The academic health center in a disrupted world

Steven A. Wartman, MD, PhD, MACP

Introduction

Richard L. Byyny, MD
Executive Director, Alpha Omega Alpha

At the time of the founding of Alpha Omega Alpha in 1902, the Flexner Report was still eight years in the future and the academic health center as we know it today did not exist. These institutions developed as a mid to late twentieth-century approach to aligning education and research with patient care, and have become critically important to the medical profession and health care worldwide. Academic health centers have evolved to represent the best in medical care, research, and medical education in the United States. But what has become the traditional structure of academic health centers faces significant challenges in an increasingly hostile budgetary and globalized environment, requiring these institutions to find the leadership they need to guide them through this period of economic, social, and technological disruption.

Dr. Steven Wartman, President and CEO of the Association of Academic Health Centers, wrote this editorial at my invitation to explain to members the structure and function of academic health centers, and to tell us about the challenges they face in the twenty-first century, and the kinds of leadership they will need to master these challenges.

The author (AΩA, Johns Hopkins University School of Medicine, 1970) is President/CEO of the Association of Academic Health Centers, a member of the Board of Directors of Alpha Omega Alpha, and a member of the editorial board of *The Pharos*.

In my role since 2005 as president of the Association of Academic Health Centers (AAHC)—and building on my prior experience in academic leadership—I have gained a unique perspective about the institutions comprising the health-related components of universities. The mission of these institutions is to educate the next generation of health professionals, conduct cutting-edge basic and clinical research, and provide comprehensive and advanced patient care. Their central defining feature is the ability to align education and research with patient care. As such, they are horizontally focused organizations that aspire to remove the traditional boundaries between health professions, schools, specialties, departments, and other divisions to create a whole capable of providing synergies that are vastly larger than the sum of its individual parts. Academic health centers (AHCs) are, in a sense, evolving works-in-progress that innovate continuously to meet the challenges and opportunities of twenty-first-century trends in patient care, education, and research.

Over the past decade, the world of AHCs has begun an especially interesting and important transition, sparked by the emergence of both unprecedented—often daunting—challenges and exhilarating new opportunities. I believe a new model of the AHC is evolving. AHCs are currently in a prolonged period of "mission disruption"—preserving some traditions and jettisoning or transmogrifying others, while simultaneously forging ahead in wholly new directions. Each AHC's unique priorities and issues mean that many new models are emerging. Here, however, I will focus on general and overarching trends that apply broadly to the universe of AHCs.

An AHC is an accredited, degree-granting institution of higher education consisting of a medical school (either allopathic or osteopathic), one or more other health professions schools or programs (e.g., allied health sciences, dentistry, graduate studies, nursing, pharmacy, public health, veterinary medicine), and an owned or affiliated relationship with a teaching hospital or health system.[1] AHCs are thus unique hybrids of business and academics, pursuing simultaneously the business of patient care and the missions of education and research. The use of the term "center" to describe what these institutions do is more historical than contemporary—in reality, AHCs might be better described as "systems" or "networks," in that they include an expanding geographic range of institutions and facilities that offer many different kinds of services.

There are two prototypical models of the organizational structure of AHCs:

1. The fully integrated model, in which academic, clinical, and research functions report to one person and one board of directors.

2. The split/splintered model, in which the academic and clinical/health system operations are managed by two or more individuals reporting to different governing boards.[2] This model typically includes a defined contractual relationship between a medical school and a teaching hospital.

Obviously, there are a number of nuances of the two types,

including variations in locating the responsibility for faculty practice plans and other health system components.

AHCs are vital to their communities, whether they be regional, national, or international, fulfilling a broad social mission. Their three central activities of education, research, and patient care improve health and well-being and expand the boundaries of knowledge.[3] AHCs train future generations of health professionals in medicine, nursing, public health, and related disciplines. They develop transformative knowledge through biomedical research that often leads to innovative therapies. They deliver a comprehensive range of medical services informed by continuous improvement. In addition, AHCs address the intractable challenges such as rare diseases and threats to public health—including Ebola and HIV—that otherwise would not receive focused attention.[4] Many AHCs serve as safety net institutions, caring for a significant proportion of the uninsured.[5,6] They provide what is often the only local source of specialized services, such as burn units and transplant centers, and stand at the forefront of the country's defense in response to public health outbreaks, natural disasters, local crises, and potential terrorist attacks.[7]

AHCs also serve as powerful economic engines. They employ thousands of people, with billions of dollars paid for salaries, research funding, and direct spending.[8] The research they support generates original products and technologies driving economic growth and benefiting the health and well-being of millions of people worldwide. AHCs are economic anchors of their communities and often serve as the nucleus for groups of biomedical industries that grow around them.

Clearly, a strong future for AHCs must be secured and sustained. But to continue to flourish in increasingly competitive national and global economies, AHCs must achieve unprecedented scales of efficiency and agility in their mission areas of education, patient care, and research. The challenges they face have never been more acute.

Disruption and transformation*

The forces of disruption in medicine today are many. The explosion of consumer empowerment created by the internet and related technologies challenges the knowledge hegemony of caregivers. The "omics" revolution and entrepreneurial advances in health and internet-related technologies is creating a new scale of "personalized medicine." The long-standing and highly successful U.S. model of biomedical research in AHCs, in which clinical revenues subsidize research and teaching, is increasingly fragile given the downward pressures on reimbursement and lack of real growth in many funding agencies, including the U.S. National Institutes of Health (NIH).[9] Further, ongoing consolidation within the health marketplace, especially in the United States,[10] raises serious concerns about the ability of individual AHCs to compete with far larger

national or international health systems.

At the same time, of course, AHCs are also being buffeted by broader trends—to cite just a few, these include changes in societal needs and values, disease patterns, economic trends, globalization, politics, population demographics, policy changes, and advancing science and technology.

Meanwhile, the day-to-day operations of AHCs are predominantly affected by market consolidation, changes in clinical funds flows, and downward pressures on research funding. A recent survey of AAHC members found clear markers of disruption and change:

• Forty-one percent are undergoing major expansions of their hospital or physical network.

• Thirty-seven percent are embarking on large-scale cost-reduction measures.

• Thirty-six percent are opening a new health professions school or new branch campus.

• Thirty-one percent are changing their governance structures or significant reporting relationships.

These dynamic realities challenge or perhaps even upend the grand tradition of the "virtuous cycle," in which the business side of academic medicine subsidizes the research and education functions, while the academic side enhances the margins and reputation of the clinical programs.[12] In the face of the forces of disruption, however, new realities about health care must be acknowledged and appropriate new business models evolved.

Three trends, among others, are particularly noteworthy as harbingers of disruption and transformation for AHCs:

1. New economic realities

2. The trend towards interprofessional (team) education and practice

3. The evolving relationship of medicine and machine.

Economic realities
Patient care

Since the advent of Medicare and Medicaid, AHCs have increasingly relied on clinical revenues to support research and teaching. This model is unique to the United States. Today, this long-standing arrangement is being challenged by changes in health care delivery and economics. These changes are so disruptive that I euphemistically describe them as creating a "new physics" of patient care. With apologies to Dr. Einstein, the following frames my argument for rethinking the way AHCs deliver health care.[13]

---

* Portions of these observations are adapted from my chapter, "Academic Health Centers: Future Shock or Future Success?" in reference 11.

$E = mc^3$

E = emerging model of health care where

m = population, individually and collectively

$c^3 = \quad c^1$ = care anywhere

$\quad\quad\quad c^2$ = care in teams

$\quad\quad\quad c^3$ = care by large data sets

In this tongue-in-cheek model, care anywhere (c^1) reflects two key trends. First, technological advances allow care to be delivered wherever the patient happens to be, rather than keeping it tethered to a hospital or clinic. Second, increasingly knowledgeable and informed consumers are seeking more convenient options for receiving health care. Among other implications this means that large infrastructures, such as hospitals, while continuing to be necessary, will need to be configured differently as part of systems or networks that expand far beyond their fixed boundaries.

Care in teams (c^2) refers to the reality that the once sacrosanct one-to-one doctor/patient relationship is giving way to patient relationships with multiple kinds of health professionals. In this context, determining how to gain the most value from team care will be crucial. Reimbursement practices will need to be realigned to support this new model, and the scope of practice will likely need careful redesign as interprofessional health care teams play a much larger role in health care delivery.

Care by large data sets (c^3) suggests that with the rise of Big Data, enormous volumes of information can and will be collected for each individual patient, often continuously, requiring fundamental shifts in practices for analysis. Big clinical data sets may yield insights that will transform individual patient care, but will also create challenges in developing best practices to manage and operationalize them. A new interpretive and functional infrastructure will be required to manage this remarkable flow of data. This trend is likely to lead to a new confluence of medicine and machines.

Evolving payment models

The market forces driving institutional consolidation and consolidated provider power particularly threaten AHCs that serve as comprehensive care providers and often as community health care safety nets. To flourish, such AHCs will need to form new alliances and strategic partnerships, while still meeting the challenges of preserving and maintaining their fundamental missions.

Against this complex backdrop, there is no perfect payment model. As a 2001 paper put it: "There are many mechanisms for paying physicians; some are good and some are bad. The three worst are fee-for-service, capitation, and salary."[14] The sad truth is that each payment methodology has its flaws: fee-for-service can lead to overuse of health services; capitation can lead to underuse; and salaries can lead physicians to do less work less efficiently.

As health systems adapt to new market realities, a hybrid of payment methodologies reflecting health system priorities and political contingencies will evolve. These methodologies will be calibrated according to the degree of risk for population health that is assumed by the care provider. Being willing to take risks in the first place, and being able to manage risk well, will eventually be defining characteristics of the "new physics" of patient care.

The changing dynamics of research and the future of the single-lab funded investigator

Research is rarely a profit center for institutions, either academic or commercial. Data collected by AAHC's Research & Analytics program indicate that, on average, external grants and contracts are the largest funding source for U.S. medical schools, and that thirty-five percent of total research expenses are funded using internal funds. Thus, for every one dollar increase in research expenses funded by external grants and contracts, U.S. medical schools pay an additional fifty-two cents.[15]

Much of that fifty-two cents has traditionally come from patient care revenues. It is no coincidence that the rise in NIH funding has been largely paralleled by the rise of non-tenure track clinical faculty. However, as clinical margins shrink and traditionally available resources either lose purchasing power or become more competitive, institutions in both the public and private sectors—as well as international institutions—will need to compete aggressively for new sources of research support. More attention is also being paid to research efficiency and research emphases: institutions are increasingly moving to shared resource models that offer the promise of lower overhead and increased economies of scale. One result is that, for many institutions, it is no longer economically practical to consider every grant a "good" grant. Rather, institutions are in the early stages of adopting a more business-like approach to R&D, with careful budgeting that focuses on areas of priority. Grants falling outside these focal areas will be scrutinized— and possibly even declined. Moreover, it is likely that these economic forces will drive further differentiation among AHCs in the extent and reach of their research portfolios.

The image of the brilliant, single-minded scientific

researcher producing astounding insights is indelible. From Archimedes to Galileo to Newton to Einstein, the dazzling accomplishments of lone scientists reinforce society's preconceptions of how science is done. Indeed, the classic model of the single-lab funded principal investigator has historically been the backbone of much biomedical research at AHCs. In contrast, today's breakthroughs increasingly derive not from lone researchers but from teams of scientists collaborating across disciplines. That trend, now also seemingly indelible, has significant implications for AHCs, including for budgeting.

At the same time, other fundamental building blocks in the economics of laboratory research are crumbling. The R01 model is significantly challenged, of course, by erosion in NIH funding, both in terms of the decrease in the number of successful R01 applications—now at record low levels—and the reality that funding for the NIH overall has not kept pace with inflation and has thus been eroded in general.[16] As if changes in the economics of lab research did not pose a significant enough threat to current budgeting practices in AHCs, broader factors also apply. The rise of mega data sets, combined with the possibilities of cloud- and crowd-sourcing, point to control of research beginning to shift from tightly contained, peer-reviewed mechanisms to a more open framework. With the possibility of data aggregation open to individuals through new medical apps and body sensors, for example, patients may choose to consult millions of their peers rather than participate in clinical trials. Finally, the public in general, and legislators in particular, are increasingly impatient for research results—factors that affect not just funding but also public opinion about research. Each of these trends creates its own innate and potentially truly significant impact on AHCs.

Budgeting for research in AHCs has not yet definitively shifted to a model based on team science. AHCs still mostly design budgets and allocate space based on the increasingly inefficient construct of a lone R01-funded investigator heading up his or her single-PI lab. Can such research effectively meet the evolving economic, socio-political, and big science imperatives? In short, the rise of team science coupled with the economic realities of supporting research is a game-changer for the traditional science paradigm of AHCs. This challenging issue demands profound thinking and hard decisions, including deep scrutiny of long-held assumptions.

Health care teams: The need for interprofessional education and practice[17, 18, 19]

The new physics of patient care points to care increasingly delivered by interdisciplinary teams. AHCs need to organize and manage their health centers to maximize the value of input and collaboration across the full diversity of health care professionals. Indeed, across medicine writ large, a strong business case can be made for interprofessional health care.[20]

Worldwide, the increasing predominance of non-communicable diseases, the pressing need for better access to

health care in general, and our growing understanding of the social determinants of health[21] all argue for integrated health care across the full diversity of health care professionals. In the United States, the increase in demand for health services by baby boomers over the next several decades suggests that effective interprofessional care will lead to decreased demand for acute care services. The reality is more likely to be a shift in needs for acute care. For example, while the demand for acute care of diabetes and hypertension may diminish, the need for care in other critical areas, such as cancer and Alzheimer's disease, will increase as people live longer. Robust and well-integrated collaboration among diverse health professionals will be crucial to meet these health care needs.

And fundamentally, interprofessional health care provides patients with better access to core provider competencies. Consumers will increasingly demand that such care be accessible as readily as any other service. The ability of the health care system to provide easy access will require more widespread use and acceptance of interprofessional health care, which will lead to increased effectiveness of care, improving health care outcomes and quality, while lowering costs.

Barriers to interprofessional health professions education: A baseball metaphor

As they develop and enhance their interprofessional education programs, AHCs will need to master new electronic and digital education platforms to help develop interprofessional teams. New teaching modalities such as the "flipped classroom" add important alternatives to problem-based learning and other standard methodologies.[22] While information overload in curricula is not a new problem, what and how to teach have become increasingly difficult and important questions, especially since today's students will probably still be practicing medicine in 2050.

In participating in discussions on interprofessional education, I have often reflected on the barriers to practicing it. One conversation on the topic occurred during the World Series, and started me thinking about these impediments in terms of baseball. Too often, those of us seeking better ways to integrate interprofessional education and practice spend inordinate energy pursuing home runs: trying to develop the large-scale fixes that will solve many things all at once. Maybe our attention would be more productively focused on incremental fixes: to round the bases one by one, addressing challenges incrementally in ways that might eventually result in more wholesale reform.

Let's call first base the "guild mentality" of the health professions. We silo health care disciplines, which not only divides health practitioners and knowledge, but creates competition and duplication where today we urgently need collaboration and efficiency. The guild mentality inhibits an integrated, interdisciplinary approach to a full spectrum of health care and population health. To get beyond first base, we

need to develop strategies that overcome the attitudes and beliefs that get in the way of true interprofessional learning and practice and that arbitrarily divide health care professionals.

On second base, we need to carefully review current university and hospital structures and procedures. Traditionally, professions, disciplines, hospitals, and health systems are separated administratively into departments and other units, each with its own schedules, operating principles, and policies—such as those for promotion and tenure—that deeply impact behavior. As well, they often compete with each other for limited resources. The lack of alignment between management and infrastructure thus drives a wedge between types of professionals. How can we restructure institutions to ensure better integration and alignment? Addressing that challenge would move us that much farther along a path to broader reform.
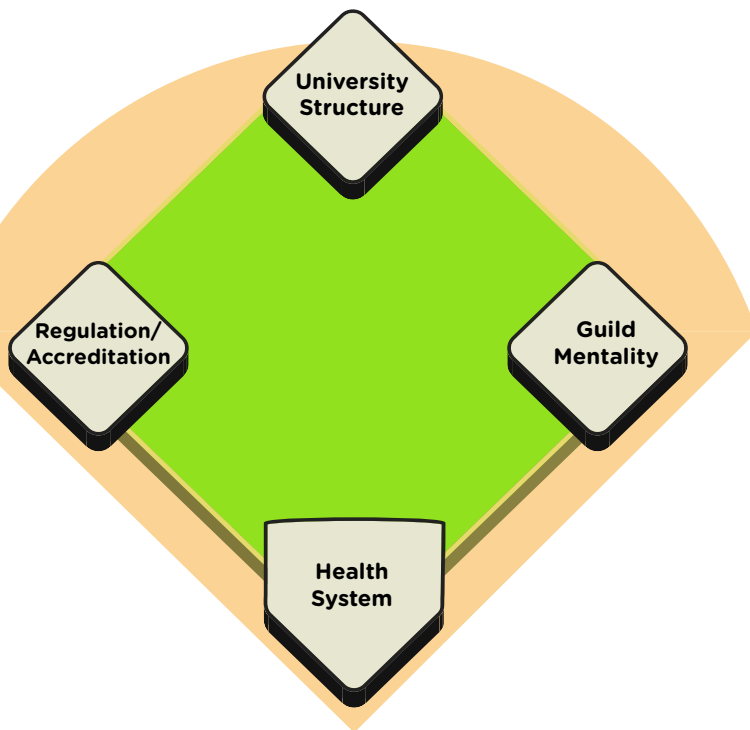
Third base addresses the dizzying variety of regulation and accreditation requirements for various health professions. Licensure requirements, scope of practice laws, accreditation requirements, and other regulations complicate coordination and collaboration across professions. Such strictures limit, for example, who is qualified to serve as an educator. They overburden some clinicians and undervalue others. Generally, the lack of coordination and consistency among regulators and accreditors impedes the efficient delivery of health care. A deep look at this body of regulations with reform in mind would greatly facilitate the process of moving us closer to true

integration of interprofessional education and practice.

Scoring is the ultimate goal. In the area of interprofessional education and practice, however, reaching home plate is perhaps the most formidable task. This involves aligning the incentives of the health care delivery system to support and promote the kind of system we would like to envision. It is becoming readily apparent that interprofessional education and practice will serve an increasingly important role in health care in the years ahead. It is therefore incumbent upon AHCs and health systems to begin an organized process of aligning curricula and policies to support and nurture true collaboration among health practitioners at all levels. The "four bases" scenario described above, which considers the guild mentality of the health professions, university policies and procedures, accreditation and regulatory bodies, and the incentives of the health care system, offers an approach to this important and challenging issue.

Medicine and machines: Toward a new paradigm of professional intelligence

The practice of medicine is increasingly taking place at the nexus of patients and machines. From diagnosis to rapid data analysis and robotic surgery, computer-assisted advances are transforming the delivery of health care. Couple that with patients' expanding access to medical information on the internet, and the traditional role of health providers is challenged. The doctor may no longer be the principal expert and possessor of unique skills. Machines are fundamentally changing the nature of the provider-patient connection—and, ultimately, what it means to deliver health care. The profession needs to refine its thinking about the intensifying marriage of medicine and machine.

Foremost is the issue of how the physicians being trained today will develop the expertise needed for the future. Currently we educate and train health professionals quite well for practice *as it was*, and less well for *how it is and will be*. The curriculum now needs to focus on the development of a new kind of proficiency that I call *professional intelligence*, defined as the confluence of professional values and expertise.

The curriculum for professional intelligence has yet to be written, but we need to get started. It needs to acknowledge that no human can effectively process the exploding volume of medical knowledge and data, as well as the implication that machines will know more and be able to perform more tasks than physicians. Scientific and technological advances are already creating devices that out-perform human capacity both cognitively and physically. Computer algorithms, for example, offering rapid analyses and suggesting both diagnostic and therapeutic possibilities, far out-perform what a human expert can review to reach a reasonable decision.[23]

The pressing need to instill a new form of professional intelligence in our students and trainees demands that we accelerate the preparation of students in the health professions for

practice as it will be. It is not surprising that health professions schools concentrate more on training for the development of skills and competence than expertise. Skill is the ability to perform a concrete act, and competence is the level at which you are able to perform that skill. Expertise, however, refers to the ability to see the big picture, to understand all the unique elements involved, and to draw appropriate conclusions. While many skills and competencies will eventually be largely taken over by machines, expertise is uniquely human.

The leadership imperative

Clearly, the challenges and emerging opportunities that AHCs face—and will face—underscore the importance of hiring, nurturing, and supporting exceptionally capable leaders. Making high-level appointments at academic institutions is arguably one of the most important actions to be undertaken. In working with and visiting more than 100 AHCs, however, I have found that identifying and keeping high quality leaders is extraordinarily challenging. Too often, and too regularly, AHCs find themselves wondering how to reach the next level, and searching, yet again, for new talent to fill key leadership positions.

In part, the problem is often attributable to two types of lapses: lack of understanding of the characteristics of successful leaders for these complex institutions, and breakdowns in the recruitment process itself. Through a collaborative effort with academic health center leaders and leading search firm executives, the AAHC has analyzed the search process in depth and made a series of recommendations to improve the likelihood of a successful outcome. These suggestions apply broadly for searches, not just in AHCs but throughout academe.[24]

Defining successful leaders

Being a successful academic does not mean someone can be a successful leader. While a strong academic track record is often an important prerequisite for top leadership posts in AHCs, other factors—such as humility and emotional intelligence—may be as important, or even more important, to successful leadership in these institutions.

Academic Skills		Leadership Skills
Intellectual capacity		Emotional intelligence
Narrow knowledge base		Broad range of topics
Strong work ethic		Strong work ethic
Self-motivated		Institution-motivated
Gets individual results		Gets institutional results
Rises up the academic ladder		Manages 360°

Similarly, candidates with a high level of narcissism and/or arrogance may be perceived—incorrectly—as well suited for the job. A charismatic personality may obfuscate a candidate's actual managerial and administrative capabilities. In the quest for top-level talent, therefore, those participating in the search process should be advised about the importance of distinguishing confidence from competence.

Changing the dim view of leadership

Faculty often have the vague impression that the administration (the "suits") is adversarial to the academic ethos. Part of the problem is that there is insufficient understanding of what leadership actually entails. Faculty may believe that the leader is "sitting on a pile of money and not giving me any of it." Because of the lack of deep comprehension of and appreciation for the leadership role, faculty members do not often seek leadership positions, but may find themselves becoming "accidental leaders" when they happen to be appointed. As a result, there is not a clear preparatory pathway to obtaining leadership positions. Academic administration needs to be "demystified" through open and transparent leadership styles that clearly demonstrate the realities and challenges of leadership, along with the development of programs (e.g., leadership academies) to promote the development of effective leaders.

Finding successful leaders

Broadly speaking, search processes for institutional leaders have been only intermittently successful. In part, this is due to a lack of detailed organization for the search itself and the lack of a "pathway" to becoming an AHC leader.

Ideally, a search process consists of three distinct phases and proceeds in an orderly and efficient manner.

• Phase I, the pre-search phase, establishes the principles and foundation for a successful search.

• Phase II, the active search phase, involves screening, interviewing, and ultimately selecting the final candidate.

• Phase III, the transition/on-boarding period, introduces the successful candidate to the institution and is designed to help the new hire adapt successfully to his or her new role.

The path forward

The landscape of disruption and change has many ramifications for AHCs. Clearly, these challenges call for a strong, definitive course of action. That mandate will be no less demanding over the next decade. In this regard, I believe AHCs must get back to fundamentals, using as a guide the answers to two essential questions:

• How best can we apply knowledge to improve health and well-being?

• How best can we build the knowledge economy and apply it in patient care?

The answers will both serve as a general approach as the institution moves forward in a disrupted landscape and provide

the backdrop for the specific actions that need to be taken. Six steps seem particularly warranted:

1. Find the best mission balance.
2. Adjust to changing funding streams.
3. Develop an integrated interprofessional vision.
4. Broaden the understanding of what AHCs encompass.
5. Be willing to change.
6. Find visionary leaders skilled in the art of change management.

1. Find the best mission balance

I believe each AHC must decide its own best mission balance, emphasizing areas in which it can make the most difference and greatest contributions. Once it makes a decision, it must budget accordingly, preparing for the end of open-ended funding and developing methodologies and tools to assess and improve efficiency, especially in the area(s) on which it chooses to focus.

2. Adjust to changing funding streams

AHCs must find new ways to optimize efficiency, including clear and delimited resourcing of research and teaching. New methodologies to assess efficiency in all mission areas are needed. Difficult questions need answers, such as what is meant by research and education full-time equivalents (FTEs). Institutions will also need to establish how much they are willing to invest for optimization in both current and new areas. Business models need to be adapted to the operational implications of the changing clinical care delivery and payment systems.

3. Develop an integrated interprofessional vision

To thrive in an era of disruption and change, an AHC needs to pursue strategies that capture the combined power of its component parts, largely through bringing disciplines together in purposeful alignment.

4. Broaden the understanding of what AHCs encompass

Fundamentally, AHCs need to expand the scope of their mission, shifting from a focus on management of individual patients to management of community and population health—locally, regionally, nationally, and globally. This includes the need for AHCs to address the social determinants of health as a critical part of improving health and well-being.[25] Including expertise from disciplines previously thought of as external, such as engineering, business management, and the social sciences, would provide both immediately applicable benefits and tools that can catalyze system change. Broadening the scope of interdisciplinary thinking in this way could lead to potential advances in effective system redesign, medical device development, and advancing population health.

5. Be willing to change

A disruptive environment poses something of an existential problem for AHCs. Writer Clay Shirky addressed the heart of this dilemma when he noted "Institutions seek to preserve the problem to which they are the solution."[26] To meet the challenges of constrained resources, for example, AHCs must transform the way they teach, conduct research, and deliver patient care. But how do they shake loose their insular, siloed traditions to change their culture and behavior? A large part of the answer is to have visionary leaders who are skilled in the art of change management.

6. Find visionary leaders

AHCs need to find the kind of leadership that can guide them through disruption. These leaders need to be highly skilled in transactional operations, but they also need to be able to envision how to help transform their institutions and reposition them. Bold new thinking is necessary not only to foresee what new kinds of leadership are needed, but to rethink the processes AHCs are using to recruit tomorrow's leaders. As discussed earlier, the specific identification of leadership abilities is essential, along with a search process designed to optimize the chances of a successful outcome.

Concluding remarks

AHCs will be well-positioned for success if they can successfully achieve three overarching strategic goals:

1. Function as organizations that align academics (teaching and research) with the care of patients.
2. Focus on the next generation of education, research, and patient care.
3. Have the transformational leaders necessary to change culture and behavior.

AHCs are in the process of transforming themselves to meet ever-changing societal needs and priorities, while dealing with evolving health care delivery and economic conditions in the midst of rapid scientific, technologic, and pedagogic advances. As they do so, I am confident that they will ultimately be successful and lead the way in educating a new generation of health professionals, making scientific breakthroughs that offer new diagnostic and therapeutic modalities, and providing cutting-edge patient care—all with the goal of improving health and well-being.

References

1. Association of Academic Health Centers. Academic Health Centers: Defined. http://www.aahcdc.org/About.aspx.
2. Wartman SA. The Academic Health Center: Evolving Organizational Models. Washington (DC): Association of Academic

Health Centers; 2007. Available at: http://aahci.org/policy/reddot/AAHC_Evolving_Organizational_Models.pdf.

3. Wartman SA. Academic health centers: The compelling need for recalibration. Acad Med 2010; 85: 1821–22.

4. Task Force on Academic Health Centers. Envisioning the Future of Academic Health Centers. New York: The Commonwealth Fund; 2004. Available at: http://www.commonwealthfund.org/~/media/files/publications/fund-report/2003/feb/envisioning-the-future-of-academic-health-centers/ahc_envisioningfuture_600-pdf.pdf.

5. Cunningham P, Felland L. Environmental Scan to Identify the Major Research Questions for Monitoring the Effects of the Affordable Care Act on Safety Net Hospitals. Washington (DC): Center for Studying Health System Change; 2013. Available at: http://aspe.hhs.gov/health/reports/2013/SafetyNetEnvScan/rpt_ACA_and_Safety_Net_%20EnvScan.pdf.

6. Task Force on Academic Health Centers. A Shared Responsibility: Academic Health Centers and the Provision of Care to the Poor and Uninsured. New York: The Commonwealth Fund; 2001. Available at: http://www.commonwealthfund.org/~/media/files/publications/fund-report/2001/apr/a-shared-responsibility--academic-health-centers-and-the-provision-of-care-to-the-poor-and-uninsured/ahc_indigentcare_443-pdf.pdf.

7. Institute of Medicine Committee on the Roles of Academic Health Centers in the 21st Century. Academic Health Centers: Leading Change in the 21st Century. Washington (DC): National Academic Press; 2004. Available at: http://www.nap.edu/openbook.php?record_id=10734.

8. Association of American Medical Colleges. The Economic Impact of AAMC-Member Medical Schools and Teaching Hospitals. Washington (DC): Association of American Medical Colleges; 2012. Available at: http://www.aamc.org/download/326478/data/trippumbachcorrected.pdf.

9. Howard DJ, Laird FN. The new normal in funding university science. Issues Sci Technol Fall 2013. Available at: http://issues.org/30-1/the-new-normal-in-funding-university-science/.

10. Tsai TC, Jha AK. Hospital consolidation, competition, and quality: Is bigger necessarily better? JAMA 2014; 312: 29–30.

11. Wartman SA. Academic Health Centers: Future Shock or Future Success? In: Wartman SA, editor. The Transformation of Academic Health Centers: Meeting the Challenges of Healthcare's Changing Landscape. Waltham (MA): Elsevier; 2015.

12. Wartman SA. Toward a virtuous cycle: The changing face of academic health centers. Acad Med 2008; 83: 797–99.

13. Inspired by this TED talk: Dishman E. Health care should be a team sport. TED.com; 2013. Available at: https://www.ted.com/talks/eric_dishman_health_care_should_be_a_team_sport?language=en.

14. Robinson JC. Theory and practice in the design of physician payment incentives. Milbank Q 2001; 79: 149–77. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2751195/pdf/milq_202.pdf.

15. Association of Academic Health Centers. How Much Does Research Cost? Three Key Findings for U.S. Medical Schools. Association of Academic Health Centers; 2014. Available at: http://www.aahcdc.org/Resources/BenchmarksandMetrics/TheCostofResearch.

aspx.

16. Boadi K. Erosion of funding for the national institutes of health threatens U.S. leadership in biomedical research. Center for American Progress; 2014 Mar 25. Available at: https://www.americanprogress.org/issues/economy/report/2014/03/25/86369/erosion-of-funding-for-the-national-institutes-of-health-threatens-u-s-leadership-in-biomedical-research/.

17. Mitchell P, Wynia M, Golden R. et al. Core Principles & Values of Effective Team-Based Health Care. Discussion paper, Institute of Medicine. Washington (DC): National Academy of Sciences; 2012. Available at: http://www.iom.edu/~/media/Files/Perspectives-Files/2012/Discussion-Papers/VSRT-Team-Based-Care-Principles-Values.pdf.

18. Josiah Macy Jr. Foundation. Transforming Patient Care: Aligning Interprofessional Education with Clinical Practice Redesign. New York: Josiah Macy Jr. Foundation; 2013. Available at: http://macyfoundation.org/docs/macy_pubs/TransformingPatientCare_ConferenceRec.pdf.

19. Patient-Centered Primary Care Collaborative. Progress and Promise: Profiles in Interprofessional Health Training to Deliver Patient-Centered Primary Care. Washington (DC): Patient-Centered Primary Care Collaborative; 2014. Available at: https://www.pcpcc.org/resource/progress-and-promise-profiles-interprofessional-health-training-deliver-patient-centered.

20. Knettel A. Making the business case for interprofessional education and training. Washington (DC): Association of Academic Health Centers; 2011. Available at: http://www.aahcdc.org/Policy/PressReleases/PRView/tabid/85/ArticleId/99/Making-the-Business-Case-for-Interprofessional-Education-and-Training.aspx.

21. Marmot M, Wilkinson R, editors. Social Determinants of Health: The Solid Facts. Second edition. Geneva (Switzerland): World Health Organization; 2003. Available at: http://www.euro.who.int/__data/assets/pdf_file/0005/98438/e81384.pdf.

22. EDUCAUSE. 7 things you should know about flipped classrooms. EDUCAUSE; 2012. Available at: https://net.educause.edu/ir/library/pdf/ELI7081.pdf

23. Cummings ML. Disruptive innovation, technology, and the future of healthcare. Presented at the Association of Academic Health Centers 2013 Annual Meeting: Technology and the Transformation of the Academic Health Center. September 25–27, 2013.

24. Wartman SA. Searching for Leadership: Best practices for academic institutions. Washington (DC): Association of Academic Health Centers; 2014.

25. Marmot M. Social determinants of health inequalities. Lancet 2005; 365: 1099–1104.

26. Kelly K. The Shirky Principle. The Technium; 2010. http://kk.org/thetechnium/2010/04/the-shirky-prin/.

Dr. Wartman's address is:
Association of Academic Health Centers
1400 Sixteenth Street, NW, Suite 720
Washington, DC 20036
E-mail: swartman@aahcdc.org