

## Improving medication adherence Tailored approaches may boost potential for success



### Executive summary

Increasing medication adherence is critical to improving patient health outcomes and provider performance on value-based care (VBC) and related quality initiatives. Many of the quality measures in the Centers for Medicare and Medicaid Services' (CMS) value purchasing programs are influenced by medication adherence, and some measures capture adherence directly. For example, controlling hypertension and blood sugar — quality measures for accountable care organizations (ACOs) and Medicare Advantage plans — improves with higher levels of medication adherence. CMS also directly measures and rewards medication adherence for three conditions (diabetes, hypertension, cholesterol) under Medicare health plans that cover both Part C and Part D benefits and standalone Part D plans.

Deloitte's 2015 Survey of US Health Care Consumers finds that adherence is associated with consumers' attitudes about the health care system, wellness, and engagement with digital tools. The survey also shows that individuals' positive attitudes about the value of incentives in health plan offerings are associated with higher rates of reported adherence, and that — consistent with industry literature — lower rates of reported adherence are associated with individuals' demographic and socioeconomic characteristics.

Many health care organizations are developing numerous strategies and tools to help patients adhere to their medication regimens. These include sophisticated programs that combine sensors to see whether people take their medications, electronic reminders, communication with family members, and innovative benefit designs. New technologies, such as Proteus's digital pill, offer potential breakthroughs in measuring non-adherence and creating real-time strategies to address it.

Deloitte's consumer survey shows that many (54 percent) consumers who take prescription drugs are interested in using digital tools and mobile technology that provide alerts and reminders to take their medication. Although current usage of these tools is only 13 percent among survey respondents who had a prescription in 2015, many people who used the tools say they are very or somewhat interested in receiving this type of information. Among the larger group of people who had not tried these tools, 42 percent say they are very or somewhat interested in receiving this type of information.

A successful adherence strategy that lowers overall health care costs, produces better outcomes, and generates higher value-based reimbursement for providers likely will be tailored to specific chronic conditions and the underlying reasons for non-adherence. These may include economic barriers, lack of incentives, health literacy issues, drug-drug interactions and side effects, patient forgetfulness, and lack of support systems. Strategies to support adherence range from automated, "one-size-fits-all" approaches to personalized programs incorporating clinician involvement. Selecting and investing in a particular strategy should be based on a consumer's reason(s) for non-adherence and the potential benefits of better adherence — patients with chronic conditions where pharmaceutical therapy is critical for avoiding adverse outcomes might warrant a personalized approach.

### Low medication adherence can undermine health outcomes

Improving adherence to medication therapy — especially among people with chronic conditions — has been a longstanding concern for health care providers and payers. Low medication adherence undermines health outcomes and may lead to potentially avoidable mortality, morbidity, and health care spending. It also contributes to antibiotic resistance when individuals do not finish a course of treatment. According to the Centers for Disease Control and Prevention (2013):<sup>1</sup>

- Non-adherence causes ~30 percent to 50 percent of treatment failures and 125,000 deaths annually.
- Non-adherence to statins increases relative risk for mortality (~12 percent to 25 percent).
- Non-adherence to cardio-protective medications increases risk of cardiovascular hospitalizations (10 percent to 40 percent) and mortality (50 percent to 80 percent).
- Poor adherence to heart failure medications increases the number of cardiovascular-related emergency department (ED) visits.

Estimated US costs of non-adherence range from \$105.8 billion for adults diagnosed with diabetes, hypertension, or dyslipidemia in 2010<sup>2</sup> to \$290 billion for all patients in 2012.<sup>3</sup>

Non-adherence also can — perversely — increase an individual's health care spending. For example, a patient may be charged a \$10 copay for a 90-day supply of a generic blood pressure medication — a total of \$40 per year. If the patient has an uncontrolled hypertension event that sends her to the emergency room, the visit alone might cost as much as \$1,000 to \$2,000 — which she would have to pay in its entirety if she has a \$2,500 plan deductible. High deductibles also can lead to irregular prescription filling patterns if patients "stock up" on drugs at the end of the year once they've met their deductibles and don't start new fills until well into the next year.

Non-adherence has many underlying causes, including issues related to cost, health illiteracy, medication side effects, and patient forgetfulness. Causes may be voluntary or involuntary; conscious or unconscious. One involuntary cause is the inconsistent color/shape of pills and labeling of prescriptions/pill bottles. Older people, in particular, often have difficulty figuring out the meaning of labels that use Latin abbreviations, like TID for three times a day.<sup>4</sup> Similarly, people who speak Spanish might interpret "once" to mean "eleven." Solutions to address both voluntary and involuntary underlying causes for non-adherence, therefore, may be targeted to boost their potential for success.

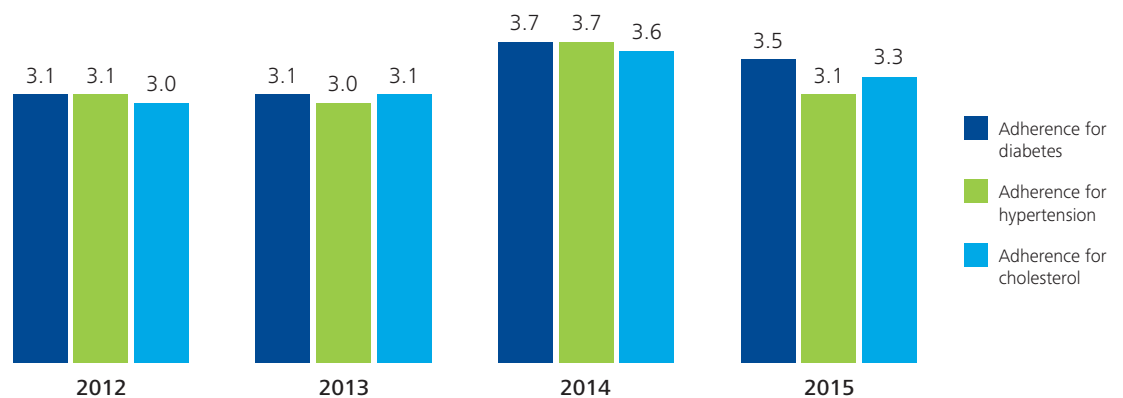


**Many health care organizations have incentives to improve adherence**

Increasing medication adherence is critical to improving patient health outcomes and provider performance on VBC and related quality initiatives. Medicare’s Star Rating program<sup>5</sup> for health plans (those that cover the full range of benefits, including drugs, and those that cover only drugs) provides financial bonuses to health plans with high quality scores and penalizes low performers using policy levers such as labeling these plans for consumers and even dropping them from program participation. Similarly, ACOs must meet quality performance thresholds to share in Star Rating program savings.

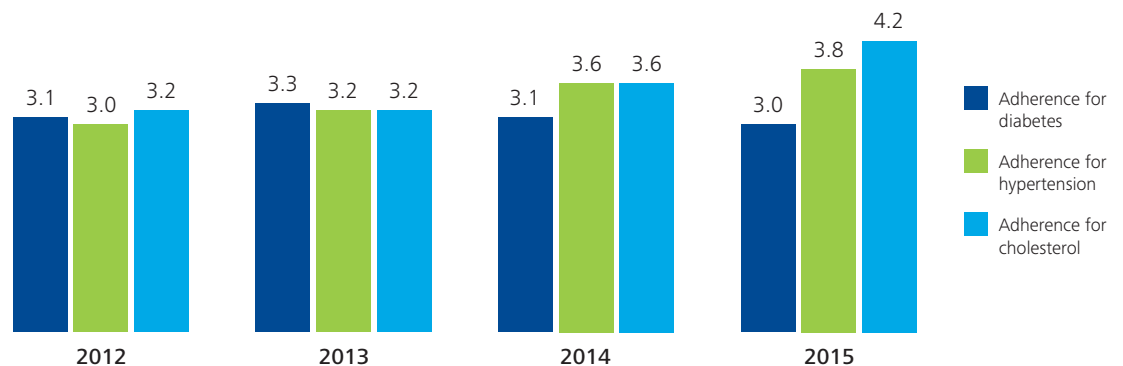
Many of the quality measures used in CMS’s value purchasing initiatives are influenced by medication adherence and some measures capture adherence directly. For example, controlling hypertension and blood sugar — quality measures for ACOs and Medicare Advantage plans — improves with higher levels of medication adherence. CMS has three medication adherence measures for plans offering Medicare Part D coverage. Both Medicare Advantage and Part D only plans saw improvement in these measures between 2013 and 2014; however, Medicare Advantage plans saw their ratings drop between 2014 and 2015 (see Figure 1). By contrast, Part D only plans saw improvement in two of the three measures, with a large increase (from an average star rating of 3.6 to 4.2 between 2014 and 2015) in the adherence measure for cholesterol (see Figure 2).

**Figure 1. Average star rating by Part D only measure — Medicare Advantage, 2012-2015**



Source: Fact Sheet — 2015 Star Ratings, Centers for Medicare and Medicaid Services<sup>6</sup>

**Figure 2. Average star rating by Part D measure — PDP, 2012-2015**

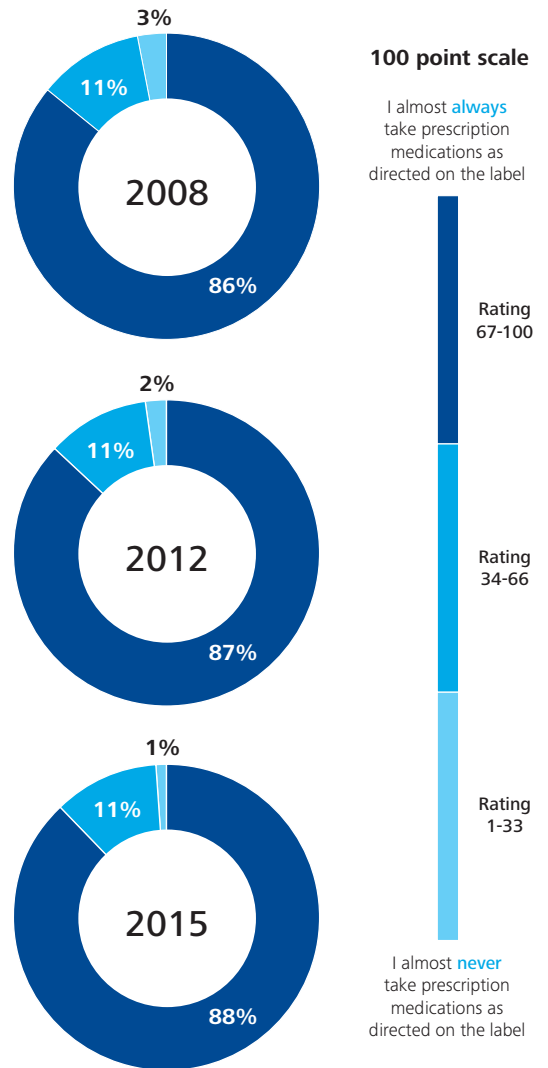


Source: Fact Sheet — 2015 Star Ratings, Centers for Medicare and Medicaid Services<sup>7</sup>

**Adherence is associated with consumer attitudes and demographic and socioeconomic factors**

Findings about medication adherence from Deloitte’s 2015 Survey of US Health Care Consumers differ from other studies in that they show adherence related to consumers’ attitudes about the health care system, wellness, and engagement with digital tools. Specifically, our study reveals that individuals’ positive attitudes about incentives’ values in health plan offerings are associated with higher reported adherence. We also found — consistent with industry literature — that lower rates of reported adherence are associated with individuals’ demographic and socioeconomic characteristics.

Figure 3: A consistent share of consumers reports non-adherence, 2008-2015



Source: 2015 Survey of US Health Care Consumers, Deloitte Center for Health Solutions

**Deloitte Center for Health Solutions 2015 Survey of US Health Care Consumers**  
 Since 2008, the Deloitte Center for Health Solutions has annually polled a nationally representative sample of US adults about their views of the health care system and their experiences and attitudes related to their health, health insurance, and health care. The general aims of the online survey are to track changes in consumer engagement over time and investigate key questions of interest to the health plan, provider, life sciences, and government sectors. Each sample includes 3,000 to 4,000 adults (18 years and older) and is representative of the US Census with respect to age, gender, race/ethnicity, income, geography, insurance status, and insurance source. This year’s survey was conducted between January 16, 2015 and February 8, 2015. Not all survey questions are repeated each year. Wherever comparable data are available, year-to-year trends are shown.

Our survey’s key adherence-related question was the individuals’ rating of adherence when presented with a 100 point scale, with “I almost never take prescription medications as directed on the label” at one end and “I almost always take prescription medications as directed on the label” at the other end. Figure 3 shows that responses have stayed more or less consistent between 2008 and 2015, with about 88 percent of people reporting that they almost always take their medication as directed.

We recognize that other medication adherence analyses have much lower reported adherence rates than our survey reports. We surmise that the reasons for our relatively high rates of reported adherence are that some individuals answer in the way they think is socially acceptable; that the “always” in our question may give some people “wiggle room,” and that the question does not take into account non-adherence due to not filling or refilling the prescription. Nevertheless, we found sufficient variation in the responses to be able to look at characteristics associated with higher reported adherence. In addition, an individual’s view of adherence differs from what is found in claims data, which show significant variability in adherence to the rigid guidelines of medications.

Studies to date have primarily analyzed the relationship between adherence and patient demographics, and adherence and health condition. These studies note a strong association between adherence and demographic factors such as age and income,<sup>8</sup> and adherence and patient health condition factors such as health status and chronic illness.<sup>9</sup> A study of the relationship between unintentional factors affecting adherence levels identified difficulty in affording medicines as a critical factor in non-adherence.<sup>10</sup>

In addition to patient demographics and health conditions, we quantitatively analyzed the impact of behavioral variables on adherence, such as participation in wellness and prevention programs, consumerism and other cost behaviors, and attitudes about traditional care. Understanding and leveraging these and other behavioral/attitudinal factors (including incentives) may help organizations develop their adherence strategies and lead to substantial improvement in clinical and health outcomes.

To understand the impact of consumers’ socio-demographic characteristics and attitudes on medication adherence levels, we built a regression model that isolates the effects of each factor. This type of analysis is helpful when responses to some questions are likely related — for example, people with low incomes may be less likely to have insurance coverage. Following our review of the research literature, we grouped the characteristics of interest into several categories:

- Demographic variables, including race, age, and gender
- Insurance and income status, and difficulty affording health care
- Chronic conditions and health status
- Behavioral and attitudinal variables, including responses to questions about incentives.

The model’s final version contained 17 independent variables, 14 of which were statistically significant despite controlling for all the other factors (some variables become significant when tested in certain combinations).<sup>11</sup> The overall R squared (the percentage of variation explained by the variables in the equation) for the analysis was 14 percent. Even though this is a relatively low R squared, it is not surprising, as the variables affecting non-adherence are complex and multi-faceted (see Figure 4).

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**Figure 4: Deloitte’s analysis of the consumer survey shows higher adherence is related to demographic, economic, health, and attitudinal characteristics**

Variable	Finding
<b>Demographics</b>	
Age group: Young =18-34, Middle-aged = 35-54, Older = 55+	People who are middle-aged or older are more likely than young people to report higher adherence.
Gender	Not significant.
Race: Black vs. not black	Lower reported adherence among blacks.
<b>Insurance and income status and difficulty affording health care</b>	
Insurance group: Six groups, with people with commercial insurance as the reference group	People without insurance are less likely to report higher adherence. However, the type of insurance does not have a significant effect on adherence.
Income (annual): Low = Less than \$25,000, Low-medium = \$25,000-\$49,999, Medium = \$50,000-\$74,999, High = More than \$75,000	Relative to the low income group, people with higher incomes are more likely to report higher adherence.
Out-of-pocket (OOP) spending is difficult to afford	People reporting that OOP payments are difficult to afford are less likely to be adherent.
OOP trend — whether spending has grown, stayed the same or decreased	Relative to individuals whose OOP stayed the same, people with decreasing OOP costs reported lower adherence.
<b>Chronic conditions and health status</b>	
Chronic condition (any kind)	People that have a chronic condition are more likely to report adherence than those that do not.
Health status: Four groups, sorted into poor, good, very good and excellent health, with poor as the reference group	People with better health status are more likely than those with a poor health status to report greater adherence. Note the previous variable on chronic condition: Those that have a chronic condition but are feeling good are more likely to report higher adherence.
<b>Behavioral and attitudinal variables, including responses to questions about incentives</b>	
<b>Wellness and prevention</b>	
Whether the person looked for online information on wellness and healthy living	People who are looking for information online are also more likely to be people who self-report being adherent to medications.
Whether people think that having a prevention program in their health plan would help them be healthy	People who favor this idea (think it would have an impact) are more likely to be adherent.
Whether individuals think there was a high impact on their health by using technological tools or getting points for using a wearable device like a Fitbit	Not significant.
<b>Consumerism/cost behaviors</b>	
If the person responded yes to looking for price information or looking at report cards on quality	More use of digital tools to obtain cost and quality information equals less adherence. Perhaps people are trying to shop for less expensive drugs and not finding them.
Whether people think having financial incentives in their health plan would help them be healthy	People who favor this idea are more likely to be adherent.
<b>Attitudes about traditional care</b>	
Whether the individual paid OOP for seeing an alternative practitioner	Consumers more likely to say yes had lower adherence levels. This may suggest that individuals with some skepticism about medications are less adherent.
Grade for whether the US system is innovative: Favorable, grade of A or B, Average, grade of C, Unfavorable, grade of D or F	People who grade the system as A or B are more likely to be adherent.

Source: Deloitte Analysis of 2015 Survey of US Health Care Consumers

In summary, our analysis revealed:

- Self-reported adherence is higher among older people and people who are not black. The finding that adherence is lower for people who are black is consistent with a recent Centers for Disease Control and Prevention (CDC) report.<sup>12</sup>
- Adherence is higher for people with insurance coverage, with higher incomes, and among those less likely to report that OOP spending is a challenge.
- People with chronic conditions are more likely to report that they are adherent with their medications. This finding is consistent with other studies.<sup>13</sup> Those reporting better health status also are more likely to report they are adherent. The nature of this association is not clear; better health status could result from higher adherence rates. Alternatively, better health status could help people with chronic conditions stay focused on remembering to take their medication, and/or might reflect a lack of side effects which could lead to non-adherence.
- Better adherence is associated with certain types of online consumer engagement activity. For example, adherence is higher among people looking online for information about their health condition. It is lower among people looking online for price and quality information.

- People who report paying for alternative medicine and services from alternative practitioners, and those who state that the US health care system is not innovative are less likely to be adherent. This may reflect a cluster of characteristics for people who are skeptical about or unsatisfied with their current care.
- Finally, people who are positive about the idea of having health plan incentives for healthy behaviors are more likely to report adherence. The finding is consistent with a study that suggests that incentive-based medication adherence interventions can be very effective. Across studies that reported adherence percentage comparisons, incentives increased adherence by a mean of 20 percentage points, but effects varied widely.<sup>14</sup>

The above findings indicate that when trying to encourage adherence, one must understand a significant amount of information about the patient, where they are in their “journey” with a disease and condition, their beliefs and interests, and their specific needs. Financial, clinical, and socioeconomic variables are important considerations; but so are perceptions, behaviors, and attitudes.

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### Creative solutions to improve adherence

Many health care organizations are developing strategies and tools to help patients adhere to their medication regimens. These include benefit design and other incentives, disease management programs, and multifaceted programs that combine technology with behavioral economics insights.

#### University of Pennsylvania's (UPenn) HeartStrong Program combines remote monitoring, alerts, and incentives

The Centers for Medicare and Medicaid Innovation awarded funding to U Penn for a project using monitoring technology, incentives, and behavioral economics principles to improve medication adherence for people hospitalized due to heart attacks. Patients use electronic pill bottles, which sense whether they are opened, to take their medications. If patients do not open their bottles, they receive a reminder from a family member to take the medication. If they do open their bottles, they are eligible for a small cash award distributed through a lottery.<sup>20</sup>

**Benefit design:** Reducing or eliminating drug cost-sharing for people with chronic diseases can improve adherence rates. One trial (Post-MI FREEE) tested the effect of eliminating cost-sharing on several outcomes, including adherence, for patients discharged from the hospital following a heart attack. The trial found that patients who did not have to pay cost-sharing for drugs had adherence rates four-to-six percentage points higher, and that total

#### University of Massachusetts' (UMass) digital pill may help doctors remotely monitor adherence

Researchers at UMass Medical School are beginning a pilot study to explore using an ingestible sensor or "digital pill" — a gelatin capsule with an embedded wireless sensor designed to hold medicine — that allows physicians to remotely monitor patients taking oral medications. Patients in the study will take the medicine as they normally do and the capsule will dissolve in the body. Once ingested, stomach acid will activate the transmitter-containing pill and a small hip-mounted device will download critical information to the internet. In almost real-time, the care team will be alerted as to whether the patient has taken the medication. Researchers hope the digital pill will help them get a sense of how and when patients take their medications and how many pills they take.

spending was no higher.<sup>15</sup> CMS recently allowed Medicare Advantage health plans to experiment with reducing cost-sharing or supplemental benefits to improve outcomes for chronic conditions.<sup>16</sup>

Despite interest in reducing drug cost-sharing to encourage medication adherence by people with chronic conditions, benefit design around drug coverage is often moving in the other direction, as seen in rising deductibles and cost-sharing levels for high-cost specialty drugs.

**Digital tools:** To counter forgetfulness as a reason for non-adherence, numerous companies are developing tools to remind people to take their medications. At the beginning of 2014, one health care industry expert found around 100 companies in this space.<sup>17</sup> Many of these tools have not yet been formally evaluated, but one study in the UK examined the effect of sending text messages to remind patients to take their medications; the study saw a significant drop in the share of patients who were the most non-adherent.<sup>18</sup>

**Multifaceted programs:** Some adherence programs combine disease management, incentives, and digital technologies. For example, researchers at several academic institutions have received funding to apply lessons from behavioral economics to the challenge of improving adherence, including reminders and incentive programs.<sup>19</sup>

#### Welldoc's Bluestar provides diabetes patients with a daily plan

Welldoc's Bluestar offering enables patients to self-manage their diabetes through real-time motivational, behavioral, and educational coaching. Bluestar coordinates care by helping patients adhere to their treatment plan while also providing clinical decision support to the patient's health care provider to optimize treatment decisions.



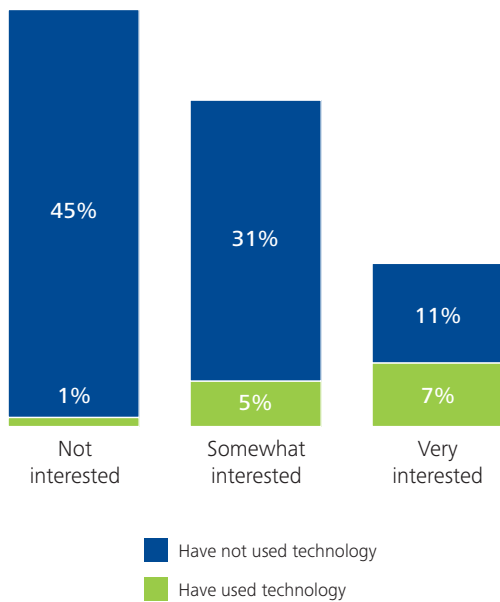
**Use of digital alerts and reminders is low, but people are interested**

Deloitte’s 2015 consumer survey shows that many (54 percent) consumers are interested in using digital tools and mobile technology that provide alerts and reminders to take their medication (see Figure 5). Although current use of these tools is only 13 percent among people who had a prescription in 2015, many people who used the tools say they are very or somewhat interested in receiving this type of information. Among the larger group of people who had not tried these tools, 42 percent say they are very or somewhat interested in receiving this type of information.

The gap between self-reported interest and actual use of a digital tool could represent a ripe area of research and investment for patient engagement to learn whether the issue is lack of access or concerns about the tools that are available.

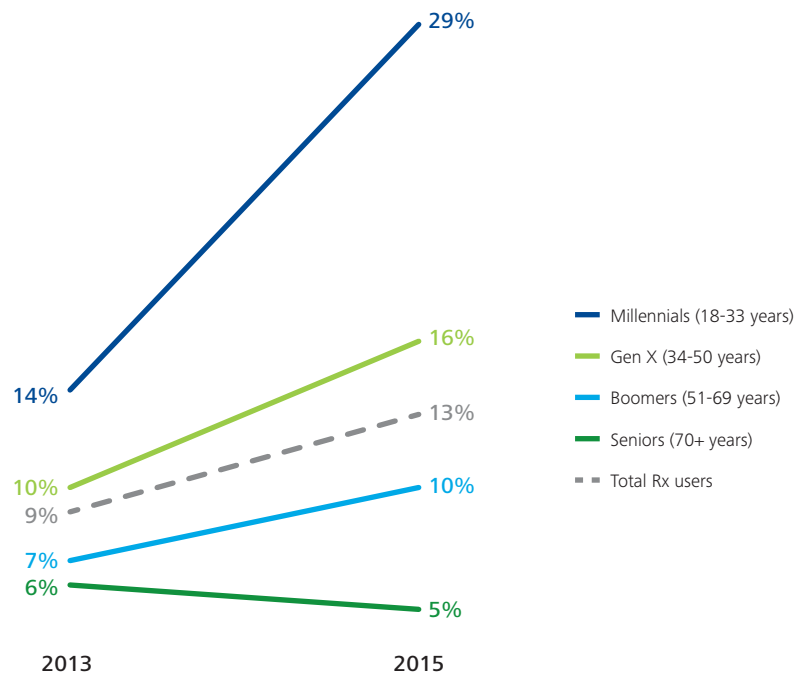
In the last two years, use of these tools has grown, especially among younger generations. For example, among Millennials, use has more than doubled, from 14 percent in 2013 to 29 percent in 2015 (see Figure 6). Use is more common among people covered through public health insurance exchanges (19 percent) compared with people with Medicare coverage (9 percent) (data not shown).

**Figure 5: Many people are interested in tools that provide medication alerts or reminders**



Source: 2015 Survey of US Health Care Consumers, Deloitte Center for Health Solutions

**Figure 6. Used technology to receive alerts or reminders**



Source: 2013 and 2015 Survey of US Health Care Consumers, Deloitte Center for Health Solutions

**Multiple touchpoints provide opportunities to improve adherence**

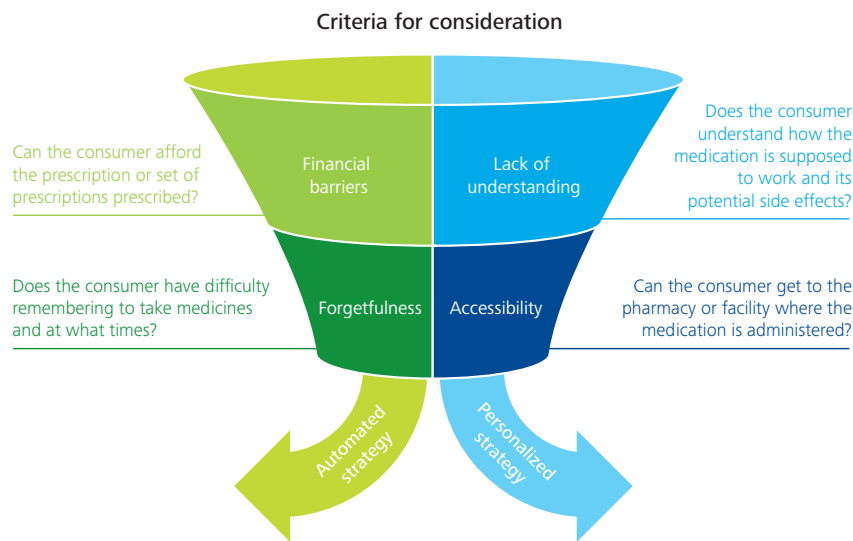
A strategy to improve medication adherence may be to tailor it to a consumer’s economic information and incentive issues. For example, if a person’s reason for non-adherence is financial, one potential solution is providing access to a discount coupon or best-price drugs (like those made available through the Good Rx app) and/or information about generic options or mail order savings. If the issue is side effects or skepticism about a medication’s benefits, scheduling a clinician consultation might be a good approach. Finally, if the issue is forgetfulness, the patient may need a reminder app.

Ultimately, a health plan or provider’s technology or program investment will likely be calibrated to the potential savings and better outcomes associated with improved adherence (see Figure 7). Consumers with chronic conditions where non-adherence can result in hospitalization might merit a more resource-intensive and personalized intervention than consumers taking medications for a relatively mild and/or short-term condition.

Life sciences companies striving to improve the clinical and market value of their medications may consider offering a patient services suite (see Figure 8) targeted to particular health conditions.<sup>21</sup> For example, if the issue driving non-adherence is side effects, a company may want to invest in patient services such as nursing support, which might generate more clarity around medication side effects or other strategies to address side effects. Also, these services can make a patient’s physician aware of any reasons for non-adherence so the physician can adjust the care plan and communications accordingly.

Personalized approaches will also need to recognize that adherence issues are often related to a patient not wanting to be reminded of their disease or condition, and so the field of behavioral science may be important to “nudge” patients toward adherence (in a personalized way) without their having to make a conscious choice to focus on health and wellness.

Figure 7. Adherence strategy should tie to underlying reasons and potential payoff



Source: Deloitte analysis

Figure 8. Elements of a comprehensive patient services suite



Source: Deloitte analysis<sup>22</sup>

**Strategies to support medication adherence may leverage key demographic data points**

- **Therapy:** Connect with patients to provide access to and support for their care, including addressing side effects and advocating for the patient with his or her clinical team.
- **Financial:** Help patients obtain the financial resources they require to remain on their medication. Solutions may include shopping tools, co-pay assistance, and other incentives.
- **Clinical:** Target patients who are most likely to report poor health.
- **Engagement:** Target digital solutions like alerts and reminders to consumers with the greatest interest in them. Provide more personalized assistance to those less interested in digital solutions.
- **Education:** Deliver educational insights to inform patient decision-making and behaviors. Solutions may include medical information and pharmacovigilance, nursing educational support, and between-visit care.

Even though health care industry stakeholders are improving their understanding of medication adherence and tailoring solutions to address the reasons for non-adherence, much work remains. For example, health plans and providers can learn from industries such as retail how to adapt existing consumer loyalty programs for patient adherence initiatives. Similarly, lessons from behavioral economics can be leveraged in adherence programs, including how to use incentives to motivate consumers to take particular actions that will benefit them and other stakeholders. Our study found that consumers who think that incentives are a good idea are also more likely to say they are adherent — but how does one motivate the non-adherent patient who is skeptical about incentives?

Solutions also may be tailored to specific illnesses and health conditions. For people with a particular type of cancer, side effects may be the biggest challenge, whereas for people with hypertension, it may be convincing them to take their medicine even though they feel normal.

Multiple touchpoints along the patient journey provide opportunities for health care organizations to offer support to improve medication adherence. A successful outcome should, in turn, lead to higher industry revenues, lower overall health care spending, and — most important — better patient outcomes.

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## Appendix

To understand whether there exists a strong association between medication adherence and patients' demographics and attitudes, we performed the ANOVA F-test (Exhibit 1.1) to ascertain if all variables taken together in the model are jointly significant. The F-value is significantly higher than the critical value at 95% confidence level, which means all factors taken together are significantly different from zero. The low p-value (lower than 0.05) signifies that we fail to accept the null hypothesis of no impact model (all coefficients being equal to zero). Hence, the overall regression model is statistically significant. A statistical measure R-square is used to assess the goodness of model fit. For our regression model, the R-square value is 14% (Exhibit 1.2). This suggests that there are other factors which can be added to the regression model to explain variation in adherence. However, given the complexities, our regression model is able to capture a fair amount of variation in medication adherence.

The adherence measure used in the analysis is a rating variable. When taking prescription medications, some people always take them strictly according to the directions on the label (they take the right dose at the right times for the entire recommended period of time even when they start feeling better), while others do not.

We fit a multiple linear regression model in our analysis:

- $Y \sim (\text{Age, Income, Race, Sex, Insurance type, Employment type, OOP trend, Health status, Chronic condition, Financial incentives, Technological incentives, Wellness and prevention programs, Online presence indicator})$
- Where 'Y' is the measure of medication adherence

Exhibit 1.1 — ANOVA Model Results

Analysis of variance					
Source	DF	Sum of squares	Mean squares	F Value	Pr > F
Model	28	237,066	8,467	21.08	<.0001
Error	3,587	1,440,716	402		
Corrected total	3,615	1,677,782			

Exhibit 1.2 — Overall Model Performance

Analysis of variance	
R-Square	14%
Adj R-Sq	13%
AIC	25327
AICC	25327
SBC	21888

Exhibit 2.1

Regression results: Parameter estimates						
Parameter Category	Parameter	Estimate	Standardized estimate	Standard error	t Value	Pr >  t
<b>Base</b>	Intercept	67.40	0.00	1.75	38.51	<.0001
<b>Demographics</b>	Age group: Middle-aged	4.95	0.11	0.86	5.76	<.0001
	Age group: Old	8.13	0.18	1.01	8.01	<.0001
	Sex: Female	1.09	0.03	0.69	1.58	0.1139
	Race: Black	-2.74	-0.04	1.01	-2.70	0.0069
<b>Insurance and income status and difficulty affording health care</b>	Insurance group: HIX	1.72	0.02	1.83	0.94	0.3464
	Insurance group: Medicaid	0.14	0.00	1.27	0.11	0.9122
	Insurance group: Medicare	-0.24	0.00	1.10	-0.22	0.8284
	Insurance group: Others	1.73	0.02	1.31	1.32	0.1865
	Insurance group: Uninsured	-5.79	-0.09	1.14	-5.08	<.0001
	Employment Status: Employed	-2.30	-0.05	0.84	-2.73	0.0063
	Income group: High	2.23	0.05	0.98	2.29	0.0223
	Income group: Low-Medium	3.21	0.06	1.06	3.04	0.0024
	Income group: Medium	3.75	0.06	1.22	3.07	0.0022
	Out-of-pocket spending difficult to afford	-1.25	-0.03	0.81	-1.55	0.122
<b>Chronic conditions and health status</b>	Out-of-pocket trend: Decreased	-5.24	-0.06	1.43	-3.67	0.0002
	Out-of-pocket trend: Increased	1.15	0.03	0.78	1.47	0.1405
	Chronic condition	4.13	0.10	0.77	5.37	<.0001
	Health status: Excellent	1.91	0.03	1.30	1.47	0.142
<b>Behavioral and attitudinal variables</b>	Health status: Good	1.53	0.03	1.07	1.44	0.1513
	Health status: Very Good	3.33	0.07	1.10	3.03	0.0025
	Researched wellness/Prevention info online: Yes	2.82	0.06	0.81	3.47	0.0005
<b>Consumerism/cost behaviors</b>	Prevention program in health plan impact	2.47	0.05	0.89	2.78	0.0054
	Technological tools usage impact	0.35	0.01	0.91	0.38	0.7015
<b>Attitudes about traditional care</b>	Financial incentives in health plan impact	4.05	0.09	0.87	4.66	<.0001
	Looked for price and quality info online: Yes	-3.46	-0.07	0.83	-4.19	<.0001
<b>Attitudes about traditional care</b>	OOP for Alternate Practitioner: Yes	-3.57	-0.04	1.54	-2.32	0.0205
	Graded US HealthCare system on innovation: Average	1.65	0.03	0.96	1.72	0.0852
	Graded US HealthCare system on innovation: Favorable	5.69	0.13	0.88	6.45	<.0001

Out of a total of 17 independent variables in the regression model, 14 are individually statistically significant. Variable “Out-of-pocket spending difficult to afford” is not significant in the model at 5% and 10% significance level (Exhibit 2.1). However, when we perform a joint significance F test with other cost variables such as OOP trend and financial incentives, it gains overall joint statistical significance.

## Endnotes

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