



A therapeutic approach proposal for smoking cessation during hospitalization

Propuesta de abordaje terapéutico para el abandono del tabaco en pacientes hospitalizados

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ABSTRACT. Smoking is a major public health issue stemming from nicotine addiction and the multi-organ damage caused by the toxic substances released during tobacco combustion. It has been described that during hospitalization, patients are more receptive to initiating smoking cessation treatment, taking advantage of the enforced abstinence due to the smoking ban in hospitals, with even greater effectiveness compared to standard treatment. Quitting smoking in hospitalized patients reduces the risk of infections, surgical wound bleeding, hospital stay length in patients diagnosed with pneumonia, the number of exacerbations in COPD patients, as well as acute coronary events. This review aims to formulate a management algorithm and provide recommendations based on the most up-to-date evidence regarding the treatment of tobacco addiction in the inpatient setting in our country. The initial evaluation involves assessing smoking consumption, level of motivation, nicotine dependence, and withdrawal symptoms. For patients with more than 6 months of abstinence, management is limited to verifying continued abstinence and preventing relapse. In contrast, those with less than 6 months of abstinence should be evaluated for withdrawal symptoms and receive both pharmacological treatment and brief counseling. Follow-up after discharge presents the main challenge, as many patients may experience immediate relapse or fail to return for further care. Therefore, healthcare services must have an established plan in place.

Keywords: smoking cessation treatment, hospitalization, cessation, nicotine withdrawal syndrome.

RESUMEN. El tabaquismo es un problema primordial de salud pública derivado de la adicción a la nicotina y del daño multiorgánico causado por los tóxicos de la combustión del tabaco. Se ha descrito que durante una hospitalización los pacientes son más receptivos para iniciar tratamiento en el cese del tabaquismo aprovechando la abstinencia obligada por la prohibición de fumar en los hospitales; incluso con efectividad mayor al tratamiento habitual. Dejar de fumar en pacientes hospitalizados genera disminución del riesgo de infección, de sangrado de heridas quirúrgicas, de la estancia hospitalaria en pacientes con diagnóstico de neumonía, en el número de exacerbaciones de pacientes con enfermedad pulmonar obstructiva crónica, así como de eventos coronarios agudos. La presente revisión tiene el objetivo de formular un algoritmo de manejo y recomendaciones basadas con la evidencia más actualizada sobre el tratamiento de la adicción al tabaco en el contexto intrahospitalario en nuestro país. La evaluación inicial consiste en la cuantificación de consumo, grado de motivación, dependencia de nicotina y síndrome de abstinencia; al contar con más de seis meses de abstinencia, el manejo se limita a la comprobación del mismo y el control de recaídas; mientras que aquellos con abstinencia menor a seis meses deberán valorarse datos del síndrome de abstinencia y recibir, tanto tratamiento farmacológico como consejo breve. El seguimiento posterior al egreso es el principal desafío, ya que muchos de los pacientes pueden tener recaídas inmediatas o bien no acudir para recibir atención, por lo que los servicios de salud deben contar con un plan establecido.

Palabras clave: tratamiento tabaquismo, hospitalización, cesación, síndrome de abstinencia a nicotina.

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Abbreviation:
TAPS = the tobacco, alcohol, prescription medication and other substances use tool.

INTRODUCTION

It is well known that the tobacco consumption is one of the main health problems worldwide, it is associated with approximately 8 million death every year.¹ In Mexico, according to the Global Adult Tobacco Survey (GATS) 2023, 15.6% of the population actively consumes tobacco, which reflects the public health problem we face.² In addition, there are economic damages because of the decrease in the labor productivity and the increase in health care costs because of the increase in hospitalizations and complications of chronic-degenerative diseases.^{3,4}

In a survey made of 81 patients hospitalized at the National Institute for Respiratory Diseases Ismael Cosío Villegas (INER), it was found that 78.2% of smokers presented symptoms associated with withdrawal syndrome. The main symptoms were tension (44.4%), hypersomnia (41.9%), depression (40.7%), anxiety (38.2%). The average time in the hospital for smokers was 9.9 ± 4 days; among the main diagnoses of smokers were the chronic obstructive pulmonary disease (COPD), asthma and lung cancer with 22.2%, 13.6 and 12.3% respectively.⁵ As it is shown in this report, withdrawal symptoms are frequent and show the opportunity area to achieve effective interventions in the health care system.

Quitting smoking in preparation for hospitalization is known to have multiple benefits. For example, it decreases the post surgical complication rate, it improves wound healing and tissue proliferation, and in patients hospitalized for other diseases attenuates inflammation mechanisms; resulting in fewer complications and reduced hospital stay.⁶⁻⁸

The objective of this document is to propose recommendations based on evidence and an algorithm on the tobacco treatment in the in-hospital context, space and time conducive to smoking cessation.

Inpatient intervention

Among the main objectives in hospitalized smokers are: 1) taking advantage of the hospital stay as an ideal time for intervention; 2) individualizing treatment, taking into account the intensity of the withdrawal symptoms, comorbidities and patient preference for ease of use, cost and accessibility; 3) give a follow up plan and treatment after hospital discharge; 4) promoting the training of all health personnel to give brief advice and make referrals to clinics to stop smoking; 5) decreasing the direct and indirect complications of tobacco use.

We divided the intervention in hospitalized smokers into two parts: a diagnostic and a therapeutic one.

Diagnostic evaluation

In general, evaluation is based on analyzing the history and patterns of tobacco consumption. It includes the quantification of their consumption, analysis of the degree of motivation to quit smoking, the degree of physical and psychological dependence on nicotine, exploring of previous attempts to quit and if they were accompanied by pharmacological treatment, as well as the measurement of exhale carbon dioxide (CO) or measurement of continine (*Table 1*).

Therapeutic intervention includes pharmacological and no pharmacological as a whole.⁹ In *Figure 1*, we present a proposal algorithm for the evaluation and treatment of tobacco consumption in the in-hospital context.

Quantification of cumulative tobacco consumption

The packet-year index is calculated, establishing the average number of cigarettes consumed per day in the years that they have smoked multiplied by the number of years divided by 20 (cigarettes per packet); as well as the number of daily cigarettes consumed before admission, since they

Table 1: Recommendations for the evaluation of active smokers.

Interrogate every inpatient about nicotine use. If the consumption is through tobacco, it must calculate: cigarettes per day on average, years of smoking, pack-years and date of last cigarette consumed
Assess motivation to quit smoking (Richmond test)
Find out the number of previous successful attempts (> 24 hours)
Evaluate physical and psychological dependence on nicotine (Fagerström test and TAPDS)
Evaluate abstinence syndrome and craving at baseline. (Craving to Nicotine Questionnaire [CCN] or the smoking urges [QSU])
Conduct questionnaires to assess symptoms of anxiety and depression
Measure exhaled CO and/or cotinine on admission
Interrogate history of epilepsy, comorbidities, medications, other drug use, pregnancy, and allergies to plan pharmacological intervention

TAPS = evaluation of psychological dependence on tobacco.

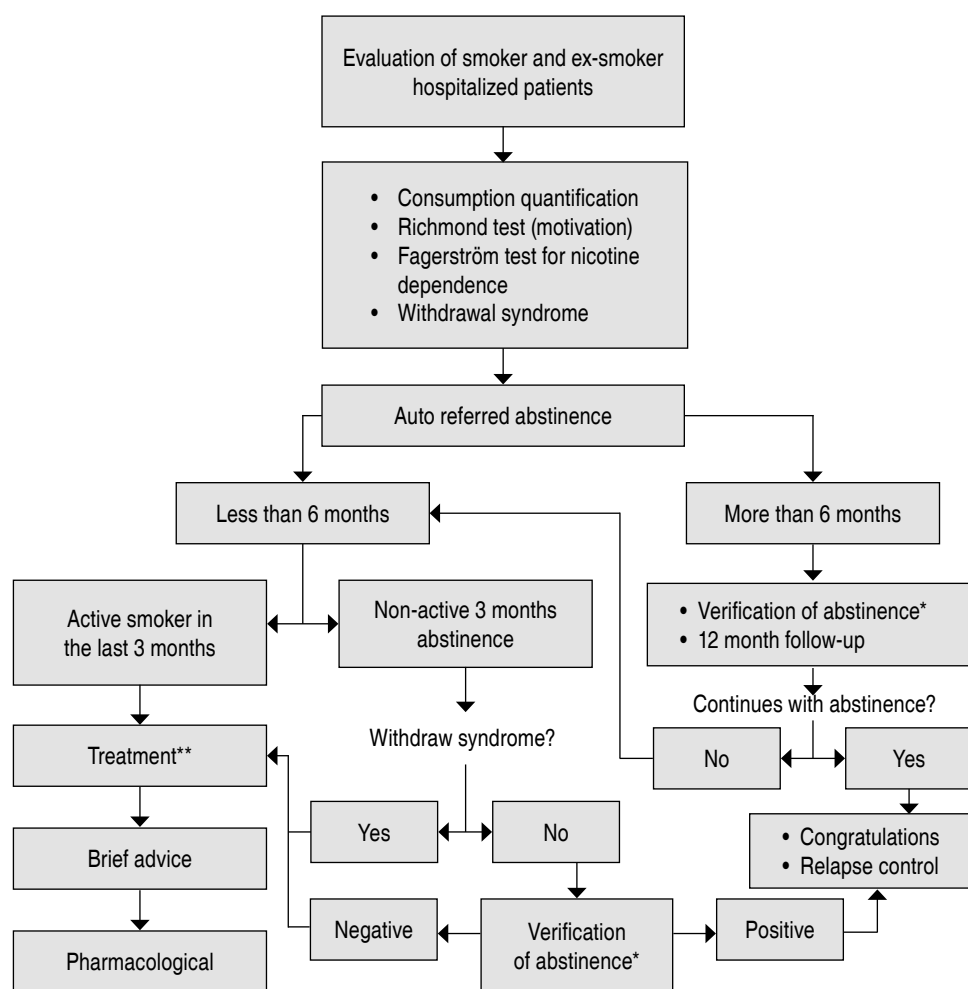


Figure 1:

Smoking management algorithm in hospitalized patients. All patients with abstinence less than six months are recommended for follow-up. * The abstinence test will be carried out with an exhaled carbon monoxide or cotinine test. In case of unavailability, it will be self-referred. † For treatment evaluation (Table 3).

allow to guide the nicotine replacement treatment.¹⁰ The patients can be categorized as:^{9,11,12}

1. Active smoker if their last consumption is less than three months.
2. Non-active smoker if their last consumption is more than three months, but less than six months.
3. Ex-smoker if their last consumption is more than six months.
4. Non-smoker if there is no consumption or if the total consumption has been less than 100 cigarettes.

In addition, it is important to question about passive exposure to tobacco in places such as home or work, to assess relapse and general health risks.

Degree of motivation analysis

A strong association with abstinence success has not been demonstrated; however, some tests could be considered

to predict the adherence to treatment.¹³ Motivation can be measured by visual analog scales, the Richmond test, the Smoking Abstinence Questionnaire (SAQ), and the Henri Mondor Paris or Khimji Watt test.¹⁴ The Richmond test is the most widely used and classifies the degree of motivation as: 0-5 weak motivation, 6-8 medium motivation and > 9 strong motivation.

Analysis of the degree of physical and psychological dependence on nicotine

The Dependence Nicotine Questionnaire of Fagerström is the world standard for the assessment of physical dependence on nicotine,¹⁵ it has six items that assess the amount of consumption, compulsion and dependence. Reagents from 0 to 1 and the multiple choice items from 0 to 3 are scored. These are added together for a total score of 0 to 10. The higher it is, the more intense the physical dependence on nicotine. The scores obtained allow to classify the dependence into five levels: very low (0 to 2 points); low (3

to 4 points); moderate (5 points); high (6 to 7 points); and very high (8 to 10 points). Measuring dependence has been used primarily for dose selection in drug therapy.¹⁶

Currently, it is recognized that tobacco dependence is a multidimensional behavioral phenomenon that involves psychological, social and physical components, such as the number of cigarettes consumed. Therefore, the characterization of the patient is relevant for the diagnosis, and according to the consumption pattern in Mexico, which is mostly as occasional consumption, it is suggested to integrate evaluations such as the psychological dependence on tobacco assessment scale (TAPS).¹⁷ Others can be mentioned, such as the Heavy Smoking Index (HSI) or the Nicotine Dependence Syndrome Scale (NDSS) that predict the craving to smoke, the withdrawal syndrome and cessation success.¹⁵

Craving and withdrawal syndrome

The absence or decrease in the intensity of craving and withdrawal syndrome have been used as secondary treatment goals as well as smoking cessation; currently they are also used for the decision of the type and dose of pharmaceutical treatment, mainly nicotine replacement therapy in its various presentations. The evaluation can be done using various questionnaires, such as the nicotine craving questionnaire (CCN),¹⁸ or the Questionnaire on Smoking Urges (QSU) that allow to discriminate stable and the high intensity aspects of the need to smoke.¹⁹ It is recommended to select a short questionnaire that contains the desire to quit smoking and the withdrawal symptoms referred to by the Diagnostic and Statistical Manual of Mental Disorders (DSM), including cravings.²⁰

Analysis of previous attempts of cessation

The number of attempts will be investigated, how long he remained smoke-free in those attempts, the treatments that were used and above all, the withdrawal syndrome, since these can predict the success of abstinence or the relapse.²¹ Abstinence for at least 24 hours has predicted the following cessation, that is why this cut-off point is taken into account to define previous attempts.^{22,23}

Table 2: Summary of recommendations on the non-pharmacological treatment in active smokers.

Brief advice training for all the hospital member health personnel
Provide brief advice explaining the risks of this and benefits of its abandonment
Continue counseling and/or refer for cognitive-behavioral treatment post-hospital discharge

Biochemical verification of smoking cessation

Different tools can be used such as the measurement of nicotine and cotinine in saliva, urine or blood and/or exhaled carbon monoxide (CO); the latter being the simplest, innocuous, cheapest and very useful to corroborate abstinence.^{11,24-26} Levels of CO are expressed in ppm (1-6 = non-smoker, 7-10 = light smoker, 11-20 = smoker, > 20 = heavy smoker).⁹

Treatment

The interventions that can be performed are similar to those of outpatient treatment, which consists of non-pharmacological and pharmacological measures. Psychological counseling can be used in its various forms after hospital discharge,^{11,27,28} and brief advice is essential during hospitalization. The effectiveness of therapeutic interventions in patients with respiratory diagnoses is less clear, in part because there are few studies in this subgroup.²⁹

Non-pharmacological treatment

Types of hospital non-pharmacological interventions include brief advice and self-help materials. In the outpatient context, the greater the intensity of the behavioral intervention, the greater the effectiveness, but in the hospital context it is necessary to limit and systematize it in a brief and accessible way. Rigotti et al. showed that brief counseling initiated during a hospitalization and continued with non-pharmacological measures for at least one month after discharge increased smoking cessation rates (OR 1.37; 95% CI, 1.27-1.48).³⁰ The short advice to quit smoking is the most recommended type of advice, as well as being simple it can be given by any health worker. It includes three steps:

1. «Asking» about tobacco use,
2. «Advise» that the best method to quit smoking is with a combination of medication and behavioral support, and
3. «Act» guiding to establish a plan with the available means. It is critical to clearly explain the benefits of quitting, highlight the risks, and congratulate the decision to quit.^{27,28,30}

Training on how to give brief advice should be implemented through educational programs for health personnel, including advice on treatment to quit smoking, as they have shown a 41% increase in counseling and the prescription of treatments at discharge up to 31%²⁹ (Table 2).

Table 3: Pharmacological recommendations for active smokers.

Nicotine replacement therapy (NRT)	NRT administration during in-hospital stay in active smokers and/or with high to moderate dependence or withdrawal symptoms regardless the degree of dependency
	Consider combination of immediate and long acting NRT if existing high dependence and/or withdrawal syndrome
	High nicotine dependence and/or consumption of < 10 cigarettes/day consider: PN 21 mg for six weeks, 14 mg for four weeks, 7 mg for two weeks
	Low to moderate dependence and/or consumption < 10 cigarettes/day consider: PN of 14 mg for six weeks and 7 mg for four weeks
	Low dependence on nicotine and consumption < 10 cigarettes/day, and/or intolerance to patch consider: Immediate-acting NRT (chewing gum, spray, inhaler or dragees) individual with dosing ad lib/for necessary reason
	Immediate-acting NRT (gum or tablet): 4 mg if they smoke their first cigarette in the first 30 minutes after waking up; 2 mg if you smoke your first cigarette after waking up. It is recommended Ad lib schema or according to the manufacturer
	NRT prescribing considerations: not recommended in uncontrolled HBP. For oral presentations not recommended if there are oral or pharyngeal lesions, history of radiation therapy to the head and neck, peptic ulcer or UGIB risk.
Oral therapy	Start treatment based on varenicline, cytisine or bupropion in hospitalized active smokers patients with a high degree of dependence, prolonged use or multiple unsuccessful abandonment attempts
	Consider varenicline, cytisine and/or bupropion, in combination with NRT
	Varenicline, its dosage will be with tablets: 0.5 mg every 24 hours day 1 to 3, 0.5 mg every 12 hours day 3 to 7 and 1 mg twice daily to complete 12 weeks
	In patients with an anxiety and/or depression profile, it is recommended to use NRT of immediate and/or prolonged action in combination with bupropion
	Bupropion dosage: 150 mg starting dose the first 3 to 7 days increasing the dose at 150 mg twice daily for 12 weeks
	Events to consider in the prescription of bupropion: contraindicate consumption of alcohol, avoid if renal failure, uncontrolled HBP or hepatic exists, evaluate drug interactions and reconsider another option if epilepsy, CVE, AVM, TBI, any cancer with suspected brain metastasis or brain neoplasia
	If cytisine is indicated you may consider two schemes: - From 1st to 3rd day one tablet every 2 hours 6 tablets. From 4th to 12th day one tablet every 2.5 hours 5 tablets. From 13th to 16th day one tablet every 3 hours 4 tablets. From 17th to 20th day one tablet every 5 hours. From 21st to 25th day one tablet every 24 hours. - Reduced schedule: 2 tablets (3 mg) every 8 hours for 25 days Tablets: 1.5 mg If there is poor adherence to treatment due to adverse effects, it is possible to reduce the dose of each medication as follows: - Varenicline 0.5 mg twice daily - Bupropion 150 mg once daily

AVM = arteriovenous malformation. CVE = cerebrovascular event. HBP = high blood pressure. NP = nicotine patches. TBI = traumatic brain injury. UGIB = upper gastrointestinal bleeding.

Non-pharmacological measures at discharge

Some measures such as personal contacts between the healthcare professional and the patient, sending SMS, email, proactive telephone contact, etc.,³¹⁻³⁴ have shown their usefulness in increasing the effectiveness of the interventions offered during the hospital period.

Pharmacological treatment

The four first-line smoking cessation drugs are: bupropion, varenicline, cytisine, and nicotine replacement therapy.³⁵

Drug therapy during the hospital stay can attenuate withdrawal symptoms and increase withdrawal success. The characteristics of each of the pharmacological alternatives are described below:

1. Nicotine replacement therapy (NRT)

The use of any presentation is recommended (chewing gum, tablets, mouth spray or patches). It is useful to help manage withdrawal symptoms acutely.²⁶ In the in-hospital context they increase effectiveness by 54% compared to counseling alone³⁶ (Table 3).

Adverse effects and drug interactions: the most commonly reported include singulum, gastrointestinal symptoms, headache, jaw and orodental pain. Few interactions have been reported with other drugs, including adenosine (tachycardia), cimetidine (increased nicotine concentration), and memantine (increased toxicity to nicotine).³⁷ There are few contraindications for these types of drugs such as nicotine hypersensitivity, and lactating women. Traditionally, its prescription was contraindicated in patients with coronary heart disease (CHD), however, there is evidence demonstrating efficacy and safety in this type of patient.³⁸

Choice of NRT scheme: it is currently based on three characteristics: 1) the degree of the patient's nicotine dependence, 2) the number of daily cigarettes consumed, 3) the latency time between awakening and the first cigarette smoked. The nicotine patch is the simplest presentation to use; despite not acting as quickly to decrease acute withdrawal, it is an excellent maintenance therapy.³⁹ For patients with moderate to high dependence, long-acting NRT (patches) plus immediate-acting NRT (gum, tablets, etc.) have been recommended in patients who smoke > 10 cigarettes a day. For patients with low dependence the NRT can be used with either 2 mg ad lib chewing gum or patches in their dosages of 14 or 21 mg/day depending on cigarette consumption.^{40,41}

Duration of treatment: in most studies a total duration of 10-12 weeks is established. The American Thoracic Society (ATS) Clinical Practice Guideline recommends an extended regimen of at least 12 weeks.⁴²

2. Varenicline

It is currently the most effective medication for smoking cessation, recommending its use over nicotine and bupropion patches.⁴² The treatment is effective regardless of nicotine dependence and can be combined with other drugs to increase success⁴¹ (Table 3).

Adverse effects and interactions: the main symptoms are nausea (24-29%), but the dose can be adjusted to 50% to reduce these symptoms without affecting their effectiveness; others are constipation (5-8%), less frequent insomnia, vivid dreams and headache (< 5%). It requires dose adjustments in liver or kidney failure.⁴³ Varenicline is safe in patients with a history of acute coronary syndrome (ACS).⁴¹ It has previously been associated with increased anxiety, depression, and even suicidal ideation; however, this was ruled out by a meta-analysis in 2018 [ABT1].^{44,45} It has few interactions with other drugs,⁴³ being ideal in patients with polypharmacy.

Contraindications: hypersensitivity to varenicline, and caution during lactation.⁴³

Disadvantages: its main drawback in hospitalized patients lies in the need to use it for a week before it reaches

its efficacy 10 so it must be combined with a fast-acting nicotine replacement treatment. In addition, it is the most expensive pharmacological treatment related to smoking cessation. It was recently reincorporated by the FDA, still unavailable in our country, considerably hindering access to medicines, although it is likely to be reincorporated into the therapeutic armamentarium.

3. Bupropion

Its recommendation for use in the in-hospital context is unclear, as its effectiveness in achieving abstinence is lower compared to NRT or varenicline.⁴⁶

Adverse effects: Among the most common are tachycardia (11%), weight loss (14-19%), xerostomia (17-26%), headache (25-34%) and insomnia (11-20%). Serious adverse effects that have been reported are complete atrioventricular block, hypertension (2-6%), decreased seizure threshold, and psychiatric disturbances such as hostile behavior (6%), requires adjustment in renal failure and not recommended in hepatic failure.⁴⁷ No association with suicidal ideation has been demonstrated.⁴⁵

Contraindications: use of alcohol, benzodiazepines, barbiturates, linezolid, methylene blue, anticoagulants, or antiepileptic drugs; concomitant use of monoamine oxidase inhibitors or within 14 days of discontinuation; current or previous diagnosis of bulimia or anorexia nervosa; hypersensitivity to bupropion; or history of uncontrolled seizures and liver failure.^{47,48}

Disadvantages: it requires a period of 7 to 14 days to reach therapeutic concentrations, so in the hospital context it must be combined with nicotine substitutes and can be associated with important interactions with other drugs.⁴⁷ It requires a meticulous assessment of drug interactions.

4. Cytisine

Cytisine is an alkaloid purified from the seeds of *Cytisus laburnum* and has been used for decades to quit smoking in regions such as Eastern Europe.⁴⁹ Cytisine, like varenicline, competes with great affinity for nicotinic cholinergic receptors in the brain.⁵⁰ It has been shown to be as effective as varenicline,⁵¹ being the best cost-effective therapy for the treatment of smoking, especially in the absence of varenicline on the market. One of its great advantages has been its low cost, especially in Eastern European countries,^{49,52} although at the time it is marketed in the United States, procedures already started, it could raise the cost substantially and gets closer to varenicline.

Adverse effects: mainly abnormal dreams (16.6%), nausea (10.9%), sleep disturbance (18.6%) and headache (9.2%).⁵¹

Disadvantages: its main limitation are the treatment schemes that suggest an initial consumption every two

hours; however, it has been found that fixed doses of every eight hours or every six hours seem to be equally effective.⁵³ This drug is not available in Mexico.

Interventions in hospitalized ex-smokers

Cessation less than six months

The following measures are recommended:

1. Avoid relapses: the greatest risk is during the first six months of abstinence, so it is advisable to offer follow-up.⁹
2. Reinforce and recognize achievements.^{9,12}
3. Offer of Support: The ex-smoker should be offered assistance in initiating and maintaining abstinence during their hospital stay.⁹
4. Assessment of abstinence syndrome and corroboration of abstinence: if the patient has been abstinent for less than three months, it is still possible for the patient to develop abstinence syndrome.⁵⁴
5. Assess symptoms of depression and refer if they are present to the psychiatrist.⁵⁴
6. Advice from a nutritionist since he can present weight gain.⁵⁵

Cessation greater than six months

In this group of patients, they will simply recognize their achievements, reinforce their maintenance and offer help in case of relapse.⁹

Follow-up on hospital discharge

Perhaps this is the main challenge, since many of the patients may have immediate relapses, or do not come to receive care upon discharge. Health services must have a follow-up plan at discharge. Pharmacotherapy is not consistently covered by health systems and toll-free smoking cessation hotlines are poorly linked to health care systems.³² A referral to a smoking cessation clinic is recommended for follow-up days after discharge.⁵⁶

CONCLUSIONS

Scientific evidence is consistent regarding increases in smoking cessation rates when implementing cessation interventions in hospitalized patients, accompanied by timely monitoring of discharge. It is necessary to document and characterize consumption at each clinical visit, train health personnel to provide brief counseling and pharmacological treatment. In addition, it is essential to promote policies for the health system at the national level to support and provide smoking cessation treatments and counseling during a hospitalization.

Conflict of interests: the authors declare no conflict of interests.

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