



Driving Down Claim Costs With

PREDICTIVE MODELING

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Executive Summary



Tools based on predictive modeling are transforming claims management. In workers' compensation, automobile liability, general liability, medical professional liability, and other lines of insurance, predictive modeling enables insurers to identify problematic claims soon after they are reported, and to quickly allocate the necessary resources to mitigate losses. Predictive models also are used throughout the lifecycle of a claim to identify emerging problems and to flag potentially fraudulent activity. As a result, significant cost savings can be achieved.

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Introduction

A worker has been injured and the employer's workers' compensation insurer needs to assign an adjuster to the claim. To be certain that the worker receives treatment and services appropriate to the circumstances of the claim while at the same time effectively managing costs, the insurer must assign an adjuster with relevant experience and skills. As the first notice of loss is entered into the insurer's system, a computerized model scores various characteristics of the claim behind the scenes and matches them to a skill level of the company's adjusters. Almost immediately, the program identifies the best fit between the claim complexity and adjuster skill level required for most effectively managing the claim.

The above scenario is an example of using technology to more effectively and efficiently manage complex workers' compensation claims. More effective claims management can have material impact on outcomes – positively affecting a worker's satisfaction with how his or her case was handled while lowering medical and indemnity costs and internal expenses. These tools not only match claim attributes to adjuster skill level, but also can provide important

decision support capabilities throughout the claim lifecycle for tasks such as analyzing treatment and spotting fraudulent activity.

Many of these tools are based on predictive modeling, a process to identify and quantify factors that are likely to influence outcomes. The complexity of workers' compensation claims, and the number of decisions that must be made throughout the lifecycle of a serious claim, make workers' compensation particularly well-suited for the application of predictive modeling. Almost every line of insurance, however, can benefit from these types of tools. Predictive modeling is used today to improve the management of automobile liability, general liability and professional liability claims.

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What is predictive modeling?

Predictive modeling is the process of creating mathematical models of the likelihood of certain outcomes occurring by identifying patterns in data related to those outcomes. Perhaps the most familiar example of an application using predictive modeling is a credit score produced by any of the three credit bureaus, Experian, Equifax and TransUnion. Each bureau uses various pieces of information about an individual (income, credit history, etc.) to develop a score that predicts the likelihood that an individual will repay his or her debts. The higher the score, the more likely the individual is to repay debts on a timely basis.

Predictive modeling is closely allied with data mining, the process of using software to discover relationships among elements in a database. Using fraud as an example, data mining can identify characteristics that fraudulent claims have in common. These characteristics can then be incorporated into a model that scores claims and flags those that are more likely to be fraudulent.

One predictive modeling challenge has been to uncover meaningful relationships buried in multi giga-bytes of data. Recent developments in machine learning, including the use of advanced artificial intelligence technologies, have made it possible to uncover correlations among factors in massive data warehouses. In the case of insurance claims, these factors, or combination of factors, typically are cost drivers that could not otherwise have been identified and quantified by adjusters.¹

1. See June Hong and Sholom M. Weiss, *Advances in Predictive Model Generation for Data Mining*, IBM T.J. Watson Research Center, p.1

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The uses of predictive modeling in insurance claims

Predictive modeling has recently received a lot of attention in the insurance industry – initially for underwriting and pricing, but now for claims management and marketing as well. One organization that serves the property/casualty industry identifies four factors that have contributed to the increased interest in predictive modeling: technological advances that enable computational-intensive analysis of large data sets, the greater availability of data for analysis, the desire for growth in slow markets, and the search for a competitive advantage.²

For insurance company claims management, the search for a competitive advantage is a key driver for the adoption of predictive modeling. Insurers that can improve customer satisfaction by settling legitimate claims quickly and accurately while at the same time more effectively managing costs have a clear advantage over less sophisticated competitors. According to a Towers Watson survey of insurance carriers, within two years, nearly half of respondents expect to be applying predictive modeling to a variety of claim issues.³

Policyholders also benefit from the use of predictive models in claims management. This is especially the case for bigger companies that have large self-insured retentions, or which have loss sensitive workers' compensation programs. However, all insurance buyers benefit from predictive models that help to hold down costs for everyone.

Workers' compensation

Some of the most sophisticated applications of predictive modeling for insurance claims have been developed for workers' compensation. The complexity of serious workers' compensation claims, which can involve extensive medical treatments, physical rehabilitation, and transitional work before a worker can resume his or her prior work role, makes predictive modeling an especially effective tool for improving outcomes and managing costs. According to some experts, the use of predictive modeling in workers' compensation claims management can result in a 5 to 12 percent improvement in loss costs and up to an additional 3 to 7 percent improvement in claim leakage.⁴

Tools based on predictive models play a role from the moment an injury is reported. A rapid and effective response immediately following an injury is important: claim decisions made as early as even the first 24-48 hours following an injury can have a significant influence on the ultimate outcome. Predictive models analyze medical, psychological and social risk factors to identify high risk claims so that the most appropriate resources can be assigned from the

2. Charles Nyce, *Predictive Analytics White Paper*, American Institute for CPCU/Insurance Institute of America, 2007, p. 10

3. *Insights: Predictive Modeling*, Towers Watson, March 2011, p. 4

4. "Predictive Analytics for Workers Compensation Claim Management: It's All about Outcomes," ISO Review, <http://www.iso.com/Research-and-Analyses/ISO-Review/Predictive-Analytics-for-Workers-Compensation-Claim-Management-It-s-All-about-Outcomes.html#fig1>

More recently, the NICB reported that the number of suspicious or questionable claims increased sharply as the recession threatened workers with layoffs.

very beginning of the claim management process. Additionally, models can help identify the best cases for settlement, return-to-work, or early referral for case management.⁵

Predictive models can be used to monitor the progress of the claim to identify factors that can negatively impact outcomes. For example, models can analyze medical bills to determine if treatment is appropriate for the injury. If problems are identified, the insurer may be able to intervene with improved medical management to prevent claims from developing adversely.

In 2000, the National Insurance Crime Bureau (NICB) estimated that workers' compensation insurance fraud cost the insurance industry \$5 billion per year, and was the fastest-growing insurance scam in the nation.⁶ More recently, the NICB reported that the number of suspicious or questionable claims increased sharply as the recession threatened workers with layoffs. Predictive models have proved to be effective in flagging suspicious claims in all three main categories of fraudulent workers' compensation claims: worker, employer and medical provider. Anti-fraud software can screen claims based on dozens of criteria, scanning for red flags such as delays between medical appointments, long distances traveled to receive medical care and care that is inconsistent with an injury.

Liability claims

While the lifecycle of a workers' compensation claim differs from that of the typical automobile or general liability claim, the use of predictive modeling for managing liability claims has a number of similarities with workers' compensation. In particular, predictive modeling is used to identify claims that have the potential for high defense costs or more severe damages from the outset so that the most appropriate resources and strategies can be quickly deployed for the sophisticated decision-making necessary to manage claims with these more severe characteristics. Additionally, all lines of insurance benefit from effective fraud detection.

Factors that are predictive of bodily injury values include such things as the nature of the injury, characteristics of the claimant, location, and the time between the occurrence of the injury and the notification of a claim. Claims with characteristics of severe injuries can be identified for assignment to adjusters with the right skill set to manage the claim and to apply the additional analysis and evaluation of the issues relevant to an insured's legal liability that are necessary to obtain a valuation of the claim. The goal is to ensure that claims with a higher probability of developing into a large loss are handled with more attention early on to mitigate the ultimate loss.

5. "Triaging Trouble: Predictive Modeling in Claims Management," *Workers' Compensation Insider*, Lynch Ryan, Oct. 4, 2011, <http://www.workerscompinsider.com/2011/10/triaging-troubl.html>

6. "Fraud: Workers' Compensation Fraud and Convictions," *California Department of Insurance* <http://www.insurance.ca.gov/0300-fraud/0100-fraud-division-overview/0500-fraud-division-programs/workers-comp-fraud/index.cfm>

Predictive modeling also has been useful in assessing the benefits of innovative claims resolution techniques such as proactive physician apologies and early offer proposals.

Medical professional liability claims

Predictive modeling has proved to be effective in managing medical malpractice claims, which typically have a large number of variables that can contribute to the ultimate value. Factors can include such things as the type of procedure performed, the severity of the injury, claimant characteristics, the state and county where the suit was filed, treatment characteristics, the defendant doctor's specialty and years of experience, and the use of specific attorneys and expert witnesses.⁷

Early identification of potentially high severity claims allows claims managers to select the best claims handling tactics (litigate rather than settle, for example), to make more informed choices on defense counsel and expert witnesses, and to take other proactive steps to handle these claims in the most effective manner. Predictive modeling also has been useful in assessing the benefits of innovative claims resolution techniques such as proactive physician apologies and early offer proposals.⁸

Conclusion

"Some [insurance] companies are outperforming their peers by using predictive analytics applications such as case reserving systems, proactive claims protocols based on scoring claims data, and fraud monitoring tools," according to predictive modeling consultant Robert J. Walling, III. "Applications such as these are reducing claim frequencies and severities, cutting claims defense costs and improving efforts to identify and combat fraud."⁹

Tools that enable insurers to discover and quantify claim cost drivers in massive databases have transformed claims management at technologically advanced companies. Cost savings from the use of predictive modeling benefits not only insurers, but also their customers. This is especially true for workers' compensation, where many larger companies have loss sensitive plans or large self-insured retentions. Experts estimate that predictive modeling may make it possible to trim workers' compensation loss costs by as much as 12 percent.

Predictive modeling for claims management still is in its infancy. Experts agree that companies generally could do a much better job of compiling and cleansing data for data mining purposes, and that external data sources are being under-utilized. Better and more complete data will lead to further discoveries of cost drivers. Additionally, new technologies almost certainly will make it possible to identify more subtle and more complex relationships among factors that drive claim costs. Predictive modeling will make claims management increasingly more efficient and should continue to have positive impact on loss costs and expenses.

7. Robert J. Walling III, *Improving Commercial Casualty Claims Handling with Predictive Analytics*, Pinnacle Actuarial Resources, Inc., October 2010, p.1. <http://www.pinnacleactuaries.com/Files/Publications/PinnacleMonographCommercialClaims.pdf>

8. Walling, p. 4

9. Walling, p. 1

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