Utilizing Credit Scoring to Predict Patient Outcomes

An Equifax Predictive Sciences Research Paper
September 2005
Introduction — Improving Your Revenue Cycle Performance Through Financial Management Solutions

As today’s healthcare payment trends shift toward an ever increasing self-pay population, providers are at greater risk of losses. Due to rising costs associated with most health insurance plans, many employees are opting for reduced coverage to keep their monthly costs down. Add to that the uninsured population, and one can quickly assume that the financial risk levels in the healthcare industry are increasing.

Equifax Predictive Sciences, the modeling and analytical division of Equifax, undertook this research paper to provide a tool that will aid healthcare executives in understanding the value in using credit scoring in their decisioning practices. For many years, financial institutions have utilized credit data to better understand the financial risk associated with a client, and since the mid-80s have placed more confidence in the use of credit scoring to understand the client’s behavioral tendencies. The predictive power that lies within credit information is so strong that most lenders use it as the main consideration when extending credit. Credit scoring has gained huge acceptance in this process because of its non-biased nature and the speed in which a decision can be made. Due to the increasing self-pay population, the healthcare industry can benefit from the lessons learned in the financial arena by placing confidence in the predictive power of consumer data. Equifax Information Services LLC has been in the business of helping multiple industries improve their financial performance for more than 100 years. Working diligently over the past several years, we have successfully addressed the challenges of the healthcare industry’s financial performance as well. We assist thousands of hospitals and healthcare providers nationwide in reducing bad debt and accounts receivable days, as well as increasing overall revenue efficiencies.

Our solutions help to identify potential fraud, assess risk and offer insight into managing differences in demographic information and financial interactions with patients. With our extensive credit and non-credit consumer databases, we have the information and expertise that addresses one of the major problems of the healthcare industry: cash flow. Through our solutions, you can objectively handle the financial portion of your patient relationship wherever it fits best in your revenue cycle, helping you avoid major process changes and meet your financial improvement objectives.

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Equifax and the healthcare industry share the same vision: continuous improvement in patient care and protecting the patient mission. As a trusted steward of consumer information, Equifax has been awarded Cap Gemini’s ISO 9000 certification of our procedures for monitoring the quality, integrity and stability of our consumer database. Additionally, to the extent applicable to a particular product or service we provide, we operate subject to the guidelines of the Fair Credit Reporting Act, the Fair and Accurate Credit Transactions Act, the Gramm-Leach-Bliley Act and the Health Insurance Portability and Accountability Act. Inquiries to the credit database from healthcare providers are kept private to be viewed only by the consumer, and we have a long-standing policy to protect sensitive healthcare information. Patient privacy is a cornerstone of our services.

Whether your organization has an aggressive point-of-service collection strategy or handles the entire A/R in a patient accounting function, knowing patients’ propensity to pay can improve your cash flow, reduce days in A/R, and expedite assistance filings such as Medicaid and Charity. From a cost perspective, you can prioritize patient accounting resources, minimize costly collection methods and even maximize the economics of outside collection agency contracts. Take advantage of our expertise, world-class analytics and consulting services to identify your greatest return on investment opportunities.

One of the Greatest Challenges in Predicting Medicaid Eligibility is Estimating the Core Components that are Required to Qualify Patients

In “Top Issues Confronting Hospitals, 2004,” a research survey by the American College of Healthcare Executives, 480 CEOs responded to rank their three most pressing issues affecting their hospitals. Financial challenges was the most pressing, with 71 percent listing it in their top three, and within these challenges, Medicaid (78 percent) and bad debt (72 percent) were identified as the most specific concerns.

Medicaid is a concern because funding at the state level is being cut and Medicaid usage by patients has been on the rise since 1984. This trend creates a difficult situation for healthcare providers and chaos for the agencies that are charged with processing claims and verifying eligibility. For the providers, assigning resources to verify eligibility can be a taxing proposition since contact with the patient is needed to obtain the appropriate documentation required by the servicing agencies.
For a healthcare CFO, managing the hospital's bad debt is a constant challenge. Since a CFO's main responsibility is the financial health of its hospital, limiting the levels of bad debt is critical. These CFOs are challenged by multiple receivable factors such as managed care contracts, Medicare and Medicaid, but what keeps many up at night is caring for the uninsured and underinsured patient populations. By law, providers can’t control who enters their facility and therefore can’t contain their level of exposure.

**Challenges in Predicting Medicaid Eligibility**

One of the greatest challenges in predicting Medicaid eligibility is estimating the core components that are required to qualify the patient. The Medicaid eligibility guidelines are a sliding scale of household income by number of household members. The problem stems from finding reliable and proven sources of income and the number of household members. Currently there are two ways to obtain income information without contacting the patient. The first is through a demographic data provider that has household income as part of their deliverables. The second is through some form of an income prediction tool that includes either credit attributes, demographic attributes or both. The problems with obtaining household income from a demographic source are hit rates (many demographic variables are sparsely populated), and the information contained is reported by consumers but not verified. While this is OK for marketing and other efforts where generalities are accepted, it cannot be utilized as a benchmark for decisioning.

Income prediction scores utilize regression techniques to find correlations between attributes from the data source and the income to create an algorithm or output that equates to a predicted income. These tools can be flawed if the income being modeled is reported versus verified income since we are attempting to predict the actual income. An example of the difference between reported and verified income is where a clerk verbally takes the word of the patient about income (reported) versus actually receiving a pay stub or tax record (verified) as proof of income. The other challenge in utilizing an income prediction score is in validating the score against verified income to ensure its accuracy.

As with utilizing demographic information for household income, the same holds true for utilizing demographic data for household size. In a recent test, we found in most of the patients being analyzed (greater than 60 percent), the number-of-household attribute was missing. Again if a provider is going to utilize an
outside data source to assist in assigning resources, the predictive variables driving its decision strategy must be populated in the majority of cases.

**The Hypothesis**

Taking into consideration the providers’ concerns and the challenges of predicting actual income, Equifax Predictive Sciences began to create a hypothesis. If proven correct, this hypothesis could assist providers in not only identifying which population has the highest probability of Medicaid eligibility but could also identify the population most likely to pay their healthcare obligations. This hypothesis was developed after multiple tests and strategies proved that credit scoring, specifically Equifax’s Payment Predictor for Healthcare™ score, does work in segmenting the self-pay population most likely to pay versus the population less likely to pay their balances.

The hypothesis: Combining the Equifax Payment Predictor for Healthcare score with the Equifax Income Predictor® score to create a workflow for providers will enable them to effectively assign resources to a predicted outcome. The workflow is illustrated in Figure 1.

![Figure 1: A Work Flow of Providers](image)

Figure 1 visually represents that if our hypothesis is correct, a provider would use the two scores in the following manner:

- Higher credit score combined with higher income prediction = maximum collection efforts.
- Low credit score combined with low income prediction = minimum collection efforts and attempt to verify household income and number in household to qualify for Medicaid or Charity Care.
- Higher credit score combined with lower income prediction = first attempt to collect on the debt, but take an approach that allows the patient the opportunity to submit verified data to qualify for Medicaid or Charity Care.
• Low credit score combined with higher income prediction = minimum collection efforts.

There is a significant advantage to proving this hypothesis versus utilizing a straight Medicaid/Charity Care prediction tool. We are attempting to remove the inadequacies with the data elements and are creating a solution that provides workflow strategies that tackle both bad debt and Medicaid issues for the provider.

The Analysis
To test our hypothesis, we needed to obtain data from providers where the Medicaid eligibility had been verified. Additionally, recreating the decisioning period was critical and could be accomplished by utilizing Equifax's archived database. Equifax archives its credit database on a monthly basis and for analysis purposes, our Predictive Sciences group can obtain credit scores and attributes at the point of service to analyze how predictive metrics would have worked had they been used at the historical point in time.

The first test performed was on a data set provided by a third party collector of bad debt and provided the first supporting evidence that our hypothesis was correct. The collector provided a data set containing self-pay accounts, patient payment and balance information and verified Medicaid accounts. We appended our Payment Predictor for Healthcare score and Income Predictor score at the date-of-service points for the patients and matched that to the collector’s outcome data to arrive at the calculations in Figure 2.

To summarize the results, we found that the dual score strategy clearly identified the population on which to collect (Strategies A & B), the population on which to work Medicaid eligibility (Strategies B & C) and the population on which to perform minimal collection efforts (Strategies C & D). While these results
supported our original hypothesis, we felt the originating source, the third-party collector of bad debt accounts, restricted our story. We wanted to demonstrate the full benefit by testing it in the early-out environment. Therefore, we partnered with a large mid-Atlantic regional provider and obtained our second data set. Again we obtained a data set containing self-pay accounts, patient payment, balance information and verified Medicaid accounts with a date of service that covered a period of six months (July - December, 2004). We again utilized our historical archived credit database and appended our Payment Predictor for Healthcare score and Income Predictor score at the date-of-service points for the patients and matched that to the provider’s outcome data to arrive at the data in Figure 3.

The results show that had this provider utilized the strategies described above, they would have maximized collection efforts on 46 percent of their population, which would have netted 84 percent of their patient collected dollars. Likewise, had they applied more discovery collection calls on the Strategy B population and verification calls on their Strategy C population, they would have identified 92 percent of their Medicaid-eligible population. Based on the fact that the hypothesis has held up in two different testing environments, we believe we have proven our original hypothesis and support this initiative on a going-forward basis.

![Figure 3](image)

**Figure 3** Proving the Dual Score Strategy

<table>
<thead>
<tr>
<th></th>
<th>Strategy A</th>
<th>Strategy B</th>
<th>Strategy C</th>
<th>Strategy D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>18%</td>
<td>28%</td>
<td>50%</td>
<td>4%</td>
</tr>
<tr>
<td>Number Payment</td>
<td>45%</td>
<td>37%</td>
<td>17%</td>
<td>1%</td>
</tr>
<tr>
<td>Number Amount Collected</td>
<td>50%</td>
<td>34%</td>
<td>15%</td>
<td>1%</td>
</tr>
<tr>
<td>Number Medicaid Eligible</td>
<td>5%</td>
<td>21%</td>
<td>71%</td>
<td>3%</td>
</tr>
</tbody>
</table>

- **Strategy A** - High credit score & higher income prediction (18% of the scored population, 45% of the patients that paid their obligations, 50% of collected dollars and 5% of the Medicaid-eligible accounts were captured in this population)
- **Strategy B** - High credit score & lower income prediction (28% of the scored population, 37% of the patients that paid their obligations, 34% of collected dollars and 21% of the Medicaid-eligible accounts were captured in this population)
- **Strategy C** - Lower credit score & lower income prediction (50% of the scored population, 15% of the patients that paid their obligations, 15% of collected dollars and 71% of the Medicaid-eligible accounts were captured in this population)
- **Strategy D** - Lower credit score & higher income prediction (4% of the scored population, 1% of the patients that paid their obligations, 1% of collected dollars and 3% of the Medicaid-eligible accounts were captured in this population)

**Summary**

Today’s C-level executives are concerned with the level of exposure that caring for the uninsured and underinsured populations brings to their facilities. These executives need ways to service this population without finding themselves on the front page of newspapers for their collection tactics.
After two separate tests at different points in the revenue cycle, Equifax Predictive Sciences proved that combining our industry-specific Payment Predictor Healthcare score with our Income Predictor score could identify which populations a provider should collect on and which populations they should work as Medicaid/Charity Care eligible. Providers should feel confident in moving forward with a scoring strategy to prioritize their efforts.

There are many healthcare vendors attempting to meet the Medicaid/Charity Care-identification needs of providers but who may find growing pains without sound analytics behind their product offering. Our hypothesis was developed in the fourth quarter of 2004 but was not released publicly until sound analytical data supported our beliefs. This is the foundation on which our Equifax Predictive Sciences group has been built and on what it will continue to operate.

Background
In December 2003, Equifax Predictive Sciences released a research paper titled “The Unique Credit Characteristics of Healthcare Patients,” in which a correlation was drawn between healthcare payment performance and overall credit payment performance.

As a follow-up to that paper, Equifax Predictive Sciences utilized its research and development around multiple projects to summarize its hypothesis and findings with regard to utilizing credit scoring to predict patient outcomes.

Contact Information
Equifax Inc. is a global leader in information technology that enables and secures global commerce with consumers and businesses. We are one of the largest sources of consumer and commercial data. Utilizing our databases, advanced analytics and proprietary enabling technology, we provide real-time answers for our customers. This innovative ability to transform information into intelligence is valued by customers across a wide range of industries and markets.

Headquartered in Atlanta, Georgia, Equifax employs approximately 4,700 people in 13 countries throughout North America, Latin America and Europe. Equifax was founded 107 years ago, and today is a member of Standard & Poor’s (S&P) 500® Index. Our common stock is traded on the New York Stock Exchange under the symbol EFX.

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