well established, causing decrements in health care quality and equity (18, 19). There is a growing shortage of essential primary care providers in the face of rising rates of professional burnout and discontent (20, 21). Access to care is unequal across geographic and socioeconomic variables (22, 23). While complex and not easily remedied, each of these phenomena is amenable to behavioral and social sciences study and intervention.

BEHAVIORAL AND SOCIAL SCIENCE CONTRIBUTIONS TO BASIC AND APPLIED RESEARCH

- Interactions of physiology and behavior
- Interventions informed by accurate knowledge of motivation
- Facilitating behavior change
- Understanding social forces influencing health behavior
- Policy interventions to promote healthful behaviors
- Health care system factors
- Effective relationships with all health care providers

Medical science is witnessing the emerging demonstration of relationships between the bodily material of the individual—genes, hormones, cellular membrane receptors—and the feelings and actions of the individual. Processes such as neuroendocrine responses to stress and relaxation techniques reveal the complexity of the mind/body unity. Behavioral and social science knowledge and skills can support health and wellness, explain disease etiology, improve adherence rates to existing treatments, and develop new interventions.

Behavioral and social science provides essential conceptual frameworks like the biopsychosocial model for understanding complex, interactive phenomena, such as treatments for chronic disease, medical non-adherence, and substance use disorders. Understanding social dynamics within the health care system and processes improves the effec-

tiveness of the health care team. Behavioral and social sciences support the movement across multiple levels of analysis ranging from molecular biochemistry to individual behavior to social policies.

CLINICAL EXAMPLE OF BEHAVIORAL AND SOCIAL SCIENCE APPROACH

To truly understand and address the health consequences of smoking, contemporary physicians use biomedical knowledge of gas exchange, oxidative stress, platelet activation, endothelial dysfunction, mutagenesis, and the neurophysiology of nicotine addiction. To best serve their patients, they also need to understand why patients choose to smoke and how to facilitate behavioral change through building intrinsic motivation. Physicians with behavioral and social science knowledge also appreciate social factors, such as peer pressure and advertising, that promote smoking, and the policy interventions, such as tobacco taxes, that greatly curtail smoking rates. Moreover, prevention or treatment of nicotine addiction requires knowledge of the health care system, referral resources, adherence promotion, and effective relationships with allied addiction counselors.

BEHAVIORAL AND SOCIAL SCIENCE INTERVENTIONS FOR HEALTH CARE GOAL ATTAINMENT

Healthful Mind-body Interaction – stress reduction relaxation, non-pharmacologic pain and anxiety treatment, substance abuse treatment, sobriety maintenance

Health Promotion and Wellness – public and social media health education, community motivational interventions, impactful health literacy

Treatment Adherence – education in building trusting physician-patient relationships, meaningful partnerships, community activism and outreach

Individualized Chronic Illness Management – home factors influencing chronic care, health care team-building, social interventions, family counseling for reducing hospital readmissions

Health Care Team Efficiency – interprofessional communication, hierarchical obstacles, development of collaboration and trust, communities of practice design

APPLICATION OF BEHAVIORAL AND SOCIAL SCIENCE PRINCIPLES TO MEDICAL EDUCATION

Behavioral and social science contributions are apparent in individual physician-patient relationships, as well as in complex systems of health care, social policies, and population health practices. However, behavioral and social sciences are also very important to understand the medical education process and the professional context of medicine. The ways that physician-patient relationships, health systems, professional obligations, and educational organizations interact and create enduring patterns of influence are revealed by behavioral and social science inquiry (24).

In the educational environment, behavioral and social science offers essential tools that guide professional development, inform pedagogy, and support a humane training environment (25). In order to master an overwhelming body of biomedical knowledge and procedures, medical trainees need to acquire essential meta-cognitive skills that promote learning. In order to use this medical knowledge in clinical situations, trainees have to understand and manage emotions, stress, and competing demands while staying empathically connected with the patients they serve. The skills for reflective practice, peer or collaborative learning, and growth of self-awareness stem from the deep capacities drawn from behavioral and social science learning. Attention, curiosity, imagining others' perspectives, tolerating uncertainty, and developing meaningful human relationships are products of disciplined and committed growth in the essential methods and practices of a socially informed and psychologically aware medicine.

As part of their professional development, trainees learn medicine's "social contract," the primary roles and obligations of being a physician, and the complexities of medical ethics (26). This process of professional identity development and the necessary tools for learning and practice are similarly governed by behavioral and social science principles and could be greatly enhanced by behavioral and social sciences-informed teachers and mentors.

CASE CONTRIBUTIONS FROM BEHAVIORAL AND SOCIAL SCIENCE DISCIPLINES

Table 2 poses a clinical teaching scenario from multiple perspectives, with question examples that various disciplines might prompt, by way of demonstrating that each discipline has a significant contribution to understanding clinical presentations, and as such health care necessarily includes factors related to the behavioral, and social sciences.

Table 2. Case Considerations Informed by Discipline Perspective

A woman newly diagnosed with breast cancer is searching for a physician to help her think through her situation, set goals, and develop a "health strategy." While waiting to meet with a new physician for consultation, she tells a medical student that she has been mostly receiving "treatment options," instead of health strategies.	
Anthropology • How do different cultures shape the physician-patient relationship? • How does diversity awareness help us understand the patient's search and physician response?	**Communication, Linguistics** • How do patients attempt to build therapeutic alliances with their physicians? • How do physicians and patients signal their approach to medical care through their opening dialogue?
Epidemiology, Public Health, Population Sciences • How is breast cancer distributed across populations? • How are breast cancer populations distributed relative to available physicians? Is this patient's experience representative of the overall population of breast cancer patients?	**Education** • How can learners grapple with complexities of care, unique individual patient desires, variation among patient populations and the provider's own sense of the "right way" to respond to a cancer diagnosis? • How does the medical education system approach "health strategies" and "disease treatment"? • What is the medical student role in communicating with patients about care?
Informatics, Knowledge Management • What information does this patient need to understand her diagnosis and options? • How can she best access and make sense of the available information? • What is the difference in her care if she has a portable electronic medical record?	**Political Science, Policy, Economics** • What is the difference in cancer care options based on health coverage, ability to pay, and access networks? • What are the political and economic factors that shape a person's access to different health care options?
Psychology • What are the emotional, cognitive, and social consequences of a cancer diagnosis? • How will those influence clinical outcomes? • What high-stakes treatment decision-making models should be used, and what is the impact on the patient's coping capacity?	**Social Work, Health Systems Administration** • Are there system factors that could support or impede the patient's search? • What is the role for patient advocates or administrative support mechanisms in cancer treatment?
Sociology • How do we conceptualize the difference between a "health strategy" and "treatment options"? • How is the care of a cancer patient embedded in a network of friends, family, and health care providers?	

III. THE BEHAVIORAL AND SOCIAL SCIENCE MATRIX

DEFINING THE MATRIX TOOL

Clinicians have to fulfill multiple roles simultaneously, relying on inter-related knowledge and skills to do so. The Behavioral and Social Science Matrix arrays the CanMEDS physician roles that clinicians must perform with the IOM behavioral and social sciences knowledge and skills that facilitate fulfilling such roles. Populating the resulting cells with case-specific content serves to provide guidance for physicians and medical students on clinical approach and patient considerations.

Teaching & Learning Matrix		CanMEDS Physician Roles					
		Professional	Communicator	Collaborator	Manager and Systems Thinker	Health Advocate	Scholar
IOM Behavioral & Social Science Knowledge Domains	Patient Behavior						
	Mind-Body Interaction						
	Physician Role & Behavior						
	Physician-Patient Interaction						
	Health Policy, Economics, and Systems (including Population Health)						
	Social and Cultural Context						

CLINICAL APPLICATION OF THE MATRIX

The Matrix displays how knowledge/skill domains intersect with the roles clinicians play in dozens of ways for any one case. In considering a particular clinical situation, the Matrix helps the user to identify what roles might be activated in the case and what knowledge/skill domains might contribute to effective fulfillment of that role.

Plotting a clinical case on the Matrix, prompts consideration of the 36 cells that might be active in addressing the case's dimensions. By identifying the roles to be fulfilled, the user contemplates domains of knowledge or skill might aid in effective treatment. The knowledge, skill, and research resources available through the vertical axis derive from disciplines including: sociology, anthropology, psychology, linguistics, epidemiology, ethics, communication studies, informatics, education, and population sciences.

Applying the Matrix to a learning situation (see Matrix Case No. 1) reveals that not every cell will be activated by every case. However, in pilot testing, users discovered that potential facets are illuminated by this method, aspects that would have been overlooked even by attentive clinicians. Repeated use of the Matrix trains clinicians and students to enlarge their habitual zones of attention not only to include conventional professional actions but also to consider actions outside of their typical repertoire of clinical response. By arraying specific behavioral and social science knowledge domains that might help the clinician in fulfilling each role, this method brings to mind data and evidence resources that improves care efficacy.

MATRIX CASE NO 1: APPLICATION OF THE MATRIX IN THE LEARNING CONTEXT

As a medical student, you see a 15-year-old patient named Jennifer whose HIV test has just been confirmed positive. She has been sexually active with more than one partner since she was 13 years old. She reports no intravenous drug use or blood transfusions. Her mother is apparently healthy. The chart indicates that her current boyfriend has recently been told that he is HIV negative. The patient has had past negative HIV tests at another clinic.

Employing the Matrix immediately alerts the user to critical aspects of this complex clinical situation. (**CanMED ROLE**; *IOM domain*)

COMMUNICATOR

- *Patient Behavior* From Jennifer's behavior and language cues, recognize her emotions regarding her illness, cognitive grasp of her disease and its implications, and willingness to work toward health.
- *Physician Role and Behavior* Find the means to convey these results to Jennifer without transmitting personal biases or assumptions that could interfere with effective patient partnership.
- *Physician-Patient Interaction* Respect all confidentiality guidelines and laws in discussing blood test results. Establish rapport and trustworthiness to build a therapeutic partnership.

COLLABORATOR

- *Physician Role* Include health care team members with complementary roles: social worker, ethics consultant, and HIV intake nurse practitioner for new infection cases.
- *Social and Cultural Context* Search for the community resources available to Jennifer, such as community support groups and health education resources.

HEALTH ADVOCATE

- *Health Policy and Economics* Address issues of access to care for Jennifer, i.e., insurance status and special programs for HIV care funding.
- *Professional* Consider your responsibilities to report a new case of HIV infection. Engage in advocacy movements to improve care for young people with HIV infection. Address systemic biases that may compromise care to persons of this patient's class, gender, ethnic group, or behaviors.

Appropriate Matrix users range from students and clinicians relating to patient exchanges to educators and administrators addressing teaching objectives. For example:

- A second-year medical student in physical diagnosis interviews a clinic patient said to be non-compliant. She recognizes through the HEALTH ADVOCATE role and the patient's behavior that the patient is illiterate.
- A third-year medical student on an outpatient pediatric rotation suspects child abuse and recognizes that her role as PROFESSIONAL includes both reporting to the Department of Health and considering the needs of the parents.
- An attending physician on ward rounds hears a clinical clerk's congestive heart failure patient's readmission presentation. From the team's role as MANAGER AND SYSTEMS THINKER within the hospital's network of post-discharge interventions, focuses on both the health economics of readmissions and mind-body interactions of a family's anxieties with post-hospitalization care.
- A curriculum committee member recognizes that the curriculum does not prepare students for the COLLABORATOR role so finds multiple points of entry through the IOM domains of Policy, Mind-Body Interaction, and Social and Cultural Contexts for introducing teamwork into courses and clerkships.

BEHAVIORAL AND SOCIAL SCIENCES TEACHING AND LEARNING MATRIX

The populated Matrix displayed here illustrates, by cell, categories of concerns that may arise in working on any clinical case. While not exhaustive, these examples are intended to illustrate the utility of the Matrix in teaching, learning, and providing patient care.

Teaching & Learning Matrix		CanMEDS Physician Roles					
		Professional	**Communicator**	**Collaborator**	**Manager and Systems Thinker**	**Health Advocate**	**Scholar**
IOM Behavioral & Social Science Knowledge Domains	**Patient Behavior**	Counsel re risk and health promotion, model healthy behavior	Principles of behavior change, motivational interviewing	Enlist team resources for behavior change, 12-step groups, support groups	Patient-use interactional aids to change, environmental influences on behaviors	Advocate for services for patients with behavior-related illness	Review clinical guidelines for treating those with particular health-related behavior
	Mind-Body Interaction	Consider and propose to patient evidence-based mind-body interventions	Learn patient's interest in non-pharmacologic interventions	Involve CAM practitioners in treating pain, stress, mental illness, chronic disease	Include CAM in health plans, pt-centered design of clinical spaces	Advocate for reimbursement for and research in evidence-based mind-body treatments	Research emerging data on mind-body interactions
	Physician Role & Behavior	Ethical practice, enhance own well-being, expose biases, respect professional conduct codes	Reflective practice, self-awareness, recognize patient's effect on self	Commit to health care teamwork, accept leadership from other team members	Commit to quality improvement, reduce error, ensure patient safety	Advocate for health care professionals' needs, care for colleagues as well as for patients	Develop life-long learning habits, maintain and certify professional fund of knowledge
	Physician-Patient Interaction	Confidentiality, benevolence, trustworthiness, fidelity, altruism	Basic and advanced interview skills, shared decision-making	Partner with pt and family, seek help from mental health, social work, family therapy colleagues	Privacy of EMR, continuity of care, balance needs of each patient with needs of system	Personalize care, reflect on relationship with patient	Critically assess the evidence supporting the value of different interviewing approaches
	Health Policy, Economics, and Systems (including Population Health)	Avoid/expose conflicts of interest, control costs of care	Influence and educate public in health policy	Work with legislative, political, and public health systems	Develop knowledge of financial, investing, and marketing forces on health care policy	Activism toward health improvement at population level	Use & produce research on population science and epidemiology to improve health policy
	Social and Cultural Context	Recognize and reduce health disparities, include cultural & spiritual aspects of care	Culturally sensitive interactions, use of interpreters	Engage with community resources, learn patients' cultural health practices	Include patient's advocates in decision-making	Advocate for improvements in community health resources	Learn and use knowledge of social determinants of health status

THE PEDAGOGIC USE OF THE BEHAVIORAL AND SOCIAL SCIENCE MATRIX

Academic and clinical faculty in academic health centers must balance the clinical teaching mission with the clinical mission. Unlike earlier times, contemporary clinical teaching occurs not in patients' homes or solely in the in-patient setting, but increasingly in fast-paced outpatient settings. Wherever it occurs, clinical teaching enables faculty to teach and model skills and professional behavior, and to assess learners' knowledge, communication skills, procedural skills, and professional behavior. It also provides excellent settings for self-directed learning, learning through reflection, peer observation, and feedback.

As known behavioral health risks rise and proven behavioral treatments increase, clinical teachers must integrate knowledge and strategies from the behavioral and social sciences along with the biomedical and clinical sciences to more effectively prepare future generations of physicians to manage the current complexities of health care (28, 29). In all clinical environments, faculty members are striving to balance clinical productivity with effective teaching of medical students and residents. They need easily accessible tools to focus students' and trainees' attention on urgent social and behavioral dimensions of patients' situations, dimensions that risk being overlooked in a disease-centered approach.

The Matrix can be used in a time-effective way to provide synchronous or asynchronous teaching of behavioral and social content and skills. The Matrix can be applied to a clinical case to identify highest relevance content areas, can frame chalk talks in a broader integrative context, and can identify new learning issues. Students might identify personal, community, or policy issues germane to the case and/or their own development. Such training can motivate trainees to provide patient-centered and culturally responsive care, to become effective team members, to reduce health care disparities, to recognize their own professional development, and to foster self-directed learning (30).

Clinical teachers are encouraged to incorporate principles and processes of adult learning (31) that increase learner success, such as those detailed in Appendix C.

The Matrix can be fashioned for clinical, educational, or curriculum use by accessing the blank instrument provided in Appendix E (page 43).

IV. BEHAVIORAL AND SOCIAL SCIENCE LEARNING OUTCOMES

Medical educators teaching the behavioral and social sciences do not expect to produce sociologists or psychologists, any more than medical school teachers of cell biology expect to produce molecular biologists. The goal in providing rigorous training in behavioral and social sciences is to equip medical trainees with behavioral and social science-derived knowledge, skills, and attitudes required to practice medicine effectively.

CONCEPTUAL FRAMEWORK

Knowledge, skills, and attitudes taught through behavioral and social sciences weave together intellectual, interactional, emotional, and values-related lessons, some of them in very personal ways. In addition to objective knowledge and data, behaviors and social abilities are being taught or modeled. While behavioral and social science teachers convey population science, epidemiological information, and demonstrable facts about social processes and cultural groups, they also present socially and psychologically complex modes of action, like teamwork, and internally formative habits of being, like reflective practice. These interwoven social and behavioral lessons require and support dynamic forms of human interaction. Hence, as interactional skills, behavioral and social science teaching methods take into account the vitality of the relationships between students and teachers. As behavioral skills, the assessment methods have to observe the student's actual behavior in performing clinical activities.

Although behavioral and social sciences teachers may not agree on exactly what to teach to students or how and when to teach it, they are perhaps in more agreement regarding what they want their trainees to be able to do. Assessing these dimensions of medical expertise may require moving beyond check-listing learning objectives to observing the performance of professional activities (32). That is to say, what are the products of teaching social and behavioral sciences in medical school? Educators need to articulate the desired outcomes of this teaching as clinical actions. As has recently been expressed by proponents of "entrustable professional activity" modes of evaluation, the effectiveness of behavioral and social science education may ultimately be demonstrated by the student's ability to be entrusted with specific clinical responsibilities (33, 34).

The elegant lists of topics and roles created by the Institute of Medicine and the Royal College of Physicians and Surgeons of Canada set out many "must-teach" lessons to learn from the behavioral and social sciences. (See Appendices A and B.) Each school, within its own culture and situation, will emphasize certain aspects of this large field, and each will prioritize specific outcomes.

This report presents three methods of displaying learning outcomes in the behavioral and social sciences:

- Narrative Description of the Successful Student
- Tabular Crosswalk with Knowledge Domains and Competency Frameworks
- Prospective Professional Activities Performance Aspirations

As medical educators progress in their understanding of behavioral and social science curricular content, their pedagogic methods, and their readiness to assess learning, they will be able to use aspects of all three methods of goal-setting in arriving at the optimal method for setting, teaching, and evaluating the behavioral and social sciences curriculum in their school, and developing competencies specific to their school's program of study.

NARRATIVE DESCRIPTIONS OF STUDENTS INCORPORATING BEHAVIORAL AND SOCIAL SCIENCES EXPERTISE INTO PRACTICE

Panel members wrote-up narrated stories from experience with students who appeared to have incorporated behavioral and social sciences into their emerging clinical practice. Their mini-vignettes articulated performance goals of behavioral and social science teaching. From asking 'What does the student effectively equipped in behavioral and social science knowledge, skills, and attitudes look like?' emerged observable professional clinical activities amenable for assessment and appropriate to student competence. The identification and articulation of components of effective practice also serve as valuable curricular design and assessment guidelines.

MATRIX CASE NO 2: USING THE MATRIX TO LOCATE PROFESSIONAL ACTIVITIES

A fourth-year student on a sub-internship in the medicine ICU caring for an 85-year-old septic demented woman is told by the patient's daughter, "We want you to do everything for our mother." Having witnessed the family concern and tenderness, he has also noted their tensions and disagreements about what is best for her. His own grandmother had recently been hospitalized after a stroke and he recalls his alarm at her sudden frailty. Although of a different race and religious background, he can well imagine the pressures and emotions they are feeling. Recognizing the patient care team considers her clinical situation beyond effective treatment, he interprets the daughter's plea to "do everything" to include arranging with them for effective pain control and dignified hospice care.

The student's observed behaviors displayed the following **CanMEDS Roles** using selected *IOM domains*:

COMMUNICATOR

Doctor-Patient Interaction, Mind-Body Interaction, Social and Cultural Context The student displayed capacity to interpret emotions, build patient family relationships, recognize cultural humility, accord patient's religious/cultural beliefs, and accept communication challenges of familial discord.

HEALTH ADVOCATE

Doctor-Patient Interaction, Social and Cultural Context The student displayed capacity to convey available care options and behave accountably with the patient and family.

COLLABORATOR

Physician Role and Behavior The student displayed capacity to recognize his dependence on the health care team, understand the family's wishes and offer them appropriate support, engage guidance from experts, and volunteer to do some of the difficult emotion work.

PROFESSIONAL

Physician Role and Behavior, Health Policy and Economics The student displayed capacity to understand a dire clinical status, acknowledge his own empathy for the patient and family, use his personal experience to clarify and humanize care, balance his desire to comfort the family with their need for clinical realism, fulfill ethical duties to respect patient and family autonomy, and remain mindful of appropriate ICU resource use.

LEARNING OUTCOMES CROSSWALK MAPPED TO IOM DOMAINS AND COMPETENCY FRAMEWORKS

Crosswalk of Learning Outcome Competencies, CanMEDS Roles, IOM Knowledge Domains, and ACGME Core Competencies

Behavioral and Social Science Learning Outcomes at Graduation	Behavioral Social Science Field	CanMEDS Physician Roles	IOM Behavioral and Social Science Knowledge Domains	ACGME Core Competencies
Accurately describe the influence and potential implications of culture and community context on health behaviors, beliefs and outcomes, as well as how physicians should appropriately integrate this knowledge into patient care.	Anthropology	Professional Health Advocate	Social & Cultural Issues Patient Behaviors Physician-Patient Interaction	Patient Care Medical Knowledge
Build a comprehensive, accurate, and relevant patient history using an approach that supports a therapeutic alliance between patient and physician and that displays self-awareness and reflective practice.	Communication Linguistics Narrative Sciences	Communicator Health Advocate Professional	Physician-Patient Interaction Physician Role and Behavior	Patient Care Medical Knowledge
Use appropriate sources of information that identify and explicate a significant public health issue; be able to analyze data and information to reach a defensible conclusion, carefully noting specific limitations to inferences made.	Epidemiology Public Health Population Sciences	Scholar	Health Policy and Economics Physician Role and Behavior	Systems-based Practice Practice-based Learning and Improvement
Effectively explain to a patient, using the principles of shared decision- making, the patient's medical condition and/or treatment options (for common conditions and risk factors) within the context of that patient's background, education and belief systems.	Education	Communicator Health Advocate	Physician-Patient Interaction Physician Role and Behavior	Patient care Interpersonal and Communication Skills
Honestly and comprehensively document and access patient information within medical records, including the EMR. Understand the consequences of emerging forms of clinical recording.	Informatics Knowledge Management	Collaborator Communicator	Physician Role and Behavior Health Policy	Interpersonal and Communication Skills Systems-based Practice
Describe the potential impact of changes in governmental and private-sector health policies and how to advocate on behalf of individual and groups of patients in relation to the policy's intended consequences.	Political Science Health Policy Economics	Collaborator Health Advocate	Health Policy and Economics	Professionalism Systems-based Practice
Provide patient-centered behavioral guidance, and explain the appropriate theoretical model that supports the approach.	Psychology	Communicator Scholar	Patient Behavior	Interpersonal and Communication Skills Patient care
Accurately describe the organization and basic financial models of the U.S. health care system, its overall performance, and potential impact of these realities on patients the student has cared for.	Health Systems Administration Social Work	Professional Health Advocate	Health Policy	Systems-based Practice Practice-based Learning and Improvement
Accurately describe how social determinants of health influence health outcomes and how physicians can incorporate this knowledge in the care of patients.	Sociology Psychology	Communicator Health Advocate	Social /Cultural Issues Physician-Patient Interaction	Medical Knowledge
Accept and report personal errors, discuss the potential sources of errors, and develop an action plan to reduce the risk of future errors.	Ethics Psychology	Professional Health Advocate	Physician Role and Behavior	Systems-based Practice Practice-based Learning and Improvement

The crosswalk table displays learning outcomes distilled from the IOM knowledge domains and the competencies published by CanMEDS and ACGME. This display is intermediate between an observation of what successful students can do and a list of aspirations regarding the professional activities that all students can be expected to perform with adequate behavioral and social sciences training. The resultant proposed learning outcomes are nationally and internationally derived, with broad applicability for medical learners, and as such are offered as a credible and objective foundation for schools to draft individualized learning objectives that will garner the endorsement of their faculty and students.

Proposing the learning outcomes within the nationally endorsed knowledge domains and competencies ensures that a school's expectations are based in evidence and consensus regarding educational standards and good clinical practice.

Learning outcomes drawn up by individual schools can reflect local priorities and needs within an evidence-based competency-based framework that will intercalate with the school's overall learning objectives/graduation competencies. The required outcomes may mature with time, as the health care system changes and new knowledge and skills appear. Dynamic and responsive, such statements of learning outcomes can act both as expectations for students and faculty and as articulations of institutional missions.

BEHAVIORAL AND SOCIAL SCIENCE IN MEDICINE COMPETENCIES

The sample competencies below follow from the learning outcomes crosswalk presented in the preceding section. These examples may be useful as schools draft competencies germane to their institutional mission and goals.

Example Behavioral and Social Science in Medicine Competencies
Upon graduation, the medical student will be able to:
• Describe the influence and potential implications of culture and community on health behaviors, beliefs, and outcomes. • Integrate into patient care factors relating to the patient's cultural context and community influences.
• Employ principles of self-awareness and reflective practice in developing a therapeutic patient-physician alliance.
• Use appropriate sources of information to identify and explicate a significant public health issue. • Analyze data and information to reach evidence-based defensible conclusion. • Describe limitations to inferences derived from data analysis.
• Communicate using the principles of shared decision-making, the patient's medical condition and/or treatment options within the context of that patient's background, education, and belief systems.
• Employ patient documentation and information systems, including the EMR. • Understand the consequences of emerging forms of clinical recording.
• Describe the potential impact of changes in governmental and private-sector health policies. • Advocate on behalf of individuals and groups of patients in relation to the policy's intended consequences.
• Provide patient-centered behavioral guidance. • Explain the appropriate theoretical model that supports the approach.
• Describe the organization and basic financial models of the U.S. health care system, the current performance of the overall U.S. health care system, and the potential impact of these constructs on patients.
• Describe how social determinants of health influence health outcomes and how physicians can incorporate this knowledge in the care of patients.
• Accept accountability in reporting personal errors. • Discuss potential sources of errors with members of the health care team. • Develop an action plan to reduce the risk of future errors.

PERFORMANCE EXPECTATIONS FOR PROFESSIONAL ACTIVITIES

Grounded in 'entrustable professional activities' concepts and modes of assessment, the descriptive profiles below illustrate performance capacities that, with proper behavioral and social science training, students should display in their intellectual and clinical work. These profiles transcend competency and knowledge domains by arraying the levels of responsibility, micro to macro, actually being entrusted to students by a performance inventory expected of an effective medical student. Behavioral manifestations will vary by setting, but the range in the array signals multiple evaluation sources appropriate for educator assessment (73).

Offered as aspirational in nature, not all students will be able to attain expertise in all of the activities delineated. Since these performance capacities are integrations of multiple lessons on multiple axes—cognitive, emotional, relational, values based—direct cause-effect is not straight-forward. However, faculty can assess performance with emerging metrics and assessment approaches from simulation, reflection, 360° assessments, ethnographic field methods, and the students' actual performance.

Patient: (Communication, Trustworthiness, Supportiveness) Patients cared for by this student report comfort, respect, and trust in their interaction. They understand information communicated by the student, including behavioral counseling. They report that their personal, cultural, and social contexts were taken into account in their care and that their questions fully answered.

Community: (Language Proficiency, Strength and Needs Assessment, Culturally Sensitive Care) The student can communicate, through interpreters when necessary, with patients in their native language, and is capable of delivering culturally appropriate care. Curious about the cultures served by the institution, the student displays willingness to act on behalf of patients and community members, who in turn find the student to be responsible, humble, and helpful.

Public/Global Health: (Health Policy, Health Care Justice, Advocacy) The student considers health policy and economics forces when making decisions about patients or resource allocation, recognizing the potential conflicts of interest for the individual clinician. The student understands the cultural influences on health, and contributes to efforts toward health care justice at local, community, or global levels.

Self: (Knowledge Growth, Self-Awareness, Professional Development) The student applies knowledge of population sciences, psychological dimensions of patient care, epidemiological disease patterns, and evidence-based practice guidelines. Mindful to maintain systems of self-care, the student reports an increase in self-awareness and intentional reflection, while conscious of developing professional identity.

Peers: (Teamwork, Collaboration in Teaching and Learning) The student is recognized by fellow students for peer teaching and evaluation engagement, and is found by peers to be available for peer consultation, shared learning projects, and a willingness to share expertise.

Institution: (Effective Teamwork, Contributions to Institutional Climate) Team members note respectful collaboration. The student asks for advice and guidance from non-physician colleagues, and is similarly approachable. The student shows fiscal prudence, is alert to minimize medical errors, ensure patient safety, and improve quality.

Profession: (Medical Standards, Integrity, Altruism) The student is aware of personal boundaries in clinical work, performs clinical duties with honesty, reports clinical data truthfully, and admits personal errors. The student observes professional standards of conduct and does not violate standards such as dress, demeanor, conduct, civility, and punctuality. The student understands the need to put patients' interests ahead of personal interests and the interests of the medical profession.

V. INSTITUTIONAL CHANGE AND PEDAGOGY FOR THE BEHAVIORAL AND SOCIAL SCIENCES

This report is a call to more fully incorporate the insights, tools, and perspectives from the social and behavioral sciences into medical education so that their value can be more fully realized in medical practice. However, readers may be left with questions about how to make the plan work at their individual institutions and medical practices.

Significant organizational and cultural change is difficult. Papers about both the "problems and prospects" (36) of incorporating the social and behavioral sciences in medical education have been around for generations. This is not a new concern, nor one with a simple and clear path to successful solution. Arguments for the need to include this content in medical training are common and persistent. Discussions of barriers, challenges, and model programs are readily available. However, each institution must find the most productive way forward for its own culture, organization, students, faculty, staff, patients, and patient populations.

BARRIERS AND CHALLENGES

Awareness of the historical barriers to behavioral and social science content in medical education can provide some guidance and help in avoiding common pitfalls. The first stage of barriers were defined in terms of concerns over behavioral and social sciences content value from a biomedical perspective, staffing issues, and tight curriculum space (36, 37, 38, 39, 40).

With the increasing content of behavioral and social sciences in medical education, additional concerns have been uncovered and articulated in the literature. The first involves the question of relevance and student resistance to content that they do not perceive to be valuable or that they feel has an ideological bias (41). This picks up from earlier concerns over content value, but has been recast as a specific need to do a better job of translating this content into the individual medical practice of physicians in training, as opposed to presenting abstractions and theories (41, 42, 43, 44, 45). The second major contemporary concern involves integration with the rest of the curriculum. Behavioral and social sciences courses that are primarily stand-alone or exist outside of the rest of the medical school content are at risk of being perceived as irrelevant

by medical students (44, 45, 46, 47). However, there are substantial challenges and unanswered questions in integrating medical curricula (48).

An additional concern is over the lack of standard curricula, content modules, clear learning objectives, and training resources. This should be interpreted as a positive change in the configuration of barriers. Instead of questions about "whether to" include behavioral and social sciences, the questions have shifted to "how to" better include behavioral and social sciences content in medical education. The current concerns focus on how to make this content more integrated, relevant, and applicable, and on identifying successful education strategies for institutions, although questions persist about teaching this content (49).

CURRENT LANDSCAPE

A number of medical schools have published their own models for successfully integrating and improving behavioral and social sciences content (43, 47, 50, 51). There are also guidelines about the necessary or "ideal" content for medical school behavioral and social sciences programs (4, 40, 52). For example, nine U.S. medical schools were awarded five-year NIH grants to enact the Institute of Medicine recommendations on social and behavioral sciences, each pursuing very different avenues toward selected learning outcomes. (See Appendix D.)

Even with these important advances, consensus on curricula and teaching resources remains lacking, made all the more acute by insufficient supply of faculty versed in integrating behavioral and social science content into the medical education program (39, 49). These two issues are clearly related. The historical problem of staffing for behavioral and social sciences education in medical schools and residency programs still poses an important barrier to advancement in this area.

TEACHING METHODS FOR BEHAVIORAL AND SOCIAL SCIENCE CURRICULA

The pedagogies that are useful to convey the complex nature of the behavioral and social sciences include classroom/lecture hall methods and also team-based learning, small-group discussions, reflective writing, mentorship, and simulations (53, 54, 55, 56, 57). Most of them incorporate longitudinal seminars or small groups whose members can develop group ownership in which faculty and students share direction and facilitation.

Population sciences, statistics, cognitive and developmental psychology, and applied sociology can typically be taught in conventional classroom settings. Other capacities to be taught—empathy, team collaboration, patients' lived experiences, and self-awareness—develop in the interior of the individual learner and mobilize emotions and value beliefs (58).

As its own social system, the medical school can teach these lessons. Faculty and students learn together and from one another (59). Discovery, setting of goals, building of skills, and assessing oneself and others in the achieving of skills take place collaboratively.

Evidence-based teaching maximizes effectiveness and encourages ongoing learner engagement (60, 61). In general, passive information dissemination (e.g., the standard didactic lecture) doesn't have a significant impact on professional practice (62, 63). Highly interactive, multimodal teaching materials adapted or even co-designed by learners shows promise for improved learning outcomes. Creating a multimodal training program that includes pedagogies, such as web modules, hands-on training sessions, ongoing expert consultations, small group peer-to-peer learning, and learner-driven adaptations best situates learners to develop vital attitudes, knowledge, and skills.

The personal relevance of behavioral and social sciences concepts such as gender, race, socioeconomic status, and power may imbue an emotional poignancy to the material, creating tensions that can facilitate or hinder learning. A learning climate that establishes safety, but allows and supports differences of opinion, is essential. Students need small groups to promote highly engaged discussions, large groups that illustrate the range and depth of diversity in their classmates, and personal writing or other reflective exercises that facilitate processing of sometimes challenging material (64). Unlike studying other biomedical sciences, learning behavioral and social sciences often requires personal reflection, questioning ideologies, guidance from mentors, and an element of personal growth that influences professional development. Robust student and community involvement in curriculum development, implementation, and evaluation ensures topical relevance, maximizes learner buy-in, and minimizes concerns about promoting a particular political ideology (65, 66).

Successful behavioral and social science teaching requires a cadre of well-trained, reflective scientists and clinicians who are supported by their institution (67, 68). Ideally, clinically experienced behavioral and social sciences scientists and behavioral and social sciences-trained physicians and other health care professionals will create interdisciplinary and interdepartmental teams to achieve this mission.

It is essential to use evolving assessment methods that require learners to demonstrate a meaningful understanding of behavioral and social sciences concepts and the facility to apply them in clinical practice. Clinical performance exams involving complex simulations with observations and feedback offer one resource-intensive way of evaluating behavioral and social sciences competencies (56). In the domain of professional development, structured reviews of personal reflections developmentally arrayed within a learning portfolio could provide enough data to identify students in need of remediation and those doing exceptionally well (57). Peer-to-peer evaluations or even 360° evaluation could furnish further data, particularly about how a student performs in clinical scenarios or when not under the scrutiny of the faculty.

VI. SUMMARY

This report presents a way to understand established learning outcomes in the behavioral and social sciences and suggests teaching implementation strategies. The learning outcomes template gives medical schools an outline to incorporate the concepts of the behavioral and social sciences in their curricula, and the teaching methods section provides the means for incorporation.

Hodges describes an outcomes-based model of competence development and uses the CanMEDS and ACGME Core Competencies to illustrate that the "time based" model of learning in medicine is no longer adequate (52). This report continues the conversation that began with the publication of the "Scientific Foundations for Future Physicians" and echoes the call from medical educators to renew approaches used to educate physicians while remaining mindful of the complex journey of becoming a physician.

This report opens a dialogue with medical educators, clinicians, and students about the nature of clinical work and the foundations in the science and methods of behavioral and social science that support aspects of that work. Although it is not within the purview of this report to recommend pre-medical curricula or residency program training, it has been undertaken with the hopes that close collaboration among those deliberating about these topics at all levels of medical training will occur. Together, the efforts of these linked projects will equip medical educators with contemporary insights into how best to prepare medical students to practice a fully informed medicine.

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APPENDIX A

Institute of Medicine Behavioral and Social Science Knowledge Domains
Excerpted from Institute of Medicine. Improving Medical Education: Enhancing the Social and Behavioral Science Content of Medical School Curricula. National Academy Press, 2004.

BEHAVIORAL AND SOCIAL SCIENCE DOMAINS

Patient Behavior
- Health risk behaviors
- Principles of behavior change
- Impact of psychosocial stressors and psychiatric disorders on manifestations of other illnesses and on health behavior

Mind-Body Interactions in Health and Disease
- Biological mediators between psychological and social factors and health
- Psychological, social, and behavioral factors in chronic disease
- Psychological and social aspects of human development that influence disease and illness
- Psychosocial aspects of pain
- Psychosocial, biological, and management issues in somatization
- Interaction among illness, family dynamics, and culture

Physician Role and Behavior
- Ethical guidelines for professional behavior
- Personal values, attitudes, and biases as they influence patient care
- Physician well-being
- Social accountability and responsibility
- Work in health care teams and organizations
- Use of and linkage with community resources to enhance patient care

Physician-Patient Interactions
- Basic communication skills
- Complex communication skills
- Context of patient's social and economic situation, capacity for self-care, and ability to participate in shared decision-making
- Management of difficult or problematic physician-patient interactions

Health Policy and Economics
- Overview of U.S. health care system
- Economic incentives affecting patients' health-related behaviors
- Costs, cost-effectiveness, and physician responses to financial incentives
- Variations in care

Social and Cultural Issues in Health Care
- Impact of social inequalities in health care and the social factors that are determinants of health outcomes
- Cultural competency
- Role of complementary and alternative medicine

APPENDIX B

CanMEDS Physician Competency Framework

Excerpted from Frank, JR. "The CanMEDS 2005 Physician Competency Framework." The Royal College of Physicians and Surgeons of Canada, 2005.

PHYSICIAN ROLES

As **Professionals**, physicians are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behavior.

As **Communicators**, physicians effectively facilitate the physician-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.

As **Collaborators**, physicians effectively work within a health care team to achieve optimal patient care.

As **Managers**, physicians are integral participants in health care organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the health care system.

As **Health Advocates**, physicians responsibly use their expertise and influence to advance the health and well-being of individual patients, communities, and populations.

As **Scholars**, physicians demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application, and translation of medical knowledge.

As **Medical Experts**, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes when they provide patient-centered care. Medical Expert is the central physician Role in the CanMEDS framework.

APPENDIX C

Principles and Settings of Behavioral and Social Science Matrix Use

In designing learning experiences using the Matrix, clinical teachers are encouraged to incorporate principles and processes of adult learning (31) that increase learner success, as detailed below:

Allow choice/self-direction. Encourage students to explore areas of personal interest or personal insecurity. Facilitate students' learning rather than just providing facts. Actively engage students to identify the behavioral and social science domains and physician roles they want to investigate.

Integrate new concepts with current knowledge. Ask students to share a challenging clinical encounter. Help students recall relevant knowledge and experience. Help learners identify relevant social and behavioral science content that could support more effective management of similar problems in the future.

Connect the goals of the clinical teaching to their personal goals. Ask students to choose one physician role that they want to augment in their practice. Guide them in setting a specific goal and plan to enhance their development in that role. Help them connect this goal to the other educational requirements and patient care experiences in the clinical rotation.

Illustrate relevance. Help students see the value of learning how to facilitate behavior change. Show students how motivational strategies can be incorporated into work with patients.

Are practical. Explicitly connect relevant behavioral and social science content with a challenging clinical problem. Help students develop a plan to apply behavioral and social science knowledge and strategies to their work with patients and colleagues.

Show respect. Cultivate an open, learner-centered environment that affirms students' knowledge, reinforces their contributions to patient care, and encourages them to share their ideas and assess their strengths and weaknesses. By example, encourage students to foster a patient-centered health care environment in which they solicit their patients' ideas and concerns, show respect for culturally based values and preferences, affirm patients' goals and accomplishments, and advocate for evidence-based diagnostic and treatment strategies.

There are many settings in which the Behavioral and Social Science Matrix can add to efficiency and comprehensiveness in teaching, mentoring, and educational planning:

"Doctoring" Courses: Faculty who teach medical interviewing, communication skills, and physician-patient relationship skills can use the Matrix to prepare students for early patient contact or standardized patient interviews. By plotting a few known features of a case on the Matrix, the students can preview what role or roles they might be called upon to play and what knowledge domains to tap during their interaction.

Pre-Clinical Students: The Matrix can orient pre-clinical students in physical diagnosis courses or early clinical exposures, who can often be overwhelmed by the urgency of patients' problems and the uncertainty of their role in the clinical setting.

Basic Science Behavioral and Social Science Courses: The Matrix can assist teachers of sociology, anthropology, psychology, population sciences, linguistics, political science, or other behavioral and social science disciplines in achieving optimal relevance in medical school teaching.

Clinical Behavioral and Social Science Courses: Courses or rotations devoted to preventive medicine, reducing health disparities, or international health can use the Matrix to anchor academic learning to clinical practice.

Clinical Clerks and Residents: Faculty holding attending rounds and supervising students and trainees in clinic settings can expect learners to identify behavioral and social aspects of cases on the Matrix before case presentations and during case discussions.

Identifying Research Projects: Mentors for research students or Scholarly Projects students can use the Matrix to counsel students trying to crystallize the social/behavioral focus of a research project.

Curriculum Planning: The Matrix can assist curriculum committees or course directors in identifying aspects of population sciences, systems teaching, and clinical practice to include in training. Both Physician Roles and IOM Domains are helpful sorting devices for making a curriculum both coherent and comprehensive.

Assessment of Individual Student or Resident: The Matrix is a unifying tool for examining and evaluating a student's progress in using knowledge and perspectives from a behavioral and social science perspective in a number of clinical roles.

APPENDIX D

NIH K07 Grants for Strategies to Improve Behavioral and Social Science Teaching and Learning

Becoming a Doctor at the Albert Einstein College of Medicine

Albert Einstein College of Medicine, Bronx, NY

1. A major revision to the clinical clerkships: a new, longitudinal course before and throughout the clerkship year entitled "Patients, Doctors, and Communities"
2. Major changes in the teaching and assessment of communication skills through all four years of medical school
3. New initiatives in teaching and assessing professionalism (e.g., addressing implicit bias and its impact on within-provider health care disparities)

Medical Student Behavioral Science Learning/Teaching

David Geffen School of Medicine at University of California at Los Angeles, Los Angeles, CA

1. Medical student curriculum evaluation and major overhaul in teaching of all IOM domains with faculty development and innovation in curriculum materials
2. Graduate medical education intensification of the teaching and assessment of professionalism, system-based practice, and practice-based learning
3. Influencing structure and culture of medicine institution-wide with school of nursing, residency programs, and hospital around issues of student abuse, CQI, reflective writing, and appreciative inquiry

Redesigning and Enhancing Behavioral and Social Science Curricula

University of North California School of Medicine, Chapel Hill, NC

1. Introduction of longitudinal curriculum in culture, communication, and ethics with communication assessment, cultural sensitivity, and faculty education
2. Narrative enrichment to instill in students a habit of critical reflection on the social science, behavioral and values dimensions of health and doctoring
3. Institutional change via collaboration with school leadership to extend the teaching of behavioral and social sciences into the clinical years

Indiana University School of Medicine Behavioral and Social Science Integrated Curriculum

Indiana University School of Medicine, Indianapolis, IN

1. Infusing social and behavioral science (SBS) into all four years for a total of 93 hours of IUSM medical student contact
2. Developing and using innovative interactive learning materials, including a simulation board game, to teach health policy and economics in a team-based learning context
3. Council of Elders and Council of Family Violence Survivors bringing patients and community members into direct dialogue with medical students

APPENDIX D (CONT'D)

Behavioral and Social Sciences as Core Elements of Physician Training

Oregon Health & Science University, School of Medicine, Portland, OR

1. Revitalization of health policy and economics curriculum to coherent, 24-hour sequence including student leadership and ethnographic interview with patients
2. Expansion of training in doctor-patient communication introducing OSCEs, video review and feedback, motivational interviewing, and rigorous evaluation
3. Increased institutional acceptance of importance of BS/SS in medicine, including faculty, student, and house staff involvement

Relationship-Centered Transformation of Curriculum

Baylor College of Medicine, Houston, TX

1. Enhance formal curriculum with relationship-centered care curriculum in all four years, including "healer's art" and longitudinal ambulatory clinical experience
2. Establish competency-oriented curriculum using Matrix evaluation, student portfolios, reflective writing, and scholarly projects
3. Establish learning communities with faculty mentors and peer resource network student groups

Integrating the Social and Behavioral Sciences in Undergraduate Medical Education

University of California at San Francisco School of Medicine, San Francisco, CA

1. Creation of a social and behavioral science (SBS) "pipeline" program to train the next generation of physician leaders and scientists doing SBS research, teaching, and program development
2. Creation and evaluation of core SBS content required for all medical students, validation of global SBS competencies, and the development of innovative SBS assessment tools
3. Construction of enduring curricular infrastructures and processes to support greater "institutional penetration" of the SBS and shared ownership of core clinical competencies

BASIC Training in Medicine: Behavioral and Social Sciences Integrated Curriculum

University of Wisconsin School of Medicine and Public Health, Madison, WI

1. Comprehensive longitudinal addressing of issues of professionalism with medical students via education, faculty mentors, and peer learning communities
2. New public health curriculum (health care systems/economics/public health) integrated into all four years of curriculum, with education integrating medicine and public health
3. New cultural competency longitudinal curriculum with innovative interventions on clerkships, standardized patients, and introduction of student portfolio

Human Behavior and Experience in Health and Illness

College of Physicians and Surgeons of Columbia University, New York, NY

1. Improving pedagogy for medical students using student-led seminars, student initiatives in teaching and learning methods, and peer evaluation
2. Improving faculty skills, expertise, and power through weekly, graduate-level faculty seminar in narrative skills, reflective practice, and team-based learning
3. Impact on institutional culture through K07 participants in leadership positions, medical-center-wide team building, and collective reflection

APPENDIX E: THE BEHAVIORAL AND SOCIAL SCIENCE MATRIX INSTRUMENT

Teaching & Learning Matrix		CanMEDS Physician Roles					
		Professional	Communicator	Collaborator	Manager and Systems Thinker	Health Advocate	Scholar
IOM Behavioral & Social Science Knowledge Domains	Patient Behavior						
	Mind-Body Interaction						
	Physician Role & Behavior						
	Physician-Patient Interaction						
	Health Policy, Economics, and Systems (including Population Health)						
	Social and Cultural Context						

AAMC BEHAVIORAL AND SOCIAL SCIENCE EXPERT PANEL

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Columbia University

Eric Holmboe, M.D.
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