

Promoting cessation in hospitalized smoking patients: a systematic review

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SUMMARY

OBJECTIVES: *The objective of this review was to evaluate high intensity post-discharge follow-up strategies to promote smoking cessation in hospitalized patients.*

METHODS: *A systematic review was performed, based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA – P) protocol. The databases used for research were: PubMed, LILACS/BIREME, Scopus, Web of Science, Cochrane and Scielo. The included articles were randomized clinical trials, published from 1990 to 2018, which evaluated in-hospital and post-discharge intervention, and provided a minimum of 30-day care post discharge. The studies aimed to evaluate tobacco cessation.*

RESULTS: *Fourteen studies were selected for analysis. Across studies, pharmacotherapy was consistently effective for smoking cessation. Communication technologies likewise were consistently effective for cessation and post-discharge access.*

CONCLUSION: *Effective strategies exist. The challenge for future trials is to determine the best approaches for different clinical contexts, to promote cessation.*

KEYWORDS: *Tobacco use cessation. Smoking cessation. Patient discharge. Hospitalization. Systematic review.*

INTRODUCTION

In 2018, Datasus¹ registered more than 11 million hospitalizations in the country, which means that a large contingent of patients spent at least one night in a hospital, including many smokers. This situation configures hospitalization as a valuable opportunity to approach these patients. The post-discharge follow-up

of smoking patients is considered a key element for the actions implemented in the hospital environment to be sustained in the home environment. Without the follow-up of smoking patients after hospital discharge, interventions in favor of cessation, initiated during hospitalization, lose effectiveness. However,

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post-discharge follow-up remains a challenge for hospitals that offer evidence-based smoking treatment²⁻⁴.

That said, we consider it necessary to evaluate the strategies studied to assist the smoking patient after hospital discharge, seeking to understand which would be the most effective and promising approaches to promote smoking cessation in this group.

There are still few publications with the purpose of evaluating the strategies for approaching smokers after hospital discharge. Brasil occupies a prominent position for its successful tobacco control program, but few national studies address the challenges of post-discharge monitoring.

A meta-analysis that evaluated the approaches to promote the cessation of hospitalized smokers defined high-intensity interventions as those that, in addition to the approach during hospitalization, remained for 30 days after hospital discharge. Interventions classified as high intensity were more effective in promoting cessation³. The aim of this study is to contribute to the literature by reviewing studies that evaluated different forms of high intensity approaches in the post-discharge period of smokers to promote cessation.

METHODS

The studies' eligibility was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prisma-P) protocol. The characteristics evaluated were study design, studied population, types of intervention, presence of a control group and analyzed outcomes⁵.

Randomized clinical trials were selected in order to study interventions in the post-discharge period in smoking patients, with smoking cessation as the main or secondary outcome. Pilot studies were also included, as presented in an important previous review on approaches during the hospitalization period²⁻⁴.

The studies contemplated interventions in smoking patients initiated during the hospitalization period, or at the time of hospital discharge, with the objective of promoting cessation, extended to post-discharge. Post-discharge follow-up should be maintained for a minimum period of 30 days after the patient leaves the hospital, an intervention considered to be of high intensity by previous meta-analysis⁶.

The studied population was composed of hospitalized smokers, defined here as individuals who smoked in the last 30 days^{2,3,7}.

Studies that evaluated the population exclusively of psychiatric patients, who used tobacco in combination with other drugs, and in patients admitted to rehabilitation clinics were excluded.

The control group received the usual care from the various institutions studied.

Studies that presented smoking cessation outcomes, such as self-reported or biochemically proven tobacco abstinence, were included. The period of abstinence assessed after discharge could vary from short-term, such as seven days after discharge, to long-term, established here as 12 months after discharge. The abstinence to be considered could be punctual, for example, in the last seven days, or continuous, for example, since hospital discharge.

The search strategy adopted was to find articles published in English, Spanish and Portuguese between 1990 and 2018. The choice of the review period was motivated by the development and wide access to new communication resources, such as internet, mobile phones and new communication technologies that started at that time.

The following databases were used for screening: PubMed, Lilacs/Bireme, Scopus, Web of Science, Cochrane and SciELO. To search for gray literature, in an attempt to avoid the non-inclusion of studies due to publication bias, the Open Gray platform was used, in addition to performing a manual search for authors of articles already selected. The following Boolean expressions were used: (TOBACCO USE CESSATION) AND (POST-DISCHARGE) AND (HOSPITALIZATION OR INPATIENT).

For data extraction and review of titles and abstracts, four researchers met in pairs; one of the pairs had the participation of an expert in epidemiology and the other, with a specialist in the treatment of smoking. After the initial search, repeated titles in different databases were excluded. Then, articles that did not meet the proposed acceptability criteria for the review were excluded.

The studies selected in this stage were read in full by the researchers, in order to confirm or discard their eligibility. The decision for inclusion was made by consensus among the four reviewers. The article selection process is described in the flowchart in Figure 1.

The risk of bias was assessed individually in each study according to the Cochrane risk assessment tool (Cochrane Risk of Bias Tool - version 5.1.0), which identifies low, high or uncertain risk of bias, according to the following possibilities: Selection bias,

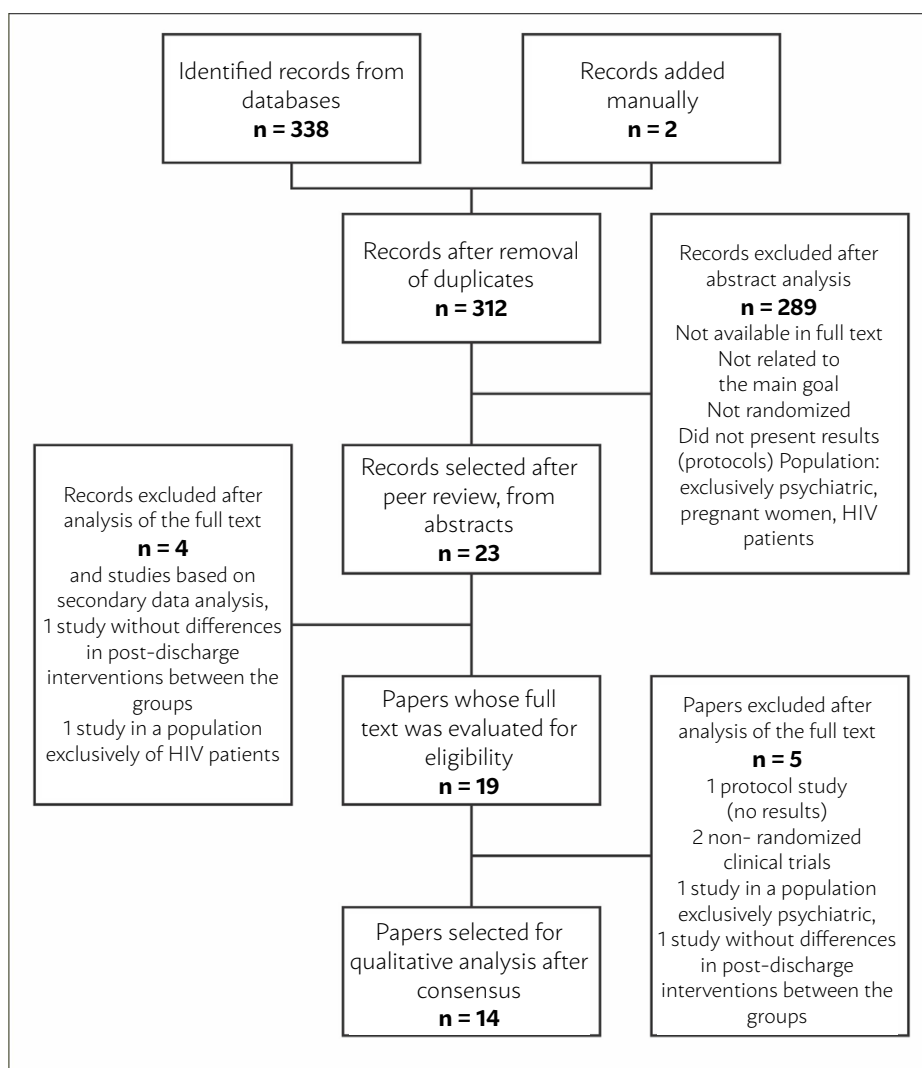


FIGURE 1. STUDY SELECTION FLOWCHART

Performance bias (performance), Detection bias, Friction bias, Reporting bias and other biases that do not belong to the aforementioned domains^{8,9}.

RESULTS

The initial selection on the search platforms resulted in 338 articles, two of which were added manually. Among them, 28 were repeated and 293 were excluded after analyzing the title and abstracts and resolving differences between researchers, as they did not meet the established criteria. Five studies were discarded after their complete reading, as they did not fit the search objectives (exclusively psychiatric population, non-randomized studies, uncontrolled studies, future study protocols).

14 studies carried out in the following countries were selected for the review: United States, Canada, Brasil and Australia. The data were extracted from February 1996 to June 2018. Individual data for each study were obtained from publications, as well as their

protocols and records on clinical trial registration platforms (U.S. National Institutes of Health Clinical Trials Registry). The characteristics of the selected studies are shown in Table 1.

The follow-up time for the studies ranged from 3 to 12 months. It is worth noting the finding that the current decade has the largest number of publications on the subject, with 11 studies between 2011 and 2018.

The interventions performed during the hospitalization period varied in different publications. The bedside approach, whether for smoking history, demographic data collection or counseling, was a strategy common to all studies. In one of the studies¹¹, only the intervention groups received counseling, while the control group received printed informational material.

The pharmacological treatment of smoking, with nicotine replacement during hospitalization, has been used in several studies, with the purpose of reducing abstinence symptoms^{6,7,12,13,14,19-21}.

Also regarding the hospitalization period, several

studies described the referral to community post-discharge care services (quitlines), and in some studies, the way in which the reference to these services was given, whether assisted or not by the researcher, it was the strategy to be studied^{7,17}.

The post-discharge strategies in the intervention group and in the control group are described in Table 1, which also shows the main characteristics of the population of the selected studies, the outcomes related to cessation and the results. The interventions took place at a distance, with contact, in most studies, mediated by communication technologies, with emphasis on telephone calls and interactive voice response (IVR), a technology that allows the interaction between computers and human beings through the using your phone's voice or keypad. One of the studies intervened via text messages. Sometimes e-mail was used to send information after discharge, but it was not the main intervention mechanism. It is also worth mentioning the attempt of several studies to stimulate adherence to quitline programs, intermediating the enrollment of patients in the programs, in order to promote cessation. The follow-up time for the studies ranged from 3 to 12 months.

All the studies analyzed used some type of pharmacotherapy for smoking cessation at some point in the study. Therapy with nicotine replacement (NRT), bupropion and varenicline appear as alternatives for pharmacotherapeutic treatment, with NRT being the most widely used. The data about this are detailed in Table 2. In most studies, there was a balance in the use of pharmacotherapy between the intervention group and the control group. Among the three studies in which the intervention group received pharmacotherapy more frequently than the control group, in one of them pharmacotherapy was part of the proposed intervention^{6,18,20}.

The risk of bias was established, in each study, as low (L), high (H) or undetermined (U), considering the following domains: selection, performance, detection, attrition and reporting bias. Table 3 shows the risk of bias in each study. The performance bias was considered high in all studies, in view of the evident difficulty in promoting blindness when offering or receiving interventions, given the nature of the studies. Regarding the detection bias, most studies did not present data regarding the blindness of the outcome evaluators, being, therefore, considered undetermined in most of them. The attrition bias was considered high when the withdrawal of participants was not

justified by the authors. In the reporting domain, although some studies have not published a protocol, the outcomes were reported as proposed in the methodology, and therefore, the likelihood of such bias is considered low.

The intention-to-treat analysis was used, considering losses such as still smokers.

DISCUSSION

A meta-analysis published in 2012³ categorized interventions to promote the cessation of hospitalized smokers into four groups, according to their intensity. The group considered to be the most intense, and which showed results in the cessation outcomes, was the group with interventions that continued for up to 30 days after discharge. In this review, we analyzed the studies that offered high-intensity approaches to assess the strategies they used.

Behavioral interventions, associated with pharmacological interventions, make up the set of measures to promote the cessation of hospitalized smokers^{2,22,23}. The search for those that would be the most effective strategies and the best way to offer them has been the subject of studies, especially in the last decade. The six studies that demonstrated statistically significant differences in termination outcomes had in common the use of some distance communication strategy, such as phone calls, text messages and interactive voice calls, associated with pharmacotherapy^{10,11,14,18,19, 21}.

The emergence of new communication technologies and the population's growing access to these resources drove the development of strategies and the use of these new tools since the 1990s, supported by the increase in access to telephone sets^{2,24}.

Pharmacological treatment with first-line drugs (NRT, bupropion and varenicline) is an important strategy for cessation²⁵. Nicotine replacement therapy was the drug strategy highlighted in this review, being common to all studies. Pharmacotherapy had an equivalent prevalence, between intervention and control groups, in most studies, with the exception of three of them^{15,19,20}, in which the intervention group received more medication than the control group.

Quitline programs, in which trained counselors provide support for cessation, appear as a consolidated strategy for monitoring smokers after discharge^{2,22,26}. The program is part of the standard care adopted by the control group for most studies. The quality of these programs may be one of the explanations for

TABLE 1. CHARACTERISTICS AND RESULTS OF SELECTED STUDIES

Study/ Year of publication	Country/ Follow-up Period	n and special characteristics	Group(s)/Interven- tion/Post-Discharge Intervention	Control Group/ Post-Discharge Intervention	Cessation outcome/Results (statistically significant difference)
Dornellas et al. 2000	USA Unicentric Feb. 1996 Jan. 1997	100 Patients hos- pitalized with acute myocar- dial infarction	Single group (n = 54) • Bedside counseling during hospitalization (20 minutes) and post-discharge tele- phone counseling, with calls at 1, 4, 8, 12, 16, 20, 26 weeks post-discharge	(n = 46) • Oriented to access institutional video during hospital stay • No interventions after discharge	Self-reported abstinence for 7 days and confirmed by cohabiting, 6 and 12 months after discharge Results There was a difference between the groups • 6 months: - Intervention group = 67% - Control group = 43% (p <0.05) • 12 months: - Intervention group = 55% - Control Group = 34% (p <0.05)
Henrikus et al. 2005	USA Multicenter (4 hospitals) Jan. 1997 Jul. 1999	2,095 Smokers hospitalized for multiple causes	Group 1 (n = 703) • Modified standard care and note highlighted in the patient's record, recommending advice by the assistant team Group 2 (n = 696) • Modified standard care, note highlighted in the medical record and additional telephone counseling sessions - ≥ 1 - 617 (90%) - ≥ 4- 318 (63%) - ≥ 7 -88 (13%)	(n = 696) • Modified standard care, 2 manuals and referral to com- munity cessation programs	• Outcome 1: Self-reported abstinence for 7 days, 7 days post-discharge • Outcome 2: Self-reported abstinence for 7 days, 12 months after discharge • Outcome 3: Abstinence for 7 days, 12 months after discharge confirmed by salivary cotinine Results There was a difference in relation to outcome 2 • Outcome 1: - Group 1 = 24%; - Group 2 = 25.2% - Control group = 26% - (p> 0.05) • Outcome 2: - Group 1 = 15.2% - Group 2 = 19.8% - Control group = 15% - (p <0.05). • Outcome 3: - Group 1 = 10% - Group 2 = 9.9% - Control group = 8.8% - (p> 0.05)
Reid et al. 2007	Canada Pilot Unicentric Nov. 2004 May 2015	100 Smokers hospitalized for coronary disease	Single group (n = 50) Standard care during hospitalization, RIV 3, 14 and 30 days post discharge and additional counseling as needed	(n = 50) • Standard care during hospital- ization, access to NRT and printed material. No other interventions after discharge	Self-reported abstinence in the last 7 days, 52 weeks after discharge Results There was no difference between groups Intervention group = 46% Control group = 34.7% (p = 0.25)
Regan et al. 2011	USA Unicentric Dec. 2007 Jul. 2008	738 Smokers hospitalized for multiple causes	Single group (n = 368) • IVR (4 times) in the 30 days after discharge and possibility of request- ing a callback by the counselor	(n = 379) • An IVR 2 weeks after discharge	Self-report of cessation 2 and 12 weeks after discharge Results There was no difference between the groups studied • Withdrawal 2 weeks after discharge - Intervention group = 39% - Control group = 39% - RR 1.02 - CI = 0.85–1.22 • Abstinence 12 weeks after discharge - Intervention group = 29% - Control group = 26% - RR 1.11 - CI = 0.9–1.41

Study/ Year of publication	Country/ Follow-up Period	n and special characteristics	Group(s)/Interven- tion/Post-Discharge Intervention	Control Group/ Post-Discharge Intervention	Cessation outcome/Results (statistically significant difference)
Rigotti et al. 2014	USA Unicentric Aug. 2010 Apr. 2012	397 Smokers hospitalized for multiple causes that: • Received counseling during hospitalization • Planned to quit smoking • Accepted the pharmacological treatment	Single group (n = 198) • Medication for 30 days, with replacement twice for up to 90 days, 5 IVR (2, 14, 30, 60 and 90 days after discharge) and fax to the primary care physician informing about the treatment	(n = 199) • Recommendation for free call to quitline, individualized recommendation for medication and note in the medical record alerting the attending physician about the prescription of medication	Biochemically proven abstinence for 7 days, 6 months after discharge (cotinine, or monoxymetry for those using NRT), self-reported abstinence for 7 days and abstinence continues 2.3 and 6 months after discharge Results There was a difference between the groups in the main outcome and in some secondary outcomes • Biochemically proven withdrawal: - Intervention group = 26% - Control group = 15% - (p = 0.009) • Self-reported abstinence last 7 days 6 months after discharge: - Intervention group = 40.9% - Control group = 28.1% - (p = 0.008) • Continuous self-reported abstinence 6 months after discharge: - Intervention group = 27.3% - Control group = 16.1% - (p = 0.007) • Other outcomes without statistically significant difference between groups
Cummins et al. 2016	USA Multicenter Jun. 2011 Nov. 2013	1,270 Smoking patients hospitalized in 5 hospitals	Group 1 (n = 320) • Nicotine patches Group 2 (n = 317) • Nicotine patches and telephone advice Group 3 (n = 317) • Telephone advice	(n = 316) • Standard care: quitline	Self-reported abstinence for 7 and 30 days, 2 and 6 months after discharge, and salivary cotinine-confirmed abstinence in those who reported abstinence for 7 days, 6 months after discharge. Result There was no difference between the intervention groups and the control group or between the different intervention groups in any of the analyzed outcomes Main outcome: • Abstinence for 30 days, 6 months after discharge: - Groups without patches = 18.3% - Groups with patches = 22.8% - (p = 0.051) • Counseling groups = 21.1% • Groups without counseling = 20.0% • (p = 0.65)
Fellows et al. 2016	USA Multicenter Nov. 2011 Nov. 2013	898 Smoking patients hospitalized for multiple causes	Single group (n = 597) • Approach during hospitalization • Proactive reference for post discharge assistance • Pharmacotherapy (offered according to a health plan) and 4 IVR 4, 14, 28 and 49 days after discharge	(n = 301) • Approach during hospitalization • Standard care after discharge: - Information on medications and how to access quitline. - A brief follow-up call to assess cessation	Self-reported abstinence in the last 30 days, 6 months after randomization Result: There was no difference in cessation between the two groups in the primary or secondary outcomes related to cessation • Intervention group = 24% • Control group = 22% • (p = 0.159)
Harrington et al. 2016	USA Unicentric Jul. 2011 May 2013	1,488 Smokers hospitalized for multiple causes	Single group (n = 748) • Approach during hospitalization and time of discharge (Standard Care), visit by a team that guided access, registration and use of website with various information on smoking	(n = 740) • Standard care	Self-reported abstinence for 30 days, 6 months after discharge Results: There was no difference between groups • Intervention group = 25.8% • control group = 24.1% • (p = 0.436)

Study/ Year of publication	Country/ Follow-up Period	n and special characteristics	Group(s)/Interven- tion/Post-Discharge Intervention	Control Group/ Post-Discharge Intervention	Cessation outcome/Results (statistically significant difference)
Sherman et al. 2016	USA Jul. 2011 Apr. 2014	1,619 Smokers hospitalized for multiple causes, with a high number of participants on the street or in temporary housing (25%) alcohol users (40%), and with mental illness (50%) and use of other drugs (60%)	Single group (n = 805) • Post-discharge counseling calls (proactive), 2 weeks after discharge, other calls 1, 3, 7, 14, 30 and 42 days after the first call	(n = 814) • Referred to the quitline	Self-reported abstinence for 30 days, 2 and 6 months after discharge Results: There was a difference between the groups • Withdrawal 2 months after discharge: - Intervention group = 29.0% - Control group = 20.7% - (RR 1.40 CI = 1.13, 1.73) • Withdrawal 6 months after discharge: - Intervention group = 37.4% - Control group = 32.5% - (RR 1.19 CI = 1.01, 1.40)
Richter et al. 2016#	USA Multicenter Jul. 2011 Out. 2014	1,054 Smokers hospitalized for multiple causes	Single group (n = 527) • Assessment of withdrawal symptoms, adjustment of the NRT dosage (standard care). Explanations about the project. Quitline registration mediated by the researcher	(n = 527) • Standard Care, assistance with cessation (quit plan + providing medication prescription after discharge) and forwarding via fax to quitline	• Abstinence in the last 7 days, self-reported, 6 months after discharge • Biochemically confirmed abstinence (cotinine, carbon monoxide, proxy) 6 months after discharge Results There was no difference between the groups studied • Self-reported abstinence for 7 days, 6 months after discharge: - Intervention group = 25.4% - Control group = 25.3% - (p = 0.88) • Abstinence confirmed for 7 days 6 months after discharge (carbon monoxide and cotinine): - Intervention group = 23.7% - Control group = 21.6% - Oradj = 1.02 - 95% CI = 0.77, 1.35 - (p = 0.88) - RR = 1.02 - 95% CI = 0.82; 1.24
Rigotti et al. 2016	USA Multicenter Dec. 2012 Jul. 2014	1,359 Smokers hospitalized for multiple causes who: • Received counseling at hospitalization • Planned to quit smoking • Accepted the pharmacological treatment	Single group (n = 681) • Medication for 30 days, with replacement twice for up to 90 days, 5 IVR (2, 12, 28, 58 and 88 days after discharge) and possibility to access a counselor if necessary	(n = 678) • Recommendation for free call to quitline (1-800-QUIT-NOW), individualized recommendation for medication • Note in the medical record alerting the attending physician about the medication prescription	Biochemically proven abstinence for 7 days, 6 months after discharge (cotinine or monoxymetry for those using NRT) Self-report abstinence assessment at 1, 3 and 6 months Results There was a difference between groups in outcome 2 • Biochemically proven abstinence: - Intervention group = 17% - Control group = 16% - (p = 0.58) • Self-reported abstinence for 7 days, 1 month after discharge: - Intervention group = 43% - Control group = 32% - (p <0.0001) • Self-reported abstinence for 7 days, 3 months after discharge: - Intervention group = 37% - Control group = 30% - (p = 0.008) • Self-reported abstinence 6 months after discharge: - Intervention group = 31% - Control group = 27% - (p = 0.09)

Study/ Year of publication	Country/ Follow-up Period	n and special characteristics	Group(s)/Interven- tion/Post-Discharge Intervention	Control Group/ Post-Discharge Intervention	Cessation outcome/Results (statistically significant difference)
Thomas et al. 2016	Australia Multicenter Apr. 2012 Jun. 2014	600 Smokers hospitalized for multiple causes	Single group (n = 300) • Behavioral approach (2 sessions in the hospital and 3rd session 4 weeks after discharge). Motivational interview for those who did not want to quit smoking. Pharmacotherapy during hospitalization and 1 week after discharge. Pharmacotherapy for another 28 days according to availability (PBS). Impressive information material, quitline reference, case summary and action plan for assistant physician and community pharmacist and follow-up by telephone at 1, 6 and 12 months after discharge	(n = 300) • Standard care for each hospital: - Brief intervention during hospitalization - Available pharmacotherapy: NRT, bupropion and varenicline maintained for a period of 28 days after discharge according to PBS and follow up by phone at 1, 6 and 12 months after discharge	Abstinence for 30 days, six months after discharge, confirmed with monoxymetry Abstinence for 6 months, 12 months after discharge, also by monoxymetry Self-reported abstinence for 30 days at 1, 6 and 12 months Results There was no difference between groups • Abstinence for 30 days, six months after discharge, confirmed with monoxymetry: - Intervention group = 11.6% - Control group = 12.6% - (OR) = 0.91 - 95% (CI) = 0.55–1.50 • Abstinence for 30 days, 12 months after discharge, confirmed with monoxymetry - Intervention group = 11.6% - Control group = 11.2% - OR = 1.04 - 95% CI = 0.63–1.73 • Self-reported abstinence for 30 days in 1, 6 and 12 months - 1 month: Intervention group = 28.8% Control group = 23.4% OR 1.56 (1.05–2.33) - 6 months: Intervention group = 28.8% Control group = 23.4% OR 1.47 (0.91–2.39) - 12 months: Intervention group = 13.0% Control group = 12.2% OR 1.21 (0.72–2.03)
Busch et al. 2017	USA Pilot Unicentric Oct. 2013 Apr. 2015	59 Smoking patients hospitalized for acute coronary syndrome	Single group (n = 28) • Five counseling sessions in weeks 1, 3, 6, 9 and 12 post discharge. Up to 4 additional contacts according to need	(n = 31) • Received informative material at weeks 1, 3, 6, 9 and 12 after discharge	Abstinence in the last 7 days, confirmed by monoxymetry, assessed at the 12th and 24th weeks after discharge. Result There was no difference between the intervention groups and the control group • 12th week: • Intervention group = 48.0% • Control group = 44.8% • 24th week: • Intervention group = 45.8% • Control group = 42.3%
Cruvinel 2016	Brasil Pilot Unicentric Jun. 2015 Mar. 2016	66 patients Hospitalized smokers	Single group (n = 44) • Brief approach, informative material printed during hospitalization, in addition to NRT for 4 weeks (standard care) • And 1 phone call and text messages after discharge	(n = 22) • Standard care and 1 follow-up call 30 days after discharge	Self-reported abstinence in the last 7 days, 30 days after discharge and 90 days after discharge Abstinence confirmed by monoxymetry 90 days after discharge Result There was no difference between the groups in the 1st and 3rd outcomes and there was a difference in the 2nd outcome • 30 days after discharge: - Intervention group = 25.0% abstinence - Control group = 9.1% - (p = 0.13) • 90 days after discharge: - Intervention group = 31.8% - Control group = 9.1% - (p = 0.04) • Abstinence confirmed by monoxymetry: - Intervention group = 20.5% - Control group = 4.5% - (p = 0.09)

NRT: Nicotine Replacement Therapy; IVR: Interactive Voice Response. PBS: Pharmaceutical Benefits Scheme. #The intervention still occurs at the time of admission, but with the aim of interfering after discharge.

TABLE 2. USE OF PHARMACOTHERAPY IN THE STUDIES

Study	Type	Initial Dose	Time	Difference between control and intervention groups
Dornelas et al. ¹⁰	NRT	Not informed	Not informed	No. Approximately 24% of participants in both groups. No statistic data
Hennrikus et al. ¹¹	NRT Bupropion	Not informed	Not informed	No. No additional data (e-mail sent to the author)
Reid et al. ¹²	NRT Bupropion	Not informed	Not informed	No. NRT: Intervention Group: 14% Control Group: 14.3% ($p = 0.85$) Bupropion: Intervention Group: 8% Control Group: 4.1% ($p = 0.60$)
Regan et al. ¹³	NRT Bupropion Varenicline Other non-specified mediation	Not informed	Not informed	No Intervention group: 69% Control group: 52% ($p < 0.05$)
Rigotti et al. ¹⁴	NRT, Bupropion varenicline (Isolated or combined)	Not informed	Intervention group: up to 90 days Control group: non-specified	Yes. Intervention group: it was provided. Intervention group: 79 % Control group: 59% RR, 1.34 [95% CI, 1.17-1.54]; ($p < 0.001$)
Cummins et al. ¹⁵	NRT	14 to 21 mg accord- ing to number of cigarettes smoked	08 weeks	Yes. Medication was part of the strategy in two of the intervention groups.
Fellows et al. ¹⁶	NRT Bupropion Varenicline	Not informed	Not informed	No. Intervention group: 47.0% - Control group: 38.0% ($p = 0.013$)
Harrington et al. ¹⁷	NRT Bupropion	Not informed	Not informed	No. Intervention group: 25.9% Control group: 26.0% ($p = 1.00$)
Sherman et al. ¹⁸	NRT	Not informed	Not informed	No. Intervention group: 44% Control group: 44%
Richter et al. ⁷	NRT - During hos- pitalization and pre- scribed after discharge		Not informed	No Intervention group: 23% Control group: 26% ($p = 0.23$)
Rigotti et al. ¹⁹	NRT Bupropion Varenic- line, (Isolated or combined)	Not informed	Up to 90 days. -Control group: Non-specified	No. Intervention group: 83.7% - Control group: 60.6% RR 1.38 [95% CI, 1.29-1.48]; ($p < 0.001$)
Thomas et al. ²⁰	NRT Bupropion Varenicline After discharge, these same medications were offered for 28 days in a co-participa- tion regime.	Not informed	During hospital- ization and for at least 28 days after discharge	Yes Intervention group: 43.1% Control group: 28.8% ($p < 0.001$)
Busch et al. ⁶	NRT - Patches	14 to 21 mg accord- ing to the number of cigarettes smoked	08 weeks	Intervention group: 67.9% Control Group: 58.1% (p value not informed)
Cruvinel ²¹	NRT	14 to 21 mg accord- ing to the number of cigarettes smoked	04 weeks	No Intervention group: 27.3% Control Group: 36.4% ($p = 0.44$)

NRT: Nicotine Replacement Therapy.

the absence of a statistically significant difference in the responses between the intervention and control groups in these studies. Control groups received interventions already established in the literature as effective, therefore, the standard of effectiveness of experimental treatments was not strong enough for differences to be highlighted. Based on the importance achieved by quitline, studies also seek to find ways to improve adherence to these programs. One of the mechanisms presented was the intermediation, by a

researcher, in the participant's access and registration to the quitline, in order to, with this, favor the cessation in post-discharge^{7,17}.

The studies that showed the efficacy of alternative strategies did not support such a difference when biochemical confirmation criteria were used, demonstrating the fragility of the information provided by self-report^{11,19,21}. The exception was a study¹⁴ that used interactive voice messages and guaranteed medication for a period of up to 90 days after hospital discharge.

TABLE 3. RISKS OF BIAS OF EACH STUDY.

Study/Areas of Bias	Selection		Performance	Detection	Friction	Report	Other/main limitations mentioned by authors
	Random sequence	Blinded Allocation					
Dornelas et al 2000	B	I	A*	I	B	B	The outcome of cessation was assessed by self-report.
Henrikus et al 2005	B	I	A*	I	B	B	The absence of medication supply is reported by the authors as a possible factor of interference in the prevalence of cessation.
Reid et al 2007	B	I	A*	I	B	B	Pilot study, data analysis should be carried out with caution.
Regan et al 2011	B	B	A*	B	B	B	No biochemical evaluation of cessation at 1 and 3 months. The impossibility of separating the contributions of voice calls and medication in the treatment effect. Only patients willing to quit smoking after discharge were evaluated.
Rigotti et al 2014	B	B	A*	I	B	B	Single center and it was not possible to separate the effect of medication from the effect of the RIV.
Cummins et al 2016	B	I	A*	B	B	B	Over 90% of the patients who were hospitalized and smokers were not included in the study due to limited resources (harming the generalization of results). Only smokers interested in quitting were evaluated. The biochemical confirmation of cessation by cotinine occurred in only 57% of the participants.
Fellows et al 2016	B	B	A*	B	B	B	Low level of recruitment in two of the hospitals Follow up with various strategies.
Harrington et al 2016	B	B	A*	B	A	B	Low adherence to the strategy provided to the intervention group.
Sherman et al 2016	B	B	A*	I	B	B	Self-reporting with a high tendency of the sample providing unreliable reports when biochemical validation (cotinine) was performed.
							Counseling in the intervention group was carried out by a trained researcher and not by a member of the healthcare team.
Richter et al 2016	B	B	A*	B	B	B	Counseling in the intervention group was initially provided the hospital environment, which is turbulent
Rigotti et al 2016	B	B	A*	A	B	B	Cessation validity Biochemically only for the six-month outcome It was not possible to separate the effect of the medication from the effect of interactive voice calls. Applicable only to hospitalized patients who wished to stop smoking and accepted medication use. Losses of 25% of follow up in both groups; 31% did not provide saliva for the biochemical confirmation of cessation. In those who did provide it, cessation was not confirmed in 27% of the sample
Thomas et al 2016	B	B	A*	B	A	B	Possible contamination of interventions in the control group performed by pharmacists trained. Standard care varied in the different hospitals studied
Busch et al 2017	B	B	A*	B	B	B	A Pilot study, results analysis should be carried out with caution.
Cruvinel 2018	B	B	A*	B	B	B	Pilot study, results analysis should be carried out with caution..

B: low risk of bias; A: high risk of bias, I: uncertain risk of bias. * Based on the nature of the studies, the bias (performance) is high, but cannot be changed due to the impossibility of blinding who receives or provides the intervention.

The follow-up of hospitalized patients still poses great challenges. Understanding the cause of early relapses has been the subject of analysis, demonstrating that relapse is related to factors such as continue

to smoke during hospitalization, low self-efficacy, depression, greater dependence on nicotine and not setting a date to quit smoking²⁷. The high number of losses in the post-discharge follow-up is another

obstacle in conducting treatment, even with the help of modern communication technologies. The difficulty of follow-up and, therefore, of offering the intervention is pointed out in one of the studies as a justification for why established strategies, such as pharmacotherapy and telephone counseling, have failed to demonstrate the expected result in clinical trials¹⁵.

Some authors consider that the negative result of the intervention does not necessarily invalidate it, and it may be necessary to have a better understanding of in which contexts they would be the most effective options⁷.

This study has limitations related to the barriers of working with control groups that are not exempt from intervention, due, in fact, to the ethical implications imposed on this issue.

CONCLUSION

The idea that cessation should be promoted at every opportunity to approach smokers reinforces the need to build and apply intervention protocols for hospitalized smokers. The time of hospitalization is an especially opportune occasion for the treatment of smoking.

RESUMO

OBJETIVO: O objetivo deste estudo foi avaliar as estratégias no acompanhamento pós-alta para a promoção da cessação no paciente tabagista hospitalizado.

MÉTODOS: Foi realizada uma revisão sistemática tomando-se por referência o protocolo Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prisma-P). Foram utilizadas as seguintes bases de dados: PubMed, Lilacs/Bireme, Scopus, Web of Science, Cochrane e SciELO. Os artigos incluídos foram ensaios clínicos randomizados, publicados entre 1990 e 2018, que promoveram intervenções durante e após a alta hospitalar, intervenções essas que se mantiveram pelo período mínimo de 30 dias após a alta. Os estudos deveriam ter como desfecho a avaliação da cessação do tabagismo.

RESULTADOS: Quatorze estudos foram selecionados para a análise. A revisão dos artigos destacou a farmacoterapia como elemento importante para a promoção da cessação, bem como o uso das novas tecnologias de comunicação no acesso pós-alta.

CONCLUSÃO: Ainda se impõe como um desafio o aprimoramento das estratégias de follow-up após a alta hospitalar para se adequarem aos contextos locais e alcançarem melhores taxas de cessação.

PALAVRAS-CHAVE: Abandono do uso de tabaco. Abandono do hábito de fumar. Alta do paciente. Hospitalização. Revisão sistemática.

REFERENCES

1. Brasil. Ministério da Saúde. TabNet Win32 3.0: Procedimentos hospitalares do SUS - por local de internação - Brasil [Internet]. 2018 [cited 2019 Nov 11]. Available from: <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sih/cnv/qjuf.def>
2. Stead LF, Perera R, Bullen C, Mant D, Hartmann-Boyce J, Cahill K, et al. Nicotine replacement therapy for smoking cessation. *Cochrane Database Syst Rev*. 2012;11:CD000146.
3. Rigotti NA, Clair C, Munafò MR, Stead LF. Interventions for smoking cessation in hospitalised patients. *Cochrane Database Syst Rev*. 2012;(5):CD001837.
4. Richter KP, Faseru B, Mussulman LM, Ellerbeck EF, Shireman TI, Hunt JJ, et al. Using "warm handoffs" to link hospitalized smokers with tobacco treatment after discharge: study protocol of a randomized controlled trial. *Trials*. 2012;13:127.
5. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev*. 2015;4:1.
6. Busch AM, Tooley EM, Dunsiger S, Chattillion EA, Srouf JF, Pagoto SL, et al. Behavioral activation for smoking cessation and mood management following a cardiac event: results of a pilot randomized controlled trial. *BMC Public Health*. 2017;17(1):323.

7. Richter KP, Faseru B, Shireman TI, Mussulman LM, Nazir N, Bush T, et al. Warm handoff versus fax referral for linking hospitalized smokers to quitlines. *Am J Prev Med.* 2016;51(4):587-96.
8. Higgins J, Thomas J, Chandler J, Cumpston M, Li T, Page M, et al., eds. *Cochrane handbook for systematic reviews of interventions.* Chichester: John Wiley & Sons; 2011.
9. Carvalho APV, Silva V, Grande AJ. Avaliação do risco de viés de ensaios clínicos randomizados pela ferramenta da colaboração Cochrane. *Diagn Tratamento.* 2013;18(1):38-44.
10. Dornelas EA, Sampson RA, Gray JF, Waters D, Thompson PD. A randomized controlled trial of smoking cessation counseling after myocardial infarction. *Prev Med.* 2000;30(4):261-8.
11. Hennrikus DJ, Lando HA, McCarty MC, Klevan D, Holtan N, Huesch JA, et al. The TEAM project: the effectiveness of smoking cessation intervention with hospital patients. *Prev Med.* 2005;40(3):249-58.
12. Reid RD, Pipe AL, Quinlan B, Oda J. Interactive voice response telephony to promote smoking cessation in patients with heart disease: a pilot study. *Patient Educ Couns.* 2007;66(3):319-26.
13. Regan S, Reyen M, Lockhart AC, Richards AE, Rigotti NA. An interactive voice response system to continue a hospital-based smoking cessation intervention after discharge. *Nicotine Tob Res.* 2011;13(4):255-60.
14. Rigotti NA, Regan S, Levy DE, Japuntich S, Chang Y, Park ER, et al. Sustained care intervention and postdischarge smoking cessation among hospitalized adults: a randomized clinical trial. *JAMA.* 2014;312(7):719-28.
15. Cummins SE, Gamst AC, Brandstein K, Seymann GB, Klonoff-Cohen H, Kirby CA, et al. Helping hospitalized smokers: a factorial RCT of nicotine patches and counseling. *Am J Prev Med.* 2016;51(4):578-86.
16. Fellows JL, Mularski RA, Leo MC, Bentz CJ, Waiwaiola LA, Francisco MC, et al. Referring hospitalized smokers to outpatient quit services: a randomized trial. *Am J Prev Med.* 2016;51(4):609-19.
17. Harrington KF, Kim Y-I, Chen M, Sadasivam RS, Houston TK, Bailey WC, et al. Web-based intervention for transitioning smokers from inpatient to outpatient care: an RCT. *Am J Prev Med.* 2016;51(4):620-9.
18. Sherman SE, Link AR, Rogers ES, Krebs P, Ladapo JA, Shelley DR, et al. Smoking-cessation interventions for urban hospital patients: a randomized comparative effectiveness trial. *Am J Prev Med.* 2016;51(4):566-77.
19. Rigotti NA, Tindle HA, Regan S, Levy DE, Chang Y, Carpenter KM, et al. A post-discharge smoking-cessation intervention for hospital patients. *Am J Prev Med.* 2016;51(4):597-608.
20. Thomas D, Abramson MJ, Bonevski B, Taylor S, Poole SG, Paul E, et al. Integrating smoking cessation into routine care in hospitals: a randomized controlled trial. *Addiction.* 2016;111(4):714-23.
21. Cruvinel E. Mensagens de texto e aconselhamento por telefone como suporte à cessação tabágica entre fumantes em alta hospitalar: um estudo clínico de viabilidade [Tese de doutorado]. Juiz de Fora: Universidade Federal de Juiz de Fora; 2016.
22. Stead LF, Perera R, Lancaster T. A systematic review of interventions for smokers who contact quitlines. *Tob Control.* 2007;16(Suppl 1):i3-8.
23. Lancaster T, Stead LF. Individual behavioural counselling for smoking cessation. *Cochrane Database Syst Rev.* 2017;3:CD001292.
24. Abu-Hasaballah K, James A, Aseltine RH Jr. Lessons and pitfalls of interactive voice response in medical research. *Contemp Clin Trials.* 2007;28(5):593-602.
25. Clinical Practice Guideline Treating Tobacco Use and Dependence 2008 Update Panel, Liaisons, and Staff. A clinical practice guideline for treating tobacco use and dependence: 2008 update. A U.S. Public Health Service report. *Am J Prev Med.* 2008;35(2):158-76.
26. Zhu SH, Anderson CM, Tedeschi GJ, Rosbrook B, Johnson CE, Byrd M, et al. Evidence of real-world effectiveness of a telephone quitline for smokers. *N Engl J Med.* 2002;347(14):1087-93.
27. Mussulman LM, Scheuermann TS, Faseru B, Nazir N, Richter KP. Rapid relapse to smoking following hospital discharge. *Prev Med Rep.* 2019;15:100891.

