



Issue Brief: Medication Adherence and Health IT

Date: January 9, 2014

Author: Aja B. Williams, J.D., M.P.A.
Policy Analyst
ONC, Office of Policy and Planning

Acknowledgements: Kathy Kenyon, J.D., ONC
Kory Mertz, B.A., ONC
Tricia Lee Wilkins, Pharm.D., Ph.D., ONC

Table of Contents

What's the Issue?	3
Changing View of Medication Adherence	
Measuring Medication Adherence	
Health Outcomes	
Economic Impact	
What Has Happened So Far?	6
Meaningful Use and Certified EHR Adoption	
Electronic Prescribing	
Drug Formulary	
Medication List/Reconciliation	
North Carolina HIE: PHARMACeHOME	
Electronic Drug Monitoring	
Predictive Modeling	
Southern Piedmont Beacon Community: Closing the Gap!	
Substitutable Medical Apps, Reusable Technologies (SMART) Platform	
Consumer eHealth Tools	
Southeast Michigan Beacon Program: Patient Health Navigator Initiative	
Hawai'i HIE: Pharm2Pharm	
Video Challenge/Txt4health	
What Are the Opportunities and Challenges?	11
What's Next?	12

“Drugs don’t work in patients who don’t take them.”
– C. Everett Koop, MD

There seems to be agreement that medication adherence is important, can improve health, and reduce costs. Innovations in health information technology (health IT) present an opportunity to increase medication adherence rates, measure medication adherence, improve care, improve overall population health, and reduce health care costs.

Today, vendors are increasing the number of consumer facing tools to assist in the self-management of health conditions. Medication adherence, specifically the lack thereof, presents an opportunity for the health IT community to develop solutions and tools that support medication adherence to improve the quality of life and health of millions of Americans. Without the use of information technology (IT), measuring medication adherence can be onerous, with feasibility and cost being barriers. Innovations in health IT can increase the feasibility of monitoring, accuracy, and widespread usage of medication adherence tools.

This brief provides an overview of medication adherence and how implementing health IT can increase adherence rates that support wellness and population health. HHS, via the Office of the National Coordinator for Health Information Technology (ONC) and the Centers for Medicare & Medicaid Services (CMS), is supporting medication adherence and medication management through a variety of activities, including the meaningful use of certified electronic health records (EHRs) and through the Medicare and Medicaid EHR Incentive Program. In addition, this brief identifies challenges pertaining to reliable metrics and the expansion of consumer-based tools that encourage patient and caregiver participation in medication adherence.

What’s the Issue?

Changing View of Medication Adherence

There is a changing view of medication adherence. Medication adherence commonly refers to the “extent to which a patient takes medications as prescribed by their health care provider,”¹ specifically, their conformance to timing, dosage and frequency of medications taken during a prescribed length of time.²

Adherence implies mutual engagement on the part of the provider, the patient, and their caregiver that results in consensus regarding the patient’s treatment regimen.

- Ho, et al

However, some have suggested that this definition assumes a passive role of patients and that medication adherence requires a more active role for providers, patients, and caregivers. According to *Facilitating Treatment Adherence: A Practitioner’s Guidebook*, “Adherence is the active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behavior to produce a therapeutic result.”³ In this instance, medication adherence implies mutual engagement on the part of the provider, patient,

¹ Meichenbaum D and Turk DC. *Facilitating Treatment Adherence: A Practitioner's Guidebook*. New York: Plenum Press, 1987.

² Viswanathan M, Golin CE, Jones CD, Ashok M, Blalock S, Wines RCM, Coker-Schwimmer EJL, Grodensky CA, Rosen DL, Yuen A, Sista P, Lohr KN. *Medication Adherence Interventions: Comparative Effectiveness. Closing the Quality Gap: Revisiting the State of the Science. Evidence Report No. 208.* (Prepared by RTI International–University of North Carolina Evidence-Based Practice Center under Contract No. 290-2007-10056-I.) AHRQ Publication No. 12-E010-EF. Rockville, MD: Agency for Healthcare Research and Quality. September 2012. <http://www.effectivehealthcare.ahrq.gov/reports/final.cfm>.

³ Meichenbaum and Turk.

and caregiver that results in consensus regarding the patient's treatment regimen.⁴ Medication adherence, in this view, is a dynamic practice that is part of an ongoing collaboration, rather than a static activity determined unilaterally by a health care provider.

The Surgeon General has identified three categories for non-adherence:

- (1) primary non-adherence (occurs when patient does not obtain prescribed medication)
- (2) discontinuation (occurs when a patient stops taking a prescription too early); and
- (3) compromised execution (patients who are actively engaged in therapy, but use medication inconsistent with provider instructions, i.e. skipping dosages and splitting pills).

Health IT can support a more engaged approach to medication adherence by supporting consumer decision-making and coordination between patients and health care providers.

Measuring Medication Adherence

Despite the existence of many effective medical treatments, the Institute of Medicine reported discrepancies between the projected estimates for treatment success rates and actual treatment outcomes.⁵ "This gap has been attributed partly to lack of patient *adherence* to recommended treatment."⁶ The Agency for Health Research and Quality (AHRQ) attributed low medication adherence rates to: (1) poor communication between the provider and patient/caregiver; (2) socioeconomic barriers for the patient; (3) and complexity of medication regimen prescribed.⁷ If left unchecked, the high prevalence of medication non-adherence may have a substantial and detrimental impact on U.S. population health and economy.

Absent the use of IT, measuring medication adherence can be costly, labor-intensive and may produce unreliable results. There are a number of methods used to measure medication adherence and these methods are categorized as either direct or indirect.^{8,9} "Direct methods include: taking medication in the presence of a health care provider, measuring the level of medicine or metabolite in blood or measuring biological markers in blood, once a prescription is taken."¹⁰ Indirect methods include: pill counts, self-report, patient diaries, pharmacy refill data, electronic medication monitors, and other telemedicine devices. While direct measures are considered by some to be more reliable and accurate than indirect measures, most agree that direct methods are too burdensome and not practical for routine clinical use.¹¹

Human interventions that once required direct patient contact can now be performed electronically using health IT. For instance, with the advent of video conferencing and smartphone applications, patients, caregivers and providers are now able to monitor medication

⁴ Ho, P, Bryson C, and Rumsfeld J. "Medication Adherence: It's Importance in Cardiovascular Outcomes." [In eng]. *Circulation* 119, no. 23 (Jun 16 2009): 3028-35.

⁵ Priority Areas for National Action: Transforming Health Care Quality. Summary of Institute of Medicine report. Agency for Healthcare Research and Quality. Rockville, MD: January 2003. <http://www.ahrq.gov/qual/iompriorities.pdf>

⁶ Viswanathan M, Golin C, Jones C, Ashok M, Blalock, Roberta CM Wines, Emmanuel JL Coker-Schwimmer, et al. "Interventions to Improve Adherence to Self-Administered Medications for Chronic Diseases in the United States: A Systematic Review." *Annals of Internal Medicine* 157, no. 11 (2012): 785-95.

⁷ Viswanathan, et al. Medication Adherence Interventions: Comparative Effectiveness.

⁸ Osterberg L and Blaschke T. "Adherence to Medication." [In eng]. *N Engl J Med* 353, no. 5 (Aug 4 2005): 487-97.

⁹ This is not in reference to compliance. Compliance implies "submissive behavior" of complying with a provider's will and order. Researchers have recognized that a patient-centered approach that builds on the patient's strengths and choices is more effective at achieving adherence. Adherence implies more of a collaborative, active role between patients and their providers.

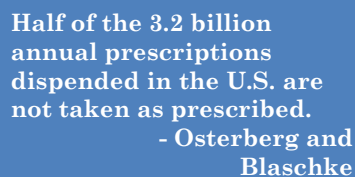
¹⁰ Ho, et al.

¹¹ Id.

adherence through video-logged confirmation of dosage. Using health IT increases the feasibility of monitoring medication adherence and promotes technological innovations that are consumer-facing to improve self-management.

Health Outcomes

Medication non-adherence poses a threat to public health and increases costs of health care. In the United States, it is estimated that lack of adherence causes approximately 125,000 deaths and at least 10% of hospitalizations.¹² Half of the 3.2 billion annual prescriptions dispensed in the U.S. are not taken as prescribed.¹³ This number is even lower among patients with chronic conditions. Chronic conditions persist over a length of time and are among the most costly and preventable of all health problems in the U.S.¹⁴ The Centers for Disease Control and Prevention (CDC) reported that 75 percent of health care expenditures are used for the treatment of chronic disease. Non-adherence occurs with greater frequency in persons suffering from multiple chronic conditions and among those taking multiple medications.



Half of the 3.2 billion annual prescriptions dispensed in the U.S. are not taken as prescribed.
- Osterberg and Blaschke

Economic Impact

Evidence suggests that medication adherence programs have the potential to reduce health spending and generate significant savings for taxpayers. [The IMS Institute for Healthcare Informatics](#) estimated that implementing improvements in medication adherence could mitigate \$105.4 billion in avoidable costs. On average, non-adherent patients have higher health costs per year: \$3,700 for diabetes, \$3,900 for hypertension, and \$7,800 for congestive heart failure. Adherence to diabetes medications alone could save \$4.7 billion.¹⁵

In November 2012, the Congressional Budget Office (CBO) released a report announcing a change in the agency's estimating methodologies that attributes cost savings to legislation that directly affects the quantity of prescriptions filled. The agency relied on analysis that demonstrated a link between changes in prescription drug use and spending for medical services pertaining to the Medicare Part D drug benefit program:

“For example, a policy that increased prescription drug copayments for certain Medicare beneficiaries might save \$4 billion in federal drug costs in a given year but reduce the number of prescriptions filled that year by 1 percent. That reduction in use would result in a one-fifth of 1 percent increase in the affected population's total spending for medical services. If that total spending would otherwise be \$250 billion in that year, then those costs would increase by \$0.5 billion. The net effect of the policy,

¹² Viswanathan, et al. "Interventions to Improve Adherence to Self-Administered Medications for Chronic Diseases in the United States: A Systematic Review."

¹³ Osterberg and Blaschke.

¹⁴ "Chronic Diseases and Health Promotion." Centers for Disease Control and Prevention. <http://www.cdc.gov/chronicdisease/overview/index.htm>.

¹⁵ Roebuck MC, Liberman JN, Gemmill-Toyama M, and Brennan TA. Medication Adherence Leads To Lower Health Care Use And Costs Despite Increased Drug Spending. *Health Affairs*. January 1, 2011; 30(1):91-99.

combining the savings on drug costs of increased use of medical services, would be a saving for the federal government of \$3.5 billion in that year.”¹⁶

Essentially, CBO’s new method incorporates offsets or savings from decreases in medical services, which had not been previously recognized.

What Has Happened So Far?

Meaningful Use and Certified EHR Adoption

Innovations in health IT and higher adoption and use of certified EHRs present opportunities to reduce medication non-adherence. The [Health Information Technology for Economic and Clinical Health \(HITECH\)](#) Act established financial incentives for eligible hospitals and health care professionals to adopt and meaningfully use certified EHRs. The "meaningful use" of an EHR refers to the use of [certified EHR](#) technologies by health care providers in ways that measurably improve health care quality and efficiency.

Under the Medicare and Medicaid EHR Incentive Program, CMS has developed objectives and measures that eligible hospitals and health care professionals must meet in order to receive incentive payments. ONC has established the standards and certification criteria to ensure that certified EHR technology is capable of meeting certain minimum requirements necessary to support these actions by providers.

CMS has included objectives that support medication adherence, such as: generating and transmitting electronic prescriptions; exchanging key clinical information among providers; [providing patients with electronic access to their health information](#) (including medication lists); enabling automated clinical decision support; and implementing drug formulary checks.¹⁷

Electronic Prescribing

Electronic-prescribing (e-prescribing) is the electronic generation, transmission, and filling of a prescription. E-prescribing provides an opportunity for the provider to monitor a patient’s medication regimen. A 2013 article in *Health Affairs* attributed increases in e-prescribing to federal incentives: “Between 2008 - 2010, federal incentives resulted in 89,000 - 94,000 more new e-prescribers, than there would have been otherwise. The data suggest that among providers who were already e-prescribing, the federal incentive program was associated with a 9 - 11 percent increase in the use of the e-prescribing- equivalent to additional 6.8 - 8.2 e-prescriptions per provider per month.”¹⁸ In 2011, the [National Progress Report on E-prescribing and Interoperable Health Care](#) found one in two office-based physicians used e-prescribing, versus one in ten circa 2008. Likewise, the report found e-prescribing increases medication first fill adherence by 10 percent with the potential to save \$140 - \$240 billion over the next 10 years.¹⁹

¹⁶ Congressional Budget Office. "Offsetting Effects of Prescription Drug Use on Medicare’s Spending for Medical Services." Congressional Budget Office (CBO), 2012. .

¹⁷ Not an exhaustive list.

¹⁸ Joseph SB, Sow MJ, Furukawa MF, Posnack S, and Daniel JG. "E-Prescribing Adoption and Use Increased Substantially Following the Start of a Federal Incentive Program." [In eng]. *Health Affairs* (Millwood) 32, no. 7 (Jul 2013): 1221-7.

¹⁹ The National Progress Report On E-Prescribing and Interoperable Health care. Surescripts. (2011)

There is value in an e-prescribing system that makes it easier to fill a prescription and to assure its accuracy. However, there is also an opportunity for health IT to facilitate provider-patient communications through automatic notification of unfilled prescriptions, which can trigger an intervention to avoid gaps in medication usage.²⁰

Drug Formulary

In [*Medication Adherence Interventions: Comparative Effectiveness*](#), AHRQ concluded that policy interventions that reduce out-of-pocket costs improved adherence. Likewise, the authors of [*Using Health Information Technology to Determine Medication Adherence*](#) identified prescription cost as a factor of non-adherence. A drug formulary refers to a comprehensive list of medications, generic and name-brand that are approved under a specific health plan. The purpose of the formulary is to reduce overall cost for medications to the insurer and the patient, while safely and effectively treating the health condition or concern at a minimum cost.

Generally, drugs prescribed outside a health plan's formulary result in increased costs of medications. In April 2013, CMS released data that showed drug formularies are among the most popular (optional) menu objectives for eligible providers in the first phase of the Medicare and Medicaid EHR Incentive Program. Subsequently, as this program progresses into its next phase, drug formulary checks will move from an optional menu item to a core objective. Utilizing health IT to generate formularies presents providers and patients with the opportunity to make informed decisions by optimizing medication choice. Optimizing choice of medications supports efforts to improve medication adherence at the time a prescription is first filled.

Medication List/Reconciliation

The average hospital patient is subject to at least one medication error per day.²¹ Health IT can facilitate medication adherence by supplying providers, patients, caregivers, and other members of the care team with complete medication list. An active medication list serves multiple purposes and is used during reconciliation. Reconciliation is the process of avoiding inadvertent inconsistencies during transitions in care by reviewing the patient's complete medication regimen at the time of admission, transfer, and discharge, then comparing it with the regimen being considered in the new setting.²² For example, Stage 1 of Medicare and Medicaid EHR Incentive Program requires eligible providers to maintain an active medication list and the option of reconciliation during transitions of care. Should the patient, caregiver, or other member of the care team identify discrepancies within the active list, this process provides an opportunity to make changes that suit the patient's needs. In addition, distribution of the medication list may improve care coordination, decrease the number of adverse care events, and include instructions for medication management and adherence.

ONC has provided grant funds that support the expansion of Health IT innovations that facilitate the secure electronic exchange of medication list. The following is an example of that work.

²⁰ Bosworth HB, Granger BB, Mendys P, Brindis R, Burkholder R, Czajkowski SM, and Daniel JG, et al. "Medication Adherence: A Call for Action." [In eng]. *Am Heart J* 162, no. 3 (Sep 2011): 412-24.

²¹ Institute of Medicine's *Preventing Medication Errors* report.

²² Cornish PL, Knowles SR, Marchesano R, Tam V, Shadowitz S, Juurlink DN, and Etchells EE. "Unintended Medication Discrepancies at the Time of Hospital Admission." [In eng]. *Arch Intern Med* 165, no. 4 (Feb 28 2005): 424-9.

North Carolina HIE: PHARMACeHOME

The [Health Information Exchange Challenge Grant Program](#) encourages innovations that can be leveraged widely to support nationwide health information exchange and interoperability. Through collaboration between the North Carolina HIE (NCHIE) and Community Care of North Carolina (CCNC) under the Challenge Grant Program, the [PHARMACeHOME](#) was created to address the need for a “common view” of medication records across the continuum of care. The PHARMACeHOME aids health care professionals in their medication optimization activities to include medication reconciliation and drug therapy problem finding. This technology transcends payer, health system and data sources by capturing data from multiple care settings. From this common cloud-based platform, pharmacists, nurses and other health care professionals can:

- Record medication lists from various care settings, and annotate the lists with actionable and patient-specific information;
- Identify, track, and resolve drug therapy problems across multiple users simultaneously;
- Utilize timesaving templates for communicating timely “need to know” information in the form of progress notes, letters and summaries of drug therapy problems; and
- Task other care team members and assist in medication optimization workflow and throughput management.

Currently PHARMACeHOME maintains more than 600 active users across all North Carolina geographies and 42 different user types in six distinctly different settings of care. The modularized version of PHARMACeHOME connects to more than 4,000 active users so that a summary view of the patient’s medications alongside meaningful narratives are quickly consumable by the health care provider to better inform the patient encounter.

Electronic Drug Monitoring

It is generally accepted that self-reporting is the most common method for calculating medication adherence. The rationale behind this practice is attributed to the low cost and low burden metric for evaluators.²³ On the other hand, it has been established that self-reporting raises concerns when evaluating timing and dosage of pills taken. [Challenges in Measuring Antiretroviral Adherence](#) identifies gaps and methodological issues in self-reporting of medication adherence, specifically the “ceiling effect,” the tendency of self-reported adherence to be positively skewed.

Innovations in health IT have accelerated the use of electronic drug monitoring systems (EDMs) to measure adherence. “EDMs use monitoring devices, such as medication event monitoring systems (MEMS), a pill bottle cap embedded with a microprocessor that [records] the time and date of each bottle opening as a presumptive dosage.”²⁴ Other advances include electronic pill boxes, or tracking pharmacy refill data and sending automated alerts to the prescriber, when the medication is not filled. Two of the most common sources of fill information are from pharmacy claims data and medication history transactions available through the Surescripts e-prescribing network.²⁵

²³ Using Health Information Technology to Determine Medication Adherence. Findings from the AHRQ Health IT Portfolio (November 2009).

²⁴ Berg KM and Arnsten JH. "Practical and Conceptual Challenges in Measuring Antiretroviral Adherence." [In eng]. J Acquir Immune Defic Syndr 43 Suppl 1 (Dec 1 2006): S79-87.

²⁵ Using Health Information Technology to Determine Medication Adherence.

Predictive Modeling

Health IT tools can be utilized to improve adherence by using data captured in an EHR. EHR functionality can use predictive modeling to identify patients who are least likely to adhere to medication regimens and enable targeted interventions to prevent non-adherence. Predictive models analyze past performance to assess how likely a person is to exhibit a specific behavior. Automated systems have the capacity to analyze the patient's past adherence history and provide access to educational resources or materials, particular to that individual's needs to improve adherence.²⁶

ONC has supported initiatives that use predictive modeling to supplement and direct human interventions to improve medication adherence. The following are examples of that work.

Southern Piedmont Beacon Community: Closing the Gap!

The Southern Piedmont Beacon Community is one of 17 communities participating in ONC's [Beacon Community Cooperative Agreement Program](#). Community Care of the Southern Piedmont deployed pharmacists and nurse care managers in multiple settings, including pharmacies, physician offices, hospitals and mobile care teams to engage patients with a history of medication non-adherence who are at risk for complications from sub-optimal medication use and uncoordinated care. By combining the workflow processes created by the Southern Piedmont Beacon Community and the North Carolina HIE/CCNC PHARMACeHOME platform, a medication adherence intervention was created that has yielded positive results.

Initially, the focus of the intervention was to hone in on patients who discontinued their medications based on a "Gap in Therapy" alert provided in the PHARMACeHOME platform. This proved to generate a high number of false positives (up to 60 percent) where the patient was rationally and appropriately discontinuing the medication. The decision support tools within PHARMACeHOME were then adjusted based on feedback from the Beacon community's providers and an analysis of the findings from more than 1,100 patient encounters to utilize additional data inputs such as active medication list in the EHR and a more patient specific calculation of overall medication adherence. Since the change, the false positive rate has been reduced to less than 10 percent.

Community Care of the Southern Piedmont is now partnering with the global, research-based pharmaceutical company GlaxoSmithKline to further advance the predictive modeling components of the PHARMACeHOME. The refined model will include decision support tools related to medication management. For instance, the tool will allow users to leverage a risk profiling tool that will match a patient's medication therapy challenges with the optimal provider-setting-intervention combination to maximize the care team's efforts. Southern Piedmont plans to deploy this new system in 2014.

Substitutable Medical Apps, Reusable Technologies (SMART) Platform

The Children's Hospital Informatics Program, part of the Boston Children's Hospital and Harvard Medical School, designed a software application, which enables physicians to rapidly review all medications in a patient record for potential non-adherence problems using the

²⁶ Bosworth HB, et al.

SMART platform.²⁷ [The Substitutable Medical Apps, Reusable Technology \(SMART\) Platform](#) was developed under [ONC's Strategic Health IT Advanced Research Project \(SHARP\)](#) program. The SMART platform's goals are to develop application programming interfaces (APIs), that enable compliant EHR technologies to interface with multiple third party-developed medical applications. This can be compared to cell phone carriers creating a set of APIs that enable a smart-phone to run on multiple third-party apps.

[Scalable Decision Support at the Point of Care: A Substitutable Electronic Health Record App for Monitoring Medication Adherence](#) describes the functionalities of the SMART Medication Possession Ratio (MPR) Monitor app that implements a recently published medication adherence prediction algorithm. This app has the capacity to pull data from a SMART-enabled EHR, input an adherence algorithm (from data obtained from the last 60 to 120 days following a prescription), and determine the rate of adherence for a particular patient based on the latest adherence data rapidly.

Consumer eHealth Tools

ONC is interested in increasing individuals' access to their own health information, helping families to take action and gain control over their health, and shifting attitudes to encourage consumers to become full partners in their care with the support of e-health tools. Through the [Consumer eHealth Program](#), ONC is fulfilling its goal of empowering Americans to improve their health and health care through health IT.

Southeast Michigan Beacon Program: Patient Health Navigator Initiative

The Beacon Patient Health Navigator (PHN) Initiative was designed by the [Southeast Michigan Beacon Community \(SEMBC\)](#), one of ONC's Beacon Communities. PHNs empower people with diabetes to better self-manage their condition, adhere to physician treatment plans and address the social determinants of health. Preliminary survey results indicate that there was significant improvement in patient medication adherence across twelve medication adherence measures, among other areas.

High-risk patients were identified by providers through prompts programmed within EHRs and data pulls from their physicians' electronic health records. Preliminary clinical data captured from the community-level clinical data repository, part of the Beacon health information exchange (BeaconLink2Health) also show improvement in patient health outcome measures (the diabetes measure HbA1c and the Body Mass Index (BMI)) for participating primary care practices and their participating patient population.

Hawai'i HIE: Pharm2Pharm

ONC created the State Health Information Exchange (State HIE) Cooperative Agreement Program to build capacity for electronic health information exchange within and across states. The Hawai'i HIE has entered into an agreement with the University of Hawaii at Hilo's College of Pharmacy to provide the connecting infrastructure for their Pharm2Pharm project that facilitates coordination between hospital pharmacists and rural community pharmacists that

²⁷ Bosl W, Mandel J, Jonikas M, Ramoni RB, Kohane IS, and Mandl KD. "Scalable Decision Support at the Point of Care: A Substitutable Electronic Health Record App for Monitoring Medication Adherence." [In eng]. *Interact J Med Res* 2, no. 2 (2013): e13.

will provide patient medication management and consultation services for patients' pre- and post-discharge. Pharm2Pharm identified the following objectives to direct their work:

- Identify elderly patients admitted to rural hospital with comorbid conditions and on multiple medications;
- Identify rural community pharmacist that will provide medication adherence plan for patients upon discharge;
- Report to primary care physician if there are any changes or reactions to medication adherence plan; and
- Report to project team any barriers to medication adherence plan

This collaboration will facilitate information to be provided by hospital pharmacists and delivered to ambulatory care teams through the use of [DIRECT](#) messaging for patient medication plans. The intended result will be improved transitions of care, a reduction in medication adverse events, and reduction in hospital readmissions. Now in its second year of the three-year CMS Innovations grant, the University of Hawaii at Hilo's program, along with Hawai'i HIE's Health eNet (DIRECT) messaging is planned to begin active enrollment of DIRECT users in November 2013.

Video Challenge/Txt4health

In 2012, ONC sponsored the [Managing Meds Video Challenge](#) through the Investing in Innovation (i2) program and the [Txt4health](#) initiative through the HIE Challenge Grant Program. The Managing Meds Video Challenge helped promote the creation of instructive videos that motivate and inspire others to use health IT to support effective medication management. The Txt4Health initiative is an interactive, text-messaging based tool that helps users complete an assessment for diabetes risk, and then offers personalized programs of information, goal tracking, and reminders customized to their health status and location. Today, through the ONC Beacon Community program, Txt4Health is available in New Orleans, Southeast Michigan, and Greater Cincinnati.

What Are the Opportunities and Challenges?

Some of the greatest opportunities for health IT to improve medication adherence are in the areas of consumer engagement and predictive analytics. The use of these tools can help support behavior modification that is necessary for adherence to proven treatments.

Today, there is an opportunity for researchers and innovators to expand the number of health IT tools that are available to the patient and caregiver. So far, health IT is being used to identify non-adherence via EHRs and clinical data repositories that are provider-focused. Widespread implementation of low-cost, consumer-facing health IT tools empowers the patient and caregiver to better manage their medications resulting in improved medication adherence rates and population health.

The use of health IT to monitor medication adherence has many advantages, yet challenges arise when considering the multiple adherence variations: primary non-adherence, discontinuation and compromised execution. Considering the complexity of the measures needed to properly measure medication adherence, there a number of issues that must be addressed to ensure the

reliability of the data collected.²⁸ For example, medication acquisition does not necessarily equate to medication adherence and individual's medication can be dispensed from multiple pharmacies.

More work on predictive analytics and decision support can greatly improve the problem of non-adherence by identifying people that are likely to not follow treatment protocols and addressing the issues that are likely to result in non-adherence. Decision support and other health IT tools can also help patients make decisions outside of the doctor's office, where adherence or non-adherence decisions are made.

While health IT offers much promise to supporting medication adherence, the problem is complex and multi-dimensional. Non-adherence occurs for various reasons and, as such, it is difficult to target the best solution for an individual. Behavioral science research, predictive analytics, and decision support tools may help identify and address these challenges.

What's Next?

Better medication adherence is a key factor in achieving national priorities for improving care, improving population health, and reducing health care costs. Improved medication adherence can create health benefits for patients and caregivers as well as efficiencies required by the passage of the Affordable Care Act. Health IT can play an important role in improving medication adherence by: providing important data and measurement, improving medication reconciliation, supporting or triggering human interventions, helping identify high risk patients, and equipping patients and caregivers with helpful tools for self-management.

HHS will continue to support medication adherence and medication management through a variety of activities, including the meaningful use of certified EHRs. Also, ONC will continue to monitor innovative technologies and innovative users of those technologies for predictive modeling and consumer eHealth tools that improve medication adherence.

²⁸ Berg and Arnsten.