



A Preventative Approach to Medication Nonadherence

New predictive analytics enable engagement with the right patients *before* they become nonadherent

Number 52—June 2011

Medication nonadherence has become known as a silent epidemic within the health care system. Each year, it is estimated to result in around 125,000 premature deaths and cost the US health care system \$290 billion.

These social and economic costs are rising and likely to rise further unless current approaches to nonadherence are rethought. Many existing approaches are only able to engage with patients after they have already stopped taking medication, exposing them to greater health risks.

Adherence initiatives need to be more preventative in nature, engaging with individuals at risk of failing to take their medication and keeping them adherent. This white paper shows how that goal can be achieved by applying predictive analytics to health care. It examines:

- Limits to current approaches to medication adherence.
- New predictive analytics that accurately assess the risk of patients becoming nonadherent in the future.
- How these analytics can promote more effective treatment strategies, improving patient adherence and health outcomes.

By predicting medication nonadherence, the FICO® Medication Adherence Score drives improved adherence rates, reduced costs and healthier patients.

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» **The High Cost of Patient Nonadherence**

Building patient engagement is increasingly seen as an important way of improving overall wellness and reducing health problems. Engagement initiatives like the provision of lifestyle advice and coaching, the use of e-learning programs, financial incentives and the closer integration of care management to primary care teams have been developed to encourage patients to play a more active role in their personal treatment.

These approaches all have the potential to deliver improvements in self-care, particularly in the realm of patient medication adherence. Research shows as many as half of all patients in the US do not take their medication as prescribed, 31% do not fill prescribed medication, 29% stop taking medication before supply runs out and 24% take less than the recommended dosage.¹

This issue has been gaining attention recently. The National Consumers League (NCL) and the Surgeon General have announced a three-year campaign to raise awareness of the importance of medication adherence. Many prominent health care associations and other industry leaders are supporting the initiative.

Patient nonadherence to prescribed drug regimes leads ultimately to poorer health outcomes for individuals and greater overall costs to the health care industry. In extreme cases, nonadherence can lead to premature death.

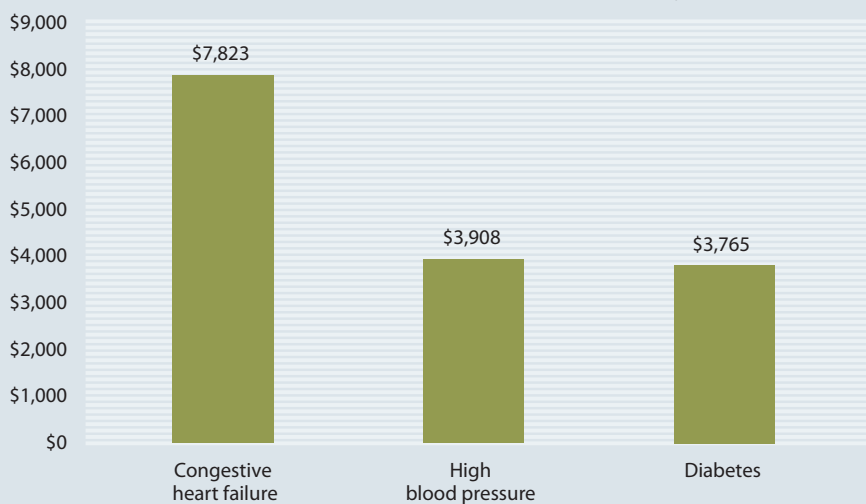
For instance, the health risks of drug nonadherence for patients with high blood pressure increase the likelihood of complications like coronary heart disease or stroke. It's estimated that better adherence to high blood pressure treatment would prevent close to 90,000 premature deaths per year in the United States.²

In addition to detrimental health consequences, nonadherence adds significant costs to the health care system. A nonadherent patient with high blood pressure requires on average \$3,908 per year more in total health care spending due to extra treatment, compared to an adherent individual.³ For congestive heart failure, the cost is estimated to be \$7,823 and for diabetes \$3,765.

The overall cost of nonadherence to the health care system is estimated at \$290 billion per year⁴—13% of US health care expenditure—and rising.

Figure 1: Costs of medication nonadherence

Additional annual cost of treatment for a nonadherent vs. an adherent patient



Source: Medication Adherence Leads To Lower Health Care Use And Costs Despite Increased Drug Spending, Health Affairs (2011)

¹ National Council on Patient Information and Education. "Enhancing Prescription Medicine Adherence: A National Action Plan" (2007)

² Norman G. "It takes more than wireless to unbind healthcare." Presentation at Healthcare Unbound Conference (2007)

³ Medication Adherence Leads To Lower Health Care Use And Costs Despite Increased Drug Spending, Health Affairs (2011)

⁴ Cutler D. & Everett W. "Thinking Outside the Pillbox: A System-wide Approach to Improving Patient Medication Adherence for Chronic Disease." New England Journal of Medicine, 362, 1553-1555 (2010)

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» Rethinking Nonadherence Strategies

There are a number of existing approaches to improving medication adherence. These can be summarized broadly as:

- **Monitoring:** For organizations with access to claims information—health care providers and payer organizations—it is possible to monitor patient treatment history and look for gaps. But this approach can only address nonadherence after it has occurred. Once treatment has been interrupted, it becomes more difficult to re-engage.
- **Point-of-care interaction:** Direct communication is another technique used by organizations like health care providers and retail pharmacies. However, it is costly and not always accurate; there is a tendency by patients to overstate prescription usage. It is also hard for practitioners to know which patients are in most need of counseling, making it difficult to allocate time and resources where most needed.
- **Behavioral surveys:** Psychometric-style surveys are employed to assess current and potential future adherence behavior. They are popular with pharmaceutical manufacturers, who do not typically have direct relationships with patients. Though useful, survey responses often give an incomplete picture of a patient population because they are limited by low response rates and spurious self-reported information.
- **Patient education:** Organizations send out mail, emails and SMS messages, and use TV and online channels to communicate with patients. Some pharmaceutical manufacturers combine educational material with incentives like copayment cards to reduce out-of-pocket expenses for individuals. These education strategies can be a useful but costly tool because they are too often conducted using a “one-size-fits-all” approach. This means valuable resources are used on patients who take their medication on time and in full, when better matched tactics would achieve superior results.

A new approach is needed to address the two primary problems with these current approaches.

First, retroactive action on patient nonadherence is too late. Patients are exposed to the risk of their medical conditions worsening in the time between nonadherence and re-engagement. It is also more difficult and costly to re-engage with a patient, and get them back onto a drug regime after they have already failed to fill a prescription. Methodologies that rely on identifying lapses in patient medication after they occur are part of the reason economic and social costs associated with nonadherence are so high.

Second, engagement strategies need to be more nuanced, channeling resources to where they will have the most impact—those patients with the greatest risk of nonadherence. The one-size-fits-all approaches typically employed are unable to do this.

» A Predictive Approach

The use of predictive analytics is the best way to overcome the limitations of current strategies and drive improved patient medication adherence.

Figure 2 shows how one such solution, the FICO® Medication Adherence Score, achieves this. The solution predicts who will become nonadherent *before* they stop taking prescriptions—a game-changer in the health care industry. Knowing who is most likely to become nonadherent in the future provides a foundation from which to build preventative engagement strategies.

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Figure 2: Solving the limitations to current nonadherence tactics

Current Tactic	Why It's Limited	How FICO® Medication Adherence Score Can Help
Monitoring	Backward looking. Patients are exposed to negative health outcomes; once treatment has been interrupted, it becomes more difficult to re-engage.	Predicts how likely a patient will become nonadherent, enabling engagement strategies to be proactive rather than reactive.
Point-of-care interaction	Hard for practitioners to know which patients are in most need of counseling, and for time and resources to be allocated appropriately.	Enables practitioners to quickly determine which patients are most in need of counseling at the point of care, and allocate time and resources appropriately.
Behavioral surveys	Limited by low response rates and spurious self-reported information.	Provides a broad baseline assessment of adherence propensity across the entire patient population. Requires no survey participation.
Patient education	Usually conducted using a "one-size-fits-all" approach, thus valuable resources are used on patients who take their medication on time and in full.	Ranks a patient population by probability of nonadherence, enabling more nuanced, segmented approach to customer engagement.

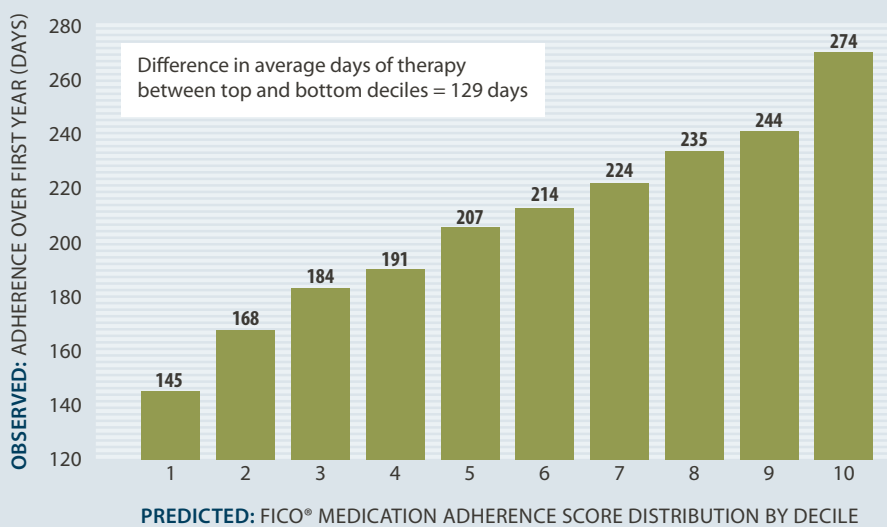
The FICO Medication Adherence Score works by ranking all individuals in a patient population according to their risk of nonadherence over the next 12 months. FICO developed this HIPAA-compliant tool by comparing thousands of variables from publicly available data sources with de-identified prescription claims history. While the solution considers numerous factors such as demographic characteristics, it does not use any personal credit information to compute scores.

The predictive power of the FICO Medication Adherence Score is highlighted in Figure 3, which shows the results of testing across a large national representative sample of patients. After all patients were scored, they were distributed by deciles (across the x-axis) by their likelihood to adhere to the prescribed medication for the course of a year.

To validate the solution's effectiveness, its predictions were compared with actual adherence performance on the sample of patients for the year following scoring (y-axis). The observed behavior validated that the FICO Medication Adherence Score accurately predicted adherence behavior. The top-scoring decile of patients took their medication as prescribed for an average of 129 days more than patients in the lowest-scoring group, showing strong separation between the highest-risk and lowest-risk segments.

Similar analytic precision was seen when the FICO Medication Adherence Score was tested on patients with high blood pressure, asthma, osteoporosis and gastrointestinal conditions. This accuracy is a result of the decades of experience FICO has in the field of predictive analytics. The FICO Medication Adherence Score builds on analytic methodology already proven in the financial services, insurance and retail sectors, and is now starting to be employed by health care organizations.

Figure 3: Accurately predicting medication adherence for hypertension



FICO® Medication Adherence Score accurately ranks patients from least to most likely to be adherent over the subsequent year.

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» Predictive Analytics at Work

By identifying which patients are most at risk of becoming nonadherent, the FICO® Medication Adherence Score provides a foundation from which to develop patient engagement strategies. Applying more nuanced tactics based on the FICO Medication Adherence Score improves health outcomes by concentrating engagement and education programs in areas where they will do the most good.

A score can be generated early in the course of treatment, when an individual is being prescribed drugs for the first time. If the score indicates the patient is at higher risk of nonadherence, there is an opportunity to spend extra time when prescribing the drugs to emphasize the importance of taking them on time and in full. Further into the medical regimen, more intensive engagement strategies, like nurse calls and visits, could be applied to strengthen ongoing levels of adherence. Lower-touch, lower-cost strategies—such as emails, direct mail education or copayment offers—can be employed with medium- and lower-risk groups.

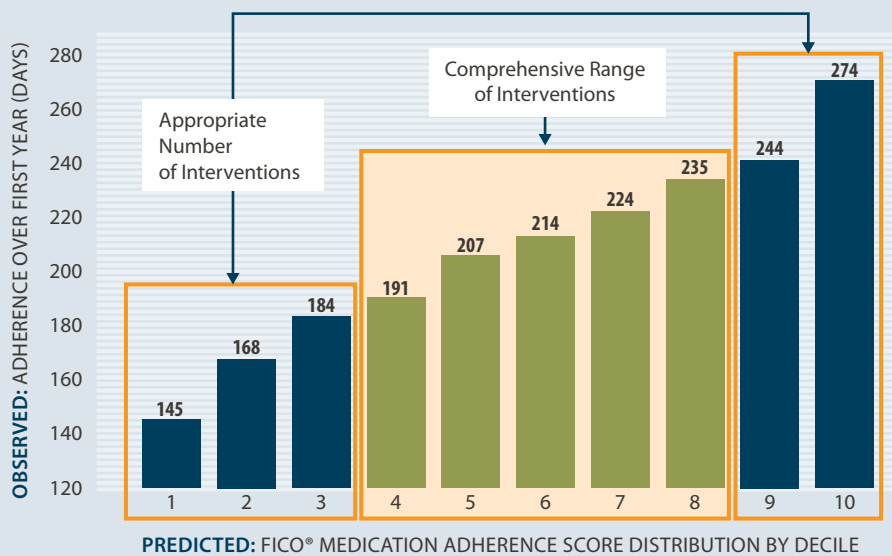
This differentiated approach has the potential to deliver greater health outcomes and lower costs, compared to traditional one-size-fits-all approaches.

Here’s an example. Traditionally, a payer organization might attempt to improve adherence of new diabetes patients through a mix of tactics including multiple nurse calls and counseling sessions—an expensive strategy. Using the FICO Medication Adherence Score, the level of nurse interaction could be adjusted to reflect a patient’s adherence risk ratings.

By reducing the level of nurse outreach to low-risk patients (those most likely to adhere), the company would reduce expenditure on low-risk patients and could re-deploy extra resources to engage the most at-risk patients. Patients considered low and medium risk may still be contacted, but using lower-touch educational strategies and communications.

Overall, the use of the FICO Medication Adherence Score to build patient engagement and education strategies is an effective way to improve adherence levels, focusing expenditure in the area it will do most good—and improving health outcomes across the patient population.

Figure 4: Moving away from a one-size-fits-all approach



Instead of using a broad-brush approach to engagement and education strategies, the FICO® Medication Adherence Score can be used to segment individuals into higher- and lower-risk groups. Here, patient risk levels were broken into deciles showing the observed average number of days’ adherence in each group. The scores can then be used to find the appropriate number and level of interventions in the different risk categories, with more intensive strategies applied to higher-risk segments (deciles 1, 2 and 3).

» Further Refining Engagement Strategies

Building on the FICO® Medication Adherence Score and additional layers of data, analytically driven test-and-learn strategies can be used by health care organizations to test different tactical approaches to adherence, measure effectiveness and refine strategies.

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This is important in deciding the most effective combination of engagement tactics from a large range of available approaches. For example, for a patient at high risk of drug nonadherence, what is the most effective combination of copayment cards, nurse calls, nurse visits, pill-top alarm reminders, emails and SMS messages?

The most advanced test-and-learn techniques can accurately infer results across a wide range of potential tactics to find the best tactics faster than traditional testing methods. Instead of the time-consuming task of measuring the impact of each variable in multiple tests, testing can be made smarter, faster and less costly by using a smaller but better designed sample set.

This advanced analytic test-and-learn is successfully being used by some organizations within health care. One FICO client involved in a multi-year disease management pilot used this approach to engage and retain diabetes and chronic heart failure patients. The approach helped the company surpass its internal patient enrollment target by 17% and its program sponsor's target by 36%.

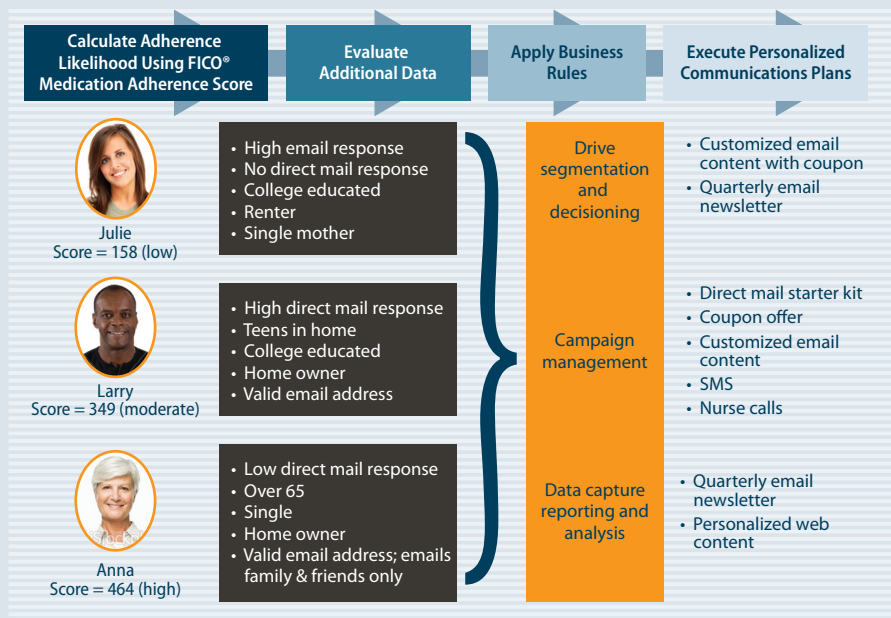
The company worked with FICO to determine what would motivate a group of 20,000 patients to enroll and adhere to a new disease management program. Specifically, the company tested potential messaging to find which would have the most impact on patients during the first few seconds of a nurse call.

The messaging was pre-tested in focus groups of individuals with diabetes or heart failure to gauge audience understanding and responsiveness. It was then tested again in a nationwide attitudinal survey, using a representative panel. FICO analytics were employed to quickly search within this survey information and other available data sources (e.g., demographic and credit bureau data) for groups of patients who respond similarly to specific engagement tactics.

The company used these test-and-learn results to segment patients into six groups, and to develop tailored engagement strategies for each segment that would maximize enrollment and retention.

Advanced test-and-learn techniques are particularly relevant now, as health care organizations consider the use of new communication channels such as mobile and social media. These approaches provide an effective way for organizations to test patient response to both old and new engagement tactics, helping them find the most effective engagement strategies more quickly and cost effectively.

Figure 5: Personalized engagement tactics



Here's an example of a predictive analytics approach to patient engagement and education. Patients are segmented into similar risk groups using the FICO® Medication Adherence Score. Additional key data—including factors known to affect adherence and preferred communication channels—are incorporated in the communications strategy. Then, business rules and testing can be applied to provide differentiated communications strategies across patient populations.

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» Conclusion

Many existing engagement and educational approaches to drug adherence are only able to focus on identifying patients after they have become nonadherent. The lag between when a patient stops taking treatment and when it becomes apparent to medical professionals places patients at greater risk of hospitalization and raises costs across the health care system.

Predictive analytics like the FICO® Medication Adherence Score are already in use by some health care organizations, and will play an increasingly important role in improving patient engagement initiatives and ultimately patient adherence.

Most importantly, the health care system and patients benefit from a win-win scenario: improved medication adherence rates, a healthier population and reduced expenditure across the health care spectrum.

Learn more about the FICO® Medication Adherence Score and other FICO solutions for health care.

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