The five immediate past presidents of the American Association of Colleges of Pharmacy (AACP) comprise membership of the Argus Commission Association. This Commission is named for a mythological being attributed to be all-seeing. These leaders serve the Association to scan the environment and interpret implications for policy and action. The Commission also convenes at the request of the standing AACP president to offer their views and analysis on focused areas. AACP 2007-08 President Cynthia Raehl asked the Argus Commission to review and discuss a report prepared by the Institute for Alternative Futures titled “The 2029 Project: Achieving an Ethical Future for Biomedical R&D.” This charge was also consistent with the recommendation to AACP made by the 2005-06 Argus Commission in the combined report of the 2005-06 Standing Committees:

Given the trends of the early 21st century that are influencing the delivery of health services and the vision for pharmacy practice in 2015 articulated by the Joint Commission of Pharmacy Practitioners (JCPP), a future Argus Commission should be charged to envision the characteristics of the pharmacy profession at the end of the first quarter of the 21st century (2025). In light of this envisioned future, delineate its implications for pharmacy education and considerations that must be before the academy now to influence, prepare for, and optimize pharmacists’ contribution to society in this timeframe.2

The change drivers considered as part of the background to the 2007-08 Argus Commission discussion include: scientific discoveries and application leading to an era of personalized medicine, health information technology, empowered consumers, fully integrated care teams, and changes in health care organization and financing. In addition, the Commission considered the implications in cognitive or developmental psychology from the perspective of our learners, teachers, preceptors, and patients. Each of these areas has implications for learning and leading germane to pharmacy and other health professions faculty.

CASE SCENARIO: THE ROLE OF THE THERANOSTICIAN PHARMACIST

J. Lyle Bootman, Dean of the University of Arizona College of Pharmacy and 2008 Remington Medalist, began his Remington address by looking out into the future with the following scenario.3

The year is 2050 and in my home in Tucson, Arizona, I am awakened by the gentle sounds of waves lapping the shore. No, it’s not that California has dropped into the ocean; climate change is under control now. It’s the Soothing Snooze alarm function on my new i-PHARM—the Individual Personal Health And Records Manager that combines my phone, computer, and calendar with a digital hookup to the Global Health Medical Records Vault and my team of healthcare providers.

My i-PHARM contains my own Personalized Good Health Regimen for the day, scheduling in not just the times to take my genetically determined medications but also the sleep, rest and exercise I need for optimal health. The i-PHARM tells me I have a morning tennis date (I am playing again after my third successful hip replacement), a short afternoon nap and dinner plans at a new restaurant with my wife.

In the bathroom, my body waste reclamation unit automatically takes and analyzes a urine sample, sends the results to my healthcare team at Health Central, to the Global Health Medical Records Vault and to my i-PHARM. The i-PHARM reminds me I need to take...
a low dose aspirin, eat a banana, a bran muffin, an extra glass of water and an anti-inflammatory before any physical activity. Oh, and a good stretch wouldn’t be such a bad idea either.

But I’m feeling a little achy and listless, for the second day in a row, so I use my i-PHARM to cancel my tennis date, to initiate a saliva analysis and vitals via my home diagnosis unit, and to make an appointment with my healthcare team. The Internet is still impossibly slow; it takes 3.2 seconds to make the connection to Health Central. My doctor is at an international conference today, but is “seeing patients” from his hotel room in Sydney. From his i-DOCTOR device, he sees all the information sent from my home diagnostic unit as well as my personal healthcare database from the Global Health Records Vault on his screen.

As the physician looks over my e-records and conducts a visual exam via hologram, he sees a note in my file from Health Central’s theranostician, the new Pharm.D. on staff trained in pharmacogenomic therapy and diagnosis of drug-related issues. It seems that the medication I have been taking for the prevention of Parkinson’s disease, formulated for me based on my proteome profile, may interact adversely with both chocolate and peanuts. Have I eaten either food in large amounts recently? Sheepishly, I confess to not checking my i-PHARM recently for interaction warnings and to having enjoyed Super Scoop Tin Roof Sundaes twice this week at the new pharmacy chain in which I have invested. He applauds both my business acumen and my interest in restoring “old-fashioned” services to modern drugstores, but recommends I curb my enthusiasm for certain sundaes. He notes that he will bill my Medicare account in a week, based on whether his advice has solved my complaint. I promise to send in my follow-up health status report when the i-PHARM recently for interaction warnings signals me, so my records are complete. We end our session with my recommending he visit a bistro I know near the Sydney Opera House.

[Published with permission of J. Lyle Bootman, Professor and Dean, University of Arizona College of Pharmacy,3]

BACKGROUND

It is hard to predict a future 20 to 25 years ahead, especially in the health care arena, but certain of the technologies embedded in Dean Bootman’s Remington scenario are actually available in the marketplace today. Clearly, much change would have to be introduced to society generally and health care delivery specifically for the typical exchange between patients and providers depicted in the case to represent mainstream medical care.

Several significant change drivers are moving simultaneously, and their interacting components challenge our ability to clearly appreciate how social and economic forces, as well as diagnostics, therapeutics, medical care and pharmacy practice, will change. It is nonetheless important that academic pharmacy attempt to envision this change given that those students entering college as pre-pharmacy freshmen in 2008 will enter practice after 2015 and will remain active practitioners well into the middle of the 21st century. Helping to define what their role in health care will be calls for leadership from across the profession of pharmacy and specifically from academic pharmacy.

AACP Standing Committees in 2005-062 and 2006-076-7 have contributed significantly to the academy’s analysis of the curricular, professional and scientific issues required to enable achievement of the profession’s overarching goal of delivering pharmaceutical, or patient-centered, care to all patients across all settings of practice by 2015. While certainly not our guaranteed future, societal need for medication use experts graduating from our programs as generalist clinicians who subsequently mature through post-graduate education and practice to become advanced practice (i.e., even more competent) generalists or specialists is better defined today than ever before. New models of pharmacy practice and evidence of the positive impact on both institutionalized and ambulatory patients are merging to advance the standard of pharmacy practice in the US health care system.

However, there is substantial additional work to complete in both education and practice to achieve the 2015 vision. Enhancements in interprofessional education, expansion of high quality experiential learning environments, integration of information technology in education and practice, and adoption of the change leadership imperative are all necessary to achieve the immediate change proposition. The 2007-08 Argus Commission looked beyond these issues to a substantial degree to focus on a further time horizon for change beyond 2015. It is interesting to note, however, that the same fundamental themes and issues carry forward as significant drivers of envisioned change in the 15 to 20 year timeframe.

The 2029 Project and Personalized Medicine

The Institute for Alternative Futures (IAF), supported financially and intellectually by Pfizer Global Research and Development, embarked upon the 2029 futures research project in 2004. Extensive scans of the scientific literature, individual interviews with dozens of scientists and focused meetings with representatives from the scientific, informatics and regulatory communities led to the report’s findings and recommendations. In summary, IAF anticipates that “emerging ethical concerns for global health will create the context for medical science to reach its full potential.” This potential can only be reached by coupling scientific advances, knowledge management
powered by informatics, and ethical leadership and decision-making at all levels.

IAF forecasts short term (2005-2010), mid term (2011-2020) and long term (2021-2029) developments in biomedical research and development and characterizes the changes in the 2029 report thematically as follows:

Knowledge Management: Science will have extraordinary tools and immense amounts of data to support knowledge creation. The flood of data from genetics, proteomics and electronic medical records will challenge clinicians to find tools to turn this overwhelming amount of information into applicable knowledge. In the mid term new biomarkers and nanotechnologies will improve diagnosis to the point of pre-disease detection, supporting trends toward preventive health and wellness. 

Union between East and West: Asian scientists will increasingly introduce their worldview into biomedical R&D and the West’s tendency to teach, diagnose and treat one condition at a time will be influenced by Eastern philosophies and practices emphasizing the mind and spiritual components of health and well-being. At all levels, prevention will become the favored intervention, with “pre-disease” displacing disease as the focal point for research.

Globalism in Learning: Learning networks that cut across countries, sectors, institutions and disciplines will be supported by open source networks that rapidly create and spread knowledge. Connectivity between researchers and patients will create continuous risk assessment for individuals, families and communities. This will require new intellectual property rules to speed innovation and diffusion and require a new global ethic.

Shift from Disease to Health Potential: The increased use of surrogate markers and suites of biomarkers will allow for pre-disease detection and emphasize prevention. Global learning cooperatives will pool their knowledge of risk factors. Healthy communities will grow in number and will focus on the role of compassion and spirituality in creating and sustaining health.

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These same themes are echoed in a report on personalized health care released in September 2007 by Health and Human Services Secretary Leavitt. Noting that the pace of scientific advancement in the last decade is exponential, the report suggests that advances in “systems biology, bioengineering, genomics, proteomics, nanotechnology, cellular and tissue engineering, bioimaging, computational methods and information technologies have all shuttled medicine into a molecular future at a pace that exceeds people’s ability to fathom it.”

The Secretary’s report examines the opportunities, challenges and pathways to achieving the promise of personalized health care, defined as information-based health care that works better for each patient, based partly on scientific information and partly on technology to make complex information useful. The task force tackled the Herculean charge of looking across all HHS agencies to identify existing programs and initiatives that had the potential, perhaps largely unrealized, to support and advance the vision of personalized health care. While noting that the role of health care professionals remains unchanged – to deliver the right care to the right patient at the right time – the Secretary’s foreword notes that “personalized health care means knowing what works, knowing why it works, knowing who it works for, and applying that knowledge to patients.”

Ethical/Developmental Issues

The scientific advances identified in both the IAF and HHS reports are undisputable. As the scientists involved in the 2029 Project shared their views on the advancement of biotechnology and clinical medicine their attention turned to the broad range of ethical challenges on the horizon. Related to the scientific and clinical advances, the dramatic potential of information technology to transform scientific discovery and health care delivery also introduces important ethical questions.

The ability of consumers and health care providers to navigate successfully through the resulting knowledge-rich environment to co-create better personalized and community health requires renewed attention to what IAF calls “wisdom ethics”. Grounded in cognitive or developmental psychology, Dr. Peck described a developmental spiral applicable to individuals as well as groups (e.g., learners, patients, health professionals, corporate employees and leaders). Table 1 provides levels of development as applied by IAF and collaborators to the pharmaceutical industry. Effective teaching, learning and interpretation of knowledge requires sensitivity to where individuals are on the developmental spiral and hence their motivations for change.

**TOP CHALLENGES FOR ACADEMIC PHARMACY IN PREPARING FOR 2029**

Following the presentation on the 2029 report by Dr. Peck and a discussion of the developmental spiral, the Argus Commission and advisory council members identified the top issues or challenges for academic pharmacy which should be considered in future curriculum changes and in contemporary research and clinical practice. Those identified included:

1. Biotechnology and Advances in Personalized Medicine
2. The Knowledge Technology Revolution
Table 1. The Evolutionary Spiral Model

The map of the Evolutionary Spiral was crafted by Dr. Glenna Crooks and based on the work of many researchers in the field of adult development. The map uses a color coding system with descriptions drawn from multiple sources to describe seven levels that are most relevant to the pharmaceutical industry.15

Beige, Survival, Help Me: Facing harsh life conditions, the prime directive is to survive and the basic goals are to satisfy needs to stay alive. This level is seen in small biotech companies whose one promising experimental product is rejected by regulators or large companies whose blockbuster is suddenly challenged by safety concerns.

Purple, Magical, Tribal We: Seeing a threatening world full of mysterious powers, the prime directive is to gain safety and security, generally through the family and larger groups. Tradition and ritual are the coping systems. This is an “us vs. them” world that appears in “corporate tribes” as well.

Red, Power, Gratify Me: Recognizing that life is a jungle where the strong prevail and the weak serve, the prime directive is to assert power and avoid shame. Exploitation and dominance create the coping systems, as seen in war lords, gang leaders, heroes and low emotional quotient company managers. This level can be found in overstressed executives who cheat on expense forms or break rules to get what they want, but it’s also in the maverick scientist who won’t take “no” for an answer and creates a “skunk works” to investigate compounds that a company has decided to abandon. Patient activists also operate at this level, the model of which was ACT-Up in the early days of HIV/AIDS.

Blue, Conformist, Righteous We: Realizing that a higher power is in control, the prime directive is to sacrifice immediate gratification in order to gain a greater benefit later. This level creates stable order through hierarchies. Obedience to the higher authority (teachers, religious leaders and governments) and conformity to rules are the coping systems. This is seen in large companies, bureaucracies and “true blue” patriot gatherings. Industry encounters this level wherever stability and security are dominant interests, such as in regulatory agencies, formlary committees, and payers.

Orange, Achievement, Competitive Me: Looking for opportunities to make things better, the prime directive is to excel, to win and to succeed. Pragmatism, objectivity and strategic plans provide the coping systems for marketplaces, laboratories and strategic enterprises as well as on Wall Street and Rodeo Drive. This level uses the stability created in the blue, conformist stage preceding it as a base to be entrepreneurial and compete for success. Industry’s mastery of this level is what attracts investors, and it is measured in earnings reports and pipeline promise.

Green, Affiliative, Holistic Us: Believing that we are all part of common humanity and have a shared responsibility to each other, the prime directive is to assure everybody receives consideration. Others matter as much as we do. Affiliation with a community creates the coping systems, which are found in non-governmental organizations, social movements and advocacy groups. This level is expressed within industry through corporate social responsibility and advocacy group relationships. This level uses matrix organizations which, though highly inefficient, meet the needs of this level to offer participation in decision-making to all who might have a stake in the outcome.

Yellow, Authentic, Interdependent Me: Research has demonstrated that this group is ten times more efficient and can manage more complexity than all the levels below them combined. Unlike previous stages (which believe that they, and only they, are “right” in their view), this stage knows that all of the previous stages are “right” depending on the circumstances. The prime directive here is to integrate all the wisdom of the previous stages and apply it appropriately.
spring affirms the salience of these issues to our faculty, students and practicing pharmacists.

An article by Aspinall and Hamermesh\(^9\) opens with a critical assessment of the status of the personalized medicine movement today.

In the last decade, scientific advances have made it possible to diagnose and treat a rapidly growing number of diseases – especially various types of cancer – much earlier and with greater precision than ever before. These developments have vastly expanded doctors’ power to customize therapy, maximizing the effectiveness of drug treatments and minimizing their side effects. That’s the good news. The bad news is that progress in realizing the promise of personalized medicine has been slow and uneven in the United States and the rest of the world. Although science is always ahead of practice in the medical field, the gap today in the area of personalized medicine is inexcusably large.

The authors identify four barriers to progress: 1) the pharmaceutical industry’s historically successful blockbuster model for drug development and marketing; 2) the regulatory environment and the over reliance on expensive Phase III clinical trials at the expense of effective monitoring and assessment post-approval; 3) dysfunctional payment systems that reward activity (procedures and prescribing) rather than support efforts for early diagnosis and prevention; and, 4) physician behavior that is deeply rooted in “trial and error medicine” [and clinician-centered care].

While the authors’ recommendations for changes that will unleash the potential for personalized medicine are thoughtful, the reality for the mid to longer term delivery of health care is that these impediments will be overcome as progress in science, informatics and demand for disease prevention and evidence-based, patient centered care accelerate. Personalized medicine will allow for better analysis of risk of disease and of the unintended consequences of treatment. The roles of traditional health professionals in this era are not well defined today. Key questions include: Who owns and has access to the data/patient information? Which professionals are best positioned to translate access to information into value for patients, payers and other stakeholders? Is pharmacy sufficiently entrepreneurial and empowered by law and regulation to create sustainable new practice models and roles as part of the evolution toward personalized medicine?

**Proposed AACP Policy Statement.** Current AACP policy on biotechnology dates back to action taken by the House of Delegates in 1987 and states:

Curriculum committees of colleges of pharmacy need to review their respective curricula for the incorporation of biotechnology related material so as to adequately prepare the student for future practice. *(Source: Academic Affairs Committee, 1987)*

Colleges of pharmacy have a responsibility to invest the appropriate resources to develop and/or retrain selected faculty in the area of biotechnology. *(Source: Academic Affairs Committee, 1987)*

The Argus Commission believes that a more contemporary statement(s) of policy is appropriate to guide curriculum and faculty development in the 21st century.

**Policy Statement #1-Curricular Implications of Biotechnology and Personalized Medicine.** Pharmacy curricula must adequately address contemporary issues associated with advances in biotechnology and personalized medicine, including relevant competencies in cell and systems biology, bioengineering, genetics/genomics, proteomics, nanotechnology, cellular and tissue engineering, bioimaging, computational methods and information technologies.

**Policy Statement #2- Faculty Development in Biotechnology and Personalized Medicine.** Faculty development programs and collaborative research and teaching strategies should be expanded such that faculty at colleges and schools of pharmacy are prepared to lead and contribute significantly to education and research related to cell and systems biology, bioengineering, genetics/genomics, proteomics, nanotechnology, cellular and tissue engineering, bioimaging, computational methods and information technologies.

**Policy Recommendation #1.** The AACP House of Delegates should archive the 1987 policy statements on biotechnology.

**The Knowledge Technology Revolution**

Information on health and illness is ubiquitous today and accelerating in quantity at an unprecedented rate. The Center for Information Therapy studies the evolution of knowledge systems and their application, especially to health care consumers and delivery systems. The most recent paper, “Navigating a Changing Health Care System: How Consumers, Clinicians and Policymakers Can Make Sense of Shared Decision Making and Information Therapy”, begins with this vision:

Imagine a world in which clinicians delivered just the right information to their patients at precisely the right moment. Imagine that clinicians were able to focus their limited time helping well-prepared patients to put that information into perspective for their particular situations, guiding them to a decision that balances the best available scientific evidence with what matters most to them. Imagine that the collaboration continues over time, with clinicians delivering tailored information at the right time to help people consis-
tently make informed choices and do the right things for themselves.\textsuperscript{10}

Knowledge management tools are available and used today and will rapidly mature in the next 10 to 15 years. They will support both open source scientific collaboration for the creation and interpretation of new knowledge and evidence-based clinical decision making at the point of patient care. It is essential that pharmacy education enables pharmacists to develop mature knowledge management competencies to use in delivering patient-centered care that is evidence based. The need for a critical mass of pharmaceutical clinical scientists to contribute to knowledge creation has also never been more pronounced.\textsuperscript{5}

What is the role of the health professional in a knowledge technology revolution? Consumers empowered with access to information, both general and specific to their own health status, are radically different consumers than those traditionally encountered today. Pharmacists and other health professionals must remain on the leading edge of scientific understanding in order to assimilate and synthesize vast amounts of information to be applied at the point of care. Consumers will have vastly different levels of health and technological literacy and will require professionals who can interpret complex data and translate information into applied knowledge and strategies for prevention and treatment of disease.

The availability of metrics and related information on patient health status and outcomes of interventions will substantially influence quality improvement and assurance systems as well as payment systems for health services. The knowledge technology revolution which provides access to information to all clinicians when and where it is needed should also serve to lessen fragmentation of care and support effective functioning of interprofessional teams.

It is essential that pharmacists are “inside the loop” of knowledge systems, able to both access patient- and population-level information and contribute to the data systems that support health care service delivery. Standards related to health informatics are developing locally and nationally. Quality measurement systems are similarly evolving at several levels. Pharmacy educators have much to contribute on behalf of patients and the profession to these standards and measures development processes.

**Recommendation 1.** ACPE and colleges and schools of pharmacy must assure that students, faculty and alumni have sophisticated and continuous preparation in the design and use of health information technology and systems and are prepared to apply IT in evidence-based decision-making at the point of patient care for individuals as well as populations.

**Recommendation 2.** AACP must commit to fully integrating academic pharmacy leaders into those standard setting bodies and regulatory agencies that will determine health informatics standards and interoperability decisions, public and private health care financing policy, and planning efforts that will influence the development of future health research priorities and funding streams.

**Chronic Illness Treatment by Interprofessional Teams**

Trends in aging (e.g., increased longevity), lifestyles (e.g., sedentary habits and eating leading to an epidemic of obesity) and the environment (e.g., pollutants) will influence the incidence and prevalence of disease over the next 15 to 20 years. Despite advances in science, it is reasonable to expect there will be large populations of individuals suffering from a spectrum of disease co-morbidities. There is a renewed movement in health care to implement models of care coordination across primary care providers, specialists and other groups of clinicians. A renewed call for a “medical (or patient care) home” is heard from a variety of groups and is a model of patient-centered, team-based care that acknowledges the role of a primary care provider as the “hub” of diagnostic and therapeutic services and information aggregation and sharing among those caring for an individual or family.

As noted above, patients will need interpretation of individualized health assessments, treatment options and risk/benefit information. Further, professionals will play the roles of informed coach and navigator, seeking to motivate individuals to maximize health and wellness behaviors. Fundamental competencies for pharmacists will include the ability to access and manage information, participate in teams both directly at the point of care and virtually, and apply empathy, education and motivational communication to the care of patients with varied levels of knowledge, motivation and ability to manage their health.

**Recommendation 3.** Pharmacy faculty should lead the development of interprofessional models that deliver on the promise of personalized medicine and expose students to the role pharmacists must play in delivering such care.

**Recommendation 4.** AACP and member institutions should expand opportunities for students and faculty to provide culturally sensitive clinical and other service experiences in the context of global health care such that they fully embrace their responsibilities to improve health worldwide.
Developmental Psychology and Global Ethics

Regardless of the developmental theory to which one ascribes, humans from birth to death are evolving from one cognitive/moral level of development to another. It is possible to regress as well as move forward depending on the stimuli in the environment and availability of mentors prepared to guide development.

Duncan-Hewitt contributed an evidence-based interpretation of levels of cognitive/moral development using the qualitative grounded theory method and data on pharmacy students at multiple institutions at admission to the professional degree program. Pharmacy students enter our programs at varied levels of cognitive/moral development. Perhaps of even greater significance is the finding that faculty have not all achieved a level of developmental maturity best aligned with the role of a true professional, complicating their ability to serve as an effective role model and mentor. The full implications of these findings will be addressed further in this report.

IAF drew upon work that identified seven levels of development as set forth in Figure 1. Duncan-Hewitt described six levels:

- F0 – Nurturing Infancy – Love and Language
- F1 – Schooling Childhood – Work and Involvement
- F2 – Apprenticing Adolescence – Competence, Economy, and Measurement
- F3 – Admitting into Adulthood – Responsibility and Abstraction
- F4 – Certifying Authority – Expertise and Critical Thought
- F5 – Criticality – Embracing Meta-Paradigmatic Understanding and Sustainability

A decade ago, Latif and Berger reported that the moral reasoning of the average pharmacy student is F3, or the level of the conventional adult. They found a substantial percentage of students entered the PharmD program at lower levels of development. It would be important to conduct additional research on the current student population before drawing specific conclusions about their moral reasoning given the changed composition of many pharmacy classes today where the majority of students enter the professional degree program already having completed a baccalaureate degree.

Research by Kegan on a group of 207 professional, highly educated people found that only 40% had achieved F4 or above. Latif also cites a body of literature across disciplines relating increased moral development to better clinical performance.

Cognitive development has implications today for our learners and their mentors. Pharmacy education should serve to move learners closer to the level of a professional with expertise and critical thinking abilities (F4). There are implications as well for clinical performance of graduates and faculty. Further, the interaction between pharmacists and their patients is influenced by the cognitive/moral development of both parties.

The relevance of understanding issues of cognitive/moral development and wisdom ethics is greater as access to highly sensitive information increases and the application of that information to the care of individuals and populations becomes more complex in the next 15 to 20 years. Pharmacy and other health professions educators should together study cognitive psychology, examine tools for assessing individual and group cognitive/moral development, and determine how best to apply these lessons to admissions, professionalism initiatives, didactic and experiential education.

IAF projects significant global ethical change that will influence health care by 2029. As information technology eliminates barriers of distance for the exchange of knowledge and cultural perspectives, richer and more advanced societies will recognize the ethical imperative to care for the poor on a worldwide basis. Caring professionals in the US must be equipped to contribute to global health improvement in a culturally sensitive and responsible manner.

Recommendation 5. AACP should provide programming that enables colleges and schools of pharmacy to facilitate faculty members’ cognitive/moral development, including model reward systems that encourage movement up the developmental spiral.

Recommendation 6. AACP and member institutions should identify methods of applicant assessment and student development to advance learner movement up the cognitive/moral developmental spiral, including meaningful strategies for teaching ethics, cultural and linguistic competency, intra- and inter-professional teamwork and community engagement with underserved populations.

Leadership to Accelerate Change

In the report to Secretary Leavitt on Personalized Health Care the authors reflected that “for more than 1,000 years physicians had to rely upon what they could see, palpate, or intuit in order to diagnose, treat and monitor patients.” The last 100 years, science and technology advanced to achieve understanding of cells and cellular processes. “The most recent decade broke all records. Systems biology, bioengineering, genomics, proteomics, nanotechnology, cellular and tissue engineering, bioimaging, computational methods, and advances in information technologies have all shuttled medicine into a molecular future at a pace that exceeds people’s ability to fathom it.”

Navigating change, or perhaps even more important, influencing the direction of change, requires leadership. How will pharmacists fare in the era of personalized medicine? Will our graduates be essential “hubs” in the generation, transmission and application of knowledge or will they be peripheral players in the new age? The Argus Commission agreed that it will take vision and leadership from within the profession to insure the former rather than latter role.

That leadership can and should come from our colleges and schools of pharmacy where faculty contribute to advances in scientific understanding and develop the new practice roles to deliver advances in diagnostic and therapeutic technology to individual patients. Our curricula and co-curricular activities must also prepare our graduates to be leaders of change, despite the fact that they will be the junior members of the health care team as they graduate. It is critical that they understand the concepts of grass roots (or non-positional) leadership and have the ability to work within their immediate environments to initiate and sustain health care improvements. They must also continue to develop their leadership abilities and become positional leaders for the profession and their health care organizations.

In the immediate and mid term, the Argus Commission recommends that academic pharmacy gets to those places where important decisions will be made to influence the future direction of health care. These would include standard setting bodies and regulatory agencies, health care quality improvement and measurement organizations, the health informatics standards and interoperability discussions, public and private health care financing organizations, the health informatics standards and interoperability discussions, public and private health care financing policymaking, and planning efforts that will influence the development of research priorities and funding streams.

Recommendation 7. The 2008-09 Argus Commission, collaboratively with national student pharmacy leaders, should examine the curricular, co-curricular and extra-curricular strategies necessary for the development of change leadership for health care system improvement in students, faculty and alumni.

CONCLUSION

The look forward to 2029 identified key trends that will influence the future delivery of health care and the roles of the graduates of health professions education programs. Each of the issues (e.g., advances in science, knowledge technology) has roots planted in the current systems of health care but are expected to advance markedly in the next two decades as evidenced by the rapid pace of change in the first decade of the 21st century.

Will any of these trends ultimately represent “disruptive technology” that radically changes the interaction between patients, providers, payers and society in general? Perhaps the knowledge technology revolution has the greatest potential for change yet many impediments might slow its progression and/or blunt the dramatic nature of its effect on the health care system.

Regardless, pharmacy’s leaders have been assessing this changing landscape for some time and recognize that the pharmacist of the future must be an empathic coach to a diverse population of patients with a wide range of needs spanning prevention and wellness and complex chronic co-morbidities. They must also be scientists prepared to manage data and information and interpret and apply best evidence to the direct care of individuals and groups. Finally, they must be leaders of change, not passive observers, or the pace of future changes may in fact represent a sufficiently disruptive technological force as to severely minimize the future contributions of pharmacists as “theranosticians.”

ACKNOWLEDGEMENT

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REFERENCES