

Modern Conservative Management of Hip Osteoarthritis and Other Intra-Articular Pathologies of the Hip: Alternatives to Opioids

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Summary

Hip Osteoarthritis is the most common chronic condition in the United States today, affecting more than 1 in 5 people sometime during their lives. Hip replacement surgery will ultimately be necessary for most patients, however, studies show that many of those patients will wait 3 to 6 years after diagnosis before having surgery. The old model of conservative care focused on narcotics/NSAID, weight loss, exercise and use of a cane. This model has contributed to the current overuse of opioids in the US. Methods of conservative care focusing on manual therapy and therapeutic exercise in clinic and at home have demonstrated excellent patient outcomes at substantially lower costs to the healthcare system. New research suggests reasons for that success. This modern model represents best practices for healthcare providers around the world, and provides a positive alternative to the use of opioids.

Introduction

There are approximately 24-30 million individuals with some amount of personal disability and pain related to hip osteoarthritis in the US alone. There is an average delay of about 3-6 years from diagnosis to surgery, if surgery is needed or possible. There are a few reasons for this delay, with the most significant being that although the individuals have pain and limitations related to hip osteoarthritis, they are not yet severe enough to warrant surgical intervention. Today's hip replacement will last approximately 20-25 years before it needs to be surgically performed again on that hip. It is in the best interest of the patient to wait as long as possible to avoid multiple surgeries. As a result, there are millions of individuals trying to wait as long as possible and experiencing increasing levels of disability for years prior to surgery.

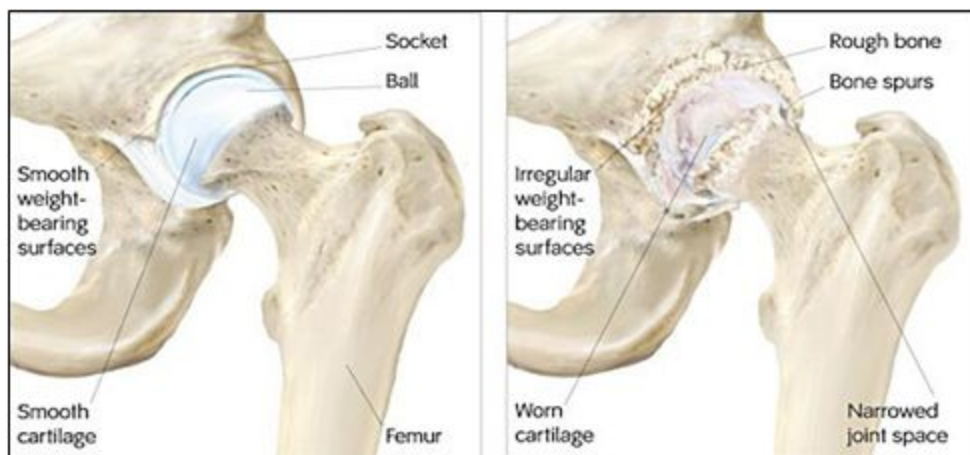
Due to the symptoms of hip OA, including pain as well as loss of range of motion, strength, functionality and quality of life, these patients become increasingly less active and in progressively worse condition. In the absence of activity and exercise, they have an increased risk for comorbidities including heart disease, diabetes, obesity, cancer, stroke, depression and addiction. Historically, the conservative treatment model in the US has focused on prescribing narcotic and NSAID medications to relieve pain, recommending weight loss and exercise (although the latter is increasingly painful as

the disease progresses) and waiting for it to get bad enough to warrant surgical intervention. The result is loss of physical conditioning prior to surgery - increasing surgical risks and the cost of post-surgical rehabilitation; exposure to opiate addiction and a significant decrease in quality of life for patients.

This model has failed millions of individuals as well as cost the healthcare system billions of dollars. Current studies demonstrate a less expensive and superior approach to treating these individuals. This paper will discuss hip osteoarthritis, the impact it has on the individual and the healthcare system and the best practices that make up this less expensive and more successful model of conservative care (“modern conservative care”) prior to surgery.

Hip Osteoarthritis

Osteoarthritis (OA), also known as osteoarthrosis or degenerative joint disease (DJD), is a disorder of the joints caused by progressive loss of hyaline cartilage, sclerosis of subchondral bone, and the formation of bone spurs and cysts at the margins of the joint.^{1,6,9,11,17,22,42} OA of the hip joint occurs between and around the head of the femur and the acetabulum of the pelvis.



Signs and Symptoms

The physical signs and symptoms of Hip OA are significant and occur as a result of the secondary changes to the joint. These secondary changes include, but are not limited to, capsular restriction, loss of mobility at the joint, weakness and tightness of surrounding musculature, increased pressure within the joint, general deconditioning,

loss of balance and proprioception, and overall increase in stress on surrounding joints including the knee, pelvis, and lumbar spine. As the OA progresses, many individuals will eventually have intolerable pain, lose their overall functional ability, independence, and quality of life.

The social and economic effects of Hip OA on the individual, and society as a whole, may be just as significant as the physical signs and symptoms. Overall, OA is the sixth leading contributor worldwide to total years lost to disability, or disability adjusted life years (DALYs).⁴ The direct and indirect societal costs attributable to OA are enormous. For example, individuals with OA are more likely to reduce work hours or stop working altogether resulting in lost wages and income. Older adults with symptomatic arthritis report greater medical utilization and health care costs compared with people not reporting arthritis.³⁸ Individuals with hip OA lose interest in participating in some of the most common leisure activities such as walking with friends, going to a dinner party, and engaging socially in fear of the pain involved. Rates of depression are higher in individuals with long-standing pain and loss of overall function.^{28,29}

Size of the Problem

OA is the most frequent cause of musculoskeletal disability in developed countries and one of the most common causes of disability resulting in limited activities of daily living in the general adult population.^{9,22,27} In addition to the individual's personal pain and disability, OA has a huge financial impact on both the individual and the federal health care system as a whole. In the United States alone, it is estimated that the number of individuals with OA in any part of the body will increase from 43 to 60 million by 2020, resulting in an estimated cost of over 100 billion healthcare dollars per year.^{4,8,34,44}

Studies investigating prevalence of hip OA, specifically, have cited between 10-25% in aging populations and 0.7 to 4.45% of the population overall.^{5,6,12,23,25,31,39} A systematic review by Dagenais et al in 2009, yielded 23 studies reporting 39 estimates of overall prevalence ranging from 0.9% to 27% of populations with a mean of 8.0% and a standard deviation of 7.0%.⁹ According to research presented at the 2006 American College of Rheumatology annual meeting, about 25% of Americans can expect to develop osteoarthritis of the hip during their lifetime.² Based on this research and the age and population of our country, there are between 24-30 million individuals suffering from some form of personal disability related to hip osteoarthritis today.

The prevalence of Hip OA is rising dramatically and is expected to continue to rise sharply in the next 20-30 years. Reasons for this dramatic increase stem from the aging

of large groups of the population including the “baby boomers”, people living much longer with higher expectations and the increase of obesity rates among western populations.^{6,9,32} Iorio et al found that obese individuals suffered twice the rate of hip and knee arthritis as compared to adults with healthy body weight. Nearly 32% of obese adults have arthritis, as opposed to 16% of those of normal weight and 22% of people who are overweight but not obese.²¹

The Old Treatment Approach

The old model of conservative treatment for OA included only narcotics/NSAID medications, exercise, weight management and waiting for it to get painful enough to warrant surgical intervention. While medications are important and can be used to manage pain and inflammation, they do not restore strength, flexibility, proprioception and joint mobility, the root causes of the pain and functional disability in the individual. They also become very expensive and carry their own risks associated with long term use such as gastrointestinal bleeding, cardiovascular disease, and addiction.¹⁶ In addition, our past reliance on opioids has been a significant contributory factor to our national overuse of such drugs, a situation the healthcare community is working to change.

Many studies have shown that non-pharmacological treatment options, such as manual therapy and therapeutic exercise programs, can be very effective when emphasized.^{6,7,14,15,16,18,30,33,35,41,45,48} Therapeutic exercise, when used alone, has been found to help biomechanically unload intra-articular pressure from within the hip joint leading to decreased pain response. This unloading occurs through improved flexibility, increased strength, improved mechanics and decreased overall weight of the individual.

However, utilization of commonly recommended self-management strategies such as exercise and weight loss have demonstrated poor compliance among patients and clinicians alike.^{20,37,46}

The most significant reason for this poor compliance centers around the progressive Capsular Pattern of Restriction that develops around the degenerative hip. The hip joint is surrounded by a deep connective tissue called the joint capsule. The joint capsule, in addition to ligaments, helps to stabilize and control the range of motion of the hip joint. As hip OA progresses, the joint capsule becomes inflamed and very tight causing the femoral head to migrate superiorly and severely restrict normal movement of the hip. This capsular tightening, inflammatory reaction and loss of range of motion increases pressure within the joint which causes immediate increased pain.

Many individuals show poor compliance with an exercise program, not because they lack motivation to improve, but because of the progression of the joint restriction and severe pain. The exercises cannot specifically target the progressive capsular restriction. The pain becomes so great that they are not able to tolerate exercise to lose weight, improve flexibility and improve biomechanical strength as prescribed to them. The OA continues to progress, causing more pain and disability. The person remains inactive and suffering for years which leads to increased risk for many co-morbidities including depression, diabetes, addiction, obesity, heart disease, stroke and cancer. This continues until the hip becomes degenerative enough to warrant total hip replacement surgery.

Current Evidence-Based Medicine

Newer and more recent studies that have investigated the combination of manual therapy techniques, focusing on increasing capsular mobility of the hip, and therapeutic exercise have shown important and significant results.^{6,8,17,19,26,48}

Manual therapy techniques are defined as those in which a medical provider, such as a physical therapist, osteopathic physician, or chiropractor, perform skilled hand movements intended to improve tissue extensibility, increase range of motion, induce relaxation, mobilize or manipulate soft tissues and joints, modulate pain, and reduce soft tissue swelling, inflammation, or restriction.³ There are a variety of manual therapy techniques that target the hip joint capsule with the goal of increasing its extensibility and increasing ROM.

The first and most widely used manual therapy technique to improve general hip joint capsular mobility and decrease pain immediately is termed Long Axis Hip Traction.^{6,10,17,19,40,42,48} (See Figure 1). The patient is lying supine while the practitioner grasps the patient's leg near the ankle. The practitioner then places the leg in approximately 15-30 degrees of flexion, 15-30 degrees of abduction and available external rotation for the most relaxed position of the hip joint. The practitioner then begins to pull at a certain force to distract the hip joint, stretch the joint capsule, and decrease intra-articular pressure. This technique immediately decreases pain and begins the process of increasing hip joint capsule extensibility, leading to decreased pressure within the joint, increased range of motion and relaxation of surrounding muscles.

Alternating varying amounts of compression and decompression during the traction is also thought to be one of the mechanisms by which lubrication and flow of nutritious synovial fluid is enhanced within the joint.

Long Axis Traction (LAT) is followed by many other specific and directional techniques performed by the practitioner to target specific parts of the joint capsule and surrounding soft tissues of the hip joint. They include, but are not limited to, Lateral Distraction, Distraction Manipulation and Directional glides including Inferior, Medial/Inferior, Anterior and Posterior in a variety of positions.

It is important to note that greatest benefit will come from combining all of the joint and soft tissue techniques required for each individual patient, not just LAT alone. LAT is the first technique used because of its immediate pain relief and general capsular stretching. Oftentimes the patient will not tolerate more specific directional techniques initially so LAT can be used to desensitize the patient in order to build tolerance for the less comfortable techniques and progression of the important therapeutic exercises.

Individuals with hip OA, who receive modern conservative care that includes physical therapy, usually receive manual therapy, exercise instruction and education 1-2 x per week for 3-8 weeks depending on their specific level of dysfunction and needs. Manual therapy is most effective by consistently accumulating the effects of one treatment on another. It is similar to how an antibiotic medication works on an infection. In order to effectively eliminate the infection, the person must consistently, and for the entire duration, take the antibiotic medication. Likewise, one session of mobilization on the hip joint is ineffective for mobility change or long term pain relief, but by accumulating the treatments consistently for a certain period of time, it has longer lasting effects.

Combining patient-specific manual therapy with the specific therapeutic exercises shows the greatest promise for positive patient outcomes in the treatment of hip osteoarthritis prior to surgical intervention. By increasing the patient's mobility and decreasing their pain, they are better able to perform their long-term exercise routine for decreased weight, increased mobility, increased strength, and improved biomechanics. These modern conservative measures can decrease the need for medications, improve patient morale, improve functionality, and most of all, improve quality of life.

Although this conservative treatment does not cure arthritis nor prevent surgery at some point, the universal belief is that if the patient can lose weight, gain strength and mobility and improve activity level, that patient has a greater chance of more comfortably delaying surgery until it is absolutely necessary. Each 3-6 month period of time surgery can be delayed is another 3-6 months of improved surgical techniques, surgical experience, improved surgical components and cost savings by the patient and the insurance company. In addition, there is growing evidence that providing

“prehabilitation” prior to surgery can improve patient outcomes pre- and post-surgery while decreasing overall costs. See the section titled “Profiles in Coverage” at (<http://www.apta.org/PTinMotion/2016/2/Prehabilitation/>)

Costs of No or Ineffective Treatment

In summary, combining manual therapy, therapeutic exercise and education in the clinic demonstrate significant benefit to the patient. After discharge from the clinic, individuals are able to maintain improved range of motion, strength and pain levels up to 12-24 months with basic maintenance.^{17,48}

Manual therapy and therapeutic exercise are covered expenses under health insurance plans and are far less expensive than the overall costs associated with NOT providing this care. The results of NOT treating non-surgical or pre-surgical cases of hip OA with manual therapy and therapeutic exercise include:

1. Patients will be in more pain requiring more expensive and risky medications.
2. Reliance on narcotics contributes to the US opioid epidemic. Plus, medication side-effects can lead to expensive treatments related to gastrointestinal disorders, cardiovascular problems, and/or addiction.
3. Patients will worsen in overall fitness and conditioning related to inactivity and potentially lead to more expensive treatments related to diabetes, addiction, obesity, heart disease, cancer, depression or stroke.
4. Psychosocial costs of not participating in life activities and socializing including lost wages from inability to work and treatment of depression.
5. Progression of physical weakening, capsular restrictions and inability to move normally results in other expensive orthopedic dysfunctions and more importantly, advanced degenerative changes around hip and possibly premature hip replacement surgery.

Limitations of Surgery

There is no cure for osteoarthritis. As the disease progresses, many people, even with delayed surgery, greater quality of life and decreased comorbidities, will still require surgical intervention. Joint replacement surgery has proven to be very effective in improving pain and function. If there are no contraindications or limiting factors, it is the premier choice of treatment once conservative measures have been exhausted.

There are, however, some obstacles to having surgery. It is very expensive, carries its own risks associated with general anesthesia and may have to be repeated depending on the age of the individual. Historically, it has been reserved for individuals older than 65, but there are more individuals seeking out surgery at a younger age. Studies indicate that by 2030, 52% of patients needing primary hip replacements and 36% of those needing revision hip replacements will be younger than 65 years old.¹³

According to a study by Kurtz et al, by 2030, the demand for primary total hip replacements is estimated to grow by 174% to 572,000 and the demand for hip revision procedures is projected to double by the year 2026 with an increase of nearly 100,000.²⁴

Due to the lack of proper care and increasing expectations for an active lifestyle, more and more individuals are seeking out joint replacement surgery earlier than they have in previous decades. These replacements will only function for approximately 20-25 years, which means more patients will require the more time-intensive and expensive revision surgery at a younger age.

There is another significant problem with the future of joint replacement surgery. The shortage of orthopedic surgeons that perform these surgeries is expected to be so drastic by 2016 that 50% of those who need total hip replacements will not be able to obtain them in timely fashion, according to Thomas Fehring, MD, senior surgeon at OrthoCarolina Hip and Knee Center, in Charlotte, North Carolina.¹³ Reasons for this shortage have to do with the continuing downward spiral in reimbursements and the lifestyle choices of younger surgeons.

Dr. Fehring states, "The shortage of hip and knee surgeons reflects the economic disincentives for performing total joint replacements. Reimbursement by Medicare for these procedures has fallen significantly in recent years. As a result, most young orthopaedic surgeons are shying away from joint replacements, and are instead going into more lucrative specialties, such as sports medicine and spinal surgeries."¹³

According to the American Academy of Orthopaedic Surgeons, those who do have the surgery, a primary total hip replacement will cost upwards of \$50,000 and a secondary revision will cost about \$60,000. These figures do not include costs associated with rehabilitation services following the surgery and adaptive changes made to one's home.

Several studies have investigated the impairments and function in patients with hip OA, such as lower extremity muscle strength, hip range of motion (ROM), and aerobic

capacity. Although surgery is very effective once conservative measures have been exhausted, it is important to note, data indicate that only 12% of the patients seeking help for hip pain ended up having hip replacement within 3 years and 22% within 6 years. Therefore, the patient group *not* candidates for surgery represent the majority of patients seeking primary care for hip pain, including patients with hip OA.³⁶

Home Joint Mobilization

Even after successful pre-surgical, conservative treatment in the clinic, hip OA is progressive and the patient's hip will eventually begin to worsen even if the patient is compliant with their home exercise program. In a perfect world, patients would just continue to receive the manual therapy and exercise instruction in the clinic until surgery is indicated. However, clinical care is limited by the costs of treatment and visit limits set by insurance companies.

To date, there have been only a few home manual therapy techniques or devices that individuals report being helpful in the conservative management of hip OA. Some of these joint mobilization techniques include inversion tables, SuperBand Self-Mobilization with Movement (SMWM), ankle weight traction, self-traction with a mobilization belt and self-traction with a traction device. Some of these can be quite useful while others are too cumbersome or not specific or intense enough to create any meaningful change.

Home Mobilization Options



Inversion Tables

Specifications: Fairly large apparatus that can fold up and be stored. Consists of a flat table that the person will lie on with their ankles fixed at the end. Table rotates around an axis so that the person may lie inverted thereby utilizing gravity to traction from the ankles all the way to the top of cervical spine.

Benefits: While inverted and secured at ankles, the body will be tractioned generally. Typically used for lumbar spinal traction.

Limitations: The traction is not specific to the hip joint and may traction other parts of body that are not desired. Not strong enough to provide the necessary force to distract the hip joint in a meaningful way (<400N). Can be cumbersome for some individuals to set up. Increases blood pressure and eye pressure which may be contraindicated. Unable to sustain for enough time to make any meaningful changes to the hip joint capsule. Does not allow for a variety of positions for the hip joint or lumbopelvic region. Usually limited to individuals less than 300 lbs; costs approximately \$200-\$400.



SuperBand

Specifications: Thick, strong resistance band that is looped and approximately 41" in length and come in many levels of resistance. A variety of techniques is illustrated in these YouTube videos:

<https://www.youtube.com/playlist?list=PL252Piz4v2QsTd3ZuqkTHEi7JpgQu7k-t>

Benefits: Can easily be used to provide LAT by securing one end to a support base and other end around involved leg via the ankle, then scooting away to desired level of distraction. Can also be used for self-mobilization with movement (SMWM) in all directions of hip joint. Inexpensive, approximately \$20-30. Great for individuals who only need very light traction.

Limitations: Can be cumbersome to set up for some individuals. Uncomfortable pull to foot/ankle area during traction. Needs to be secured to very strong base. Unable to provide amount of force needed to make meaningful changes to greatly restricted hip joint capsule (i.e. > 400 N). Usually applied while on the floor which can be difficult for those individuals who'd prefer to have traction while in bed.

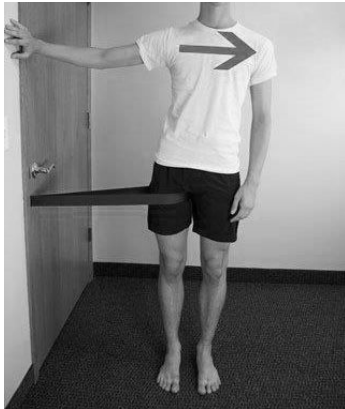


Ankle Weight Traction

Specifications: Patient will wrap heavy ankle weight (10-30 lbs) around ankle of involved leg. They will stand on a step or staircase and allow the weighted leg to hang off the edge while staying supported on uninvolved leg.

Benefits: Provides traction to involved leg. Inexpensive and easy to set up. Inexpensive, approximately \$15 - \$50.

Limitations: Patient cannot fully relax entire body as they are in single leg weight-bearing. May not be comfortable to stand on the other leg for any period of time, unable to perform in different positions as gravity will pull along the plane of their body. May be uncomfortable on ankle when using for more than a few minutes, unable to provide strong enough force (<400N) to produce meaningful capsular deformation/changes.



Mobilization Belt

Specifications: Long belt (72") that usually has a pad in one area that is approximately 12" in length.

Benefits: Inexpensive and great tool used by clinicians while performing joint mobilization to the patient in the clinic. Patients can use at home to provide self-traction in a weight-bearing position by wrapping around upper thigh and securing other end to support base/doorway, then leaning away. Can be a good tool if patient is looking for minor pain relief. Inexpensive, approximately \$20 - \$40 dollars.

Limitations: Patient is usually in weight-bearing position so cannot relax for meaningful level of traction. Typically used for lateral distraction and not long axis traction. Unable to provide level of force needed to make any meaningful changes to joint capsule (< 400N). No "give" in the material to build tension in the belt making it difficult to relax enough. Difficult to perform for over a few minutes.

HipTrac - Independent Long Axis Traction



Specifications: Portable hip traction device measuring 44" X 13" X 5", weighing 15 pounds, with wheels on case. Includes hand pump, knee and ankle bindings and foam pillow. It works on a specific impairment, capsular restriction at the hip joint.

Benefits: HipTrac replicates LAT as provided by the healthcare provider in the clinic, using a hand pump and pneumatic cylinder to create traction forces of 1 - 1000N (meaningful changes to joint capsule >400N). Can be used independently by patient, does not require assistance from another person. Relieves

pain and improves mobility in the same way as LAT performed by provider. Relief provided increases with consistent use. Appropriate for use with any condition in which the health care provider recommends/prescribes outpatient traction of the hip. Can be used on a bed or on the floor.

Limitations: Superior method of all the self-mobilizations listed due to its specificity to the hip joint and ability to generate forces needed to create meaningful changes to mobility, but also most expensive - \$125 per month to rent; \$895 to purchase.

Summary

As stated earlier, beginning conservative treatment with manual therapy by a physical therapist or other healthcare provider, works best by accumulating the effects 1-2 x per week for 3-8 weeks. The patient's mobility increases throughout the treatment period, however there is a slight rebound or stiffening between visits. This is normal and occurs regularly at varying amounts depending on the individual. Using the home mobilization options described above between visits can help stave off some of this natural rebound and potentially lead to improved outcomes sooner. Improved outcomes are related to the amount of traction force applied and the consistency of use between visits.

After discharge, use of these home mobilization options combined with specific therapeutic home exercises will provide individuals with some of the same combination of manual therapy and exercise they obtained in the clinic. The continued use will help in the retention of the improved outcomes they experienced.

A way to think about manual therapy is similar to what happens when a car breaks down. It needs to be pushed off the street and down to the mechanic. It takes a lot of energy and specific force to get the car moving from a standstill, but once it gets moving, it takes much less energy and specific force to keep it moving. Similarly, for hip OA, it is best to see the healthcare provider to do the heavy pushing to get the stiff hip moving, but then to use home mobilization options and home exercise program to keep it moving after discharge from the clinic.

Home manual therapy and therapeutic exercise will not eliminate the need for surgical intervention. As there is no cure for aging, the hip will continue to technically degenerate no matter what treatment is provided. This more complete care will simply improve the level of conservative care and quality of life during the natural gap between diagnosis *and* surgery. Many individuals are told by their orthopedic surgeon that they definitely have a problem related to hip OA, but are not bad enough for surgery yet. During this

period (as much as 3-6 years) is when patients reduce their activity level and increase their risk for expensive and life-threatening co-morbidities. Individuals can improve their functionality and quality of life prior to surgery, thus leading to improved physical health eliminating the extra risk for these co-morbidities, reducing medication usage and better preparing individuals for surgery when that times comes.

Research Conclusions

There are 8 main conclusions to be drawn from this paper:

1. There is, and will continue to be, a massive increase in the number of individuals suffering from OA secondary to aging and obesity.
2. More active and younger individuals are seeking treatment earlier. More than 50% are younger than 65.
3. This is a huge financial burden to the individual and federal health care system with over \$100 billion dollars already spent per year on OA treatment.
4. The majority of individuals (78%) seeking treatment for hip pain will not actually need surgery within 6 years, but will need some form of conservative treatment like physical therapy. However, there will still be a huge increase in the number of individuals requiring hip replacement surgery due to the increasing prevalence of hip OA overall.
5. There will be a significant shortage of surgeons to perform these surgeries in the near future due to decreasing reimbursements by payers. The payers will need to move towards a more evidence-based model as stated earlier or there will be a greater expenditure by the payers on narcotics/NSAIDS and other treatments.
6. Combining a variety of manual therapy techniques, home therapeutic exercises and home therapeutic devices, shows the greatest promise for effective and conservative treatment of Hip OA.
7. There is currently, and will continue to be, an enormous demand for any conservative treatment that can provide positive treatment outcomes while reducing costs for the patient, insurer and federal government.
8. Increased emphasis on manual therapy techniques, home therapeutic exercises and home therapeutic devices can positively impact the current overuse of opioids in the United States.

Current statistical analysis shows that there are already 24-30 million individuals in the United States alone with some form of personal disability related to hip osteoarthritis. The oldest of the “baby boomers”, which consist of 79 million individuals, turned 65 years old beginning January 1, 2011. In 2031, when the oldest will turn 85 years old,

there will still be 51 million “boomers” remaining.⁴³ With these staggering figures predicted in the next 20 years and the healthcare crisis that we are already facing, it is imperative that we create or expand any evidence-based, conservative treatment that can help improve outcomes and patient quality of life, while decreasing overall healthcare costs.

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