

Are Medical Guidelines Effective Tools?

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It Depends on the Goal



Research by the Integrated Benefits Institute

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This research assesses the full-cost effects of treating under medical treatment guidelines five medical conditions common in an employment setting. Controlling those full costs—medical, absence and disability costs, as well as hidden lost-productivity costs—generally is not considered when treatment guidelines are established. Among the findings from the analysis is that mistreatment and over-treatment cost the six employers in the analysis almost \$19 million for low-level, acute low-back pain alone. The research identifies different treatment, monitoring and management goals for guidelines, depending on the medical condition. The analysis also recognizes limitations on the ability of employers to measure full-cost effects unless the employee becomes the unit of analysis, over time.

The Integrated Benefits Institute partnered with Medstat in this research. Medstat furnished proprietary medical episode grouper software, disease-staging methodology and data from two of its employer databases. It also selected the guidelines. IBI thanks Michelle Eiden, Product Designer; Scott McCracken, MBA, Product Manager; David Schutt, MD, Associate Medical Director; Ron Goetzel, PhD; Andrea Comporato and Carrie Seyfarth.

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Medstat (www.medstat.com) is a healthcare information company that provides market intelligence and benchmark databases, decision support solutions and research services for managing the cost and quality of healthcare. The company applies these capabilities to improve policy and management decision-making for employers, government agencies, health plans, hospitals and provider networks, and pharmaceutical companies. Medstat is headquartered in Ann Arbor, Michigan, and is a business within The Thomson Corporation.

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Are Medical Guidelines Effective Tools?

It Depends on the Goal

- **Inappropriate medical treatment can levy a substantial burden on employers and employees in full medical, absence and lost-productivity costs.**

When basic acute low-back pain is treated outside medical guidelines, excess medical, disability and hidden employer costs amounted to \$18.8 million, spread over the 425,000 employees of six employers. Unnecessary surgery led the way. The waste averaged \$3.1 million per employer for this single, lowest-severity condition.

- **Many workers with diabetes don't receive essential monitoring/prevention guidelines even when facing severe repercussions (e.g., blindness or kidney failure).** Only 42% comply with monitoring requirements such as annual counseling visits with a doctor and hemoglobin tests to assess blood sugar levels. Perversely, the increased medical costs to employers for worker monitoring outweigh reduced absence, disability and lost productivity by 10%. Positive results for employers may not show up for years.
- **Major depression is likely to be treated appropriately under guidelines,** with 88% of those diagnosed with the condition receiving compliant treatment. Compliant treatment saves employers 8% in full costs when compared to workers whose treatment doesn't meet guideline requirements.
- **Employers should consider the full medical, absence, disability and hidden costs from failing to provide guideline-compliant monitoring and treatment for key conditions.** When treatment guidelines promote short-term results in reducing absence, employers

are most likely to be willing to pay for the treatment and promote workplace incentives for adopting healthy practices and management.

- **Monitoring guidelines to assess the progression of disease are less likely to result in such short-term, full-cost advantages as an incentive for employers to champion such efforts.** Nonetheless, there still is room for employers to engage in primary prevention efforts to stop disease before it starts through vaccination, counseling, wellness, ergonomics and reducing risk factors by other means.
- **Research and disease-monitoring insights also came from the study:**
 - To capture all related medical and absence costs, databases should follow the health experience of the individual holistically as new complications develop. Databases that capture results only on a diagnosis basis are unlikely to capture the true costs of the onset disease as conditions deteriorate to more serious conditions or combine with the effects from other conditions.
 - Don't limit to the short term the search for the advantages of proper medical care in reducing absence and disability, especially when chronic disease is considered. The true benefit of detecting and controlling chronic disease through preventive and maintenance medical treatment may result in extending life span well past retirement age or avoiding a major life-threatening event like a heart attack.

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Background

The surge in healthcare costs in the past few years underscores the need for effective, evidence-based medical treatment guidelines. Employers want guidelines to show them how their medical expenditures can best meet their medical quality, absence management and workforce productivity goals. Appropriate guidelines can give employers the information they need to encourage their employees to use healthcare appropriately and effectively through consumerism approaches.

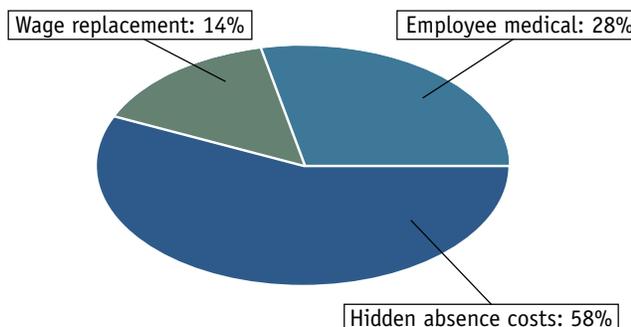
But it's not only employers that are looking for evidence-based medical treatment guidance. Physicians also want guidelines to help them manage disability effectively. In IBI's 2001 physician survey,¹ 57% of responding physicians say they need diagnosis-based absence guidelines to better manage disability; 42% want medical protocols.

What's Really at Stake for Employers?

The wrong medical treatment may produce medical results that are wasteful, excessive or ineffective. By the same token, too little in diagnostic testing and treatment or the wrong medical treatment may result in unnecessary and avoidable absence and disability. In addition to excess medical costs, any assessment of the cost to employers of poor medical treatment should consider absence/disability benefits costs and include the lost productivity value² of absent employees.

IBI's study of the full costs of absence, lost productivity and health for 80 employers in 12 industries for the year 2002 demonstrates that these additional costs are substantial. Although group health costs account for almost two-thirds of paid benefits costs, the average cost of employees' medical care for non-occupational conditions and workers' compensation was only 28% of the full cost of employee health and absence for employers [Figure 1]. Perhaps more telling, the lost

[Figure 1]
Full Costs of Absence



productivity value for IBI's participating employers is more than four times the benefits costs of replacing lost earnings.

IBI research shows that the timeliness and type of medical treatment will not only affect medical costs but can also have a profound effect on the wage replacement and the lost productivity value of absence.^{3,4} A focus on out-of-pocket medical costs alone can cause employers to underestimate their full costs by more than 150%, on average.

Guideline Goals

With all the demand for effective guidelines, we need to know more about the various ways current guidelines are structured and how their design may be improved for a variety of purposes. We also should know how a prescribed course of medical treatment affects absence and disability to understand the full costs for employers.

For example, an effective disease-management program has the potential to reduce both the medical and lost-time costs for an employer. Hughes Electronics found that employees that participated in its disease management program had only about half the incidence of short-term disability (STD) claims as did qualified non-participants.⁵

¹*Physicians Managing Disability: Identifying Opportunities and Constraints*, Integrated Benefits Institute, April 2002.

²IBI calculates lost-productivity value as the midpoint between (1) the costs of excess staffing (based on payroll, benefits load and training costs) to cover for workers absent due to sickness or disability and (2) lost revenue from having a worker's production off-line for the day based on reported cash payroll and industry cost structure.

³*Return to Productivity*, Integrated Benefits Institute, September 1996.

⁴*Considering a New Employer Healthcare Strategy: Linking Medical Care to Productivity*, Integrated Benefits Institute, February 2001.

⁵*Hughes Electronics Corporation: Integrating Outsourced Wellness and Disability Management*, Integrated Benefits Institute, 2002.

Traditionally such programs focus, however, only on medical-cost implications because they commonly are managed by those that have responsibility only for medical treatment programs and not disability or absence. Knowing how different patterns of medical treatment can produce different medical and disability/absence results could vastly improve the effectiveness of disease management and wellness programs design and implementation as well as the determination of the most appropriate treatment once a condition occurs.

What are the goals of medical treatment guidelines that are commonly used today? How do medical treatment guidelines promote medical cost savings and for what kinds of conditions? What is their effect on full costs, including absence, disability and lost productivity?

There also is a broader question: Where guidelines do offer clear means to manage and control exacerbation of disease, to what extent do physicians and their patients follow those guidelines, or must there be stronger incentives to encourage appropriate treatment and testing to avoid unnecessary disease progression?

Research Goals and Limitations

To help answer these questions, IBI partnered with Medstat to evaluate the medical cost, disability and absence differences that exist between patients whose treatment complied with national, evidence-based guidelines⁶ compared to noncompliant treatment.

We found that guideline compliance for those with diagnosed injuries or illnesses often resulted in neither lower medical costs nor shorter or less frequent absence—at least during the one-year period of the study. Some of that result may come from the nature and goals of the guidelines themselves. For example, some guidelines—especially for chronic conditions—may prevent a disabling condition or early death rather than fostering a rapid or effective cure or rehabilitation from the effect of a full-blown condition. For those cases, guideline compliance prompted higher medical costs. In addition, diagnoses such as diabetes may not generate much in the way of absence, but the blindness or renal failure that results from diabetes will, if left unidentified and untreated. Still other concerns may result from the inability of the best research techniques to sufficiently explain the reasons for the differences in results or to adjust for differences in severity of the conditions themselves.

What are the goals of medical treatment guidelines that are commonly used today? How do medical treatment guidelines promote medical cost savings and for what kinds of conditions? What is their effect on full costs, including absence, disability and lost productivity?

⁶Medical guidelines applied in this study were taken from the National Guideline Clearinghouse™ (NGC) database [www.guideline.gov].

Steps to Evaluating Evidence-Based Guidelines

IBI's research partner in this study is Medstat, possessor of a large, nationally representative database of medical claims information ("national database"). Medstat also has a Health and Productivity Management (HPM) database for a subset of six large employers who together employ 425,000. The HPM database includes STD data on 250,000 employees and incidental absence data on 100,000 employees in addition to medical claim information on over 350,000 employees.

Aggregating Medical, Absence and Disability Costs Into Episodes

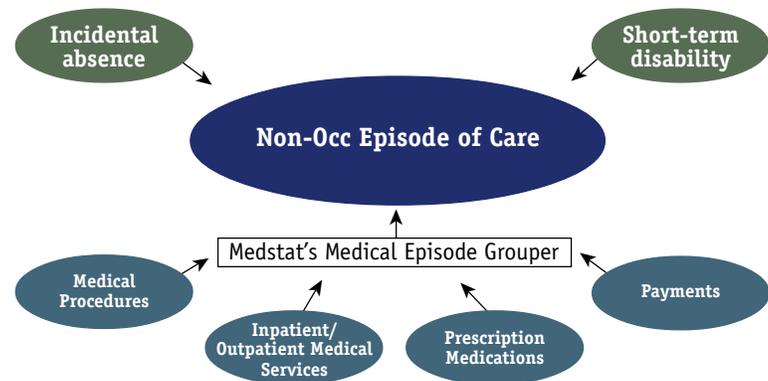
In this research, we determined the full costs of non-occupational injury and illness. A crucial step is to determine which medical payments, incidental absences (sick days) and STD payments belong to a single injury or illness.

To do so, we created a "virtual" workers' compensation-style claim file for conditions that occur off the job. Such an arrangement is unusual on the non-occupational side, and data aren't kept that way for the participating employers—hence the need for a software solution.

Medstat used its proprietary "episode grouper" software to combine individual medical procedures in the HPM database into a single data record or "medical episode" [Figure 2].

Medstat then linked these medical episodes to STD claims and incidental sick-leave absences related to the medical treatment to create an overall "episode of care" for an individual related to a specific medical condition.

[Figure 2]
Aggregating Out-of-Pocket Costs



Selecting the Conditions for Evaluation

Medstat and IBI agreed to focus the analysis on conditions that are:

- Prevalent among the workforce
- Expensive for employers
- Amenable to medical intervention

See Appendix A for methodological detail.

As a result, we jointly selected two acute and three chronic medical diagnoses:

Acute:

- Low-back conditions
- Common ear, nose and throat (ENT) conditions

Chronic:

- Diabetes
- Major depression
- Coronary artery disease (CAD)

Because we examined conditions that had already been diagnosed, we could analyze only the effects of secondary and tertiary prevention; that is, monitoring/prevention methods applied after a condition becomes known or after functional loss already has occurred. Primary prevention methods—stopping disease before it starts—were not evaluated. Prevention aimed at altering risk factors may be effective and relatively

inexpensive but was beyond the scope of this study. [See Appendix B for a description of the conditions we analyzed.]

Adjusting for Differences

Before comparing the impact of following the guidelines, we wanted to be sure that compliance or noncompliance wasn't simply correlated with other factors. IBI statistically removed the effects of other characteristics that might influence outcome such as age, gender, region of the country, health plan type (PPO, POS, fee-for-service), and the medical severity of the case (using Medstat's disease-staging methodology).

Other factors, however, may have a profound effect on benefits usage such as benefits plan design, corporate culture, existence of disability management/return-to-work programs, occupation and wages. These data were unavailable because of data confidentiality agreements between Medstat and its clients.

Evidence-based Medical Guidelines

After making the statistical adjustments, IBI compared total medical costs, STD incidence and duration, and workdays lost for cases with compliant medical treatment against cases that didn't comply with the selected evidence-based medical guidelines.

Evidence-based guidelines recommend clinically defined treatment patterns. Medstat selected the specific guidelines used for this review from the National Guideline Clearinghouse™ (NGC) database [www.guideline.gov], a comprehensive database of evidence-based clinical practice guidelines maintained by the Agency for Healthcare Research and Quality. They are based on a systematic literature review of current scientific evidence published in peer-reviewed journals. [See Appendix C for a description of the guidelines we used.]

Determining Whether Treatment is Compliant With the Guidelines

Whether treatment is “appropriate” for purposes of this study is based on how medical treatment provided in a given case met or deviated from the treatment prescribed in the guideline. Guidelines can be conservative by promoting a “wait-and-see” approach—for example, postpone aggressive (and expensive) treatment and diagnostic tests; do not prescribe unproven drugs.

Other guidelines are “positive” and focus on things that physicians should do that have demonstrated efficacy. For example, an employee with depression should have an adequate supply of appropriate medication on hand (although the data don't show whether the patient actually takes the medication) and should see a doctor periodically to monitor the medication.

The episodes of care that IBI analyzed do not allow, for example, identification of *when* certain medical procedures took place or if they took place appropriately under the guidelines, after a condition worsened, or inappropriately, prior to its worsening. For chronic illnesses, we also couldn't determine when during the one-year span of the episode that the illness may have increased (or decreased) in severity. As a result, we cannot determine the cause-and-effect relationship of noncompliant treatment on deterioration of a condition.

Results of Compliant Versus Noncompliant Treatment:

After controlling for the factors that we were able to measure, we found that medical-treatment compliance affected claim costs and disability incidence [Figure 3]. Where no box appears, we were unable to identify *any* statistically significant effect, one way or the other.

These results tell a consistent story for the acute low-back conditions. Compliant treatment results in lower medical costs per case, lower STD incidence, fewer lost workdays due to STD and fewer sickdays. We examine the interaction between medical treatment, medical costs and disability incidence and duration.

We also discuss results for two chronic conditions: “managed” depression in a maintenance state and diabetes.

Finally, we explain why, after analysis, that two of the conditions—ENT and coronary artery disease—do not lend themselves to this analysis due to the nature of the treatment guidelines, the data and the medical conditions themselves.

Dealing With Incidental Absence Costs

Although this study focuses on short-term disability, the Medstat HPM database includes incidental sick-day information for 100,000 of the 425,000 total employees. Because matching individual sick days to specific health conditions poses far greater challenges than does matching disability episodes to medical treatment (both of which typically contain at least some diagnostic information), we have not examined the impact of medical care on incidental sick days on a diagnosis-by-diagnosis basis.

For the aggregate of the cases studied, however, we did find that medical care has a substantial impact both on the direct and hidden costs of absence as well as on STD [Figure 4]. For the six employers, the average number of paid days on short-term disability per employee was close to 1.5, compared to over three days per employee of incidental sick leave. STD is lower than what might be expected for a typical U.S.

[Figure 3]
Compliance Impact (After Adjustments)

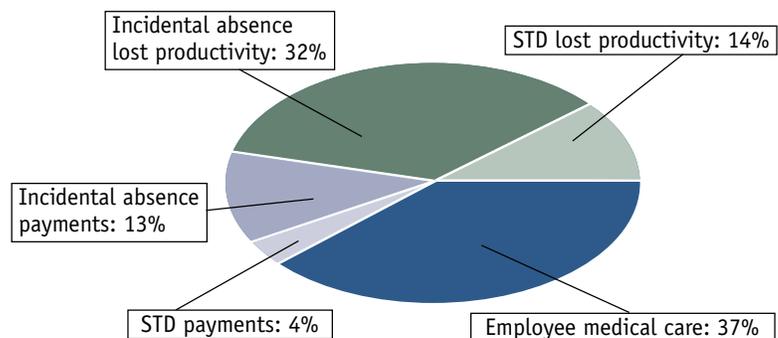
Diagnosis/Condition	Medical Payments	Disability Rate	STD Workdays	Incidental Workdays
Coronary Artery Disease	Higher			
Diabetes		Lower	Lower	
Major Depression	Lower			
Ear, Nose and Throat	Lower			Higher
Low-severity Low back	Lower	Lower	Lower	Lower

Significant at .05 level. Unless noted, there was no significant effect.

employer. However, it’s reasonable to assume that any employer sufficiently committed to developing integrated episodic medical and disability data will also be committed to HPM and disability management strategies, thereby lessening the impact of such cases.

Our analyses also do not attempt to estimate the “presenteeism” factor related to these medical conditions: the lost productivity that occurs when workers are at work but not working to full capacity.

[Figure 4]
Full Costs With Absence



Blue = Direct payments
Green = Hidden costs of lost productivity

Guideline Compliance Results by Diagnosis

Low-Back Conditions

We limited the statistical analysis to the lowest-severity low-back conditions as identified by the Medstat severity measurement tool. These lowest-severity conditions include “pain and symptoms related to the lower back that are not associated with specific degenerative disorders such as arthritis or systemic illness such as tumors.” [See Appendix B for a description of the diagnoses that we subjected to statistical analysis.] These back cases likely will be the most homogeneous, with the least variation in appropriate treatment and are the type of case compatible with the conservative treatment guidelines chosen for this condition.

We also selected these cases because the episode database doesn’t include the timing of medical services. Within the database, 37,458 low-back cases were of this “lowest-severity” type. For acute low-back pain, the guidelines recognize that determining treatment efficacy is difficult given the “rapid rate of spontaneous recovery,” that is, most acute low-back conditions get better, quickly without treatment. According to Medstat medical experts, those in the lowest-severity grouping are highly likely to be of this type. The guidelines further advise, “The use of symptom control methods known to have less risk of harm than methods with proven efficacy may thus be warranted if such methods are inexpensive and allow an individual to remain active or build activity tolerance through exercise.”⁷

Two types of compliance guidelines were selected to apply to these least severe, acute low-back pain conditions [Figure 5]:

- Treatments and tests that are not recommended either within or after specified timeframes
- Medications that are not recommended

[See Appendix C for a detailed description of each compliance trigger.]

[Figure 5]

Low-Back Guidelines

Compliance Guidelines

- No steroids or other injections.
- No surgery or special diagnostics (e.g., x-rays, imaging) **within** the first 30 days.
- No manipulations **after** first 30 days.

Other NGC Guidelines

- May use non-steroid anti-inflammatory drugs; salicylate analgesics.
- Use opiates or muscle relaxants sparingly.

There are additional treatment recommendations in the national guidelines that are not part of the actual compliance test. Strongly recommended is the use of non-steroidal anti-inflammatory drugs (NSAIDs); e.g., aspirin/ibuprofen, Anaprox, Alleve, and non-opiate painkillers. The guidelines also suggest that opioid analgesics and muscle relaxants that can cause drowsiness, while not necessarily bad (unless you are driving or working) may work, but should be used sparingly.

Compliance

For the purpose of this analysis, it was determined that not adhering to *any* one of the compliance guidelines for this lowest-severity category of acute low-back pain condition would result in the treatment being deemed noncompliant. It is important to note that the severity controls require that the results for any case that moves from lowest severity to a higher stage be reflected in the highest level attained. Thus it is only the low-back cases that remained in the lowest-severity stage that are reflected in the results and the IBI analysis.

Overall, IBI’s results for low-back treatment show that compliant treatment (usually comprised of conservative, delayed application of diagnostic testing and delayed invasive interventions for these low-severity cases)

⁷Veterans Health Administration, Department of Defense. Clinical practice guideline for the management of low back pain or sciatica in the primary care setting. Washington (DC): Department of Veterans Affairs (U.S.); 1999 May. Various p. [216 references].

is associated with lower medical costs and lower incidence and duration of disability [Figure 6].

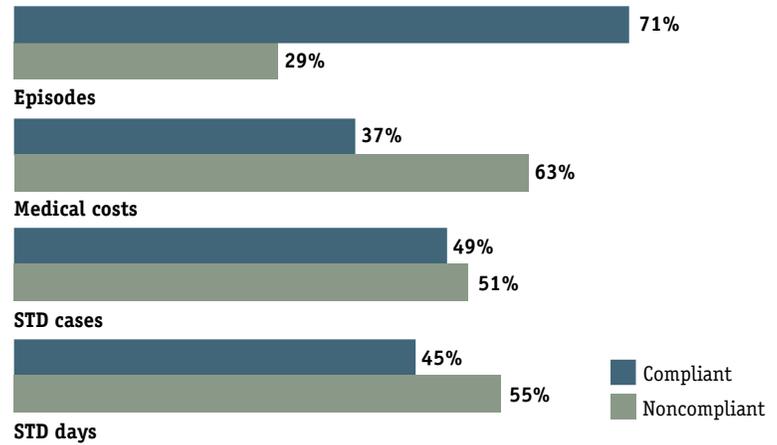
For even these lowest-severity cases there is a high level of noncompliance with conservative treatment guidelines. Figure 6 shows that 29% of these cases involve noncompliant medical treatment and that noncompliance is associated with disproportionate amounts of medical costs (63%), STD case incidence (51%) and STD days (55%).

Noncompliance for this single, least-severe condition is associated with significant financial losses for these six employers when IBI considers the full costs of health, disability and lost productivity. [See footnote 2 on page 2 for the lost productivity calculation.] The difference in full costs between compliant and noncompliant episodes is substantial [Figure 7].

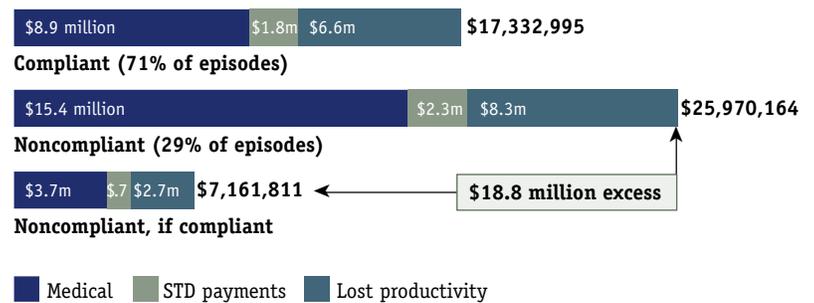
The full costs for the 26,520 lowest-severity low-back cases with compliant treatment (71% of the total) for the six employers were \$17.3 million or \$654 per case. For the 10,962 cases with noncompliant medical treatment (29% of the total), the total cost was almost \$26 million for an average of \$2,369 per case. The total difference in full costs to the six employers had the noncompliant treatment been limited to compliant treatment was \$18.8 million, or an average of \$3.1 million per employer for this single, lowest-severity condition.

X-rays within the first 30 days are the most common reason for noncompliance (16% of all cases), together with manipulations after 30 days (also 16% of all cases) [Figure 8]. Some episodes have more than one noncompliant treatment modality, so the percentage of episodes with a noncompliant treatment type totals to more than the percent of total cases that are noncompliant. Imaging during the first 30 days (6% of the episodes) and

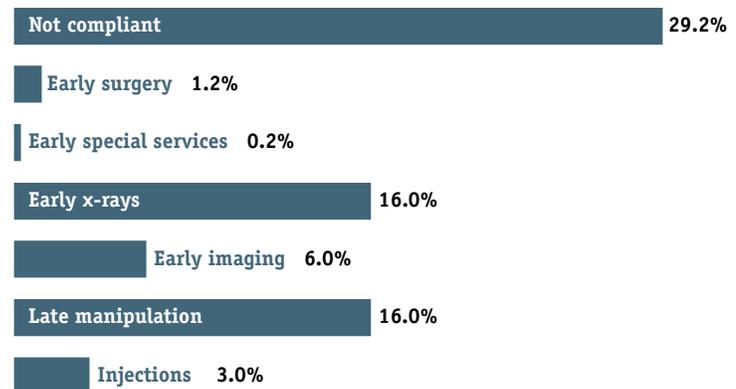
[Figure 6]
Compliance Effect: Low-back [Percent of cases]



[Figure 7]
Cost Impact of Low-Back Compliance



[Figure 8]
Low-back Noncompliance



injections (3%) also are relatively frequent medical practices for noncompliant episodes.

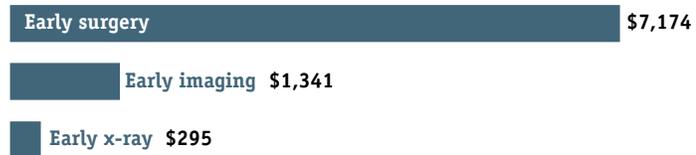
But the most frequent noncompliant treatments don't necessarily drive the most costs. Although the database doesn't include data at the medical-transactions level to allow us to examine the direct costs by treatment type of episodes that contain noncompliant treatment, IBI could control for other variables in the database and was able to determine additional medical costs associated with episodes that contained three types of noncompliant treatment: early surgeries (accounting for relatively few of the noncompliant episodes—4%), early X-rays and early imaging (that are associated with higher proportions of the noncompliant episodes—55% and 21%, respectively). The additional costs in early surgery cases are extremely high, with early X-ray cases relatively low and early imaging episodes in between [Figure 9].

Episodes with surgery in the first 30 days have medical expenses almost 15 times higher than lowest-severity, low-back episodes with no early surgery (\$8,264 versus \$558, respectively). This result occurs even though 28% of the cases with no early surgery are still noncompliant; that is, they include medical treatment that doesn't follow the guidelines like early X-rays or imaging, injections or manipulations that occur after 30 days. We look more closely at surgery as a major driver of employer excess medical costs below.

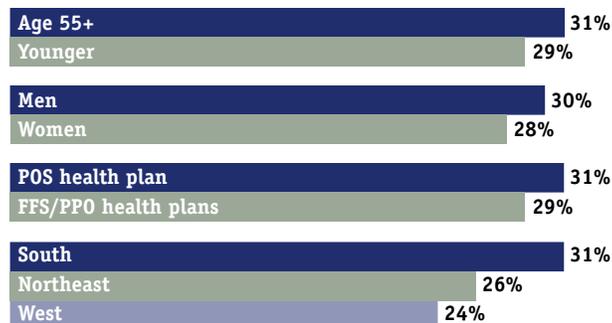
Other Noncompliance Drivers

IBI statistical analysis finds there is little practical difference in compliance by age, gender, health plan type or geographic region [Figure 10], although the small differences are statistically significant because of the large number of episodes in the database. Other factors, not included in the database, are likely to be responsible, such as wage

[Figure 9]
Additional Costs from Noncompliance



[Figure 10]
Low-Back Compliance Differences
[% Noncompliant]



differences and plan design characteristics. Perhaps most interesting is the variation by geographic region. The relative prevalence of managed care in the West may make use of guidelines more prevalent there.

Surgery

Surgery in the first 30 days is an example of treatment that is unlikely ever to be necessary for these lowest-severity low-back conditions. Worse, such treatment is likely to create disability during the time it takes to recover from the invasive nature of the surgery itself. [See Appendix D for a description of the most common back surgical procedures included in the study.]

Early-surgery cases present total disability and medical costs completely out of proportion to their low incidence because they are very expensive. They also are associated with a high proportion of total full costs (medical, STD payments and lost productivity) for

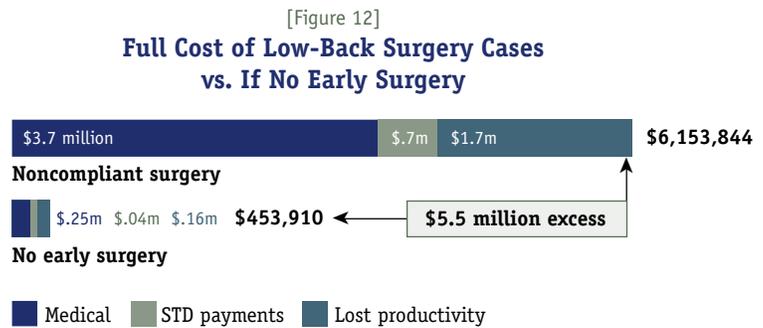
these conditions. Episodes with early surgery account for only 1.2% of the total episodes, but episodes with surgery in the first 30 days account for 13.7% of overall full costs [Figure 11].

Noncompliant episodes with early surgery costs these employers \$5.5 million more than the episodes would have cost had the medical treatment not included noncompliant early surgery [Figure 12]. Medical costs would shrink to \$251,658, while STD payments would amount to only \$43,228. Retrieving the lost productivity resulting from STD absence would save an additional \$159,024.

We take one last look at the likely effect of early surgery on workers' health and employers' costs [Figure 13]. Workers with low-back surgery in the first 30 days are almost nine times more likely to file short-term disability claims. Given that the cases being analyzed are of the lowest-severity stage, there is a high likelihood that for most of these cases the surgery itself is the driver of the STD. Had conservative, compliant treatment been followed it is likely that those workers with the early surgery would have been able to return to work with a relatively short absence.

Employer Implications

For these lowest-severity, acute low-back pain cases the lesson seems clear. As the guidelines state, acute low-back pain is commonly characterized by a "rapid rate of spontaneous recovery." Because we are dealing only with the lowest-severity cases, these cases are most likely to get better with little treatment. Employers may need to address this issue in two ways. First, employees should be educated to ensure that their expectations of appropriate treatment are consistent with



conservative treatment for this lowest-severity diagnosis. To the extent physicians are responding to patient complaints, this may be the best way to modify inappropriate treatment.

It also appears axiomatic that employers and their health plans should work together to establish and enforce conservative treatment guidelines for cases of this type to generate improved health outcomes for their employees along with substantial employer savings.

Diabetes

The application of medical treatment guidelines to low-back pain cases is a classic study of an acute injury that can be expected to get better over time without intervention. The next condition we examine, lowest-severity diabetes, [asymptomatic diabetes mellitus (see Appendix B for a definition and description)] is far different—a chronic condition that is expected to deteriorate over time and that must be monitored to be able to ward off more serious conditions.

As a result, the guidelines that apply to diabetes [Figure 14] stress timely diagnostic tests and counseling to avoid deteriorating physical condition or progression of the diabetes to a more serious condition [see Appendix C for a complete description of the diabetes guidelines]. The one mandated procedure is physician “lifestyle counseling” with the goal of improving lifestyle and reducing risk factors. As a proxy for such a counseling visit, we used a diabetes-related visit with a primary care physician.

Another important diagnostic test is the “glycated” or “glyco” hemoglobin A1c test. This test measures the amount of glucose coating the blood cells have picked up over two to three months—about as long as the average red blood cell lives in the blood stream. The higher the blood glucose, the more coating blood cells will pick up. Keeping glycated hemoglobin in the normal or near-normal range helps prevent some of the major problems that diabetes can cause, such as blindness, kidney and nerve problems. If a low-level diabetes sufferer has four or more such hemoglobin tests a year, compliance is attained with only one other type of diagnostic test. If the hemoglobin A1c test is taken only three times or fewer, two or more other diagnostic tests are required.

[Figure 14]

Diabetes Guideline Compliance

- One or more PCP counseling visits.
- **Plus** three of the following:
 - Cholesterol screen
 - Triglycerides screen
 - Urinalysis
 - Ophthalmology visit
 - Three or fewer hemoglobin A1c tests
- **Or** four or more hemoglobin A1c tests and one other above test.

These other diagnostic tests include:

- Cholesterol screen
- Ophthalmology visits to ensure vision health and prevent diabetes-related blindness
- Triglyceride screen to determine a worsening of diabetes in early stages and to monitor a rise in cholesterol as a byproduct of diabetes, leading to more severe circulatory diseases
- Urinalysis to identify disease progression and prevent spillover diseases such as renal (kidney) failure.

Compliance

A significant starting point in the analysis is that these patients all have a diagnosed low-level diabetes disease state. Given the dangers of conditions that spring from diabetes (kidney failure, blindness) a lack of compliance with these basic diagnostic tests constitutes a basic level of failed medicine, especially since the patients in this sample all have group health coverage.

Nonetheless, only 43% of workers with a low-level diabetes diagnosis were compliant with these prevention-oriented guidelines—a much lower rate of compliance than for low-back pain episodes. Although more than four in five diabetes sufferers visited their

primary care physician during the year, fewer than one in 20 obtained even a single hemoglobin test [Figure 15]. In addition to a physician visit, compliance relied most frequently upon the relatively common urinalysis and tests for cholesterol and triglycerides. It is surprising that despite a high incidence of physician visits, diabetes sufferers seldom completed the necessary tests to protect their health. It is impossible to tell if the tests were recommended by the physician, only that they did not occur. Failure of the occurrence of key tests for diagnosed diabetics should trigger alarms of anyone tracking or case-managing patient treatment.

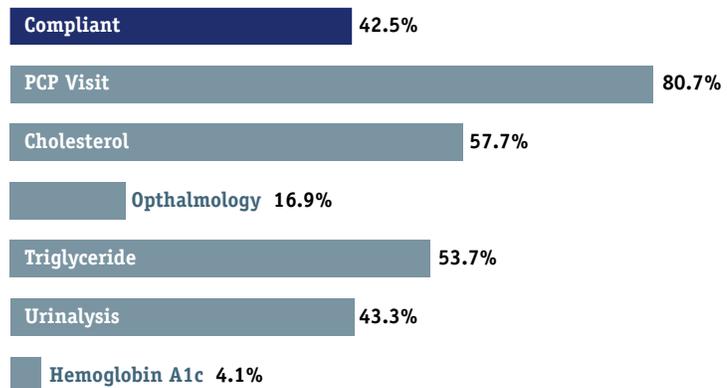
Preventive Compliance Costs More

Instead of the relatively clear pattern we saw from the (over-) treatment of acute low-back pain conditions—higher medical and STD costs—a failure to secure these preventive services for a low-level diabetes diagnosis did not result in proportionately higher overall costs over the database’s one-year timeframe.

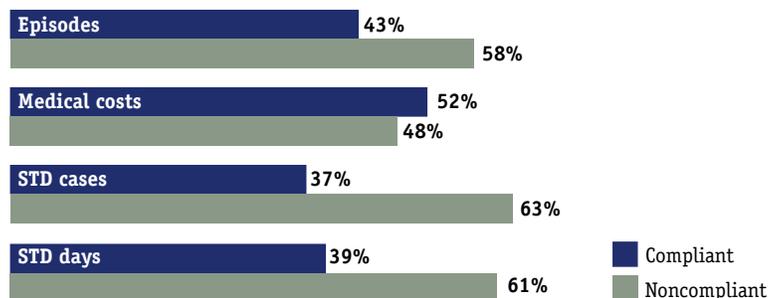
Looking first at the relative proportions of costs between compliant and noncompliant episodes, we see proportionately lower medical costs for noncompliant cases (which follows the logic that they didn’t get the services that would have made them compliant) [Figure 16]. We see higher STD incidence and duration associated with noncompliant diabetes-related episodes of care—but only marginally higher than the proportion of noncompliant cases.

It is likely that there is so little difference in compliant versus noncompliant costs and STD incidence compared to low-back cases because when diabetes results in STD, it is likely to show up in the database as STD related to other disease states.

[Figure 15]
Diabetes Compliance



[Figure 16]
Lowest-Severity Diabetes



Comparing the full costs of compliant and noncompliant episodes, we see differences between compliant treatment for an acute injury such as low-back pain and guideline-compliant preventive care for lowest-severity diabetes [Figure 17].

The full costs of noncompliant episodes is more than for compliant cases, but if those cases had been compliant, their combined medical and disability costs would have *increased* because the increased medical costs would be more than the decrease in disability costs.

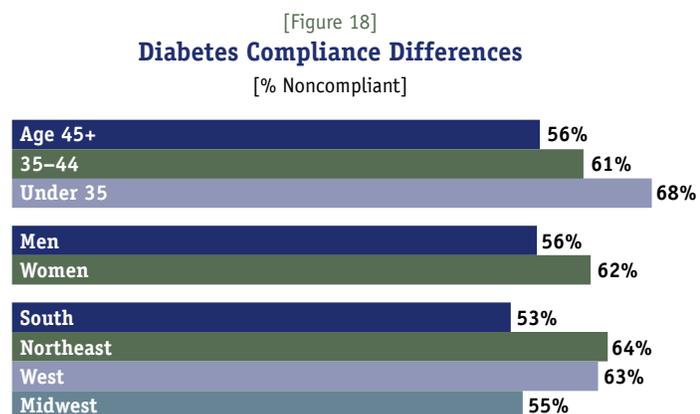
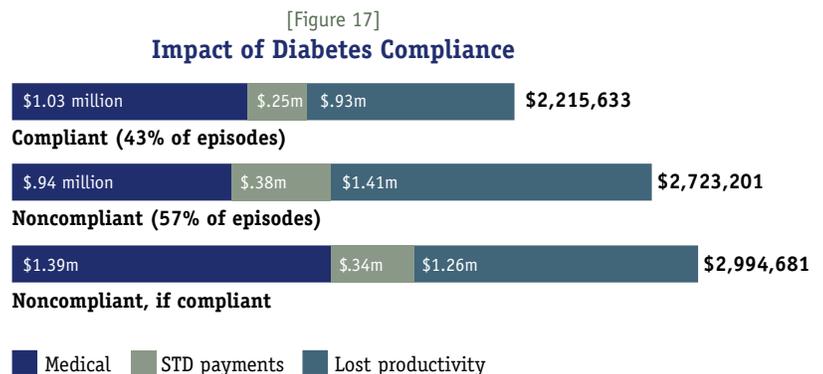
This is not to say that compliant treatment is bad for employers. The most likely explanation is that without prevention, noncompliant episodes are likely to migrate to much more costly diagnoses that are reflected elsewhere in the Medstat database. So, while compliance likely has a positive effect on low-severity diabetes, it appears likely that the biggest impact is from the *preventive* nature of the treatment that is largely uncaptured in the diagnosis-based data available for this research.

We see more variation in compliance for these types of preventive services than we do for treatment services [Figure 18]. Older workers with diabetes tend to be monitored more consistently than younger workers with the condition—unlike low-back cases where over-treatment was spread across age and gender categories with little discrimination. Women receive less attention than men, and preventive care is more frequent in the South and Midwest than in the West and Northeast.

Employer Implications

We learn from looking at these episodes that chronic disease management presents difficult employer data issues that don't apply to acute conditions. From an employer viewpoint, instead of developing and tracking episode-related information by diagnoses—and having the individual drop out of the original diagnosis category when the diagnosis changes—it would give more information to track results using *the individual* as the unit of analysis.

Here, we wouldn't know whether cases with noncompliant treatment go on to suffer blindness or experience renal failure. If they



do, then we seriously underestimate the costs to the individuals of noncompliance. From the employer viewpoint, we need to know when a diabetes case significantly deteriorates. We know that to some extent noncompliant cases suffer more episodes of disability for longer periods of time, but we don't know from this data if an employer can expect serious deterioration during the working life of the worker or only at some time after normal retirement. Answers to such questions, crucial to an employer's benefits design, must come from data other than that available for this analysis.

Major Depression

A recent study confirms that mental stress/depression claims are the fastest-growing type of disability claim.⁸ What can employers expect from the effect of treatment pursuant to medical treatment guidelines? We examined the results for major depression—excluding those involving suicide attempts—and found significant results from compliant treatment.

First, a bit about the basic guidelines that were applied to these conditions [Figure 19]. For compliant treatment, the guidelines require at least one psychiatric visit during the one-year duration of the episode tracked and at least a 60-day supply of antidepressant drugs.

Compliant cases presented patterns of medical cost savings and STD results similar to diabetes episodes, where compliant medical treatment costs more—because the guidelines call for more intensive monitoring—but produce better results in incidence of STD and in STD duration. Unlike the low-back cases where more medical costs (albeit associated with noncompliant treatment) were associated with higher levels of disability, here the greater intensity of compliant treatment is associated with slightly superior disability results [Figure 20]. Although noncompliant episodes comprised 12% of total major depression episodes analyzed, they accounted for only 7% of medical treatment costs. At the same time, they were responsible for 16% of STD cases and 17% of STD days.

When we controlled for such factors as age, gender, region of the country and type of health plan, the results for depression didn't vary from the results we observed looking only at whether the treatment was compliant or noncompliant.

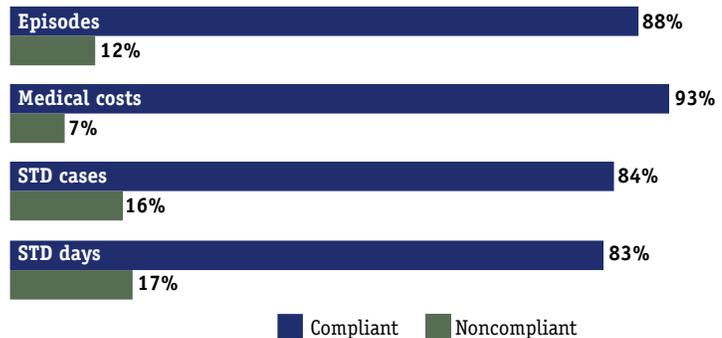
[Figure 19]

Major-Depression Guidelines

- Psychiatric visit—at least one.
- Antidepressive script—60 days or more.

[Figure 20]

Lower-Severity Depression



■ Compliant ■ Noncompliant

[Figure 21]

Impact of Depression Compliance



The full-cost analysis for the six employers also shows results similar to those for diabetes episodes. Even with the increase in medical costs from furnishing compliant medical treatment, however, an 8% savings in full costs would be the result if noncompliant cases are, instead, furnished compliant treatment [Figure 21].

⁸Mercer/Marsh—2003 Time-off and Absence Survey

Implications for Employers

Perhaps the best news here for these six employers is that the vast majority of employees with major depression episodes are being furnished medical treatment in accord with basic medical guidelines. This is contrary to diabetes episodes where employees with the diagnosed condition often fail to participate in the basic diagnostic testing required for compliant medical treatment. Instead of assuring compliant treatment, the challenge for employers here may be to ensure that such conditions are diagnosed and to work to develop employment practices and preventive treatment measures reflected in expanded guidelines to do a better job avoiding the incidence of depression for workers in the first place.

ENT and Coronary Artery Disease

After reviewing the guidelines and results, IBI determined that ear/nose/throat (ENT) conditions (comprising sinusitis and pharyngitis—commonly known as “stuffy nose” and “sore throat”) and coronary artery disease were not conditions that are amenable to an analysis bearing on the advantages to employers and employees *in the employment setting* that would come from applying medical treatment guidelines to these conditions.

Ear/Nose/Throat Conditions

ENT conditions are common both in and out of employment settings, but they are not medically expensive nor do they result in prolonged disability. When absence occurs, it is likely to be short-term and not reflected in the analysis we applied in this study to individual diagnoses.

Perhaps more telling, the medical guidelines applied to this analysis proscribe treatment (antibiotics) unless the condition is likely to

[Figure 22]

ENT Treatment Guidelines

- No antibiotics for sinusitis
- No antibiotics for pharyngitis unless strep test done

be bacterial [Figure 22]. Thus, noncompliant treatment of viral conditions with an antibiotic would be useless and produce no direct beneficial effect. Following the guidelines, therefore, would not, by definition, be expected to reduce absence from work or STD incidence or duration. Instead, the goals that appear to be served by these guidelines are more likely to be societal in nature—the reduction of overuse of antibiotics to maintain their effectiveness in fighting disease. [We deal in more detail with ENT results in Appendix E.]

Coronary Artery Disease (CAD)

Analysis of CAD produces results similar to the prevention effects associated with diabetes. In addition, analysis is complicated by the difficulty in assessing cause and effect from the data. We know that episodes where treatment is compliant produce higher medical treatment costs [Figure 23]. We also know that certain treatments are associated with higher STD incidence and, in some cases, higher absence rates.

[Figure 23]

Coronary Artery Disease (CAD) Treatment Guidelines

Compliant if at least three of the following occur:

- Nitroglycerin script (filled and on hand)
- Antianginal script (six-month supply)
- Cholesterol test
- PCP visit re CAD (counseling proxy)

But because the episodes for chronic diseases extend over our study's one-year period without specifying when during the year the treatment, disability or absence events took place, we cannot know whether the compliant treatment occurred before or after an episode of short-term disability or absence.

Thus, some compliant medical treatment is associated with a higher rate of disability and disability duration, particularly visits to a primary care physician presumably for cardiac care counseling and the availability of nitroglycerin to increase the flow of blood to the heart in response to symptoms. We cannot tell, however, if the heightened

treatment levels occur in the aftermath of an episode of STD or absence as a result of a heart disease episode or if the STD and absence occurred in spite of prior treatment and counseling.

Other compliant treatment is preventive and not associated with disability or absence, such as antianginal beta-blockers to lower blood pressure and cholesterol tests to determine the levels of fat in the blood and assess risk of further heart problems. Reduced disability or absence may occur later in life. The long-term preventive nature of the treatment is beyond the scope of this study. [See Appendix F for more detail on CAD effects.]

Conclusions

Our analysis determined a variety of apparent purposes for medical treatment guidelines. Conservative low-back pain guidelines, had they been followed for those lowest-severity cases for which they are likely to be appropriate, would have saved employers significant dollars and their employees significant life disruption from disability, pain, absence and lost earnings.

The success of the application of the guidelines to chronic illness is more difficult to assess. We were able only to evaluate prevention techniques that apply after a condition has been diagnosed and, thus, we were unable to evaluate the potential effectiveness of wellness and education programs that incorporate primary prevention techniques such as altering an individual's health risks. Such programs may have a significant effect on preventing medical costs and absence.

We did see short-term benefits from monitoring and preventing deterioration of two diagnosed chronic conditions—depression and diabetes. However, such secondary and tertiary preventive medical care for these chronic illnesses is more expensive—in the short run—than providing no care at all. The most significant fruits of that care may not occur until several years later when preventive or maintenance medical treatment result in substantial health improvement and a lessened burden from disability and absence. In this analysis, we were not able to capture those results using our one-year study period. Also, to ensure that we have fully credible results, we should follow the individual patient over a period of years

to assess the value of prevention—whether, for example, untreated or unmonitored diabetes results in blindness or kidney failure years hence.

We had similar problems assessing the efficacy of the guidelines with regard to coronary artery disease. To be sure of credible results, we would need to know the timing of care over the year to discover if a heart attack precipitated an active medical response or if a heart attack occurred *in spite of* preventive treatment. We also need to follow the individual to assess if significant improvement in life expectancy occurs as a result of following the guidelines.

Chronic disease is more likely to result in “presenteeism,” where a disease sufferer may be at work, but not performing up to their full, unimpaired capacity. We considered here only absence. The full cost-saving benefits of medical efforts at disease management may be more apparent if all those costs of disease are available.

Finally, disease management initiatives may not best reside in a single employment setting. If the beneficial results from prevention or wellness maintenance are not expected to provide short-term lowering of medical costs and absence for an employer, then that employer may not be the best agent to encourage appropriate medical treatment or prevention efforts beyond education at the primary level. The responsibility may shift, here, at least in part to the employee to be educated to undertake measures that will improve long-term results.

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Appendix A

Methodology

IBI's research partner in this study is Medstat, an organization with a large and rich nationally representative database of medical claims information ("national database"). Medstat also has disability and incidental absence information for a subset of six large employers with an average employment of over 70,000 employees. This Health and Productivity Management (HPM) database includes medical claim information on more than 350,000 employees, STD data on a quarter of a million employees and incidental absence data on 100,000 employees.

Aggregating Medical, Absence and Disability Costs into Episodes

Medstat used its proprietary "episode grouper" software to combine individual medical procedures in the HPM database into a single data file or "medical episode." These medical episodes—annual panels in the case of chronic conditions where all episodes for the patient are rolled up into one—are organized around specific medical diagnoses and specify the mix of medical services, inpatient and outpatient hospital costs, physician services, prescription medications, and the payments associated the diagnosis.

Medstat then linked these "consolidated medical claims" to short-term disability (STD) claims and incidental sick leave absences related to the need for medical treatment to create an overall "episode of care" for an individual related to a specific medical condition.

The database analyzed is extraordinarily rich, but does not include a temporal element to allow, for example, identification of when certain medical procedures took place or, for chronic illnesses, when during the one-year span of the episode that illness may have increased (or decreased) in severity. As a result, we have not been able to determine the cause-and-effect relationship of noncom-

pliant treatment and change in medical severity of a condition.

Selecting the Conditions for Evaluation

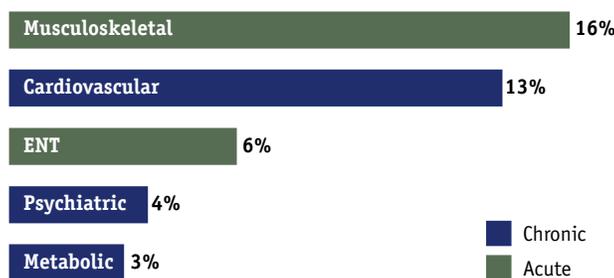
Medstat and IBI agreed to focus the analysis on key conditions meeting three criteria:

- Prevalent in the workforce
- Costly to employers (using Medstat's national database)
- Amenable to treatment

We also sought to evaluate both acute and chronic conditions.

We jointly selected five major medical categories: musculoskeletal, cardiovascular, ear/nose/throat (ENT), psychiatric and metabolic [Figure 24]. Musculoskeletal and cardiovascular categories (from which we chose 43,100 low-back cases and 8,100 coronary artery disease conditions) are the top medical cost drivers—accounting for almost 30% of inpatient and outpatient costs between them. No other single category represents more than 10% of total costs. Ear, nose and throat conditions (from which we chose 122,000 ENT infection cases) are prevalent both at work and away from the workplace. Psychiatric and metabolic conditions (from which we focused on 5,599 non-suicidal depression cases and 10,900 diabetes cases)

[Figure 24]
Categories We Chose
[By percent of costs]



are often linked to other conditions. These so-called “comorbidities” make treatment far more complex and tracking “full costs” more difficult.

Within each of these major categories we further focused on representative key medical diagnoses: low-back conditions; coronary artery disease (CAD); ENT sinusitis and pharyngitis; major depression cases—which are 86% of the affective mood disorders in the database—and diabetes.

Evidence-based Medical Guidelines

This research focuses on the relationship between non-occupational injury/illness and the relationship between medical care, absence and disability. Specifically, how does compliance with evidence-based medical guidelines impact medical costs, and what is the subsequent effect on disability and absence? Evidence-based guidelines are clinically defined treatment patterns—for example, specifying that certain medications should or shouldn’t be prescribed, that certain tests should or shouldn’t be administered, or that certain treatments should be performed within a given period of time or postponed until a certain amount of time has passed.

Medstat medical experts selected the specific guidelines used for this review from the National Guideline Clearinghouse™ (NGC) database. The NGC [www.guideline.gov] is a comprehensive database of evidence-based clinical practice guidelines and related documents maintained by the Agency for Healthcare Research and Quality, formerly AHCPR (Agency for Health Care Policy and Research). They are based on a systematic literature review of current scientific evidence published in peer-reviewed journals.

The American Medical Association and the American Association of Health Plans assisted in the development of the NGC database. The

guidelines are produced by medical specialty societies, public or private organizations, government agencies or health care organizations. On March 1, 2000, the Clearinghouse provided access to 700 guidelines from 125 different organizations. By December 2003, the Clearinghouse was expected to contain a total of 3,500 guidelines.

Determining Whether Treatment is Compliant With the Guidelines

Whether treatment is “appropriate” for this study is based on whether the medical treatment provided in a given case met or deviated from the treatment prescribed in the guideline for the specific conditions selected. These guidelines typically are a mix of “dos” and “don’ts”—things that are considered medically desirable, and things that are considered inappropriate or just wasteful.

The treatment guidelines for these conditions can be conservative; that is, promoting a “wait-and-see” approach—for example, postpone aggressive (and expensive) treatment and diagnostic tests; do not prescribe unproven drugs. Some guidelines, however, are “positive”—they focus on things that physicians should do that have demonstrated efficacy. For example, an employee with depression should have an adequate supply of appropriate medication on hand and should see a doctor periodically to make sure their medication regime is effective (though we don’t know if the patient actually takes the medication).

Adjusting for Differences

Before comparing the impact of following the guidelines, we needed to be sure that compliance or noncompliance wasn’t simply a result of other factors. To get a true sense of the impact of compliance, IBI estimated multivariate linear and logistic regression models to control for, or “take out”, the effects of other characteristics that might

influence outcome such as age, gender, region of the country, health plan type (PPO, POS, fee-for-service) and—probably most important—the medical severity of the case (using Medstat’s disease-staging methodology).

We had no information to adjust for other key drivers of lost time and benefits use such as benefits design, occupation, wages and other employer-specific information because of data confidentiality agreements between Medstat and its clients.

Severity Controls: To get sound comparative results, it’s critical to adjust for the relative severity of a case. For example, if a patient has a severe back condition the physician may be more likely to determine that advanced diagnostic tests are required immediately, rather than waiting, as the

guidelines would suggest, for cases of lower severity.

To adjust for severity we used Medstat’s disease-staging process. It tracks the progression of an illness over time and records the “highest stage” of severity that the illness reached based on the level and number of procedures applied at different stages of treatment. This measure has the great advantage of not using medical costs or even hospitalization as an indicator of severity. If it did, the severity measure would be using as a yardstick the very things it is trying to measure.

IBI then compared total medical costs, STD incidence and duration, and workdays lost for cases with compliant medical treatment versus cases that were noncompliant with the guidelines applied by Medstat.

Appendix B

Description of Conditions Studied

Low-Back Pain

Low-back pain is defined as pain in the back as well as back-related leg pain (sciatica) that causes intolerance to physical activity. Low-back pain is a common complaint with a lifetime prevalence of 70%.

Back problems rank high among the reasons for physician office visits and are costly in terms of medical treatment and time lost from work. Low-back problems are the most frequent cause of disability among persons under age 45. Initial treatment of low-back pain is similar in most patients—symptom control to allow the patient to remain as active as possible. About 80% of low-back pain episodes are resolved two to six weeks after the onset and do not require specific treatment.

Diabetes

Diabetes mellitus is a disorder of glucose (blood sugar) metabolism due to impaired insulin control. In patients with diabetes mellitus, the absence or insufficient production of insulin causes hyperglycemia. The total incidence of diabetes in the United States is 0.624%, or 6.24 per 1,000 citizens (U.S. Department of Health and Human Services, 1995).

Besides the acute metabolic disorders associated with the lack of insulin and elevated blood glucose (sugar)—e.g., coma and infectious complications—there are a number of chronic complications that can result from diabetes. Over time, diabetes mellitus can lead to blindness, kidney failure and nerve damage. Diabetes mellitus is also an important factor in accelerating the hardening and narrowing of the arteries (arteriosclerosis), leading to strokes, coronary heart diseases and other blood vessel diseases.

Major Depression

Major depressive disorders are serious, disabling illnesses. In the U.S. alone, the estimated monetary costs for depression exceeded \$44 billion in 1990. The personal costs are reflected by higher mortality and impairment in multiple areas of functioning. The World Health Organization estimates that major depression is the fourth most-important cause worldwide of loss in disability-adjusted life years, and will be the second most-important cause by 2020.

Despite the high prevalence of depressive symptoms and major depressive episodes in patients of all ages, depression is underdiagnosed and undertreated by primary care and other non-psychiatric practitioners who are, paradoxically, the providers most likely to see these patients initially. Once identified, medication, psychotherapy or a combination of both can often treat the condition successfully.

ENT Conditions

Sinusitis, or inflammation of the sinuses, is one of the more common diseases. Sinusitis may be caused by anything that interferes with airflow into the sinuses and the drainage of mucous out of the sinuses, including viral respiratory infections and seasonal allergic problems or hay fever that cannot be expected to respond to antibiotics.

Pharyngitis is the inflammation of the pharynx (the back of the throat) causing a sore throat. Many common viruses, and even the viruses that cause mononucleosis (mono) and the flu, can cause a sore throat. A sore throat can also be caused by bacterial infection. One common bacterium to cause sore throat is *Streptococcus* (strep throat), the same bacteria that causes rheumatic fever.

This Appendix is abstracted from information provided by Medstat.

Coronary Artery Disease

Coronary Artery Disease (CAD), also known as Ischemic Heart Disease (IHD) or Coronary Heart Disease (CHD), affects seven million Americans. This type of heart disease is caused by arteriosclerosis, a narrowing of the coronary arteries that feed the heart. CAD is the number one killer of both men and women in the United States. Each year, more than 500,000 Americans die of heart attacks caused by CAD. Many of these deaths could be prevented because CAD is related to certain aspects of lifestyle. Risk factors for CAD include high blood pressure, high blood cholesterol, smoking, obesity and physical inactivity—all of which can be controlled.

Although medical treatments for heart disease have come a long way, controlling risk factors remains the key to preventing illness and death from CAD.

CAD begins when hard cholesterol substances (plaques) are deposited within a coronary artery. The plaques can cause a tiny clot to form, which can obstruct the flow of blood to the heart muscle. Symptoms of CAD include chest pain (angina pectoris) from inadequate blood flow to the heart; heart attack (acute myocardial infarction) from the sudden total blockage of a coronary artery; or sudden death, due to a fatal heart rhythm disturbance.

Appendix C

Description of Medical Guidelines Used in the Study

Low Back Pain

Drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) and salicylate analgesics are the preferred medications. In most circumstances, these medications all have very similar analgesic (pain-relieving) and antipyretic (fever-lowering) abilities. Their onset of action (the interval from the time of ingestion to the start of pain relief) also is similar. At high doses, salicylates and NSAIDs suppress inflammation and are, therefore, particularly useful in treating inflammatory diseases such as arthritis.

Muscle relaxants are medications that might work, but have less evidence. These relieve muscle spasm when the spasm is due to local problems (that is, problems originating in the muscle itself and not in the nerves controlling the muscles).

Opioid analgesics are a class of analgesics that are synthetic narcotics resembling the naturally occurring opiates. These medications will work, but should be used sparingly.

Steroids are medications used to reduce swelling, pain and other symptoms of inflammation. These are not recommended because of a lack of evidence to suggest their effectiveness.

Medical Treatment

Surgery visits, generally inpatient back surgery or outpatient laminectomy (spinal fusion) procedures, are not recommended within the first 30 days of the onset of symptoms. See Appendix D for more detail on the surgical procedures that should be avoided in the first 30 days.

Special studies, including special diagnostic tests such as myelography, electromyography

or thermography, are not needed during the first month for the condition we studied, because it is not possible to predict early on which patients will and will not improve during this period. Where serious underlying pathology is suspected, the diagnosis changes and takes the case out of our analysis.

X-rays, or plain radiography, is inappropriate within the first month of lowest-severity acute low-back pain included in the analysis that is not related to trauma, infectious causes or possible carcinoma. Other imaging services—routine spinal imaging tests—are also not generally recommended in the first month of symptoms except in the presence of red flags for serious conditions that are outside the analysis. Herniated disks and spinal stenosis are observed in a substantial number of asymptomatic patients. Therefore, anatomic abnormalities may not indicate the true cause of pain. These false-positive tests are an important reason to avoid early imaging in a patient with back pain.

Manipulation services—adjustment of body structures, such as the spinal column, so that pressure on nerves coming from the spinal cord due to displacement of a vertebral body may be relieved—are not recommended beyond the first 30 days.

Injection services such as spinal anesthesia or other medications, are not recommended, as there is no evidence to suggest it will help.

Compliant if:

- No steroids or injections.
- None of the following **within** 30 days: surgeries, special studies, x-rays, imaging.
- No manipulations **beyond** 30 days.

This Appendix is abstracted from information provided by Medstat.

Diabetes

The goal of treatment for diabetes is two-fold. The first goal is to control blood sugar levels as a way of avoiding acute complications from high or low glucose. The second is long-term control of blood sugar and surveillance for complications of diabetes. Intensive control of blood sugar in patients significantly delays the onset and slows the progression of complications of diabetes.

Medical Services

Cholesterol tests: Diabetes is an important factor in accelerating the hardening and narrowing of the arteries (arteriosclerosis), leading to strokes, coronary heart diseases and other blood vessel diseases. Elevated LDL cholesterol also is associated with an increased risk of coronary heart disease through the formation of cholesterol plaque that, over time, thickens the artery walls and narrows the coronary arteries resulting in chest pain and blockage of the artery leading to death of the heart muscle (heart attack). Thus, the diabetes guidelines require an assessment of LDL cholesterol levels to identify diabetes cases where there is likely to be heightened risk of heart- and artery-related disease.

Lifestyle counseling: Patients should have counseling related to improving lifestyle and reducing risk at least annually. The study used diabetes-related primary care physician visits as an indicator.

Ophthalmology visits: Retinopathy (aneurysms or hemorrhages within the retina) is a complication of diabetes that is readily treatable. A complete exam and visual acuity evaluation including direct dilated ophthalmoscopy or stereoscopic imaging should be performed annually. Diabetic retinopathy may not have symptoms; therefore, ongoing evaluation is important. When retinopathy is discovered in its early stages, laser photocoagulation therapy can prevent loss of vision.

This measure determines the rate patients receive evaluation services or therapeutic services from an ophthalmologist. Optometrists may also provide some of these services. Patients should have at least one eye exam annually.

Triglyceride tests: Mild to moderate increases in triglycerides occur in a number of diabetes conditions. Triglycerides are the major form of fat. Triglycerides come from the food we eat and from being produced by the body. High levels of triglycerides (greater than 200 mg/dl) are associated with a heightened risk of coronary heart disease. Markedly high levels of triglycerides should be treated aggressively with low-fat diets and, if needed, medications. Patients should have at least one test annually.

Hemoglobin tests: Diabetic persons must monitor their blood sugar one or more times daily in order to adjust their treatment and diet. In order for the patient's physician to determine how well the blood sugar is controlled, glycated hemoglobin (Hgb A1c) is measured. As blood cells move through the blood stream, they pick up a glucose coating, or glycosylation. The higher the blood glucose, the more coating blood cells will pick up. Keeping glycated hemoglobin in the normal or near-normal range helps prevent some of the major problems that diabetes can cause, such as blindness, kidney and nerve problems. Hgb A1c levels represent the mean blood glucose level that the red blood cells were exposed to over the previous 60-day time period. Patients should have at least four tests per year.

Compliant if:

- Patient has one or more office visits and at least three of the five other above services.
- Or patient has four or more hemoglobin tests and one of the five other above services.

Major Depression

Patients diagnosed with major depression should have at least one psychiatric visit per year. If the patient is being treated with antidepressants, he or she should have a supply of at least 60 days of medication on hand.

Compliant if:

- Patient meets both criteria.

ENT Conditions

A major objective of treating strep throat is to prevent the development of rheumatic fever, a serious illness that can cause joint pain and heart valve damage. For this reason, many healthcare professionals will recommend a “rapid strep” test for a patient with a sore throat. The rapid strep test can usually be done in the office and takes 15 to 20 minutes. If the result is negative, it is often followed with a strep culture. If either of these is positive, the sore throat is generally treated with penicillin or another antibiotic.

Antibiotic use is not appropriate for acute sinusitis. A major goal of the guidelines is to limit the use of unnecessary antibiotics to cut down on the development of drug-resistant strains of bacteria.

Compliant if:

- Strep screen to confirm infection before an antibiotic prescription is issued.
- Antibiotic use only if the strep test confirms the presence of the strep virus.

Coronary Artery Disease

Treatment of ischemic heart disease (IHD—lack of blood flow and oxygen to the heart muscle) involves prescribing medication to control symptoms; controlling hyperlipidemia (elevation of fats—lipids—in the bloodstream), which is believed to contribute to IHD; and controlling other contributing

conditions such as hypertension (high blood pressure).

Drugs

Antianginals, any drug used in the treatment of angina pectoris (a feeling of pressure on the chest), a symptom of CAD, should be prescribed and taken.

Nitroglycerin, a vasodilator (medication that dilates blood vessels) that frequently is used in the management of angina pectoris, should also be prescribed and on hand in case it is needed.

Medical Services

Cholesterol tests: Elevated serum cholesterol is a known risk factor for acute myocardial infarction (heart attack). Elevated LDL cholesterol is associated with an increased risk of coronary heart disease. LDL lipoprotein deposits cholesterol on the artery walls, causing the formation of a hard, thick substance called cholesterol plaque that, over time, causes thickening of the artery walls and narrowing of the arteries reducing the supply of enough blood and oxygen to the heart muscle during exertion. Lack of oxygen to the heart muscle causes chest pain; also, formation of a blood clot in the artery can cause complete blockage of the artery, leading to death of heart muscle (heart attack). The American College of Physicians and the American Board of Family Practice recommend frequent or appropriately timed cholesterol tests for patients with ischemic heart disease. Patients should have cholesterol screened at least annually.

Lifestyle counseling: Patients should have counseling related to improving lifestyle and reducing risk at least annually. The study used CAD-related primary care physician visits as an indicator.

Compliant if:

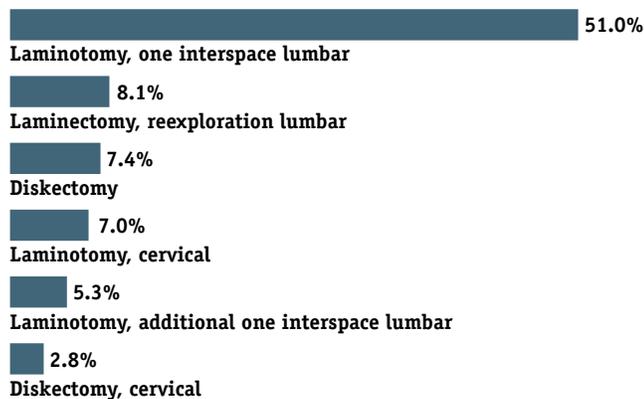
- Patient meets at least three of the four drug or medical treatment regimens specified above.

Appendix D

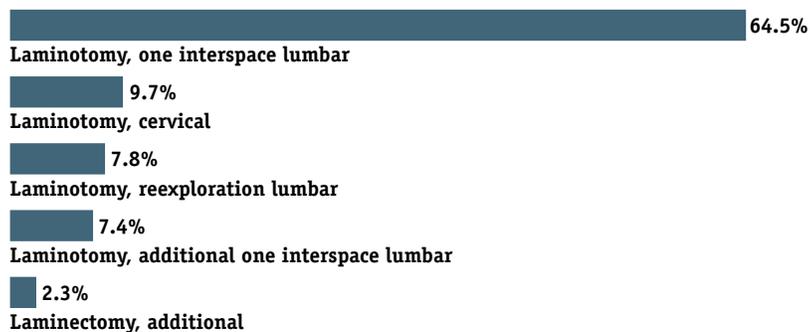
Back Surgery Characteristics

The following procedures are the most frequent surgery codes for noncompliant in-patient [Figure 25] and outpatient [Figure 26] surgical procedures. Laminotomy and laminectomy are surgical procedures involving the lamina, a thin bony layer covering the spinal canal. Laminotomy is the partial removal of the lamina. Laminectomy is the complete removal of the lamina.

[Figure 25]

Inpatient Back Surgery

[Figure 26]

Outpatient Back Surgery

Appendix E

Ear/Nose/Throat Conditions

ENT cases are ubiquitous, short-term and low-cost. The two conditions subject to the analysis are:

- **Sinusitis:** Inflammation of a sinus or the sinuses, especially in the nasal region
- **Pharyngitis:** Inflammation of the section of the alimentary canal that extends from the mouth and nasal cavities to the larynx where it joins the esophagus

The guidelines applied are conservative and proscriptive and recognize that many ENT conditions are viral and do not respond to antibiotics. The guidelines specify only that antibiotics should never be prescribed for sinusitis, and for pharyngitis only after a strep screen confirms a strep infection that is amenable to treatment by antibiotics. Thus, compliance is found for sinusitis if antibiotics are not prescribed and for pharyngitis if antibiotics are prescribed only in the presence of a strep screen [See Appendix C].

Since the guidelines only prohibit ineffective antibiotic prescriptions, meeting the guidelines should not, by definition, shorten absence or STD or eliminate STD incidence. Intuitively, compliance can be expected to reduce medical costs by the cost of unnecessary antibiotics and increase them for the costs of strep screens.

We found only two significant results after adjustments:

- Compliant cases have medical treatment that's \$107 cheaper—perhaps because the worker didn't go to a doctor for antibiotics or didn't pay for unnecessary antibiotics.
- The number of sick days was approximately 8% of a day (40 minutes) shorter—perhaps because the patient took additional time from work to go to the drug-store to fill an unnecessary prescription for antibiotics.

The results for STD incidence or duration were not significant.

Appendix F

Coronary Artery Disease

Medical treatment is compliant for 30.4% of CAD episodes. Compliant medical treatment for CAD is determined if three of the four following treatments occur during a year:

- **Nitroglycerin** prescribed and filled to take in case it is needed. It is a vasodilator, which increases blood flow to the heart taken in response to symptoms. Drug costs run approximately \$200 to \$300 a year.
- **Antianginals** prescribed and taken regularly—observed at least six month’s usage. These include beta-blockers, which are used to reduce blood pressure and prevent recurrence of heart attacks. Generics are available for under \$300 a year.
- **Cholesterol tests**—a screen for cholesterol fats in the blood. At least one total screen or LDL “bad” cholesterol screen.
- **Primary care physician lifestyle counseling**—at least one CAD-related PCP visit is a proxy for the presence of counseling related to improving lifestyle and reducing risk.

There are varying effects of complaint treatment on episodes compared to noncompliant treatment in terms of medical costs, STD incidence rate, duration in days of STD claims and the number of days of incidental workdays [Figure 27].

The treatment that might be expected in response to a period of STD or absence as

[Figure 27]

Impact of CAD Compliance

Guideline	Medical Payments	Disability Rate	STD Workdays	Incidental Workdays
Nitroglycerin script	Higher	Higher	Higher	Higher
Antianginal script				
Cholesterol test				
PCP visit (counseling)	Higher	Higher	Higher	

Significant at .05 level. Unless noted, there was no significant effect.

a result of a heart condition show higher costs and incidence, almost across the board. The preventive treatment modalities show no significant effects.

These findings substantiate IBI’s conclusion that difficulty in determining the timing of treatment, absence and disability in the database does not lend itself to clear-cut conclusions from IBI’s analysis.

Also, the preventive nature of several of the guideline treatments also have little absence or disability effect while increasing medical costs at least in the short term. As a result, employers are unlikely to learn much regarding the efficacy of these medical guidelines as they relate to employment-related results and the actions an employer might take to encourage their use.

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