

**The Budget Impact of Hydrodiscectomy versus Open Discectomy for Patients with Contained Herniated Discs**

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DRAFT

**Key words:** Lumbar disc herniation, lower back pain, open discectomy, Hydrodiscectomy, SpineJet, budget impact

**Abstract** (250 words)

**Background:** Lumbar disc herniation results in significant pain and leads to approximately 300,000 surgical discectomies annually in the United States. While surgical discectomies have been found to be effective at relieving pain in patients with uncontained disc herniations, patients with contained disc herniations do not receive the same benefit. Clinical studies have demonstrated that a minimally invasive Hydrodiscectomy approach is more effective in this patient population. This analysis sought to understand the cost impact of treating patients with contained herniated discs with Hydrodiscectomy as compared to open discectomy.

**Objectives:**

A budget impact model was constructed comparing Hydrodiscectomy to open discectomy or ongoing symptomatic care over two years. The model leveraged clinical studies of surgical management for contained herniated discs to predict the likelihood of pain relief and subsequent treatments. Costs were taken from the literature and from 2013 US DRG and CPT Medicare reimbursement rates.

**Results:** Hydrodiscectomy is a less expensive procedure with a higher success rate in alleviating pain in patients with contained herniated discs, compared to open discectomy. At 2 years post-procedure, total costs, including initial medical management, procedure and subsequent treatments, were \$13,897 for Hydrodiscectomy versus \$24,181 for open discectomy. An average of \$10,284 may be saved per patient when referring patients with contained herniated discs to Hydrodiscectomy as first line therapy.

**Conclusions:** Hydrodiscectomy is a minimally invasive approach to relieving lower back pain. When used in appropriate patients in place of open discectomy it is likely cost saving both in the short-term and over 2 years.

## Introduction

Lumbar disc herniation, defined as protrusions of the nucleus pulposus from the intervertebral disc, is one of the leading causes of lower back pain that leads to surgical intervention. Inflammation resulting from lumbar disc herniation causes local pressure on the spinal nerve roots and leads to significant pain for affected patients.<sup>1</sup> Five percent (5.1%) of men and 3.7% of women, predominantly in the 30-50 year age range,<sup>2</sup> suffer from symptomatic lumbar disc herniations over their lifetimes.<sup>3</sup> As a result, approximately 300,000 US-based surgical discectomies are performed annually.

Surgical discectomy, defined as either open or microdiscectomy, has been the primary surgical treatment used in patients who present with lumbar disc herniations that have not been responsive to conservative therapy (physical therapy, steroid injections, pain medication, and chiropractic care). It is performed through an incision in the midline of the lower back. A small portion of the bone (lamina) over the nerve root and/or disc material from under the nerve root is removed to relieve neural impingement. The procedure is performed under general anesthesia and involves both muscle and ligament trauma as well as nerve root manipulation. Surgical discectomy typically takes place in the inpatient setting, and requires a 4 to 6 weeks post-operative recovery period.

In addition to surgical discectomy, percutaneous disc decompression approaches exist. Minimally invasive percutaneous approaches to nucleus pulposus removal were first reported in 1975.<sup>4</sup> Since then, several different minimally invasive techniques have been introduced, including various automated percutaneous mechanical disc decompression techniques, lumbar laser discectomy, and Coblation® Nucleoplasty®. Percutaneous discectomy involves a more lateral (discography or Kambin Triangle) approach to the disc and targets the disc nucleus with the goal of reducing intradiscal pressure, thereby reducing neural impingement. This technique is most often performed in the outpatient setting under local anesthesia and is considerably less invasive than surgical discectomy. The benefits of percutaneous disc decompression versus surgical discectomy include the use of local instead of general anesthesia, no muscle trauma, no bone removal, no nerve root manipulation, and no sutures, all of which allow for a more rapid patient recovery period.

There are two general categories of percutaneous disc decompression: those that employ thermal energy sources (laser, Coblation, or radiofrequency) and those that involve automated mechanical methods of reducing intradiscal pressure. One of the latest forms of automated mechanical techniques for the percutaneous approach is called Hydrodiscectomy®. Hydrodiscectomy utilizes a high-speed non-thermal saline stream to remove approximately 2 to 3 grams of disc nucleus, thereby relieving the nerve pressure that causes back and leg pain. It generates the power equivalent to laser and radio frequency technologies without causing heat damage to surrounding tissues and structures. The procedure is performed under local anesthesia and conscious sedation.

Hydrodiscectomy differs from thermal discectomy in two important ways. First, it uses highly pressurized non-thermal water rather than heat energy. Secondly, unlike thermal techniques which only ablate tissue, Hydrodiscectomy utilizes a mechanical approach to remove tissue that is creating pressure on existing nerves. A study which measured the weight of removed tissue concluded that an average of 0.75 grams of tissue from the disc nucleus is removed per minute during a Hydrodiscectomy procedure.<sup>7</sup> Hydrodiscectomy has been shown to be an effective treatment for a certain category of disc herniation.

Disc herniations are generally categorized as contained or non-contained. Contained herniations are defined as those that are intact and within the disc annulus while non-contained consist of those that are extruded or sequestered outside of the posterior longitudinal ligament. Approximately 15% of all open and microdiscectomy surgeries are performed on patients with contained herniated discs. Initially, these patients are managed with conservative treatment. Conservative therapies include, rest, physical therapy, pharmacotherapy, epidural steroid injections, and chiropractic care. Patients who continue to experience neurologic signs or symptoms of disc herniations that have been confirmed by magnetic resonance imaging (MRI) are considered candidates for surgical intervention.

Although broad payer coverage currently exists for surgical discectomy, the evidence does not support its use for patients with contained disc herniations. While a 2001 study concluded that surgical discectomy is more effective than percutaneous disc decompression in relieving general lower back pain<sup>5</sup>, patients with contained herniated discs do not receive the same benefit. A study by Carragee and colleagues found that surgical discectomy had a 99% success rate in patients with a small annular defect and protruding pulposus, while only 62% of patients with contained disc herniations undergoing surgical discectomy achieved back pain relief.<sup>6</sup>

Conversely, clinical studies of Hydrodiscectomy have found favorable clinical results in this specific patient population. Most recently, Hardenbrook et al published results on clinical outcomes of patients with contained lumbar disc herniation treated with Hydrodiscectomy.<sup>7</sup> The authors conducted a retrospective review of 50 patients with a diagnosis of confirmed subligamentous lumbar disc herniation by MRI who had undergone Hydrodiscectomy at six centers between August 2008 and May 2012. These patients were considered candidates for surgical discectomy, but elected percutaneous Hydrodiscectomy. All patients had documented conservative therapy failure.

Forty-seven of 50 (94%) patients improved following the Hydrodiscectomy, and three patients reported no change in symptoms. Seven of the 47 patients with initial improvement in symptoms experienced recurrence of symptoms, three with recurrent herniations and four with a gradual return of pain symptoms on average one year following the procedure. In total, six patients (12%) went on to receive surgical discectomy following Hydrodiscectomy.

Other studies of Hydrodiscectomy have found success rates as high as 98.6% out to nine months of follow-up,<sup>8</sup> 92% procedural effectiveness evaluated at 5.5 months,<sup>9</sup> and 88% procedural success at six months with 90% of patients returning to work in less than two weeks.<sup>10</sup>

While clinical evidence indicates that Hydrodiscectomy is an excellent solution for patients with contained herniated discs, a lack of coverage exists for this procedure stemming from two events which occurred prior to its introduction in 2009. In 2007, Cochrane published an update to its 1999 review of surgical interventions for lumbar disc prolapse.<sup>11</sup> The review considered 40 randomized controlled trials and concluded that the evidence for percutaneous disc decompression remained unclear.

The following year, the Centers for Medicare & Medicaid (CMS) issued a non-coverage decision (NCD) for percutaneous thermal based disc decompression techniques.<sup>12</sup> The non-coverage decision specifically defines the scope as “percutaneous intradiscal techniques utilizing devices that employ the use of a radiofrequency energy source or electrothermal energy to apply or create heat.” The decision was based on a review of the clinical literature which determined there was insufficient evidence that thermal techniques remove the tissue which is causing neurologic pain. The decision however preserved coverage for mechanical means of disc decompression. As a result of that NCD by CMS, most private health insurers categorically decline to cover all techniques that fall under the umbrella of percutaneous disc decompression approaches, even though Hydrodiscectomy fits well within the definition of a non-thermal, mechanical means of disc decompression.

In addition to the lack of general coverage, the insufficient level of reimbursement has created a disincentive for hospitals to offer the Hydrodiscectomy procedure. The combination of coverage hurdles and insufficient reimbursement results in patients with contained herniated discs being denied access to the most effective treatment.

In order to address these barriers, analyses of both the clinical and cost impact of Hydrodiscectomy are needed to support coverage and payment decisions for use of this procedure in patients with contained herniated discs. To date, no study has been undertaken to evaluate the cost impact of this procedure in this specific patient sub-group. Hence, this study sought to explore the cost implications of providing Hydrodiscectomy to patients with contained herniated discs as compared to either symptom management or surgical discectomy.

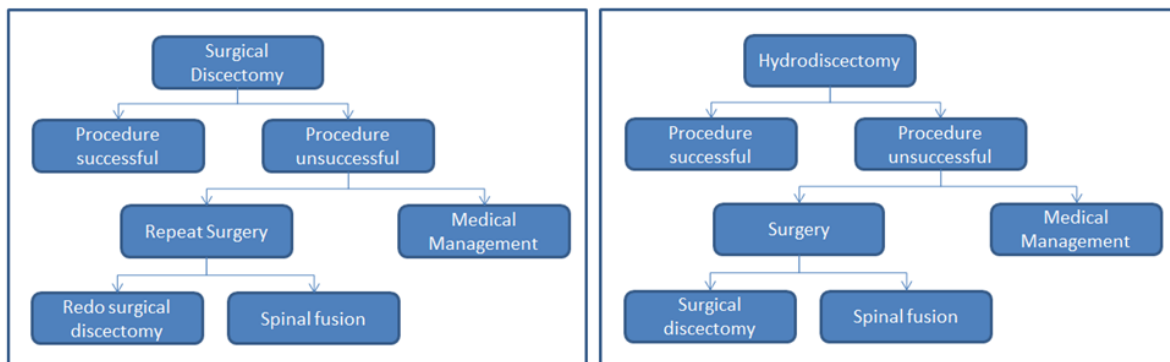
## **Methods**

### Model Overview

A budget impact model was constructed in Microsoft Excel (Microsoft, Redmond, WA, USA) which compared the costs of conservative care, surgical discectomy and Hydrodiscectomy for patients with contained herniated discs over 2 years.

The model assumes all patients have undergone a course of conservative care that has not improved their symptoms. Forty-five thousand patients, which represents the estimated annual number of Americans with contained disc herniations who receive surgical discectomy, begin the model by electing to undergo a procedure to resolve back pain, either surgical discectomy or Hydrodiscectomy, or by refusing an intervention and opting to continue conservative medical management to address back pain.

Following a procedure, patients can be pain free and thus, the procedure is considered successful, or can continue to experience back and/or leg pain, in which case the procedure is considered unsuccessful and further treatment is needed. Patients receiving unsuccessful surgical discectomy can opt for a repeat surgery, either surgical discectomy or spinal fusion, or to follow conservative management. Similarly, patients receiving an unsuccessful Hydrodiscectomy can opt to undergo a surgical discectomy or to follow conservative medical management.



**Figure 1. Model schematics of surgical discectomy and Hydrodiscectomy**

Clinical Inputs

Clinical inputs were derived from the literature. Probabilities for initial procedure success and follow-up treatments are shown in Table 1 below.

| Input   | Probability | Source            |
|---|-------------|-------------------|
| Hydrodiscectomy procedure success for contained disc herniation | 0.80        | Hardenbrook 20137 |

|  |      |                               |
|--|------|-------------------------------|
| Open discectomy procedure success rate for contained disc herniation | 0.62 | Carragee 2003 <sup>6</sup>    |
| Repeat surgery after open discectomy failure                         | 0.14 | Sherman 2010 <sup>13</sup>    |
| Medical management after open discectomy failure                     | 0.24 | Sherman 2010 <sup>13</sup>    |
| Open discectomy after failed Hydrodiscectomy                         | 0.12 | Hardenbrook 2013 <sup>7</sup> |
| Medical management after failed Hydrodiscectomy                      | 0.08 | Hardenbrook 2013 <sup>7</sup> |
| Repeat surgery is spinal fusion                                      | 0.20 | Sherman 2010 <sup>13</sup>    |
| Repeat surgery is open discectomy                                    | 0.80 | Sherman 2010 <sup>13</sup>    |
| Surgical complications during repeat surgery                         | 0.17 | Sherman 2010 <sup>13</sup>    |

**Table 1. Clinical probabilities for initial and follow-up treatments**

Cost Inputs

A 2009 study by Sherman et al on the economics of unfavorable outcomes following lumbar discectomy was used to inform cost assumptions. The study utilized a claims database to assess the use of resources including MRI, CT, injections and medications following failed open discectomy.

Cost inputs were taken from 2013 US CPT and DRG-specific reimbursement rates from CMS, based on a national average reimbursement, and from the literature. All costs were normalized to 2013 values. Component and total costs for initial conservative treatment are shown in Table 2 below and include the steps usually taken in initial evaluation and treatment of patients with lower back pain. These include: initial office visit, x-ray and MRI, one follow-up office visit, medications to manage pain and physical therapy at the Medicare allowable amount of \$1900.

Component and total costs for second line treatment, following failed conservative therapy are shown in Table 3 below and include surgical discectomy, Hydrodiscectomy or continued medical management. For surgical discectomy these included: physician fees, hospital fees and anesthesia fees for the procedure itself plus a course of physical therapy following the procedure. An assumption was made regarding the total cost of the Hydrodiscectomy procedure. Facilities are

currently reimbursed for Hydrodiscectomy at \$1,500, a rate which is too low to capture the cost of the SpineJet® device (Hydrocision Inc., Billerica, MA) used in the procedure and thus leading to negative revenue for the facility. This model has therefore assumed a total reimbursement of \$4,200 (professional and facility combined) for Hydrodiscectomy, which reflects a rate likely to make this procedure revenue positive for facilities and thus encourage its use for appropriate patients.

Many patients will decline a procedure to treat back pain and instead opt for ongoing medical management. These patients incur costs for medications to manage pain, several follow-up office visits with a physician and treatments with a chiropractor and/or physical therapist.

**Conservative Therapy**

| Service (quantity)                    | Cost per service | Percent of patients receiving | Source  |
|---------------------------------------|------------------|-------------------------------|---|
| Initial Office Visit (1)              | \$108            | 100%                          | CPT: 99203 <sup>14</sup>  |
| Follow-up visits (1)                  | \$73             | 100%                          | CPT: 99213 <sup>14</sup>  |
| Medications                           | \$322            | 100%                          | 13  |
| Xray (1)                              | \$66             | 100%                          | CPT: 72114  |
| MRI (1)                               | \$1,258          | 100%                          | Sherman 2010 <sup>13</sup>  |
| Physical Therapy                      | \$1,900          | 100%                          | CPT Codes: 97001, 97110, 97002, 97014 <sup>14</sup><br><br>Medicare therapy limit |
| Epidural steroid injection (3)        | \$675            | 100%                          | CPT: 62310 <sup>14</sup>  |
| <b>Total for Conservative Therapy</b> | <b>\$5,752</b>   |                               |   |

**Table 2. Component costs for initial conservative therapy**



| Service (quantity)                                   | Cost per service | Percent of patients receiving | Source  |
|--|------------------|-------------------------------|---|
| <b>Open Discectomy</b>                               |                  |                               |   |
| Physician fees (1)                                   | \$981            | 100%                          | CPT: 22224 <sup>14</sup>  |
| DRG (1)  | \$9,530          | 100%                          | DRG: 490, 491 <sup>15</sup>                                     |
| Anesthesia (1)                                       | \$550            | 100%                          | CPT: 00630 <sup>14</sup>  |
| Physical Therapy (1)                                 | \$1,518          | 100%                          | CPT Codes: 97001, 97110, 97002, 97014 <sup>14</sup>             |
| <b>Total for Open Discectomy</b>                     | <b>\$12,579</b>  |                               |   |
| <b>Hydrodiscectomy</b>                               | <b>\$4,200</b>   |                               | Assumption for facility, physician and anesthesia reimbursement |
| <b>Medical Management (surgery refusal) – 1 Year</b> |                  |                               |   |
| Medications  | \$1,599          | 100%                          | Sherman 2010 <sup>13</sup>                                      |
| Follow-up visits (12)                                | \$73             | 100%                          | CPT: 99213 <sup>14</sup>  |
| Chiropractor visits                                  | \$728            | 50%                           | CPT Codes: 98941, 99213 <sup>14</sup>                           |
| Physical Therapy (1)                                 | \$1,900          | 75%                           | CPT Codes: 97001, 97110, 97002, 97014 <sup>14</sup>             |
| <b>Total for Medical Management – 1 Year</b>         | <b>\$4,264</b>   |                               |   |

**Table 3. Component and total costs for initial treatment choice**

For patients who elect either open discectomy or Hydrodiscectomy, a portion of that patient population will continue to experience back pain following the procedure (38% for open discectomy and 20% for Hydrodiscectomy). Within the model, these patients can opt for a second procedure (either redo surgical discectomy or spinal fusion), or receive medical management for their pain symptoms (Table 4). Patients who opt to have a procedure receive several months of medical management which includes medications and injections. If these treatments fail to relieve pain, MRI and CT scans will be used to confirm the disc herniation and the patients will then be recommended for surgery. In the Sherman study, patients with a failed procedure who progressed to a second procedure had, on average, 1.3 MRIs and 15% had CT/MYE at an average rate of 1.8 imaging studies per patient.

| Item  | Service (quantity)   | Cost per        | Percent of patients receiving | Source  |
|---|----------------------|-----------------|-------------------------------|---|
| <b>Surgical discectomy after failed surgical discectomy or failed hydrodiscectomy</b> |                      |                 |                               |   |
|   | Medications          | \$1599          | 100%                          | Sherman 2010 <sup>13</sup>                          |
|   | Injections (6.6)     | \$675           | 100%                          | CPT: 62310 <sup>14</sup>                            |
|   | MRI (1.3)            | \$1,258         | 100%                          | Sherman 2010 <sup>13</sup>                          |
|   | CT/MYE (1.8)         | \$1,374         | 15%                           | Sherman 2010 <sup>13</sup>                          |
|   | Physician fee (1)    | \$981           | 100%                          | CPT: 22224 <sup>14</sup>                            |
|   | DRG (1)              | \$9,530         | 100%                          | DRG: 490, 491 <sup>15</sup>                         |
|   | Anesthesia (1)       | \$550           | 100%                          | CPT: 00630 <sup>14</sup>                            |
|   | Physical Therapy (1) | \$1,518         | 100%                          | CPT Codes: 97001, 97110, 97002, 97014 <sup>14</sup> |
|   | Complications (1)    | \$14,862        | 13%                           | Sherman 2010 <sup>13</sup>                          |
| <b>Total for repeat open discectomy</b>   |                      | <b>\$22,571</b> |                               |   |
| <b>Fusion</b>   |                      |                 |                               |   |
|   | Medications          | \$1,599         | 100%                          | Sherman 2010 <sup>13</sup>                          |

|  |                 |      |   |
|--|-----------------|------|---|
| Injections (6.6)   | \$675           | 100% | CPT: 62310  |
| MRI (1.3)  | \$1,258         | 100% | Sherman 2010 <sup>13</sup>                                |
| CT/MYE (1.8)   | \$1,374         | 15%  | Sherman 2010 <sup>13</sup>                                |
| Physician fees (1)   | \$2,732         | 100% | CPT: 63295  |
| DRG (1)  | \$21,725        | 100% | DRG: 453,454  |
| Anesthesia (1)   | \$550           | 100% | CPT: 00630 <sup>14</sup>                                  |
| Physical Therapy<br>(1)                                      | \$1,577         | 100% | CPT Codes:<br>97001, 97110,<br>97002, 97014 <sup>14</sup> |
| Complications (1)  | \$14,862        | 13%  | Sherman 2010 <sup>13</sup>                                |
| <b>Total for Fusion</b>                                      | <b>\$36,576</b> |      |   |
| <b>Medical Management After Failed Surgery</b>               |                 |      |   |
| Medications (1)  | \$1,422         | 100% | Expert opinion  |
| Follow-up visits<br>(12)                                     | \$73            | 100% | Expert opinion  |
| Injections (6.1)   | \$675           | 100% | CPT: 62310 <sup>14</sup>                                  |
| MRI (1)  | \$1,258         | 78%  | Sherman 2010 <sup>13</sup>                                |
| Physical Therapy   | \$1,900         | 100% | CPT Codes:<br>97001, 97110,<br>97002, 97014 <sup>14</sup> |
| <b>Total for Medical Management After<br/>Failed Surgery</b> | <b>\$9,574</b>  |      |   |

**Table 4. Component and total costs for patients with failed initial procedure**

Many patients with a failed initial procedure did not progress to a second surgery in the Sherman study, but still required significant medical management (Table 4). Claims analysis showed these patients had, on average, 6.1 epidural injections and 78% had at least one MRI. Medication usage also occurred in this patient group with costs averaging \$461 in 2006 dollars. While use of physical therapy and chiropractic care was not reported in the Sherman study, expert clinical opinion suggested these patients would incur another cycle of physical therapy at the maximum amount allowable under Medicare (\$1900) in effort to alleviate their back pain symptoms.

### Sensitivity Analysis

One-way sensitivity analysis was undertaken on the cost differential between Hydrodiscectomy and surgical discectomy by varying all clinical and cost variables by +/- 20%.

### **Results**

Total procedural costs were lower for Hydrodiscectomy as compared to surgical discectomy (\$4,200 versus \$12,579) and compared to ongoing symptomatic care without surgery (\$4,264). Thus, in the short term, Hydrodiscectomy was a lower cost approach to treating contained herniated discs following a failed initial course of conservative management.

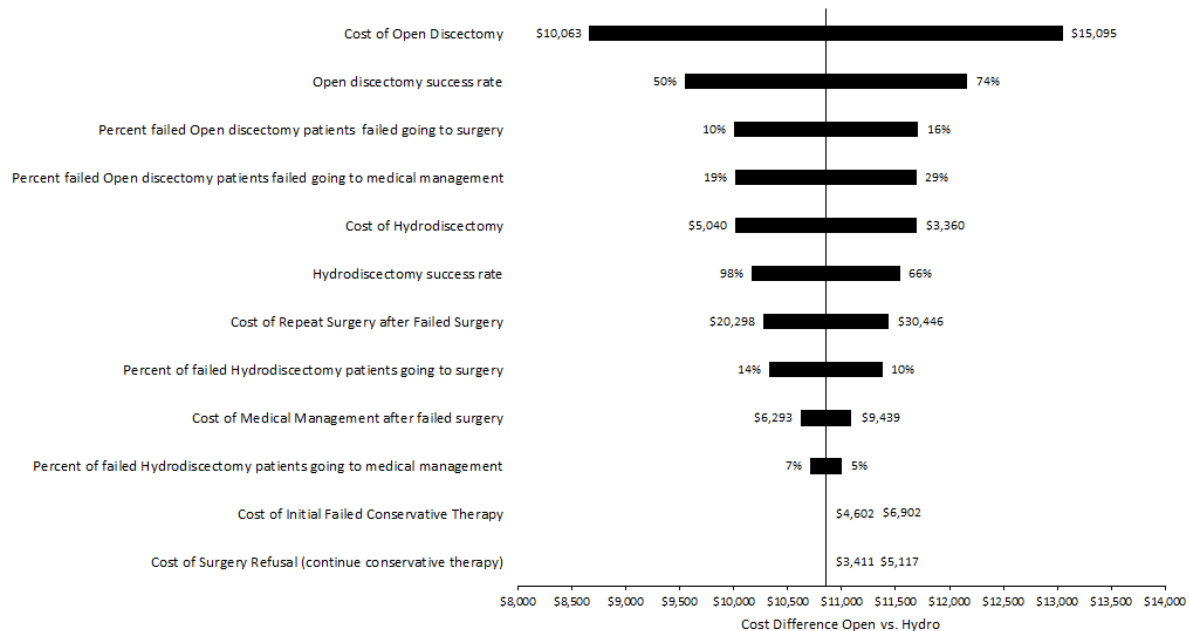
However, the immediate procedural costs did not capture the downstream clinical impact of the procedures, including subsequent procedures and future costs. Procedure success rate and probability of receiving future costly interventions drove the total two-year per patient costs.

At 2 years post-procedure, total costs for a Hydrodiscectomy patient were \$13,897, which included costs for initial medical management, the Hydrodiscectomy and costs for subsequent treatments for failed Hydrodiscectomies, including surgical discectomy, fusion or medical management, weighted based on the probability that a patient would receive each treatment. This compared to \$24,181 for total 2 year costs to manage a patient who receives surgical discectomy. This represents an average savings of \$10,284, or a 43% reduction in the costs typically accrued to manage these patients over two years.

Based on an annual estimate of 45,000 Americans with contained herniated discs who currently receive surgical discectomy instead of Hydrodiscectomy, the potential savings to the US healthcare system of introducing Hydrodiscectomy for the first line treatment after failed conservative therapy for patients with contained herniated discs is \$462 million dollars over 2 years.

### Sensitivity analysis

One-way sensitivity analysis found that the cost of the surgical discectomy procedure and the rates of surgical referral following a failed surgery or Hydrodiscectomy were the biggest drivers of cost outcomes. Varying these inputs by 20% affected the amount of savings achievable with Hydrodiscectomy, but did not result in Hydrodiscectomy becoming more expensive than either surgical discectomy or medical management. Results are shown in the tornado plot in Figure 2 below.



**Figure 2. Tornado plot of variables and impact on the average per patient cost savings from Hydrodiscectomy**

**Discussion**

While clinical studies have found that Hydrodiscectomy is an effective treatment for patients with contained herniated discs, the procedure faces two significant hurdles in gaining widespread adoption: coverage and reimbursement. Coverage is limited, as many payer organizations have failed to evaluate the procedure independently, instead relying on the conclusions of an outdated Cochrane review which did not include an assessment of Hydrodiscectomy. Further, payer organizations incorrectly consider Hydrodiscectomy in the same category as thermal discectomy and thus deny coverage. Importantly, unlike thermal discectomy, Hydrodiscectomy is a mechanical procedure which removes tissue and is therefore not within the scope of CMS’s non-coverage decision. This analysis indicates that providing coverage for Hydrodiscectomy for the subset of patient whose disc herniations remain contained represents excellent value to payers, reducing costs by 42%. Conversely, surgical discectomy does not offer good value for these patients, achieving a lower success rate at a higher cost.

Secondly, where coverage is provided, reimbursement is currently too low to cover the costs of the SpineJet device used in this procedure, which discourages hospitals from offering it to patients who are likely to benefit. At a reimbursement of \$4,200 modeled in this analysis, Hydrodiscectomy represents excellent value to payers and is sufficient to cover the costs of the procedure.

Hydrodiscectomy represents a clinical advantage over surgical discectomy in terms of a higher overall cure rate in patients with contained herniated discs (80% versus 62%), sparing more patients

from repeat surgeries or a return to conservative management. While approximately 12% of patients with Hydrodiscectomy will eventually undergo a surgical discectomy, many patients are able to avoid this invasive procedure and its potential negative clinical outcomes. Despite the fact that a portion of patients receive both procedures, the avoidance of surgical discectomy by 80% of patients reduces the budget impact to payers from contained herniated discs by 43%. This savings is largely derived by the avoidance of surgical discectomy, a procedure which costs nearly 3 times more than Hydrodiscectomy and results in worse outcomes for patients with contained herniated discs.

#### Limitations of this analysis

This analysis had several limitations. First, it considered only the direct medical costs to manage patients with contained herniated discs. The impact on patient quality of life was not considered. Importantly, Hydrodiscectomy represents a significant improvement in quality of life for patients with contained herniated discs. Hydrodiscectomy is a minimally invasive procedure which can be performed in an outpatient setting in approximately 30 minutes. Patients can return to activities of daily living and to work within 1 week. This compares to expected return to work in about 4-6 weeks for open discectomy. This should make the procedure extremely appealing to employer sponsored health plans and workers compensation plans that frequently see employees disabled and out of work as a result of back pain, sometimes for several months or longer.

Secondly, this model considers only the costs of managing these patients for the two years of follow-up from the clinical study. Further consideration of the longer term costs, while not reflective of the immediate budget concerns of payer organizations, would make this analysis more robust.

#### **Conclusion**

The United States is undergoing a major shift in its healthcare landscape, with an increasing focus on delivering value and quality. As such, Hydrodiscectomy represents excellent value and quality for patients with contained herniated discs. Results of this analysis indicate that, at a higher reimbursement of \$4,200, Hydrodiscectomy reduces total average per patient management costs by 43% over 2 years. Additionally, it has a higher cure rate, shorter recovery period, and, at this level of reimbursement, is less than half the cost of surgical discectomy. It would be prudent for payer organizations to include coverage of and sufficient reimbursement for Hydrodiscectomy in their treatment options for patients with contained herniated discs. Without adequate coverage and reasonable reimbursement rates, access will be severely restricted and patients will be driven to more costly, less effective treatment alternatives.

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