Interdisciplinary health professions education: A systems approach to bridging the gaps

2009 Rho Chi Lecture

Presented at the Annual Meeting of the American Pharmacists Association

San Antonio, Texas

Sunday, 5 April 2009

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Keywords: Interdisciplinary Education, Safety, Educational Reform

"None of us is as smart as all of us." -- Japanese proverb

Thank you Dean Bricker for your kind introduction. First, allow me to say what an absolute privilege and honor it is to stand before you as the 2009 Rho Chi Award recipient. Paying homage to those intellectual leaders and the community of scholars who have come before me, I am truly humbled to have been asked to give this lecture. In keeping with the spirit and fundamental objective of the Rho Chi Society, which is to "promote the advancement of the pharmaceutical sciences through the encouragement and recognition of sound scholarship," I would like to share my thoughts with you on the criticality of interdisciplinary health professions education and would like to suggest a systems approach to bridging the gaps that exist today. In setting the stage for this lecture, allow me to start by sharing with you the story of the crash of United Airlines flight 232 in1989.

The crash of a DC-10 in Sioux City, Iowa, in 1989 was a major, uncommon tragedy in American aviation. Many lives were lost. But this great tragedy also served as an important lesson and opened new thinking in the training of cockpit crews. On July 19, 1989, when United Airlines flight 232 took off from Stapleton International Airport in Denver, Colorado, and headed to Philadelphia, Pennsylvania, via Chicago's O'Hare International Airport, no one could have imagined what lay ahead.

About an hour and seven minutes into the flight, at an altitude of 37,000 feet, the fan disk on the Douglas DC-10 aircraft tail engine broke in two and suffered an uncontained failure.[1] All controls on the aircraft failed except for the power levers in the remaining two engines. Using all possible means and resources, Captain Alfred Haynes, First Officer William Records, Second Officer Dudley Dvorak, and DC-10 flight instructor and pilot

Dennis Fitch, made an emergency landing on the runway at Sioux City, Iowa, Airport. Unfortunately, during the landing, the aircraft split in two. That day, 111 people lost their lives, including 110 passengers and 1 crew member.[2]

High-Performance Organizations

Behind the scenes of this tragedy lie truth and triumph. With the skill, collaboration, and concentrated efforts of the flight crew and an instructor pilot, the lives of 175 passengers and 10 crew members were saved. Today, the efforts of these crew members are often referenced as a classic example of effective crew resource management (CRM). According to the Civil Aviation Authority, CRM is defined as "a management system which makes optimum use of all available resources---equipment, procedures and people---to promote safety and enhance the efficiency of flight operations."[3] Originally developed by the National Aeronautics and Space Administration at a 1979 workshop titled "Resource Management on the Flightdeck," CRM was initiated in response to the increasing number of human errors at the root of aviation accidents. Over the years, its success has been measured using two criteria: (a) crew attitudes showing acceptance or rejection of CRM concepts and (b) flight deck behavior.[4] Studies suggest that positive attitudes among aircraft crews in flight deck management are highly correlated with positive outcomes,[5] and the observation of crews under non-jeopardy conditions provide the most useful data of crew practices and coordination. [6]

CRM uses the core principles of effective teamwork, standardized communication, situational awareness techniques, effective decision-making, and leadership strategies to improve cockpit safety and quality within the aviation industry.[7] These collaborative and

interdisciplinary skills were used by the crew of Flight 232 on July 19, 1989, and are still used in every U.S. aircraft, on every flight..Just this January you may recall the emergency landing of U.S. Air flight 1549 into the Hudson River. With 148 passengers, including a baby, and a flight crew of 7 (2 pilots and 5 crew members), all passengers safely escaped. It was reported that the plane was struck by a flock of geese, and within 30--45 seconds after takeoff, both twin engines were in trouble. Captain Chesley 'Sully' Sullenberger III, a 29-year commercial airline veteran and retired U.S. Air Force pilot, safely landed the plane into an icy Hudson River. Along with the flight crew, Captain Sullenberger escorted passengers onto rescue boats and then walked the length of the plane twice to make sure no passengers were left behind. Certainly, the efforts of Captain Sullenberger and his crew are perfect examples of CRM techniques in vivid application.

With the alarming increase of tragic errors occurring within hospitals and health systems, the concept of CRM is now being studied, adopted, and applied in health care to directly improve and enhance patient safety. If the safety and effectiveness of the aviation industry was compared to the safety and effectiveness within the health care industry, the results would be startling. According to the Healthcare Excellence Institute, the number of "deaths due to medical errors were translated into aviation scenarios…(with a) reported number of 98,000 deaths per year due to medical errors in this country alone…this rate would be equal to the fatal crashes of 2 fully loaded Boeing 747 airliners every day of the year."[8] These are alarming statistics! And for the most part, the errors are avoidable.

Much like the aviation industry, the health care industry has battled with very similar issues; human error, poor judgment, and systems failures.[9,10] The difference, however, is that within the health care industry, efforts to tackle these growing challenges have not been met

with the same sense of urgency, commitment, and resolve. There continues to be a lack of rigorous standardization for safety as evidenced by the aviation industry or other high-performance organizations.

High-performance organizations are characterized as structures "composed mainly of high performance teams and a set of operating principles that create a widespread culture of motivated individuals that is highly focused on metrics, extremely execution driven, and committed to continual improvement and rapid adaptation."[11] Challenges facing these organizations include the ability to manage complex and demanding technologies, and the necessity to maintain the capacity for meeting periods of very high peak demand.[12]

These challenges sound very similar to those facing every pharmacy and hospital and health-system today. It is time for the health care industry to begin to address its patient safety issues and challenges and develop standards of care and levels of competence and accountability based on the same criteria used within the aviation industry and other such high-performance industries.

Safety must be viewed as a system property. According to the Institute for Healthcare Improvement (IHI), viewing safety as a system property ultimately leads to higher reliability systems. "Human errors indicate a weakness in the system, not in the person."[13] High-reliability systems have the following key characteristics:

- A nonpunitive approach to error reporting,
- Error-proofing of new products, programs and services,
- Team training and organizing,
- Direct communication,

- Fatigue management,
- Optimiziation of information processing, and
- Mitigation of unwanted side effects of change.[14]

Along with such a system approach, other strategies are also being introduced within the healthcare industry to mitigate error. For example, crime prevention and crime science techniques are two systematic approaches being used to aid in promoting patient safety.[15] Researchers are now studying how criminology strategies can be used to help develop and evaluate a systematic approach to better understand the decision-making process of those who intentionally or unintentionally make medication errors.[16] But, regardless of the method or approach, preventing medication errors will require the actions of many since so many individuals "touch" the medication-use process. It will require individuals and groups within the health care industry to work more closely, more effectively, and more efficiently together to ultimately provide the best, evidence-based care to patients. It will require a culture change that will be markedly different than that which exists within most health care communities today. It will require a greater, deeper and more concentrated effort on team-based care that is strongly founded on interdisciplinary health professions education.[17]

Understanding Interdisciplinary Care

According to the United Kingdom Centre for the Advancement of Interprofessional Education, interprofessional or interdisciplinary education is defined as the "occasions when two or more professions learn from and about each other to improve collaboration and the

quality of care."[18] Further, the National Academies of Practice more specifically defines interprofessional health care as

> "a partnership among professionals involving individuals and communities based on (1) a shared mission, (2) a shared biopsychosocial paradigm, and (3) a shared responsibility for decision-making and problem solving, with leadership based on the expertise that is needed for improving health outcome in a shared relationship with individuals, families, and communities."[19]

To ultimately provide integrated clinical care, several prerequisites must be considered in the training of future health care providers within each health discipline. These include

- Establishing communication standards and procedures among providers,
- Engaging interaction among providers to include shared decision-making and goal-setting responsibilities and accountability,
- Working together to comprehensively meet all needs of the patient, and
- Working together to ensure that patient care delivery is timely and continuous from one provider to the next.[20,21]

State of U.S. Healthcare – The Need for Interdisciplinary Care

At a macro-level look within the health care sector, representatives from many disciplines provide care to patients, including physicians, nurses, pharmacists, therapists, social workers, case managers, and others. However, within these health care disciplines, collaborative and interdisciplinary training and education or the provision of care is neither consistent nor prevalent. Additionally, within the profession of pharmacy alone, there is rarely interaction between practitioners in the community pharmacy and the hospital. Patient

records and files are rarely shared between the two, which can often lead to a discontinuity in the quality of care provided to the patient. Examples of this discontinuity can be seen within every profession, especially in transitions of care.

The need to work in interdisciplinary teams is now more urgent than ever. This is largely due to the growing demand to ensure quality, safety, efficiency, and efficacy. This need was well illustrated in a survey among independent physician practices, integrated health systems, hospitals, and other providers.[22] Eight-five percent of the participants stated that sharing patient records was a major and critical concern in providing quality care to patients. We know that in community pharmacies, there is a substantial deficiency in having access to patient data, including diagnostic and laboratory data and notes by caregivers.

There continues to be a significant increase in health care spending. By 2010, the Centers for Medicare and Medicaid Services projects that total health care spending will increase to over 16% of the gross domestic product. This increase is a result of the escalating costs of prescription medications, more intense and concentrated utilization of medical services, expanding use of technology, and the aging and longer lifespan of the U.S. population.[23] Chronic disease also is a growing problem within U.S. health care. The number of patients suffering from at least one chronic disease continues to grow.[24] In addition, with the increase of medical care costs, more patients are assuming a greater financial responsibility for their care. Unfortunately, many are unable to absorb these costs. From 2003 to 2007, the number of underinsured patients age 19–64 years increased by 60%, with medical costs on average totaling 10% of total income.[25].With patients taking more financial responsibility for their health care, more cost-efficient and effective services must be provided. Health care providers must learn to work more closely together to ultimately

provide not only safer care to the patient, but also more affordable, efficient, and effective care. This could save our health system billions of dollars. In fact, we have seen that in the economic evaluation of clinical pharmacy services.[26]

Health care providers will also need to work more closely together to tackle growing health disparities. Studies show minorities and the poor often receive lower-quality medical care. According to the Agency for Healthcare Research and Quality's *National Healthcare Disparities Report*, African Americans, American Indian and Alaska natives, and Hispanics receive approximately two thirds, one third, and one half the quality of care received by white Americans, respectively, with the poor receiving an even lower quality of care compared with higher-income patients.[27] More interdisciplinary, team-based efforts are needed to address these disparities and ultimately provide all with quality care.

To address the growing issues of (a) affordable and efficient health care and (b) increasing health disparities, every health professional must first "step up to the plate" to their role and responsibility in optimizing, equalizing, and enhancing patient care. We need to look at models and pilots in this regard. Several organizations are developing interdisciplinary models for health professionals to assist them in optimizing their value. One example of such an organization is the Canadian Patient Safety Institute. This institute has developed a set of safety competencies that they recommend every health professional to possess within their practice. One domain of these safety competencies is to work in interdisciplinary teams to ensure patient safety and to minimize health disparities [28] Through collective efforts, the institute suggests that interdisciplinary teams can help to better educate patients on the quality of care they receive and also help to empower them to ask the right questions. As patients become more financially responsible for their health care, the institute

also suggests that interdisciplinary teams can help to more actively engage patients in financial decision-making for their care.

At a micro-level look within the health care industry, many hospital departments for example, often work in their own silos instead of taking an enterprise approach to providing care. While patient safety and quality of care is every provider's responsibility, many health professionals unfortunately embrace a "unit-based" approach—solely confining their professional duties to those within their department.[29] A recent study showed that while seniors now account for 35% of all hospital stays, 26% of all physician visits, and 34% of dispensed prescriptions, less than 1% of licensed pharmacists and nurses are certified in geriatric care.[30] This is alarming, considering that older adults have a higher risk of adverse drug effects due to their use of multiple medications.[31] And all of these adverse events create extremely costly "rework."

A recent study published in the *Annals of Emergency Medicine* suggests that interdisciplinary care can help improve medication reconciliation efforts. When patients are admitted to the hospital, those with life-threatening illnesses are treated with priority. Unfortunately, for trauma patients with non-life-threatening illnesses, the risk of experiencing a medication error increases. This study revealed that on admission, a patient's medication history was recorded inaccurately 96% of the time by a trauma team member. When a patient's medication history was reconciled by a clinical pharmacist, accuracy was significantly improved. However, in many cases, reconciliation took an average of three days after the patient's admission,[32] which still puts the patient at significant risk. These are just some examples of gaps in adequate care that must be bridged. Physicians, nurses, and pharmacists must learn to work together to ultimately improve patient outcomes, increase

patient satisfaction, and create of more timely and effective patient care solutions.[33-35] The urgent need to improve the current health care enterprise has also gained national attention. With a spiraling economic downturn, the need to eliminate overuse, increase efficiency, and control cost has become a national priority. Federal programs like Medicare and Medicaid now, more than ever, are under scrutiny. Policymakers and health care providers are calling for these and other national programs to be reevaluated and restructured. Today, payment disbursements by insurance companies are also transitioning. More payers are moving away from fee-for-service to pay-for-performance models, where patient safety, satisfaction, quality, and cost-efficiency are used as measurement factors for determining reimbursement levels.[36] Some studies suggest that such cost-control methods may create more barriers to providing efficient medical care to patients because they stifle the practitioner's judgment, create a dichotomy between quality improvement and cost reduction, and rely on global measures to solve very specific issues.[37] But the reality is that with the growing need for more complex and individualized patient care, new systems and new care processes are needed, and these will require a multidisciplinary approach.

Now more than ever, interdisciplinary teams are needed to provide the best clinical judgment, quality of care and communication to patients. Through collective, interdisciplinary efforts, formal processes should be developed so that all patients are effectively taught to understand their medication therapy.

Interdisciplinary Health Professions Education and Training

Acquisition of team skills does not occur by happenstance. It may also be argued that American cultural values and professional cultures augur against a team-based model. Health professionals must be educated and trained to value and demonstrate desired team behaviors.[38] In order to create a team-based organization, like those seen within the aviation industry, it is first necessary to develop team-focused employees. Developing team-focused employees requires (a) developing mutual trust between the organization and its employees, (b) empowering employees to participate in planning, organizational, and goal-setting activities, and (c) emphasizing to employees that upholding the organization's social and moral responsibilities and accountability are shared responsibilities.[39] It also requires proper training and appropriate formal education. Interdisciplinary health professions education must be incorporated into the formal curriculum of all health disciplines. Currently, it is sorely lacking across all the health professions.

The current approach to educating and training our health care providers has outlived its effectiveness and utility. With the growing complexity of health care and the accelerated pace of accumulation of knowledge, significant reform of health professions education is in order. The "care as usual" methods for treating patients must be revamped to include appropriate care of more varied and compounding issues affecting patients today. Health care professionals will need to develop new teaching and learning models.

Every day, new health professionals entering their profession in hospitals are greeted with a variety of complexities and system challenges, including a lack of continuity of care, complex charting and order entry systems, and inefficient emergency department procedures. Often, new professionals quickly learn that they lack the social and managerial science skills

needed to handle these complex issues.[40] To meet these and other challenges, the rigorous formal education of "hard" sciences must include more interprofessional training. New teaching models must incorporate shared training exercises with other health disciplines to ultimately provide high-quality patient care. "The training of all health professionals should instill a balance between the importance of striving for personal excellence and the understanding that improving the performance of systems is very often the most effective route to quality improvement." [41] Students in all health care disciplines should be trained to work together to make safe and sound clinical decisions in the most timely fashion possible. This training should not only be taught as a formal requirement, but it should also be emphasized as a lifelong process and commitment. Within pharmacy education, some efforts are being made to stress this commitment.

The Accreditation Council for Pharmacy Education's Rubrics for Evaluating the Criteria for Quality, specifically outline minimum criterion schools of pharmacy must meet in providing appropriate interdisciplinary education.[42] Within their core curricula, schools of pharmacy must provide interdisciplinary topics that relate to and address key contemporary issues not exclusive to the practice of pharmacy (e.g., communications, quality improvement, safety and computer applications). Their curricula must also include interactive application opportunities for students to link research findings with practice. Few schools of pharmacy are actually engaged with other health professions schools for structured and consistent interdisciplinary training. This can no longer be acceptable. Each of our schools of pharmacy and their student bodies must engage in interdisciplinary team training.

Just like high-performance organizations, health professions educational institutions must develop interdisciplinary curricula that teach students how to work together under

complex and structured systems to achieve desired patient outcomes. These strategies should be taught formally, as well as experientially, with actual application and training exercises. Achieving these goals will require multiple short- and long-term goals. To address short-term improvement, licensing and credentialing requirements as well as continuing-education initiatives must be reviewed and revised to include multidisciplinary and interdisciplinary clinical decision-making. To address long-term improvement, providers' professional and postgraduate education should be reoriented toward the "acquisition of knowledge, competencies, and attitudes necessary for coordinated care."[43] Training exercises and clinical experience should also be provided in more interdisciplinary teamwork settings, and incentives to licensing and certification bodies as well as educational institutions should be provided to help promote these changes.[44]

The role of the pharmacists is to help patients make the best use of their medications. As health care professionals, pharmacists have a responsibility to the patient to "do no harm." Unfortunately, this responsibility is not being upheld, as the number of adverse drug events(ADEs) occurring in U.S. hospitals continues to rise. The same is true for pharmacies in the community. Some studies suggest that 78% of these ADEs occur as the result of system failures[45] and cost roughly $2 billion a year.[46,47] Recently, the *Journal of the American Medical Association* published a study warning about the dangers of combining over-the-counter medications, prescription drugs, and dietary supplements for older adults. The results showed that for adults age 57–85 years, 81% used at least 1 prescription medication, 42% used at least 1 over-the-counter medication, and 49% used a dietary supplement. For adults age 75–85 years, 29% concurrently used at least 5 prescription

medications. Overall, 4% of individuals were found to be potentially at risk of having a major drug–drug interaction.[48]

These errors and harmful drug interactions will continue to occur unless efforts to improve medication-use processes are reengineered and a more patient-oriented practice model is put in place. Researchers suggest that addressing medication errors must first start with clear and open communication among all health professionals. "Anything that interferes with the necessary communication among the professionals involved in care will lead to increasing medical errors and a worsening of patient outcomes."[49-51] This can only be achieved through collaborative efforts with other health care providers to better assess patients' needs, demands, and preferences, as well as better inform and educate patients regarding their medication therapies. And that can not be done but just asking the patients if they have any questions.

In 2001, the Institute of Medicine issued the report *Crossing the Quality Chasm: A New Health System for the 21st Century.* This report emphasized the need for more integrated and collaborative care among health care professionals to include better communication.[52] Within the pharmacy profession, the need for better communication still plagues the interactions between pharmacists and other health professionals. [53].

Commented [a9]: Ref. 53 should be cited here, not 52. I did not change but it should be noted.

Some strides are being made to address these challenges and issues. Currently, within pharmacy education, 8 colleges and schools of pharmacy are members of the IHI Health Professions Education Collaborative—a joint partnership that also consists of 19 medical schools, 14 nursing schools, and 5 health administration programs. The goal of the collaborative is to ensure a continuum of interdisciplinary learning during residency training

that will ultimately help health professionals develop lifelong practices based upon quality and safety.[54]

The Association for Prevention Teaching and Research's Institute for Interprofessional Prevention Education is another initiative making strides to advance interdisciplinary education among health professions in the United States. Since 2007, 25 schools (medical, nursing, pharmacy, and health professions) have participated in the program. The institute is designed to "address high-priority health problems by advancing interprofessional training and increasing the emphasis on prevention in health professions education programs."[55] The institute works with faculty members to ultimately help them become change agents within their institutions to help promote national curriculum reform.

From a pharmacy practice perspective, hospitals like Brigham and Women's Hospital in Boston, Massachusetts, are beginning to create joint orientation programs for nurses and pharmacists. Components of these programs often include

- Pretests of participants' understanding and knowledge regarding the key processes within the medication-use process,
- A lecture to discuss the roles of pharmacists and nurses and to outline the vital components and actions within the medication-use process,
- A tour of the central pharmacy department (including investigational drug services, cleanroom, purchasing department, and inventory and repackaging areas) and posttests to ascertain knowledge gained by participants and evaluate the program,
- Job-shadowing opportunities, where both nurses and pharmacists can apply lessons learned in daily experiences, and

- Periodic review orientations conducted by clinical colleagues to keep nurses and pharmacists abreast of trends and changes occurring within the medication-use process.[56]

The McLeod Regional Medical Center in Florence, South Carolina, is another facility that has adopted a systems approach to promote interdisciplinary health care. The 476-bed tertiary care hospital first began implementing more interdisciplinary efforts by establishing a more transparent culture of safety, which involved all levels of leadership within the hospital. The hospital revamped its vision to promote its commitment to perfecting its "medication delivery system to be safe for every patient, every time, while making it easy for caregivers to do the right thing, and impossible to do the wrong thing."[57] Lastly, the hospital redesigned its Adverse Drug Events Committee and renamed it the Medication Safety Committee. The committee took on a more interdisciplinary focus and included members from a wider spectrum of health professions to include pharmacists, respiratory therapists, physicians, nurses, dietitians, patient educators, and representatives from surgery, marketing, children's services, anesthesia, and information services.

Recently, Thomas Jefferson University in Philadelphia, Pennsylvania, created the Jefferson Center for Interprofessional Education. The goal of the center is to improve "patient care through coordination, implementation and evaluation of a team-based education curriculum."[58] Bringing together students from a variety of disciplines (pharmacy, nursing, medicine, occupational therapy, physical therapy, and physicians completing residency and fellowship training), the center's goal is to incorporate team-based simulations into its curriculum. A component of the program requires students to be grouped into interdisciplinary teams,and, over a 2-year period, jointly meet with patients 8 times.

The University of California, San Diego (UCSD) is another institution offering interdisciplinary education for pharmacy students. The UCSD Skaggs School of Pharmacy and Pharmaceutical Sciences offers interdisciplinary health sciences professional education and research opportunities to students. Through an innovative curriculum, pharmacy and medical students share clinical experiences and classes in the biomedical sciences. This continues after graduation into shared residency experiences.

In August 2007, Northeastern Ohio University College of Pharmacy enrolled its first class of students. This program is another example of efforts being made at the institutional level to develop more interdisciplinary opportunities for pharmacy and medical students. It partners with its college of medicine colleagues to offer interdisciplinary course work and training to both pharmacy and medical students.

As we look to the future to develop more interdisciplinary practice efforts and provide recommendations for standards of care, several grounding principles must be collectively acknowledged and addressed. Specifically, within the health care industry, health care professionals must collectively acknowledge that it is **no longer acceptable** to

- Accept single health care professions or professionals working in isolation to handle the patients' needs and provide adequate care,
- Accept single health professions or professionals to be trained in silos and isolation,
- Accept the current lack of leadership on the part of health care professionals and educators for developing and implementing structured interdisciplinary education, and

- Assume that all health professionals are capable or properly trained to work together in all health care environments starting on the day of graduation.

Based on these foundational principles, several recommendations are proposed. First, health professions should work together to accept a formal agreement on the foundational principles of interprofessional health professions education. This effort should be discussed in an interprofessional forum and hosted by educators and practitioners in each respective health profession.

Second, schools of pharmacy that work collaboratively to mount interdisciplinary health professions education with schools of medicine and nursing should be publicly showcased. Best practices should be established from these schools and shared to help increase and improve interdisciplinary health professions education on national and global scales.

Third, as new health care professionals enter the work force with new interprofessional training, the skills and training of existing health care professionals must be on the same trajectory. Professional organizations and educational institutions should explore ways to "interprofessionally" train the existing health professions work force to provide the most efficient, effective, and safest care to patients.

And fourth, accreditation standards among pharmacy, medical and nursing schools must be harmonized. Specific mandates should be established, maintained, and consistently evaluated for high-performance, interdisciplinary team training.

It should be clear that we in the health professions can no longer continue business as usual with regard to our silos of practice and consequent lack of interdisciplinary caregiving. Our health care system is in dire need of new solutions that enhance quality and moderate

spending. To be sure, that is a current political priority as well as a priority of patients and third-party payers.

The profession of pharmacy and its educational institutions must engage themselves in ensuring that all of our students are trained in an interdisciplinary fashion. Moreover, we must overcome the notions that we can improve patient care in our isolated silo by creating a climate of interdisciplinary dependency through trust and competence. Pharmacists must take accountability for drug therapy in close collaboration with our colleagues in the other health professions. That will take leadership, vision, and deliberate action—traits and values that are consistent with the mission of the Rho Chi Society.

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