

Why do cancer patients smoke and what can providers do about it?

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Despite the widespread dissemination of information about the health risks associated with smoking, many cancer patients continue to smoke, which results in a decreased quality of life, an increased probability of cancer recurrence, and a decreased survival time. Efficacious interventions are available to assist cancer patients to quit smoking, yet smoking cessation interventions are often not implemented. This review describes how clinicians, administrators, insurers, and purchasers can encourage a culture of health care in which tobacco cessation interventions are implemented consistent with evidence-based standards of care. Implementing efficacious tobacco cessation interventions can reduce morbidity and mortality among cancer patients.

Cancer is the leading cause of death among men and women under the age of 85.¹ Smoking is responsible for 30% of all cancer deaths and for 87% of lung cancer deaths.² Yet many cancer patients continue to smoke even though there is widespread awareness of the health risks associated with smoking. To better assist cancer patients to quit smoking, this review will describe the unique issues related to smoking and quitting smoking among cancer patients. Literature searches were conducted in both Medline and PubMed during August 2010 through August 2011. The most recent papers were included on each topic in the review.

What are the consequences of smoking after a diagnosis of cancer?

Study findings have shown that 50%–83% of cancer patients continue to smoke after diagnosis.^{3–5} Not all cancers are smoking related, but once a patient has been diagnosed with cancer, the risks of continuing to smoke are high. Surgical procedures for both smoking- and nonsmoking-related cancers can result in adverse outcomes if the patient is a smoker.⁶ For example, cancer patients who continue to smoke after diagnosis experience

a decreased response to radiotherapy and chemotherapy, impaired wound healing, an increase in the occurrence of infections, an increased incidence of mucositis and xerostomia, and increased circulatory problems.^{5,7,8}

Moreover, smoking results in an increased probability of cancer recurrence, an increased risk of second cancers, and decreased quality of life and survival time.^{6,9} Cigarette smoking has been associated with poorer survival in patients with liver, pancreatic, breast, and prostate cancers, as well as in those with lung and head and neck cancers.⁶ Yet, findings suggest that at long-term follow-up (1–2 years), about 50% of lung or head and neck cancer patients who smoked at diagnosis continue to smoke.^{10,11}

So why do cancer patients continue to smoke?

Nicotine addiction. In general, patients with smoking-related cancers will have high levels of nicotine dependence⁹ (28 cigarettes per day for 35–40 years). Nicotine is a highly addictive alkaloid found in tobacco, which is absorbed in the lungs through cigarette smoke and then binds to nicotine cholinergic receptors in the brain. The stimulation of these receptors causes the release of dopamine, signaling a pleasurable experience with improved mood, reaction time, arousal, and concentration, and reduced stress and anxiety. Repeated exposure to nicotine changes the nicotine receptors and forces smokers to continue smoking

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to curb cravings. Conditioned behaviors can also trigger a desire to smoke, even after withdrawal symptoms have ceased.¹²

Lack of participation in cessation interventions. As with smokers in the general population, most cancer patients try to quit smoking on their own.¹³ Findings in 2 studies showed that about 50% of eligible cancer patients who smoked declined cessation treatment,^{14,15} however, another study found that only 12% of patients declined to participate in a smoking-cessation intervention trial.¹⁶ Cancer patients may also be reluctant to disclose their current smoking status due to embarrassment and social stigma associated with being a smoker.¹⁷

Smoking relapse rates. Relapse rates are high among cancer patients who try to quit smoking, and in the general population more than 85% of people who try to quit smoking on their own will relapse, usually within a week.¹⁸ An observational study of surgically treated lung cancer patients found that relapse tended to occur within the 2 months of surgery. Those who relapsed were more likely to have lower income and less social support.¹⁰

Lack of access to cessation services. Patients who have been diagnosed with cancer and are scheduled to undergo rigorous treatments such as radiation, chemotherapy, or surgery need to quit smoking quickly by abbreviating the planning phase and interfering with proper preparation, such as keeping track of triggers and choosing a quit date.⁹ Surgical intervention and intense chemotherapy and radiation regimens may preclude ongoing participation in cessation programs. Most insurance companies now cover cessation medications, but cancer patients who are uninsured¹⁹ may not be able to afford cessation medications. As of January 2011, smoking cessation counseling is covered by Medicare as a preventive service for patients who have not been diagnosed with a smoking-related illness or who have an illness complicated by tobacco.²⁰ In all, 60% of National Cancer Institute (NCI) cancer centers provide some type of tobacco-use treatment, but fewer than half of those centers have designated tobacco-use treatment personnel²¹ even though addressing tobacco use is a measure in the Quality Oncology Practice Initiative (QOPI).²²

Low perceived risk. Study findings have suggested that there is a low perceived risk of smoking among cancer patients.^{23,24} Cancer patients with a lower stage of disease are at higher risk of continued smoking,²⁵ perhaps because smoking seems less dangerous. Lung cancer patients are often aware that smoking is related to their diagnosis, however, those with head and neck cancer often do not make the connection,¹⁵ perhaps because of denial and/or their feeling guilty about the relationship between smoking and cancer.²⁶

Self-efficacy. In the context of smoking cessation, self-efficacy refers to a patient's confidence in their ability to quit smoking. High self-efficacy has been found to predict smoking cessation in head and neck cancer patients¹¹ as well as in adult survivors of childhood cancer.²⁷ The aforementioned trials measured self-efficacy only among participants in trials, but another study found that low self-efficacy in quitting was the only significant predictor of actually enrolling in a smoking-cessation trial,²⁸ which suggests that those who have high confidence in quitting are the least likely to seek assistance.

Lack of social support. Social support has been known to improve cessation,²⁹ yet many cancer patients do not have the support they need to help them quit smoking. Cancer patients who smoke tend to have a large social network of other smokers⁹ and are likely to live with a smoker.³⁰ Although 75% of family members who smoke are motivated to quit, they are rarely included in cessation interventions, thus 71% continue to smoke⁹ in the presence of their cancer patient relatives without realizing the dangers of secondhand smoke and the potential for smoking relapse by the patient.³¹

Psychological stress or depression. Cancer patients experience elevated psychological distress after diagnosis because of the radical changes in lifestyle and complicated, multifaceted treatment regimens such as chemotherapy, radiation, and surgery.⁹ Depression can be as high as 58% among cancer patients,³² compared with lower than 10% of the general population.³³ People with depression are much more likely to use tobacco than are nondepressed people, but they do participate in cessation interventions, although they often have a harder time quitting.³⁴ The elevated levels of distress and depression experienced by cancer patients may cause them to rely more on nicotine to cope, and in the process, postpone smoking cessation. Unfortunately, many cancer patients accept the negative consequences of smoking, may have more fatalistic beliefs, and do not see the point in quitting smoking because "the damage is already done."⁹

Alcohol misuse. Smoking is strongly associated with alcohol consumption.^{35,36} Cancer patients who smoke and are heavy users of alcohol are less likely to quit smoking than are those who consume moderate amounts of alcohol and they are less likely to succeed when they do attempt to quit. Cancer patients may use alcohol as a form of self-medication to cope with their cancer. Unlike depressed patients, problem drinkers are less likely to participate in cessation programs.²⁸ Problem drinking has been shown to increase mortality among cancer patients either from the disease, exacerbation of comorbidities, or poor health habits related to cigarette smoking.³⁷

Sleep problems. Depression, problem drinking, and smoking are correlated with sleep difficulties,^{38,39} which are common in cancer patients.⁴⁰ Nicotine is a stimulant that promotes wakefulness and, once a patient is asleep, cravings can prompt awakening. Patients who frequently awaken during the night because of nicotine cravings have the least success in quitting smoking.⁴¹ Sleep deprivation in turn can actually increase smoking, possibly due to the belief that smoking a cigarette will reduce sleepiness.⁴² Sleep deprivation can contribute to health problems and further decrease quality of life for cancer patients.

Poor diet. Smokers often eat less fruit and vegetables and that decreases their exposure to antioxidants,⁴³ which are crucial in DNA repair.⁴⁴ Hence, the poor dietary habits of smokers exacerbate the harmful effects of smoking among cancer patients.⁴⁵ Consumption of fruits and vegetables is associated with a longer life for cancer patients and may protect against cancer recurrence and increase survival rates.⁴⁶

Lack of activity. Smokers are less likely to exercise than are nonsmokers, and exercise has been shown to increase and maintain smoking abstinence,⁴³ yet cancer patients are often too fatigued to exercise. Vigorous exercise facilitated quit rates among sedentary women; however, the evidence for moderate exercise interventions has been more limited.⁴⁷ Nevertheless, exercise has multiple physical and psychological benefits for cancer patients and survivors and is a sound recommendation for general health.⁴⁸

Gender and educational level. Patients with smoking-related cancers such as lung and head and neck and who are smokers tend to be men and are often heavier smokers than are women cancer patients.⁴⁹ Among childhood survivors of cancer, men seem to have lower rates of long-term quitting.²⁷ In the general population, those with lower educational levels and a lower socioeconomic status have more difficulty quitting.^{27,50}

What is the evidence for smoking cessation interventions among cancer patients?

Most smoking cessation trials have been conducted with healthy adults, and only a few randomized controlled trials have studied smoking cessation among cancer patients. A large trial showed promising results for cessation interventions for childhood survivors of cancer,⁵¹ but in other studies of cancer patients, the sample sizes were small and therefore most results were underpowered.^{11,34,52-57} (See Cooley and colleagues⁵⁸) for a table of studies evaluating smoking cessation interventions in cancer patients. A review of the evidence follows.

Physician- and nurse-based interventions. In general, brief advice from physicians has been shown to enhance quit rates.⁵⁹ Yet clinical trials testing physician-

based cessation interventions among cancer patients did not show a significant effect compared with control groups,^{11,53,55} perhaps because physicians are too busy attending to the immediate medical needs of the cancer patients. One study found that 56% of usual care physicians recommended that their smoking oncology patients stop smoking,⁵³ and most oncology providers do not provide smoking interventions beyond advice to quit.⁶⁰

A meta-analysis showed that in general, nurse-administered interventions were more efficacious than were nonnursing interventions.^{14,61} Oncology nurses are ideally positioned to deliver cessation interventions because they are educated in patient education, psychosocial interventions, and physiological interventions; they have access to and immediate rapport with patients as well as respect from patients' physicians; they understand the patients' medical conditions, can read their charts, and write nursing notes; and they constitute a much larger workforce than oncology physicians. Moreover, physician time is at a premium, which makes nursing interventions more cost effective.

Hospital- and surgery-based interventions. Inpatient cessation interventions are efficacious in general population settings.⁶² Counseling that begins at the time of hospitalization followed by postdischarge contacts for more than 1 month was found to increase smoking cessation rates at 6- and 12-month follow-up.⁶³ Hospitalization provides an excellent opportunity for patients to quit smoking because they are confined, are often motivated to quit because of their illness/treatment, and often quit temporarily because of hospital smoking bans.⁶⁴ Some investigators have examined the effect of providing smoking cessation advice to patients who will undergo or who have already undergone a surgical procedure for their smoking-related cancer and their results have demonstrated abstinence rates ranging from 21% to 75% in intervention groups^{55-57,65} compared with quite rates of 13% to 64% in intervention studies that were not related to surgery.^{11,34,52-54} In July 2011, the Joint Commission issued more stringent, albeit voluntary, tobacco performance measures for inpatient settings, which include: screening of tobacco use; counseling and medications; counseling and medications provided upon discharge; and follow-up calls within 30 days of discharge regarding smoking cessation.⁶⁶

Community-based interventions. State-supported 1-800-QUIT-NOW telephone support lines have been shown to be efficacious in a randomized control trial and have been found to be effective in a real world setting.⁶⁷ QUITPLAN, a program offering a smoking cessation helpline for Minnesota residents,⁶⁸ showed a high 30-day abstinence rate of 20%.⁶⁹ The helpline program had

higher abstinence rates compared with QUITPLAN's Web-based smoking cessation program and treatment center and work-site smoking cessation programs.⁶⁹ It is not known if these community-based interventions work or not for cancer patients, but such interventions are available to that population.

Barriers to providing cessation treatment

Lack of education of providers. Most health care providers feel more should be done to assist patients to stop smoking, but many do not provide smoking cessation services because they lack confidence and/or training.⁷⁰ Medical and nursing education does not typically include training in interventions to change health behaviors such as smoking. Barriers to proper provider education include lack of educator preparation, low priority of tobacco-control content, overloaded curricula, lack of tested tobacco-control curricula, negative attitudes toward tobacco control, and smoking among students and faculty.⁷¹

Hesitancy to upset patients. Many providers may be hesitant to upset patients during cancer treatment and therefore avoid promoting smoking cessation. Patients are already overwhelmed by their cancer treatment, and providers may feel that asking their patients to attend extra appointments and cope with the withdrawal symptoms associated with smoking cessation may be asking too much,⁷² even though the evidence for this is poor. Some providers may themselves feel it is too late to recommend cessation interventions once a patient already has cancer, or are just not interested in psychosocial issues.⁷³

Reluctance of surgeons to provide nicotine replacement therapy. Anecdotal evidence suggests that some surgeons believe that providing cancer patients with NRT will diminish the effect of surgery because of vasoconstriction. However, one study found that smoking abstinence using NRT had no effect on collagen synthesis or wound size after 7 days of healing, when compared to smoking abstinence with a placebo patch.⁷⁴ The risk of NRT for surgical patients is far outweighed by the risk of exposure to tobacco smoke as tobacco smoke contains many other hazardous chemicals, has a very harmful effect on lung tissue, and results in poor oxygenation. Alternative cessation medications are available including varenicline or bupropion, which do not contain nicotine.

Scheduling conflicts. Some cessation interventions include individual or group sessions, which cancer patients may not be able to attend because of their complicated treatment regimens, having to keep multiple appointments, and the fatigue related to the disease and the subsequent treatment. Providers are rarely trained in cessation interventions so that clinic-based interventions are implemented infrequently. Even when oncology care pro-

TABLE 1 Recommendations for smoking cessation in cancer care

Patient or provider level of care
<ul style="list-style-type: none"> Provide behavioral counseling enhanced by workbooks and videotapes, which include information on: <ul style="list-style-type: none"> Motivational enhancement Detrimental effects of smoking Triggers for smoking Costs of smoking Setting a quit date Handling cravings Relapse prevention Follow-up calls, including referral to 1-800-QUIT-NOW
<ul style="list-style-type: none"> Considering contraindications, provide pharmaceutical interventions starting with those with the fewest side effects and that are at the lowest cost, including: <ul style="list-style-type: none"> Nicotine replacement (patch or gum or lozenge) Combination NRT (patch and gum or lozenge) Bupropion Combination NRT (patch or gum or lozenge) and bupropion Varenicline Relate cessation treatment with interrelated comorbid disorders such as problem drinking and depression. Include family members in smoking cessation efforts.
Hospital level of care
<ul style="list-style-type: none"> Train all front-line providers about smoking cessation. Provide smoking cessation support for health care providers. Offer treatment at all points of care, but especially during teachable moments such as immediately after diagnosis. Use medical record systems to trigger providers to assess and treat smoking. Provide a culture of care which supports smoking cessation, including smoke-free campuses.

Abbreviation: NRT, nicotine replacement therapy.

viders are trained in smoking intervention, they may not have the time to provide cessation interventions when faced with other urgent priorities.

How do we treat cancer patients who smoke? (Table 1)

Motivational enhancement. To boost patient motivation to quit smoking, providers should counsel cancer patients about the dangers of tobacco use. Informing patients of the short-term benefits of quitting smoking related to their cancer treatment as well as the long-term

benefits related to prolonged survival may decrease their fatalistic beliefs about their smoking behavior.^{9,26} Providers can assess a smoker's self-efficacy in quitting, and then tailor the invitation to participate in a program accordingly. Those with low confidence for quitting may be easier to engage than those who feel confident in their own ability to quit. Those who feel confident about quitting on their own may need additional information about the benefits of participating in a cessation program such as the additional support and improved quit rates.

Capitalizing on the teachable moment. The greatest success is achieved among cancer patients who are offered cessation treatments immediately after their diagnosis.^{52,75} The longer the lapse between diagnosis and initiation of a cessation program, the lower the likelihood of success. For most, a diagnosis of cancer may result in a "teachable moment," which constitutes a time when patients may be more likely to comply with smoking cessation advice.^{9,11,26}

Behavioral interventions. Common behavioral intervention techniques that can be used to aid cancer patients with smoking cessation include sessions with a trained provider^{14,55-57,65} and follow-up calls to participants.^{14,34,54-57} Behavioral interventions can be enhanced with take-home work books^{11,14,53,55-57} and videos that deal with smoking cessation. Videos can be useful for patients with literacy problems and can be spliced into hospital television systems and save providers time at the bedside. Common items that can be discussed within interventions are the patient's personal habits and triggers,^{52,56} the risks of continued smoking after cancer-related surgery,^{56,65} the benefits of quitting smoking,^{53,56,57,65} preparation techniques for high-risk situations,^{52,65} how to manage withdrawal and quitting-related stress,^{11,52,55,57} and setting a quit date.^{11,52-55,57}

Pharmaceutical interventions. Behavioral interventions work best when enhanced with pharmaceutical interventions. Cancer patients who continue to smoke are typically highly addicted to nicotine and may need combination therapies such as patch with supplemental gum (although gum is not indicated for head and neck cancer patients) or lozenge and/or bupropion. Bupropion may also treat comorbid depression,³⁴ but it is contra-indicated in patients with CNS tumors⁷⁵ and those with tremors related to alcohol use. Varenicline has been shown to be efficacious in a number of trials,⁷⁶ but can be contra-indicated in patients with psychiatric⁷⁷ conditions and those with renal problems.⁷⁸ Considering all of the contraindications for cessation medications, each patient should be individually assessed regarding the medication best suited for his/her health status and lifestyle (Table 2).

Telephone follow-up. Cancer patients who smoke can be referred to the 1-800-QUIT-NOW national telephone quit line offered by each state as well as Puerto Rico, Guam, and Washington, DC.⁷⁹ The program can vary from state to state, but the smoker is generally assigned a personal coach and will have several individualized counseling sessions. Some states provide free NRT for residents who are not insured for NRT.

Treating comorbid health behaviors/disorders. A 2009 National Institutes of Health meeting on the Science of Behavior Change acknowledged that risk behaviors often occur in "bundles" and the importance of focusing on clusters that may have common underlying processes.⁸⁰ Combining goals such as relieving depression and stopping smoking allows clinicians to capitalize on similar approaches. For example, motivational interviewing and bupropion can be used to treat both comorbid depression and smoking. Such unified services may be more effective and efficient for both clinicians and patients, particularly if the service emphasizes the common theoretical and technical aspects of treatment. Smoking should be considered central among bundled interventions as it has the strongest and most consistent association with other unhealthy behaviors.⁸⁰

Treating family members and significant others who smoke. Many cancer patients who quit smoking in the hospital return to a smoking household, decreasing their chance of quitting. Lung cancer patients either tend to ignore their relatives' smoking habits or confront them about their smoking, and that can lead to strain and conflict within the family, which is an undesirable outcome.³¹ There is evidence for including the patients' relatives in smoking cessation efforts.^{9,31}

How can institutions support smoking cessation interventions? (Table 1)

Training personnel. Training health professionals about smoking cessation has been shown to increase the delivery of these services⁸¹ and to boost quit rates.²⁹ A commitment to train providers requires allocation of time for implementation of cessation interventions. It may be helpful for all front-line providers such as physicians and nurses to be trained in providing smoking cessation services so that patients are given a consistent "quit smoking" message at all points of contact.⁸² There are many available resources for training providers, such as pocket guides and online material.⁸³ Using a system such as the 5 A's of counselling patients to stop using tobacco (Ask, Advise, Assess, Assist, and Arrange), or the AAR system (Ask, Advise, and Refer) can guide provider behavior.²⁹

Provider interventions. Based on available evidence, it is recommended at the very least that physicians provide

TABLE 2 Dosage guidelines for smoking cessation interventions

Pharmaceutical	Amount smoked	Dose (amount, duration)			Quit date	Maximum dose
		Step 1	Step 2	Step 3		
Nicotine replacement therapy⁹⁶						
Nonprescription						
Patch ^a	1 ppd	21 mg, 3-6 wk	14 mg, 2-4 wk	7 mg, 2-4 wk	D 1	May extend treatment up to 16 wk
	½ ppd	14 mg, 6-8 wk	7 mg for 2-4 wk		D 1	
	¼ ppd	7 mg for 4-6 wk			D 1	
Gum	1 ppd	2 mg (1 piece) every 1-2 h, 6 wk	2 mg every 2-4 h, 3 wk	2 mg every 4-8 h, 3 wk	D	24 pieces daily for 12 wk, or 6 pieces daily with patch
	> 1 ppd	4 mg (1 piece) every 1-2 h, 6 wk	4 mg every 2-4 h, 3 wk	4 mg every 4-8 h, 3 wk	D 1	
Lozenge	1st cigarette 30 min after waking	2 mg (1 lozenge) every 1-2 h, 6 wk	2 mg every 2-4 h, 3 wk	2 mg every 4-8 h, 3 wk	D 1	20 pieces daily, or 5 pieces in 6 h. No more than 1 lozenge at a time.
	1st cigarette within 30 min of waking	4mg (1 lozenge) every 1-2 h, 6 wk	4mg every 2-4 h, 3 wk	2 mg every 4-8 h, 3 wk	D 1	
Prescription						
Nasal spray		1 spray in each nostril (1 dose) 1-2 times/h, at least 8 times daily			D 1	5 doses/h or 40 doses daily
Inhaler		1 cartridge with craving (2 mg nicotine absorbed)			D 1	16 cartridges daily
Nonnicotine prescription medications						
Bupropion ⁹⁷		150 mg (1 tablet) every morning, for at least 3 d	150 mg (1 tablet) twice daily, 7-12 wk		Week 2	300 mg daily
Varenicline ⁹⁸		0.5 mg (½ tablet) daily, on d 1-3	0.5 mg (½ tablet) twice daily, on d 4-7	1 mg (1 tablet) twice daily during wk 2-12	Week 2	May extend use another 3 months

Abbreviations: d, day(s); h, hour(s); min, minute(s); nrt, nicotine replacement therapy; ppd, pack per day; wk, week(s).

^aDirections may vary slightly depending on the manufacturer.

brief advice. Physicians should emphasize the importance of quitting for avoiding recurrence and further disease, rather than focusing on smoking as the cause of cancer, as patients who blame themselves for their cancer tend to adjust poorly to their diagnosis.⁸⁴ Brief physician advice to quit smoking should be followed by intensive behavioral counseling by a nurse or other professional. Social support is often lacking among cancer patients and telephone follow-up has been shown to be efficacious at strategic points (eg, at 2, 14, 21, and 60 days after discharge or after quit date).

Electronic medical record systems. Only 20%-25% of hospitals use EMRs,⁸⁵ and although both paper and electronic documentation systems can trigger providers to

assess and treat smoking cancer patients, there are several disadvantages to using paper records, including the inability to access them remotely and the fact they are often difficult to read, that make EMRs a more reliable tool.⁸⁶ EMR reminders can prompt assessment for smoking cessation^{87,88} and referral for cessation services. Physician referrals promoted by EMR reminders have been shown to increase patient compliance with preventive care recommendations.⁸⁹ Documentation templates can provide for easy documentation of the provision of cessation services to these patients. Other benefits of EMRs include potential cost effectiveness, as well as improved safety, quality, and efficiency.^{90,91} There are many EMR options for institutions, including traditional desktop EMRs and

internet EMRs; ChartWare, EpicCare, and Health Probe were given the highest overall system rating.⁹²

Culture change. In the same way that protocols are implemented for the treatment of cancer, protocols for smoking cessation must be instituted. An incentive for institutions to promote smoking cessation protocols is the reduction in hospital stay and readmission rates. Already adopted by many hospitals,⁹³ promoting a healthy environment with smoking bans can increase the efficacy of smoking cessation treatments.⁹⁴ Joint actions by clinicians, administrators, insurers, and purchasers can encourage a culture of health care in which tobacco cessation interventions for cancer patients are implemented consistent with evidence-based standards of care.²⁹

Conclusion

Cancer patients are personally, physically, and situationally vulnerable to smoking and efficacious interventions are available to assist cancer patients to quit. A 2009 NCI conference discussed the need for cancer centers to properly address tobacco dependence, by improving identification of smokers and enhancing referral to appropriate smoking cessation programs;⁹⁵ this is also a benchmark of the quality of their treatment and survivorship plan according to the QOPI. To enhance quality of life and survival, there is a growing consensus about the obligation to provide state-of-the-art smoking cessation interventions for cancer patients.

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