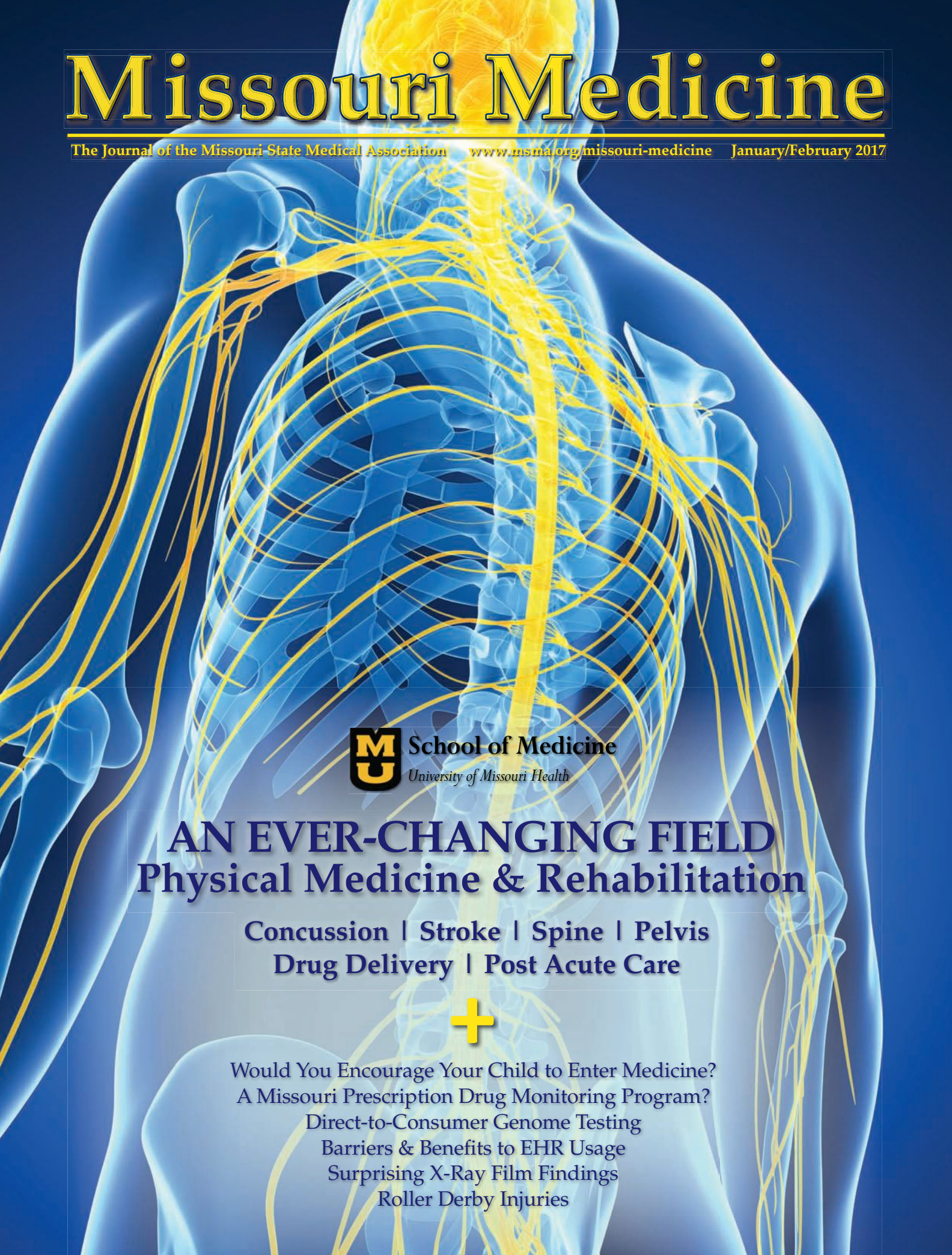
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The Journal of the Missouri State Medical Association www.msma.org/missouri-medicine January/February 2017



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The Journal of the Missouri State Medical Association - Since 1904

Volume 114 | Number 1 | January/February 2017 www.msma.org/missouri-medicine



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Missouri State Medical Association

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Owned and published since 1904 by the Missouri State Medical Association. Missouri Medicine, the Journal of the Missouri State Medical Association [ISSN 0026-6620], is published bi-monthly at 113 Madison Street, Jefferson City, Missouri 65102. Periodicals postage paid at Jefferson City, Missouri and at additional mailing offices. Postmaster: Send address changes to Missouri State Medical Association, c/o Membership Dept., P.O. Box 1028, Jefferson City, MO 65102. Copyright 2017 by the Missouri State Medical Association. Printed by the Ovid Bell Press, Inc., Fulton, Missouri. The subscription price per year for non-members is $75.00. Annual subscription for members is included in the annual membership dues. Single copies are $12.00, if available.

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Would You Encourage Your Child to Follow in Your Footsteps and Become a Physician?

by Samer Cabbabe, MD

It is no secret that physicians are disenchanted with the changes in medicine and can be overheard saying that they do not want their children to go into medicine. Has the practice of medicine deteriorated to the extent we say it has, and are there more appealing options?

According to a Doctors Company survey of 5,000 physicians, nine out of ten physician respondents indicated an unwillingness to recommend health care as a profession. In addition, 43% of respondents indicated that they were contemplating retiring within the next five years as a result of transformative changes occurring within America's health care system.[1] What factors are influencing these physicians' decisions?

Emotional Stress

Doctors have the highest rate of suicide of any profession. Every year, between 300 and 400 physicians take their own lives, approximately one per day. In contrast to the general population, where male suicides outnumber female suicides four to one, the suicide rate among male and female doctors is the same. While the rate of depression over a lifetime is basically the same for male physicians and the general population of men, about 12%, doctors' suicide rate is 1.4 times higher. Female physicians have twice the rate of depression and 2.3 times the rate of suicide compared with the general population of women. Doctors worry that if they admit to a mental health problem, they could lose respect, referrals, income and even their licenses. Some depressed physicians also have substance abuse problems, another major risk factor for suicide.[2]

Physicians are generally unhappy and many desire to leave the practice of medicine. Medical students often select high-paying specialties with the goal of early retirement. Physician MBA programs are flourishing; more than 50% of medical schools offer a joint MD/MBA degree program. In 2014, health care had more students in MIT's executive MBA program than any other industry, accounting for about one in five members, or 20 percent, of the class of 2014.[3] Physicians are leaving clinical practice to work as hospital administrators, or for health insurance companies, hedge funds or investment firms.

Financial Burdens

Physicians have seen declining reimbursement and increased expenses. The average medical student graduates with $183,000 of debt,[4] and an average resident earns a salary of only $56,500 for over 60 hours of work per week.[5] This amounts to an earning wage of only $18 per hour. Health care reimbursement from Medicare has decreased every year when adjusted for inflation. Cost burden has been shifted to physicians to collect co-payments and co-insurance, maintain EMRs, take care of uninsured and under-insured, and provide ancillary staff for the EMRs and billing operations. In order to make ends meet, physicians have gradually had to increase the number of patients they see. The end result is that the average face-to-face clinic visit lasts about 12 minutes.[6] The focus of health care has shifted toward



Samer Cabbabe, MD, FACS, MSMA member since 2010, is with Cabbabe Plastic Surgery in St. Louis and Immediate Past President of the St. Louis Metropolitan Medical Society.
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not only patient wellness but also patient satisfaction scores, despite the fact that high scores are correlated with worse outcomes and higher costs.[7] Unfortunately, the response of medical leadership is to call for more physician testing in the form of Maintenance of Certification (MOC).

As a result of the financial burden being placed on physicians, private practice physicians are essentially being forced into hospital employment and now, many private primary care physicians may be forced into Accountable Care Organizations (ACOs). While the majority of physicians (56.8%) worked in practices that were wholly owned by physicians in 2014, this majority decreased slightly from 60.1% in 2012. In contrast, the share of physicians who worked directly for a hospital, or in practices that had at least some hospital ownership, increased from 29% in 2012 to 32.8 percent in 2014.[8]

Physicians are no longer regarded with the same respect they enjoyed in years past. Patients are unhappy with their financial responsibilities (deductibles and co-pays), unhappy waiting for physician services, unhappy seeing mid-level providers, unhappy at the limited time they are allowed in their visit, unhappy or non-compliant to follow our recommendations (weight loss, smoking cessation), unhappy when they do not receive what they anticipate (narcotics or antibiotics) and unhappy when complications arise (and may seek lawsuits as a result). Nurse practitioners are attempting to assume the role of physicians despite the lack of physician education and experience.

There appears to be a media narrative that blames physicians for things the doctor has no control over such as increased health care costs, which are mainly a result of medication expenses and increasing hospital administrative costs. The implication is that doctors are getting away with something and need constant training, watching and regulating. With this in mind, it's almost a reflex for policymakers to pile on the regulations, much as CMS has done.

What We Cherish About Medicine

Given all of these negatives, why would we ever encourage our children to pursue medicine? We must consider what we cherish in our profession when considering the alternatives: Medicine is a wonderful profession. It is one where you can repeatedly help and be of service to many people. The special role a physician has in healing and comforting patients is inspiring. It means working and being directly involved in deeply meaningful human interactions. There are many chances to make a difference, and not many professions can bring this type of personal satisfaction.

In addition, the profession demands and presents intellectual stimulation and requires a constant learning challenge to keep up with new procedures, types of drugs, approaches and frequent modifications in the diagnosis and treatment of common and new conditions. Most physicians chose medicine because they grew up admiring the physicians who treated their families. These physicians later served as role models and sources for encouragement when today's physicians were initially considering a career in medicine. People respect, value and pay for our opinions.

Medicine is a wonderful profession. It is one where you can repeatedly help and be of service to many people. The special role a physician has in healing and comforting patients is inspiring. It means working and being directly involved in deeply meaningful human interactions.

Although physician pay has been relatively unchanged or decreased commensurate with inflation, physicians remain in the top one percent of American earners. Doctors enjoy job security; although our contracts may not be 100% secure, it is highly unlikely that we would ever be out of work for an extended period, barring injury or illness. Physicians may have (chronic) work-related injuries like neck and back pain, but we are certainly not doing heavy manual labor. We have energy to do things we enjoy after work and are able to work later into life or retire early.

Finally, physicians have the opportunity to use their degrees and training outside of clinical practice

such as in the role of hospital administrative duties, working for insurance companies or medical startup companies. Physicians have become necessarily involved in politics and are councilmen, senators and representatives.

Solutions for the Next Generation

What can we do to help aspiring medical students achieve their goals? We can improve their educational plight by preparing them for the rigors of business and the hard realities of economics. Education, pre-medical and medical, that speaks to aspiring doctors about the glories of caring for the sick, that tells them only about their economic security, is entirely unfair and unrealistic if we do not teach them that medicine is also a business.

Medical students should have exposure to management and business classes in their pre-medical days, so that they can have those concepts in mind as they consider their economic futures. The cost of their educations, balanced against their own assets and motivations, will have to be factors in their educational process. And universal health care, if passed, won't change this reality. It will only change the customer from the patient to the government.

Medical student debt needs to be restructured to lower interest rates and young physicians need to get credit towards those loans for non-paying patients they see. Over a few years, they could work off that student loan debt. Residents need reasonable salaries, commensurate with physician assistants and nurse practitioners performing the same role. Residents deserve mileage reimbursement and overtime pay for on-call duties. Work hours need to be reasonable in terms of time off and shift length. Food should be available, and lockers should be provided to all residents so they have somewhere to put their personal belongings instead of on a bed in a call room.

For future physicians to succeed, they need to be freed from the tyranny of ideas imposed upon them by those not working at the bedside of the patient.

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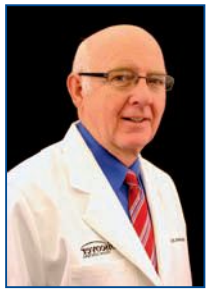
by John C. Hagan, III, MD

Since 1969, when I received my Doctor of Medicine from Loyola University Stritch School of Medicine in Chicago, I have encouraged parents, friends, grandparents, relatives, patients, educators, and students at all levels to consider medicine as a highly rewarding, intellectually satisfying, and infinitely customizable career (think patient care vs. administration; pure research vs. exclusively clinical; pathology vs. family medicine, full time vs. job sharing, etc.) I have emphasized the necessity of intelligence, adaptability and perseverance. I have not minimized the burden of financing 10 to 15 years of higher education. I'm proud many of them or their young are now fellow physicians. I am gratified that my brother Warren E. Hagan, MD, followed me as the second physician in our family. Our cousin Ann's accomplished daughter Shelley Hagan Bridgford, MD, has just begun practice as an emergency room physician in Kansas City. (See Sidebar page 9) I encouraged both my daughters to consider medicine as a career but their interests lead them elsewhere. I note a high rate of unemployment and underemployment in many people with degrees in history, English, philosophy, communications, liberal arts, art history, and other 'warm and fuzzy' majors where the average class grade is an "A". Unemployment with a Doctor of Medicine or Doctor of Osteopathy: not so much. In fact not at all!

I would have never survived physically, mentally or financially if I had persisted in the solo practice model I began in 1975. During that trying time I was in two different three-physician, single-specialty (ophthalmology) groups of discordant physicians providing medical and surgical services six days/week, emergency care 24/7/52, and uncompensated emergency room call for three busy hospitals. (The going rate at many Kansas City hospital ERs for ophthalmology now is $500/24 hours call). As small practice physician owners, we struggled with staffing, reimbursement, compliance, billing, insurance participation, business, and professional equipment purchase, stock ownership, and equitable disbursement of dwindling profits. In 2001, I joined my practice with Discover Vision Centers, a high quality physician-owned group of 15 ophthalmologists and 23 optometrists in the Kansas City metropolitan area. Unencumbered I happily practice clinical medicine three days/week and one day equivalent as Editor of *Missouri Medicine*. Staffing, business, and compliance matters are accomplished by able management professionals responsible to the physician owners.

As Dr. Samer Cabbabe so capably states (see page 4) as physicians, and through membership in the Missouri State Medical Association, we must continue to work to improve the lot of medical students, house staff, and all physicians, be they in private practice, hospital or industry employed, rural or urban, primary or specialty care. We must foster humane working conditions and hours, appropriate reimbursement and teach physicians business and coping skills. Physician-orientated mental and physical health services such as Missouri Physicians Health Program (MPHP) must be available from the first day of medical school to the elderly retired physician for recognition and appropriately confidential treatment of depression, severe anxiety, suicide prevention, alcohol and substance abuse, anger management and family counseling.

The physician's training must be made more affordable. Opportunities to significantly amortize medical education debt by service in the military or underserved urban and rural areas must be expanded. Fair reimbursement rates for medical and surgical services for private practice physicians must be the same as for hospital employed physicians. Same pay for the same procedure or service. An ounce of sweat or a pound of consternation weighs just the same in the private



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The Missouri State Medical Association Medical Student Section gathered for its 2017 "White Coat Day at the Capitol" in Jefferson City.

practitioner's office as in the hospital employed physician's office. The cosseting of hospital fees and reimbursement must end.

At a recent meeting I was seated with several full-time academics from three different medical schools. They commiserated that today's medical students, residents, and fellows "just wanted to be well paid shift workers." If that was emended to "well paid shift professionals" I would have no equivocation. The inability to control one's time is among the most stressful aspects of medicine. Suddenly being called away from family events, holidays, and other minor and major memory-making moments of our families' lives should be modulated. Are our patients better off with a well-rested but less familiar competent physician up to date on their care via detailed shift hand-offs and electronic health records or their very familiar solo practitioner who is working 100 hours/week, caring personally for an entire practice of thousands and working on two hours of sleep? I believe the former. Shift work is especially important to our female colleagues who may be balancing roles as wife and mother still much more difficult than males as husband and father. In my opinion removing the barriers to women entering medicine has done more to maintain the profession's high standards and reputation than anything else in the last half century.

A 2016 Harris Poll[1] reported that physicians were the most respected and prestigious profession in the United States. Moreover nine out of ten American adults would encourage their children to pursue a career in medicine. It is a wondrous and sacred honor the public bestows on us. Let us always make it attractive to our best and brightest women and men.

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MM

I'm Glad I Was Encouraged to Become a Physician

I'm 'Shifting' Into Emergency Medicine Very Nicely...

by Shelley Hagan Bridgford, MD

I grew up in a small town in rural Mid-Missouri. Mexico is mainly a farming community. It did have an excellent community hospital. My path to medicine was circuitous and really did not begin in earnest until my junior year in college.

My interest was fostered early on by my family's passion for raising, riding, and showing horses. I greatly admired the veterinarians who expertly and compassionately treated our paso fino horses. The vets taught me a thing or two about bandaging and suturing wounds. In all honesty, I remember considering various health care careers. One memorable night I just realized that I did possess the determination and abilities required for medical school. I chose human medicine as I was excited about the endless intellectual challenges and abundant opportunity to help and care for people. So after a phone call to my mother, who quickly confirmed she knew all along that medicine was where I was headed, my decision to become a physician was cemented.

Medical school at Mizzou was challenging, enlightening, and thoroughly unique. The core teaching concept was based on problem-based learning. This was difficult at first, but I soon discovered its value and it transformed me into a rigorous lifelong self-educator.

The hardest decision for me was picking a specialty. I did not enter medical school knowing what kind of medicine I wanted to practice. I have this amazing cousin who is an ophthalmologist and has encouraged me at every step in my path to medicine (hint: he edits *Missouri Medicine*). Consequently, I found myself drawn to ophthalmology.

However, during my third year of medical school, I had a career-shaping conversation with one of my best friends while we were studying for our surgery rotation exam. I realized my career path must come down to balancing what I value and want most out of life with the field of medicine that would best fulfill and accommodate all of my goals and desires for my personal and professional life. I wanted a medical practice that would allow planned time for other non-medical activities. I knew I wanted a family and to return to raising and riding horses again. I wanted a career that when my workday ended, it really ended, and call wasn't a part of that schedule. So, I left that conversation convinced that emergency medicine was the best field for me. I believed ER shift work would allow me the quality time outside of medicine I so desired.

ER Residency at UMKC followed and I soon realized that I had no idea what being busy was until I entered this phase of my career. However, unlike most new residents, my husband and I had also added two amazing little ones to our family. Multitasking became my new best friend, as I attempted to competently handle residency,



Shelley Hagan Bridgford, MD, MSMA member since 2016, is a graduate of Missouri University and MU School of Medicine. She did an Emergency Medicine Residency at UMKC and began private practice in 2016. She is married, has two children and is a national champion equestrian rider. Right: Family life is extremely important to Dr. Bridgford. She is pictured at her graduation from MU School of Medicine. From left to right: brother Ross DeLong, father Jim DeLong, husband Andy Bridgford, daughter Avery, Shelley Hagan Bridgeford, MD, mother Ann Hagan. A son Spencer has joined their family since this photo.
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Dr. Bridgford, shown as a child with her father Jim DeLong, has raised and shown horses all her life. She has won awards on the national level. Remaining active in equestrian shows is a lifelong goal for her.

motherhood and marriage. Quite frankly, I really do not know how all the things I accomplished for my family and my residency got done but they were done and done well. I consider myself blessed and fortunate to have the amazing support of my husband, family, friends, advisors, mentors, faculty and colleagues. Of course there were difficult and stressful times throughout residency but this network of people was there to assist me and allowed me to not only endure but thrive.

I am now at a wonderful emergency room practice at North Kansas City Hospital. I was so fortunate to have had the opportunity to join this prestigious group. I am now starting to re-balance things all over again, but this time, I am harmonizing my own created journey of practicing ER medicine with the other essentials in my life. I feel that fateful conversation back in the MU library served me well.

Being an ER physician allows me every day to learn, to educate, to help, to heal, to comfort, and to be amazed and surprised. ER medicine allows me time with my family and to return to the world of being an equestrian. My personal medical career does allow me to balance the things I want out of life. That is what I tell people who ask me if medical school is worth all the money, time and effort. Medicine has given me a career I love and also helps support my family with good job security. The path to medicine is grueling and not for everyone. But it is a path I'm happy I followed. **MM**

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Missouri is Last in the Nation Without a Prescription Drug Monitoring Program Bill

Will the Bill Pass This Year?

by Jeff Howell, JD

The establishment of a prescription drug monitoring program (PDMP) in Missouri has been a slippery proposition for a number of years. A PDMP is one of the many ideas that have been proposed to curb the nation's opioid epidemic. In the last decade, an electronic PDMP has been enacted by every state, with the exception of Missouri.

In 1990, Oklahoma became the first state to implement an electric prescription database. Between 2003-2012, with the assistance of financial grants, 33 states implemented an electronic PDMP. A PDMP bill has been introduced in the Missouri House of Representatives every year since 2005.

In the early years, the issue was sometimes sponsored by a member of the minority party, which gave it little chance to pass. In addition, it was a relatively new issue. By 2012, however, the issue had begun to get more attention with the onset of the opioid epidemic. It has since created passionate advocates and vocal opposition.

2012

By this time, Missouri was one of two states that had not passed a PDMP (New Hampshire was second last). The House bill moved quickly and passed that chamber by a 143-6 vote in early March. Both versions were bogged down by a Senate filibuster which charged that the government has no business tracking the medications citizens are using. With a few precious days left in the session, the House version passed the Senate after a referendum clause was added that would have sent it to the ballot box for a vote by the people. That effectively killed the bill.



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2013

By now, Missouri was the last state without a PDMP. The 2013 House bill didn't even get a committee hearing that year. The Senate bill got a hearing, but did not receive a vote. Both versions would have been bogged down by a Senate filibuster that would have charged that the government has no business tracking the medications citizens are using. There was a fairly large coalition of stakeholders pushing this bill, so it's surprising that it seemed to lose momentum. The coalition has since been named the "Missouri PDMP NOW Coalition."

2014

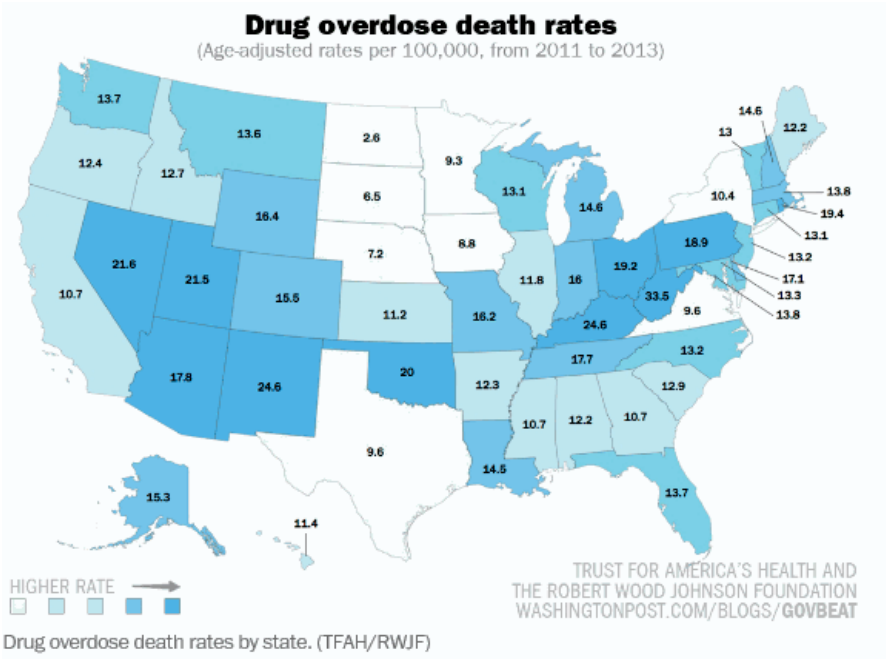
The bill passed the House by the middle of February. The Senate had three full months to pass it, but they didn't even hold a hearing on it.

2015

Once again, the House passed their version quickly (before March). This time, the obstructionists in the Senate came to the table to negotiate. Despite being woefully inadequate compared to other states' programs, the compromise language was a move in the right direction. With little time left, the House made changes to the compromise thereby requiring it be sent back to the Senate. It never made it across the finish line as time ran out. The changes the House made likely would have resulted in a filibuster anyway. This was as close as Missouri has come to having a PDMP.

2016

There was a more concerted effort to derail the bill in the House of Representatives this year, as the folks who oppose the creation of government-sponsored databases



Drug overdose death rates by state. (TFAH/RWJF)

rallied their troops. The result was that the bill escaped the House by a 91-68 vote. The Senate held onto the bill for almost two months before scheduling it for a hearing. It was eventually placed on the calendar for floor debate in the session's final week. It received a half hour or so of debate before it was unceremoniously suffocated.

2017

As has been the case the past couple of years, there are two competing PDMP bills in the legislature. We have been advocating for the version contained in HB 90, and remained silently opposed to the concepts behind the Senate's version (SB 74). In many cases, the differences between the two bills are subtle, but the House version is better at helping physicians treat their patients and it avoids unknowns, so we - along with the rest of the PDMP coalition - have historically been more closely aligned to it.

Probably the biggest difference between the two programs is that only the House version would allow physicians to actually see their patient's prescribing data. Under the Senate's version, a physician would only get a 'red-light' or 'green-light' notification from the Department of Health and Senior Services (DHSS) as to whether there might be a prescribing discrepancy. While that might give the physician an indication of whether to prescribe or not, it doesn't do much to actually help treat patients. Not to mention it requires a system far more complex than what we feel is required. The goal is to make patient information as confidential and secure as possible while still allowing for proper treatment for patients. We are actively looking for that sweet spot.

Another huge difference is the Senate bill, once approved by the Senate, would require a vote of the people. This is a procedure trick designed to kill the PDMP. We're not so sure Missourians wouldn't vote for it, but ballot questions are incredibly expensive and it's a road we'd rather not travel.

Both bills allow government agencies (DHSS and Bureau of Narcotics and Dangerous Drugs) to contact law enforcement agencies and/or professional licensing boards when they find "reasonable cause" to believe something is amiss. This language will need finessing. These executive agencies are accustomed to finding violations from a checklist; not in the business of establishing "reasonable cause" from a data set or two. Both bills require dispensers to submit information to the PDMP. The Senate bill allows prescribers to submit information, but neither requires it.

These are big bills that involve multiple stakeholders. They're not easy to deal with and it is difficult to find compromise that suits everyone at the table. We have been assisting with the nuts and bolts of the recent local efforts to establish county-based PDMPs, and we serve on a number of statewide task forces on this issue. At the Capitol, we will continue to advocate for PDMP language that will survive the legislative process, yet doesn't dilute the impact of the county-based PDMP presently being enacted across the state. **MM**

"I Stuffed Their Mouths With Gold"

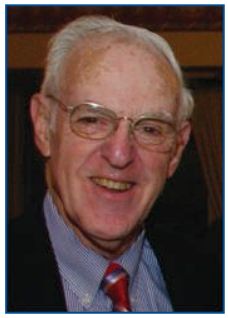
How Hospitals Destroyed the Private Practice of Internal Medicine

by Arthur H. Gale, MD

At the end of World War II, the British people voted their great wartime leader Prime Minister Winston Churchill out of office. The Labor candidate Clement Atlee became the new prime minister. His health minister was Aneurin Bevan. Bevan an eloquent if somewhat crude orator from Welsh coal mining country was the prime mover behind the creation of the British National Health Service (NHS). Under the NHS doctors in Britain are employees of the government. This system is commonly referred to as socialized medicine.

In 1948 Bevan boasted that he was able to accomplish his goal "by stuffing the doctors' mouths with gold."[1] What he meant by his famous and oft quoted statement is that he allowed some British doctors or consultants as they were called, to continue seeing private paying patients if they accepted NHS patients.

Fast forward to the 1990s in the U.S. Hospitals began buying internal medicine practices by "stuffing the doctors' mouths with gold." The hospitals contended that buying medical practices would improve quality and lower cost through "integration and coordination of care." Integration and coordination of care" are vague meaningless statements that the supporters of managed care used to sway doctors and the public and thereby justify their takeover of health care.



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Essentially the process of buying practices was nothing more than a poorly concealed bribe. Hospitals paid private physicians exorbitant salaries in order to make sure they referred patients to their own facilities. This gave the hospitals monopoly power in dealing with the government and private payers.

The Stark self-referral law prohibits hospitals from offering financial incentives to private doctors who refer patients to their facilities.[2] So in order to avoid large government fines hospitals hired doctors who then became employees. The Stark law is a classic example of a law enacted to solve a problem but which actually makes the problem worse.

I am aware of one internal medicine group that sold their practice to a hospital which paid them a salary that was approximately four times the average income most internists earned at that time. When their contract was up eight to ten years later a new contract with far lower compensation was offered - a classic bait and switch tactic. The internal medicine group rejected the new contract. But the group could no longer survive financially in independent private practice. Some of the doctors in the group retired, some started boutique practices, and some finally were forced to again become owned by the hospital at a significantly reduced salary.

There were some internists who resisted the financial enticements offered by hospitals preferring the freedom and independence of private practice. These internists refused to sell their practices for as long as possible. But eventually they too were forced to sell their practices to the hospitals because of the low reimbursement by the government and third party payers.

Under managed care, third party payers and Medicare pay hospital-owned physicians nearly double what they pay office-based independent physicians for the exact same services.[3] This unfair system is rigged against private practice internists. It is also rigged against patients when it comes to cost because either they or their insurance company must pay this additional cost. The hospitals constitute a monopoly and they use their monopoly power to their own advantage.

Chalk up the private office practice of internal medicine as just one more casualty of managed care. Which medical specialty will be next?

One may legitimately ask why the Federal Trade Commission (FTC) does not break up hospital monopolies. The answer is that the FTC has a track record of bias against and deep seated hostility towards physicians. It arbitrarily instituted rules that prevent doctors from forming their own integrated and coordinated care organizations to compete with hospitals.[4]

Hospitals have bought the practices of other specialists like cardiologists but the outcome is different. When, for example, a lucrative contract ends the cardiologists can simply opt out. Unlike the situation with the internists the cardiologists have been able to survive as independent practitioners primarily because they are able to perform procedures and tests for which they are able to obtain adequate reimbursement. This option is not available to internists and other primary care physicians.

The Doctor as an Assembly Line Worker

The problems encountered by practicing internists today are not just low reimbursement. Perhaps even more important hospitals have "brutalized" internists. They have forced internists into assembly line medicine. Doctors must see patients fast. One internist recently told me that he has to see a sick elderly patient with five or more complaints within a 15-minute period. At Kaiser Hospitals in California doctors must see patients every 10 minutes. It is impossible to give patients appropriate care in that time frame.

Internists are forced to use electronic health records (EHRs). Current versions of EHRs are a disaster. They are poorly designed and they slow the internists' work down by at least 25%.[5] This in turn causes internists to work 25% longer in the office than with prior hand-written notes. It has been estimated that ambulatory physicians spend two hours on EHR and desk work for every hour face-to-face with patients.[6]

In addition to trying to practice medicine EHRs have forced internists to become order-entry clerks and coders. They are also forced to spend an inordinate amount of time with insurance companies getting pre-authorizations for x-rays, labs and procedures.

Then there are the endless "meaningful use" checklists as part of "value-based" care. One primary care physician summed it up:

…"the endless box-checking and scoring takes precious time away from doctor-patient communication. Not one of my patients has lost a pound from my box-checking…Primary care providers are forced to monitor innumerable other metrics… [they] are swamped with lists, report cards, and warnings about their performance… Countless other personnel have been recruited in primary-care practices and hospitals to manage the metrics…the financial toll for pursuing these measures is significant… Medicine is becoming a nanny state in which doctors must chase down patients because one metric is off…Would you rather your doctor won the "quality" contest by doing good list management and robust box-checking or spent that time listening to you?"[7]

Our present dysfunctional managed care health system is based on the Toyota Production System (TPS) It is also referred to as Lean, or Medical Taylorism. Frederick Taylor who lived at the turn of the last century was known "as the father of scientific management." This system is based on the factory production of inanimate objects (widgets).[8]

Patients are not inanimate objects or widgets. Patients are complex human beings. Each illness is unique and complex for that particular person. Nevertheless TPS attempts to transform internists (as well as other primary care physicians) into assembly line workers. Their autonomy has been undermined. They are overworked, depressed, and burned out. Just ask any internists to tell you truthfully whether he or she likes practicing medicine. Almost all will tell you no. Some may say they actually hate it.

For years analysts have predicted that there would be a shortage of primary care physicians including internist. But the system has managed to somehow perk along. Internists complained but they continued to practice. They had mortgages and loans to pay off. They had to help pay for their children's education, etc.

But finally young physicians have rebelled and said enough is enough. The present generation of office-based internists is retiring. And there are virtually no doctors willing to replace them.[9] Hospital administrators have told me that they can barely find a physician willing to practice office-based internal medicine anymore. This should come as no surprise.

Why would any resident physician, after years of grueling study, spending untold hours of rigorous residency training and often facing huge debts, become an internist? Practicing office-based internal medicine has sunk so low that there that are no young physicians left into whose mouths the hospitals "can stuff gold."

The managed care folks will say "not to worry." They will get busy and find a solution to the internist shortage. They always find solutions to the problems that they themselves create. And they will even put a positive spin on it.

They will tell the hospitals to employ more nurse practitioners to see patients. It's cheaper. The U.S. doesn't need all those high priced internists. But nurse practitioners' salaries are already nearly the same as internists. And ultimately the nurse practitioners too will burn out for the same reasons internists do. They will get MBA degrees and look for administrative jobs just like so many current internists. Any job beats actually practicing internal medicine. Sad to say this wasn't always the case.

The advocates of Medical Taylorism and their acolytes in hospital administration will never admit their responsibility for destroying the private practice of internal medicine. The managed care establishment will solemnly declare that all of the changes that have occurred in internal medicine had to be done in the interest of cost containment.

Of course that statement is patently false. There was no cost crisis in 1973 when the Federal HMO Act was enacted. But since 1973 when the managed care takeover of our health care delivery system began, costs have skyrocketed and the overall quality of care is worse than in any other developed nation.[10] For over forty years the managed care folks have never looked at the bottom line. They have never admitted that after all the years that they have been proclaiming the benefits of Medical Ta;ylorism, Toyota Production System, and Lean, their efforts have been a total failure.

Chalk up the private office practice of internal medicine as just one more casualty of managed care. Which medical specialty will be next?

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Volunteer to spend a day in the Capitol as MSMA's Physician of the Day in 2017!

Between January 4 and May 11, 2017, MSMA needs volunteers to be "Physician of the Day" in the Capitol. Sign up at www.msma.org/physician-of-the-day.

This excellent program is warmly received by the General Assembly and participating physicians. Lawmakers and their staff benefit from knowing good medical attention is always at hand, and physicians enjoy spending a day in the Capitol, experiencing the political process on a personal basis.

Would you consider helping us? Plan to spend a day in Jefferson City as the Legislature's physician, and bring your family and let them see the Capitol, too.

One physician per day is needed every Tuesday, Wednesday, and Thursday during the legislative session. Plan to arrive in the Capitol around 9:00 or 9:30 a.m., and stay until 2:00 or 3:00 p.m. (except Thursdays, when the House and Senate typically adjourn around noon).

NEW FEATURE: Some of our medical students have expressed an interest in shadowing the Physician of the Day. If you are willing to allow a student to shadow you, please check the box at the bottom of the sign-up sheet at www.msma.org/physician-of-the-day. If you would rather not have a student follow with you, just leave the box unchecked.

Contact MSMA's Kenny Jackson at 800-869-6762 or kjackson@msma.org. He will coordinate with you to outline the responsibilities and offer dates available.

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Celebrating 125 Years of the Osteopathic Profession

by Margaret Wilson, DO

2017 will mark the 125th anniversary of the founding college of osteopathic medicine, A.T. Still University—Kirksville College of Osteopathic Medicine (ATSU-KCOM). The profession has grown and changed in many ways since its beginning but the institution continues to carry out the mission of preparing highly competent professionals with a commitment to its osteopathic heritage and focus on whole-person health care. ATSU-KCOM works hard to provide the best medical education and training for its students through an innovative curriculum, in a research environment.

A.T. Still, DO, the founder of the profession and ATSU-KCOM envisioned an approach to patient care based on the tenets a body is a unit made up of the body, mind and spirit. This set the tone for the whole person approach to patient care. Another tenet of the profession states the body is capable of self-regulation, self-healing, and health maintenance. This lends to the strong focus on wellness and prevention incorporated into osteopathic care.

Today, osteopathic medical students represent about 25 percent of all medical students in the United States. There are more than 30 osteopathic medical colleges and more than 100,000 osteopathic physicians practicing in the country. The osteopathic profession has continued training students to be successful in any specialty of choice but has remained ahead at producing primary care physicians, graduating more than 50 percent of their students in this field. ATSU-KCOM's program blends a rigorous academic curriculum, state-of-the-art technology and hands-on clinical training to best prepare graduates for residency.



Margaret A. Wilson, DO, MSMA member since 2012, is Dean of the Kirksville College of Osteopathic Medicine, and Professor, Department of Family Medicine, Preventive Medicine and Community Health.
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Curriculum

ATSU-KCOM has a patient-centered systems curriculum, which integrates learning of both explanatory sciences and clinical medicine. This year, ATSU-KCOM won an American Association of Colleges of Osteopathic Medicine (AACOM) Innovation Award at the annual conference for "Patient Morning Rounds," which is a collaborative faculty effort bringing a real-life patient into the classroom to present their case. This was recognized as a novel way to guide clinical problem-solving while modeling physician-patient interactions in the large-group setting.

In an effort to prepare osteopathic students entering into assessment innovations in graduate medical education AACOM recently created a national steering committee to guide integration of osteopathic principles and practices into the Core Entrustable Professional Activities for Entering Residency (CEPAER). ATSU-KCOM faculty members serve on the committee to help prepare the profession for this enhancement and to better prepare our students. The steering committee will advance implementation of EPAs within undergraduate medical education to prepare osteopathic graduates to meet performance outcomes and ensure competitiveness in residency applications.

In addition to the core curriculum, the ATSU-KCOM Center for Medical Humanities offers many electives allowing students to broaden and enrich their learning experience. These include electives on spirituality in health care, literature in medicine, vulnerable populations, advanced wilderness life support, culinary medicine and medical Spanish to name a few.

Technology

At ATSU-KCOM clinical ultrasound has continued to be an integral part of curricular innovation in training future physicians. Students learn living anatomy and physiology along with point-of-care bedside examinations, such as the FAST exam, which prepares them for emergent clinical encounters. Clinical cases are used to develop clinical reasoning helping to bridge the gap among basic science, diagnosis, and clinical applications. All first- and second-year students use ultrasound for learning anatomy and physiology, then an advanced ultrasound course is available for third- and fourth- year students on clinical rotations.



Tatyana Kondrashova, MD, PhD, ATSU-KCOM associate professor, family medicine, demonstrates ultrasound techniques to a high school student attending an ATSU-sponsored Summer Healthcare Career Experience for students interested in healthcare as a profession.

Ultrasound training at the College has expanded beyond use in required curriculum. Many student organizations engage in applied ultrasound learning, including radiology, anesthesia, emergency medicine, and sports medicine. Activities can include development of guided knee injection skills or echocardiography. In addition to ultrasound integration at the medical school, ATSU-KCOM faculty train all dental students at its sister school, Missouri School of Dentistry & Oral Health by providing a course on head, neck and maxillofacial anatomy, to enhance learning in the dental curriculum. The faculty has also been providing hands-on training workshops for physicians as part of the University's continuing education programs. Many of these workshops have focused on the musculoskeletal system, teaching clinicians how to access joints and guide injections.

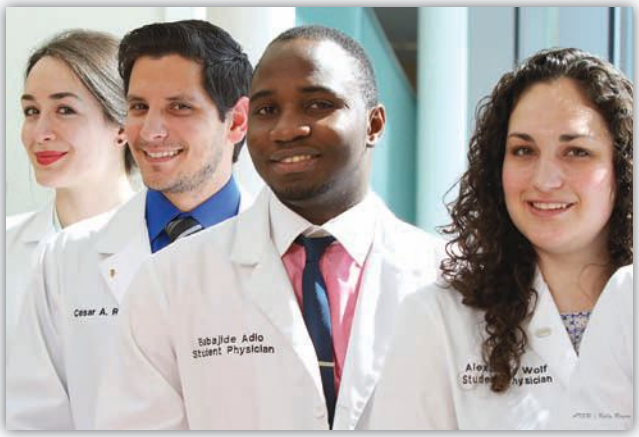
ATSU-KCOM houses a state-of-the-art human patient simulation (HPS) lab, also serving as the regional American Heart Association Training Center. Assessed curricular exercises along with weekly enrichment activities provide many opportunities for student learning and interprofessional team building. ATSU-KCOM works with local hospital staff, nursing students, dental students, and paramedics to provide a variety of training sessions which include basic and advanced disaster life support, disaster drills, obstetrical deliveries, colonoscopies, bronchoscopies, and neonatal care. In total, the Drabing HPS Center hosted more than 6,000 encounters during the past academic year.

As part of clinical preparation, students work with the obstetrical simulator on routine and complicated (i.e. nuchal cord, delivery, breech and shoulder dystocia) deliveries and also newborn resuscitation. During curricular systems blocks they experience clinical cases like anaphylaxis, thyroid storm, pulmonary edema, status epilepticus and trauma. These cases challenge students to work together as a team, apply clinical reasoning and practice diagnostic skills.

Research

While ATSU-KCOM's primary focus is on medical education, the College recognizes the importance of research and scholarly activity, which is a part of its mission. ATSU-KCOM currently has active research in cancer biology, bone and joint disease, neuroscience, infectious disease, medical education, and osteopathic manipulative medicine. Clinical and basic science researchers regularly publish in highly-rated journals such as Brain Proceedings of the National Academy of Sciences (USA), The International Journal of Microbiology, and PLOS One, often ATSU-KCOM students are co-authors on these publications. This past year, ATSU-KCOM received recognition from *The Journal of the American Osteopathic Association* for having the highest number of manuscripts published by colleges of osteopathic medicine in its publication. This in part reflects the emphasis put on scholarly activity by the faculty and students at the institution.

Each fall, ATSU-KCOM supports the Interdisciplinary Biomedical Research Symposium, which invites participation from both ATSU campuses of Kirksville, Missouri, and Mesa, Arizona, along with other institutions in the state such as Truman State University. The 2016 symposium featured 12 short talks, more than 50 poster presentations, and 136 attendees. The keynote speaker was J. Justin McCormick, PhD, distinguished professor, in the Department of Microbiology and Molecular Genetics and the director of the Carcinogenesis Laboratory at Michigan State University. Participants are recognized with awards in multiple categories.



A.T. Still University-Kirksville College of Osteopathic Medicine (ATSU-KCOM) is the founding school of osteopathic medicine and has a rich heritage of providing leadership for comprehensive medical education, research, and healthcare. KCOM graduates represent a diverse group of osteopathic physicians practicing in every state and several foreign countries.

PCTE Grant

In July 2015, ATSU-KCOM was awarded a $1.2 million, five-year grant from the U.S. Department of Health and Human Resources and Services Administration (HRSA). This grant, titled the Primary Care Training and Enhancement (PCTE) Grant, seeks to enhance primary care education and better prepare medical students to reduce health disparities, barriers to care for vulnerable populations, and improve patient engagement. It also trains faculty and students to become leaders in the Primary Care Workforce Competencies endorsed by the Patient-Centered Primary Care Collaborative. Now entering its second year of funding, the grant has already seen significant progress toward its objectives.

Specific objectives of the grant include enhancing primary care didactic curriculum and primary care clinical training and establishing a Primary Care Leadership Track. Increasing demand for new primary care graduates coupled with growing retirement of seasoned providers suggests the profession will sorely lack primary care leaders needed to transform health care systems. Through HRSA funding, ATSU-KCOM will continue to address these issues with strategic planning that prioritizes innovative educational approaches for an evolving health care workforce, strategic partnerships, diversity, and interprofessional education.

In an effort to augment ancillary campus-based primary care activities, the ATSU-KCOM PCTE grant expanded the scope of National Primary Care Week (NPCW) events on the Missouri campus in October 2016. The goal of NPCW is to promote primary care career choices and provide opportunities for students to network with primary care faculty and local providers. The week's activities began with a National Health Service Corps Panel (NHSC) consisting of Margaret Wilson, DO, Dean, ATSU-KCOM (and former NHSC scholar); Joni Adamson, Manager, Recruitment and Workforce Development, Missouri Primary Care Association and NHSC National Advisory Council member; and Matthew Tilton, OMS II, ATSU-KCOM, NHSC scholarship recipient and NHSC ambassador. Students also participated in the NEMO Senior Heath Expo held on the Missouri campus as part of NPCW. This event provided resources and assessments to seniors, caregivers and adults with disabilities and provided students the opportunity to work with these populations. NPCW events also included a service project where students were encouraged to make cards for local nursing home residents. Finally, two larger showcase events with noted guest speakers were held. Starla Fitch, MD, "The Connection Doctor," spoke to an audience of students, faculty and local health care providers about resilience, the importance of approaching work-life balance effectively as health care providers, and the power of connection in medicine. The week was concluded with a presentation by Marci Nielsen, PhD, MPH, president and CEO of The Patient-Centered Primary Care Collaborative. Dr. Nielsen's presentation focused on patient-centered primary care and the patient-centered medical home. All presentations were live-streamed and made available to off-campus students and faculty.

Wellness Activities

Today, one of the issues of greatest concern at the forefront of medical training is physician burnout and mental health. ATSU-KCOM, because of its osteopathic philosophy, has long tried to emphasize self-care and wellness in its educational process. For more than 20 years, the University has provided a student wellness program focused on finding balance during a student's professional development. There are seven components of the program that provide opportunities to focus on physical, environmental, social, professional, intellectual, spiritual and emotional wellness. Team leaders in each area work together to provide activities throughout the year such as fitness, yoga, speaker panels, exploring different faiths, creative writing, art fairs, nutrition seminars and fun activities like bowling, LEGO building competitions or video game competitions. The Still Well Program has successfully promoted health and wellness throughout the educational experience.

This year, the dean of ATSU-KCOM also formed a Student Mental Well-being Task Force to improve mental health awareness and strengthen the support provided to students to help ensure life-long habits of personal well-

being. The work of this task force will help educate both students and faculty on heightened awareness, preventions and interventions when dealing with the stress and pressure of medical school and the clinical environment. It is extremely important those both inside and outside the health care system strive to improve the learning and working conditions for those in the system, to assure the health of those providing care.



Vineet Singh, PhD, ATSU-KCOM professor for microbiology/immunology, mentors Hannah Braungardt, OMS I towards her master's degree in biomedical sciences.

Third and Fourth Year

ATSU-KCOM maintains 38 clinical training sites in nine regions (Arizona, Illinois, Kansas, Michigan, Missouri, New Jersey, Ohio, Pennsylvania, Utah) across the country. Faculty and staff in each region oversee the curriculum, assessment, and progression of student learning at each site. Students at their clinical training sites also have on-going didactics, on-line modules, and hands-on sessions in osteopathic theory and methods. Specific learning objectives are outlined within each discipline syllabus which reinforces osteopathic manipulative technique elements and application.

Graduate Medical Education

Still OPTI, the osteopathic educational consortium that supports ATSU-KCOM in graduate medical education accreditation, has actively been assisting its members in the transition to a new single accreditation system. As an Accreditation Council for Graduate Medical Education (ACGME) institutional sponsor, Still OPTI has been successfully helping its partners submit their program applications. Through weekly structured meetings and the dedication of teaching faculty and staff, many programs are in pre-accreditation status with ACGME, and other program applications are in-progress. Still OPTI has also consulted with each of its members to help them examine options and processes which can guide them to a successful transition.

In addition, programs sponsored by other institutions look to Still OPTI for assistance with osteopathic recognition. Still OPTI provides application assistance, live and online workshops, assessment tools, and on-site visits to supplement program resources in osteopathic education. This ensures a thorough application, continued support, and a greater likelihood for approval as an osteopathically-recognized program. Some of Still OPTIs dually accredited programs have already successfully submitted applications for osteopathic recognition and currently await review by ACGME.

This fall, Still OPTI also provided a day-long faculty development "boot camp" training and education event for MD and DO preceptors and senior residents in osteopathically-recognized programs. The goal was to provide foundations in Osteopathic Principles and Practice and OMT for clinician instructors as they bring osteopathic-focused training forward in the new world of single accreditation. Lastly, Still OPTI has implemented a robust plan for outreach to hospitals across the state of Missouri to develop new residency and osteopathically-recognized programs in the single accreditation system.

The Next 125 Years

As osteopathic medicine moves forward into the future, ATSU-KCOM plans to remain a leader by producing the next generation of health care professionals to meet the needs of the nation. Its long tradition of focusing on whole-person care, wellness and prevention best positions its graduates to provide the type of care patients continue to seek. ATSU-KCOM continues its commitment to excellence for the future while taking pride in our past as it enters into the next 125 years of service to the country. **MM**

Contributors to the MPHP 2016 Fund Raising Campaign

The Missouri Physicians Health Program is proud to recognize the following organizations and individuals who contributed to our annual fund drive. We are truly grateful for their generosity which helps provide crucial support as we strive to provide high quality physician health care services and meet the demand for our services statewide. Many of our participants are physicians in training who are unable to pay for services rendered. Your contribution helps us to defray those costs. We encourage you to generously contribute to our 2017 campaign. Thank you for your compassionate support.

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Centerpoint Medical Center
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Overland Park Regional Medical Center
Ozarks Medical Center
Pershing Memorial Hospital
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Pike County Memorial Hospital
Progress West Medical Center
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SSM St. Clare Health Center
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Barnes Jewish Hospital West County
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Mercy Hospital Jefferson
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Mercy Hospital Springfield
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Ozarks Medical Center
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SSM St. Clare Health Center
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SSM St. Mary's Hospital Audrain
St. Alexius Hospital
St. Anthony's Medical Center
St. Joseph Health Center Hospital, St. Charles
St. Joseph Medical Center, Kansas City
St. Luke's East Lee's Summit Hospital
St. Luke's Hospital – Chesterfield
St Luke's Hospital – Kansas City
St. Luke's North Hospital
St. Mary's Health Center, St. Louis
St. Mary's Medical Center, Blue Springs
Texas County Memorial Hospital
Truman Medical Center

2016 Contributors, continued

Medical Societies

Boone County Medical Society
Missouri Academy of Family Physicians
St. Louis Society for Medicine & Scientific Education

Group Practices

Anesthesia Associates of Kansas City, P.C.
Jefferson City Medical Group
Mercy Clinic Four Rivers Division

Individuals

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David L. McLaren, MD
Gareth Johnson, MD
Gene Thomas, MD
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Stephen Waltman, MD
Thomas Cooper, MD
William Woods, MD

Attorneys at Law

Danna McKitrick, PC

State of Missouri

Department of Mental Health

MM

MISSOURI PHYSICIANS HEALTH PROGRAM
The Physician Lifeline: Preserving Physicians' Lives

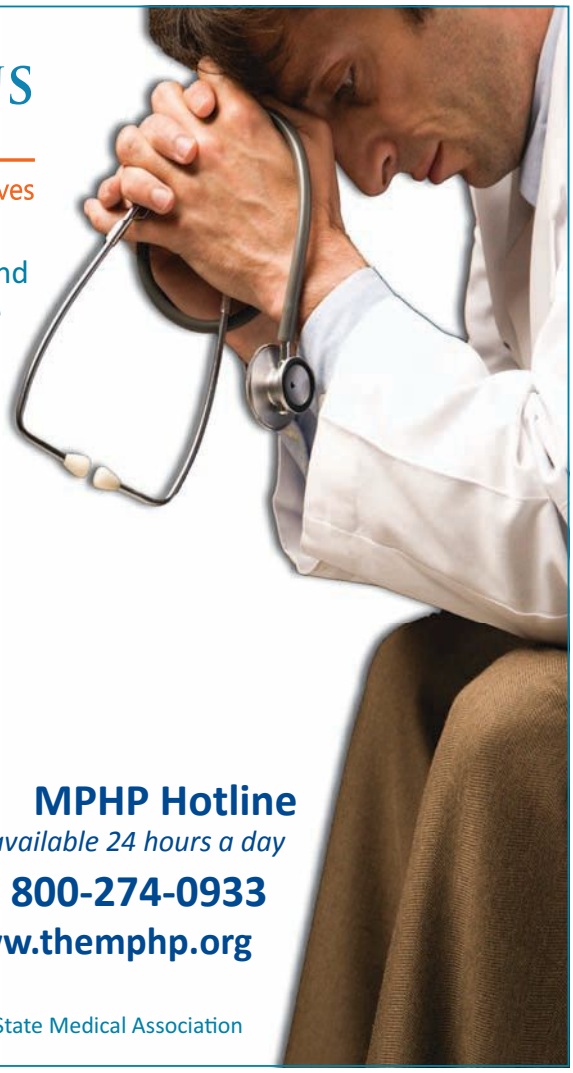
The MPHP is available to all Missouri physicians and physicians in training, and is designed to facilitate the physician's return to healthy personal and professional functioning through early identification, intervention, and treatment.

Issues We Address

- Substance Abuse
- Mental Health
- Behavioral Health Problems
- Disruptive Behavior
- Stress-Related Problems
- Boundary Violations
- Physical Illness

Program Services

- Education
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- Monitoring
- Advocacy



MPHP Hotline
available 24 hours a day
800-274-0933
www.themphp.org

Sponsored by the Missouri State Medical Association

MSMA Members in the News

Read more about what our members are doing at www.facebook.com/momedical




Congratulations to Drs. Carl Blatt Jr. and Leslie Tucker, for having their endoscopy unit at Mercy Hospital Washington certified by the American Society for Gastrointestinal Endoscopy. They have been MSMA members for a combined total of 55 years.



Felicitations are in order for Erik Meidl, MD, MSMA member since 1996, for being named President and CEO of Hannibal Clinic!.And thank you, Michael Bukstein, MD, for his many years of service in this role.



MSMA would like to recognize David Chang, MD, of Columbia, and the work he has been doing with medical missions since his first trip in 2005 to Kenya. Last fall, 56 children there had cleft lip and palate surgeries performed on them by Dr. Chang and the team. He has been a valued MSMA member since 2006.



We applaud James Corder, MD, for being recognized with the Physician of the Year Award from BJC Medical Group in St. Louis. We appreciate your membership since 1980.



MSMA is grateful to have Omofolarin Fasuyi, MD, as a new member and we applaud you for setting up practice at Mercy's Rolla Clinic.



Congratulations to Sarah Gordon, MD, on moving her practice to serve the patients of Prairie Hills in Versailles and Warsaw. MSMA appreciates your membership since 2002.



An MSMA Delegate to the AMA and member since 1988, Rebecca Hierholzer, MD, of Kansas City, has been recognized by Continental Who's Who as a 2016 Woman of The Year, for her role as the Chief Executive Officer of the Collection of Victim Evidence Regarding Sexual Assault.



MSMA applauds Sri Kolli, MD, on her practice move to Esse Health Physicians at St. Clare. She's been an MSMA member since 2006 and serves as MSMA Councilor for the International Medical Graduate Section.



MSMA is proud to call Christopher Maugans, MD, a new member of MSMA. He is in his first year of practice and just joined Rockhill Orthopaedics in Lee's Summit.



An MSMA member since 2013 from Columbia, Brian Fassil Mesfin, MD, has been initiated as a fellow of the American College of Surgeons (FACS). This designation signifies he passed a rigorous evaluation and met the ACS membership requirements for education and training, professional qualifications, surgical competence and ethical conduct.



Krikor Partamian, MD, an MSMA member the past 40 years, expanded his practice to include Northwest Health Services in St. Joseph.



Toniya Singh, MD, MSMA member since 2015, was recently published in the *Saint Louis Post Dispatch* for the work she has been doing to combat gender inequality through advocacy.



Karen Thies, DO, congratulations on setting up practice at MU and for being featured in COMO Living Magazine. MSMA appreciates your membership since 2008.



MSMA wishes all the best to Racheal Whitaker, MD, MSMA member since 2015, for setting up her new practice at Ste. Genevieve County Memorial Hospital.

Correspondence



Cover to Cover

Congratulations on a phenomenal November/December 2016 edition of *Missouri Medicine*. I thought it was the single best issue I had read over the years. I particularly enjoyed every article in the "Perspectives"; I learned something new reading each article. Keep up the good work!

Samer W. Cabbabe, MD, FACS
MSMA member since 2010
Cabbabe Plastic Surgery, St. Louis

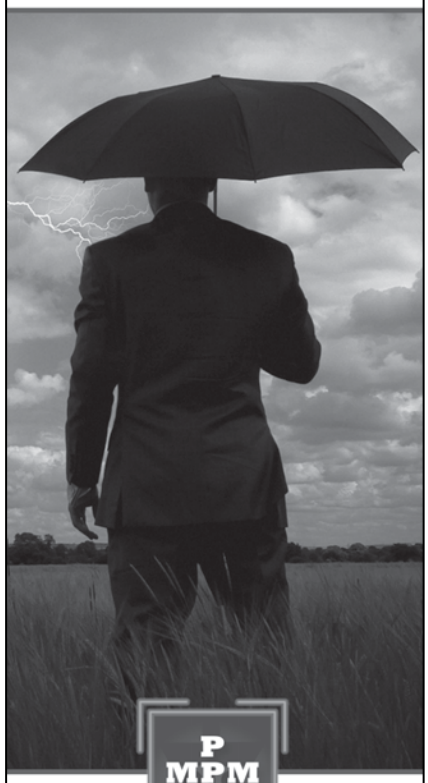
In Memoriam



MSMA Past President Richard V. Bradley, MD, passed away in Tomball, Texas, on January 1, 2017. He was 90 years old. Born and having lived in St. Louis, Mo., Dr. Bradley attended Washington University School of Medicine, and completed his internship and residency in general surgery at Barnes Hospital and the Veterans Administration in St. Louis. He practiced general surgery in St. Louis until 1989. Dr. Bradley was installed as MSMA President in April 1980, and was instrumental in founding MOMEDICO, a physician-owned professional liability insurance company.

- James E. Jameson, MD, 95, Springfield, MO, Orthopedic Surgery, 11/6/2016
- Charles W. Barbee, Jr, MD, 77, Columbia, MO, Vascular Surgery, 10/9/2016
- Aaron M. Bernstein, MD, 89, St. Louis, MO, Internal Medicine, 11/15/2016
- Lawrence G. Stuerman, MD, 81, O'Fallon, MO, Family Practice, 12/1/2016
- Charles W. Cheek, MD, 80, Rocheport, MO, Opthamology, 1/6/2017
- William C. Banton, II, MD, 94, St. Louis, MO, Internal Medicine, 12/31/2016
- Mark M. Tendai, MD, 78, Springfield, MO, Obstetrics & Gynecology, 1/5/2017

We have weathered Missouri's stormy medical liability climate, only to come out bigger, stronger and better. As you look for protection from the hazards of running your own medical practice day-to-day...choose strength... choose stability...choose a company committed to your best interests.



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Pre-Convention Meetings

Thursday, March 30

2:15 pm	MSMA Insurance Agency Board Meeting
3:30 pm	MSMA Executive Committee
3:30-6:00 pm	Convention Registration
3:30-6:00 pm	Exhibitor Setup & Registration
5:00 pm	**MSMA Council Meeting**
6:30 pm	Alliance Dutch Treat Dinner [Offsite]
6:30 pm	**MSMA Council Reception & Dinner**

Convention Meetings

Friday, March 31

6:30 am-4:00 pm	Convention Registration
6:45 am	Moneta Breakfast
7:00 am	**Exhibit Hall Opens/Continental Breakfast for all Conferees**
8:00 am	**Opening Session MSMA House of Delegates**
8:30 am	Alliance Board Meeting
10:00 am	Alliance General Assembly - Session I
10:00 am	**Reference Committee A**
10:30 am	**Reference Committee B**
11:30 am	"Spirit of the Alliance" Awards Luncheon
Noon	SLMMS Caucus & Luncheon
Noon	KCMS Caucus & Luncheon
1:30 pm	**MSMA General Session**
2:00 pm	Missouri Million Hearts Meeting
3:15 pm	"Wings of Love" Birdshow
3:30 pm	**MSMA General Session**
4:30 pm	Alliance Past President's Reception
5:00 pm	OMSS Business Meeting
5:30 pm	Medical School Alumni Receptions
7:00 pm	"Blues Highway" Alliance Foundation Fundraiser/Dinner

Saturday, April 1

6:30 am-4:00 pm	Convention Registration
7:00 am	**Exhibit Hall Opens/Continental Breakfast for all Conferees**
All Day	CME Programs, Lectures & Meal Functions
8:00 am	**MSMA General Session**
8:30 am	Alliance General Assembly - Session II
9:00 am	International Medical Graduate Section Meeting
10:00 am	**MSMA General Session**
10:00 am	MMPAC Meeting
10:00 am	Medical Student Section Meeting
10:30 am	Exhibit Hall Closes
11:45 am	Million Hearts CME Program
12:30 pm	Alliance Installation Luncheon
1:00 pm	AMA Issues
1:00 pm	Resident Fellow Section Meeting
1:00 pm	Young Physicians Section Program & Meeting
1:30 pm	**MSMA General Session**
2:00 pm	Missouri State Medical Foundation Meeting
2:30 pm	Alliance Board Meeting
3:00 pm	Component/Specialty Society Leaders Meeting
3:30 pm	OMSS Educational Session
5:15 pm	Reception: 50-Year Pin Recipients & MSMA Past Presidents
6:30 pm	**MSMA Presidential Inauguration**
7:30 pm	**MSMA Presidential Reception** *Entertainment, Hors d'oeuvres & Cash Bar*

Sunday, April 2

7:00 am	District Breakfasts & Caucuses
8:15 am	**Second MSMA House of Delegates**
Immediately Following Closure of the HOD	MSMA Council Meeting

Complete Program at www.msma.org/annual-convention

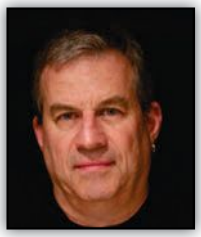
Subject to Change. Refer to Convention Official Program for times and meeting locations. All meetings held at the Sheraton Kansas City at Crown Center unless otherwise noted. Updates on CME program, lectures, and meal functions at www.msma.org/annual-convention. For more information, contact MSMA's Benita Stennis, at 800-869-6762 or bstennis@msma.org.

Convention is EARLY!
Make Hotel Reservations Now!

www.msma.org/convention-registration-lodging
Call Sheraton Kansas City at Crown Center
1-866-932-6214
Group rates available until February 27, 2017.
Rates start at $151 per night plus charges and taxes.
If calling, mention "MSMA 2017 Annual Convention."



GENERAL SESSIONS & EVENTS



Friday, March 31 | 1:30 pm

Dreamland: The Opioid Epidemic

Sam Quinones
Journalist and Author
Los Angeles, California



Friday, March 31 | 3:30 pm

Breast and Ovarian Cancer Prevention

Joshua Cohen, MD
Obstetrician-Gynecologist
Ronald Reagan UCLA Medical Center,
Los Angeles, California







Saturday, April 1 | 8:00 am

Economic and Health Impact Addressing Under-Treatment of Sleep Apnea

Lirong Zhu, MD
Medical Director, Mercy Sleep Center, Rolla, Missouri

David Kuhlmann, MD
Medical Director of Sleep Medicine, Bothwell Regional Health Care, Sedalia, Missouri

Thomas Gotsis, DDS
Midwest Dental Sleep Medicine
Bridgeton, Missouri



Saturday, April 1 | 10:00 am

Exciting Years in Cancer Treatment

Joseph J. Muscato, MD
Founding Partner, Missouri Cancer Associates, Columbia, Missouri



Saturday, April 1 | 1:30 pm

Patient Engagement

Peter Anderson, MD
Founder and President, Team Care Medicine, Yorktown, Virginia



Paul Grundy, MD, MPH
Global Director, Healthcare Transformation, IBM, Washington, DC



Saturday, April 1 | 3:30 pm

OMSS Presentation MACRA: The Shift to Value-Based Payment

Michael Munger, MD
Family Medicine, Saint Luke's Health System, Overland Park, Kansas

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Two-Day Exhibit Showcase
House of Delegates
Foundation Fundraiser/Dinner
Presidential Inauguration & Reception

Direct-to-Consumer Genomics: Harmful or Empowering?



It is important to stress that genetic risk is not the same as genetic destiny.

by Joel C. Eissenberg, PhD

Abstract

The price of whole-genome sequencing is now within the budget of the average American consumer. This has resulted in the commercialization of genome sequencing for a variety of applications, including health-related risk assessment. Direct-to-consumer marketing of personal DNA sequence information uncouples the generation of personal health-related data from the physician-patient relationship. Here, I discuss the status of consumer genomics and the current and potential concerns about bypassing physicians in the analysis and interpretation of personal genomic information and subsequent health care decision-making.

Introduction

The sequencing of the human genome is transforming medicine. In a few years, the underlying molecular basis for thousands of genetic disorders will be known. A key dividend of the Human Genome Project was to drive down the cost of DNA sequencing by five orders of magnitude (100,000-fold) in 15 years. To put this transformation in perspective, Moore's law (as modified by David House) describes the progressive increase in computer speed over the last several decades as doubling in performance every 18 months. From 2001 to 2007, the decrease in genome sequencing cost followed Moore's Law, but after 2008, the drop in DNA sequencing cost sank far faster (See Figure 1).

Recent revolutions in DNA sequencing technology and computational speed and storage have reduced the cost of genome sequencing and analysis to a level that makes it practical for middle-class Americans to obtain the sequence of their genome in few days. For a few hundred dollars, it is now possible for anyone to get their DNA analyzed for a variety of personal traits and disease risk factors. What effect will this information have on patient care? How much do we currently know about the predictive power

and clinical validity of DNA sequence-disease associations? How should the clinical care community respond to this information revolution?

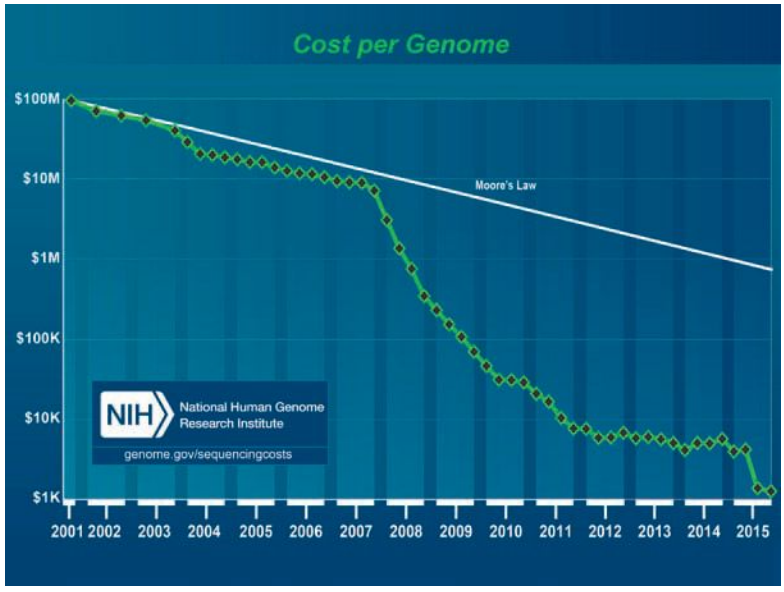


Figure 1
Decline of genome sequencing cost (green diamonds) compared to Moore's Law.
Source: https://www.genome.gov/27565109/the-cost-of-sequencing-a-human-genome/

Genetic disease and genetic risk

The language used in the popular press to describe inherited disease is confusing. People often speak of "gene for sickle cell disease" or the "gene for hemophilia," for example. There is no gene for sickle cell disease. The gene altered in sickle cell anemia is the adult beta globin gene, and everyone has two copies of it. What distinguishes patients with sickle cell disease is that they have a particular variant—a so-called "allele"— of the adult beta globin gene that makes their red blood cells clump abnormally in their capillaries under low oxygen tension, resulting in transient painful crises and long-term organ damage. It is also important to understand that all mutations are not alike. Sickle cell disease occurs in people with two copies of the same adult beta globin gene allele, both copies of which program an abnormal protein. Other alleles of the adult beta globin gene result in little or none of the beta globin protein, a condition called beta thalassemia. The severity of beta thalassemia can vary, depending on the nature of the allele, and whether one or both copies of the adult beta globin gene are altered, but the clinical presentation is distinct from sickle cell disease. Personal genomics testing can certainly determine whether a patient carries a mutant adult beta globin gene, and the clinical data concerning this gene are sufficient to provide useful interpretations of such genomics data.

If the public discourse surrounding simple Mendelian diseases is sometimes misleading or confusing, the idea of disease risk for complex disease is infinitely more challenging. For common medical conditions like age-related macular degeneration, asthma, depression, heart disease, hypertension, obesity and type 2 diabetes, there are multiple genetic factors with various contributions, as well as environmental inputs. In some cases, gene sequence variants are statistically more often encountered in affected individuals, yet others may have the same variants without symptoms. An illustration of this is the association of the APOL1 allele with chronic kidney disease (CKD). While CKD was thought to be a complex disease, the presence of the APOL1 allele can account for much of the risk. But only approximately 20% of individuals who carry two copies of the APOL1 allele actually get CKD unless they also suffer from another condition such as HIV infection. For most people with APOL1 CKD, the influence of such secondary factors is unknown, making it hard to predict who will get CKD. Thus, it is important to stress that genetic risk is not the same as genetic destiny. Critical to the utility of genomics data is the predictive power associated with specific alleles at specific genes, and appreciating the clinical validity behind a given prediction. In most cases of sequence variants uncovered by personal genomics, the clinical validity of most allele associations with complex diseases is weak or nonexistent, making the predictive power of genomics testing problematic at best.

The Direct-To-Consumer Genomics Business Model

A variety of genomics testing services are presently being marketed directly to consumers without a doctor's order. Some companies test for a handful of specific genes, looking for alleles for which there are clinically informative data or that have significance for ancestry. Other companies sequence the "exome," that fraction of the genome that contains genes encoding proteins. This represents only about 1% of the human genome, making the amount of data and the task of assembling and validating it much more manageable than sequencing the entire genome. The remainder of the genome encodes (1) sequences that control protein coding genes, (2) non-coding

RNAs that regulate protein coding genes, (3) transposable elements, (4) sequences that control chromosome behavior and (5) sequences with no known function. However, with the rapidly declining cost of DNA sequencing and rapidly growing computational speed and data storage capacity, many companies offer whole genome sequencing. Table 1 tabulates several privately held companies offering direct-to-consumer personalized genomic analysis and their services

Obtaining a highly accurate entire genome sequence of a single person is relatively easy compared to making sense of that information. To begin with, the raw sequence information is fragmentary; hundreds of millions of fragments must be assembled by computer into the linear sequences comprising the three billion nucleotide sequence units in a human genome. Then, there is the reality that the chemistry of DNA sequencing isn't flawless, so sequencing errors

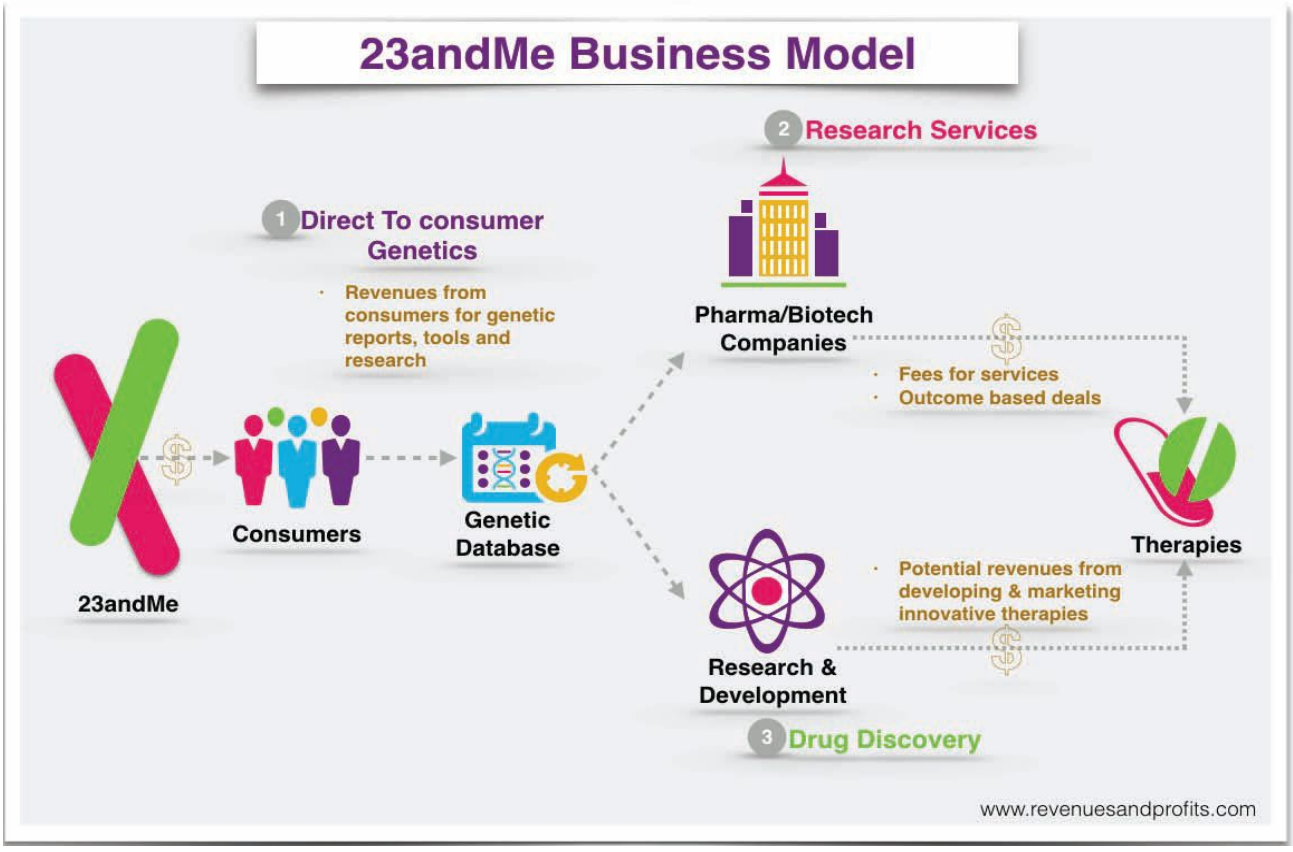
Table I

List of personal genomics companies providing direct-to-consumer DNA testing in the US as of June, 2016

Company	Services
23andME	ancestry and ethnicity, traits, genetic disease carrier status, wellness
AncestryDNA	ancestry and ethnicity
Counsyl	inherited cancer gene screening, pre-natal and pre-conceptional screening
DNA4Life	drug sensitivity report, wellness review, skin care report
DNA-CardioCheck, Inc	clotting and cardiovascular disorders
FullGenomes	deep ancestry
Gene by Gene	research, exome sequencing, whole genome sequencing
Genographic Project	deep ancestry
Genomic Express	ancestry, nutrition, pharmacogenetics, sports, traits
*Genos	exome sequencing for disease risk, athletic or nutritional predispositions.
Healthspek PGT	pharmacogenetics
Interleukin Genetics	periodontal disease, ,weight management, heart health, bone health and nutritional needs
InVitae	cardiology, hematology, hereditary cancer, metabolic diseases and newborn screening, neurology, ophthalmology, pediatric genetics
Kailos Genetics	cancer screening, pharmacogenetics, ADHD
Sure Genomics	health, whole genome sequencing
Ubiome	gut microbiome sequencing
**Veritas Genetics	whole genome sequencing, BRCA, prenatal testing

adapted from: http://isogg.org/wiki/List_of_personal_genomics_companies
*does not accept orders from NY or FL
**according to their web site, requires a doctor's order

Figure 2



Source:http://revenuesandprofits.com/how-23andme-makes-money-understanding-23andme-business-model/

have to be distinguished from actual variants. Finally, there is the question of whether the validated variants are simply random and benign or have meaning for the person's ancestry or health.

Probably the most widely advertised consumer genomics provider is 23andMe, a privately held biotechnology company based in Mountain View, California. 23andMe provides the customer with a container in which they deposit a saliva sample. When the sample is returned, the company extracts and genotypes the DNA. 23andME then sends the customer a research report showing whether they are a carrier for any of over 35 diseases and provides information about benign traits and likely ancestry. The 23andMe business model is to collect genetic data in order to identify patterns and aggregate information to sell to researchers, insurers and pharmaceutical companies. (See Figure 2.) Anticipating the future market value of this database to commercial partners, 23andMe steeply subsidizes the cost of its services to individual consumers. In all but one case, the companies listed in Table 1 work directly with consumers without a doctor's order.

Direct-To-Consumer Genomics: Disintermediating Access to Medical Data

Disintermediation is the process of bringing customers closer to products or services by cutting out intermediaries. A familiar and long-established example of disintermediation is the farmer's market, where farmers sell produce directly to consumers without the intermediation of a grocery store. More recent examples include the Uber app, which connects people directly with a car and driver without the intermediation of a taxi company, and airbnb, which gives travelers access to overnight accommodations without the intermediation of hotel companies.

Consumer genomics disintermediates personal genetic information by removing the physician and genetic counselor. The expertise required of physicians is orders of magnitude more complex than that required for farming, driving a car or renting a room, so the idea of removing the doctor from the collection and interpretation of personal medical data would seem to threaten the traditional medical information hierarchy.

In reality, disintermediation has been occurring in medicine for decades. Digital thermometers, blood pressure cuffs, blood sugar monitors, and pregnancy testing kits are examples of only somewhat more sophisticated commercialized technologies that permit the lay public direct access to actionable health-related parameters without overt symptoms or physician intermediation

The public is increasingly turning to online applications called "symptom checkers" to seek diagnoses and advice on appropriate care. In a recent study, 23 such online applications were evaluated for accuracy in a total of 770 standardized patient evaluations for diagnosis and 532 standardized patient evaluations for triage.[1] Surprisingly, the correct diagnosis was listed first in only 43% of standardized patient evaluations overall, and was listed in the top 20 diagnoses only 58% of the time. Appropriate triage advice was given in 57% of the cases. This compares with in-person physician diagnostic accuracy rates of 85-90%. With regard to online diagnostics, *caveat emptor*.

Direct-to-consumer marketing of genomics data may be compared to the widely accepted direct marketing of MRI and CT imaging of the coronary arteries for calcification and of the breasts, lungs, abdominal organs and pelvis for cancer. In contrast to sampling DNA from cheek swabs or sputum samples, CT imaging involves ionizing radiation exposure, a known cancer risk; radiation exposure during a full-body CT scan is approximately 500 times that of a chest X-ray. While a small number of individuals could discover tumors this way, only a fraction of these people will have an altered outcome. On the other hand, benign lesions uncovered incidental to imaging—so-called "incidentalomas"—can lead to needless invasive testing and anxiety. For screening the "worried well," the risks of asymptomatic CT imaging clearly outweigh the benefits. While MRIs lack the risks associated with ionizing radiation exposure, the possibilities of actionable false positives remain.

The critical health care issues that emerge from direct-to-consumer marketing of genomic data are (1) should consumer access to personal genomics data be denied or controlled, and (2) what can and cannot be claimed concerning the medical implications of the data.

On the first issue, I will argue that people should have unfettered, disintermediated access to their personal genome data. On the second, there are legitimate controls that should be imposed on the marketing of claims about personal genomic data.

Access

In an open society, maximizing autonomy is a virtue. Knowledge is power. The concerns expressed around disintermediated access to personal genomics data are focused on whether personal genomics data could cause significant harm to the subject. There is certainly anecdotal

Table 2
Predictive testing cost/benefit comparisons

Potential advantages	Potential disadvantages
More information	Costs to individuals of tests that yield little determinate information
Allows early intervention	Social harms when private testing can undermine equal access to healthcare
Allows more personal control	Costs of consequences of having information: a) for individual when inaccurate or hard to interpret, b) for individual when nothing can be done, c) for individual if inaccurate risk assessments lead to false reassurance or misplaced anxiety, d) for the individual, if results lead to stigma or other effects that may be regretted, given that information once known cannot be 'un-known' (e.g., for insurance declarations), e) for taxpayers when unnecessary follow-up testing and treatment is carried out
Possibility of saving public healthcare resources if testing and treatment are conducted privately	Costs and harms to third parties – when children or third parties are tested without consent, or when embryos are tested for conditions whose risks may be hard to determine
Can alert relatives to important genetic conditions	Costs and harms to third parties – when children or third parties are tested without consent, or when embryos are tested for conditions

Adapted from: Nuffield Council on Bioethics (2010) *Medical Profiling and Online Medicine*: *the ethics of 'personalised healthcare' in a consumer age*, NCB, London, Chapter 3.

evidence for severe emotional distress associated with disintermediated genetic testing that resulted in unexpected risk findings.[2] Fortunately, several recent studies have been published that address these concerns.

• **Does genetic risk information concerning the ApoE4 allele increase distress and anxiety?** The presence of one copy of the ApoE4 allele increases the risk of Alzheimers by approximately three-fold, while two copies increases risk approximately fifteen-fold. In a study of 162 asymptomatic adults who had a parent with Alzheimer's disease, each subject's symptoms of anxiety, depression, and stress were measured after test results were revealed.[3] Genetic counselors monitored all subjects for adverse psychological effects and made referrals when appropriate. The study found evidence that disclosure of genotyping information provides a benefit to those who are ApoE4-negative and results in only transient, modest distress to ApoE4-positive individuals. A caveat here is that there is no proven medical intervention for Alzheimers. In the case of bilateral prophylactic mastectomy in response to increased genetic risk for breast cancer, it is possible that anxiety and distress may be quite different when contemplating invasive therapy.

• **Do elevated cancer risk results alter risk perception in genomic testing customers?** In surveys of over 1,000 people for the effect of risk information for four common cancers, a study found that DTC genomic testing results indicating elevated risk did lead to increased risk perception, while an average risk result left risk perception unchanged or lower.[4]

• **Do genetic risk data motivate risk-reducing behavior?** Based on a review of 14 papers reporting results of seven clinical studies and six analogue studies, Marteau et al.[5] reported that ". . . communicating DNA-based disease risk estimates has little or no effect on smoking and physical activity." The same could well be said of the common long-term patient response to standard DNA-free doctor's admonitions concerning weight loss, smoking cessation, alcohol moderation, sunscreen use, and regular exercise

Taken together, the current published literature suggests no lasting harm comes from giving people access to their genomics data, although little benefit could be quantified, either.[6] On the issue of DTC genomics testing, there is no justification for medical paternalism, defined as " . . . usurpation of decision-making power, by preventing people from doing what they have decided, interfering in how they arrive at their decisions, or attempting to substitute one's judgment for theirs, expressly for the purpose of promoting their welfare."[7] Thus, disintermediated access to personal genomics data is not contraindicated.

Data Interpretation

The second major concern for direct-to-consumer genomics testing is that the current state of medical knowledge has not kept up with the detail with which we can examine genomes. Therefore, what should direct-to-consumer genomics testing companies be allowed to tell their clients about the meaning of sequence variation?

Many or most genomic testing clients are interested in whether they carry a mutation that affects their health or the health of their descendants. An obvious place to look for such mutations is in genes that code for proteins, and whether there is a mutation that would inactivate one or both copies of that gene. A 2012 paper reported an exhaustive analysis of 185 human genomes of healthy people to look specifically for changes that would result in complete loss of function in any of their protein-coding genes.[8] The analysis found that the typical "healthy" person has about 100 such mutations in their genome, with about 20 of these changing both copies of the gene. Most of the loss-of-function variants found in specific individuals appear to be common variants that occur in non-essential genes,

and there is little or no evidence implicating these loss-of-function mutations in common complex diseases like heart disease or type 2 diabetes. Some loss-of-function variants are rare, suggesting that they are deleterious, and some of these could be associated with serious disease conditions.

However, our current ability to predict risk from genomics data is weak or nonexistent for most sequence variants, so simply knowing that there are sequence variants that disrupt a specific gene is not enough reason to seek medical intervention. Indeed, a recent study comparing the ability of three direct-to-consumer genomics companies to assess risk for six common complex diseases (age-related macular degeneration, atrial fibrillation, celiac disease, Crohn's disease, prostate cancer and type 2 diabetes) using data sets simulating 100,000 individuals found that the company genomic data analysis varied significantly in their predictive ability for each disease and in the risks predicted for individual consumers.[9]

For now, stringent standards are essential for published disclaimers concerning the limitations of current knowledge of risks attached to most sequence variants in light of current scientific evidence. Of course, the standards must be evolvable as the evidence inevitably improves with time.

Even with better data on gene function, low health literacy (health reporting jargon) and low genetic literacy are barriers to the ability of consumers to use personal genomic data as a guide to health care decision-making. Both barriers necessarily affect perception of risk, which is also influenced by education, ethnicity and culture. Here lies a critical role for intermediation, either by a genetically literate physician or a genetic counselor. Of course, clinically significant responses to genomic data will still require standard medical protocol; patients who seek a mastectomy or ovariectomy based on genomics data will still face physician intermediation in this country.

With the widespread availability of disintermediated genomics data, are we really better informed about our health? What happens when a consumer of genomics data learns he or she carry a mutation associated with an elevated risk for colon or breast cancer? Or more dramatically, consider a 25-year-old who learns that he or she carries a mutation giving the certainty of dying of Huntington disease in their fourth or fifth decade when no mitigating therapies exist. While psychological evaluation and genetic counseling are standards advocated by the medical community prior to specific testing for Huntington disease, disintermediated testing provides no such mechanism to prepare consumers of commercial testing for bad news and the risk of anxiety, emotional distress, depression and suicidal ideation.[10] Table 2 summarizes some of the cost/benefit considerations of commercial genomics testing.

Studies conducted in collaboration with 23andMe so far have shown no evidence of adverse effects, but current users of 23andMe skew toward an emotionally, intellectually and educationally prepared demographic with sufficient affluence and access to health care to cope with adverse news. Nevertheless, the terms of service on the 23andMe web site stipulates that " . . . information you learn from 23andMe is not designed to independently diagnose, prevent, or treat any condition or disease or to ascertain the state of your health in the absence of medical and clinical information," and "23andMe makes no warranty that . . . the results that may be obtained from the use of the services will be accurate or reliable."

Regardless, it is clear that more and more personal medical data will be finding their way unfiltered directly to consumers. This represents a significant shift in control from doctors to the general public. In the absence of physician oversight, will this new access result in a significant impact on outcomes? In the cases of diabetes and heart disease, most people don't need test data or a doctor to know that a better diet and regular exercise will improve their health. Will whole genome data change patient behavior for the better? So far, it looks like the risk data currently available from direct-to-consumer personal genomics are neither as empowering as claimed by the companies promoting this product, nor are they as dangerous as critics have feared.[11]

The Future of Personalized Genomics and the Doctor-Patient Relationship

At its best, direct-to-consumer genomics testing could eventually become like other forms of home medical testing—another way for people to take personal control of their health and wellness. According to a recent study, the reliability of current genomic sequencing technology surpasses the accuracy of Sanger DNA sequencing, long held to be the gold standard.[12] Today, however, genomics testing to assess risk for complex diseases rests on a weak foundation of clinical validation. Thus, in most cases genomics data cannot serve as a guide to action. While medical paternalism is not warranted in controlling access to personal genomics data, there may be a benefit for some genomics testing clients to access pre-test intermediation by physicians or genetic counselors to prepare for adverse news, and a stronger post-hoc role for physician intermediation in interpreting risk, prescribing risk

response where appropriate and counseling caution in over-interpretation. Indeed, the American College of Genetics and Genomics has published their recommendations for health care professional involvement in DTC genomic testing (see sidebar). For their part, regulation of direct-to consumer companies should be limited to proper lab and confidentiality practices and avoiding over-reach in making interpretive claims concerning medical risk.[6]

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Disclosure

None reported. **MM**



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SIDEBAR

Direct-To-Consumer Genetic Testing: A Revised Position Statement of the Amercian College of Medical Genetics and Genomics

Source: American College of Medical Genetics and Genomics/Genetics in Medicine

With ongoing genetic discoveries and improvements in technology, more genetic tests are available than ever before. Along with greater availability has come increased consumer demand for genetic tests and expansion of direct-to-consumer (DTC) testing. The American College of Medical Genetics believes that it is critical for the public to realize that genetic testing is only one part of a complex process which has the potential for both positive and negative impact on health and well-being. The College believes that the following should be considered minimum requirements for any genetic testing protocol:

• A knowledgeable health care professional should be involved in the process of ordering and interpreting a genetic test. Genetic testing is highly technical and complex. A genetics expert such as a certified medical geneticist or genetic counselor can help the consumer determine, for example, whether a genetic test should be performed and how to interpret test results in light of personal and family history. A number of risks can be reduced if a genetics professional is involved in genetic testing. These risks include lack of informed consent, inappropriate testing, misinterpretation of results, testing that is inaccurate or not clinically valid, lack of follow-up care, misinformation, and other adverse consequences.

• The consumer should be fully informed regarding what the test can and cannot say about his or her health. Many DTC genetic tests do not give a definitive answer as to whether an individual will develop a given condition, but provide only a risk or probability of developing a disease. The interpretation of such results is often highly nuanced and such information needs to be communicated to the consumer in the appropriate context and in an understandable fashion that is linguistically and culturally appropriate.

• The scientific evidence on which a test is based should be clearly stated. DTC genetic test providers should provide easy-to-understand information with primary references documenting the scientific data on which a specific test is based.

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• The clinical testing laboratory must be accredited by CLIA, the State and/or other applicable accrediting agencies. The accreditation process ensures that laboratories adhere to strict standards and guidelines for clinical testing. Test result reports to consumer should indicate the specifics of the lab's accreditation.

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The Ever-Changing Field of Physical Medicine and Rehabilitation

by Gregory M. Worsowicz, MD

One thing all PM&R physicians agree on is that we are doctors that specialize in function. This unique perspective on patient care allows physiatrists to be integrated into multiple care teams, service lines, and evolving models of patient care.



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It is a pleasure to highlight some of the programs and patient care activities of the Department of Physical Medicine and Rehabilitation (PM&R) at the University of Missouri in this issue of *Missouri Medicine*.

Since 1947, when Physical Medicine and Rehabilitation became a board certified specialty, our field has continued to grow and diversify in our areas of practice.[1] While there are 12,155 board certified physical medicine and rehabilitation specialists, patients and other physicians often struggle with our identity.[2] Unlike some specialties, PM&R is not linked to one specific organ or body system, rather our field takes a global view of how a disease or impairment affects a patient's function. With this relatively low number of PM&R specialists and the diversity of our practice there can often be confusion regarding how patients and physicians refer to us.

Physiatrists (PM&R physicians) are often referred to as therapy doctors, PM&R docs, therapists, rehab docs, spine docs, brain injury doc, or identified based on our area of PM&R practice specialty. Regardless of this fact, one thing all PM&R physicians agree on is that we are doctors that specialize in function. This unique perspective on patient care allows physiatrists to be integrated into multiple care teams, service lines, and evolving models of patient care. Whether assisting in the acute care setting, providing consultation on appropriate levels of post-acute care, managing the rehabilitation of stroke patients, developing models of spine care (determining non-operative vs. operative care), managing intrathecal pumps for spasticity, evaluating and treating pelvic pain, or any other clinical practice, our focus is always grounded in how our treatment will impact each individual patient's functional status.

This issue has articles highlighting not only the diversity of the field of PM&R, but also that of our PM&R department and faculty at the University of Missouri. Drs. Chis Wolf and Katie Fast's article on concussion provides updated evidence on the management and treatment of concussions as well as decisions on return to play. As the recognition and management of concussion has gained greater national awareness, Dr. Wolf and a group of multi-disciplinary specialists (physical therapy, occupational therapy, neuropsychology) have developed an interdisciplinary clinic specializing in concussion management. The article by Joseph Burris, MD, on stroke rehabilitation, highlights the recent American Stroke Association guidelines and its implications on practice. Dr. Burris was recently selected to be a member on an American Academy of Physical Medicine and Rehabilitation (AAPM&R) national task force to develop guidelines for physiatrists and other clinicians to assist with matching acute hospital patient needs with the appropriate post-acute care setting. This includes evaluating the needs of patients who have suffered strokes or



other disabling conditions such as: traumatic brain injuries, amputations, spinal cord injuries, multi-trauma, or other catastrophic events. In the area of program development, Mark Drymalski, MD, and Mohammad Agha, MD, have drawn from evidence-based literature to develop a new and innovative spine care program here at the University of Missouri Health System. Both Drs. Drymalski and Agha have worked to develop pathways at the Missouri Orthopaedic Institute for patients referred with back pain. Working in collaboration with the Departments of Orthopaedic Surgery, Neurosurgery, and Physical Therapy, they are developing processes to place patients with the right type of provider (surgical or non-surgical) at the correct time. Sarah Hwang, MD, has developed a program to evaluate, diagnose, and treat women with pelvic pain. Not only does she see patients in the Obstetrics-Gynecology Clinic, she has developed a specialized Pelvic Pain Clinic in conjunction with pelvic floor-trained physical therapists. Initially the clinic focused on female patients, but this program is now expanding to males who have undergone pelvic surgeries or suffer similar pain. Rez Farid, MD, a pediatric PM&R specialist, provides information on trouble shooting and caring for patients with intrathecal drug delivery systems.

Our opportunities for research continue to grow just as our clinical programs continue to grow. The recent addition of the Mizzou Advantage Stroke Registry Program will allow clinicians and researchers to evaluate and improve care and treatment for stroke patients. This grant allowed a data registry to be developed for tracking patients with strokes in the acute, post-acute, and chronic care management. This data set will be useful to further develop evidence based practice here at our institution and provide the opportunity to collaborate with other centers as well.

Conclusion

The past present and future continue to be bright for the Department of PM&R here at the University of Missouri. While we continue to grow and be involved in multiple service lines including: pediatrics, injured workers, regenerative medicine, cancer care, sports medicine, post acute care, and a multitude of other areas, our focus remains on the patient and his or her function. I hope you will take the time to read the diversity of articles presented in this edition of *Missouri Medicine*. While we all face many challenges ahead, it truly is an exciting time to be a member of the Department of PM&R at the University of Missouri.

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MM

"Put Me Back In, Coach!" Concussion and Return to Play

by Christopher Wolf, DO & Katie Fast, MD

The majority of patients recover from concussion within 7-10 days. Prolonged symptoms (>3 months) may require additional investigation and treatment by a multidisciplinary team.





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Abstract

Concussion is a mild traumatic brain injury (TBI) sustained as a result of blunt force or acceleration/deceleration injury to the head.[1,2] Approximately 1.4-3.8 million concussions occur each year in the United States, making the understanding of concussion pathophysiology and how it can impact one's gross function an essential part of a physician's toolbelt.[3,4] It is important to recognize that the biochemical changes of concussion that result in functional cognitive deficits and compromised synaptic plasticity are greatest at three days and still active more than 15 days post-injury.[6,7] Therefore, prompt diagnosis of concussion and subsequent proper treatment can help promote adequate healing and prevent synergistic effects of second-impact syndrome. Recognition of the common signs and symptoms of concussion combined with pertinent physical examination findings, concussion assessment tools aid with proper identification and triage of patients. Consensus guidelines have delineated return to play protocol and treatment regimen for these patients and athletes. The goal of treatment for concussion is important to limit long-term deleterious effects that can result from single or multiple injuries to the brain.

Introduction

Concussion is a mild traumatic brain injury (TBI) sustained as a result of blunt force or acceleration/deceleration injury to the head.[1,2] In 2012, the International Conference of Concussion in Sport determined concussion as "A brain injury defined by a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces resulting in neurologic impairment reflected by functional disturbances." Resolution of concussions follows a sequential course, though duration is largely dependent on severity. The Center for Disease Control (CDC) approximates 1.4-3.8 million concussions per year in the United States.[3,4] However, due to debate about precise definition of concussion and underreporting of incidence, epidemiologic estimations have limited strength.[5]

Pathophysiology of Concussion

Concussive brain injury results in transient neuronal dysfunction in the absence of gross anatomic lesion on imaging. It is a functional disturbance. A complex cascade of neurochemical and neurometabolic events ensues within the brain secondary to acceleration/deceleration forces after impact.[6] The axonal and neuronal membrane stretch causes dysregulation of ion channels and membrane instability. Thus, excitatory neurotransmitters, most notably glutamate, are dispersed. Glutamate binds to a N-methyl-d-aspartate

receptor on the cell membrane, resulting in calcium influx to the cell and ultimately disrupting mitochondrial energy production. This disruption results in the build-up of reactive oxygen species (ROS) which hinder the cell's ability to re-establish proper ion balance, minimizing effective oxygen-dependent energy production within the cell. In other words, the initial traumatic injury causes depressed brain energy metabolism, resulting in a so-called "energy crisis" which results in functional cognitive deficits and compromised synaptic plasticity.[6] This neurologic dysfunction occurs within the first 30 minutes to four hours of injury. The biochemical changes after concussion are greatest at three days and still active at more than 15 days post-injury.[7] Timing of the cascade of events reveals an ongoing process of injury that is imperative to understand for proper evaluation and treatment.

Initial Concussion Assessment

The most vital component of concussion care is prompt recognition of the concussion itself.[1] Ninety percent of the time concussion occurs without loss of consciousness (LOC), making it more difficult to recognize.[8,9] Team personnel should immediately remove any athlete from play that is suspected of a concussion in order to minimize risk of further injury.[10] A more severe head injury is indicated by LOC greater than 30 minutes, post-traumatic amnesia greater than 24 hours, or Glasgow coma score (GSC) of 12 or less.[1] Current recommendations denote that players diagnosed with concussion should not return to play the same day; previous guidelines recommended this only if the individual was under 18 years.[11]

A recently published literature review from March 2016 reevaluated the physical examination findings most relevant for concussion assessment. The essential examine points should include cranial nerves, manual muscle testing, deep tendon reflexes, inspection of head and neck for trauma/tenderness and cervical range of motion, Spurling maneuver, a static or dynamic balance assessment, screening ocular assessment, and mental status examination which includes orientation, recall, concentration, mood, affect, insight, and judgment.[12] Simple questions of orientation are not adequate to rule out a concussion.[13] Common early concussion symptoms include headache, dizziness, lack of awareness of surroundings, nausea, and vomiting.[9] Headache tends to be the most common symptom. Additional signs of concussion may include: vacant stare, delayed verbal expression, poor concentration, disorientation, slurred speech, imbalance/incoordination, mood lability, anxiety, fatigue, memory impairments, irritability, and anxiety.[14]

The Sports Concussion Assessment Tool (SCAT3) is an expert consensus standardized concussion assessment utilized worldwide. It combines aspects from previous concussion tools into eight components. In 2013, the SCAT2 was revised to the SCAT 3 to further incorporate ideas/recommendations discussed at the 2012 CISG (Concussion in Sport Group). Changes were made to the assessment of amnesia, disorientation, vacant looks, GSC, and Maddocks questions along with increasing emphasis on symptom severity.[15,16] The SCAT3 added the Balance Error Scoring System (BESS) to improve detection of balance deficits. Still, testing paradigms are not fully inclusive and should not replace comprehensive neurologic examination.[17] Baseline neurocognitive testing for comparison is debatable; the ImPACT study of 2009 demonstrates athletic trainers have been shown to base return to play more on symptoms versus previous functional status.[18]

Neuroimaging is not necessary for all concussion patients. However, if there is question of the diagnosis or neurologic deterioration, immediate neuroimaging is indicated. The initial test of choice is a non-contrast head CT to assess for intracranial bleeding or fracture.

Treatment and Management

Physician evaluation should occur within a few days of the injury if not done so initially. The cornerstone of concussion management is physical and cognitive rest until symptom resolution.[11] Activities that should be limited include scholastic activity, video games, computer usage, text messaging, television screen time, etc. Once an athlete is asymptomatic, graduated return to play (RTP) protocol can be initiated. Pharmacologic treatment is aimed at prolonged symptoms or those symptoms that are affecting quality of life. Headaches should be monitored for regression and treated if not improving within several days or persisting beyond one to two weeks; topiramate or amitriptyline are first line medications for treatment.[21]

Return to Play Protocol

The current published data evaluating the effect of rest following a sports-related concussion is sparse. There is good evidence to indicate benefit from rest 24-48

Table 1
From Zurich 2012 conference CONSENSUS STATEMENT: McCrory, Paul, et al. "Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012.

GRADUATED RETURN TO PLAY PROTOCOL		
Rehabilitation Stage	***Functional exercise at each stage of rehabilitation***	***Objective of each stage***
1. No activity	Symptom limited physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming, or stationary cycling keeping intensity <70% maximum permitted heart rate. No resistance training	Increase HR
3. Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
4. Non-contact training drills	Progression to more complex training drills, e.g. passing drills in football and ice hockey. May start progressive resistance training	Exercise, coordination, and cognitive load
5. Full-contact practice	Following medical clearance participate in normal training exercise	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

hours post-concussive injury. However, data on required rest beyond that time period is limited. The current recommendation is a graduated RTP protocol as noted in Table 1 with a goal of limiting symptom exacerbation.

The graduated RTP follows a stepwise approach. The typical consensus is that each step takes at least 24 hours and if no symptom exacerbation, the player may move on to the next step the following day. At any time if post-concussive symptoms arise, the patient needs to drop back to the level at which the symptoms subside. From there, the player may proceed from that level after 24 hours of rest. While this protocol serves as guideline, clinical judgement of patient's status and situation should be considered and return to play schedule modified as necessary.

Recovery/Prognosis

The majority (80-90%) of concussions resolve in a short (7-10 day) period, although the recovery time frame may be longer in children and adolescents.[19] However, as stated above, the biochemical changes may not be resolved at the time of functional symptom resolution.

Prolonged Concussion

Persistent concussion symptoms (>3 months) have been noted in approximately 15% of concussion patients.[6] Post-concussive syndrome (PCS) is defined by at least three concussive symptoms lasting a minimum of three months with specific criteria defined in DSM-IV. If symptoms persist, further evaluation to rule out co-existent pathologies should be considered.[20] Evaluation by a multidisciplinary team can be initiated based on symptoms and may incorporate neuropsychological testing for concentration deficits, vestibular therapy for balance/dizziness issues, and potential imaging to exclude structural pathology. Pharmacologic treatment is another consideration for persistent post-concussive symptoms. Amitriptyline has been studied specifically for persistent posttraumatic headaches and is an ideal first line treatment.[21] With ongoing cognitive deficits, methylphenidate and amantadine have been shown to be beneficial in treating deficits in attention and processing speed. Of note, Amantadine may have N-methyl-d-aspartate antagonist effects and thereby be effective in halting the direct metabolic disturbances induced by concussion injury.[21] After thorough evaluation, graded exercise program would be recommended at a level that does not exacerbate symptoms to improve mood and aid in cognitive recovery.[20,22]

Second Impact Syndrome/Chronic Traumatic Encephalopathy

Second impact syndrome results from a person sustaining a second brain injury prior to biochemical resolution of their previous concussion. Evidence demonstrates that "concussed" brain cells maintain a state of vulnerability for a time after injury due to metabolic energy perturbations. This heightened vulnerability to even minor trauma can cause these brain cells disproportionate damage if such head insult occurs, resulting in irreversible damage and even cell death.[6] This cell death can result in impairment of the brain's vascular autoregulation leading to engorgement

and increased intracranial pressure with potential for herniation. Clinically, severe symptoms may be manifested as rapid (within seconds to minutes) decompensation in the form of collapse, pupil dilation, loss of eye tracking, respiratory failure, and semi-comatose state.[14] When this occurs, mortality rates are between 50%-100%. Injury in this vulnerable period may also contribute to morbidity. Multiple studies have shown that the metabolic effects of two concussions can be additive and the degree of clinical severity depends on which phase of metabolic recovery the brain is in at the time of the second concussion.[6]

Chronic Traumatic Encephalopathy (CTE) is derived from multiple concussions and/or subconcussive blows resulting in a neurodegenerative process that clinically features motor deficits, progressive dementia, and difficulty with depression/emotional instability which begins several years after the end of exposure to repeated head blows.[23] Currently, the definitive diagnosis relies on post-mortem examination. This syndrome has been most widely studied in football players and boxers and is another consequence of repeated concussion.

Conclusion

A concussion is a form of mild traumatic brain injury sustained from traumatic biomechanical forces. These forces initiate a complex cascade of neurochemical and neurometabolic events, leading to "energy crisis" within the brain which results in functional cognitive deficits and compromised synaptic plasticity. Due to the serious pathology underlying concussion, prompt recognition is an imperative part of management. Currently, rest is the initial treatment for concussion. Though there is lack of scientific evidence for duration of rest to resolve concussion, graduated return to play protocol is the recommended standard to avoid further complications of brain injury. The majority of patients recover from concussion within 7-10 days. Prolonged symptoms (>3 months) may require additional investigation and treatment by a multidisciplinary team. Serious consequences of improper management or lack of recognition of concussion can reflect the additive nature of multiple head injuries as noted in post-concussive syndrome, second impact syndrome, and chronic traumatic encephalopathy.

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Disclosure

None reported. **MM**

Stroke Rehabilitation: Current American Stroke Association Guidelines, Care, and Implications for Practice

by Joseph E. Burris, MD

Post stroke care should be initiated in the early rehabilitative phase and also continue in the chronic restorative phase of life for patients living with stroke.



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Abstract

Stroke attacked approximately 795,000 Americans last year, and it was the fifth leading cause of death in the United States. In 2016, the American Stroke Association published updated guidelines for stroke rehabilitation, with recommendations intended to improve systems of care and functional outcomes for people who suffer stroke and important recommendations regarding specific aspects of care. This article summarizes some of these recommendations with implications for those who treat stroke patients in their practices.

Introduction

Stroke attacked nearly 800,000 Americans this past year, and it was the fifth leading cause of death in the United States.[1] Despite these profound numbers, the relative rate of stroke deaths dropped by 35.1% from 2001-2011. Procedures such as chemical and mechanical thrombolytic therapies, improved general medical care, and guideline-driven acute hospitalization care such as the American Stroke Association's Get With the Guidelines (GWTG) have improved stroke survival.[2] However, many patients do not receive full benefits of this care or otherwise still suffer from significant residual functional impairments. At least two-thirds of stroke survivors undergo stroke rehabilitation interventions after acute hospitalization. With more than six million stroke survivors in the United States, nearly $18 billion was spent on stroke rehabilitation in 2011. Despite this expenditure, stroke remains a leading cause of severe disability.

Guidelines for Adult Stroke Recovery and Rehabilitation

In May 2016, the "Guidelines for Adult Stroke Recovery and Rehabilitation" were released from the American Heart Association/American Stroke Association (AHA/ASA). These guidelines represented both updated and new information from the AHA/ASA stroke rehabilitation care guidelines initially established in 2005 and the Veterans Affairs/ Department of Defense stroke rehabilitation guidelines established in 2010.[3,4] These guidelines included critical information, and the reader is encouraged to seek and review this material. The following results are summarized from the 2016 guidelines:

"Stroke rehabilitation requires a sustained and coordinated effort from a large team, including the patient and his or her goals, family and friends, other caregivers (e.g. personal care attendants), physicians, nurses, physical and occupational therapists, speech-language pathologists, recreation therapists, psychologists, nutritionists, social workers, and

others. Communication and coordination among these team members are paramount in maximizing the effectiveness and efficiency of rehabilitation and underlie this entire guideline. Without communication and coordination, isolated efforts to rehabilitate the stroke survivor are unlikely to achieve their full potential."[5]

Consultation with PM&R or Rehabilitation Neurologist

The AHA/ASA multidisciplinary group strongly recommended physician consultation and follow-up care with specialists in Physical Medicine and Rehabilitation (PM&R)/physiatry or a neurologist with specialized training or board certification in rehabilitation to specifically address a patient's ongoing needs. In an environment that, in reflection of current U.S. systems of care, is largely fragmented in nature, with rules and regulations that do not align with coordinated, patient-centered care this can be challenging for all caregivers. The provision of rehabilitation physician consultation should ideally begin, if possible, during the acute stroke hospitalization (See Table 1). In part due to the success of the ASA's GWTG campaign, the evaluation and treatment plan in the acute hospital setting for a stroke patient is often efficiently performed, and acute length of stay may be as short as four days for uncomplicated stroke.[6] Subsequently, direct patient care involvement of the rehabilitation physician should continue during post-acute inpatient and outpatient care.

The AHA/ASA 2016 guidelines summarize the types of post acute care that stroke patients typically receive. Patients are referred to a variety of settings, and each setting has different funding, eligibility, and continuation requirements. Per the guidelines, most patients are referred to a first post acute care setting of a skilled nursing facility (SNF), followed by an inpatient rehabilitation facility (IRF) for institutionalized care, and those first discharged to a community setting receive home health care agency (HHCA) services. Stroke patients may also discharge to a long term acute care hospital (LTAC) if their medical needs are sufficiently substantial and require a more intense post hospital medical care than that provided at an IRF or SNF. Medically stable patients performing well enough, especially from a mobility/self care status may be referred directly to outpatient physical therapy (PT), occupational therapy (OT), and speech therapy (ST) services (See Table 2).

The consensus AHA/ASA guidelines team made the strongest recommendations yet regarding the type of care recommended for stroke patients following acute stroke hospitalization: "It is recommended that stroke patients who are candidates for post acute rehabilitation receive organized, coordinated, interprofessional care. It is recommended that stroke survivors who qualify for and have access to IRF care receive treatment in an IRF in preference to a SNF."[5]

Table 1
Physiatry/rehabilitation physician consultation during acute hospitalization for patients with stroke rehabilitation needs, evaluation and management planning

- NIHSS review
  - Categorize recovery estimation
    - <7 anticipate good recovery
    - 7-16 variable recovery
    - > 16 anticipate poor recovery
- Stroke recurrence risk factors
- Secondary stroke prophylaxis
- Medical comorbidities and effects on post acute care needs
- DVT prophylaxis
- Cognition/communication
- Dysphagia
- Nutrition
- Mobility/self care
- Bowel/bladder function
- Skin integrity
- Caregiver availability
- Patient/caregiver education
- Depression/mental health screen
- Spasticity
- Durable medical equipment/orthotic needs
- Recommendation regarding transition to appropriate level of post acute care and follow up with physiatry/rehabilitation physician for future stroke rehabilitation needs

The ASA/AHA 2016 guidelines elaborate on the nature of this IRF care with the following statements: "IRFs provide hospital-level care to stroke survivors who need intensive, 24-hour-a-day, interdisciplinary rehabilitation care that is provided under the direct supervision of a physician. Medicare (Centers for Medicare & Medicaid Services) regulations specify that admission to IRF's should be limited to patients for whom significant improvement is expected within a reasonable length of time and who are likely to return to a community setting (rather than being transferred to another setting such as a SNF or long-term care facility). Medicare regulations also generally dictate that IRF's provide at least three hours of rehabilitation therapy (defined as PT, OT, and SLT) per day for at least five days per week. Physicians are expected to have training or experience in rehabilitation, and daily physician visits are typical. Registered nurses are present on a continuous basis and commonly have specialty certification in rehabilitation nursing."[5]

The ASA/AHA 2016 guidelines purported an extension of stroke rehabilitation care beyond the typical paradigm

Table 2
Features of various levels of post acute care for stroke rehabilitation care.

Inpatient Rehabilitation Facility (IRF)
- Coordinated, interdisciplinary rehabilitation team with expertise in stroke rehabilitation, including: physiatrist/rehabilitation physician; physical, occupational, and speech therapy; psychology; rehabilitation nursing; case manager/social worker. May also include recreational therapy, vocational rehabilitation, neuropsychology
- Requires at least 2 of 3: PT/OT/ST
- Sufficient medical stability to perform at least 3 hours of therapy at least 5 days per week or 15 hours of therapy over 7 days per week under special circumstances (e.g. dialysis)
- Physiatrist/rehabilitation physician oversight 3-7 days per week for evaluation/intervention of medical/rehabilitation management issues

Skilled Nursing Facility (SNF)
- Multidisciplinary rehabilitation team, should/may include: physical, occupational, speech, recreational therapy, psychology, nursing, case manager/social worker
- Ability to perform at least 1-3 hours of therapy 5 days per week
- Physiatry/rehabilitation physician consultant for recommendations specific to stroke rehabilitation needs

Long Term Acute Care Hospital (LTAC)
- Medical treatment issues supersede rehabilitation needs at another level of post acute care
- Three-day ICU stay during acute hospitalization required
- Physiatry/rehabilitation physician consultant for recommendations specific to stroke rehabilitation needs

Outpatient Therapy
- Physical, occupational, and speech therapy as indicated
- Interdisciplinary outpatient programs, as available/indicated
- (Rehabilitation) Psychology, as indicated
- Neuropsychologic testing, as indicated
- Vocational rehabilitation, as indicated
- Driving evaluation, as indicated

Home Health Care Agency (HHCA)
- Patient will be considered "homebound"
- Patient/family will benefit from interventions specific to their home environment
- Inability to arrange logistics for attendance in an outpatient treatment program due to patient tolerance or program availability
- Physical, occupational, and speech therapy, social worker, as indicated
- Nursing/aide, as indicated

from acute hospitalization through three to six months of formal rehabilitation, recognizing stroke as a chronic condition, for which many individuals have ongoing needs. For mobility, patients may be evaluated for declines in function which may require further therapy interventions, establishment and adjustment for home or community-based exercise programs for maintenance, improvement of function, or general health. Further durable medical equipment (DME) needs may arise, or equipment may require repair or replacement. The stroke patient may have these same needs for assistive devices such as walkers or orthotic devices such as ankle foot orthoses (AFOs). For self-care, equipment such as commodes, tub and transfer tub benches, and grab bars, and evaluations for home health aides may be helpful in allowing someone to remain in the home versus a return to institutionalized care. Ultimately, these items require physician orders for therapy evaluations and device recommendations, and may require medical documentation to assist in the establishment of medical necessity for financial coverage of these items.

Cognitive Impairment

Cognitive impairment may demonstrate early improvement with therapy interventions but the contribution of dementia may require further medical workups and treatments. Cognitive testing such as neuropsychologic evaluation may be important for return to employment, return to driving, or for living more independently. Communication impairment such as aphasia is generally initially improved with therapy interventions, but assistive technology such as augmentative communication devices also requires evaluations by therapy and medical equipment suppliers with physician oversight for medical necessity to oversee the process. Nutritional needs in early stroke recovery, especially with the common finding of dysphagia, are generally focused on obtaining sufficient caloric intake. It is critical to meet protein needs and to avoid the complication of aspiration pneumonia during this acute phase. In the chronic phase of stroke, nutrition should be focused to address risk factors for stroke recurrence, such as addressing optimal nutrition for obesity, diabetes mellitus, hypertension, and hyperlipidemia.

While the stroke rehabilitation physician may not be directly involved in the medical care of patients for these issues, education and direction of care towards primary care physicians and other specialists is an important aspect of rehabilitative care. Social services consultation during the various acute and post acute aspects of stroke recovery are helpful to aide in the determination of coverage benefits and resources in the community such as services for independent living, transportation assistance, and other community based programs. Support groups or stroke associations may provide resources and input on community based living. Adjustment, depression, and anxiety are often undertreated, and this may require a combination of psychology treatments, medication interventions, and family/caregiver advisement to optimally manage these common complications.

Bladder and Bowel Incontinence

Bladder and bowel incontinence improves in the first several months of stroke recovery, aided by various pharmacologic and nonpharmacologic interventions, but remains a persistent factor in reducing independent living, increasing risk for mood disorders, and exacerbating isolation in the home even for community dwelling stroke patients. The presence of spasticity, unfortunately still held as an inevitable rather than treatable consequence of stroke, is both under-recognized and undertreated. Hemiplegic shoulder pain predominates in stroke patients, and requires careful evaluations in the determination of pain generator factor(s). Neuropathic pain may contribute to depression, and osteoporosis may increase risk for fractures, particularly on the hemiplegic side of the stroke patient, with patients at known increased risk for falls.

Activity & Exercise

Activity, and specifically exercise, is noted to by lacking in the overwhelming majority of stroke patients once they have transitioned from the rehabilitation phase with therapy interventions, noted over the course of the first several months, to the chronic, restorative phase, over the ensuing months to years. As reported in the ASA/AHA 2016 Guidelines, the relentless cycle of reduced physical activity leading to reduced functional capacity and heightened risk of secondary complications must be broken to improve the quality of life of the stroke patient, especially the chronic stroke patient. Numerous complications mentioned in this article may be addressed simply by the application of regular exercise, with varying results noted by aerobic versus non-aerobic activities, and for various intensities, and no consensus but rather the recommendation that stroke patients receive interventions based on their abilities despite certain impairments, and that these patients perform these activities on a regular basis. Community resources for exercise vary widely, and funding for stroke patients to attend these types of programs is generally private pay or through philanthropy.

Conclusion

Communication and coordination of care for stroke patients by a wide variety of professional and non-professional members may benefit from the oversight of a stroke rehabilitation physician specialist, whether physiatrist or other rehabilitation focused physician. The recommendations of the most recent American Heart Association/American Stroke Association Guidelines for Adult Stroke Rehabilitation and Recovery in 2016 recognize and endorse the need for stroke patients to receive an early, organized, interdisciplinary approach to their initial stroke rehabilitation, with preference to inpatient rehabilitation facilities to provide this level of intensity of care for patients who have sustained stroke related impairments and have a prognosis sufficient to warrant this type of treatment plan.

Additionally, this organized treatment should continue in the home and community settings not only for the next few to several months but even in the following years and by a variety of professional and non-professional caregivers. This care should be initiated in the early rehabilitative phase but also continue in the chronic restorative phase of life for patients living with stroke. With the future of bundled payment models and value based care envisioned, maximizing functional outcome and reducing re-hospitalizations will likely further drive the care recommended by these consensus guidelines.

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Disclosure

None reported.

MM

The Changing Face of Spine Care: The MU Comprehensive Spine Center

by Mark Drymalski, MD & Mohammad Agha, MD

Not knowing where to send their patients with unrelenting back, neck, or radicular pain can be frustrating for physicians. At the MU Comprehensive Spine Center our interdisciplinary clinical approach is making this process easier while improving patient care.

Abstract

Back pain is extraordinarily common, and the current approach to treatment has yielded enormous financial burdens on health care systems and society in general. In addition, primary care providers and patients alike are often unsure where to seek further care, and what, if any, advanced tests or images are needed. As a result, spine surgeons often see a high percentage of non-operative patients when unnecessary, redundant, or incorrect imaging was obtained. At MU Health Care a team of physiatrists, orthopedic surgeons, neurosurgeons sought to address these issues by forming the MU Comprehensive Spine Center that offers a systematic, collaborative approach to spine care.





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Introduction

Back pain and disability from spine-related issues are extremely common with upwards of 80% lifetime incidence.[1] It is one of the most common causes of missed work and visits to a primary care physician with direct and indirect costs approaching 100 billion dollars annually.[2] Faced with an unsustainable trajectory of spending and demand for high quality service, health care must evolve. More than ever, there is an emphasis on improving the patient experience, improving the quality of care, cost reduction, decreased utilization of resources, and benefit/cost ratio. While administrative burdens are increasing, physician satisfaction is decreasing. Physicians and patients alike are frustrated with long wait times and visits with multiple providers before finding the proper treatment or provider to deliver the most appropriate care. At MU Health Care, we are addressing these issues with collaborative care centers. The MU Comprehensive Spine Center has taken an evidenced-based approach to improve spine care, improve surgical access for appropriate surgical patients, decrease redundancy of testing and imaging, and decrease the confusion of referring a patient into the system. This model integrates multiple specialties including physiatrists, orthopedic surgeons, neurosurgeons, radiologists, physical therapists, pain management, anesthesiology, and rheumatology.

Goals

The impetus behind starting a comprehensive spine center came from University of Missouri orthopedic surgeons, neurosurgeons, and physical medicine and rehabilitation (PM&R) physicians aspiring to deliver

Figure 1

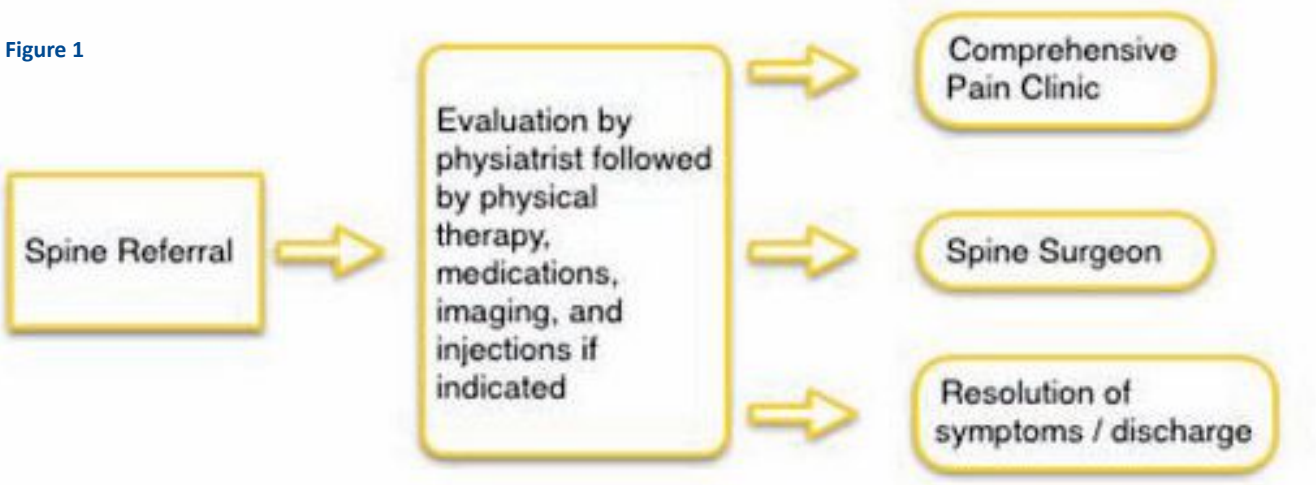
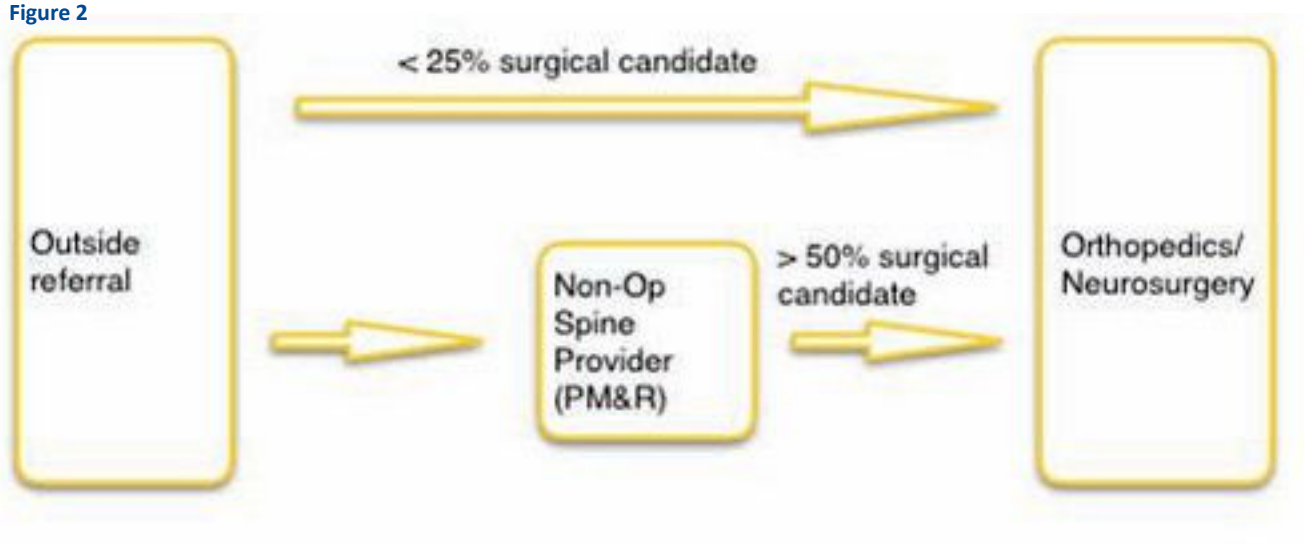


Figure 2



more comprehensive, high quality spine care. The surgical specialties noticed a high number of non-surgical patients in their clinics, many without the needed imaging or needed work-up. This often led to dissatisfied patients and surgeons with long, less-productive clinic days. Physiatrists, who specialize in multidisciplinary non-operative care and appropriate triage of surgical patients, were experiencing a lack of utilization of their services prior to surgical referrals. Both groups recognized a relative lack of understanding and communication between the surgical and non-surgical physicians. This is a common occurrence in a traditional care model, where too often specialties function as "islands" of patient care. This leads to redundancy of services and often multiple visits with multiple providers until the appropriate care setting or provider is found to address each patient's needs.

Our first goal was to have a single point of entry into the spine center in order to reduce confusion for both referring providers and self-referred patients into the system (See Figure 1). This was accomplished by directing all incoming spine calls to a single call center. Support staff fielded calls and triage to the appropriate physician, generally encouraging non-operative physician appointments unless an urgent surgical need was identified.

The second goal of the Spine Center was to ensure that all patients would have a protocol-driven approach to their nonoperative care, shared decision making, access to appropriate imaging, and timely surgical evaluations when warranted. Physiatrists were the natural choice for delivering the initial evaluation and

directing non-operative care and education. Spine care protocols, with a focus on evidence based care, were developed and implemented. To ensure timely access to surgical providers, a rotation was designed for non-assigned surgical patients to equally distribute those patients among the participating neurosurgeons and orthopedic surgeons. This immediately improved access for surgical patients, lowering wait times for surgical evaluation from over six weeks in some instances to two weeks or less.

Results

Whenever alternative care delivery systems are initiated, data and outcome collection is paramount. While data collection can be burdensome, advances to the electronic medical record (EMR) and other outcome data tracking software has offered new and less tedious ways to accomplish this task. One of the main outcome measures we have been tracking is the percentage of patients seen by a spine surgeon who were determined to be surgical candidates (i.e., offered surgery). In 2016, the percentage of patients referred for surgery through the MU Comprehensive Spine Center pathway was over twice as likely to be surgical candidates than those referred to orthopedic spine surgeons directly from either providers outside the University system or non-PM&R providers from within the University (outside the pathway slightly over 20% surgical candidates vs. over 50% surgical candidates through the Spine Center pathway) (See Figure 2). From a physician's perspective, this leads to a much more satisfying clinic interaction. From a patient's standpoint, it means he or she is with the right provider at the right time.

Other health care systems also have explored collaborative care centers as a way to deliver more efficient and effective care. Priority Health, a Michigan-based insurance company, implemented a "Spine Centers of Excellence" program in part to curb the rising costs of spine care. The program essentially relied upon a physiatrist-led team approach to spine issues and, in non-emergency conditions, required a visit with a non-operative spine provider (physiatrist) prior to surgical consultation. Outcome and cost analysis were disseminated in a recent paper in the journal *Spine* and compared costs and procedures prior to and after the implementation of this pathway. They found that requiring a patient to see a non-operative provider first led to decreased utilization of advanced imaging, surgeries, and costs all while maintaining patient satisfaction. Their overall spine costs decreased by 12.1%, saving more than 14 million dollars in one year.[3]

Another study from the journal *Spine* looked into the concept of triaging patients through a non-operative pathway. This study compared traditional spine referrals directly to a spine surgeon to referrals to a Spine Pathway clinic that utilized a multidisciplinary spine triage to identify which patients were likely operative vs. non-operative candidates. Their results showed that patients referred to surgeons through the Spine Pathway were more likely to be surgical candidates than those referred directly to the surgeon.[4] Again, there is an implication of cost savings as well as the potential for spine surgeons to adjust their clinics and OR time to accommodate for more surgical candidates, benefiting all parties involved.

Conclusion

Change is inevitable. The continued push from insurers, patients, physicians, and society in general to curb costs while delivering outstanding care will shape the way we practice medicine. We physicians need to be a part of this change, not just bystanders. Using collaborative care models like the MU Comprehensive Spine Center is an avenue to deliver on these goals while also improving the physician experience.

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Disclosure

None reported. **MM**

Advances in the Treatment of Chronic Pelvic Pain: A Multidisciplinary Approach to Treatment

by Sarah K. Hwang, MD

Due to the multitude of contributing factors, a multidisciplinary approach to treatment of patients with chronic pelvic pain (CPP) is often optimal for their care.



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Abstract

The treatment of chronic pelvic pain can often be difficult, as many times after visits to multiple providers, patients can carry multiple diagnoses. Even with appropriate treatments, patients often have continued pain that can result in frustrations for both patients and their providers. Utilizing a multidisciplinary and multimodal approach to chronic pelvic pain is beneficial, especially when including evaluation for musculoskeletal dysfunction or other contributors to chronic pelvic pain.

Introduction

Pelvic pain is often a difficult condition to treat. Even when a diagnosis is found, treatment of the cause often doesn't elicit the expected results. This can be due to the fact that the pain can have multiple presentations and often carries a multifactorial etiology. Due to the multitude of contributing factors, a multidisciplinary approach to treatment of patients with chronic pelvic pain (CPP) is often optimal for their care.

Chronic pelvic pain is defined as pain in the region of the pelvis for greater than six months. It may involve the visceral or somatic system and encompassed structures supplied by the nervous system from the tenth thoracic spinal level and below.[1, 2] More specifically, this pain can be located between the umbilicus and the thighs. Chronic pelvic pain carries a broad differential diagnosis, including the gynecologic, urologic, gastrointestinal, neurologic, and musculoskeletal systems. It is important to remember that patients may have multiple conditions that lead to CPP. The challenge in treating patients with CPP lies in identifying the pain generator and effectively treating the identified conditions.

One of the musculoskeletal causes of CPP can be levator muscle spasm or pelvic floor dysfunction. Literature suggests that the pelvic floor muscles contribute to CPP in women as both the primary pain generator and as a compensatory contributor.[3, 4] Pelvic floor dysfunction (PFD) may occur as a result of inherent musculoskeletal causes in the pelvic floor muscles, ligaments and tendons or PFD may occur as a functional adaptation to other disorders within the pelvis-hip-spine complex. It is common to see pelvic floor dysfunction arise in patients with visceral pelvic diseases, such as endometriosis or irritable bowel syndrome. Therefore, part of the reason chronic pelvic pain is so difficult to treat is because the pelvic floor muscles are often involved as a pain generator, so without treating these muscles as well as the initial disease, the pain may continue.

Studies have examined the role of the pelvic floor muscles in patients with interstitial cystitis/painful bladder syndrome (IC/BPS) and have found that myofascial pain and pelvic floor dysfunction are present in as many as 85% of patients with the diagnosis of IC/BPS.[5] Bassaly et al[6] evaluated patients with co-existing myofascial pelvic pain and IC/BPS and reported that over 78% of patients with IC/PBS were found to have at least one myofascial trigger point on pelvic exam. Additionally, 67% of patients had six or more trigger points.

Anatomy of the Musculoskeletal Pelvis

The pelvis is composed of a bony ring, which serves as a site for multiple cartilaginous, ligamentous and tendon attachments.[7] The female pelvis is smaller, shallower and wider than the male pelvis, and this can lead to an increase in injuries that can occur in the female pelvis. The sacroiliac joints are located in the posterior pelvis while the pubic symphysis is located anteriorly; these joints are stabilized by ligaments. Extending from the sacrum is the coccyx that acts as an important ligamentous and tendinous anchor.

The pelvic floor is composed of muscles, ligaments, and fascia that act as a sling to support the bladder, reproductive organs, and rectum. The pelvic floor muscles (PFM) are divided into three layers: the superficial perineal layer, the deep urogenital diaphragm layer, and the pelvic diaphragm. The superficial PFM are the bulbospongiosus, ischiocavernosus, and superficial transverse perineal muscles. The deep PFM that line the inner walls of the pelvis are the levator ani and coccygeus that along with the endopelvic fascia comprise the pelvic diaphragm. The levator ani is a muscle group composed of three muscles - the puborectalis, pubococcygeus, and iliococcygeus. Lining the lateral walls of the pelvis are the piriformis muscles and obturator internus.

The PFM receive innervation through somatic, visceral, and central pathways. The skin of the lower trunk, perineum and proximal thigh is innervated by the iliohypogastric, ilioinguinal, and genitofemoral nerves via the lumbar plexus. There are three main terminal branches of the pudendal nerve, including the inferior rectal nerve, the perineal nerve, and the dorsal nerve of the penis/clitoris. The pudendal nerve innervates the penis/clitoris, the bulbospongiosus and ischiocavernosus muscles, the anterior portions of the levator ani muscles, the perineum, the anus, the external anal sphincter, and the urethral sphincter. This nerve contributes to many important functions, including external genital sensation, continence, orgasm, and ejaculation. Muscles of the levator ani are thought to have direct innervation from sacral nerve roots S3-5.[8]

History and Physical Exam

The history and physical exam are important tools in evaluating a person with CPP. Patients should be questioned about their pain – onset, mechanism of onset, location, quality, intensity, frequency, aggravating and relieving factors, quality, and radiation of pain. It is important to understand any previous treatments they have undergone to manage their pain. This may include medications, physical therapy, interventional procedures or surgeries. A thorough review of systems involving the pelvic organs is important in the evaluation of pelvic pain. Table 1 illustrates important questions regarding various organ systems that may be involved in the patient's pain complaints. A bladder diary may be beneficial in evaluating the patient's urinary habits and fluid intake. Another extremely important aspect of the history includes questioning the patient about any history of abuse, including physical, emotional, verbal or sexual abuse.

The physical exam should be guided by the patient's complaints but should typically include a neurologic and musculoskeletal exam focusing on the lumbar spine, hips, pelvic girdle, lower extremities and pelvic floor muscles. An abdominal exam is also crucial in evaluating causes of pelvic pain, including scar tissue from previous procedures, which can play a major role in the development of pelvic pain.

Multidisciplinary Treatment of Pelvic Pain

When determining treatment plans for pelvic pain, the ability to determine the etiology will help to guide management. However, for many cases the etiology will remain unknown or multifactorial. General treatment for chronic pelvic pain, as recommended by a Cochrane review, includes: hormonal treatments, counseling after negative ultrasound, multidisciplinary approach to pain management, physical therapy, psychotherapy, diet and environmental factors.[9] Often successful treatment requires a multimodal and multidisciplinary approach involving physiatrists, pain physicians, obstetricians-gynecologists, urologists, gastroenterologists, primary care providers, physical therapists, psychiatrists and psychologists. There have been several studies performed that have shown benefit to treatment of chronic pelvic pain with a multidisciplinary approach.[5, 10] While most of these studies focus on the treatment of interstitial cystitis/painful bladder syndrome, this same multidisciplinary approach can be applied to the treatment of chronic pelvic pain in general.

Table 1
Important aspects of the history for patients with chronic pelvic pain

Bladder
- How many times per day do you typically urinate or how often do you urinate (frequency)?
- When you have to urinate, do you feel like you have to get to the toilet immediately (urgency)?
- What do you drink throughout the day (specifically, how much and what beverages)? What do you drink after dinner?
- Do you feel like you are emptying your bladder completely?
- Do you have difficulty starting the flow of urine?
- Do you have pain with urination?
- Do you ever experience urinary incontinence or leaking?
  - With coughing and sneezing? With standing from a chair? With exercise?
  - Do you ever have difficulty making it to the toilet in time?
  - Do you have incontinence during intercourse?
  - Are you ever incontinent at night while sleeping?
  - How often are you incontinent?
  - Do you wear a pad? If yes, how often do you change the pad?
- How many times do you get up at night to urinate?
- Do you have frequent urinary tract infections?

Bowel
- Are you constipated?
- How often do you have a bowel movement (BM)?
- Have you ever been diagnosed with irritable bowel syndrome (IBS)?
- Do you have to strain to empty?
- Do you ever have to push from your vagina in order to have a BM?
- Do you feel like you have to continue to wipe more than normal in order to get yourself clean?
- Are your stools hard or soft?
- Do you have pain during or after a BM?

Gynecologic
- Are your periods regular?
- Do you have severe menstrual cramps?
- Did you have menstrual cramps during adolescence? What if any treatment did you have for that?
- Do you wear tampons? Is it painful to wear tampons?
- Are gynecologic exams painful for you?
- Have you ever been diagnosed with endometriosis? If yes, how was this diagnosis made?
- Do you have problems with chronic yeast infections?
- Are you sexually active?
- Do you have pain with intercourse?
  - With coughing and sneezing? With standing from a chair? With exercise?
  - When it is painful (initial penetration, deeper penetration)?
  - Do you have pain after intercourse? If so, how long does this last?
  - Is it painful when you orgasm?

Obstetric
- How many times have you been pregnant?
- How many children have you had?
- What was the largest birth weight?
- Did you have significant back or pelvic pain during pregnancy?
- How long were you in labor? How long did you push?
- Did you have tearing or an episiotomy?
- Did the delivery require use of vacuum or forceps?
- Any complications during labor and delivery?

Psychiatric
- Do you have a history of depression or anxiety?
- Have you ever been hospitalized for psychiatric illness?
- Have you ever had thoughts of killing yourself?
- Have you ever been the victim of abuse (physical, sexual, emotional, verbal)?
- Are you currently in an abusive relationship/situation?

Given the strong contribution of the pelvic floor muscles, inclusion of a physiatrist in the multidisciplinary team is crucial. Physiatrists are uniquely qualified and trained to manage pelvic floor pain for several reasons.[7] Physiatrists have experience in managing functional and neurological bladder and bowel dysfunction. Physiatrists also have expertise in managing musculoskeletal disorders, including disorders of the hip, bony pelvis, or spine condition that may be contributing to the chronic pelvic pain. Finally, physiatrists offer intervention outside the realm of surgery, where the focus of treatment is to reduce pain and improve function.[7]

Pharmacology

Generally, pharmacologic treatment in chronic pelvic pain is used to treat pain and secondary etiology such as depression, anxiety, and insomnia. Nonsteroidal anti-inflammatories may be used for acute onset of pelvic pain and musculoskeletal injuries. When prescribing these medications, it is important to consider adverse gastrointestinal side effects and blood thinning properties. These medications may need to be discontinued due to lack of response. Neuropathic pain medications can be effective (gabapentin, pregabalin, serotonin-norepinephine reuptake inhibitors, tricyclic antidepressants), especially when there is a neurogenic component to the patient's pelvic pain. These medications have to be individualized for the patient given their side effects. Serotonin-norepinephrine reuptake inhibitors, such as duloxetine, may help reduce pain and improve sleep.

Muscle relaxants are also commonly used for symptom relief

when pelvic floor muscle spasm is contributing to the patient's pain. Oral muscle relaxants may help reduce overall muscle tone that is perceived to be painful but are not specific for the pelvic floor. Cyclobenzaprine, when taken daily, has an effect similar to the tricyclic antidepressants. It may be best prescribed at night given its sedative side effects. Of note, patients should be monitored for urinary retention when on cyclobenzaprine. Certain muscle relaxants, such as diazepam and baclofen can be made into a suppository or compounded cream and used intravaginally. Vaginal diazepam is generally well tolerated, with the major side effect being drowsiness. In a retrospective review by Carrico and Peters, 67% of women reported no adverse effects from the vaginal diazepam, while 33% of women reported some drowsiness.[11] Topical lidocaine can also been used in the treatment of severe penetrative dyspareunia. This medication is especially useful when used prior to intercourse. Lidocaine gel can also be used internally prior to physical therapy for patients that have trouble tolerating internal myofascial release of the pelvic floor muscles.

Physical Therapy

Pelvic floor physical therapy, including dilators, pelvic floor muscle strengthening and relaxation exercises, intravaginal massage techniques and biofeedback, can help to correct muscle imbalance, improve blood flow, and increase flexibility of paravaginal tissue.[12] In a small prospective study of patients with vestibulodynia, patients who completed pelvic floor therapy had significant improvement in overall sexual function and reduction in pain with intercourse.[12]

Pelvic floor physical therapy is used for myofascial pain and dysfunction with goals to restore muscle imbalance, improve function and reduce pain. Often, therapy combines neuromuscular reeducation and soft tissue mobilization. Exercises to restore normal muscle movement patterns, strength and range of motion can be utilized to help reeducate the patient.[7] Biofeedback can provide objective feedback about muscle activation with activity and at rest. Trigger point manual release, acupressure, muscle energy, and strain-counterstrain can be used for myofascial trigger points. Trigger points can be located in the pelvic floor muscles or the abdominal wall musculature. It is also important to include treatment of other disorders within the hip-spine-pelvis complex in the therapy prescription.

Psychotherapy

It is important to address any co-morbid depression and/or anxiety. Patients should be screened for depression, anxiety and history of abuse. Appropriate patients should be referred to psychiatry, psychology, or cognitive behavioral therapy.

Interventional Management

When therapeutic and medical management fails, alternative interventional pain management procedures may be required.

Nerve Blocks

Neurolytic blocks of ganglion can be used effectively in some cases. The ganglion impar, or ganglion of Walther, is found on the ventral surface of the coccyx where it forms the caudal origin of the bilateral sympathetic chain. It has sympathetic innervation to the perineal and anal regions and block of this innervation can disrupt afferent sympathetic and nociceptive signals from that area.[13]

Superior hypogastric plexus blocks (SHPB) with fluoroscopy or computed tomography (CT) guidance also have been used in malignant and non-oncological chronic pelvic pain.[14] The superior hypogastric plexus is a retroperitoneal structure extending below the aortic bifurcation in association with the common and internal iliac vessels. It innervates much of the pelvic viscera including the bladder, urethra, uterus, vagina, vulva, perineum, prostate, penis, testes, rectum and descending colon.

Pelvic Floor Trigger Point Injections

Trigger point injections have been described in myofascial pain, including CPP.[15] These injections can be beneficial when a patient presents with pelvic pain and is found to have one or more myofascial trigger points in the pelvic floor muscles. Trigger point injections are generally not used as a first line treatment or monotherapy but are generally more beneficial when used alongside physical therapy, medication management and behavioral therapy.[15]

Pelvic Floor Botulinum Toxin Injections

For patients with refractory pelvic floor muscle spasm, botulinum toxin has been utilized to decrease spasm, therefore reducing pelvic pain. Botulinum toxin type A blocks the cholinergic transmission at the

neuromuscular junction. Abbott et al.[16] performed a double-blinded randomized, placebo-controlled trial in patients with CPP and demonstrated a significant decrease in dyspareunia and non-menstrual pain in the botulinum toxin group. In addition, they reported a significant reduction in pelvic floor pressure in the botulinum toxin group when compared to the pre-injection values. It is important to note that there were no statistically significant differences demonstrated between the groups in any of the previously mentioned parameters.

Neuromodulation

Neuromodulation has also used as a treatment for CPP. Neuromodulation is a nondestructive, neuromodulory technique that delivers electrical stimulation to the spinal cord or peripheral nerves for the treatment of chronic pain. Patients with CPP may benefit from spinal cord stimulation, sacral stimulation or peripheral nerve stimulation. In particular, tibial nerve stimulation, which is an in-office weekly procedure, has shown some promise in the treatment of pelvic pain, fecal incontinence and overactive bladder.

Conclusion

Pelvic pain is traditionally recognized as a difficult condition to treat. With increased knowledge of the pelvic floor as a major contributor to pelvic pain, successful treatment can involve a multifactorial and multidisciplinary approach.

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Disclosure

None reported. **MM**

Problem-Solving in Patients with Targeted Drug Delivery Systems

by Rez Farid, MD

The future of targeted drug delivery systems is bright. Clinicians need not fear patients with these devices. Being familiar with pump mechanics and problem solving will make caring for these patients easier in the urgent or emergent setting.



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Abstract

Patients with intrathecal drug delivery systems presenting for after-hours care typically cause angst among physicians staffing emergency rooms and urgent care centers. The chief complaint of "my pump isn't working" leaves physicians inexperienced with these devices in a defensive position. Fortunately, pump malfunctions are rare. Resources are available to help physicians work through patient concerns. These resources include algorithms to manage possible over- or under-infusion of the various drugs used in these systems as well as technical support from pump manufacturers.

Introduction

Patients with implanted pumps often have complicated medical problems. A common thought upon seeing these patients in the emergent or urgent setting is to quickly conclude that a problem has developed within the drug delivery system itself. Unfortunately, the implantation of a targeted drug delivery system does not immunize these patients from common maladies that exacerbate pain or spasticity. It is critical to complete a thorough history, physical examination and work-up in order to rule out common maladies that may erroneously cause the patient to conclude that their drug delivery system is malfunctioning.

History of Targeted Drug Delivery

The first documented use of targeted drug delivery occurred in 1898 when August Bier and his partner injected their own intrathecal spaces with cocaine in an attempt to produce anesthesia.[1] Opioid receptors were discovered in the spinal cord in 1973 and intrathecal morphine was approved by the Food and Drug Administration (FDA) in 1984. In 1989, Penn et al. reported the use of intrathecal baclofen for the treatment of severe spasticity of spinal origin.[2] By 1992, baclofen was approved for the treatment of spinal origin spasticity. Lastly, Ziconotide was approved for severe chronic pain in 2004. Ziconotide blocks N-type calcium channels within the dorsal horn. It is unique in that it has no tolerance or addictive properties. As such, abrupt discontinuation of intrathecal ziconotide is not associated with a withdrawal syndrome. Baclofen is a gamma-aminobutyric acid receptor agonist assisting with the reestablishment of inhibitory cortical influences on spinal cord interneurons. Morphine targets the opioid receptors in the dorsal horn by inhibiting the release of Substance P. Though these three drugs are the only approved medications for intrathecal administration, physicians have not limited drug delivery into the intrathecal space to solely those approved by the FDA. Commonly, physicians use non-FDA approved

drug combinations containing hydromorphone, fentanyl, bupivicaine, clonidine and others.

Current Therapies

Only two manufacturers have FDA approved devices for intrathecal drug delivery. The most frequently implanted pump is the Medtronic Synchromed II which is FDA approved for the treatment of both pain and spasticity. (See Figure 1) The current model has been in use for over 13 years. It is a programmable infusion peristaltic pump with MRI compatibility to 3 Tesla. The Synchromed II has over 15,000 patient years of clinical use data.[3, 4] When a patient is in the MRI scanner, the Synchromed II pump will halt drug infusion. Upon exiting the scanner, the pump will reset on its own and resume drug delivery as programmed. The manufacturer's recommendation is to have the patient see their managing physician after an MRI in order to ensure that the pump is again fully operational. There have been only rare occasions on which the pump has not restarted after an MRI. Recently, Flowonix entered the market with their Prometra II pump. (See Figure 2). The Prometra pump is FDA conditionally approved for use in an MRI. It has a safety valve that closes upon entering a magnetic field. After exposure to an MRI, a Flowonix employee is summoned to open the safety valve so that therapy can resume. Unlike the Synchromed II, the Prometra II pump carries an FDA approval only for the treatment of pain. It is not yet approved for the treatment of spasticity. For either brand of pump, physicians should contact the technical support divisions for the respective pump manufacturer for concerns regarding MRI compatibility.

After a patient has a pump implantation, they should receive a health identification card indicating the manufacturer of their pump and the name of their managing physician. Patients should keep this card with them in the event of an unexpected hospitalization. Obtaining detailed information regarding daily dosages and medications requires interrogation of the pump through the use of proprietary programmers, only available from the respective pump manufacturer. While manufacturer's technical services departments cannot give medical advice, they may be able to connect requesting physicians to an experienced pump managing consultant.



Figures 1 and 2
Only two manufacturers have FDA approved devices for intrathecal drug delivery. The most frequently implanted pump is the Medtronic Synchromed II (left) which is FDA approved for the treatment of both pain and spasticity. Flowonix entered the market with their Prometra II pump. (right)

Troubleshooting

The most common presenting clinical scenario for a pump patient using baclofen is one of increased spasticity. Their chief complaint is often, "my pump is not working". In the absence of hearing a pump alarm, a patient has no way of knowing whether or not their pump is working properly. Likely, the patient is experiencing a medical condition contributing to their increased muscle tone. Conditions associated with increased spasticity include, but are not limited to: urinary tract infection or retention, constipation, pneumonia, pressure sore development, fracture, ingrown toenail, nephrolithiasis, cholelithiasis, deep venous thrombosis and other noxious stimuli. For those patients in whom frank baclofen withdrawal is a serious diagnostic consideration, clinicians need to consider other syndromes that can mimic baclofen withdrawal including Neuroleptic Malignant Syndrome, Sepsis, Serotonin Syndrome, Malignant Hyperthermia, Autonomic Dysreflexia, Seizure and Autonomic Storming.[3] These conditions must be considered in the workup of a patient presenting with increased spasticity while using an intrathecal baclofen pump. The hallmark symptoms of baclofen withdrawal are itching without rash, irritability and an increase in muscle tone. The most important clinical assessment to complete for these patients is to put their chief complaint aside and focus on the conditions that commonly cause an increase in spasticity. The determination of whether or not the pump is actually working may require consultation with a managing clinician who can interrogate the pump, interpret the activity logs of the pump and complete an assessment of the catheter if needed. In general, pump failures occur rarely. Medical conditions exacerbating spasticity occur frequently.

Loss Efficacy Troubleshooting Algorithm

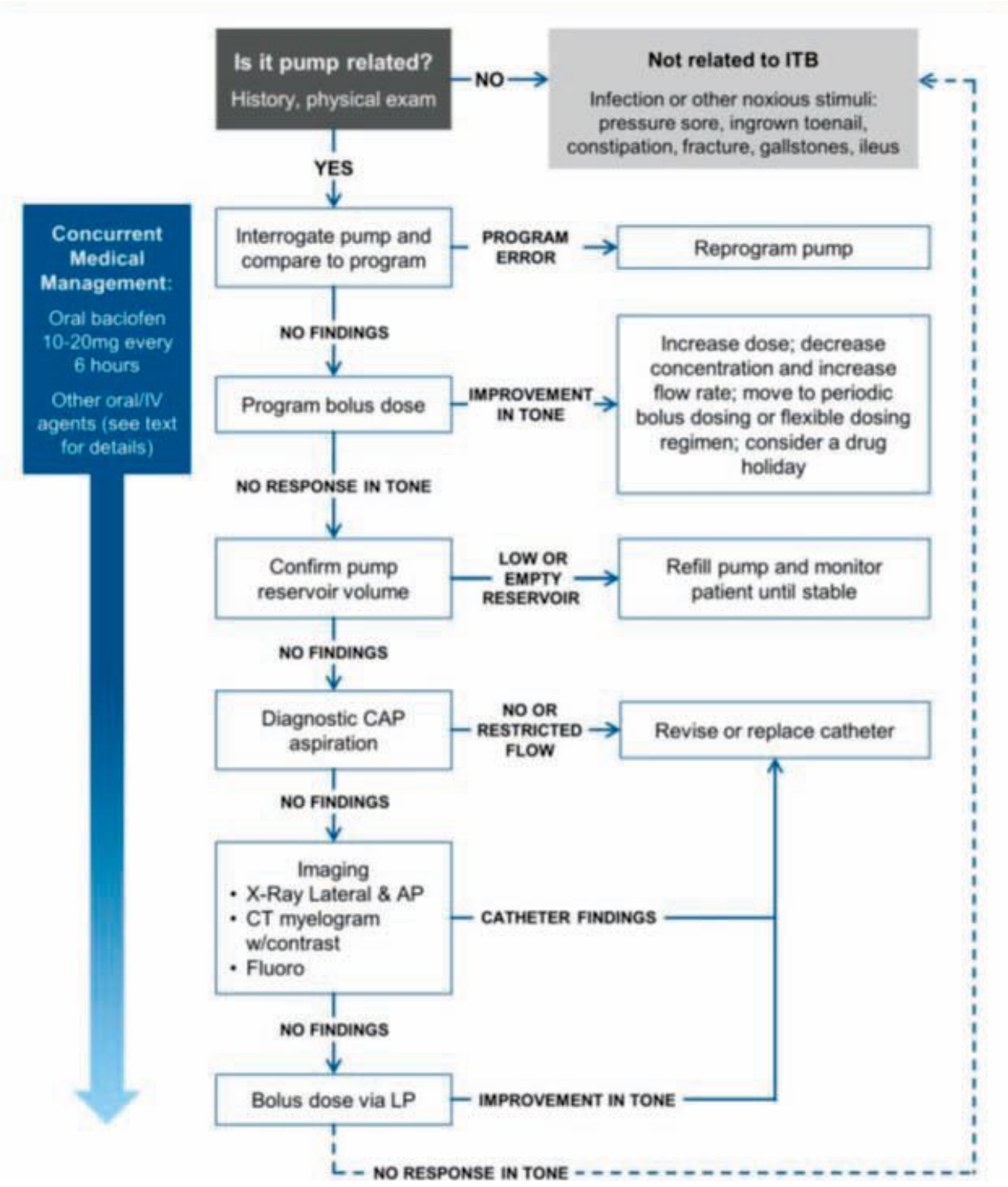


Figure 3
Loss of efficacy algorithm. AP, anterior-posterior; CAP, catheter access port; CT, computed tomography; ITB, intrathecal baclofen therapy; LP, lumbar puncture.

Catheter failures are for more common than primary pump malfunctions but both occur infrequently. The product safety profile of the Synchromed II pump indicates that pump motor stalls occur in less than 1% of cases while catheter issues occur in ~ 8% of all cases.[5] Over or under-infusion of the drug occurs very rarely. A treatment algorithm may be used to help in the assessment of patients experiencing a loss of efficacy.[5] (See Figure 3) Clinicians should consider catheter issues instead of pump failure once organic etiologies for increased spasticity have been ruled out. The pump should be interrogated and the pump activity logs should be reviewed. The proper intervention will be dependent on symptoms.

The physician managing the pump may administer a 50-100 mcg single bolus and observe the patient for a few hours. Checking the integrity of the pump catheter by performing a catheter access port (CAP) aspiration is warranted when the luxury of time does not exist. To complete a CAP access, a physician will need a special kit available only from the manufacturer. These kits are unique to each manufacturer and are not likely to be readily available in the emergency room or urgent care center. In complicated cases, a contrasted spiral CT catheter study may be helpful in determining catheter integrity. However, these studies generally need not be considered or performed in an urgent or emergent setting. If a patient is in baclofen withdrawal, re-initiation of intrathecal baclofen is the definitive treatment.[3,6] Other measures can be used but are temporizing. Baclofen is available in a 50 mcg / one ml trial dose. Physicians should secure an ampule from the hospital pharmacy and perform a lumbar puncture to inject 50 mcg into the intrathecal space to diminish symptoms. A single intrathecal dose may only help to alleviate withdrawal symptoms for 6-8 hours but this might be sufficient time to arrange for a more reliable long term delivery method such as replacement of a faulty catheter or pump. Alternatively, oral baclofen can be given at a dose of 10-20 milligrams every 4 hrs but patients may need additional supplementation with benzodiazepines, dantrolene, cyproheptadine, or even propofol in severe cases.[7] All patients should receive IV hydration to prevent renal damage associated with rhabdomyolysis. A creatine kinase level may be obtained to assess for rhabdomyolysis.

Patients receiving narcotic or Ziconotide therapy via intrathecal administration may present with complaints of increased pain. In the presence of a pump or catheter failure, patients receiving intrathecal narcotics should present with typical narcotic withdrawal symptoms and will need to be managed accordingly. Patients receiving Ziconotide will present with increased pain. There is no withdrawal syndrome associated with its use. If a patient is in narcotic withdrawal, they should be managed accordingly with an equivalent intravenous dose while waiting for an operative repair of their delivery system malfunction.

In the workup for a lethargic patient, many physicians reflexively request that the pump be turned off to eliminate targeted drug delivery as a potential source of altered mental status. The Synchromed II pump can be damaged if the pump is turned off for more than 48 hours. Patients receiving intrathecal morphine or baclofen could go into drug withdrawal if their therapy is abruptly discontinued.[8] Rather than turning the pump off, pump flow can be reduced to its minimal rate for four hours to allow for metabolism of the drug within the CSF and then resumed using a dose reduction of 20-30%. Ziconotide has a narrow therapeutic window. Patients may exhibit psychiatric changes with small dose increases. Since there is no associated withdrawal syndrome, patients experiencing mental status changes while receiving ziconotide can have their pump dosage dramatically reduced without restarting therapy. The dose can then be gradually increased once their mental status has improved. Removal of CSF or CSF effleurage (withdrawing CSF in large volumes and exchanging sterile saline in similar volumes) can be done to further dilute the drug concentration within the CSF but is usually not necessary.

A unique concern occurs in the patient who has recently been seen by their pump managing physician. For these patients, an iatrogenic cause of symptoms should be considered. In the event of a programming error leading to drug over infusion, drug infusion can be halted in a few ways. If a Medtronic N'Vision programmer is available, pump infusion can be halted by pressing the red button on the front of the programmer. The Synchromed II pump is sensitive to electromagnetic interference and will cease propulsion when the pump is exposed to a magnetic field as small as one produced by a household magnet. Infusion can be stopped by placing the magnet on the skin overlying the pump. When the magnetic field is removed from the Synchromed II pump, the pump will again start delivering drug as programmed. Lastly, if other means are not available, the pump central reservoir can be accessed via a 22 gauge non-coring needle and the contents of the central reservoir removed. The pump uses peristaltic movement so if the reservoir is empty, flow is discontinued. The central reservoir is covered by a silicone seal. The seal is designed to withstand numerous punctures from a non-coring Huber type needle. In absolute emergencies, a traditional needle could be used to access the central reservoir but doing so might damage the silicone septum. A traditional coring needle should only be used as a last resort.

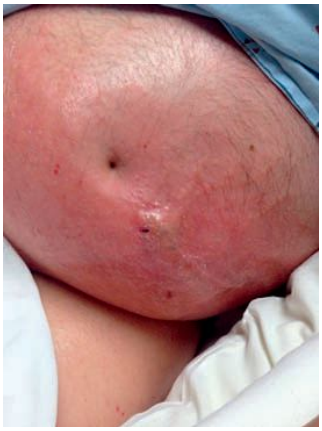


Figure 4
Infection of the pump pocket.



Figure 5
Non-infected fluid collection (seroma) .

Post-Operative Complications

Patients may present in the post-operative phase with concerns of infection, swelling over the abdominal or lumbar incision sites, or an abrupt change in symptom control. Preoperative patients should receive a total body wash to reduce their total skin bacterial load. Unfortunately, some patients develop a post-operative infection and present with warm, edematous skin overlying the pump. (See Figure 4) In the absence of abnormal lab-work or systemic symptoms, these patients may be successfully treated with oral antibiotics. [9, 10] The risk of meningitis is elevated in patients with implanted intrathecal delivery devices so careful monitoring is warranted. The implanting surgeon should take the lead on acute post-operative concerns. Wound dehiscence can occur at the lumbar or abdominal sites. A post-operative fluid collection occurs commonly in cases of elevated CSF pressure. At implant, a trochar is inserted using a shallow angle, paramedian approach. The intrathecal segment of the catheter is placed through the trochar and advanced to the desired spinal level, usually T6. An incision is made above and below the trochar and a small anchor is attached to the lumbar dorsal fascia to hold the catheter in place. The lumbar surgical site is superficial and is only deep enough to bury the anchor and catheter. When the trochar is removed, the catheter is left in place but CSF may leak around it and flow into the pump pocket itself, following the path of least resistance, causing a pocket of fluid overlying the pump. (See Figure 5) This fluid is usually sterile and remains so until bacteria are introduced. Fluid can be aspirated and tested for beta-2 transferrin, an enzyme largely unique to CSF, but such testing is not necessary and aggressive attempts to aspirate from these otherwise benign fluid collections is rarely helpful and may cause harm by introducing bacteria. Instead, post-operative patients should be given an abdominal binder and pressure dressing along with several days of acetazolamide to reduce CSF pressure. The fluid collection will usually improve without further intervention but it may take several weeks to resolve completely. Efforts should be made to prevent exposing the pump to the environment. An exposed pump necessitates explant in nearly all cases.

Conclusion

The future of targeted drug delivery systems is bright. It is an exciting therapy that is likely to expand. Clinicians need not fear patients with these devices. Being familiar with pump mechanics and problem solving will make caring for these patients easier in the urgent or emergent setting. The physician managing the pump should have clear and concise on-call coverage for pump patients. Most problems can be readily resolved with a single phone call rather than a time consuming and costly after hours visit.

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Disclosure

None reported.

MM

Changing Payment Models: Shifting Focus on Post Acute Care

by Claire Finkel, MD & Gregory Worsowicz, MD

While Post Acute Care has been important, new and evolving payment models are placing an even greater focus on this sector of health care.





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Introduction

Many health care providers receive little to no training or education with regard to Post Acute Care (PAC) options for their patients. In fact, some have difficulty naming the four PAC options for their patients defined by Centers for Medicare and Medicaid Services (CMS): Long Term Care Hospitals (LTCH), Inpatient Rehabilitation Facilities (IRF), Skilled Nursing Facilities (SNF), and Home Health Care (HHC).[1] The expenditures for these services are not inconsequential. In 2014, a total of 59.2 billion Medicare dollars were spent on PAC services. The highest amount was spent on SNF care ($29.1 billion), followed by Home Health ($17.9 billion), Inpatient Rehabilitation Facilities ($7.1 billion), and Long Term Care Hospitals ($5.1 billion).[2] As physician, hospital, and system payment models change from volume to value, it is critical for physicians to understand the services, costs, and outcomes each of these settings provide for their patients.

Current

There is little doubt that PAC utilization, spending, and variation of care is receiving greater focus from providers and payors. In fact, a recent Institute of Medicine (IOM) report on geographic variation in Medicare spending found that post-acute care spending is the largest driver of variation for Medicare spending.[3,4] Initially, this may be surprising to some; however, that shouldn't be the case when one realizes that each PAC setting has different regulatory, payment, patient criteria, and patient assessment tools (See Table 1).[5,6,7,8] These different levels of post-acute care provide very different levels of medical and rehabilitation care. Physicians need to be aware that each setting has different levels of services and costs to the payor.

The goal of PAC is to provide the appropriate level of medical and rehabilitative care at the right time. This requires matching medical, functional, situational (social), financial, geographic location, and each patient's choice (See Table 2) with the level of rehabilitation intensity, coordination of care, and comprehensiveness that each PAC setting provides. In many instances, the decision to treat a patient in a particular PAC setting is relatively clear. In instances when it is not clear, clinical judgment plays a major role in the selection of the appropriate PAC setting based on the patient's medical and functional needs, while taking into account the totality of the patient's situation and potential to live independently with or without family support.[9]

If patients are transitioned to a PAC setting "too soon" from an acute care hospital or to a setting not equipped to handle their

Table 1
Post Acute Criteria

Location	Facility/Patient Eligibility	Payment	Assessment Tool
Long Term Care Hospital	Acute Hospital need Length of stay >25 days	Prospective payment system per discharge rate	Medical issues
Inpatient Rehabilitation Facility	Patient generally tolerate and benefits from 3 hours of therapy	Case max group (CMG) adjusted; payment per discharge	Functional Independent Measure (FIM)
Skilled Nursing Facility	Need short term skilled care (nursing or rehab) following hospital stay of at least 3 days	Daily rate adjusted by resource utilization group (RUG)	Minimum Data Set (MDS)
Home Health	Beneficiaries generally restricted to their homes and need skilled care (nursing, PT/OT, speech, medical social work, home health aide)	60 day episodes and service needs	Outcome and Assessment Information Set (OASIS)

Table 2
Post Acute Care Patient Screen

Medical	What are the patient's critical needs/monitoring/care? Level of medical supervision required, social programs Wound care, ventilator, cardiac, other
Functional	Therapy and mobility needs, access to special equipment, tolerance to therapy
Social	Structural barriers, at home, family/caregiver assistance and support, reasonable chance to return to the community setting
Financial	Not all payers cover all PAC settings Most PAC settings require payor clearance for transition to a new level of care
Geographic	Not all areas have the same PAC services available Greater number of SNFs than IRFs or LTACs
Choice	Where does the patient want to go? Is it an informed choice? Does the patient understand the different services he/she may or may not need and what is provided by each setting?

Table 3
Bundled Payment Models

Model	Definition	Payment
Model 1	Inpatient acute hospital stay	Discounted payment back to facility Physicians paid separately
Model 2	Includes acute inpatient stay plus post acute and related services up to 90 days post hospital discharge	Retrospective bundle Actual expenditure reconciled against target price Physicians paid separately
Model 3	Triggered by acute hospital stay but begins with an initiation of PAC…LTAC, SNF, IRF, HHC	Same as Model 2 but does not include initial acute hospital stay
Model 4	Prospective payment Hospital, physicians, other practitioners	Single prospective payment encompassing all services at the inpatient stay (including physicians)

medical needs, the chances for readmission to an acute hospital increases.[11] Unplanned readmissions often are considered a quality failure resulting in added morbidity to the patient and costs to the system. In fact, CMS has a readmissions reduction program that places monetary penalties on hospitals that have excess readmission ratios for specific conditions (e.g., heart failure, pneumonia, acute myocardial infarction, and others).[10] One strategy to improve patient care and decrease readmissions is to educate providers regarding the different levels of PAC and their services. It has been demonstrated that knowledge deficits about PAC have been implicated in poor care transitions resulting in adverse outcomes such as higher rates of readmissions, increased use of hospital services and increases costs.[11,12] However, there is little formal education provided in medical school or residency curricula about transitional care and PAC settings.[13] At most institutions these subjects are part of the "hidden curriculum," the knowledge and skills that are not explicitly taught but that learners are expected to "pick up" along the way.[13,14]

At the University of Missouri, the Department of Physical Medicine and Rehabilitation completed a study to evaluate internal medicine residents' knowledge of post-acute care options. It revealed an opportunity for educating physicians. After one lecture, residents increased scoring on PAC educational assessment by 35%. Subjectively 91.7% believed that education on these subjects would lead to safer and timelier discharges.[15] As a result, a more formalized educational program is being developed with the goal of improving patient care.

Change and the Future

As the national policy goal of paying for value rather than volume continues to shape the health care system, many strategies are being pursued to improve patient outcomes and quality while reducing the cost of care. The level of change and innovation to achieve these goals is unprecedented. This is evident as CMS alone implements and oversees many programs: shared savings programs, Accountable Care Organizations (ACOs), Pioneer ACOs, the Bundled Payments for Care Improvement (BPCI) initiative, Medicare Advantage, the Comprehensive Care for Joint Replacement (CJR) mandatory bundling program, the proposed cardiac care bundling program, as well as other value based programs.[9] Whether these programs are meeting expectations or achieving their desired goals is just starting to be evaluated. Patient experience and outcomes from care are simply not known in any reliable or consistent manner. These issues are especially difficult to evaluate in the PAC setting. As noted earlier, each setting has different payment, regulatory, patient assessment tools, and other measures making comparison difficult (See Table 1). The enactment of the Improving Medicare Post-Acute Care Transformation Act (IMPACT Act) in September 2014 has initiated some standardization of data across the four PAC settings.[16] The goal is that this data will assist with reforming the siloed PAC payment and delivery system in a manner that assists with choosing the right setting of care at the right time for patients. Without this data, the concern of many is that payment and delivery reforms might have the effect of diverting patients to the least common denominator or the least expensive setting regardless of outcome. If this occurs, it could suboptimize the care that our patients receive.

Two of the newer payment concepts that are gaining traction in the PAC world are Bundled Payments and Medicare Spending Per Beneficiary (MSPB). While MSPB has its place in measuring resource use in PAC, using it as the sole measure for PAC Value Based Purchasing (PAC VBP) could be dangerous for our patients. Without balance measures such as accurate risk adjusters, functional assessment, and quality of life measures there is the risk that if this is the sole method to determine whether providers receive incentive payments, this might encourage some providers to only use less costly levels of PAC.[10]

The BPCI and Mandatory CJR have been adopted or mandated in multiple areas. It is important to note that not all bundles are the same. CMS has set up four different types of bundled payment models. In both models two and three, the post-hospital costs for patients (that would include any PAC services) are part of the bundle (See Table 3).[17] These bundles are encouraging models of care coordination as facilities are being placed at risk both financially and for patient outcomes. Hospitals and sponsoring entities have employed several strategies to monitor and impact care. In several systems, one strategy has been to develop relationships and to meet with individual PAC providers (SNF, IRF, LTAC, HHC) in their local area. There has been development of care transition protocols and care coordinators to assist with care within the PAC setting. Quality scorecards for individual PAC providers also are being developed based on factors such as: readmission rates; length of stay; number of therapy visits; discharge to community; weekend admissions; time to first home health visit; or multiple issues.

As with all care, patient choice must always be respected. However, patients, just like physicians, may not be educated about the differences among different PAC providers. As a result, patients often rely on their health care team. A recent study done by the University of Missouri Department of Physical Medicine and Rehabilitation revealed that 61% of patients at a local IRF and 43% at a selected SNF

stated they were at their respective facility based on physician recommendation. These results point to the importance of the patient-physician relationship in PAC placement.[18]

Conclusion

As payment models change to penalize readmissions, reward care coordination and quality, and place risk on providers, it is critical for systems and physicians to develop integrated PAC programs. Understanding and knowing where your patients go, what services they receive, and quality of service has always been essential. However, with new and evolving payment models that put systems and physicians at financial risk for patient care, the understanding and use of PAC is gaining even greater focus. This is true especially since physicians still play a critical role in influencing patient and family choices in regards to PAC. Based on these facts, in order to deliver the highest quality and cost efficient care, physicians need to have an understanding of each patient's PAC needs and options. It is and will continue to be a turbulent time for all of medicine; however, as physicians we need to advocate for the right care and right PAC options for our patients.

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Disclosure

None reported.

MM

Beware of the Film Findings!

Low Back Pain Patients and Healthy Volunteers Have A Similar X-Ray Appearance

by Roger P. Jackson, MD, Travis J. Rump, DO, Anne C. McManus, RN, Jill A. Moore, MBA & Andy S. Lee

It may be time to change the old adage "don't treat the x-ray" to "don't take the x-ray."



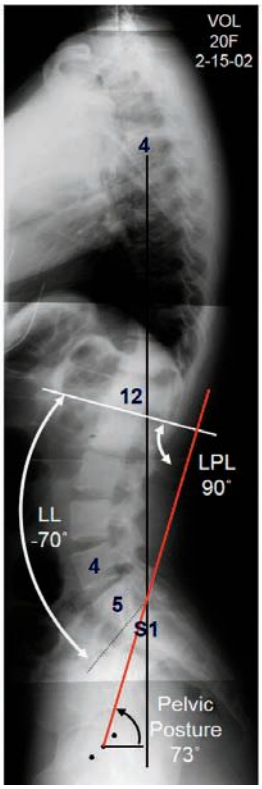
Roger P. Jackson, MD, MSMA member since 1979, is associated, along with Travis J. Rump, DO, with North Kansas City Hospital. Anne C. McManus, RN, and Jill A. Moore, MBA, are associated with Dr. Jackson's private practice; Spine & Scoliosis Surgery, Inc. Andy S. Lee is a pre-med student at the University of Missouri - Columbia.
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Abstract

Low back pain (LBP) affects 20 to 30% of the United States general population, making it the fifth most common reason for all physician visits in the U.S. The resultant financial burden on the U.S. health care industry continues to rise each year with recent estimates of over $80 billion spent annually. However, despite the dramatic rise in health care utilization and costs for this complaint, self-reported outcomes have not improved. The radiographic analysis of a healthy asymptomatic population vs. a cohort of LBP patients with lumbar degenerative disc disease, specifically as it relates to posture, spinal alignments, including lumbar lordosis, as well as other findings, may provide insight to more effectively care for the LBP patient and, in return, possibly help to rein in related health care costs.

Introduction

When in a balanced posture, minimal amounts of energy are expended by the axial and peripheral muscles to maintain an erect stance with the head centered over the hips. A coordinated and centrally mediated effort within the human body is required to create such a balanced, upright position that is free of pain. However, this fine-tuned effort to stand erect sometimes becomes dysfunctional and over-stressed in some way and to some degree, often resulting in LBP and, perhaps, changes in spinal alignments and posture. In addition, certain postures, such as those with more or less lordosis, are believed to be associated with LBP. In the absence of a particular disorder, such as a herniated disc, spinal deformity, stenosis or compression fractures, the etiology of non-specific LBP continues to perplex the medical community. The incidence of LBP has been relatively stable since the 1990s in the industrialized countries of the world, but the use of diagnostic tests and treatments, both invasive and not, have been disproportionally on the rise.[1-6] Unfortunately, despite the increased utilization of health care services, particularly in the United States, improved patient reported outcomes have not seen a similar increase.[1,5] In an effort to standardize the diagnosis and treatment of LBP, the American College of Physicians (ACP) and the American Pain Society (APS) collaborated on a joint paper providing concise patient care in a series of seven recommendations, the first of which divides the LBP patient population into three broad categories for "diagnostic triage": (1) non-specific LBP, (2) LBP potentially associated with radiculopathy and stenosis, and (3) LBP potentially associated with another specific spinal cause.[7] The series of subsequent recommendations builds upon each other outlining specific guidelines for evaluation and treatment. Even with the tools and recommendations provided by the ACP/APS and other published works, the management of non-specific



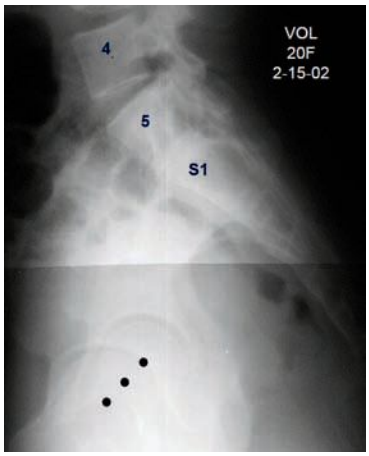
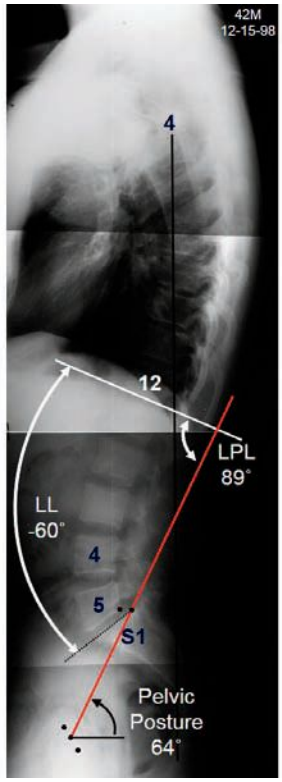


Figure 1
20-year-old female VOL with a transitional L5 vertebra. Enlarged detail below.



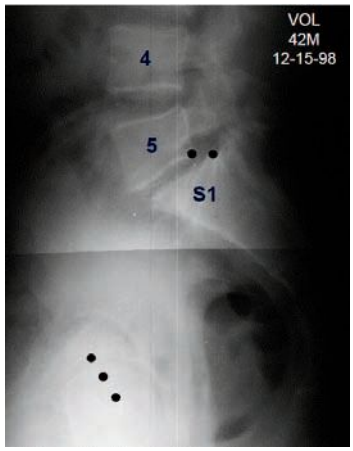


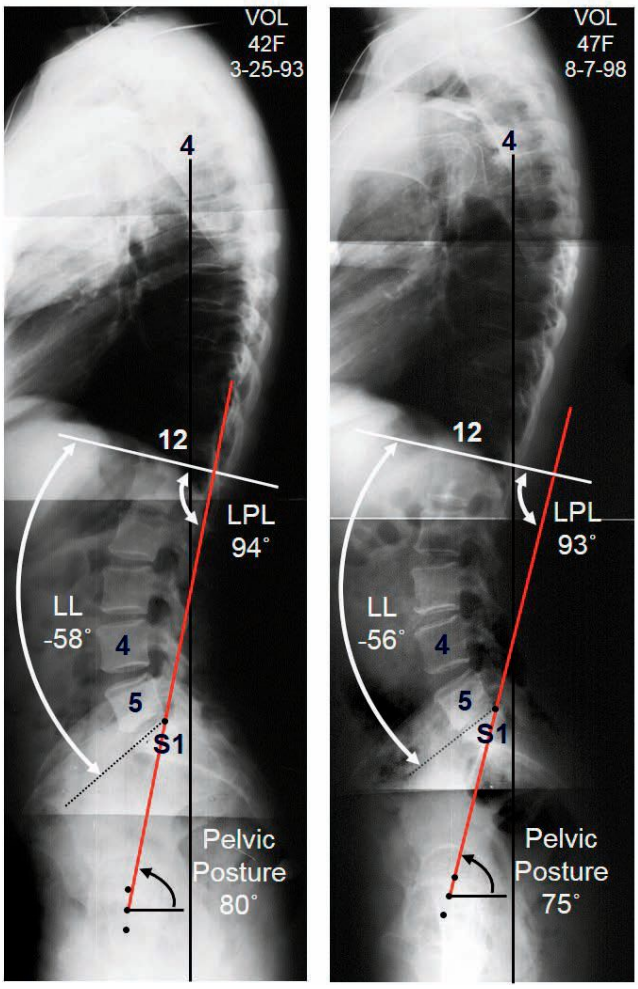
Figure 2
42-year-old male VOL with Grade I L5-S1 spondylolisthesis. Enlarged detail below.

LBP continues to follow an indirect path.[1,8-11] This lack of adherence to evidence-based guidelines contributes to the over utilization of health care services and the related rising costs for this complaint.[12,13] The authors' goal was to provide some insight into this difficult issue through their clinical observations and experiences in a spine specialty practice treating a wide variety of spinal disorders. In particular, could various changes in sagittal alignments, such as lumbar lordosis (LL) and pelvic posture, play a role in LBP, and what impact does age and individual pelvic morphology have on these alignments?

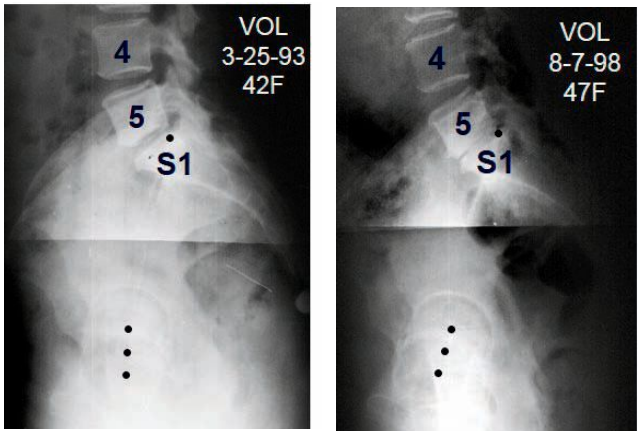
Real World Practice

When the physical exam of the patient does not provide an obvious underlying cause of LBP, the use of routine imaging may seem to be the logical next step, even though there is little evidence showing that these test results affect treatment decisions or improve outcomes. In fact, use of further testing is discouraged in most published guidelines. However, in the reality of today's medicine, the physician must deal with many outside influences that shape the course of care. Physicians are often compelled to act in response to the patient's insistence to "do something" even when their symptoms do not warrant further testing and imaging, such as standard radiographs, bone scans, CT scans, myelograms and/or MRI. The immediacy of medical information available in social media also plays into the patient wanting a "quick fix." Richard Deyo's 2011 article adds that "a professional bias for action" and "perverse financial incentives may conspire to promote approaches that are more aggressive."[1] Further observations in the literature report that many of the diagnostic studies performed provide confusing information at best, and at worst, do not improve the course and result of care.[14,15] In this regard, it is important to know that there are several conditions that may appear to be a "red flag" to the general practitioner, but do not warrant aggressive treatment. For example, radiographic findings of transitional lumbosacral vertebrae (See Figure 1) and spondylolisthesis (See Figure 2) occur in approximately 7% of the general population, but do not necessarily cause pain or require much, if any, treatment.[16,17] Degenerative disc disease (DDD) may also be seen radiographically, but its relationship to LBP is not well understood (See Figure 3).[6] The conundrum of whether to take an x-ray or not is a difficult one. Therefore, information learned by the current authors in their on-going clinical and radiographic studies comparing healthy adults to adult patients of similar age with LBP and who also have lumbar DDD (detailed below) can possibly shed some light on this issue. Hopefully these studies can offer additional material supporting guidelines that encourage conservative treatment, such as appropriate physical therapy, patient education, exercises, weight loss and life style changes, and discourage the use of early and in some cases repeated radiographic studies by providing data on whether or not

Figures 3a and 3b



Enlarged figures 3a and 3b



Female VOL with sagittal radiographs taken in 1993 at age 42 (Fig. 3a) and 5 years later in 1998 at age 47 (Fig. 3b). Significant disc degeneration at L5-S1 can be seen in Fig. 3b when compared to Fig. 3a, yet the subject reports to remain pain free. Enlarged details above.

differences in sagittal alignments, as well as other x-ray findings, are directly or indirectly associated with LBP in certain patients compared to the authors control group of asymptomatic volunteers.

Study Cohort of Volunteers and LBP Patients Background History

The authors surgical practice specializes in disorders of the spine. A basic understanding of the expected profile of human standing spinopelvic posture around the hips in the sagittal plane, as seen on lateral films, can be important and useful in the evaluation and treatment of the spine in all age groups. Many investigators have studied spinal alignment, and suggested "normal" values. However, there remains disagreement and some confusion as to which specific parameters are most significant and what constitutes an acceptable range of values for any given parameter. While lumbar lordosis (LL) is a primary component of and plays an important role in spinal sagittal alignment and global balance, there has been a growing appreciation in the effect that individual pelvic morphology can have on spinopelvic sagittal alignment, including pelvic posture, as well as perhaps, sagittal balance. Radiographic evaluation of this morphology on lateral films is often challenging due to anatomic variation, visualization of the proximal sacrum and registration of a deformed sacral plate, especially on standing lateral films. As a result, several different assessment methodologies have been reported. During et al. and Duval-Beaupère et al. described specific pelvic parameters for this morphology and their significant interdependent correlations with the lumbar spine.[18,19] Legaye et al. further reported on the relevance of the Pelvic Incidence (PI) for pelvic morphology and its correlation with and modulation of lumbopelvic sagittal alignment.[20] Subsequent studies have described LL as approximating PI (wherein LL = PI ± 9°) with data showing PI typically lower than LL. Jackson et al. and Jackson and Hales described a particular methodology to locate the pelvic Hip Axis (HA), as the initial step in their reported Pelvic Radius (PR) Technique.[21] These authors recommended that a Pelvic Radius (PR) line, originating at the HA, be established to determine lumbopelvic sagittal alignments, including the position of the pelvis over the hips, or pelvic posture, as well as the Pelvic Lordosis (PL) and the combined LL + PL for lumbar + pelvic lordosis, or lumbopelvic lordosis (LPL). PL is a constant or fixed parameter similar to PI for pelvic morphology. The PR line can also be used to more accurately measure pelvic posture and evaluate lordosis (See Figure 4). This angle for lordosis, i.e., lumbopelvic lordosis (LPL), is measured from the PR line to the inferior endplate of T12 and,

again, incorporates the PL (angle between the dotted line and the PR line in Figure 4) along with LL without needing to identify the entire sacral endplate. This approach would appear to be more practical because it decreases reliance and measurements on the often times difficult to visualize upper sacral endplate within the pelvis, such as those required for PL and PI, as well as LL, which can make these methodologies more demanding to apply clinically in an already challenging situation.

The purpose of the current study was to identify acceptable requirements or values, including minimums and maximums, for sagittal spinopelvic alignment parameters, with a focus on lordosis and pelvic posture, in a cohort of healthy volunteer subjects (VOLS) and LBP patients that otherwise stood balanced using an approach that could avoid visualization of the entire sacral end plate, so as to better and further define an expected standing profile of human posture and alignments, as seen on long lateral radiographs, and determine any radiological differences between symptomatic and asymptomatic subjects. The study also looked at the influence of age and individual pelvic morphology on these sagittal alignment parameters.

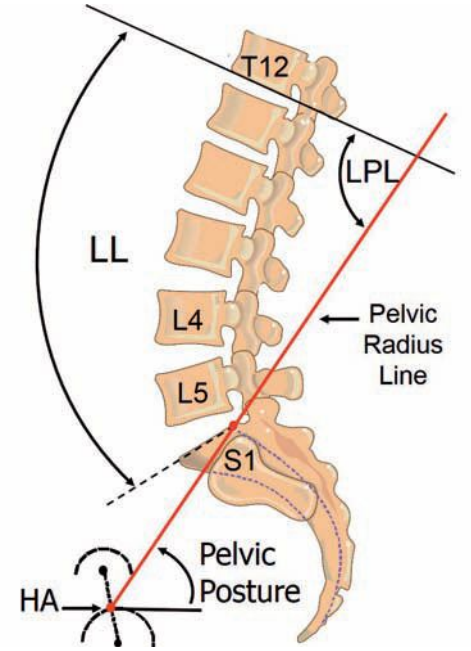


Figure 4
Drawing illustrates angle measurement technique for lumbar lordosis (LL) measured between T12 to S1, lumbopelvic lordosis (LPL) measured from the red PR line to T12 and pelvic posture measured from the horizontal to the PR line.

Materials and Methods

All subjects had a standing 36-inch lateral radiograph of the spine and pelvis showing both hips. Participants were asked to stand straight, but relaxed, with their knees fully extended. Their arms, with elbows bent 50°-60°, were positioned slightly out in front of their body and supported by holding onto an adjustable height stabilizing bar to help reduce movement and improve visualization of the spine. Inclusion criteria for the patients were as follows: low back pain only; no prior history of spine surgery; all stood up "straight", i.e., a plumbline from the center of the T4 body fell behind the L4 body and HA, as seen on the lateral films, and hip rotation was free and painless on physical examination without evidence of degeneration on the lateral films, and as also seen on the PA films of the LBP patients. Exclusion criteria were as follows: diagnosis of a disc herniation; transitional lumbar vertebra, clinical deformity, including degenerative and spondylolytic spondylolisthesis, scoliosis, thoracic hyperkyphosis and fractures.

In the original study, each lateral radiograph was measured for multiple parameters and angles, including kyphosis and balance, but for the purposes of this paper only measurements for lordosis and pelvic posture will be reported and their relationship to age and individual pelvic morphology. Lordosis was measured first, using the traditional Cobb method from the superior endplate of S1 to the inferior endplate of T12 for lumbar lordosis (LL). Films were next measured for combined LL + PL, or LPL, from the PR line to the inferior endplate of T12. Measurements for pelvic posture were made from the horizontal to the PR line, as described above. Figure 4 illustrates this methodology.

Statistical analysis was then performed on the recorded values. The average and standard deviations (SD) were analyzed and recorded for each of these parameters between the two groups and their correlations with age and pelvic morphology were calculated.

Results

There were 204 VOLS (89M/115F, mean age 40 years, range 19-72) and 426 LBP patients (182M/244F, mean age 45 years, range 14-77). The lordosis angles were as follows: LL-VOLS, mean 61° (SD 10.6, range 29° to 86°) and LBP patients, mean 61° (SD 11.5, range 27° to 99°); LPL-VOLS, mean 93° (SD 8.8, range 70° to 113°) and LBP patients, mean 93° (SD 9.1, range 70° to 118). Pelvic posture angles were as follows: VOLS, mean 73° (SD 5.9, range 58° to 89°) and LBP patients, mean 72° (SD 6.3, range 57 to 91°). Increases and decreases in lordosis and pelvic posture were influenced by and correlated with individual pelvic morphology and age, respectively ($r = .60$ and $r = -.26$, $p < 0.0001$ for both), and not by the presence or absence of LBP. Changes in LL were due primarily to pelvic morphology, not age or the presence of lumbar DDD, while changes in pelvic posture were due more to age without any gender influence.

Discussion

The current study shows that in the cohort of VOLS vs. LBP subjects, mean LL and LPL were the same for both cohorts: 61° and 93°, respectively. As can be seen from the results, the ranges were quite large for both groups and

showed the VOL cohort had a slightly lower upper limit in LL and LPL than the LBP cohort; however, the two groups could be considered to be homogenous. It may be of interest to note that in the initial film review of all VOL radiographs, approximately 6% were found to have a transitional lumbosacral vertebra and 4% were found to have a spondylolytic spondylolisthesis (See Figures 1 and 2). Despite these findings, the subjects reported they were free of pain. In the initial review of all LBP patient radiographs, approximately 7% were found to have a transitional vertebra and 11% were found to have a spondylolisthesis. Again, the relationship between LBP and these abnormalities is uncertain. The result of this analysis is that a comparison of the films taken between the LBP patient population and the VOL population show no significant differences for sagittal alignment or other significant findings. In addition, individuals who stand with an increase or decrease in these parameters would not appear to be at risk for LBP, nor are changes or differences in these parameters associated with symptoms of LBP, at least not in this study.

While the thrust of this study was the comparison of VOLS to LBP patients, a separate study within the VOL cohort was also done. For the purpose of a longitudinal comparison, 29 of the 204 VOLS returned several years later for a second standing lateral film: average time between films was six years, range two to 14 years. All reported to have remained pain free. No significant findings or changes in sagittal alignment were noted between films in the majority of the VOLS. The one exception was a female VOL whose x-rays were taken five years apart (1993, age 42; 1998, age 47). When comparing the two films, the 1998 film showed that significant disc degeneration at L5-S1 had occurred since the 1993 film, yet the subject reported to be pain free (See Figures 3a and 3b).

Conclusions

Non-specific LBP is a common and costly problem. Treatment patterns are too often influenced by patients armed with knowledge of the latest technology and the health care community's failure to adhere to evidence based guidelines. The radiographic results reported above show that the VOL (no pain) and patient (LBP only) cohorts share very similar lumbopelvic alignments, and overall standing postures, that can be seen to be wide ranging, indicating that routine films do not provide significant insight into the cause of LBP based on these sagittal alignment parameters. Hopefully this study provides new evidence and information for use in patient education and to support clinician adherence to guidelines recommending conservative treatment, including physical therapy and manipulation, without so much utilization of routine diagnostic imaging in patients with the primary complaint of localized LBP, wherein things can be said to be "out of alignment" and made more confusing. It may be time to change the old adage "don't treat the x-ray" to "don't take the x-ray".

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Disclosure

RJ receives royalties from Aesculap, Alphatec, Amedica/US Spine, Biomet Spine, NeuroStructure, NuVasive, Renovis, and Zimmer Spine. **MM**

Epidemiology of Women's Flat Track Roller Derby Injuries in Kansas City

by Sadie M. Markey, MD & Richard L. Hutchison, MD

The risk of serious injury in the sport of women's flat track roller derby is significant.





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Abstract

This cross-sectional descriptive retrospective epidemiological pilot study determined the frequency, circumstances, type, and outcome of injuries in the members of a Kansas City women's flat track roller derby league. Injuries were reported by 79% of the respondents, with 50% having sustained multiple injuries. Medical attention was required by 64%. The risk of injury in the sport is high. Further study is needed to identify specific factors that can be modified to decrease the injury rate.

Introduction

Women's flat track roller derby is an established and growing sport in the United States. Once known for its gratuitous showmanship, the sport has evolved into a popular form of recreation and entertainment. The Kansas City Roller Warriors (KCRW), formed in 2004, is a member of the Women's Flat Track Derby Association (WFTDA). The WFTDA now governs over 301 member leagues and 99 apprentice leagues in the U.S., Canada, United Kingdom, Australia, and a growing number of countries in Europe, Asia and South America. In the U.S., over 50,000 women currently participate in WFTDA teams. The KCRW currently consist of four home teams and two traveling teams and encompasses over eighty active skaters. About 250 women have participated over the course of its ten year existence.[1]

Despite the growth and popularity of the sport, the epidemiology of injury is not well-defined. The purpose of this epidemiologic pilot study was to determine the frequency, circumstances, type, and outcome of injury in the members of a women's flat track roller derby league.

Materials and Methods

This cross-sectional study was conducted on members of the Kansas City Roller Warriors. An invitation to participate in a REDCap survey was administered via e-mail to the past and present members of the KCRW league as of December 31, 2014. A total of 208 invitations were sent out with a response rate of 80 (38%). Participants ranged from ages 24 to 49, with a mean of 35 years.

Demographic information was obtained. The primary measures of the study were the total incidence and frequency of injury to the neck, trunk/spine, upper

Table 1	Demographic Data	
	Mean	Range
Age	35	24-49
seasons with KCRW	3.7	1-9
age start roller derby	29	18-45
	Number	%
active 2014	34	42.5
retired due to injury	15	19
previous skating experience (years)	30	37.5
figure skating	8	10
non-WFTDA team	8	10
WFTDA team	8	10
known medical problems while participating	13	16
lower extremity injury	5	6
trunk/back injury	3	4
asthma	3	4
other	7	9
smoke	9	11
ever on all star team	39	49

Table 2	Injury	
	Number	%
injury	63	79
required medical care	51	64
required surgery	14	18
stop skating due to injury		
no	5	6
1-2 weeks	8	10
2-4 weeks	12	15
1-2 months	14	17
> 4 months	12	15
cause		
pile-up	5	6
skater-skater	28	35
skater-object	5	6
equipment malfunction	3	4
missing equipment	1	1.25
other	21	26
> 1 injury	39	49
derby related infection	5	6
require antibiotics	3	4
methicillin resistant staph	1	1.25

extremity, lower extremity, the need for medical care, and the severity of injury as measured by discontinuation of participation. Secondary measures of the study included the relationship of injury to age, pre-existing medical conditions, medication use, skating experience, derby position, and supplemental equipment use. Participants took part in the survey on a voluntary basis. This protocol was reviewed and approved by the institutional review board. Statistical analysis was performed using unpaired t-tests and chi-square analysis. Significance level was set at $\alpha < .05$.

Results

The demographic information is listed in Table 1. As seen in Table 2, injuries more serious than contusions were reported by 79% of the respondents, with 50% having sustained multiple injuries. For those that were injured, time lost in playing the sport due to injury was less than 2 weeks for 20% and greater than 4 weeks for 40%. Injury forced 19% to permanently stop participating in the sport. Specific sites of injury are listed in Table 3.

Skaters with previous skating experience were more likely to be injured (P=.002). There were no statistically significant differences in injury rate based on smoking status, age, position, wearing additional padding, being an all-star, age starting, or current medical problems. Active skaters had an injury rate of 20%, while 22% of the retired skaters reported an injury.

Discussion

This epidemiologic pilot study of injury on women's flat track roller derby discovered high rates of injury, multiple injuries, and the need for medical care and surgery. A typical year-long season involves approximately 65 practices and 5 bouts per year for the home teams, and 150 practices and 20 bouts for the travels team. Detailed description of the rules, regulations and bouts is available from the WFTDA website.[1] Information on more than two injuries was not collected in order to limit the time required to complete the survey. Assuming the

Table 3	Specific Injuries Reported	
	Number	%
head - concussion	3	5
body/trunk	9	15
rib fracture	1	2
strain	1	2
clavicle	1	2
other	6	10
upper extremity	12	21
shoulder	1	2
fracture humerus	2	3
fracture finger	3	5
dislocation finger	1	2
other	5	8
lower extremity	35	59
knee	14	24
fracture tibia/fibula	3	5
fracture ankle	5	8
other	13	22

skaters participated in all the practices and games, a conservative estimate is 2 – 5 injuries per 1000 athlete exposures.

In this study, the lower extremity was the body region with the most injuries. This was different from other skating sports. Current literature describes roller-skating injuries as primarily occurring in the upper extremity. [2, 5, 7-9] Studies on ice-skating also show a predominance of upper extremity injuries, and a higher incidence of head injuries.[7] Skateboarding and Heelys (roller-shoes) mostly describe wrist and forearm injuries.[6, 10, 13] These studies reported on predominantly pediatric patient groups, with the skating injuries are often due to falls on outstretched hands. While upper extremity injuries still occured, our data suggests that roller derby predisposes participants to more lower extremity injuries. This may be due to the rules governing contact between skaters.[1] Lower extremity injuries were also more common in men's professional roller hockey.[12]

The derby population is required to wear certain safety equipment, including wrist guards, mouth guard, elbow pads, knee pads, and a helmet. While the literature on roller skating shows that wearing of wrist guards reduces the incidence of wrist fractures, forearm fractures are still common.[2] In women's roller derby, all pads are required to be worn at all times during practice and gameplay. The use of wrist guards and elbow pads may help to reduce upper extremity injuries. In our study, wearing extra, non-required padding was not protective against the more severe injuries, but they may have reduced the incidence of contusion.

The training and experience of skaters in WFTDA leagues may account for differences in injury pattern compared to other skating groups. Skaters must pass a yearly minimum skills test before contact skating is allowed. This test assesses the ability to stop, block, hit, and fall safely while skating in close proximity in a pack. Injury does not seem to be a deterrent to skating, with the same number of active and retired skaters reporting at least one injury from skating.

In comparison to other women's sports, flat track roller derby has frequent injuries.[4] For example, women's collegiate lacrosse injury rates range from 3-7 injuries per 1000 athlete exposures.[3] Women's rugby studies show a rate of 3 per 1000 exposures.[11]

It is unclear why skaters with more experience were prone to more injuries. Experienced skaters may skate faster, attempt more complex maneuvers, skate more often, or be more competitive.

A limitation of this study is the low response rate. The low rate may have skewed the data toward skaters that had been injured. Given a best case scenario, which assumes that all of the skaters that did not respond to the survey had never sustained an injury, the overall injury rate would still be greater than 30%. Other limitations include potential recall bias due to the retrospective nature of the survey that covered many years of participation. The studied population may not reflect the injury rate in other communities due to differences in practice attendance, bout frequency and competitive level. Exposures per year were not directly measured but estimated based on a typical schedule. We also did not measure whether injuries occurred during



The photo above depicts the typical type of contact and falls that occur in women's flat track roller derby. *Photo by Phil Peterson www.phil-peterson.com*

practice or bouts, nor did we collect the total number of injuries. The actual number of injuries per exposure may be higher. Studies on leagues in other cities need to be performed to confirm our findings. A follow-up study is also needed to define the exact injuries, especially the high number of injuries that required surgery.

The risk of serious injury in the sport of women's flat track roller derby is significant. The results of this pilot study suggest that additional studies need to be performed to more specifically identify the injury rate per encounter along with rules, training, or equipment that can be changed to help reduce the injury rate.

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Disclosure

None reported. **MM**

Barriers and Benefits of EHR Usage in Missouri: A Five-Year Journey

by Patricia Alafaireet, PhD & Lanis Hicks, PhD

Looking forward on our way towards precision medicine, the effective use of EHRs and other health care IT may allow improved provision of health care.





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Introduction

The effective use of Electronic Health Records (EHRs), and the data generated from their use, are essential, if precision medicine is to become a reality. EHRs will need to be deployed and used effectively across all aspects of health care. Storage of comprehensive, individual patient-level data will be required, if the "moonshot" goal of precision medicine, as described by former President Obama, is to be reached.[1,2]

Missouri's journey toward the effective use of EHRs has, in many ways, been reflective of the progress seen across the U.S. Differences in the rate of EHR selection, implementation, and use in Missouri, compared to national statistics, reflect the combination of barriers and benefits that is unique to Missouri, in many respects. Not only is Missouri centrally located in U.S. geography, but its population is distributed across rural and urban areas, with a significant sector of the population located in micropolitan areas. In Missouri, 97.4% of land is classified as rural, and 30.6% of Missourians are classified as living in a rural area.[3] Rural Missouri is reported to have only one primary care doctor for every 1,776 residents, compared to one for every 962 residents in the urban areas of Missouri.[4] Missouri is estimated to have 8,528 active primary care providers.[5] Missouri is one of nineteen states that chose not to expand their Medicaid program.[5]

EHR Adoption in Missouri

In Missouri, 72% of physicians have adopted a certified EHR and 49% of office-based physicians have reached Meaningful Use via Medicare funding.[6] In addition, 92% of Critical Access Hospitals (CAHs) and Rural Hospitals (RHs) in Missouri have reached Meaningful Use of an EHR.[6]

Much of the technical support and assistance provided to health care enterprises in Missouri came through the Missouri Health Information Technology Assistance Center (MO-HIT).[7] In addition to providing technical assistance, MO-HIT has conducted a number of studies to investigate both barriers and benefits of EHR adoption. These studies, carried out over the last five years, showcase knowledge that can be used to support continued and improved use of EHRs along the pathway to precision medicine.

Barriers to the Use of EHRs

Not surprisingly, the barriers to efficacious EHR use in Missouri reflect those found in other parts of the U.S., compounded by rurality. These barriers include cost, issues with the technology itself, lack of system inter-operability, concerns about patient privacy, and confidentiality, and a lack of well-trained clinical informatics workers at all levels.[8] The cost of financing health IT and the lack of demonstrable, short-term return on investment appears to have been the most noted barrier in the initial phase of EHR ramp-up in the U,S.[8] The social components of EHR use, and, indeed, the use of all health IT systems, are factors that were little recognized when such systems were newly available, but which have become increasing recognized as significant barriers to successful EHR implementation and use.[9] Equally, the complex and dynamic nature of health care service delivery creates an environment where substantive procedural or operational change is difficult and unpopular, especially when the use of health care IT requires workflow changes, or extends the amount of time needed for a provider to carry out his/her duties.[9]

These types of barriers can be summed up in four over-arching categories. One category collects the situational barriers, including the time it takes to implement and use an EHR, the lack of proven, initial return on investment, the prohibitive cost of health IT systems, especially for small medical practices or small health care facilities, and one-size-fits-all software that is difficult or costly to tailor to the needs of a particular physician or provider.[10] Cognitive and/or physical barriers to the effective use of EHRs and other health care IT constitute a second category of barriers. This category includes such issues as lack of usability of these systems and their lack of adaptability to either physician/provider disabilities or to the needs of users who lacks extensive computer skills.[10] Health care IT has also often proven to be less than supportive of physician/provider cognitive needs within the context of his/her specific practice. For example, some EHRs may not adequately support the need for rapid access to and turn-around on patient information found in emergency department, or may not adequately support the diagnosis or treatment plan needs of a sub-specialist physician.

Barriers around real or potential liability issues constitute yet another category. These barriers include privacy and confidentiality issues, as well as the potential liability associated with the actual use of the EHR or other health care IT.[8,10] The final over-arching category of barriers are classified as knowledge or attitudinal barriers. These barriers include insufficient research into, and knowledge of, the effects of the use of EHRs (as necessary to convince potential users), general apprehension about change, and barriers related to philosophical opposition to the use of health care IT, including perceived assaults on physician autonomy.[10]

Studies conducted by MO-HIT regarding the adoption and use of EHRs within the Missouri community of physicians and providers generally reflect those found in larger, more nation-wide studies, but several additional barriers were identified. The rurality found in much of Missouri created additional barriers. Not least of these was the lack of sufficient broadband coverage in some of the more remote areas of the state. These "broadband deserts" significantly delayed EHR implementation, and also created barriers to Meaningful Use, as they exacerbated patient access to patient portals.[11] Rurality also contributed to the inability of some health care organizations to attract and retain sufficiently trained IT and clinical informatics professionals.[11] Interestingly enough, MO-HIT studies showed that EHR implementations in medical practices co-located in communities that also housed institutions of higher learning, including community colleges, experienced significantly more rapid implementation. Missouri also experienced a situation where some EHR and technology vendors concentrated their efforts on certain regions of the state and did not pursue others.[11] In the event that those specific vendors are no longer able to provide services, either through their demise, through their acquisition by another enterprise, or through their inability to further certify their product, these regions of the state could experience significant loss of medical service delivery. The trifecta of costs associated with the implementation (and re-implementation) of EHRs, the changes in CMS revenue, and the lack of Medicaid expansion may have led to the closure of some critical access and rural hospitals.

MO-HIT studies of EHR use, across the continuum of health care services, including services provided by local public health departments, behavioral health organization, rural health clinics, and post-acute and long-term care providers clearly show barriers specific to their services.[12-15] These include lack of earmarked funding for health IT when organizations are primarily funded through federal, state, and local entities and, therefore, engage in very little billing of third-party insurance for services rendered.[12-15] The inability to hire trained clinical informatics professional, or to relieve current employee of their duties for a sufficient time to adequately train them in clinical informatics, poses yet another significant barrier to the use of EHRs and to the use of health information exchange. The situation is further complicated by the lack, in some instance, of EHRs and other IT products that are specially developed for use in these types of facilities.[12-15] When these products are available, they are often not certified.[12-15] Much remains to be done to eliminate or reduce these barriers to the effective use of EHRs in Missouri, but the benefits of EHR use are becoming more evident over time.

Benefits of the Use of EHRs

Missouri was presented a stark example of the benefits of EHRs in the aftermath of the 2011 tornado in Joplin. The temporary loss of one hospital and the loss of the physical clinics and medical records in physicians' practices significantly hampered efforts to care for the injured and shocked population. Some medical records were later found strewn across adjacent counties, certainly creating privacy breaches. There were bright spots, however. St. John's Hospital had completed its move to an EHR three weeks prior to the tornado. Despite the hospital being badly damaged, St. John's was able to maintain patient records and had them readily available to healthcare professionals during the disaster relief efforts.[16] Dr. Tracy Godfey of the Family Health Center of Joplin has a similar story with a similar result. Her practice had been using an EHR for seven years prior to the tornado, which destroyed her office building. Seventy-two hours later, her practice was up and running, in a different location, and busily providing much needed services with complete access to patient records. [17]

While it may be difficult to assign a dollar value to the benefits of access to patients' medical records in a disaster situation, such as that in Joplin, it's not hard to see the benefit. Benefits in day-to-day operations may be less patently apparent. These benefits include improved and faster clinical decision making, improved decision making around diagnosis, reduction in the number of medical errors and adverse drug events, and improved health outcomes at the population level.[18,6] The benefits extend to improved communication in the patient/physician relationship, including improved access by the physicians to patient information at the point of care, increased patient input into care through patient portals, and decreased instances of medications prescriptions not being filled or not taken.[18-20] In the longer term, once some barriers have been adequately addressed, physicians and other providers should experience a reduction in work load, hopefully leading to better life/work balance and increased

productivity.[22,23] Financially, health care facilities may gain through such EHR-supported cost reductions as improved order entry, reduction in duplicate test orders, reduction in turnaround times, and reductions in the costs associated with the production of care.[22]

Although the long-term financial benefits of EHR usage are yet to be realized, several case studies performed to date illustrate the passivity of such rewards. Eden Park, in Pennsylvania, implemented an EHR and eliminated their transcription fees and reduced administrative staff by 25%. In doing so, it saved an annualized $114,000, and used those funds to fuel a new position focused on improving outcomes.[24] Central Utah Multi-Specialty Clinic reduced spending and was projected to save more than $8.2 million in the period of 2004-2010 through reduced need for transcription services, decreased labor, and decreased supply costs for the maintenance and creation of paper charts, along with increased revenue generated from increased coding levels, and decreased need for physician-suite space.[25] Closer to home, Jennifer Brull, MD, who practices in the Kansas City area, successfully reached Stage 1 Meaningful Use, and in the process, cut her costs for dictation transcription by 75%.[26] Patients First, located in Washington, Mo., successfully converted to a new EHR in spring 2011, and successfully enrolled more than 15,000 patients into its patient portal. These patients can improve participation in their own health care through access to electronic clinical summaries, timely access to lab results, and through secure messaging with providers. Patients First found that access to clinical summaries was especially beneficial for older patients and patients with multiple conditions. [27]

Funding for EHRs and other health care IT remains a core issue. Funding for rural health care is especially difficult. Distance learning and telemedicine hold promise to enhance health care delivery in rural areas, as well as to decrease costs. Funding provided by the U.S. Department of Agriculture for telehealth and distance learning has helped rural health care provider's realize a number of benefits. The benefits, associated with the use of health care IT, include improving care and access to care, increasing access to continuing education and training for providers in rural areas, including resident physicians and medical students, decreasing travel time for patients, and increasing access to specialty care services, including mental health services.[28-32]

Looking forward on our way towards precision medicine, the effective use of EHRs and other health care IT may allow improved provision of health care to impoverished children, improve access to acute care, as well as to chronic disease management services, while increasing patient satisfaction and increasing worker productivity through reduction in time off needed to care for health needs. [28-32] The use of health care technology may be especially important is rural communities, where it may be instrumental in creating local jobs, supporting local businesses, spurring investments in local areas, unifying local communities, and allowing health care organizations to adequately train and retain staff.

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Disclosure

None reported.

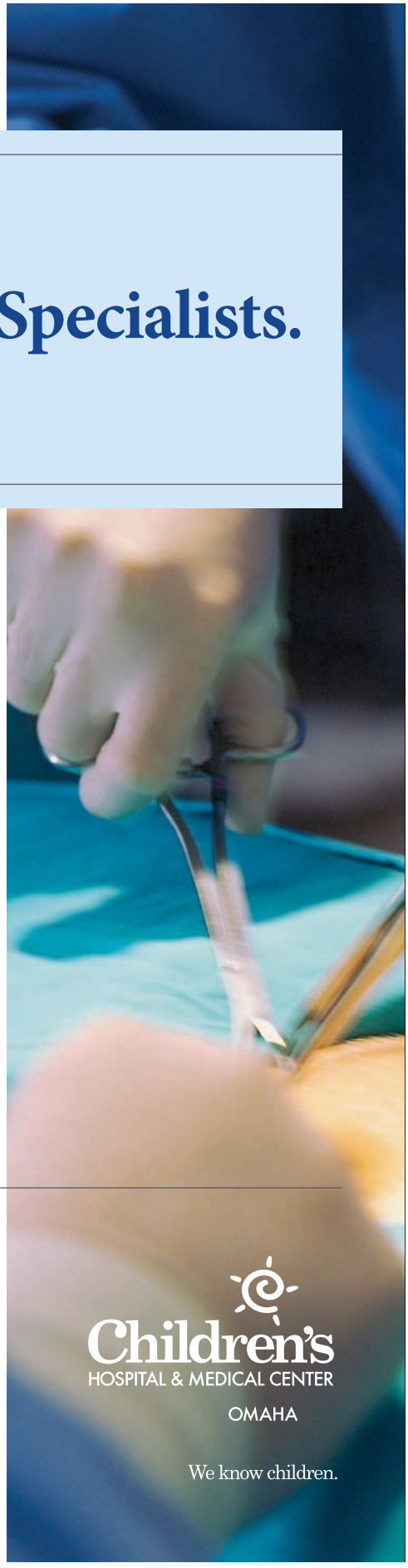
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