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Preventing Relapse Following Smoking Cessation

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Abstract

Cigarette smoking is the leading cause of preventable deaths worldwide. Long-term smoking cessation can drastically reduce people's risk for developing smoking-related disease. The research literature points to a need for clearer operationalization and differentiation between smoking cessation and relapse prevention interventions and outcomes. That said, extensive meta-analyses and research studies have indicated that there are various efficacious smoking interventions that can both support smoking cessation and relapse prevention efforts. Specifically, behavioral treatments, relapse prevention psychotherapy, pharmacologic interventions, motivational enhancement, smoking reduction to quit, brief advice, alternative intervention modes (telephone, Internet, computer), self-help, and tailored treatments can help prepare smokers for longer-term abstinence. Although these methods vary on reach, they are relatively efficacious, particularly in combined formats.

Keywords

Smoking cessation; Relapse prevention; Cigarette smoking; Review; Smoking intervention

Introduction

Tobacco use is the leading cause of preventable deaths worldwide. In the United States, cigarette smoking was associated with 438,000 deaths each year between 1997 and 2001 [1].

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Doll et al. [2] published a 50-year prospective study of smoking-related mortality in a sample of 34,439 male British doctors, concluding that cigarette smokers die approximately 10 years earlier than nonsmokers. Leading health organizations have identified smoking as a primary public health target [3, 4]. Longer-term and more serious effects of smoking have been well documented in the research literature and include, among others, smoking-related cancer, cardiovascular disease, and chronic obstructive pulmonary disease [3]. More recent epidemiologic studies have also shown significantly elevated risks of serious or chronic illness (eg, smoking-related cancers, cardiovascular disease, peptic ulcers, and migraine headaches) as well as more minor physical complaints (eg, chronic cough, experience of colds, flu, stomach complaints) in younger smokers between the ages of 18 and 30 years [5, 6]. Thus, smoking cessation should be viewed as a health care priority across the smoker's lifetime.

Fortunately, smoking cessation reduces risks of developing serious medical conditions in the long term and also has immediate ameliorative effects on health [7]. Within 20 min of quitting, heart rate and blood pressure are significantly reduced [8]. Approximately 12 h after quitting, serum carbon monoxide levels decrease to nonsmoker levels. Within a few weeks to a few months of quitting, cardiovascular fitness and lung function begin to improve, and the longer-term effects of smoking cessation include clinically significant reductions in coronary disease, stroke, and cancer risks [9].

Over the past few decades, there has been increasing public awareness of smoking-related morbidity and mortality and the health benefits of smoking cessation. Smoking rates in the United States have dropped by approximately 50% from 1965 through 2006 [10]. Despite this nationwide movement toward smoking cessation, 20.8% of American adults continue to smoke [10]. In a survey conducted in 2006, approximately 44% of smokers in the United States reported having made a serious attempt to quit smoking in the past year [10]. Unfortunately, among smokers who quit without formal treatment, approximately 95% to 98% will return to smoking within 6 to 12 months following a quit attempt [11]. Thus, findings indicate a continued need to not only support attaining smoking cessation, but also to prevent smoking relapse.

Defining and Differentiating Smoking Cessation and Relapse Prevention

Despite agreement in the field that both smoking cessation and relapse prevention are important in treatment for smokers, there is less agreement on the delineation between these two terms, and therefore what kinds of treatment outcomes provide information relevant to smoking cessation and/or relapse prevention. One reason for this confusion is that the terms "smoking cessation" and "relapse prevention" are used to refer to both treatment outcomes and to the treatments themselves.

Regarding the former, smoking cessation typically refers to the point at which a person *attains* abstinence, whereas relapse prevention refers to *maintaining* abstinence until the implied relapse [12]. Despite calls for uniform definitions in the literature [13, 14], guidelines are inconsistent regarding which smoking events should be regarded as a relapse. The questions that need to be answered are 1) how long a person must be abstinent before

they are “eligible” for a relapse; 2) when exactly a smoking event is a lapse versus a relapse; and 3) whether or not smoking cessation outcomes also subsume relapses [12, 13, 15]. For example, both the beginning point and the trajectory of 12-month continuous abstinence are considered smoking cessation outcomes, but only the end of the trajectory is considered a relapse outcome. For this reason, relapse prevention as a treatment goal is often believed to become relevant only after attainment of abstinence; however, it could be viewed as clinically relevant in the process of attaining abstinence as well [14, 16].

A further complication is that both smoking cessation and relapse prevention may refer to a variety of different treatment and intervention approaches that may be employed to help clients attain or maintain abstinence, respectively. For example, psychotherapy, pharmacotherapy, brief interventions delivered either in person or via various other media, and combined treatments may all be used to achieve smoking cessation and/or prevent relapse. Relapse prevention, however, is also used to refer to a specific cognitive-behavioral model and associated treatment type called relapse prevention psychotherapy [17].

Relapse prevention psychotherapy is a cognitive-behavioral approach that teaches clients various skills that they can employ to avoid—and/or learn and recover from—lapses and relapses. Skills include identifying and coping with high-risk situations, reframing expectancies, dealing with social pressures to smoke, and balancing lifestyle with alternative activities. Clients are also taught to view lapses or relapses as *pro-lapses* that they may learn from [18]. This reframe seeks to interrupt the *abstinence violation effect*, which refers to self-blaming attributions of the lapse to internal, unchanging, and global causes that can lead to negative emotions regarding the lapse and reduced self-efficacy for regaining abstinence [19]. Cognitive-behavioral skills that were further developed within relapse prevention psychotherapy have also begun to be integrated into interventions that do not involve traditional psychotherapy delivery, such as Internet-based, self-help, and telephone interventions [20•].

Because smoking cessation and relapse prevention are terms that may be used interchangeably to refer to various types of smoking outcome measures and/or various types of treatments, determining the efficacy of smoking cessation and relapse prevention treatments and differentiating between these two outcomes becomes a more complicated task. Furthermore, some researchers have pointed out that interventions supporting smoking cessation may also be efficacious in supporting relapse prevention [16]. Thus, for the purpose of this current article, we highlight recent findings and developments in the smoking literature that may be applicable to both smoking cessation and relapse prevention goals.

Review of Interventions Preventing Relapse to Smoking

Behavioral Therapy Approaches

Behavioral therapy components have become an established part of various smoking cessation and relapse prevention approaches. Behavioral therapy components in smoking cessation include support of motivation to change, behavioral contracting, reinforcement of nonsmoking behavior (eg, pleasant activities), relaxation training, coping with high-risk

situations, and interpersonal skills training [21]. Some recent behavioral therapy approaches have broadened their scope to include more cognitive elements (eg, emotion regulation, reframing dysfunctional thinking). Large-scale meta-analyses have supported use of behavioral therapy for smoking cessation in both group therapy [21] and individual therapy [22] formats.

The use of behavioral therapy components has become so widespread that these components are often included in different concentrations and forms in various intervention delivery formats, including telephone, Internet-based, psychotherapeutic, and brief advice interventions. Most recently, it has been recommended that behavioral treatment and pharmacotherapy be combined to maximize the effects of both types of interventions [23•]. Such combined interventions have been found to further reduce the risk of relapse following intervention delivery [22].

Relapse Prevention

Defining relapse prevention in the context of smoking cessation is a challenging task. To most precisely convey the state of the current research on relapse prevention, we report on findings for 1) relapse prevention psychotherapy as applied to smoking cessation and as defined by Marlatt and colleagues [17, 18, 24]; and 2) relapse prevention defined as any intervention delivered after abstinence has been attained.

The effectiveness of Marlatt and Gordon's [17] relapse prevention as a stand-alone treatment for smoking cessation has received mixed reviews [16, 25]. In a narrative review of relapse prevention for addictive behaviors, Carroll [16] concluded that, compared with no treatment, relapse prevention was particularly successful in the prevention of smoking relapse, whereas Irvin et al. [25] concluded relapse prevention was less effective for smoking cessation than for other addictive behaviors. The studies chosen for these two reviews differed. Carroll [16] reviewed studies that tailored the original relapse prevention intervention (ie, Marlatt and Gordon [17]) for smoking, whereas Irvin et al. [25] focused on studies that adhered to the original relapse prevention intervention, which implied that the original relapse prevention model may require modification to be effective in preventing smoking lapses. In fact, later meta-analyses on both group and individual smoking cessation counseling, which largely correspond to Marlatt and Gordon's [17] relapse prevention approaches, were found to be highly effective in helping smokers achieve abstinence and prevent relapse over the longer term [21, 22].

The literature is more heterogeneous when regarding relapse prevention as any smoking intervention that is applied after achievement of abstinence. Specifically, a recent meta-analysis involving this literature indicated that coping skills training given after abstinence was attained was less effective than the application of the pharmacologic agent varenicline [20•]. That being said, the authors indicated that many of the included studies were underpowered and lacked methodologic rigor to provide definitive evidence for or against different means of relapse prevention. After thorough review, the authors concluded that a focus on sustaining initial smoking cessation efforts, by preparing smokers for relapse prior to cessation and providing booster sessions and extended pharmacologic support, may be the most effective in preventing relapse.

A point for future clarification in both research and practice is the operationalization of relapse prevention in smoking research and intervention. The challenges surrounding this task were highlighted in a recent qualitative study in which 16 treatment providers at a smoking cessation clinic in the United Kingdom were asked to define relapse prevention [26]. Although all counselors in this study agreed that relapse prevention comprised behavioral components, there was diversity of opinion regarding whether it should be applied to abstinent smokers or lapsed/relapsed smokers, which exact components it entailed, and whether it could involve pharmacotherapy. Similarly to Hajek et al. [20•], these authors cited a lack of clarity in the operationalization and delineation of relapse prevention as a serious limitation of its clinical application and interpretation of the research findings.

Pharmacologic Interventions

The US Food and Drug Administration (FDA) has approved seven first-line medications to introduce and sustain smoking cessation. Nicotine replacement therapies (NRT; nicotine gum, transdermal patch, nasal spray, lozenge, and inhaler), and an antidepressant (ie, sustained-release bupropion) have been determined to be safe and effective pharmacologic treatments for attaining and maintaining abstinence [23•, 27, 28•]. A partial agonist/antagonist for $\alpha_4\beta_2$ nicotinic acetylcholine receptors (ie, varenicline) has also recently been included in the best-practice guidelines as a first-line medication for cessation and short-term relapse prevention [23•], although more studies are necessary to further establish its safety and efficacy in smoking cessation and longer-term relapse prevention [29•]. Two second-line medications are also included in best-practice guidelines [23•] to help smokers who do not respond to first-line medications: an α_2 adrenergic agonist (ie, clonidine) and a tricyclic antidepressant (ie, nortriptyline). However, clonidine and nortriptyline are not FDA-approved for smoking cessation. The efficacy of the first-line medications and their limited adverse side effects have been established in various studies [23•]. That being said, use of medications alone still results in relapse rates greater than 50%. Thus, current best-practice recommendations suggest combining medications with counseling to boost their effects [23•].

Recent studies have begun to look beyond best-practices to explore new means of delivering nicotine to individuals looking to reduce or quit smoking. One product is snus, a smokeless tobacco pouch taken orally that is primarily used in Sweden [30]. Due to its carcinogenic content and potential to be marketed by tobacco companies, snus has been viewed skeptically by clinicians and researchers in the field [31, 32]. Other new products currently being tested are designed to deliver nicotine orally by way of nicotine pouches, mouth spray, and lozenges [33]. These products differ from current NRT in that they deliver an initial fast-acting dose of nicotine paired with a slower release over time. Finally, liquid nicotine, which may be delivered orally, has been tested [34]. Nicotine pouches, mouth spray, and liquid nicotine, which do not contain tobacco, may provide new means of reducing harm by eliminating the risk introduced through carcinogens in tobacco. These products have shown efficacy in recent initial randomized controlled trials; however, they must be further tested before any clinical recommendations can be offered.

Smoking Reduction Approaches

Smoking reduction approaches often incorporate the pharmacologic aids discussed above. In the smoking cessation literature, smoking reduction has been described as a harmreduction approach for smokers who are unwilling to quit [35], and also as a means of “cuttingdown toquit” for smokers who are interested in quitting but not prepared for an abrupt smoking stop [36•]. These approaches have not yet been endorsed in best-practice guidelines [23•, 37] and should be used with caution [35]. However, a recent meta-analysis showed that use of NRT (with or without motivational intervention components) as a means to help nontreatment-seeking smokers to reduce or quit was two times more effective in achieving longer-term, 6-month abstinence rates than placebo [36•]. Significant reductions in smoking were also observed and very few adverse events were detected (eg, risk of nausea was higher for those receiving NRT). Furthermore, comparison of interventions involving abrupt smoking stop versus cutting down to quit indicated no significant differences on later relapses [36•]. An even more recent randomized controlled trial that was comprised of smokers who wanted to cut down to quit indicated no differences on longer-term abstinence rates between minimal intervention, formal intervention with a quit day, and formal intervention involving cutting down to quit. However, those who chose cutting down to quit did postpone their quit day longer than those in the other two groups [38]. Although smoking reduction in its different applications is still new and will benefit from further testing, initial findings suggest that these approaches may be safer and more efficacious in achieving longer-term abstinence than originally thought.

Brief Advice

Brief advice is an important secondary prevention technique that has become a cornerstone of best-practice recommendations for smoking cessation [23•]. Brief advice has been defined as health care providers’ provision of a verbal “stop smoking” message that may also include information about the harmful effects of smoking. This type of intervention has been codified in the best-practice recommendations the 5 A’s (Ask about smoking, Advise to quit, Assess motivation to change, Assist if patient is willing, and Arrange for follow-up) [23•]. Meta-analyses have indicated that brief advice can lead to increases of longer-term abstinence rates by 1% to 3% in nontreatment-seeking populations when delivered by physicians [39•] or nurses and other health care providers in various health care settings [40, 41]. There is some evidence that more intensive advice sessions (> 20 min) and the addition of booster sessions may bolster effects on quit rates and 6-month abstinence beyond those of single and more minimal (< 20 min) brief advice interventions [39•]. Although effect sizes of brief advice are smaller than more intensive psychotherapy and pharmacologic interventions, brief advice does appear to be more efficacious than usual care [39•]. Further, because a large proportion of the smoking population is seen in primary care settings every year [42], the incorporation of brief advice as an opportunistic intervention may be more cost effective and have greater reach than more intensive interventions and treatments.

Self-Help Interventions

Self-help typically refers to the provision of structured materials that assist individuals in making a quit attempt and sustaining abstinence without significant assistance from a health

care professional or other formalized support [43]. Self-help interventions may include written, video, audio-based, telephone-based, or computer-based materials but do not typically involve face-to-face social interventions. A recent meta-analysis examining the effects of self-help over 15 studies involving pregnant women showed that self-help interventions nearly doubled the odds of maintaining abstinence and preventing relapse over the longer-term compared with standard care [44•]. The latter findings suggest that self-help may be particularly desirable to clients who may otherwise feel judged or ashamed of their smoking in face-to-face interviews.

Internet-Based, Computerized, and Tailored Interventions

Internet-based, computerized, and tailored treatments have become increasingly important in smoking cessation and treatment for other health-related behaviors [45•]. Computerized and Internet-based tailored interventions often include advice to quit, assistance with a quit plan, arrangements for follow-up, and/or recommendations for pharmacotherapy. Internet-based interventions often provide avenues for social support (eg, via live chat), whereas many computerized interventions are offered in conjunction with other in-person intervention components [46, 47•].

A recent review of the quality of 23 smoking-cessation websites indicated adequate quality and accuracy of information regarding smoking and smoking cessation [46]. Furthermore, meta-analyses on the effectiveness of Internet-based and computerized interventions have shown effects that rival those of in-person brief interventions [47•, 48•]. There is also some evidence that more interactive and automated Internet-based interventions are more effective, particularly for specific subpopulations, although this area warrants further research [48•, 49].

Telephone Interventions and Quit Lines

Meta-analyses of telephone counseling interventions have shown that this is a helpful means of delivering interventions to smokers [50]. Studies involving reactive counseling (ie, in response to smokers calling a quit line), proactive counseling (ie, interventionists initiating a call to smokers), and materials that facilitate access to quit lines show that these methods appear to be helpful in boosting smoking cessation and preventing relapse [50]. There appears to be a dose-response effect, such that three or more phone calls are more effective than one or two. A meta-analysis exploring the benefits of text message and Internet interventions via mobile phones ($n=6$) have shown that text message interventions may be less effective for longer-term abstinence maintenance and relapse prevention. Overall, however, these new technologies have shown some preliminary positive effects for both shorter-term smoking cessation and relapse prevention outcomes [51•].

Motivational Enhancement

Motivational enhancement interventions are relatively new to the smoking cessation literature, with the first recorded trial having occurred in 1997 [52]. However, a recent meta-analysis of 14 randomized controlled trials indicated that motivational enhancement interventions showed modest positive effects on smoking outcomes compared with brief advice and treatment as usual [53•]. Although the effect sizes and corresponding quit rates

were lower than those found with group psychotherapy, these findings are clinically significant because participants in motivational enhancement trials are typically not seeking treatment and the interventions are often conducted opportunistically.

Such positive initial results are reflected in recent best-practices guidelines, which have specified motivational enhancement style and components as being key to brief intervention delivery for health care professionals—particularly with smokers who are not ready to quit. Specifically, Fiore et al. [23•] recommend use of a nonjudgmental, nonconfrontational, and empathetic style paired with open-ended questions in introducing discussion regarding clients' smoking and/or abstinence. Further, health care providers should aim to support clients' self-efficacy in quitting and maintaining their abstinence by congratulating them on their success and eliciting from them the successful strategies they have employed [54]. Other motivational enhancement components, such as the decisional balance, are highlighted to reinforce the continued abstinence. For example, reviewing the pros of quitting may be helpful to reinforce current abstinence, and reviewing the cons of quitting may raise clients' awareness regarding potential risky situations so they may plan ways to avoid future lapses and relapses [55].

Interventions for Specific Smoker Subpopulations

Interventions designed to match the needs of specific smoker subpopulations have received increasing attention over the past few years. Interventions for pregnant and postpartum patients have garnered a great deal of attention [56]. These interventions have often integrated education on the risks of smoking during pregnancy with various components described above (ie, relapse prevention–based psychotherapy, brief advice, motivational enhancement, pharmacotherapy). Smoking cessation approaches for pregnant and postpartum patients have generally shown strong effects on longer-term abstinence rates [57•].

Further studies have shown significant positive effects of smoking cessation approaches for individuals with cardiovascular disease. These approaches have typically included psychotherapeutic, telephone, and self-help interventions [58•]. Such efforts are well founded, as sustained abstinence has been found to reduce the risk of subsequent death by one third among individuals who have a history of coronary heart disease [59].

Recent studies and meta-analyses have shown that treatment tailored to the needs of individuals with psychological disorders can help significantly reduce odds of relapse following smoking cessation [60•]. Integration of cognitive psychotherapy and behavioral activation elements into pharmaco-behavioral smoking cessation has been effective for individuals with depressive symptoms [61]. Furthermore, a recent meta-analysis indicated that smokers with schizophrenia seem to benefit most from bupropion versus other means of intervention [62]. Finally, stage-based interventions, which are tailored to address the needs of smokers at different stages of change, have garnered some recent attention due to their popularity in the treatment of other addictive behaviors. Contrary to hypotheses, however, a meta-analysis of stage-based approaches has not yet shown systematic efficacy in bolstering the effectiveness of smoking cessation or relapse prevention interventions [63]. An updated meta-analysis on these approaches is pending [64].

Conclusions

Recent contributions to the literature have advanced research and clinical efforts in smoking cessation and relapse prevention. This review of the literature has highlighted many efficacious interventions and means of delivery that can support long-term abstinence and thereby boost relapse prevention, including group and individual behavioral therapy, pharmacologic treatment, telephone-based interventions, and computerized and Internet-based interventions. Current research and best-practice guidelines have indicated that a combination of these various treatment components and delivery formats may be helpful in providing brief yet comprehensive interventions to help smokers not only achieve initial cessation but prevent relapse over the longer term. On the other hand, the increased attention to stage-based research has highlighted challenges in operationalizing and delineating between interventions focusing on helping smokers attain (smoking cessation) versus maintain (relapse prevention) abstinence. The culmination of the evidence would suggest that attention to the initial smoking cessation effort bolstered by booster contacts and ongoing pharmacologic support may be effective means of supporting relapse prevention over the long term [20•].

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