



Web-based Telehealth for Low Back Pain: Higher Quality of Care, Better Outcomes, and Lower Cost

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Introduction

Due to an incredible amount of pressure through the system, the healthcare industry is finding and adopting new ways to deliver care to more demanding, better-educated healthcare consumers. To the benefit of all stakeholders, individual healthcare providers and healthcare systems are employing “telehealth” technologies to more efficiently deliver and manage patient care. The use of telehealth is having a significant, positive impact on quality, cost-effectiveness, and the healthcare experience of individuals suffering from some of the most debilitating and costly conditions in this country. Providers and health systems are greatly benefiting by lowering the costs of delivering care and improving profitability while better serving the needs of their most important asset - the patient.

Telehealth, the marriage of technology and care delivery models, couldn't be better suited for low back pain (LBP), one of the country's most prevalent and costly conditions. What will be revealed in this white paper is not only that LBP is pervasive and over-medicalized, but is also one of the most preventable and treatable conditions, and one that can be treated effectively at significantly lower cost. For most cases, LBP is a relatively straightforward problem of posture, strength, and awareness. Unfortunately, the traditional care model for LBP is full of clinical and financial inefficiencies that drive up costs without a corresponding improvement in outcomes (Deyo 2007). Telehealth solves these problems by giving providers the capabilities they need to better support their patients and gives patients the personalized tools, information, and access to the professional guidance they need to more effectively self-manage their condition.

This white paper will address:

- The cost and prevalence of LBP
- The adoption and success of telehealth in treating costly conditions
- How telehealth is perfectly suited to treat LBP
- How telehealth empowers patients and enables better outcomes

Low Back Pain - Prevalence and Cost

"People with back problems cost 76 percent more on average than people without back problems each year" Brook Martin MPH, a leading research scientist in LBP at the University of Washington

In terms of costs, low back pain (LBP) is right up there with coronary heart failure COPD, asthma, and diabetes. The estimated cost of chronic diseases in the United States, including treatment and lost productivity in 2007 was \$1.7 trillion per year and is on track to more than double in the next decade (Andersson 1999). Unless this trend is reversed, by 2023 the cost will swell to \$4.2 trillion (Deyo 2007). LBP affects at least 80% of us some time in our lifetimes and 10% of us at any given time, which are roughly 33 million individuals. Unlike many conditions, it is usually recurrent (Wasiak 2009), and subsequent episodes tend to increase in severity and associated costs. When poorly managed, which is common in today's healthcare delivery model, it becomes chronic.

Low back pain is second only to upper respiratory problems as a symptom-related reason for visits to a physician (Andersson 1999 Hart 1995). In addition, once diagnosed, there is evidence of excessive imaging and surgery for low back pain in the United States (Carey 1996), and many experts believe the problem has been "over medicalized" (Hadler 1998) by treating it with expensive, invasive interventions that are of questionable value in terms of cost-effectiveness (Deyo 2001, Weinstein 2006). These interventions, including surgery, injections, and long term pharmaceutical use are generally ineffective, incur more risk, and are significantly more costly. Often, patients who receive these aforementioned interventions end up back in the emergency department (Deyo 2009).

Today, the yearly expenditures for this condition are roughly \$100 billion per year in direct and indirect costs and growing at about 8% per year. The cost of compensable low back pain was \$2,110 per episode back in 1986 (Webster 1990) and today the cost per episode is calculated at \$4,020 (Martin 2008). This figure does not include the average cost of lost worker productivity at \$1,900 per episode (AMA 2009).

Low Back Pain in the Workplace

Global estimates of work-related low back pain from the WHO World Health Survey show the prevalence was 38% of the total population and somewhat higher in wealthier countries at 42% (SangWoo 2006).

- Back pain is the most frequent cause of workers' compensation claims representing about 25% of all claims and about 33% of all compensation costs. It affects about 4.6% of the US workforce and is 2x more prevalent among white collar than blue collar workers (Anju 2005).
- This condition accounts for 40% of all sick time usage, second only to the common cold. As far back as 1990, In the United States, the direct healthcare cost for back pain was \$24.3 billion and the indirect cost in terms of productivity loss ranged from \$75-\$100 billion (Frymoyer 1991).
- Lumbar injuries result in approximately \$149 million in lost work days per year. Workers Compensation costs per low back pain episode were \$8,723 in 2002, adjusted at 8% growth/year

it is today roughly \$13,607, which includes CPI inflation for medical costs and CPI inflation for wage replacement benefits (Silverstein 2005).

The tremendous costs associated with LBP in the work place include lost productivity and work absenteeism, the expense of medical, rehabilitation and surgical interventions, and quality of life decline associated with disabling pain and limited daily function. The costs for treatment and compensation for LBP is greater than the total amount spent on all other industrial injury types combined (Rainville 2009).

Recurrent back pain in the workplace is very high and accounts for the greatest compounded expense of the condition. The rate of recurrent care seeking was 33.9% and individuals with recurrence had significantly higher total length of work disability and higher medical and indemnity costs. Individuals who have recurrences may be an especially important target for secondary prevention efforts to lower cost and improve productivity (Wasiak 2006).

Mechanical LBP is Most Common

Mechanical low back pain is the most common types of low back pain and makes up 97% of all types of low back pain. Non-specific low back conditions, such as lumbar sprain or strain and caused by acute injury, repetitive trauma, and poor posture during activities, make up greater than 70% of all cases (Deyo 2001). These non-specific low back conditions are precipitated in most patients by de-conditioning and poor strength of the deep stabilizing muscles of the spine, the “core” muscles (Richardson 1999, Hides 2001). Of these mechanical causes, 10% are due to age-related degenerative changes in disks and facets, 4% are due to herniated disks, 4% are due to osteoporotic compression fractures, and 3% are due to spinal stenosis. All other causes, such as cancer, account for less than 1% of cases (Deyo 2001).

The Definition of Telehealth and Telemedicine

“The future of medicine is telemedicine” C. Everett Koop, MD, ScD, former Surgeon General of the United States

The World Medical Association defines telemedicine as “the practice of medicine over a distance, in which interventions, diagnostics, treatment decisions, and recommendations are based on data, including voice and images, documents, and other information transmitted through a telecommunication system” (WMA 2010).

More broadly, telehealth can be described as the intersection between health and technology where healthcare is more accessible and convenient to patients, quality is raised, and costs are reduced. Telehealth can impact the entire range of activities that support and enable better patient health. Prevention, promotion, education, diagnostics, and treatment are all areas where providers using telehealth can play an important role (WMA 2010).

Health insurers, healthcare providers, and technology vendors are accelerating the use of telehealth solutions and services to make healthcare more accessible and convenient to patients, to raise quality of



care and to reduce costs (Herrick 2007). As telehealth and telemedicine programs become readily available, patients and providers will find that telehealth supports and improves many aspects of healthcare delivery and the business of healthcare.

Telehealth Drives High Quality, More Cost-Effective Care

"The fields of technology and medicine are constantly advancing, and Mayo Clinic Health Manager will continue to evolve so our users will always have the best health information and tools." Sidna Tulledge-Scheitel, Mayo Clinic Medical Director of Global Products and Services

Timely, accurate, and actionable information that can be shared via telehealth solutions is leading to significant cost-savings and healthier patients. Some examples are:

Automated Physiologic Monitoring

Collection of physiologic data can take a variety of forms. A recent study compared the effectiveness of daily self-monitoring with patients with Coronary heart failure (CHF) of weight, blood pressure, heart rate and oxygen saturation with home nurse visits. Physiologic monitoring was performed on patients in their homes with the information transmitted to a secure Internet site for review by the patients' cardiologists. There was a 40% reduction in heart failure admissions among the telemonitored group compared with the nurse home visit group. The daily cost of the telemonitoring intervention was reported to be \$2.87 and the 6 month cumulative readmission charges were \$223,638 in the telemonitoring group and \$500,343 in the group receiving nurse visits (Benatar 2003).

Patient Adherence and Cost

Research has shown that telemedicine can improve adherence to treatment protocols and increase convenience for patients with chronic ailments (Jan 2007). For example, patients with chronic obstructive pulmonary disease (COPD), researchers determined that telemedicine lowered readmission rates. Patients were trained in the use of an inhaler for drug therapy (to improve lung function) and the use of a spirometer to monitor airflow to and from their lungs. Of those monitored from home, only 49 percent were subsequently readmitted to a hospital compared to 67 percent of COPD patients who were not monitored remotely (Toledo 2006).



Evolving Care Delivery and Consumption Channels

Kaiser Permanente recently studied the impact of KP HealthConnect™, Kaiser Permanente's comprehensive health information system, on ambulatory patient care interactions. These included outpatient, urgent care and emergency department visits, scheduled telephone visits, and secure patient/provider email messaging. The study was based on Kaiser Permanente's 225,000 members in Hawaii and found that after the implementation of KP HealthConnect™ between 2004 and 2007, office visits per member decreased 26.2 percent, total scheduled telephone visits per member increased nearly 900 percent. Secure e-mail, which began in late 2005, increased nearly six-fold by 2007 (Chen 2009).

In addition to the convenience of fewer office visits and the benefits of faster resolution of health issues, e-mail messaging and scheduled telephone visits saved consumers the often overlooked out-of-pocket expenses for travel, parking, and time lost that would otherwise be spent at work or other pursuits (Reuters 2009).

Patient Satisfaction with Telehealth

Patient satisfaction with telemedicine is very high at 98.3% and for good reason (Gustke 2000). Reduced costs and more convenient access to personalized therapeutic content and provider guidance strongly encourage patients to adopt and utilize telehealth solutions.

A telepsychiatry study on patient satisfaction indicated “most consumers found that a video link with a psychiatrist moderately or greatly helped them in managing their treatment, with 98% of the preferring to be offered videoconferencing in combination with local services” (Janca, 2000).

Telehealth is safe, efficient, and convenient for both patients and providers. It is often cited as the method preferred by patients who demand timely access to their doctors. Many medical conditions and testing procedures do not require the physical presence of a physician or the time and expense of an office visit. Telehealth solutions answer the problems of cost, access, and convenience while achieving desired outcomes.

Telehealth solutions may in fact be the perfect vehicle to effect the greatest therapeutic change in patients and lower cost for all stakeholders. Telehealth closes the distance and collapses time between provider and patient and enables faster insight into the patient's condition, progress, and ongoing needs.

Key Factors – Achieving More Cost-Effective LBP Outcomes

“There is a vicious cycle in which uncoordinated care contributes to further patient suffering- both for lack of integrated approach at the provider level and from patients’ own lack of knowledge and skills to help themselves.” Dr. James Schibanoff, Editor-in-Chief Milliman Guidelines

Research clearly shows that people with low back pain get better faster and have less pain when they consistently participate in healthy activities and do specific exercises that promote a healthy spine. The key word is participation, but how do we get patients to participate? Patients are classically poor performing partners in their own healthcare. They often do not fully participate, nor take responsibility for their own health. Compounding this problem is the nature of our healthcare system, which fragments continuity of care. The misalignment of incentives for all stakeholders lends to episodic care where providers are financially rewarded by a fee-for-service compensation. The current system is not supported by research which shows that ongoing support, guidance, and communication from a healthcare provider helps people with back pain get better faster. Web-based telehealth enables a more collaborative provider/patient relationship, promotes patient self-management, and can facilitate more successful clinical outcomes in patients with LBP and many other types of musculoskeletal conditions.

Key components of telehealth that drive more successful and cost-effective outcomes are:

- Early intervention
- Patient participation
- Implementation of an active plan of care
- Provider/patient communication
- Shared decision making
- Use of evidence-based protocols
- Patient monitoring and feedback

Telehealth solutions that integrate the entire compliment of key components are perfectly suited to address musculoskeletal conditions, such as LBP, where patient participation plays a critical role in outcomes.

The Importance of Early Intervention on LBP Outcomes

Due to the nature and progression of low back conditions, there should be a greater attempt in orthopedic rehabilitation models to prevent acute low back pain patients from becoming chronic patients with greater disability. Research on early intervention clearly indicates that high-risk acute LBP subjects who received early intervention displayed statistically significant fewer indices of chronic pain disability on a wide range of work, healthcare utilization, medication use, and self-report pain variables relative to the high-risk subjects who do not receive such early intervention.

In addition, the high-risk non-intervention group displayed significantly more symptoms of chronic pain disability on these variables relative to the initially low-risk subjects. Cost-comparison savings data were

also evaluated. This data shows there are greater cost savings associated with the early intervention group versus the group that did not receive any early intervention (Gatchel 2003).

Logically, muscular support to the spine and function should be restored as soon as possible following an injury to the back. It is a common clinical belief and practice to prescribe rest and limited activities to individuals with acute LBP, which in the very short term, may prevent further injury (Kinkade 2007). In contrast to this standard approach, research shows that early motor training (specific strengthening exercises of the spine) is not harmful and very effective in returning proper function of the muscular system (Hides 1996). Early intervention and recovery from acute low back injury (defined as < 1 month) by training the deep spinal muscles can take only 2-3 weeks (Hides 1996), where as recovery from chronic low back pain (defined as >3 months) by training the deep spinal muscles can take 6-10 weeks. (O'Sullivan 1997). The evidence clearly shows that an early intervention approach giving patients an active and specific plan of care is safe and most effective.

Technology can also play a key role in early intervention shortly after care starts. The Cleveland Clinic and its patient-centric chronic care management program uses remote monitoring devices. These devices permit continuous health data transmission enabling its providers to adjust medications and therapeutic regimes on an ongoing basis. They have seen a reduction in hospitalizations, more robust health outcomes, and importantly, lower costs. Telehealth applications that allow for more real-time information to be shared between patient and provider as the condition changes can have a greater effect on the course of care, slow or halt the progression of disability, and promote a more timely resolution (Sarasohn-Kahn 2009).

The Value of Active vs. Passive Plans of LBP Care

"It is well established that the lifetime incidence of low back pain is extraordinarily high, but those who incur the majority of cost, both personally and financially, are the persons who suffer recurrent and persistent or chronic pain"

Carolyn Richardson, PhD Department of Physiotherapy, University of Queensland, Australia, Pioneer in spinal stabilization exercise and research

There is evidence that manual 'hands-on' therapy treatment methods used by physical therapists and chiropractors can be effective for the relief of pain and restoration of motion in the short term (Anderson 1992), but these treatment methods have not met the challenge of lessening persistent and recurrent episodes of low back pain (Richardson 1999). As a component of musculoskeletal physical therapy, the spinal stabilization program (specific low back exercises) is more effective than manually applied therapy in treating chronic low back disorder over time (Goldby 2006).

Further, research has identified that with acute first-episode low back pain and subsequent untreated chronic low back pain the deep stabilizing muscles of the spine are immediately inhibited leading to a cascade of inefficient spinal structure compensations (Hides 1996, Hodges 1996). Introducing an active exercise program that specifically reactivates and train these important supporting muscles of the spine is critical for the return of function and reduction in pain (Jull 2000).



Deficits in the spinal stabilizing muscles have been identified in acute LBP patients and do not resolve spontaneously on resolution of painful symptoms and resumption of normal activity. The relation between this deficit and recurrence rate was investigated in the long-term. Patients were compared given two different intervention strategies (Hides 2001).

One group intervention consisted of exercises aimed at rehabilitating the spinal stabilizing musculature. The other was “medically managed” that included advice and use of medications. 1 year and 3 years after treatment, telephone questionnaires were conducted with patients. 1 year after treatment, specific exercise group recurrence was 30%, and control group recurrence was 84%. 2 to 3 years after treatment, specific exercise group recurrence was 35%, and the medical management group recurrence was 75% (Hides 2001).

Long-term results suggest that specific exercise therapy in addition to medical management and resumption of normal activity may be more effective in reducing low back pain recurrences than medical management and normal activity alone (Hides 2001).

Given the impact of the problem, there is a need for effective treatment interventions and delivery models in occupational healthcare aimed at the prevention of chronic disability and the speedy return to work (Rainville 2009). In the currently fragmented, reactive model of care delivery where 98% healthcare spending goes toward treating illness and only about 2% toward prevention and wellness, a proactive, early intervention approach is needed when treating LBP. Individuals with chronic or recurring LBP often experience difficulties returning to work due to disability. Given the personal and financial cost of LBP, there is a need for effective interventions aimed at preventing LBP in the workplace. An extensive systematic review was conducted to examine the effectiveness of exercise in decreasing LBP incidence, LBP intensity, and the impact of LBP disability. There is strong evidence that exercise is effective in reducing the severity and activity interference from LBP. (Bell 2009)

Exercise is a widely prescribed treatment for chronic low back pain and has demonstrated effectiveness in improving function and work tolerance. Exercise is safe for individuals with back pain and does not increase the risk of future back injuries or work absence. Substantial evidence exists supporting the use of exercise as a therapeutic tool to improve impairments in back flexibility and strength. Most studies have observed improvements in global pain ratings after exercise programs and many have observed that exercise can lessen the behavioral, cognitive, affect and disability aspects of back pain syndromes (Rainville 2004).

Dynamic and engaging exercise prescriptions for low back pain can be much more effectively and efficiently delivered via web-based telehealth. Both provider and patients can provide more responsive feedback about the active plan of care, make modifications to facilitate progression, and achieve more successful outcomes.

Provider/Patient Communication Improves LBP Care

Where the rubber hits the road in achieving the best possible outcomes in patients with low back pain, or any condition for that matter, is the communication and trust that exists in the provider/patient relationship. Jane Sarasohn-Kahn has described in her white paper (*Participatory Health: Online and Mobile Tools Help Chronically Ill Manage Their Care*) the benefit of near-continuous monitoring and communication. She states, “consider the time patients are not interacting with a provider. This has been referred to ‘rest of the time’ and creates a perfect opportunity gap that online healthcare solutions and services can bridge”.

Positive, thorough, and clear communication is critical. Studies have shown a great impact on functional and return to work (RTW) patient outcomes when the patient felt their provider took their problem seriously, explained the condition clearly, tried to understand job requirements, and gave advice to prevent re-injury has. Additionally, employees with work-related LBP place a high value on provider counseling and education, especially during the acute stage (<1 month) of treatment (Shaw 2005).

Patients rate “conversations with my doctor” as the #1 most valuable source of healthcare information amongst all available sources. Patients place the most value on this type of communication because of the trust, authenticity, and satisfaction associated with it (Eldelman 2008).

Telehealth applications provide a convenient, effective environment for patients and their providers to communicate in a timely manner. Payers like CIGNA and Aetna began offering “e-visits” as early as 2003 and expanded their network nationwide in 2008 (Christopher 2008). They are seeing more convenient access for their members, more efficient and effective use of the physician’s time, and improved physician-patient communication.

Evidence-Based Protocols and LBP

“Good doctors use both individual clinical expertise and the best available external evidence, and neither alone is enough” D.L. Sackett M.D., author of *How to Practice and Teach EBM*

The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence to make the best clinical decisions and achieve optimal outcomes. There is a large body of interventional evidence looking at treatment guidelines for most medical and chronic musculoskeletal conditions. The evidence for treating both acute and chronic low back pain is clear and gives a simple roadmap to help patients get better in the most cost-effective way.

There is a strong correlation between adherence to evidence-based guidelines for active physical therapy care, clinical outcomes, and subsequent utilization (i.e. utilization of healthcare service 1 year after completion of physical therapy). Adherence to recommended active evidence-based care is associated with better clinical outcomes and decreased subsequent use of prescription medication, MRI, and injections. Patients receiving evidence-based care had fewer physical therapy visits with lower charges (a



mean difference of \$167), and greater improvement in pain and disability (Fritz 2008). Simply put, using evidence-based protocols improves the cost-effectiveness of care for acute LBP.

In addition, the use of an evidence-based care models lead to greater adherence, better outcomes, and lower costs for patients receiving workers' compensation (Fritz 2007). Web-based telehealth provides a dynamic vehicle to deliver and instruct patients in an active plan of care they can then participate in anytime, anywhere.

Facilitating Healthy Behavior, Monitoring Progress, and Feedback

“Doing remote monitoring is a great idea, but in and of itself it’s not enough. Feeding back to the patient immediately is also necessary. Tools that absorb data and present it to a back-end, like home monitoring, don’t close the loop.” Mark Blatt, M.D. Developer of Intel’s Health Guide

Patients need to adopt healthy and/or therapeutic behaviors to get better. Telehealth applications that incorporate patient participation and progress monitoring can have a great impact on behavioral change. When patients know they are being monitored they are made more accountable to themselves, the process, and their provider. Also, when they are given progress feedback by using outcome measure tools such as the Oswestry Disability Index, providers can make personalized refinements to care and patients can better understand the benefits of their behavioral change.

Programs to manage chronic medical conditions are beginning to use remote monitoring to keep patients safer and out of the ER, achieve better clinical outcomes, and facilitate healthy self-management behavior. These involve training patients to collect and transmit data on their condition and allowing them to receive physician feedback. Research has shown such monitoring not only can improve patients’ adherence to protocols, but improve desired outcomes. (Herrick 2007)

In particular, care delivery systems without feedback mechanisms linking the patient back to a clinician or health coach may be effective in improving interim outcomes, but are not likely to achieve longer-term benefits (Sarasohn-Kahn 2009). Given the right tools, the patient is the most important agent of health status change. Telehealth monitoring applications and devices provide the timely, behavior-changing feedback patients need to successfully impact outcomes and lower costs.

Telehealth – Patient Empowerment and Better LBP Outcomes

“People want to be empowered to self-monitor their health to ensure that they are following their doctor’s care plan” Sidna Tulledge-Scheitel, Mayo Clinic Medical Director of Global Products and Services

Patient empowerment, and the benefits that come with it, requires giving patients capabilities that are not readily supported in the traditional healthcare model. Web-based telehealth addresses these deficiencies and views patient-centric care and empowerment as critical to the achievement of better outcomes.

Patient Education

With the proper patient education, care providers can improve their patients' behaviors and help them become active participants in their own care, leading to an overall improvement in health and outcomes.

There is a vast amount of knowledge available on the Internet, which has led to dramatic changes in how people obtain information about health and medicine (Cristiano 2002). The number of "ehealth" consumers has more than doubled since 2002 reaching 146 million in the U.S. in 2008 (Manhattan Research 2008). Also, people with chronic health conditions, such as chronic LBP tend to use online health information more often than other adults (Fox 2009). For patients who are online and interested in understanding what's wrong with them and how to get better, it would seem important that the information they receive is credible and relevant to their specific condition, set of symptoms, and health needs. The Mayo Clinic and Cleveland Clinic make patient portals available in conjunction with their PHR and communication applications to provide the most up-to-date information and fully engage their growing number of participatory patients.

For the injured worker, education and counseling regarding pain management, physical activity, and exercise can reduce the number of days off work for employees with fear-avoidance beliefs and acute low back pain. Employees with acute low back injury and fear-avoidance beliefs are at risk for remaining off work for an extended period of time. A study looking at low back injury education found that injured workers with low back pain who are educated about their condition returned to regular work duties within 45 days compared to workers not in the education program. One third of the participants in the comparison group (no education) remained off work at 45 days. There was a statistically significant difference between the groups with regard to the number of days before returning to work (Godges 2007).

Patient education is an effective method to empower patients through a process of assessment, education and skill development. Quantitative and qualitative outcome measures, including decreased pain and improvement in quality of life, are significantly better for patients who participate in educational programs (Tavafian 2007).

There is also strong evidence that LBP patients can benefit from individualized biomechanical treatment/educational booklets, such as *Treat your Own Back*. Acute and even chronic LBP (patients with an average of 10.4 years of symptoms and extensive use of the medical system) greatly benefited after they finished reading the treatment booklet. 51.62% reported noticeable improvement in their pain. At a 9-month follow-up, there was statistically significant and clinically relevant improvement in reported pain magnitude, number of episodes, and perceived benefit. At an 18-month follow-up, these gains held or demonstrated even further improvement (Udermann 2004). This study's results suggest that the *Treat Your Own Back* book may have considerable efficacy in helping patients decrease their own low back pain and reduce the frequency of, or even eliminate, their recurrent episodes (Udermann 2004).

To better push health literacy information to patients, web-based and mobile telehealth platforms allow the sharing of relevant, clinically meaningful information that can be personalized to patients with low back pain. However, patient education should not be limited to just condition-specific articles, but also include other patient-centric data. David Cerino, general manager for the Consumer Health Solutions Group at Microsoft states, “when patients are armed with this information, such as their health data, performance, and outcomes, they are more engaged in their care and feel empowered by knowing the numbers” (Booz 2009)

The Fear Avoidance (FA) Problem

A potent and prevalent factor limiting a patient’s progression through a successful rehab program for low back pain is the fear of pain. Pain anticipated before and induced by physical activities has been shown to influence the physical performance of patients with chronic back pain and impede their confidence in overcoming discomfort and subsequent fear of pain doing their required activities. This perception of real or anticipated future pain is one primary reason patients with low back pain avoid physical activities and a return to daily activities, such as work. This is called ‘fear-avoidance’ which is a cognitive-behavioral problem that explains why a minority of acute low back pain sufferers develops a chronic pain problem (Leeuw 2007). It seems counter intuitive, but an exercise-oriented physical therapy program for chronic back pain can have a great effect on reducing anticipated and induced pain with physical activities. In addition, active programs improve physical performance levels and decrease global pain and disability ratings. These findings may help explain how exercise exerts a positive influence on chronic back pain and disability (Rainville 2004). It is also widely validated that patients with low physical activity (i.e. sedentary) have significantly higher scores in fear-avoidance beliefs and pain measures. It is critically important for physical therapists to measure levels of fear-avoidance beliefs and pain and is of real value for clinicians when making treatment decisions concerning physical exercise therapy for patients with chronic LBP (Elfving 2007).

Further research in a sub-set of FA known as kinesiophobia (fear of moving), which is a common component of acute and chronic low back pain, demonstrates that an education and quota-based exercise physical therapy program yields both clinically and statistically significant improvements in flexibility, strength, and lifting ability. The same degree of improvements in back pain, disability, and measures of kinesiophobia were also noted at discharge and maintained at 12-month follow-up. In this study, kinesiophobia decreased during an intensive physical therapy program in which exercises were performed in a quota-based manner. Following the successful performance of non-pain-contingent, quota-based exercise, patients' fears of injury lessened and this had a positive influence on disability (Keman 2007). Therefore, an active progressive plan of care is better than one that promotes rest and being sedentary.

Telehealth applications can support an increase in patient confidence and the competence necessary to effectively self-management their low back condition. Telehealth very effectively supports quota-based exercise plans where patients can be given progressively difficult online exercise programs to reduce symptoms and achieve desired outcomes. Because web-based telehealth can be used monitor a patient’s



progress at a distance and facilitate more immediate feedback, the therapist can respond appropriately and more immediately address any exhibited fear-avoidance behavior.

Goal Setting & Participation

Goal setting is a means by which provider can fully engage their patients and have them actively participate, measure progress, and improve the effectiveness of an active plan of care (Baker 2001). The Guide to Physical Therapist Practice recommends therapists should identify the patient's goals and objectives during the initial examination in order to maximize outcomes. A research study looked at the perceptions physical therapists and patients have of goal setting. Therapists stated they believed it is important to include patients in goal-setting activities and that outcomes will be improved if patients participate in the activity. Patients also indicated goal setting and participation is important. Goal setting in the clinical practice is a critical component of the care delivery process as it drives patient participation and adherence to practice guidelines (Baker 2001).

In a multitude of ways, telehealth applications provide the support necessary for patients to better participate. Given the opportunity, today's patient will collaborate with their healthcare provider to help define their treatment regimes and set meaningful attainable goals. Online collaboration through telehealth leads to more consistent, productive exchanges and gives insight to both parties that is not necessarily available with the traditional "office visit" model (Robert Wood Johnson Foundation 2009).

Promoting Patient Self-Management

"In our country, patients are the most under-utilized resource, and they have the most at stake. They want to be involved and they can be involved. Their participation will lead to better medical outcomes at lower costs with dramatically higher patient/customer satisfaction."

Charles Safran, M.D. President American Medical Informatics Association

Patient self-management is an essential element in modern and effective care models for treating chronic conditions, emphasizing the patient's central role in addition to provider/patient collaboration that should be continuous, tailored, and actionable (Sarasohn-Kahn 2009).

Exercises are the most common self-management strategy used in physical therapy and reported in the literature for the treatment of chronic low back pain (CLBP). Research suggests that CLBP patients could better manage their condition if they were given self-management education and self-management support in the form of direct access, review appointments, or follow up telephone calls by their provider (Cooper 2008). Telehealth technology is advancing the way patients consume the therapeutic plans providers can make available online. Paper-based tools and pictures are highly inefficient and do not lend to effective replication and thorough exercise performance which the evidence shows leads to the best long term outcomes for LBP. Web-based telehealth takes patient self-management far beyond exercise plans by including all the components discussed throughout this paper. Communication, monitoring and feedback, education, reminders, evidence-based guidelines, progress tracking, and collaborative goal



setting all play a role in patient self-management. They lead to an engaging, empowering healthcare experience that puts the patient in a position where they can effectively self-manage and achieve more successful, cost-effective low back pain outcomes.

Summary

Telehealth is not only here to stay, it's prevalence and scope will increase dramatically in the coming years. Why? Because telehealth addresses many of the core problems associated with healthcare today including cost, access, and quality. By eliminating geographic dependencies (i.e. telehealth is as close as a mobile device or computer) and making the healthcare experience more patient-centric, more participatory and cost-effective, low back pain care can flourish. Telehealth best facilitates evidence-based LBP care models that improve outcomes, are less disruptive in terms of diagnostic, pharmaceutical, and surgical interventions, and are more empowering for the patient.

Most importantly, when using web-based telehealth as an integral part of LBP care - all stakeholders win. Here's how:

1. Patients can have more convenient access to more engaging *and* cost-effective care.
2. Providers can better meet changing consumer demand, launch new revenue streams by providing innovative healthcare services, *and* deliver better outcomes.
3. Employers can reduce healthcare costs *and* provide more valuable healthcare benefits to their employees.
4. Insurers can reduce utilization of expensive interventions that have not shown to be cost-effective *and* increase member satisfaction.

Appendix

Highlights of Telehealth and Low Back Pain

- LBP affects at least 80% of us some time in our lifetimes and 20-30% of us at any given time which is roughly 33 million individuals. The yearly expenditure for this condition is roughly \$100 billion per year in direct and indirect costs and is growing at about 8% per year.
- The average cost per episode of LBP is \$4,020.
- Back pain is the most frequent cause of workers' compensation claims representing about 25% of all claims and about 33% of compensation costs. It affects over 4.6% of the U.S. workforce.
- Mechanical low back pain is the most common types of low back pain and makes up 97% of all types of low back pain. Non-specific low back conditions, such as lumbar sprain or strain make up greater than 70% of the overall condition caused by acute injury, repetitive trauma, and poor posture during activities. Telehealth solutions are safe and effective for the majority of LBP patients.
- Telehealth can be described as the intersection between health and technology used in innovative ways to make healthcare more conveniently accessible and cost-effective.
- Telehealth solutions have proven to have a significant impact on improving outcomes, raising quality, and lowering costs of care for many conditions. In coronary heart failure patients, there was a 40% reduction in heart failure admissions among telemonitored patients and more than a 50% reduction in costs.
- Spinal stabilization exercises are shown to be better than hands-on care for long term outcomes in patients with LBP. Using evidence- based active care protocols, recurrence rates drop to 30% from 84% and demonstrated greater improvements in pain and disability.
- Early intervention and recovery from acute low back injury by training the deep spinal muscles can take only 2-3 weeks whereas recovery from chronic low back pain can take 6-10 weeks with late or no training.
- The majority of LBP is a problem of posture, strength, and awareness. Telehealth solutions deliver to patients the tools, resources and information, and access to professional guidance needed to effectively self-manage this condition. LBP patients can get better quicker and at lower cost using telehealth solutions vs. relying on traditional care delivery models.
- 98.3% of patients who have used telehealth are satisfied with it.

References

American Telehealth Association (ATA 2009), <http://www.atmeda.org/news/definition.html>

Anderson, E. A Meta-analysis of Clinical Trials of Spinal Manipulation. *Journal of Manipulative and Physiological Therapeutics* 14:181-194 1992

Andersson GBJ. Epidemiologic Features of Chronic Low-Back Pain, *Lancet* 1999; 354:581-5.

Anju, G. Impact of Back Pain on Absenteeism, Productivity Loss, and Direct Healthcare Costs Using the Medical Expenditure Panel Survey (MEPS), University of Texas at Austin, December 2005

AARQ, presented by the U.S. Department of Health and Human Services, the Agency for Healthcare Research and Quality June 08, 2009

Baker SM, Patient Participation in Physical Therapy Goal Setting, *Physical Therapy*. 2001 May; 81(5):1118-26

Bell JA, Exercise for the Primary, Secondary and Tertiary Prevention of Low Back Pain in the Workplace: a Systematic Review, *Journal of Occupational Rehabilitation*. 2009 Mar;19(1):8-24. Epub 2009 Feb 14.

Brewer et al. (1995): A Brief Measure of Adherence During Sport Injury Rehabilitation Sessions. *Journal of Applied Sport Psychology* 8(Suppl): S161.

Benatar D, Bondmass M, Ghitelman J, Avitall B. Outcomes of Chronic Heart Failure. *Archives of Internal Medicine*. 2003;163:347–52.

Brook I. Martin, Trends in Health Care Expenditures, Utilization, and Health Status Among US Adults With Spine Problems, 1997-2006, *Spine*. 2009;34(19):2077-2084. © 2009 29-32

Christopher J., Take two and E-mail Me at Your Convenience. *AHIP Coverage*, July/August 2008

Carrino JA, Spinal Injection Procedures: Volume, Provider Distribution, and Reimbursement in the US Medicare Population from 1993 to 1999. *Radiology* 2002;225:723-9.

Chaudhry S, Telemonitoring for Patients with Chronic Heart Failure: A Systematic Review. *NIHJ Card Fail*. 2007 February; 13(1): 56–62. doi: 10.1016/j.cardfail.2006.09.001

Carey TS, Garrett J. North Carolina Back Pain Project: Patterns of Ordering Diagnostic tests for Patients with Acute Low Back Pain. *Ann Intern Med* 1996;125:807-14.

Center for Studying Health System Change. Financial and Health Burdens of Chronic Conditions Grow. Tracking Report No. 24, April 2009



Cooper K. Patients' Perceptions of Self-Management of Chronic low Back Pain: Evidence for enhancing patient education and support. *Physiotherapy*. 2009 Mar; 95(1):43-50. Epub 2008 Oct 23.

Cristiano Antonelli, Information and Communication Technologies and the Production, Distribution and Use of Knowledge, *International Journal of Technology Management*, Vol. 20, No. 1/2, 2000, pages 72-94.

Cusack, C.M., et al. "The Value of Provider-to-Provider Telehealth Technologies". Center for Information Technology Leadership:2007. www.citl.org/_pdf/CITL_Telehealth_Report.pdf.

Christine Martin, A Collaborative Policy Development Initiative of the California Telemedicine and eHealth Center January 2009: Major Findings and Recommendations of the California Telemedicine and eHealth Center Telehealth Optimization Initiative. California Telemedicine and eHealth Center Telehealth Optimization Initiative 2009

Chen C, The Kaiser Permanente Electronic Health Record: Transforming and streamlining modalities of care. *Health Aff (Millwood)*. 2009 Mar-Apr; 28(2):323-33.

Deyo RA, Weinstein JN. Low back pain. *N Engl J Med*. 2001;344 (5):363-70.

Deyo RA, Overtreating chronic back pain: time to back off? *J Am Board Fam Med* 2009;22:62-8.

Ebenbichler GR, Sensory-Motor Control of the Lower Back: implications for rehabilitation. *Med Sci Sports Exerc*. 2001 Nov;33(11):1889-98.

Elfving B, Low Levels of Physical Activity in Back Pain Patients are Associated with High Levels of Fear-Avoidance Beliefs and Pain Catastrophizing. *Physiother Res Int*. 2007 Mar;12(1):14-24.

Edelman. Health Engagement Barometer- Health Engagement in the Era of Public Influence. October 2008, www.engageinhealth.com

Frymoyer JW, Cats-Baril WL. An Overview of the Incidences and Costs of low Back Pain. *Orthopedic Clinical of North America* 1991;22:263-271.

Fritz JM, Physical Therapy for Acute low Back Pain: associations with subsequent healthcare costs. *Spine*. 2008 Jul 15;33(16):1800-5

Fritz JM, Does Adherence to the Guideline Recommendation for Active Treatments Improve the Quality of Care for Patients with Acute low Back Pain Delivered by Physical Therapists? *Med Care*. 2007 Oct;45(10):973-80.

Fox, S. The Social Life of Health Information. Pew Internet & American Life Project. June 11, 2009

Gingrich, N. Ph.D. Telephone Medical Consults Answer the Call for Accessible, Affordable and Convenient Healthcare, Center for Health Transformation, 2008



Goldby, A Randomized Controlled Trial Investigating the Efficiency of Musculoskeletal Physiotherapy on Chronic Low Back Disorder Spine. 1 May 2006 - Volume 31 - Issue 10 - pp 1083-1093 Randomized Trial

Gatchel R, Treatment- and Cost-Effectiveness of Early Intervention for Acute Low-Back Pain Patients: A One-Year Prospective Study, Journal of Occupational Rehabilitation Volume 13, Number 1 / March, 2003

Godges JJ, Effects of Education on Return-to-Work Status for People with Fear-Avoidance Beliefs and Acute low Back Pain. Phys Ther. 2008 Feb;88(2):231-9. Epub 2007 Dec 4.

Gustke, S.S., Balch, D.C., West, V.L., and Rogers, L.O. 2000. Patient satisfaction with telemedicine. *Telemedicine Journal* Spring 6(1): 5-13.

Hides JA, Multifidus Muscle Recovery is not Automatic after Resolution of Acute, First-Episode low Back Pain. Spine (Phila Pa 1976). 1996 Dec 1;21(23):2763-9.

Hides, JA, Long-Term Effects of Specific Stabilizing Exercises for First-Episode Low Back Pain Spine: 1 June 2001 - Volume 26 - Issue 11 - pp e243-e248. Exercise Physiology and Physical Exam

Hodges PW, Inefficient Muscular Stabilization of the Lumbar Spine Associated with low Back Pain. A motor control evaluation of transversus abdominis. Spine (Phila Pa 1976). 1996 Nov 15;21(22):2640-50.

Hart LG, Deyo RA, Cherkin DC. Physician Office Visits for low Back Pain: frequency, clinical evaluation, and treatment patterns from a U.S. national survey. Spine 1995;20:11-9.

Hadler NM, Carey TS. Low Back Pain: an intermittent and remittent predicament of life. Ann Rheum Dis 1998;57:1-2.

H R Guo, 1999 Back Pain Prevalence in US Industry and Estimates of Lost Workdays. American Journal of Public Health, Vol. 89, Issue 7 1029-1035, American Public Health Association.

Herrick Devon M. National Center for Policy Analysis Convenient Care and Telemedicine

NCPA Policy Report No. 305. November 2007, Web site: www.ncpa.org/pub/st/st305 National Center for Policy Analysis

Janca, 2000. Telepsychiatry: an update on technology and its implications. *Curr Op in Psych* 13: 591-7.

Jane Anderson (editor), "Use of Telemedicine Tools Grows within DM," *Disease Management News*, Vol. 12, No. 8, 2007.

Jull GA, Motor Control Problems in Patients with Spinal Pain: a new direction for therapeutic exercise. J Manipulative Physiol Ther. 2000 Feb;23(2):115-7.

Keller RB, Atlas SJ, Soule DN, Singer DE, Deyo RA. Relationship Between Rates and Outcomes of Operative Treatment for Lumbar Disc Herniation and Spinal Stenosis. J Bone Joint Surg Am 1999;81:752-62.



Kessler RC, Long-Term Trends in the use of Complimentary and Alternative Medical Therapies in the United States. *Ann Intern Med* 2001;135:262-8.

Kinkade S. Evaluation and Treatment of Acute low Back Pain. *Am Fam Physician*. 2007;75(8):1181-8.

Kernan T, Observed Outcomes Associated with a Quota-Based Exercise Approach on measures of Kinesiophobia in Patients with Chronic low Back Pain. *J Orthop Sports Phys Ther*. 2007 Nov;37(11):679-87

Luo X, Pietrobon R, Patterns and Trends in Opioid use Among Individuals with Back Pain in the United States. *Spine* 2004;29:884-90.

Leeuw M, The Fear-Avoidance Model of Musculoskeletal Pain: current state of scientific evidence. *J Behav Med*. 2007 Feb;30(1):77-94. Epub 2006 Dec 20.

Meyer, Brett C., et al. "Efficacy of Site-independent Telemedicine in the STroKE DOC trial: a randomized, blinded, prospective study." August 2008. www.thelancet.com/neurology.

Martin BI, 2008 *Expenditures and Health Status Among Adults with Back and Neck Problems*. *JAMA* 2008; 299:656–664.

Maetzel A, Li L. The economic burden of low back pain; a review of studies published between 1996 and 2001. *Best Pract. Res Clin Rheumatol* 2002; 16:23-30. National Pain Foundation Web site Source: Back and Neck Pain Overview (cost).

Osterweis M, Kleinman A, Mechanic D, eds. *Pain and Disability: clinical, behavioral, and public policy perspectives*. Washington, D.C.: National Academy Press, 1987.

Paula de Toledo, "Telemedicine Experience for Chronic Care in COPD," *IEEE Transactions on Information Technology in Biomedicine*, Vol. 10, No. 3, July 28, 2006, pages 567-73.

Philips National Study on the Future of Technology & Telehealth in Home Care. National Association for Home Care & Hospice. April 2008.

Pinnington MA, An Evaluation of Prompt Access to Physiotherapy in the Management of low Back Pain in Primary Care. *Fam Pract*. 2004 Aug;21(4):372-80.

Pennfield S, Toward Health Information Liquidity: Realization of better, More Efficient Care from the Free flow Health Information, Booz Allen Hamilton, January 2009

Rainville J, Exercise as a Treatment for Chronic low Back Pain. *Spine J*. 2004 Jan-Feb;4(1):106-15.

Rainville J. The Influence of Intense Exercise-based Physical Therapy Program on Back Pain Anticipated Before and Induced by Physical Activities, *Spine J*. 2004 Mar-Apr;4(2):176-83.]



Ross DeVol and Armen Bedroussian, "An Unhealthy America: The Economic Burden of Chronic Disease — Charting a New Course to Save Lives and Increase Productivity and Economic Growth," Milken Institute, October 2007.

Ren-Long Jan, "An Internet-Based Interactive Telemonitoring System for Improving Childhood Asthma Outcomes in Taiwan," *Telemedicine and e-Health*, Vol. 13, No. 3, June 2007, pages 257-68.

Riegel B, Effect of a Standardized Nurse Case-Management Telephone Intervention on Resource use in Patients with Chronic Heart Failure. *Archives of Internal Medicine*. 2002;162:705–12

Reuters, Kaiser Permanente Identifies Key Elements in Successful Health Care Information Technology...Tue Mar 10, 2009

Robert Wood Johnson Foundation, Project Health Design. Rethinking the Power and Potential of Personal Health records, June 2009

Satsuki Kawasaki, "Use of Telemedicine in Periodic Screening of Diabetic Retinopathy." *Telemedicine Journal and e-Health*, September 1, 2003.

Silverstein B, Work-related Musculoskeletal Disorders in the Neck, Back, and Upper Extremity in Washington State, 1994-2002. Summary of SHARP Program Technical Report Number 40-8a-2004, 2005

Swedlow A, Johnson G, Smithline N, Milstein A. Increased Costs and Rates of use in the California Workers' Compensation System as a Result of Self-Referral by Physicians. *N Engl J Med* 1992;327:1502-6.

SangWoo Tak, Global Estimates of Work-related low Back Pain from the WHO World Health Survey Global Perspectives in Occupational Health and Safety. The 134th Annual Meeting & Exposition (November 4-8, 2006) of APHA

Shaw WS, Perceptions of Provider Communication and Patient Satisfaction for Treatment of Acute low Back Pain. *J Occup Environ Med*. 2005 Oct;47(10):1036-43.

Sarasohn-Kahn, J Participatory Health: Online and Mobile Tools Help Chronically Ill Manage their Care. California Health Foundation. Sept. 2009

Schibanoff, J.M. A Prescription for Better Care of Chronic Diseases. Milliman Care Guidelines, November 1, 2006.

Susannah Fox, "Online Health Search 2006," Pew Charitable Trusts, Pew Internet and American Life Project, October 29, 2006.

Sheila F, Telemedicine MD Consultations: satisfaction rates and use patterns among working-age adults Mercer National Panel of HealthCare Senior Advisors, 2008 Mercer Health & Benefits LLC



Tavafian SS, Low Back Pain Education and Short Term Quality of Life: a randomized trial. BMC Musculoskelet Disord. 2007 Feb 28;8:21.

Tsao H, Persistence of Improvements in Postural Strategies Following Motor Control Training in People with Recurrent low Back Pain. J Electromyogr Kinesiol. 2008 Aug;18(4):559-67. Epub 2007 Mar 2.

Tokey, Sandra. Telemedicine: An Adjunct to Patient Care. Presentation at Home Telehealth & Remote Patient Monitoring, Philadelphia, Pennsylvania, January 22-23, 2009.

Udermann B, Can a Patient Educational Book Change Behavior and Reduce Pain in Chronic low Back Pain Patients. The Spine Journal Volume 4, Issue 4, July-August 2004, Pages 425-435

Visicu. "Critical Care without Walls eICU® Program and eCareMobile™." 2008.
www.visicu.com/products/index.html.

Webster BS, The Cost of Compensable low Back Pain. J Occup Med. 1990 Jan;32(1):13-5. Liberty Mutual Insurance Company, Hopkinton, MA 01748.

Wasiak, R. Back Pain Recurrence: An Evaluation of Existing Indicators and Direction for Future Research. Spine: 20 April 2009 - Volume 34 - Issue 9 - pp 970-977

Wasiak, Radoslaw, Work Disability and Costs Caused by Recurrence of Low Back Pain: Longer and More Costly Than in First Episodes. Spine: 15 January 2006 - Volume 31 - Issue 2 - pp 219-225

Waddell G. 1987 Volvo Award in Clinical Sciences: a new clinical model for the treatment of low-back pain. Spine 1987;12:632-44.

Weinstein JN, Tosteson TD, Lurie JD, et al. Surgical vs. Nonoperative Treatment for Lumbar Disk Herniation: the Spine Patient Outcomes Research Trial (SPORT): a randomized trial. JAMA. 2006;296(20):2441-50. WMA 2010, <http://www.wma.net/en/30publications/10policies/t5/index.html>