

from Research to Reality

Low Back Pain

**Impact of
Early MRI**

LIBERTY MUTUAL RESEARCH INSTITUTE FOR SAFETY

SCIENTIFIC UPDATE



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Acute Low Back Pain

MRI: Miracle Tool or Roadblock to Recovery?

MRI Research @ a Glance

Study: Despite research-based medical guidelines that recommend against early MRI testing in cases of acute low back pain, the practice is common in the U.S. LMRIS researchers seek to better understand the drivers and consequences of this practice on disability, recovery and return-to-work outcomes.

Methods: Researchers examined nationally representative workers compensation data for workers with acute, disabling low back pain. They compared outcomes among patients who received an early MRI (within 30 days of pain onset), those who received MRI later on and those who received no MRI.

Findings: One out of every five patients received an early MRI, even though there were no specific medical indications for this test. These patients were three times more likely to remain on disability than those who didn't have an MRI. They were also significantly more likely to incur potentially unnecessary medical services, including surgery.

Further data analysis indicated that early MRI scanning rates vary considerably among states.

Implications: Educating patients and providers about the prevalence of early MRIs and the potential negative impact of this practice on recovery may help promote better treatment decisions and better health outcomes.

Up to 80 percent of adults will experience a significant episode of low back pain at some point in their lives.¹ Acute low back pain is pain that comes on suddenly or gradually and lasts anywhere from a few days to several weeks. It is a leading cause of work disability.

At the Liberty Mutual Research Institute for Safety (LMRIS), disability researchers examine how various treatments impact patients' recovery and return to work after an episode of acute work-related low back pain. Findings help disability management professionals, caregivers and patients understand the best ways to return to health and full function.

Our latest research in this area focuses on the early use of MRI for patients with acute low back pain.

¹ Rubin DI. Epidemiology and risk factors for spine pain. *Neurologic Clinics*. 2007; 25(2):353-371. doi 17445733



LMRIS Investigates the Impact of Early MRI on Acute Low Back Pain Outcomes

Imagine: You reach down to lift a box. When you stand up again, something happens in your back — and it's painful. The next thing you know you are headed to the doctor for help. After you explain your symptoms, the doctor suggests conservative care — minimal bed rest, ice packs, over-the-counter pain medication and a gradual increase in physical activity. She suggests that you try to manage the pain and carry on with your daily activities as best you can.

A week later, you feel slightly better, but the pain persists. You return to the doctor seeking relief, and this time, she offers to order an MRI in an attempt to find out what's causing your pain. What do you do?

As a patient seeking answers to resolve your pain, you may be inclined to request an MRI, believing it will tell you exactly what's wrong. However, research suggests that in most cases of acute (sudden onset) low back pain, getting an early MRI can actually hinder your recovery.

MRI — Miracle Tool or Roadblock to Recovery?

“An MRI can seem like a miracle diagnostic tool,” explains Glenn Pransky, M.D., director of the Liberty Mutual Research Institute for Safety, Center for Disability Research. “The test is safer than an X-ray because there is no radiation. And it provides a picture of not just bones, but also soft tissues, disks, ligaments and the spinal canal.”

The downside? Age-related conditions such as bulging disks, degenerative disk changes and disk herniation are common in adults who have no back symptoms and typically do not correlate well with the development of pain. “For the vast majority of adults, the anomalies that show up on an MRI are not related to their back pain,” states Dr. Pransky.

The problem is that patients and their doctors often perceive these anomalies as the cause of the pain. That can lead them to pursue treatments that are neither necessary nor helpful. In the worst-case scenario, a patient might even undergo an invasive, expensive procedure, such as surgery, that carries significant risks yet does not lead to significant improvement — when conservative care would have been more effective.

“For the vast majority of adults, the anomalies that show up on an MRI are not related to their back pain.”

Dr. Glenn Pransky, Director
LMRIS Center for Disability Research

“There is a large body of medical evidence to suggest that low back pain will usually improve substantially on its own after a few weeks of conservative care,” notes Dr. Pransky. “The problem is when people hear that they have something like a herniated disk, it can be hard for them to let go of this information.”

To illustrate this phenomenon, Dr. Pransky cites a clinical study that compared the reactions of patients who received an MRI just after their first visit to the doctor for back pain. Half were randomly selected to receive their MRI results within 48 hours after testing, and the other half did not receive their results until six weeks later. Both groups were treated conservatively for their low back pain and both had similar, generally positive clinical outcomes. However, those who had gotten the MRI results early rated their overall health significantly lower than the others — even when doctors reassured them of the insignificance of the MRI findings.

“Several studies with similar findings suggest that obtaining an early MRI to assure patients is not an effective strategy and doesn't improve treatment outcomes,” says Dr. Pransky. “The anomalies that are commonly detected in MRI evaluations often lead to greater concerns and decreased sense of well-being but do not enhance the effectiveness of treatment.”

All this doesn't mean an MRI is always a bad idea. Evidence-based medical guidelines suggest that, after a monthlong trial of conservative treatment, an MRI may then be considered if symptoms of sciatica/radiculopathy persist, but only to guide epidural steroid injections or to provide more information if surgery is being contemplated. These same guidelines recommend against early MRI except for “red flag” indications, such as severe trauma, infection or cancer.

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Impact of Early MRI on Risk for Subsequent Medical Procedures

MRI Groups by Severity	Risk Ratio			
	Injections	EMG*/ NCV**	Advanced Imaging	Surgery
No MRI low severity (n=1,546)	Ref.	Ref.	Ref.	Ref.
No MRI high severity (n=271)	2.70	4.59	0.48	1.64
Early MRI low severity (n=458)	27.40	38.08	17.81	28.35
Early MRI high severity (n=324)	32.70	54.89	20.53	33.80

*Table 1 shows the relative risk (RR) of having a procedure as compared to the no-MRI, low severity group (referent). Low severity cases include diagnoses more commonly associated with sprain, strain, nonspecific pain, etc; high severity cases include other diagnoses including radiculopathy, spondylolisthesis, etc. *EMG = electromyography **NCV = nerve conduction velocity*

for a number of clinical and demographic factors that influence these outcomes. These early MRI patients also had far greater medical costs, averaging more than \$12,000 higher than those of non-MRI patients.

In a subsequent data analysis, researchers followed medical treatments received by these patients over a two-year period. They divided cases in the study into low severity and high severity, based on the diagnoses patients received in the first 15 days of treatment and understanding

Impact of Early MRI in the Workplace

To explore the use of MRI in cases of work-related acute low back pain, LMRIS researchers examined a large nationally representative sample of U.S. workers compensation claims. They extracted data from more than 3,000 lost-time acute low back pain claims filed over the course of one year and purged the data of cases that included red flags or concurrent conditions that might justify early MRI. Then researchers compared treatment outcomes among two groups of claimants: those who received an early MRI (within 30 days of pain onset) and those who received no MRI.

that these cases would not have been recommended for an early MRI according to the guidelines. Researchers found that those patients who had received an early MRI were significantly more likely to incur expensive and potentially unnecessary medical services (electromyography, nerve conduction testing, advanced imaging injections and surgery) within six months post-MRI than their non-MRI counterparts. [See Table 1.]

The study also revealed that, among those who received an early MRI that would not be recommended by the guidelines, one out of five went on to have surgery. "That's a big problem, given the risks and uncertain benefit associated with surgery. It's important that we educate patients and providers so that unnecessary and unhelpful procedures and surgeries can be avoided," notes Dr. Pransky.

Early MRI recipients were three times more likely to remain on disability than those who didn't have an MRI.

The findings were staggering. Of the more than 3,000 acute low back pain cases studied, 20 percent — or one out of every five people — received an early MRI, even though there were no red flags or other indications justifying it. "Given the medical guidelines and research results that recommend against this practice, we were concerned about the high percentage of early MRIs being prescribed among these injured workers," states Dr. Pransky.

Researchers conducted further analyses of the data to explore the subsequent effects of these tests on workers and their employers. They found that early MRI recipients were three times more likely to remain on disability than those who didn't have an MRI, even after controlling

State Variations in Early MRI Prescribing

To further understand the impact of early MRI prescribing and what might be contributing to it, LMRIS researchers conducted a study of state-by-state variations. "We knew that in certain states, like Texas, MRIs were being ordered for work-related acute low back pain at a higher rate than in other states — but we didn't know how that geographic variation really played out, or what might be behind it," explains Dr. Pransky.

To investigate these questions, researchers examined more than 18,000 U.S. workers compensation claims (from 2002 to 2007) involving workers with acute low back pain and lost time from work. They excluded recurrent or chronic cases, trauma, hospitalizations, red flags, and concurrent disease; identified early MRI cases; and grouped all cases by state. Researchers examined within- and between-state variability of the six highest and six lowest early MRI utilization states.

Early MRI by State and Severity

	Low-Rate States						High-Rate States						
Severity	CA	CT	HI	MA	NH	VT	AR	FL	GA	NC	PA	TX	All
Low severity % with early MRI	9.8	11.9	4.2	13.8	13.4	2.2	53.3	46.8	39.1	41.3	42.1	32.5	21.5
High severity % with early MRI	40.7	40.7	17.4	35.7	31.3	20.8	69.0	77.0	62.3	62.9	64.6	66.2	52.5

Table 2 shows differences in percentage of low back pain cases receiving early MRI by state and severity, comparing the six states with the lowest rate of early MRI to the six states with the highest rate of early MRI.

The study found a wide variation in early MRI scanning, with the overall lowest rates in Vermont and the overall highest rates in Arkansas. [See Table 2.]

Higher rates of MRI prescribing correlated strongly with two state-level factors: low state median income and increased availability of nonhospital, freestanding MRI sites. State rates per capita of physicians, orthopedic surgeons, malpractice premiums, level of workers compensation indemnity payments and state cost containment and medical management policies were unrelated to these state differences.

The two significant state-level factors accounted for 84 percent of the between-state variability and 12.5 percent of the overall variability in early MRI prescribing. “That means that these two factors have a huge impact on the rate of medically inappropriate early MRI scanning, not just at the state level but at the individual level as well,” notes Dr. Pransky. “Based on prior studies, the low-rate states represent medical practices that are more likely to be consistent with established guidelines for care.”

Knowledge Is Power

LMRIS findings on the consequences of early MRI and the state variations in prescribing the scans suggest the most important course of action is education for both physicians and patients. “Physicians need to be informed about the potential negative consequences of ordering an early MRI, and they need to know how to effectively address requests for early diagnostic testing,” says Dr. Pransky.

“Patients need to know that most often, low back pain will resolve on its own with conservative treatment, that having an early MRI can put them on track for unnecessary treatments and give them a false sense that something is seriously wrong with their back. In the end, getting an early MRI for acute low back pain won’t help and may even impede their recovery, ultimately doing more harm than good.”

Relevant Publications:

Webster, B. S., Bauer, A. Z., Choi, Y., Cifuentes, M., & Pransky, G. (2013). Iatrogenic Consequences of Early MRI in Acute Work-Related Disabling Low Back Pain. *Spine*. 38(22), 1939-1946. doi: 10.1097/BRS.0b013e3182a42eb6. ►

Webster, B.S., Choi, Y., Bauer, A.Z., Cifuentes, M. & Pransky, G. (2014). The cascade of medical services and associated longitudinal costs due to non-adherent MRI for low back pain. *Spine*. 39(17), 1433-1440. doi: 10.1097/BRS.0000000000000408. ►

Pransky, G., Foley, G., Cifuentes, M., & Webster, B. S. (2015). Geographic Variation in Early MRI for Acute Work-Related Low Back Pain and Associated Factors. *Spine*. 40(21), 1712-1718. doi: 10.1097/BRS.0000000000001124. ►



Research to Reality

Using Science to Improve Disability Outcomes

Acute low back pain is a significant workplace safety issue. It is one of the most common conditions that occupational medicine and primary care providers encounter and a leading cause of work-related disability. The ability to effectively manage acute low back pain is important for patients, providers, companies and society in general.

At LMRIS, disability researchers study acute low back pain treatments and assess their impact on patient recovery, disability and return-to-work outcomes. Findings are used to help improve recommendations and protocols for acute low back pain treatment.

We recently interviewed National Medical Director Dr. Will Gaines to learn how Liberty Mutual's Managed Care organization uses the Institute's early MRI research findings to help injured workers and employers achieve better medical and return-to-work outcomes.

What is the function of Liberty Mutual's Managed Care organization?

Managed Care is committed to achieving the best medical and return-to-work outcomes for injured workers and their employers. We have a dedicated field staff of more than 300 nurse case managers, 55 vocational rehabilitation consultants and nine on-staff physicians who work closely with Liberty Mutual's claims team to provide the input for injured workers to have access to the best-quality, evidence-based care.

What is evidence-based care, and why is it important for treating acute low back pain?

Evidence-based care means that treatment recommendations are rooted in scientific findings. This approach helps get people back to work in a clinically sound and resource-effective way that maximizes functional recovery and minimizes treatment complications. This is very important not only for the individual workers and their families but also for employers.

For more than 20 years there have been national and international evidence-based medical guidelines about how to manage low back pain. What the Research Institute has done is built upon this work, providing additional scientific knowledge specific to work-related acute low back pain.

The Institute's findings have had a major impact on Managed Care recommendations for acute low back pain and have helped improve patient recovery outcomes.

What do we now know about early MRI from LMRIS research that we didn't know before?

We knew that degenerative conditions that show up on an MRI — such as bulging or herniated disks — are common in asymptomatic adults. And we knew that generally speaking, when people become aware of these conditions, they associate them with their low back pain, and that this can lead to unnecessary and unhelpful treatments.

The Research Institute provided solid evidence to confirm that for workers with acute low back pain, getting an MRI too soon can lead to unnecessary and sometimes high-risk treatments, increase disability, and may ultimately hurt people. We can now point to this evidence to show that unless there are objective clinical reasons to get an MRI, there is no good reason to do it. The vast majority of these cases will resolve on their own with conservative care.

How does the Managed Care team use this evidence to improve care for injured workers?

Our team uses the research to educate employees, employers, medical providers and the general public about the possible negative consequences of early MRI.

Internally, we use the research in discussions with our nurse case managers and claims teams to reinforce why early MRI is a problem and to explain why our guidelines and protocols recommend against it.

We also use the research to educate our external business stakeholders who sometimes think that because MRI machines are easy to access, they need to be used for all low back pain. I've had employers ask, "Why shouldn't my workers get an MRI when they have hurt their backs?" The Institute's findings provide further evidence to discuss with them that unless the employee has objective, serious physical exam findings or a clear history of serious back problems, getting an MRI isn't going to help. It's going to make things worse. It would be doing injured workers a disservice by opening them up to care that they otherwise never would have needed.

What would your advice be to a medical provider regarding early MRI for an episode of acute low back pain?

Our mantra is "Treat the patient, not the picture." Or in this case, treat the injured worker, not the MRI picture.

If you order MRI early, there is a tendency to treat the picture rather than the patient. When that happens, needless — and in some cases dangerous — things happen to patients that lead to more disability and poorer outcomes. That doesn't help anybody.

"Treat the patient, not the picture. Or in this case, treat the injured worker, not the MRI picture."

Dr. Will Gaines
National Medical Director
Liberty Mutual Managed Care

5 *Facts you should know about MRI and Low Back Pain*

- 1 Medical guidelines suggest four weeks of conservative treatment following onset of acute low back pain, unless there are signs of infection, severe trauma or cancer.
- 2 Disk "abnormalities" that appear on MRIs are common in adults and typically not related to pain.
- 3 Early MRIs can lead to unnecessary medical treatments that can hinder recovery.
- 4 Workers who get an early MRI for acute low back pain are three times more likely to remain on disability than those who don't receive an MRI.
- 5 Depending on which state patients live in, the likelihood of their receiving an MRI for acute low back pain can vary.



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