

# A perspective on nonadherence to drug therapy: psychological barriers and strategies to overcome nonadherence

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**Abstract:** Medication adherence represents an inefficiency and ongoing challenge within medical care. The problem has been long-recognized – indeed, the research literature contains thousands of articles on the topic. Nonetheless, because of the complex nature of the problem, it still cannot be considered to be solved. Reasons for nonadherence are myriad but psychological barriers to adherence are most difficult to mitigate and, thus, are the focus of this paper. The present narrative review sketches a summary of theoretical models commonly utilized to understand and help address medication nonadherence; uses a patient-centered care approach to contextualize the problem of nonadherence to drug therapies; and then outlines a set of best-practice recommendations based on the extant data and framed from the perspective of the Information-Motivation-Strategy model.

**Keywords:** nonadherence, medication nonadherence, adherence barriers, improving adherence

## Introduction

In the United States, spending on health care reached \$3.3 trillion in 2016,<sup>1</sup> reflecting an average of over \$10,000 per person annually and nearly 18% of the GDP. Over the course of a year, more than half of all US adults are prescribed at least one pharmaceutical medication, and approximately 15% are prescribed five or more different drugs.<sup>2</sup> The fiscal burden associated with nonadherence to prescribed medical regimens has been estimated at \$290 to \$300 billion<sup>3,4</sup> with per-person costs for all-cause nonadherence in the US ranging from \$5,271 to \$52,341 annually,<sup>5</sup> deriving from higher inpatient, outpatient, and emergency costs.<sup>6</sup> Although these economic estimates are staggering, they are not the only costs associated with nonadherence. Failure to resolve or manage symptoms can result in physical suffering and death,<sup>7-9</sup> and exacts a psychosocial toll that is more difficult to quantify but no less important – well-being suffers and quality of life is negatively impacted.<sup>10</sup>

Efficient delivery of health care and optimization of health outcomes thus require that nonadherence be minimized, and there is no shortage of interventions that aim to improve adherence – the problem is that many of them are ineffective, minimally effective, or are effective only in narrowly-defined circumstances, as is illustrated by a recent Cochrane review.<sup>11</sup> This limited effectiveness is because the reasons for nonadherence are complex, idiosyncratic, and changeable – see Sapkota et al for a review of these factors in the context of a common chronic illness, diabetes.<sup>12</sup> Indeed, as noted in the Cochrane review above, no consistent features are identifiable across those interventions that do achieve some measure of success.

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Barriers to successful adherence may be psychological or more concrete; and the two types often co-exist. Concrete barriers, however, are objectively easier to identify and potentially to address – for example by pinpointing financial need and providing assistance. Psychological barriers are more complicated and challenging to ascertain and mitigate, and it is these psychological barriers that are the focus of the present paper. We also limit this paper to medication nonadherence, although in many cases the principles identified apply well to lifestyle recommendations as well as drug therapies.

Psychological barriers to adherence can be further subdivided into two types: intentional and unintentional. Intentional nonadherence refers to cases in which patients decide to discontinue treatment (eg, quit taking a long-term asthma control medication) or to modify the recommended treatment (eg, cut diabetes pills in half but continue taking the half-dose regularly). Unintentional nonadherence reflects cases where patients incorrectly believe they are adhering properly (eg, taking ACE inhibitors as prescribed but continuing to eat bananas) or understand what to do and intend to do it, but then fail (eg, forgetting to take a medication at the appropriate time). The most effective strategies for addressing psychological barriers to medication adherence will differ depending on whether adherence is intentional or unintentional. The following sections of this paper will review: (a) some of the most common theoretical frameworks used to understand medication nonadherence, with an emphasis on emerging themes; (b) the importance of patient-practitioner communication and patient-centered care as a mechanism for delivering interventions; and (c) specific interventions that reflect current best-practices for improving adherence to drug therapies.

## Theoretical frameworks for understanding nonadherence

Although not created specifically for addressing nonadherence concerns, several classic health behavior models are relevant. Rosenstock's<sup>13</sup> Health Belief Model proposes that an individual's beliefs about susceptibility and seriousness combine to create a perception of threat associated with a health problem. Perceived benefits (and barriers) associated with a course of action then combine with the perceived threat, a personal sense of self-efficacy, and environmental cues to action to determine whether a behavior aimed at mitigating the health threat (including medication adherence) is actively pursued. The Theory of Planned Behavior,<sup>14</sup> in contrast, posits that behavioral intentions are the best predictors of actual behaviors and proposes that the factors

influencing intentions are personal attitudes, subjective norms, and perceived behavioral control (or self-efficacy). Both of these models highlight the importance of individual beliefs or attitudes and one's sense of personal control over behavior – that is, the ability to carry out a decided action.

The Necessity Concerns Framework (NCF)<sup>15</sup> was specifically designed to address individual belief-related factors relevant to adherence behavior. While noting that economic, sociocultural, and structural elements all contribute to (non)adherence, the authors argue that patients' beliefs about the necessity of a treatment weighed against their worries about potential adverse outcomes are the primary drivers of adherence-related decisions, and meta-analytic results confirm the utility of the NCF.<sup>16</sup> Each of the three models described thus far are well-suited to explaining intentional behaviors.

The heuristic Information-Motivation-Strategy Model (IMS)<sup>17–19</sup> was developed specifically to assist clinicians in promoting patient adherence, and it is more comprehensive than the NCF, addressing cognitive, social, and environmental factors from both the patient and provider perspectives. Because its foundation is broad, the IMS better accounts for unintentional behaviors than do the previously-described models. The premise of this model is that in order for patients to adhere they must understand what to do (information), want to do it (motivation), and have the means to carry out their intentions (strategy). The inclusion of both patient and provider in the model ensures that IMS-based interventions will be individualized and patient-centered.

## PCC and medical communication

The Institute of Medicine (IOM) has formally recognized the value of patient-centered care (PCC) – care that is empathic, compassionate, well-coordinated, and actively engages patients in decision-making – by including it as one of six objectives for enhancing 21st century health care.<sup>20</sup> From this perspective, patients are more than a set of symptoms or a puzzle to be solved – they are individuals who must be understood within their life contexts and they are experts on their own experiences and challenges, suggesting that they should partner with their clinicians to make health care decisions and enact strategies that will work best for their own unique situations.<sup>21,22</sup>

The Picker Institute/Commonwealth Fund has operationalized PCC as including the following key elements: (a) respect for the needs, values and preferences expressed by patients, (b) communication, education, and information, (c) care coordination, (d) emotional support, (e) physical

comfort, (f) social network engagement, (g) care continuity during hospital-to-home transfers, and (h) access to services and care. This multi-dimensional definition has been adopted by others, including the IOM.<sup>20</sup> Several systematic reviews have been conducted and PCC is generally found to be associated with a host of positive patient outcomes, including both clinical and satisfaction-related outcomes. Some studies<sup>23,24</sup> focus primarily on consultation style or communication style aspects of PCC, and each of these reviews has found that adherence is better in cases where care is more patient-centered. Another recent review,<sup>25</sup> using a more inclusive definition of PCC, also identified adherence as a positive outcome of this care-delivery approach. These positive associations between PCC and adherence are true not only in the short term but also when examined longitudinally.<sup>26,27</sup> Some studies conceptualize adherence as a potential mediator of the relationship between PCC and clinical outcomes or satisfaction,<sup>25,26,28–30</sup> rather than as the single and final endpoint. This approach is consistent with the view that PCC fosters a sense of trust and partnership that then facilitates patient behaviors, such as adherence, that lead to better health outcomes and higher satisfaction.<sup>19,29</sup>

Across the various operationalizations of PCC, it is clear that medical communication is better and clinician-patient relationships enhanced when PCC is present. Acknowledging concerns and reiterating the usefulness of a medication may also help to inspire better adherence.<sup>31,32</sup> Patient-centered, personally-tailored verbal explanations play a key role in helping patients understand the reasons for recommendations and feel comfortable voicing their concerns, and this may be especially true for patients with low health literacy.<sup>19,33</sup> Once treatment decisions have been agreed upon, simple written materials such as visit summaries, medication-specific instructions, and reminders can ensure that patients remember important information from the encounter, and may also mitigate anxiety about remembering large amounts of information.<sup>34,35</sup> Finally, sharing information about factors related to nonadherence is also important, as data suggest that patients who understand the predictors of nonadherence are more likely to recognize and navigate adherence-related pitfalls for themselves.<sup>36</sup>

## Best-practice recommendations for improving adherence

With the PCC foundation firmly in mind, we now summarize specific interventions that reflect current best-practices for improving adherence to drug therapies. The order in which

interventions are addressed is loosely based on the IMS model's framework, with efforts to enhance understanding being addressed first, followed by factors related to motivation, and ending with aspects that contribute to patients' ability to implement the plans to which they commit.

### Enhance understanding

Health literacy is defined as the degree to which a patient is able to obtain, process, and understand health information so as to make appropriate health-related decisions.<sup>37</sup> Low health literacy represents an ongoing challenge with about one third of adults in the US falling at the basic or below basic level according to the National Assessment of Adult Literacy (NAAL).<sup>38</sup> Patients commonly misunderstand directions for taking medications, and this is true even in the absence of language barriers.<sup>39,40</sup> Certain groups – including the elderly, some ethnic minorities, non-native English speakers, and those with low education and income levels – are recognized as being at particular risk for low health literacy<sup>38,41</sup> but it is also understood that any individual has the potential to experience low health literacy within a particular medical domain or in the context of certain life experiences. Indeed, interventions specifically targeting health literacy as a way to improve adherence have had minimal success.<sup>42</sup> Therefore it is currently recommended that a “universal precautions” approach be employed.<sup>41,43,44</sup> This means that rather than attempting to assess and then appropriately target patients' health literacy, clinicians should begin with the assumption that everyone has low health literacy – and then attend to patient cues that might suggest otherwise, increasing the sophistication of the medical dialog as appropriate.

A universal precautions approach suggests that, among other things, language should be kept simple (avoiding jargon), appropriate analogies should be used to aid comprehension, the amount of information presented in a single encounter should be limited to 3–5 points, and teach-back techniques should be used to verify patient understanding.<sup>43</sup> Even in cases where the patient initially understood the instructions, data have consistently indicated that forgetting how to take medications is a major contributor to nonadherence.<sup>45,46</sup> Further, more information is forgotten when more is presented, when patients are older, and when patients are anxious.<sup>47–50</sup> Therefore, providing a manageable amount of information, in a straightforward format, and then actively checking patient comprehension with teach-back all make a good deal of sense. It is important, however, that the request for the patient to “teach back” to the clinician what she or he has understood be framed as a check on the

clinician – not on the patient.<sup>51</sup> Patients who feel that they are being evaluated may be more anxious and thus less able to explain what they do, in fact, understand; satisfaction with medical care may be negatively impacted as well. Finally, clearly written materials that patients can take home with them can enhance their ability to remember, and therefore to adhere to, their recommended treatments.<sup>19,43,52</sup>

## Simplify the regimen

Not only is it important to limit the amount of information discussed in a single medical encounter, simplification of the medication regimen itself is also a key factor in influencing adherence. Studies consistently show that in cases of polypharmacy and/or when the dosing requirements are more frequent and complicated, adherence suffers.<sup>53–56</sup> Thus, best-practice recommendations are that regimens should be kept as simple as possible and that they should be integrated into patients' existing habits and lifestyles with as little adjustment as possible to existing patterns in patients' lives.<sup>19,57</sup>

## Enhance motivation

In order to encourage motivation to adhere, the clinician must know what is compelling to a patient – what fuels dreams and visions for the future, what causes anxiety and trepidation. But these things are difficult to ascertain in the absence of effective communication and a healthy relationship between clinician and patient. Recalling the importance of medical communication to the overall PCC model, it is recommended that clinicians formally evaluate their communication skills and receive training to strengthen those abilities, as training is generally found to be effective.<sup>58,59</sup>

Communication skills training may sometimes be highly individualized and include feedback focused on specific growth areas that have been identified for a clinician.<sup>60–62</sup> Other training programs focus on teaching a flexible set of skills that can be used with virtually any patient, and which can be adapted to suit the patient's unique situation. One of the most widely used of this latter type of training program is Motivational Interviewing (MI).<sup>63</sup> Although MI comprises a variety of techniques and strategies, it can be summarized as an interview-style intervention aimed at helping patients to identify discrepancies between goals and behaviors, with an eye toward guiding them toward making self-motivated decisions for change. Because of its interactive style and the clinician's focus on guiding and asking questions (vs stating what the patient needs to decide or do) it provides ample opportunity for patients to discuss the ways in which their lifestyles may be at odds with the regimen under discussion and to

work through the informational, motivational, and skill-based aspects of what it would mean to be adherent.<sup>64,65</sup> Rooted in the Transtheoretical Model of Change,<sup>66</sup> MI encourages clinicians to ask different questions of, and guide in different ways, patients who are at different stages in their readiness to change or to commit to a medical recommendation.

Meta-analytic findings indicate that patient adherence is significantly influenced by clinician communication skills training, with adherence being 1.62 times higher in patients whose physicians have received communication skills training as compared to those whose physicians have not.<sup>67</sup> Training takes a variety of forms, but there is good evidence that communication skills training programs that provide opportunities for skills-practice have better outcomes than those that do not have a practice component.<sup>68</sup> It is less clear from these data, however, that any particular form of practice is better – for instance, after completing their literature review, Lane and Rollnick concluded that it is impossible to determine whether simulated patients provide a better training experience than simple role-playing, as only one study had directly compared the two (and found no significant difference). They suggest that using simulated patients may not be worth the extra cost when the more economical role-playing approach appears equally effective.

With proper communication skills training, health care professionals are well-equipped to foster the type of trusting clinical relationships that are consistently shown to relate to better outcomes. Multiple studies have shown that patients are more motivated to adhere when they are in partnering relationships – that is, their physicians communicate effectively and welcome their involvement in care.<sup>69–76</sup> Patients in a collaborative relationship are more likely to engage in shared decision-making, an effective approach for reaching an agreed-upon treatment decision<sup>77</sup> that has been linked to greater adherence.<sup>57,78–80</sup> When patients actively engage in making decisions about their own care they tend to be more committed to those decisions, taking ownership for them in a way that is less likely if the decisions are made by the clinician alone.

Another – more direct – approach to improving adherence is to explicitly incentivize the behavior; smaller incentives may be provided to every adherent patient, or periodic opportunities for a larger incentive may be given through a lottery system. Financial incentives have been shown to improve adherence especially in cases where the treatment itself is onerous (eg, depot medications) and for patients who are at high risk for nonadherence.<sup>81–84</sup> Even this direct effort to influence patient behavior is sometimes unsuccessful,

however. Meta-analytic findings show that when incentives are larger, more frequent, and given over a longer period of time they tend to exert more influence on adherence.<sup>85</sup> This, of course, presents additional challenges as the requisite effort and financial investment are often not sustainable over longer periods of time. Additionally, providing external incentives may actually decrease the patient's intrinsic motivation for the behavior, as has been shown in other domains.<sup>86</sup> Hence, motivational strategies that emphasize partnership, shared decision-making, and patient engagement are likely preferable as they tend to reinforce themselves and do not require additional funding to make them viable.

## Engage social supports

Just as a supportive relationship with the clinician is important to patient adherence, the support of family and close friends can also play a vital role in encouraging adherence. Meta-analytic findings verify the value of social supports, with practical support – for example, providing transportation to medical appointments or picking up a prescription from the pharmacy – being the most important.<sup>87</sup> Additional findings from this meta-analysis include that patients from families in conflict were 1.5 times less adherent, and those from cohesive families were 1.7 times more adherent; additionally, living with someone (whether married or not) was found to be modestly associated with adherence. When the social support system is engaged, adherence challenges related to social, economic, or lifestyle barriers can often be more effectively addressed.<sup>19,88</sup> Family members or other individuals with whom the patient has close contact may be able to serve as reminders, cheerleaders, and troubleshooters. In addition, some data suggest that when social supports are stronger patients experience less negative affect which in turn predicts adherence self-efficacy and actual adherence.<sup>89</sup>

## Develop troubleshooting strategies

Being convinced of the utility of a drug therapy improves the likelihood of proper adherence, but it is not enough on its own. Part of helping patients to adhere to treatment involves working with them to develop goals that are attainable and linking patients with resources and tools that will help them to meet the challenges they will inevitably encounter. Much of the goal-setting literature relating to improving adherence is focused on lifestyle recommendations (for example, dietary changes or increased physical activity) – and these data are clear that step-by-step changes are generally more do-able than are large-scale changes made all at once.<sup>90,91</sup> However, goal achievement using step-by-step changes is often not

possible when the recommendations are pharmaceutical – it typically does not make sense to phase in a necessary drug in steps. But other aspects of the adherence-improvement regimen may be modified according to this strategy. For example, one adherence-related goal may be to improve self-monitoring behaviors, but these are sometimes perceived as onerous by patients, eg,<sup>92</sup> and thus personal record-keeping may be phased in more slowly, making it manageable for the patient and enabling them to experience successful self-monitoring. This experience of success is the most powerful method for improving self-efficacy for a behavior and is consistently superior to either vicarious experiences or simple attempts to verbally persuade one that they are capable of making a change.<sup>19,93,94</sup> In turn, studies consistently show that a sense of self-efficacy and a sense of personal control are important predictors of medication adherence.<sup>95</sup>

## Use technology appropriately

In an effort to streamline care delivery and to provide as many resources as possible, current trends include incorporation of technological adherence aids. The simplest reminder devices – digital timer caps and pill bottle strips with toggles – seem unhelpful when utilized as the sole intervention.<sup>96</sup> And, although some technologies may be quite effective in certain situations, their potential disadvantages should not be ignored. With the PCC framework in mind, it is easy to see that technologies that facilitate the delivery of medical care with less human-to-human interaction may sometimes ostracize already-isolated patients; further, some technologies may be confusing to even the most tech-savvy clinicians.

Because forgetting is a widespread reason for failing to adhere, interventions to remind patients of their dosing schedule are common. Some of the simplest and most economical interventions involve telephones (calling, texting, and apps)<sup>97</sup> but the effectiveness of these approaches varies. Although simple telephone reminders and SMS have been found to increase medication adherence,<sup>96–101</sup> some data suggest that electronic reminders alone are ineffective.<sup>102</sup> Combined, these findings suggest that reminders may be useful but are most effective when they are not dissociated from the therapeutic relationship. Telephone counseling is more effective than simple reminders by phone and can be supplemented with short text messages to prompt adherence over time.<sup>98</sup> It may be that the counseling portion of the telephone interaction and the corrective feedback<sup>103</sup> is driving effects.

When using reminder messages and apps, best practices require these to be as focused on individual patient needs as possible. For example, the MESSaging for Diabetes

(MED) program<sup>104</sup> sends messages that are tailored to address specific adherence barriers identified by patients (eg, beliefs that medications might be harmful, or lack of information about their medications), in addition to providing a reminder. As patients' situations change, the most prominent barriers can shift, and so the messages not only vary across patients but also within patients over time. And, a smartphone app for HIV patients<sup>105</sup> provides real-time feedback about plasma concentration of the antiretroviral medication based on adherence, thus helping patients to better understand how their medications are working and fostering a sense of personal control. It may be that when technological interventions are tailored in this way they will be more appealing to patients, which is important since some data suggest that only about 15% of patients view things like adherence diaries or mobile phone reminders as helpful.<sup>106</sup>

Remote patient reminders and counseling are not the only technological tools that may improve adherence. Van Mierlo et al<sup>107</sup> reviewed a wide range of digital health tools including social networking and videos, but concluded that most interventions had only moderate effects, and in some cases were more burdensome than help to clinicians. This review noted, however, that a substantial number of patients prefer communication with their physicians electronically (such as by email) which suggests that continued effort to improve the ease-of-use for these types of technologies may be worthwhile. Another review<sup>53</sup> highlighted the usefulness of electronic monitoring systems for improving adherence in diabetic patients and suggested the importance of these technologies for helping clinicians identify patients in need of extra support. In addition, this review<sup>53</sup> notes that electronic monitoring data has been shown to help physicians and patients to make more appropriate adjustments to treatment plans, as compared to making plan-adjustments based solely on laboratory data, because electronic data differentiates between missed doses and under-prescription, thus avoiding unnecessary changes in dosing or medication switching.

Taken together the data on technology-based adherence aids suggests that they are useful, but not uniformly so. To the extent that these tools are used to inform treatment decisions and are used in conjunction with other strategies they are likely to be more successful. If, however, they are used instead of relationship-based strategies there may be little benefit.

## Create tailored, coordinated, multifaceted plans

Evidence consistently points to the importance of using multi-pronged approaches to improve adherence – this

is not surprising because the multifaceted nature of the nonadherence problem is well-recognized. Combining educational, self-management, motivational, and practical elements in an adherence-improvement plan will yield the best outcomes.<sup>11,12,108</sup> Interventions should also be appropriately tailored to patient needs. For example, some patients may not have knowledge-based barriers but may experience financial constraints – in this case, it would make little sense to spend time and energy on informing the patient about the disease process and value of medication for controlling it, since it is the financial aspect that is creating the problem. Tailoring multifaceted interventions to individual needs not only maximizes efficiency but it also makes it more likely that patients will feel engaged, in control, and as if they are in genuine partnership with their clinicians – all of which make medication adherence more likely.<sup>109,110</sup>

Delivery of tailored, multifaceted interventions (eg, telephone reminders, counseling, education sessions) is often most effective when tackled by a health care team.<sup>98,111</sup> It is crucial, however, that each health care team member communicates consistent messages to the patient. This means that team members must communicate with each other regularly, ensuring that instructions given to patients are consistent and that the strategy is cohesive. This, in turn, helps improve patient trust and active partnership, leading to more self-advocacy and problem-solving and ultimately better adherence.<sup>19,112</sup>

## Conclusion

No single adherence-improvement strategy is best. Depending on the nature of the medication regimen, the context within which it is embedded, and the patient her- or himself, the most efficacious approach will vary. As a general rule, multifaceted interventions work most effectively, with elements of these multi-pronged approaches including simplification of the medication regimen; personalizing and tailoring both medication regimens and interventions to improve adherence; involving patients in medication decisions; utilizing social support systems to support adherence; and using technology selectively, taking patient preferences into account, but not attempting to replace the interpersonal relationship with electronics.

## Disclosure

The authors report no conflicts of interest in this work.

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