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Medication Adherence: A Call for Action

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Abstract

Poor adherence to efficacious cardiovascular related medications has led to considerable morbidity, mortality, and avoidable health care costs. This paper provides results of a recent think tank meeting in which various stakeholder groups representing key experts from consumers, community health providers, the academic community, decision-making government officials

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(FDA, NIH, etc), and industry scientists met to evaluate the current status of medication adherence and provide recommendations for improving outcomes. Below, we review the magnitude of the problem of medication adherence, prevalence, impact, and cost. We then summarize proven effective approaches and conclude with a discussion of recommendations to address this growing and significant public health issue of medication non adherence.

Introduction

Medications are the primary tools used to prevent and effectively manage chronic illness; however, despite their importance and known benefit, appropriate medication use remains a challenge for both patients and providers. Patients frequently do not adhere to essential medications, resulting in poor clinical outcomes, increased cost of care, and deleterious consequences for workforce productivity and overall public health. [1] Half of the 3.2 billion annual prescriptions dispensed in the United States are not taken as prescribed. [2] Numerous studies have shown that patients with chronic conditions adhere only to 50-60% of medications as prescribed despite evidence that medical therapy prevents death and improves quality of life. [3-8]

Estimates are that approximately 125,000 deaths per year in the United States are due to medication non-adherence [9] and between 33 and 69 percent of medication-related hospital admissions in the U.S. are due to poor adherence.[2] While some of the relationship between poor adherence and poor outcome is due to confounding factors, [10] the lost opportunity for effective therapies to improve health is staggering. For example, cardiovascular medications alone are estimated to be responsible for half of the 50% reduction in mortality from coronary heart disease over the past 20 years. [11] Yet actual achievement of these cardiovascular benefits is lost due to high rates of non-adherence in real-world settings. In fact, the true rate of non-adherence may be higher as patients with a history of non-adherence are likely underrepresented in trials outcomes research.

The consequences of medication non-adherence are not only poor clinical outcomes but also unnecessary health care costs. The total cost estimates for non-adherence range from $100-300 billion each year, and include both direct and indirect costs. [12-16] As an example of the cost benefit of medication adherence, estimates are that for every additional dollar spent on adhering to a prescribed medication, medical costs would be reduced by $7 for people with diabetes, $5.10 for people with high cholesterol, and $3.98 for people with high blood pressure. [17] Failure to identify and remediate poor adherence often results in intensified pharmacotherapy with increased doses of medication – thus increasing the overall cost of treatment, the risk of adverse effects,[18] physician frustration, [19] misdiagnoses, and in more extreme situations, unnecessary treatment and exacerbation of disease or fatality. [20, 21] Non-adherence also increases the cost-burden for informal, family caregivers [22, 23] and leads to other undesirable outcomes, including lost work productivity for patients and/or family caregivers.[24] Understanding these multiple ‘cost drivers’ is important for understanding the true cost of medication non-adherence.

Clear alignment exists among stakeholders, including patients, providers, policy makers, and payors, to improve medication adherence. The Institute of Medicine reported “Pharmaceuticals are the most common medical intervention, and their potential for both help and harm is enormous.” Ensuring that the American people get the most benefit from advances in pharmacology is a critical component of improving the national health care system.” [25] A recent World Health Organization report states that because the magnitude of medication non-adherence and the scope of these sequelae are so alarming, more health benefits worldwide would result from improving adherence to existing treatments than from developing new medical treatments. [1]

In response to the growing need to improve medication adherence, representatives of various stakeholder groups representing key experts from consumers, community health providers, the academic community, decision-making government officials (FDA, NIH, etc) and industry attended a two day meeting to evaluate the current status of medication adherence and provide recommendations for policy change to improve medication adherence and related clinical and financial outcomes on a national scale. Our goals were to propose strategies to raise national awareness of the adverse consequences of non-adherence; to propose practical strategies for disseminating evidence-based approaches in real-world clinical settings; and to delineate a broad role for electronic health information technology in which connectivity of patient, provider, pharmacy and health system data could be effectively used to generate important quality metrics for supportive monitoring and management of medication information.

Definition and Measurement

Medication adherence refers to the extent to which patients follow provider recommendations about day-to-day treatment with respect to the timing, dosage, and frequency. [26] It may be defined as "the extent to which a patient acts in accordance with the prescribed interval, and dose of a dosing regimen." [26] Medication persistence refers to the duration of medication-taking, and defined as "the duration of time from initiation to discontinuation of therapy." [26] The World Health Organization recognizes two distinct categories of non-adherence, preventable (e.g., patient forgets, misunderstands) and non-preventable (e.g., life-threatening side effects), and recommends targeting tailored treatment interventions for the former. [17] A summary of these evidence-based reasons for non-adherence and non-persistence are listed in Table 1.

Review of Medication Adherence Interventions and Programs

Interventions to improve adherence with prescribed medications are more successful for short-term treatments than for long-term, chronic illness management [27] For long-term treatments, 36 of 83 interventions reported in 70 randomized clinical trials (RCTs) were associated with improvements in adherence, but only 25 interventions led to improvement in at least one treatment outcome (Table 2). Almost all of the interventions that were effective for long-term care were complex, including combinations of more convenient care, information, reminders, self-monitoring, reinforcement, counseling, family therapy, psychological therapy, crisis intervention, manual telephone follow-up, and supportive care. For short-term treatments, 4 of 10 interventions reported in nine RCTs showed an effect on both adherence and at least one clinical outcome, while one intervention reported in one RCT significantly improved patient adherence, but did not enhance the clinical outcome.

Two problems with existing adherence interventions are clear. First, even the most effective interventions did not lead to large improvements in adherence and treatment outcomes. As reported in a recent meta-analysis of adherence interventions, adherence was improved only by approximately 4 to 11% by most interventions. [28] Most interventional trials are focused on a single medication or a particular disease area. In reality, the majority of patients take multiple medications for multiple medical problems.[29] Tailored interventions that provide a menu-driven, patient-centered approach [30, 31] address adherence for many concomitant medications and conditions, however interventions continue to be developed using a single disease-focused approach. Given the narrow focus and small effect size, translation of adherence interventions to large scale, real-world settings is likely to be unsuccessful, particularly without the additional staffing to oversee intervention delivery and follow up, as is available in clinical trials. In the short term, simple and scalable adherence strategies should be more broadly used until they can ultimately become part of successful

multifaceted and tailored interventions. Simple adherence strategies that result in even small effect size at the individual level, when broadly implemented on a population level, may provide substantial cumulative public health benefit by significantly leveraging therapeutic efficacy. A recent retrospective analysis using Walmart pharmacy dispensing data from more than 3 million individuals found such scalable results when calendarized blister packaging was introduced at pharmacy for once-daily solid oral dose cardiovascular medication. [32]

A second problem with existing adherence interventions is the external or provider-driven orientation of interventions. The dominating provider perspective also poses a barrier to translation of these results in real-world settings. Providers have little control over actual adoption of daily medication-taking behaviors, and interventions that facilitate a trusting relationship and open communication are more likely to take hold. Evidence suggests that there is a lack of accounting for patients' perspectives, an omission of data on patient and healthcare providers' relationships, and a lack of focus on shared decision-making. [33, 34] The Institute of Medicine has asserted that "patient centered care" is 1 of the 6 pillars of quality health care, yet strategies to incorporate shared decision-making into medication adherence interventions still fall short. Most interventions strive to attain patient adherence to an evidence-based medication target which may or may not be consistent with a more patient-centered approach focused on the role of medications in the context of the patient's daily life. Achievement of the patient's goals for treatment, established jointly between patients, family and providers, are rarely the primary endpoint or objective of current adherence interventions. [35, 36] Interventions are needed to enhance patient involvement, facilitate the identification and self-administration of medications, improve patients' medication-taking skills and behaviors, and improve self-monitoring and feedback to both patients and providers regarding their medication use [37].

Although publications focusing on medication adherence have increased, there are limited recommendations available to improve medication adherence beyond simplifying patients' regimens when possible and providing frequent, timely reminders to take and/or refill medication prescriptions. [38] Thus, compared with the many thousands of trials for the efficacy of individual drugs, there are only a handful of rigorous trials of drug adherence interventions and these provide little evidence that medication adherence can be improved, either consistently or over extended periods of time, as is required for management of chronic illness. To further complicate this research area, retrospective analyses of pharmacy claims data, a major source of currently-available adherence data, if appropriately conducted with rigorous analyses, can only provide insight into persistence outcomes and cannot address other measures of adherence. [26] Therefore, prospective research is required to fully understand the effects of various interventions on adherence.

In general, many of the interventions for long-term medications tend to be exceedingly complex, labor intensive, costly, and only loosely patient-centric in design. In addition, questions remain as to how to optimally target interventions to patient likely to benefit and hot feasibly carry out and sustain interventions in non-research settings, particularly in the current era of cost containment and staff reductions. However, given that the factors influencing medication adherence are many and varied, it is clear that multifaceted, tailored interventions will be necessary to improve self-administration of medication. [39, 40]

Practical, Evidence-Based Strategies for Clinical Practice

We set out to identify practical strategies to address the complex problem of medication adherence in clinical settings. Our assumptions included the following basic beliefs, 1) that proven strategies should be considered and integrated in a tailored, multi-pronged fashion

for each case; 2) that medication adherence is a shared goal for which all members of the health care team, the patient, family, providers, community liaisons, and health policy-makers, have an inherent role and responsibility; and 3) that while larger, national drivers of palpable change (e.g., quality indicators for adherence-related outcomes, national systems and standards for health information technology) were forthcoming, we might preemptively succeed through strategic, participatory action at the local level in our own clinical practice arenas.

Assumption #1: A multifaceted, tailored approach is most effective

Among the interventions found to be most effective in randomized clinical trials, successful interventions address known barriers, regardless of whether the barrier is owned by the patient, provider, community healthcare system or governmental agency. [2, 27] Given that there have been over a 100 factors observed to be associated with medication nonadherence, [41] the importance of tailoring material to individuals' needs and using a multi-faceted approach becomes more apparent. [42] Known barriers can be characterized in three ways: 1) those that address *knowing* what to do and why (health literacy), 2) those that address *doing* the skills necessary to accomplish medication-management in the context of everyday life (behavioral change), and 3) system or administrative barriers related to access and fragmentation of care. Thus, the most effective interventions use a combination of approaches and address these barriers.

Health Literacy Interventions—Health literacy refers to the ability to read, understand and use information to make decisions for treatment. [43] This includes both the context (or setting) in which health literacy demands are made and the skills that people bring to that setting. [44] For example, patients interpret visual media, graphics, written pharmaceutical labeling or one-on-one verbal instructions differently depending on their health literacy skills, learning style, and ability to interpret and synthesize information. Inadequate health literacy among patients and family caregivers is prevalent and directly related to medication non-adherence.[45] The Institute of Medicine estimated that over 90 million adult Americans lack the literacy skills to understand, question, and make informed decisions in the current health care environment.[46]

Practical strategies to address health literacy begin with an assessment of the patient's ability to read written information and understand the reasons for the medication and the proper 'dose', 'timing' and 'duration' for taking the medication. Short, validated questionnaires[47, 48] that assess health literacy can be used at clinic intake or during an acute admission.[49]

When health literacy is low, steps can be initiated to meet the patient's needs and improve the quality of care. Interventions for patients with low health literacy include using picture-based, easy-to-understand health education materials; explaining medication drug labeling in lay terms, using video presentations; creating an empowering environment for patients and caregivers to ask questions and post concerns; and, offering communication training for all providers involved in the process. Identification of opportunities to include a spouse or family member in the medication information process improves effectiveness.[50] In addition, using demonstration-based methods such as the "teach back", asking patients or caregivers to repeat key information in their own words, ensure that patients and families have heard and processed the information appropriately. However, despite many tools, a systematic review of interventions for limited literacy found mixed results and methodological limitations that prevented definitive conclusions about efficacy of these types of interventions.[51]

As a general rule for all literacy levels, clinicians should prioritize and limit the number of key points discussed during each interaction to three or fewer. [52] People comprehend more and make better-informed decisions when the most important information is presented first, is easy to evaluate and requires less cognitive effort. [53] For example, Shrank, et al [54] summarized that when optimizing content, patients prefer information about the indication for the medication, expected benefits, duration of therapy, and a thorough list of potential adverse effects, in addition to typical information identifying the drug's name, directions for use, and warnings. Yet the feasibility of delivering even basic information in a clinical setting is questionable,[55] and the impact of wide dissemination of information on potential side effects through direct-to-consumer advertising – like myalgia from statins – could have a negative impact on adherence. More research is needed to understand the net impact of this type of information.[56]

Federal requirements for drug labeling contribute to health literacy barriers. Unfortunately, the medication labels and information leaflets that patients rely on for pertinent drug information are often difficult for patients to understand. A growing body of research, for example, has found that patients frequently misinterpret prescription drug labels. [57] Recently, both the NIH and the FDA have focused attention on better understanding the related topics of adherence and product naming, labeling, and packaging. In April, 2010, the NIH issued a Request for Information: Priorities for the NIH Adherence Research Network (NOT-OD-10-078) "*Current and Emerging Priorities in Adherence Research that Offer the Greatest Potential for Improving the Nation's Health and Well-Being*." In July of 2010, the U.S. Food and Drug Administration (FDA) issued a federal register notice and conducted a public workshop on "*Developing Guidance on Naming, Labeling, and Packaging Practices to Reduce Medication Errors*" (Federal Register - April 12, 2010 (Volume 75, Number 69, Page 18514-18516) (Docket No. FDA-2010-N-0168) and is working towards issuing that guidance in the near future. FDA recently announced plans to create a new framework for the development and distribution of patient medication information (PMI) to be provided to patients who are prescribed drug products. Under the current system, patients may receive several types of information, developed by different sources that may be duplicative, incomplete, or difficult to read and understand. PMI is expected to replace Consumer Medication Information (CMI), Patient Package Inserts (PPI), and Medication Guides (MGs) with a single page document that provides concise, clear, and consistent information in a standard format. The FDA has solicited and continues to solicit stakeholder input for the new PMI Initiative. In addition, through a cooperative agreement with the Engelberg Center for Health Care Reform at Brookings, a series of expert meetings and public workshops were convened to discuss the design, content and format of the proposed single-page PMI prototypes, distribution and patient access to PMI, and how to design pilots for the implementation, distribution, and evaluation of standardized PMI (Federal Register-August 27, 2010 (Volume 75, number 166, Page 52765-52768, http://www.brookings.edu/events/2011/0223_PMI_pilots.aspx; http://www.brookings.edu/events/2010/1012_patient_medication_information.aspx#,)

In summary, medications and related instructions for use are complex. Teaching strategies that employ effective communication techniques between patients and providers, and among providers, may be the single most important intervention to reduce medication misinformation and poor adherence related to low health literacy. [58-60]

Behavioral Interventions—In addition to understanding what to do and why, patients need behavioral skills to facilitate *adoption and integration* of medication-taking into everyday life. Family caregivers, providers, healthcare systems and policy-makers must facilitate and support behavioral changes. [41, 61] Behavioral strategies that improve medication adherence include self-monitoring (e.g., use of diaries, logs, calendarized

packaging, electronic reminders, triggers and alerts), positive reinforcement (e.g., digital feedback mechanisms, trending, incentives and rewards), and accountability partnering (e.g., provider-patient contracting, web-based support groups). [62, 63]

Self-monitoring, a component of medication self-management, is the process of watching and tracking one's own medication regimen for adherence, consistency, problems or difficulties in order to successfully employ correction or change strategies. Patients who effectively self-monitor often use situational cues to integrate medication-taking into their usual daily routine. Cues can be linked to activities, such as meals or bedtime. An example of a physical cue is placing the medication container prominently by a toothbrush or lunch box.

Interactive voice response (IVR) tele-monitoring interventions have been shown to improve adherence to medications for chronic diseases and intermediate outcomes (e.g., diastolic blood pressure and hemoglobin A1C). [64-66] For patients, electronic reminders have improved prescription refill and adherence to dosing schedules, but these results have been difficult to sustain over time.[67] Computerized alerts to care providers in the outpatient setting have improved medication reconciliation rates and safety-related processes of care. [68, 69] An automatic alert to pharmacists about potentially inappropriate medications (e.g., amitriptyline and diazepam) for elderly patients led to significant decreases in the dispensing of these medications. [68] In addition, an automated alert to care providers increased the ordering of laboratory tests to monitor for potential adverse drug effects. [69] Industry-based efforts to improve timing of reminders and reinforcement-type cues have been introduced and tested in the form of calendar-based blister packaging. Especially when used in combination with education and other reminder strategies, the calendar-based blister packs have been shown to improve medication adherence. [70] The first large-scale pharmacoepidemiologic analysis of the effect of medication packaging has refocused attention to relatively simple approaches, such as "reminder" packaging, that can be widely implemented for once-daily medications take for chronic diseases. Calendarized child-resistant blister packaging was associated with modest improvement in prescription refill adherence and persistence, and significantly higher probability of patients having filled medication for at least 80% of days in the year. [71]

Assumption #2: Medication Adherence as a Shared Goal and Responsibility

Shared goals are mutually agreed upon priorities and objectives for medication selection, management and medication-taking behaviors. Communication or reciprocal flow of information among patients, caregivers and providers is needed to improve medication adherence. Opportunities to close communication gaps occur at each step of the process. For example, a medication prescription or prescription change is dependent on coordinating the multidisciplinary provider tasks of assessing medication-taking preferences, barriers and capabilities, prescribing, educating, and filling a prescription correctly. In addition, patient and family caregiver tasks such as obtaining the medication, adhering to the prescribed schedule, and reporting a response to the appropriate provider must be coordinated. Recommendations to improve medication-related health communication include employing patient-centered communication using clear health communication techniques, and confirming a common understanding of goals and priorities using regular review and reinforcement of information.[50, 72]

Maintenance of many medication-taking behaviors declines over time, posing yet another barrier to sustainability of effective interventions. Reiterative, positive reinforcement, frequent feedback and regular follow-up are essential to ensure adequate adherence over time. [73, 74] Future research must focus more on understanding what constitutes sufficient and effective education and communication of medication-related information between the

patient and the care provider in clinical practice. Ongoing studies of person-centered strategies and patients' perception of information about the medication may serve to redesign and refocus adherence promoting initiatives in such a way as to improve adherence. [75]

Assumption #3: Evaluate with iterative monitoring and ongoing quality metrics

Both patients and providers benefit from regular, ongoing feedback regarding performance in achieving commonly established treatment goals. Some patients benefit from maintaining a daily medication record of each dose taken or missed with relevant comments. The healthcare provider can then review this medication diary over the telephone or at the next clinic visit with the patient. Additional benefits include identifying potential predisposing factors for a relapse into old behavior and setting appropriate and realistic goals for new behaviors. Use of the ACE-ME model, which emphasizes the collaborative approach to medication adherence, or a similar clinically useful strategy is recommended. The acronyms represents the following steps: Assessment of medication management capacity, including cognitive skills; Collaboration on a strategy that creates and maintains a plan tailored to the patients needs; Education to explain the effects of medication and articulate why a regimen is important; Monitoring to see how the plan is implemented. This should be evaluated at every visit. Evaluation to see when the plan is not working and need to begin another ACE cycle. [76]

Timing of Evaluation and Predictable Peaks and Troughs—Patient adherence is greatest 5 days prior and 5 days post appointment with health care providers and usually tapers off significantly within 30 days – the so called "white coat adherence." [77] Thus, improving medication adherence in the context of chronic diseases is dependent on timing of evaluation, open, ongoing communication, and sensitivity to predictable peaks and troughs in adherence patterns. Providing a one month supply of all new medications to the patient prior to discharge has been adopted by some healthcare systems such as Geisinger as an effective approach to no-fill prescription rates.

Successful intervention programs ideally can preemptively identify who and when individuals will run into adherence problems. E-script, for example, has developed an algorithm that can predict who is likely not to refill a prescription versus waiting three months to use a medication refill algorithm to calculate pill refill rates. In addition, patients can encounter difficulties filling or taking prescription medications at a number of loci in the administration process, and specific analyses evaluating barriers at each point may help to better target interventions. [78] For those individuals who receive medications that are directly tied to electronic medical records, future work may need to explore the use of other screening and predictive models of medication non-adherence.

Communicating medication changes through medication reconciliation and improving the frequency and capacity for communication around medication reconciliation has been well described and evaluated in a number of community pharmacy-based projects. The community pharmacist plays an important role in ensuring that drug therapy is appropriate and that communication regarding changes in therapy occur among all key players, including patients, providers and caregivers. [1] Direct pharmacy interventions such as pharmacy CME developed by pharmaceutical manufacturers and more recently, packaging manufacturers, can optimize pharmacist counseling time and efficiency during the medication reconciliation process.

System-Based Strategies at the National Level

Financial Incentives and Medication Adherence

For many patients on Medicare, the coverage gap in Part D is a financial challenge, particularly for inexpensive medications. Sometimes, generic alternatives provided at low cost by national chains like WalMart or Kmart can provide a solution. A number of studies have examined the importance of copayments on medication adherence. Numerous studies have shown a strong and consistent relationship between copayments and medication adherence. [79] This has led to a movement, known as Value Based Insurance Design (VBID), to reduce copayments for the most effective, high value medications. [80, 81] A host of observational studies demonstrate that reducing copayments for highly effective chronic therapies can substantially improve adherence. [81, 82] Moreover, studies suggest that when physicians prescribe generic or lower-cost medications for patients, adherence improves. [83] Prospective, large-scale trials are underway to examine whether VBID can both improve adherence and reduce downstream healthcare costs. [84]

Others have posited that simply reducing copayments may not be sufficient, and have proposed that providing financial rewards for better adherence may be even more effective mechanism to promote behavior change. Volpp et al found a significant impact from financial incentives to improve smoking cessation rates [85] as well as for promoting weight loss. [86] While physician pay-for-performance has received substantial attention in the medical literature, patient pay-for-performance is a concept that needs further research to understand its long-term effectiveness and cost-effectiveness.

Role of Health Information Technology and Electronic Health Records

The ability to use electronic health records to systematically collect, organize, access, analyze, and better understand health information is expected to transform the practice of medicine.[83] Health information technology (health IT) can improve the connectivity of patient, provider, pharmacy, and health system data and is already used to generate important medication management and monitoring quality metrics.

Electronic prescribing, and the potential to use health IT to capture and provide a notice from the pharmacy to the prescriber when the prescription is filled (or not), provides a significant opportunity to measure and improve medication adherence. When medication information is shared electronically, prescribers have access to information that allows them to assess a patient's medication regime at the point of care and to identify non-adherence. Electronic systems may also be able to notify a prescriber or pharmacist about refills, which can help trigger an intervention to avoid a potential gap in medication use.

Health information exchange can facilitate medication reconciliation by providing a means for health care providers to capture a patient's complete medication list and for other members of a care team to retrieve that information to reconcile medications across the care continuum--during transitions of care, hospital admissions, and hospital discharge.

The Centers for Medicare & Medicaid Services (CMS) in the U.S. Department of Health and Human Services provides incentives to encourage the "meaningful use" of certified electronic health record technology (certified EHRs) by eligible professionals and eligible hospitals. In order to receive incentive payments, CMS requires eligible professionals and eligible hospitals to meet certain measures, some of which support improved medication adherence, using certified EHRs. The Office of the National Coordinator for Health IT (ONC), establishes standards and certification criteria for certified EHRs, which can then enable professionals and hospitals to meet these measures. Some of the measures and the related criteria for certified EHR functionality support efforts to improve medication

management and medication adherence. For example, meaningful use Stage one includes requirements to maintain active medication and allergy lists and to generate prescriptions electronically for a specified percentage of patients. Stage one also includes an option for provider to perform medication reconciliation for transitions of care. Additional meaningful use criteria in stage one promote consumer empowerment by giving patients access to their information, including discharge instructions and patient summaries. This could assist with medication adherence by providing information to patients to help them understand the prescribed medications and instructions for taking those medications.

Health IT has the potential to provide alerts and reminders to both providers and patients to support medication adherence in the future. As more data becomes available about factors that improve the likelihood of non-adherence, EHR functionality could use predictive modeling to identify patients who are least likely to comply with medication regimens and enable targeted intervention to improve compliance. While the evidence regarding health IT's role in interventions to improve adherence is quite thin, studies evaluating the role of electronic reminders show promise. [84] Consumer eHealth tools, such as personal health records and mobile phone applications, are being used to empower patients to play a more active role in managing their medication. These tools may provide electronic reminders to patients, allow patients to track their adherence and, in some instances, provide real-time information back to the provider for intervention and/or targeted follow-up. This interactive capability is important, since some literature suggests that patient engagement is associated with improved treatment adherence. [84]

National Consumers' League – Efforts to Increase National Awareness

A large public health response to the problem of medication adherence is being led by the National Consumers League (NCL) with a multi-year, research-based public education campaign. The goal of the campaign, Script Your Future, is to raise awareness among consumers and their family caregivers about the importance of taking medication as prescribed as a vital first step toward better health outcomes. The campaign focuses on patients affected by three chronic conditions – diabetes, respiratory disease, and cardiovascular disease. It encourages patients and health care professionals to better communicate about ways to improve medication adherence, and includes specific outreach to health care professionals to support them with tools and resources to help patients be more adherent. NCL has built a coalition of public and private stakeholders, including representatives from government agencies, consumer and patient groups, professional associations, business and labor, and adherence researchers, all of whom have a vested interest in improving medication adherence to move this campaign forward. The campaign includes coordinated national communications and targeted outreach efforts in six cities: Baltimore, MD; Birmingham, AL; Cincinnati, OH; Providence, RI; Raleigh, NC; and Sacramento, CA. The campaign, launched in May 2011, will continue for at least three years.

The campaign will measure its impact – both nationally and in select target markets. Before the campaign launch in May 2011 a baseline survey was conducted, nationally and in the six target cities, to measure consumers' awareness of medication adherence as a health issue. The survey will be replicated at the end of the campaign and results compared. In addition, the campaign's evaluation working group will explore ways to measure changes in medication adherence behavior resulting from the campaign and complementary interventions.

The campaign consumer website is located at http://www.ScriptYourFuture.org, and the health care professional website visit http://www.scriptyourfuture.org/hcp.

Future Directions and Recommendations

There are both enormous challenges and opportunities in addressing the public health crisis of medication adherence. The multifactorial basis for non-adherence calls for a multifaceted solution. The first important theme in this think-tank meeting was that a large number of interventions could, if effectively applied, have a large impact on adherence and thereby on improving public health. An initial step is a common understanding of some of the key issues among stakeholders including representatives from government (e.g., FDA, NIH, CMS), industry (e.g., pharmaceutical companies, packaging companies), insurers (e.g., both private and government), employers, health care providers, and patients prescribed medications. A major deficiency has been the inability to routinely measure and track adherence in standard practice. Electronic health systems provide an important opportunity to address that gap, particularly with guidance from the Department of Health and Human Services on defining meaningful use to include measurement and integration of tools to improve adherence in the electronic health record.

A second recurring theme of the meeting was the ongoing need to assess and understand the impact of various interventions, including the cost of interventions. Studying methods to improve adherence has been identified as an area of interest for Medicare innovations grants. Broad evaluation of practical interventions, like simply asking if patients are having trouble taking their medications, offering pill organizers, and using automatic reminders when prescriptions are not refilled on time, are feasible yet underutilized strategies.

Conclusion

In summary, if over 100 different factors have been identified as potential predictors of medication adherence, one can't expect 'one size intervention, to fit all.' We need to examine alternative methods of implementing interventions in order to create an effective, readily available and easy to use tool box for providers. Technology will increase in use and will likely help many individuals, but development of technology needs continued input from both patients and from providers on how to incorporate these advances into clinical care. Related, further thought into reimbursement models for medication adherence and related technology are needed. Equally important, funding must be made available to formally study methods of intervention and dissemination of these methods. Thus, to these ends, we are also proposing an ongoing alliance to continue to work together to frame the problems related to medication adherence and share methods and successes for improving optimal use of evidence based treatment.

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Table 1

Preventable and Non-Preventable Reasons for Discontinuation or Non-Adherence

Preventable	**Non-Preventable**
Low health literacy (patient did not understand instructions)	Serious mental illness (major depression; schizophrenia)
No-fill of first prescription identified	Serious side effects (e.g., diarrhea, weight gain, sleeplessness)
“Non-responder” or no clinical evidence of effectiveness of the medication	Serious adverse events (e.g., allergic reaction; renal toxicity)
Irregular refills obtained	
Cost prohibitive for the patient	

Table 2

Common Barriers and Evidence Based Interventions

Barrier to Knowing What To Do or Why	**Clinical Strategy to Improve Adherence**
Low health literacy • did not understand instructions • did not understand reason for medicines • did not understand relationship between medicines and illness • did not understand the expected duration of use • could not fill pill organizer correctly • did not understand where or how (for mail-in prescription refill) to obtain medications, and at what frequency • Too much information	• Use proven educational methods to give instructions: – Written and verbal information at 3rd grade reading level – Use pictures in addition to words – Conduct a medication use skills check (e.g., teach – demonstrate – repeat and playback methods for filling pillbox) – Ask patient to watch a short video on his medications and how to take them prior to leaving the office or while waiting • Give instructions to a second person (spouse or significant other, or community health worker) • Present 2-3 key points only; send complete list of medications and instructions in written, picture or audiovisual format • Use community liaison or pharmacist to reinforce information at a later time
Poor communication	• Engage clinic and provider staff in communication training • Engage patients in using e-health diaries (or written versions available online) to log concerns, side effects or symptom patterns • AVOID the following: – overwhelming the patient with too much information – using jargon and technical terminology – relying on words alone – failing to assess patient understanding
Negotiate agreement with the medication plan	• Simplify the dosing regimen • Explore the patient's activity and meal schedule, and preferences for dosing schedules • Altering the administration route • Using electronic adherence aids (MEMS cap) • Explore the patient's beliefs about the medication and how it works for him
Barrier to Doing	
No-fill of first prescription identified	• Dispense to the patient the first week of medications at discharge or in clinic • Identify a person to obtain medications for the patient following discharge / clinic visit • Discuss the patient's desire/willingness to take the new medication
Irregular refills obtained / forgetfulness	• Choose drug available in a calendarized blister-packaging • Enroll patient in a frequent follow-up program to receive reminder triggers from pharmacist • Use multiple frequent reminder trigger systems with the patient, including cell phone or home monitoring technology • Include a caregiver in the communication for reminders • Engage patient in an accountability partnership of his choice – contract, web-based or community support group

Barrier to Knowing What To Do or Why	**Clinical Strategy to Improve Adherence**
	• Obtain from pharmacy patient-based trends in fill-rate, and discuss feedback with patient
Cost prohibitive for the patient	• Select a different medication or a generic • Identify a local low-cost drug program (e.g., Walmart, Target) • Identify a payment program for non-generic drugs
"Non-responder" or no clinical evidence of effectiveness of the medication	• Ask patient about medication-taking using a validated assessment tool • Ask family caregiver or significant other • Use a controlled short term monitor (e.g., medication diary, electronic capture or MEMS cap) and re-evaluate drug response
Non-Preventable Discontinuation	**Clinical Strategy to Improve Adherence**
Serious mental illness (major depression; schizophrenia)	**1** Attempt to treat mental health first; then resume other medication adherence / interventions and monitoring
Side effects (e.g., diarrhea, weight gain, sleeplessness)	**1** Attempt to confirm drug-effect relationship **2** Alter medication choice (change drug class, change to new drug class) **3** Modify dose
Serious complications (e.g., allergic reaction)	**1** Discontinue; change drug choice