

## REVIEWS

## Using Insights From Behavioral Economics and Social Psychology to Help Patients Manage Chronic Diseases

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Despite a revolution in therapeutics, the ability to control chronic diseases remains elusive. We present here a conceptual model of the potential role of behavioral tools in chronic disease control. Clinicians implicitly accept the assumption that patients will act rationally to maximize their self-interest. However, patients may not always be the rational actors that we imagine. Major behavioral barriers to optimal health behavior include patients' fear of threats to health, unwillingness to think about problems when risks are known or data are ambiguous, the discounting of risks that are far in the future, failure to act due to lack of motivation, insufficient confidence in the ability to overcome a health problem, and inattention due to pressures of everyday life. Financial incentives can stimulate initiation of health-promoting behaviors by reducing or eliminating financial barriers, but may not produce long-term behavior change without additional interventions. Strategies have been developed by behavioral economists and social psychologists to address each of these barriers to better decision-making. These include: labeling positive behaviors in ways consistent with patient life goals and priorities; greater focus on more immediate risks of chronic diseases; intermediate subgoals as steps to a large health goal; and implementation of specific plans as to when, where, and how an action will be taken. Such strategies hold promise for improving health behaviors and disease control, but most have not been studied in medical settings. The effectiveness of these approaches should be evaluated for their potential as tools for the clinician.

**KEY WORDS:** chronic disease; behavioral economics; financial incentives; social psychology.

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### INTRODUCTION

Chronic diseases affect 133 million Americans<sup>1</sup> and often are not being managed effectively. For example, of 75 million people with hypertension in the United States, one-third go untreated and more than half do not adequately control their blood pressure.<sup>2</sup> Efforts to improve chronic disease control have included patient and public education programs and pay-for-performance for providers.<sup>3,4</sup> Such interventions implicitly assume a classical model of patients as rationally self-interested agents who are sometimes ignorant or forgetful. In this paper we contend that while education and financial incentives can be helpful in many clinical situations, they are often insufficient or counterproductive. We adopt a more realistic and contemporary behavioral model of patients as socially motivated and cognitively constrained. Drawing on research from social psychology and behavioral economics, we identify a broader range of behavioral tools that we believe can contribute to more effective control of chronic disease. We note that these tools have been developed in nonclinical contexts and their efficacy in specific clinical settings should be evaluated in clinical trials. In this paper we focus on patient-level barriers to sustained chronic disease control. While provider- and system-level barriers also exist, they are beyond the scope of the present paper.

### PROVIDER STRATEGIES AND THE RATIONAL PATIENT

When providers attempt to promote better control of chronic diseases they typically assume that patients are what behavioral economists describe as “boundedly rational,” making decisions that maximize their self-interest, subject to limits of their attention, memory and other cognitive abilities.<sup>5,6</sup> To the extent that providers pay attention to these issues, they may have strategies that emphasize *education*, *feedback*, and *reminders*. Some health systems also apply strategies in *cost management*.

If patients are rational, education concerning better health practices ought to stimulate their motivation and intention

to change.<sup>7–10</sup> According to the Health Belief Model (HBM), individual perceptions (perceived disease susceptibility and severity) and modifying factors (demographic, sociopsychological variables, and other people and information sources that modify the perceived disease threat) predict likelihood of patient action (including perceived benefits of and barriers to action).<sup>11</sup> For instance, more accurate health beliefs have been associated with better medication adherence in diabetes.<sup>12</sup> In general, patients who accurately perceive health costs of non-treatment and benefits of effective treatment programs should rationally choose to adhere to those programs.

Once a patient decides to initiate a strategy for controlling a disease, she must learn to calibrate her specific behaviors to achieve the desired health results. Providers generally give feedback on progress at the time of clinical visits. In some situations, they enable patients to obtain more frequent feedback as with home blood pressure or serum glucose monitoring. Of note, overly frequent feedback has been shown in non-clinical contexts to be demotivating because normal fluctuations in an undesired direction generally cause a stronger response than equivalent gains.<sup>13–15</sup>

Even when patients have learned how to control a disease, they may find regimens to be time-consuming or unpleasant, or may be distracted from the task of disease control by competing demands.<sup>16,17</sup> Thus, some providers use reminder strategies, such as phone calls before appointments and automatic prescription refills to ensure that a patient's attention remains adequately focused on disease control.

Education, feedback, and reminders may be insufficient in inducing sustained control of chronic disease by rational patients if they are deterred by the financial cost, time investment required, adverse effects of medications, or structural barriers to care. Traditional strategies attempt to address these barriers by lowering costs of treatment (e.g., by providing free medications, coverage and access improvements, and case management).<sup>18–21</sup> A strategy more recently applied in a number of clinical trials is the use of financial rewards, which presumably offsets some of the cost of treatment while serving as enticements to undertake health or healthcare-related behaviors.<sup>22–26</sup>

These strategies for promoting control of chronic diseases are summarized in Figure 1, with a model of rational patients facing at least one diagnosed and treatable chronic disease.

### SHORTCOMINGS OF CURRENT STRATEGIES TO CONTROL CHRONIC DISEASES

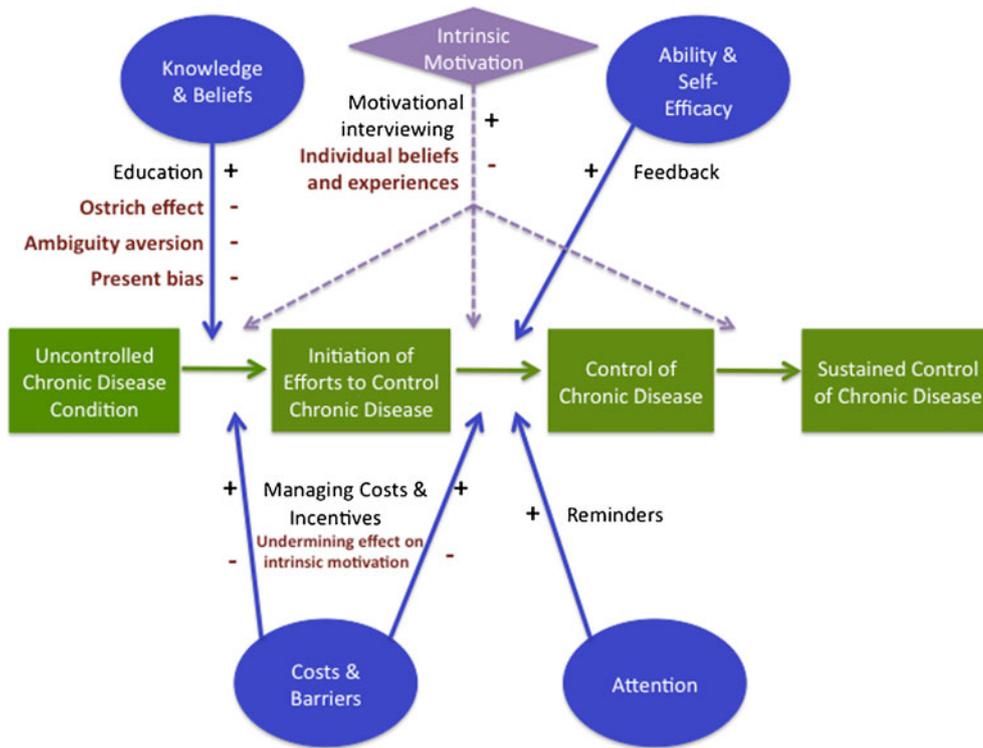
Traditional strategies that rely on the neoclassical model of rational patients have yielded limited success in chronic disease management. In particular, patient education alone is not associated with improved adherence, and knowledge-

able patients are often poor adherers.<sup>27,28</sup> Even sophisticated interventions involving education, reminders, and more have not been particularly successful in improving adherence or treatment outcomes.<sup>20</sup> We assert that one reason for the failure of such interventions is that while education may affect objective ability to control a disease, it does not necessarily affect patients' subjective perception of their capability, a construct known as "self-efficacy." High self-efficacy is important in achieving chronic disease control, and has been found to predict more successful hypertension self-management in African Americans.<sup>29,30</sup>

Behavioral research provides some clues why well-meaning attempts to educate patients or provide them feedback may backfire (see Fig. 1). First, education often centers on explaining the risks of poorly controlled chronic disease in order to scare patients into controlling their disease. Unfortunately, many people deny and dismiss information that they find frightening (the "ostrich effect").<sup>31–34</sup> While fear can motivate action, research from other fields suggests it is most effective when the proposed action helps to neutralize that fear (e.g., a clear strategy to control the disease).<sup>35,36</sup> Second, very technical or overwhelming education may cause patients ironically to feel subjectively less knowledgeable and turn away from instructed behaviors.<sup>37,38</sup> This tendency to choose a "known" risk (e.g., continuing without treatment) over an unknown risk (a confusing treatment) is called *ambiguity aversion* and appears to be driven by people's preference to act in situations where they feel relatively knowledgeable or competent.<sup>39–41</sup> Most clinicians have likely dealt with patients that feel overwhelmed when initiating treatment of chronic diseases; ambiguity aversion highlights why these patients may choose inaction instead of following medical advice. In short, when educating patients, it matters not just *what* information you convey, but *how* you convey that information.

A third reason why educating or financially inducing patients to initiate treatment may be ineffective is "*present bias*," whereby patients heavily discount future health benefits relative to more immediate tasks needed to sustain health. They thus may underweight the long-term benefits presented by managing chronic diseases while focusing on the more salient challenges of initiating and adhering to treatment regimens and follow-up.<sup>42</sup> This may be particularly important with diseases such as hypertension that have a long asymptomatic phase. For example, a patient may underweight the long-term risk of a stroke compared to the obvious and proximate difficulties of dealing with common medication side effects and costs of care, all in an attempt to control a disease that appears to the patient to have no tangible effects in the patient's quality of life.

Finally, we note that removing financial and structural barriers to adherence is clearly beneficial, particularly for poorer patients who would otherwise not be able to afford treatment. However, doing so does not guarantee adherence or disease control. Although direct financial incentives may



**Figure 1. Patient-centered continuum of chronic disease control (rectangles), attributes that influence progression along this continuum (ovals), commonly used strategies that providers typically use to influence patient behavior (+) and their shortcomings (-), and the hypothesized effects of intrinsic motivation.**

induce patients to alter behavior in the short run, the longer-term impact of such incentives is less clear (particularly, how patients respond after financial incentives are removed). While it is possible that such financial rewards may have a sustained positive impact by promoting patient self-efficacy, they could also have a long-term negative effect by undermining patients’ internal drive or “intrinsic motivation” to control the disease.

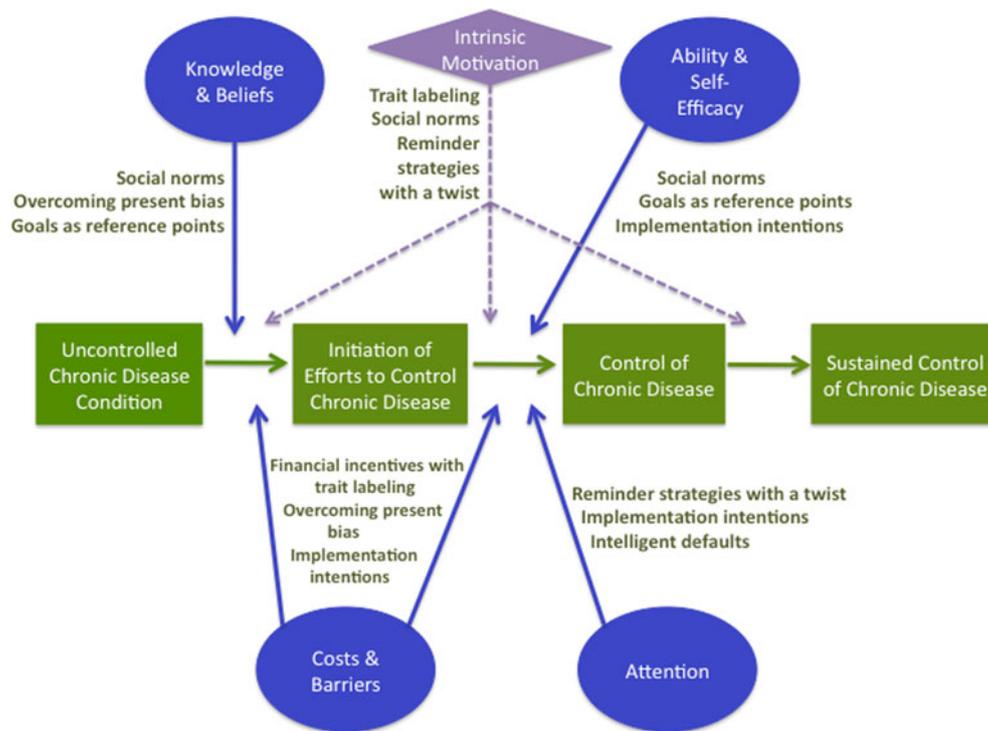
reasons to maintain good health. Of course, several factors may diminish intrinsic motivation to seek medical treatment (e.g., anecdotes from friends about bad experiences with health care, fatalistic religious beliefs, unrealistically positive views of one’s health status, mistrust of providers).<sup>47</sup> Thus, interventions designed to promote more effective control of chronic disease should take into account their potential positive or negative impact on intrinsic motivation.

**THE ROLE OF INTRINSIC MOTIVATION**

Intrinsic motivation is the inherent reward present in certain behaviors.<sup>43</sup> This construct comes into play in the stages of change model, which is useful in determining a patient’s level of motivation to change.<sup>44</sup> Clinicians also attempt to evoke patients’ intrinsic motivations when using motivational interviewing,<sup>45</sup> which was developed with the understanding that placing responsibility for change internally (“internal attribution”) was more effective than placing responsibility on external factors.<sup>46</sup> Intrinsic motivation to control disease is likely to emerge from a desire to be healthy or live longer and may be enhanced by relationships (e.g., wanting to live to see a child get married), personal goals (e.g., wanting to travel to another country), personal beliefs about the importance of life, or any other factors that patients identify as primary

**NEW TOOLS TO CONTROL CHRONIC DISEASES**

Applying an expanded model of patient behavior to chronic disease control can facilitate evaluation and incorporation of new behavioral tools to help patients more successfully control their chronic diseases (see Fig. 2). The choice of tools applied to control chronic disease should take account of where the patient stands on the control continuum (represented by the rectangular boxes in the figures). Effective interventions could render patients able and competent to manage their chronic disease. Tools that warrant evaluation in clinical settings based on their success in other arenas include financial incentives with trait labeling, making risks salient, goals as reference points, and implementation intentions (see Table 1).



**Figure 2. Potential behavioral tools to address non-optimal patient choices in chronic disease management. For brief explanations of tools not discussed in this paper, see footnotes to table.**

### FINANCIAL INCENTIVES AND TRAIT LABELING

Recent studies have examined direct *financial incentives* to modify patient behavior. These are extrinsic motivators that can influence behaviors, according to the theory of operant conditioning.<sup>43,48</sup> They have effectively produced short-term behavior changes in clinical and social science applications.<sup>22–26,43,49</sup> For example, financial incentives have been used to increase adherence to medications like warfarin, improve uptake of Hepatitis B vaccinations among drug users, and increase rates of completing smoking cessation programs.<sup>22–26,49</sup> Results have been mixed in their use as an incentive for weight loss.<sup>22,26</sup> If financial incentives are used to induce healthy behaviors for a discrete period, those behaviors may not persist when incentives are discontinued.<sup>22,49,50</sup>

In some cases, removing financial incentives may have the ironic effect of reducing healthy behaviors below baseline. There is evidence in non-medical research of an “*undermining effect*” in which even initially successful extrinsic rewards reduce later intrinsic motivation to perform a task.<sup>43,51</sup> For instance, in one classic study children promised a “good player award” for drawing a picture were subsequently less likely to choose to draw pictures during their free play time in the absence of such a reward.<sup>52</sup> The effect is explained by attribution theory, which states that individuals receiving rewards may attribute their behavior solely to earning the reward and

not to any intrinsic desire.<sup>51,52</sup> Thus, the positive effect of financial incentives as extrinsic motivators must be carefully weighed against the potential negative effect of incentives on intrinsic motivation. This does not present a problem when the desired outcome is a discrete event (e.g., encouraging vaccination or even stimulating initial hypertension treatment), but warrants more extensive investigation in situations in which the duration of treatment is likely to extend beyond the duration of any incentives, as is typically the goal in sustained chronic disease management. This undermining effect may partly explain why only one out of 19 incentive-based interventions related to smoking cessation has successfully affected long-term behavior.<sup>49</sup> Sustaining incentive-induced short-term behavior change may require supplementary interventions to enhance intrinsic motivation in order to counteract any undermining effect of financial incentives.

One such strategy is *trait labeling*: presenting a positive label along with the extrinsic incentive that can be internalized by patients as the reason for their behavior.<sup>51</sup> This might take the form of labeling positive behaviors in ways consistent with patients’ life goals and priorities. Instead of helping the patient explore their motivation for change as in motivational interviewing, a trait label is provided in order to change the patient’s *attribution* for their behavior (from external to internal) with the goal of increasing intrinsic motivation and self-efficacy. For

**Table 1. Behavioral Tools Potentially Useful to Address Non-Optimal Patient Choice & Achieve Sustained Chronic Disease Control**

Tool	What it affects	Which stage(s) it may be appropriate
1. Financial Incentives	Extrinsic motivation (increase), Costs & barriers, Intrinsic motivation (decrease)	Initiation of Treatment, Achievement of Control
2. Trait labeling	Intrinsic motivation	Achievement of Control, Sustained Control
3. Social norms*	Knowledge & beliefs, Self-efficacy, Intrinsic motivation	Initiation of Treatment, Achievement of Control
4. Overcoming present bias	Knowledge & beliefs, Costs & barriers	Initiation of Treatment
5. Goals as reference points	Knowledge & beliefs, Self-efficacy	Initiation of Treatment, Achievement of Control
6. Implementation intentions	Attention, Costs & barriers, Self-efficacy	Initiation of Treatment, Achievement of Control
7. Intelligent defaults <sup>†</sup>	Attention	Achievement of Control, Sustained Control
8. Reminder strategies with a twist <sup>‡</sup>	Intrinsic motivation, Attention	Achievement of Control, Sustained Control

\*Social norms: explicit statements about how the majority of people act in order to influence individual behavior<sup>65</sup>

<sup>†</sup>Intelligent defaults: set to the choice most people would likely prefer if they had unlimited time and resources to decide, while allowing individuals to choose differently.<sup>66,67</sup>

<sup>‡</sup>Reminder strategies with a twist: creative reminders meant to increase salience and tip the cost-consequence ratio to ensure that patients act the way they intend to, not withstanding all of life's distractions<sup>68</sup>

example, consider a hypothetical clinical trial in which financial incentives are provided to promote weight loss. The undermining effect might be blunted by delivering a message to a patient such as: “The fact that you worked really hard in the last month to lose ten pounds really shows how much you want to be well enough to see your granddaughter graduate from college. This reward is in recognition of that hard work.” In this case the patient is encouraged to attribute her positive behavior change to the intrinsic motivator (wanting to live to see a granddaughter graduate) rather than the extrinsic motivator (money), regardless of which is actually driving the behavior.<sup>51</sup> Similarly, a patient who receives an incentive to enter a smoking cessation intervention could be reminded that they are doing this to resume such activities as golfing and hiking. Such trait labels would need to be individualized based on stated reasons for acting to change long-term behaviors. While such approaches have been used successfully in several studies in the social psychology literature, we are aware of no health interventions to date that have involved use of both financial incentives and

trait labeling. Since extrinsic motivators can in different circumstances strengthen or weaken intrinsic motivation, a combined strategy takes advantage of this theory by using financial incentives to jump start behavior, while trait labeling can increase the likelihood that the patient will attribute his or her behavior to internal reasons, and thereby sustain the desired behavior.<sup>53</sup>

### OVERCOMING PRESENT BIAS: MAKING RISKS SALIENT

Many clinicians recognize the need to address *present bias* (the discounting of future costs), when they refer to both short and long-term *consequences* of diseases and behaviors in their efforts to nudge patients toward healthier behaviors. Behavioral research suggests that these discussions can be more effective if clinicians focus patients' attentions on more immediate *benefits* that accrue through specific preemptive small-cost actions (i.e., treatment adherence). For instance, in studies of low-income workers in India, including pictures of the household children on salary envelopes increased amount saved by 15 %, presumably by reminding individuals that small cost actions now (saving) have longer term implications that they care about.<sup>54</sup> Now consider the case of hypertension control. Present bias may manifest as a focus by patients on the immediate costs of treatment (e.g., common and frustrating adverse medication effects; time required for frequent clinical visits) while under-appreciating less obvious long-term benefits. Rather than informing patients of the consequences that they might expect to experience 20 or 30 years in the future, clinicians might instead tell patients, “If you take your medication regularly and bring your blood pressure to normal, the chances of another stroke in the next 4 years will go down by as much as 28 %”.<sup>55,56</sup> Clinical researchers could easily compare provider counseling that focuses on more immediate versus long-term disease risks to establish the effect on patient uptake of and adherence to treatment for many diseases such as hypertension and diabetes, as well as for behaviors such as alcohol and tobacco use.

### GOALS AS REFERENCE POINTS: STEPS TO SELF-EFFICACY

Patients with lower self-efficacy (i.e., less confidence in their ability to control the disease) tend to experience worse health outcomes.<sup>30</sup> Any tool that improves a patient's disease control may improve self-efficacy, simply through the positive experience of reaching a goal perceived to be unattainable. Using a *goals-as-reference-points* strategy may improve self-efficacy, even before full disease control is achieved. This involves breaking large goals into

intermediate sub-goals that serve as reference points.<sup>57,58</sup> People exert more effort the closer they are to achieving a goal, so that partitioning a large goal into a number of more attainable and more proximate sub-goals will generally increase total motivation.<sup>57</sup> This could be easily evaluated in chronic disease management. For example, a 20-pound weight loss program could set intermediate goals of 5 lb, then 10 lb, then 15 lb. Likewise, hypertension control may be perceived as more attainable if the end goals of taking medication each day, checking blood pressure most days, and lowering blood pressure to below 140/90 mmHg are divided into sub-goals that begin with taking medication most days, measuring blood pressure sometimes, and achieving any drop in blood pressure. Exercise, too, might be amenable to a graded approach in which “once in a while” is a reasonable first step. Completing these sub-goals is experienced as a success (thereby increasing self-efficacy), whereas the same accomplishment in the context of a single large goal is experienced as a loss and can be demotivating because the end goal has not yet been achieved.<sup>57,58</sup> Goals as reference points strategies have had positive impacts on goal achievement in other settings; clinical research should investigate whether they also improve patient adherence to chronic disease therapies.

### IMPLEMENTATION INTENTIONS

*Implementation intentions* are specific plans as to when, where, and/or how an action will be taken.<sup>59,60</sup> They are already used in some clinical situations. For example, smokers who chose a specific quit date were more likely to quit than those who committed to quitting sometime in the next two months.<sup>61</sup> In another example, college seniors who received vaccine education, chose a day to visit the clinic, and circled the clinic on a map were nine times more likely to obtain tetanus vaccinations than those receiving persuasive education alone (i.e., scaring them).<sup>62</sup> These examples highlight that while education to inform patients why they should modify their behavior is necessary, assisting them with plans as to how, where, and when they will do so may be more important in actually stimulating behavior change. Linking intentions to a specific plan is particularly useful in initiating treatment, but also may be useful to maintain treatment adherence. Implementation intention interventions for chronic disease control might include having patients specify a) when in the day they will take their medicines, b) when they will measure their blood pressure or glucose, c) what they will do if they run out of medicine, or d) what action they will take if they note particularly abnormal readings of blood pressure or glucose. Because implementation intentions have already shown success in some clinical situations such as smoking

cessation, we believe that clinical trials are warranted to assess the utility of applying this approach to efforts to improve glycemic control in diabetes, blood pressure in hypertension, and medication adherence in such conditions as HIV and epilepsy.

### CONCLUSION

There is a need for research into the effectiveness of a broader range of behavioral interventions in clinical settings that have the potential to assist patients in achieving sustained disease control. In this paper we have outlined the stages of disease control and its relationship to some underlying behavioral constructs. In addition we have provided examples of some tools that could improve success in disease management. Further clinical research is required to determine the effectiveness of these tools in practice and refine the conceptual model presented here. Overall, the tools discussed in this paper have been highly effective in inducing change in non-medical domains. Some have proven to be more effective than financial incentives that are gaining popularity in health research today. Behavioral economics and social psychology suggest a broader repertoire of potential clinical interventions than mere financial incentives; clinical research may prove that many behavioral tools beyond those discussed here are useful.<sup>63,64</sup>

Analogous to treatment of hematologic malignancies, tools effective for initiating control (induction) may differ from those needed for maintaining short-term control (consolidation), or for sustaining long-term disease control (maintenance). Some tools may have short-term benefits, but cause longer-term harm. Some patients may benefit from multiple strategies to stimulate initiation of control, followed by different strategies at later stages. Thus, “treatments” may need to be administered in combinations and be delivered concurrently, sequentially, or both. Such comprehensive strategies must: 1) influence intrinsic patient attributes including knowledge and beliefs, ability and self-efficacy, and intrinsic motivation to control the disease; and 2) restructure the surrounding choice environment or “architecture” to make desired actions more attractive and/or easier to accomplish.<sup>63,64</sup> The Table summarizes the relationships amongst tools (discussed in this paper and some others), their behavioral or attitudinal targets, and the stages of chronic disease control.

Chronic disease care is far from routine. Influencing patient behavior to achieve chronic disease control is a challenging and complex enterprise that may benefit from a broad range of tools. If application of these newer behavioral tools proves effective, their use will require an investment of substantial time both to educate providers and

to administer sometimes intricate cognitive interventions. Although behavioral interventions could add costs to systems and providers, they may ultimately prove cost-effective for society.

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