

The Past and Future of Research on Treatment of Alcohol Dependence

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Research on the treatment of alcoholism has gained significant ground over the past 40 years. Studies such as the National Institute on Alcohol Abuse and Alcoholism's Project MATCH, which examined the prospect of tailoring treatments for particular people to better suit their needs, and Project COMBINE, which examined in-depth, cognitive-behavioral therapy and medical management, helped pave the way for a new way of approaching alcoholism treatment. New findings garnered through the National Epidemiologic Survey on Alcohol and Related Conditions further defined the problem. At the heart of this research has been the development of procedures to characterize, measure, and monitor the fidelity to a particular conceptual psychotherapeutic approach so that clear comparisons can be made between conceptually and technically distinct approaches. Advances in scientific methodology and statistics have provided tools to analyze complex datasets. The resulting findings mark an improvement over the first models of treatment developed decades ago, which tended to focus on anecdotal findings and assumptions. This hard-earned progress has enabled scientists today to move ahead and address the next set of challenges. Future research, coupled with a restructured treatment system capable of making new scientific findings rapidly available to the community, hold the key to significantly improving treatment outcomes and reducing suffering from alcohol-related disorders. KEY WORDS: Alcohol dependence; alcohol use disorders; alcoholism; treatment; treatment models; treatment method; treatment research; treatment outcomes; Project MATCH

Remarkable progress has been made in the treatment of alcohol use disorders (AUDs) over the past 40 years. We have a better understanding of the natural history of heavy drinking and the development of dependence. We understand better the course of recovery and the risk factors and prognostic indicators for AUDs. Most importantly, we have made significant strides in the behavioral and pharmacological treatments available to people, and their families, who suffer from alcoholism. Research supported by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) has been instrumental in advancing treatment, moving our understanding from anecdotal approaches to those that are based firmly on evidence.

Of course, new scientific findings almost always generate more questions than they resolve, and alcohol treatment research is no different. Research conducted over the past four decades has created a number of new scientific challenges. The most central of these challenges is to truly understand the scientific basis underlying health behavior, such as alcohol consumption. This calls for careful understanding of behavior and the steps involved in decisionmaking, as well as the social determinants that influence those decisions; in short, we need to know who we are and why we do what we do. It is especially important to identify potentially modifiable operators within the systems that determine these behaviors in order

to develop new and more powerful ways to help people overcome addiction to alcohol. Medications offer one method to do so, which will require identifying neurophysiological and genomic targets for development of new medications with novel mechanisms (Koob 2006). Better-targeted behavioral approaches that address these habits (such as addiction) also are needed. Ultimately, our goals are to ensure that more people respond to treatment and that they are able to experience long-lasting effects from that treatment.

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In addition to addressing these scientific challenges, there is a pressing need to create a new system of providing risk reduction and treatment for heavy drinkers and people with alcohol dependence. The current treatment system model, the Minnesota Model, was developed by professionals at a State hospital in Minnesota and promulgated most famously by the Johnson Institute and the Hazelden Foundation. Based on what was known at the time (primarily through the folk wisdom of Alcoholics Anonymous [AA]), the Minnesota Model combined the first five steps of AA with lectures on the disease concept of alcoholism and some practical supportive psychotherapy. Central to its concept was the use of staff members who themselves were in recovery from alcohol dependence, along with others (Anderson et al. 1999).

Unfortunately, because this model of care was developed without the benefit of a scientific basis, it was not configured in such a way as to rapidly change in response to scientific advances. Currently, more than 90 percent of community treatment programs in the United States offer lectures, group counseling, and referral to AA, and nothing else (McLellan and Meyers 2004). It is common that treatment staff members are poorly trained and supervised, are paid little, and frequently do not stay long (McLellan et al. 2004). In fact, the “counseling” that is provided often consists of casual talk rather than sophisticated psychotherapy (Carroll et al. 2008). To assert this is not to disparage the dedicated professionals who devote their lives to helping others with addiction. However, most addiction counselors have relatively little education and almost no supervision, which is in stark contrast to the counselors who provide behavioral treatment in efficacy trials (Anton et al. 2006; McLellan and Meyers 2004). In addition, very few treatment programs use integrated teams with other professionals such as physicians, psychologists, nurses, and social workers (McLellan and Meyers 2004). As a result, there is a disconnect between

what has been discovered through research and what is actually implemented in everyday practice, or, for that matter, what can be implemented given the state of the treatment system.

CHALLENGING CURRENT TREATMENT MODELS

The first decades of research on treatment of alcohol dependence were characterized by several assumptions: (1) that change occurred because of, or was substantially influenced by, interaction between a client or patient and a professional—in a word, psychotherapy; (2) that the technical differences between different psychotherapeutic approaches would result in different outcomes, or at least different outcomes for different patients; (3) that most people with alcohol dependence had severe, recurrent, or chronic dependence; (4) that change depended on the development of insight and the conscious application of techniques or methods taught by an expert (who in this case would include an experienced AA member, such as a sponsor); and (5) perhaps most importantly, that the problem to be addressed was alcoholism, not heavy drinking, which were considered to be quite different entities.

For the most part, these assumptions have been proven wrong, or at best incomplete. About three-quarters of people with alcohol dependence reduce or stop drinking without any kind of professional treatment or even interaction with a community support group such as AA (Dawson et al. 2005). Psychotherapies that are conceptually and technically distinct have very similar results (Project MATCH Research Group 1998). Almost 70 percent of people who develop alcohol dependence have mild-to-moderate forms that are self-limiting (Hasin and Stinson 2007; Moss et al. 2007). Although some differences in therapist technique, such as use of an empathic, engaging approach, are associated with marginally better outcomes (Miller and Rollnick 2002), it still is unclear what drives

change. Finally, there is no clear distinction between heavy drinking, per se, and “addiction.” In fact, non-symptomatic heavy drinking blends imperceptibly into mild then moderate dependence and, in a minority of those affected, severe and recurrent dependence. Alcohol dependence is not inevitably progressive but may have long periods of stability or alternate back and forth between heavy and lighter drinking and abstinence (Dawson and Grant 2006; Dawson et al. 2005; Vaillant 2003).

Many of these conclusions, however counterintuitive they may seem, are the result of rigorous research by a dedicated scientific community. At the heart of this research was the development of procedures to characterize, measure, and monitor the fidelity to a particular conceptual psychotherapeutic approach so that clear comparisons could be made between conceptually and technically distinct approaches. Advances in scientific methodology and statistics also have provided tools to analyze complex datasets. This hard-earned progress has enabled scientists today to move ahead and address the next set of challenges.

For example, NIAAA’s Project MATCH compared three different approaches: cognitive-behavioral, which focuses on teaching skills such as drink refusal and relapse prevention; motivational enhancement, which focuses more on addressing ambivalence about and motivation to change; and 12-step facilitation, which focuses on teaching that alcoholism is a disease that requires abstinence and affiliation with AA (Project MATCH Research Group 1998). In addition, 20 different hypotheses were proffered concerning interactions between study participant characteristics and the specific therapy approach—that is, that participants with certain characteristics, such as antisocial traits or anger, would respond differentially to different therapies.

The result, for the most part, showed that all three groups had highly similar (and positive) results, and most matching hypotheses were not supported (Project MATCH

Research Group 1998). Far from a failure, however, this outcome showed that treatment works. Unfortunately, no attribution could be made as to what caused these positive outcomes, because all three therapeutic approaches had similar outcomes. Perhaps the most significant outcome was that Project MATCH provided a formidable challenge to existing thinking. Technical differences between therapies did not seem to result in different outcomes, even for extremely well-characterized participants across multiple domains. In addition, although it was not recognized at the time, it also provided a clue as to where scientists might look next. The concept emerging from the Project MATCH study (and many other studies with similar outcomes) was this: If technical differences among therapies (such as cognitive-behavioral therapy, motivational enhancement therapy, and 12-step facilitation therapy) do not account for differences in change, then it is unclear what indeed is driving the large change that occurs in most people who seek treatment.

UNDERSTANDING THE MECHANISMS OF CHANGE

Looking carefully at treatment studies for alcohol dependence, some interesting features emerge. First, the results of these studies are remarkably similar. Studies comparing different behavioral approaches, placebo-controlled medication trials, and studies combining the two have essentially identical average baseline and 12-month outcomes (Anton et al. 2006; Project MATCH Research Group 1998; Miller et al. 2001).

Overall, treatment outcomes are much better than might be expected given the widespread pessimism about outcomes. For example, about one-third of people who enter treatment trials are in full remission from alcohol dependence for the following year, and the other two-thirds show substantial improvement, from an average of more than 70 drinks per week to less than 10 drinks per week (Miller et al. 2001). Nevertheless, the specific

treatment received (as long as it is high quality, which is the case in research studies comparing treatments) does not seem to account for differences in outcomes.

These findings suggest that positive change is either a part of the natural history of the illness or the result of nonspecific factors, such as installation of hope, the decision to change, and encountering an empathic therapist who is willing to help and who has a way to do so. Conceptually and technically distinct forms of psychotherapy have roughly equivalent outcomes if they all are provided by trained professionals who are screened for the ability to form an empathic relationship with their clients (Project MATCH Research Group 1998). Certain medications, such as naltrexone and topiramate, also provide meaningful improvements in outcomes, compared with placebo, but those differences pale in comparison to the overall improvement in both groups.

One interpretation of these findings is that the change process may be driven more by nontreatment factors than treatment-specific factors, or at least factors other than specific technical differences among therapies. Recent reanalyses of several clinical trials have examined the course of drinking among study participants before entering the trial, based on retrospective accounts obtained during the baseline evaluation. It appears that for most study participants the change process began before entering treatment, often by weeks (Penberthy et al. 2007), and often includes stopping or nearly stopping drinking prior to study entry. Thus, treatment entry may be a result of change rather than an instigator of it.

Perhaps the decision to enter treatment is the crucial change point. A qualitative study of participants' accounts of what occurred in their lives prior to study entry strongly suggests this is the case (Orford et al. 2005). Participants described a process of increasing distress and drinking and pressure from others to change. Then a trigger event, such as a drunk driving charge or domestic distur-

bance, led to a realization that "I can't do this alone," which, in turn, led to the decision to seek help. In addition, as the participants continued through the treatment process, many nontreatment factors were highly influential in what course they took. These nontreatment factors often are ignored in treatment research, when in fact they may be responsible for a much greater proportion of change processes than treatment. An additional concern is that most efficacy trials exclude many people who need treatment but do not meet rigorous inclusion and exclusion criteria, raising questions about how applicable the results of these studies are to community clinical populations (Humphreys et al. 2005).

Taken together, these and other findings provide evidence that many of the assumptions underpinning the previous several decades of treatment research were wrong or at least incomplete. The mechanisms of change in drinking behavior among heavy drinkers are not well understood. In addition to these findings regarding treatment studies, it recently has become clear that most people with alcohol dependence change without exposure to treatment or AA (Dawson et al. 2005; Fein and Landman 2005; Moss et al. 2007). Thus, the mechanisms of change for these individuals are not well characterized or understood and more attention needs to be paid to change outside the context of professional treatment or AA. Additionally, future research needs to focus on elucidating the actual mechanisms of change and how treatment professionals can best assist people in reducing or eliminating heavy drinking.

None of this is meant to suggest that providing treatment for people with alcohol dependence is either unnecessary or ineffective. Rather, progress in treatment research has raised important questions about how to improve already-decent outcomes for people seeking treatment. In addition, even though the majority of people with alcohol dependence have mild-to-moderate, rather than severe, dependence, they still require treat-

ment to decrease the impact on those affected and to shorten the course. This is not significantly different from many other medical disorders. For example, most depressive episodes are ultimately self-limiting, but untreated they may result in substantial disability and misery (O'Leary et al. 2010). The same could be said of asthma or arthritis. Another important goal is to provide treatments that are acceptable and accessible earlier in the course of illness rather than waiting until chronicity and severe disability already are present.

In 2005, NIAAA began to alter the direction of research funding concerning changes in drinking behavior. Staff of the Division of Treatment and Recovery Research branch first held a series of informal meetings among senior investigators representing a wide variety of scientific disciplines, including many with no prior experience in alcohol treatment research. The perspective outlined above was presented to them and they were asked to suggest possible new directions for behavior change research. Following those meetings, a strategic research plan was developed and presented to the Extramural Advisory Board, a subcommittee of the NIAAA National Advisory Council. After further discussion and refinement, the plan was approved by the Advisory Council and the NIAAA Director and was incorporated into the NIAAA Strategic Plan (see www.niaaa.nih.gov).

What emerged was the NIAAA Mechanisms of Behavior Change (MOBC) Initiative. This initiative is an ambitious plan to fund interdisciplinary high-risk research projects and has the potential to transform our understanding of change in drinking behavior among heavy drinkers. One senior scientist, Dr. Jon Morgenstern, participating in the process described the goal as “developing the basic science of behavior change.” In this context, however, basic science refers not only to wet-lab basic research but also behavioral, psychological, and social components, which are essential to understanding the complexity of

behavior. There is no “bottom-up” assumption that the “real” determinants are genomic or neurophysiological, because influence from one level to another is bidirectional: each level of analysis (genomic, cellular, physiological, individual, and social) influences all the others in a dynamic interplay. This entire system often is described as a complex dynamical system (Barabasi 2009). In a complex dynamical system, the whole is more than the sum of its parts. One systems theorist (Barabasi 2009) used the analogy that it is possible to know and be able to lay out every single part of an airplane, but that tells you nothing about how an airplane flies or how a particular airplane will respond to wind shear. With this in mind, NIAAA invited experts in the mathematical modeling of complex systems to participate in the initiative and they, in turn, have played a crucial role in shaping its direction and focus.

The NIAAA MOBC Initiative has stimulated several new lines of research. This research is in its earliest stages and it may take some time before results are obtained and even longer before clinically useful tools are developed as a result. Yet significant progress is being made. In the past 2 years, a cross-National Institutes of Health (NIH)-MOBC Initiative involving more than 15 NIH Institutes and Centers has developed and momentum continues to grow. In February 2010, NIH issued an NIH Roadmap request for applications on the science of behavior change, providing additional evidence of a sustained commitment to MOBC research.

RECONFIGURING THE TREATMENT SYSTEM

No matter how elegant the research is and no matter how powerful the new treatments are that emerge from it, those findings must be accessible. For the most part, the scientific advances of the last 40 years have not been well embraced by treatment providers. Very few people with alcohol depen-

dence seek or receive any kind of professional treatment (Moss et al. 2007). Effective medications are prescribed very infrequently (Mark et al. 2003). The model on which most currently available treatment relies was developed about 50 years ago, when scientific understanding of substance use disorders was rudimentary (Anderson et al. 1999). More than 90 percent of U.S. treatment programs currently offer group counseling and referral to AA, without access to medications or evidence-based behavioral treatment (McLellan and Meyers 2004). As a result, most consumers have little choice as to what treatment they wish to receive. Many counselors have minimal training, and the turnover among treatment program staff is more than 50 percent annually (McLellan and Meyers 2004). There is a constant shortfall of funding so programs are unable to invest in infrastructure such as electronic medical records (McLellan and Meyers 2004). Although program staff members often are dedicated and hard working, this environment makes providing modern treatment extremely challenging if not impossible.

Perhaps more importantly, most treatment programs are predicated on the idea that a relatively brief period of education and counseling will lead to a major shift in the trajectory of a serious chronic illness, an approach that has no scientific basis and which is not used for other chronic disorders. It is true that some types of psychotherapy for psychiatric disorders may be given in a time-limited way, but this generally occurs in the context of ongoing care management by a mental health or primary-care clinician. In addition, multiple courses of the same therapy usually are not prescribed when a disorder proves resistant to the first full course of well-administered therapy. For alcohol dependence, however, patients often undergo multiple courses of rehabilitation even when it is completely ineffective for a particular person simply because no alternatives are available.

A final important limitation of the current system is that it focuses on the most severely affected people—

those with severe and persistent alcohol dependence—most of whom have encountered serious life consequences. It is not configured to provide care to people with milder forms of dependence. That group, which comprises nearly three-fourths of all cases, typically remains functional and almost all eventually enter full remission (Moss et al. 2007). Thus, the current treatment system reaches relatively few people with dependence, provides time-limited counseling for people with severe and persistent dependence, fails to offer consumers a choice of treatment approaches, and is not configured to deliver new approaches based on research. It is time to broadly reconsider what kind of services should be offered, where they should be offered, and who should provide them. Fortunately, 40 years of research provides a solid scientific basis to guide this process and suggests a framework for moving forward.

BUILDING A SCIENTIFICALLY BASED CONTINUUM OF CARE

There is a broad spectrum of drinking behaviors and associated risk of alcohol-related problems spread across the entire adult population, as determined by the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant et al. 2004; Hasin et al. 2007). NIAAA guidelines recommend that healthy adult men drink no more than 4 U.S. standard drinks in any day and no more than 14 drinks in any week and that healthy women drink no more than 3 drinks in any day and no more than 7 drinks in any week (NIAAA 2009). A standard drink in the United States contains about 14 g absolute ethyl alcohol by volume, the amount in 1.5 oz of 80-proof spirits, about 12 oz of beer, or about 5 oz of table wine. (Note that drink sizes vary widely by culture. For example in Australia and the United Kingdom, a standard drink “unit” contains about 10 g absolute alcohol by volume, the amount in 30 cc of 80-proof spirits.) Also, to be considered within the

guidelines, both the daily and the weekly limits apply. Thus, someone drinking three drinks every day would not fall within these limits, nor would someone who drank eight drinks on 1 day in a week. Individuals who drink above the guidelines but who do not report having problems or symptoms related to drinking are considered to be at an elevated risk for developing consequences in the future. These “at-risk” drinkers are analogous to someone with high cholesterol but who has not yet developed coronary artery disease. Once several symptoms have developed (currently three for dependence and one for abuse), the individual is considered to have an AUD.

Thus, there are basically three groups of drinkers: people who never exceed the guidelines; at-risk drinkers who exceed the guidelines but have no current symptoms and who have never had alcohol dependence; and people with symptoms or consequences related to their drinking who thus can be diagnosed with an AUD. Currently, the diagnostic criteria for an AUD are based on the American Psychiatric Association’s (APA’s) *Diagnostic and Statistical Manual, Fourth Edition, Text Revision* (DSM-IV-TR; APA 2000). The criteria have been undergoing review and revision for the fifth edition and are expected to be released in 2013. In the recently published draft guidelines, the categories of abuse and dependence are no longer separate disorders. Instead, the criteria for abuse and dependence have been combined in a single AUD. This revision is based on research demonstrating that the abuse and dependence diagnoses did not work as expected and that a single-dimensional construct offered a simpler solution that better fit the research findings. Thus, in the remainder of this paper, the term AUD will be used to describe what are now two different diagnoses.

In U.S. adults in any given year, 70 percent never exceed the NIAAA guidelines, either because they abstain or they drink within low-risk limits (Hasin et al. 2007). Of the remaining

30 percent, most (21 percent) are at-risk drinkers and 4 percent have an AUD (Hasin et al. 2007), currently diagnosed according to DSM-IV-TR as alcohol dependent. Among the 4 percent with dependence, 3 percent have functional dependence and 1 percent has severe recurrent or chronic dependence (Hasin et al. 2007).

Functional alcohol dependence can be described in this way: Individuals repeatedly drink more or longer than they intend to, have a persistent desire to quit or cut down and have difficulty doing so, may drink and drive (without receiving a driving-while-intoxicated [DWI] citation), and often continue drinking in spite of physical or psychological symptoms such as hangover, headache, poor sleep, or nausea. Most people who develop an AUD have only three or four symptoms and do not develop severe life disruption as a result of their drinking. For example, they do not miss work, neglect their children or other responsibilities, have legal trouble, or lose their jobs. In many cases, only their closest friends and family members realize that their drinking is out of control. In addition, a striking and unexpected finding from NESARC is that 72 percent of people who develop alcohol dependence in their lives have a single episode lasting 3 to 4 years on average, after which it goes away and does not recur (Hasin et al. 2007). The 28 percent who have recurrences have an average of five episodes (Hasin et al. 2007). Thus, there appear to be two forms of this disorder, a milder self-limited form and a more severe recurrent form.

This new understanding differs drastically from what was traditionally described as alcoholism, a chronic, severe, progressive disease. This new insight was developed in part from NESARC findings. NESARC studied the general population and identified individuals who had gone through a period of years struggling with drinking too much but who eventually overcame it without seeking professional help or AA. This finding was in contrast to previous research efforts, which generalized to everyone findings

from people in treatment programs or AA. As a result, researchers mistakenly assumed that unidentified “cases” in the community were similar to those in treatment, but that clearly is not the case. The same holds for every other medical disorder. For example, for people who have asthma, influenza, or depression, only a small proportion ever require hospital care, and it is because they have a milder, more treatment-responsive or less complex form of the illness. It turns out that the same is true for AUDs.

The result, then, is four distinct groups: abstainers and low-risk drinkers, at-risk or high-risk drinkers, people with functional alcohol dependence, and people with severe recurrent alcohol dependence. This new grouping, based on a large epidemiological research dataset, provides scientists with the information they need to devise a continuum of care for each group.

For abstainers and low-risk drinkers, the goal is to prevent a problem from developing, especially, but not exclusively, in young people. Universal prevention usually occurs in settings such as schools, workplaces, and health care settings. Such measures include public awareness campaigns establishing healthy limits and requirements for beverage labeling (Miller 2004). Such approaches provide consumers with the information they need to make informed decisions. A current example is the intense public health focus on overeating and obesity.

To support healthy choices in alcohol use, NIAAA recently published a consumer-oriented booklet and accompanying Web site (“Rethinking Drinking”) with information on defining a “standard” drink, recommended limits for alcohol use, and tips for cutting down on drinking. This material, though not expected to directly affect behavior change, may indirectly influence drinking behavior by supporting efforts to reduce drinking within the community at large. Studies to have not yet determined the efficacy of this approach.

For at-risk drinkers who do not have an AUD, the goal is to reduce the risk of later development of downstream consequences of heavy drinking. At-risk drinkers are similar to people with high blood pressure but who do not have symptoms or a cigarette smoker without lung cancer or heart disease. Fortunately, at-risk drinkers respond well to a variety of low-intensity interventions, including brief counseling by a physician (Whitlock et al. 2004) and Internet-based approaches such as “Rethinking Drinking.” Although it has not been well studied, it is likely that workplace initiatives, toll-free telephone numbers, and other low-cost high-yield methods also will be successful in treating at-risk drinkers. There is some evidence that the medication, naltrexone, may be effective in this group as well, as most at-risk drinkers prefer to cut down rather than quit. Naltrexone reduces the “buzz” one gets from drinking and thus makes it easier to drink less (O’Malley 1998; Volpicelli et al 1992).

Individuals with functional AUDs seldom, if ever, go to AA or an addiction treatment program, simply because they are able to manage their

lives and not get into serious trouble even though they are drinking more than they wish (Hasin et al. 2007). Onset varies from late teens to older age. Most seek no help at all and yet eventually are able to overcome their compulsive drinking either through abstaining or cutting back to low-risk drinking (Moss et al. 2007). They typically suffer, however, for a period of years, and, although their lives do not fall apart, their excessive drinking may be a matter of significant concern for them and their loved ones. In this way, people with functional AUDs resemble others with major depression or anxiety disorders who are able to function but at a suboptimal level and with a significant level of distress. In both cases, effective medication treatment is available that can be prescribed by a physician. In the past, people with depression were rarely treated. Like AUDs now, only the most severely affected were identified and treated, typically with hospitalization. In 1987, when Prozac® was introduced it changed the treatment landscape significantly. Now with many similar effective, safe, and easy-to-use medications available for treating depression, more than two-

Table Behavioral Approaches for Treating Alcohol Dependence.

Psychotherapy/Principles	Approach
Rational Emotive Therapy/ Cognitive Behavior Therapy	Focus on coping in the here and now; examining and changing irrational thoughts that lead to distress or increase risk for relapse; skill building
Motivational Enhancement	Focus on addressing ambivalence and barriers to change; enhancing motivation to change
12-Step Facilitation	Acceptance of addiction as a disease requiring abstinence to recover; willingness to engage fully in 12-step programs such as Alcoholics Anonymous
Community Reinforcement	Eliminating positive reinforcement for drinking and increasing positive reinforcement for sobriety
Contingency Management	Providing explicit incentives (e.g., money) for abstinence and for participating in treatment
Behavior Marital Therapy	Helping a significant other provide support for abstinence in the alcohol-dependent person, in particular by monitoring medication administration

thirds of people receive treatment, usually from their primary-care doctor (Ledoux et al. 2009). Only the most complex or treatment-resistant cases are referred to psychiatrists.

It is not widely known that medications currently are available to treat alcohol dependence and which have similar effectiveness to modern antidepressants (Bouza et al. 2005; Johnson 2007; Mann et al. 2004). Naltrexone and topiramate both reduce relapse in early abstinence patients by 20 to 30 percent, resulting in more people attaining sustained periods of abstinence compared with people taking placebo (Bouza et al. 2005; Johnson 2007; Johnson et al. 2003; Mann et al. 2004). A much older drug, disulfiram, is effective if used properly to ensure adherence (O'Farrell et al. 1995), and it has the advantage of being very inexpensive. Several other medications have some evidence of effectiveness and many more are in various stages of development (Johnson 2007; Srisurapanont and Jarusuraisin 2005). These medications are ideal for treating large numbers of people with functional AUDs in a discrete, familiar setting, such as the family doctor's office. Coupled with brief support directed at encouraging medication adherence, attendance at community support groups, and abstinence, these medications are as effective as state-of-the-art behavioral treatment, at least among people seeking help for their drinking.

Thus, effective therapies exist for people with mild-to-moderate severity AUDs, who currently do not receive any treatment at all and for whom traditional rehabilitation programs, which better address a much smaller group of people with severe chronic AUDs, are not appropriate. For those who would prefer psychotherapy to medication, several behavioral approaches are effective in outpatient settings (Miller et al. 2001), including cognitive-behavioral treatment, motivational enhancement therapy, community reinforcement, and 12-step facilitation (Project MATCH Research Group 1998; Smith and Myers 2004). Emerging research also

suggests that computer-based behavioral approaches (especially cognitive-behavioral treatment) may be effective either as a substitute for or augmentation of person-to-person treatment (Carroll et al. 2008). It is likely that various combinations of computer-based and personal behavioral treatments will emerge, further increasing the options available to people who need help.

At the other end of the spectrum are those with more severe recurrent AUDs. These individuals are more likely to have a strong family history of AUDs, to have behavioral problems as children and antisocial behavior as adults, to come from chaotic families, and to experience the onset of AUDs in the early to mid-teens (Moss et al. 2007). Many develop addiction to other substances such as cannabis, cocaine, or methamphetamine (Grant 2004). They also may have other serious psychiatric disorders, such as major depression, serious anxiety disorders, bipolar disorder, or psychosis (Grant et al. 2004; Hasin et al. 2007). This is the group who largely populates AA and treatment programs, especially as they age into mid-life (Moss et al. 2007). What is striking is that in almost all treatment programs in the United States, the model for treating such a complicated and chronic illness consists of group counseling and AA, typically for only a few weeks or months (McLellan and Meyers 2004). As noted earlier in this article, this model of treatment was developed when there were no formal treatments for AUDs and when no other methods of treatment were available. Recent findings on severe recurrent AUDs, however, suggest a different approach.

Based on the current understanding of the nature of the disorder, some principles seem relatively straightforward and resemble those for treating other severe chronic disorders. For example, treatment should continue as long as needed and not be stopped at some arbitrary point. The goal of treatment should always be full remission (for this group, this usually is abstinence), but it is not realistic

to expect to reach that goal easily or quickly. For some affected individuals, it may not be possible to achieve long-term continuous abstinence at all. In that case, clinicians must be prepared to do everything possible to reduce the severity and impact of the disorder, to extend meaningful life, and to reduce suffering. Familiar examples exist in conditions such as diabetes, bipolar disorder, and cancer. In such cases, the aim is always for a cure, but we do not abandon the patient if cure is not forthcoming. Fortunately, many people with severe recurrent AUDs eventually do get well, which often is not the case with other chronic disorders. In addition to modifying the treatment approach and goals, it is important to attend to coexisting conditions such as psychiatric and physical disorders. Social and vocational functions also are commonly affected and should be addressed as well. Thus, long-term care coordination is essential to providing good care to this group over time.

Providing this level and type of care for severe recurrent AUDs requires new approaches to where services will be provided and by whom. Ideally, physicians (including psychiatrists), other mental health clinicians, nurses, and counselors will coordinate the provision of multiple services, individualized for each patient. Restructuring the continuum of care for at-risk drinking and AUDs is a formidable but not impossible task.

THE FUTURE OF TREATMENT RESEARCH

The limited scope of this article cannot possibly do justice to the explosive growth in knowledge in neuroscience, genomics, pharmacology, psychology (including behavioral economics), social sciences, and mathematics and the implications for developing new approaches to help people change health behavior. Other articles in this issue summarize some of them. This explosion in knowledge holds great promise for developing new methods for helping people change their health

behaviors. Medications aimed at novel targets and more direct behavioral approaches will become available that likely will be significantly more powerful than what are in use now. Research conducted during the past 40 years has enabled us to develop a continuum of care with a solid scientific base, an improvement over the first models of treatment developed decades ago. As the science develops, however, so will the complexity and difficulty of the questions to be answered. Research coupled with a restructured treatment system capable of making new scientific findings rapidly available to the community hold the key to significantly improving treatment outcomes and reducing suffering from alcohol-related disorders. ■

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