Evaluation of smoking cessation treatment initiated during hospitalization in patients with heart disease or respiratory disease

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ABSTRACT

Objective: To evaluate the effectiveness of a smoking cessation program, delivered by trained health care professionals, in patients hospitalized for acute respiratory disease (RD) or heart disease (HD). Methods: Of a total of 393 patients evaluated, we included 227 (146 and 81 active smokers hospitalized for HD and RD, respectively). All participants received smoking cessation treatment during hospitalization and were followed in a cognitive-behavioral smoking cessation program for six months after hospital discharge. Results: There were significant differences between the HD group and the RD group regarding participation in the cognitive-behavioral program after hospital discharge (13.0% vs. 35.8%; p = 0.003); smoking cessation at the end of follow-up (29% vs. 31%; p < 0.001); and the use of nicotinic replacement therapy (3.4% vs. 33.3%; p < 0.001). No differences were found between the HD group and the RD group regarding the use of bupropion (11.0% vs. 12.3%; p = 0.92). Varenicline was used by only 0.7% of the patients in the HD group. Conclusions: In our sample, smoking cessation rates at six months after hospital discharge were higher among the patients with RD than among those with HD, as were treatment adherence rates. The implementation of smoking cessation programs for hospitalized patients with different diseases, delivered by the health care teams that treat these patients, is necessary for greater effectiveness in smoking cessation.

Keywords: Smoking; Smoking cessation; Hospitalization; Respiratory tract diseases; Heart diseases.

INTRODUCTION

Although the prevalence of smoking in Brazil has been declining in recent decades, with a rate of 12.1% in 2013 in Brazilian state capitals and the Federal District of Brasília, there remains a high prevalence of smokers who are hospitalized. These rates range from 15% to 22% in public hospitals and are usually associated with tobacco-related diseases, which provides a window of opportunity for smoking cessation interventions.

Specific strategies can increase adherence, reduce health care costs, and, most importantly, improve patient quality of life. Studies have shown that smoking cessation treatment is effective when initiated at hospital admission and continuing for one month after hospital discharge, which also results in a reduction in readmission costs for tobacco-related diseases when the hospital has a smoking cessation program for inpatients.

Despite scientific evidence of the benefits of smoking cessation treatment initiated during hospitalization, there are few health care facilities in Brazil that provide the necessary treatment resources. For functioning of this in-hospital service, there is a need for integration of a qualified team into routine care in hospitals, to approach patients who smoke, together with provision of pharmacological and behavioral treatment. In addition, it is recommended that patients receive post-discharge follow-up for maintenance of cessation. However, few studies in Brazil have described this in-hospital intervention or have reported results regarding smoking cessation for different tobacco-related chronic diseases in hospitalized patients. Therefore, the objective of the present study was to evaluate the effectiveness of a smoking cessation program, delivered by trained health care professionals, in patients hospitalized for respiratory disease (RD) or heart disease (HD).

METHODS

We evaluated a total of 393 patients—246 and 147 patients hospitalized for HD and RD, respectively—at the Botucatu School of Medicine Hospital das Clínicas, located in the city of Botucatu, Brazil, between March 2012 and June 2014. We included patients ≥ 18 years of age. The
group of patients with HD was classified according to the primary diagnosis during hospitalization: acute myocardial infarction, in 166 patients; unstable angina, in 65; and heart failure, in 15. The RD group was also classified according to the primary diagnosis: COPD, in 58 patients; other causes (dyspnea), in 52; pulmonary thromboembolism, in 28; interstitial lung disease, in 5; and pneumonia, in 4. All patients who reported current smoking (at least one cigarette/day in the previous week) at admission were classified as active smokers. Patients who had ceased using tobacco products for more than 30 days before hospitalization were considered former smokers. The exclusion criteria were the impossibility of evaluating patients because of their unstable clinical condition, such as the requirement for mechanical ventilation, hemodynamic instability, or coma, and a lack of understanding on the part of patients regarding the objectives of the protocol.

The study was approved by the Research Ethics Committee of the Botucatu School of Medicine (Protocol no. 3403-2009), and all participating patients gave written informed consent.

All participants were evaluated by clinical history taking and underwent a thorough physical examination. They also completed a specific questionnaire addressing demographic characteristics, smoking history (including current smoking status), smoking habits in social activities, age at smoking initiation, and number of cigarettes smoked per day. In addition, all participants were administered the Hospital Anxiety and Depression scale, (9) the Fagerström Test for Nicotine Dependence, (10) and the stages-of-change model for smoking cessation devised by Prochaska & DiClemente. (11)

Patient status as a smoker or former smoker during treatment was confirmed by measuring exhaled carbon monoxide (CO) levels (Micro CO; Micro Medical Ltd, Rochester, England), and exhaled CO levels ≥ 7 ppm were considered significantly indicative of recent smoking. (12,13)

**Smoking cessation protocol**

All smoking cessation treatment (during hospitalization and after discharge) was conducted by one trained health care professional. All patients underwent two 15-min sessions of individual counseling during hospitalization. Smoking cessation medications were used at the physician’s discretion, in accordance with smoking cessation guidelines; (7) that is, all patients with a dependence score ≥ 5 or who experienced withdrawal symptoms during hospitalization were prescribed smoking cessation medications (nicotine replacement therapy, bupropion, or varenicline). (7) Pharmacological treatment was not prescribed for patients who did not experience withdrawal symptoms and/or did not want to use medications. Educational material containing information about nicotine dependence and behavioral counseling was distributed to all participants. All of the material was developed by the smoking cessation group at the Botucatu School of Medicine Hospital das Clínicas.

At hospital discharge, all patients were referred for continuing treatment in a cognitive-behavioral smoking cessation treatment program, attending 2-h weekly sessions in the first month. In the second month, patients returned every 15 days for a session; and, from the third month onward, they returned once a month until they completed six months of follow-up. In addition, patients were contacted via telephone before the scheduled reevaluations, in order to improve adherence to treatment. For the purposes of data analysis, participants who did not complete follow-up were considered to have experienced treatment failure and to be active smokers. Readmissions and outpatient visits were analyzed.

**Statistical analysis**

The study sample size was calculated based on a population estimate. The proportion of smokers among patients hospitalized with HD or RD and treated at the Botucatu Hospital das Clínicas was unknown. In addition, we considered a confidence interval of 90% and a maximum estimation error of 5%. On this basis, the sample size was set at 271 patients.

Descriptive statistics are presented as mean and standard deviation or as median and interquartile range for variables with normal and non-normal distribution, respectively. The difference between the groups was assessed using the chi-square test for categorical variables and using the t-test or the Mann-Whitney test for continuous variables according to their parametric or non-parametric distribution, respectively. All analyses were performed with SPSS Statistics, version 22.0 for Windows (IBM Corporation, Armonk, NY, USA), and values of p < 0.05 were considered significant.

**RESULTS**

We evaluated 393 hospitalized patients, of whom 227 were active smokers and were included in the study: 146 in the HD group and 81 in the RD group (Figure 1). Compared with the RD group, the HD group had a significantly higher number of males (72.6% vs. 32.1%; p < 0.001); a higher monthly income (in Brazilian reals [R$]: R$1,150 [R$677-2,000] vs. R$677 [R$360-1,040]; p = 0.02); a higher mean body weight (77.4 ± 17.1 kg vs. 68.7 ± 20.0 kg; p < 0.002); and greater height (1.65 ± 0.10 m vs. 1.60 ± 0.10 m; p < 0.001). Conversely, tobacco consumption (in pack-years) was greater in the RD group patients than in the HD group patients (55.6 ± 36.0 pack-years vs. 53.4 ± 25.1 pack-years; p = 0.62), although that difference was not significant (Table 1).

The causes of hospitalization among smokers in the RD group were, in decreasing order: other causes (dyspnea), in 34 patients; COPD, in 31; pulmonary thromboembolism, in 13; interstitial lung disease, in 2; and pneumonia, in 1. In the HD group, the causes of hospitalization among smokers were, also in decreasing order: acute myocardial infarction, in 112 patients; unstable angina, in 25; and heart failure, in 9.

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The Fagerström Test for Nicotine Dependence scores were “high” among active smokers in the HD group and the RD group (54.1% vs. 46.9%; p = 0.29). The proportion of patients who were in the “action” stage of change in the HD group and the RD group was also similar (55.5% vs. 44.4%; p = 0.17). We also did not find statistically significant differences between the HD group and the RD group regarding the Hospital Anxiety and Depression Scale scores: “probable anxiety” (22.0% vs. 18.5%; p = 0.83) and “probable depression” (9.7% vs. 14.9%; p = 0.20).

Of the total number of active smokers at hospital discharge, only 19 patients (13.0%) in the HD group and 29 (35.8%) in the RD group participated in the cognitive-behavioral smoking cessation intervention (p = 0.003). Nicotine patch use occurred in 3.4% and 33.3% of the patients in the HD group and the RD group, respectively (p < 0.001), whereas bupropion use occurred in 11.0% and 12.3%, respectively (p = 0.92). Varenicline was used in 0.7% of the patients in the HD group.

At six months after hospital discharge, 42 patients in the RD group and 49 patients in the HD group were reevaluated. The proportion of abstainers was higher in the RD group than in the HD group (Figure 2).

There were 35 deaths within six months after hospital discharge: 18 in the RD group (13 patients still smoked) and 17 in the HD group (14 patients still smoked; p = 0.003). The primary cause of death was undetermined in 23.6% and 28.0% of the patients in the HR group and the RD group, respectively; followed by septicemia, in 23.6% and 11.1%; pneumonia, in 11.7% and 16.7%; and acute respiratory failure; in 11.7% and 16.7%. We observed that 19 (12.3%) and 27 (10.9%) of the patients in the RD group and the HD group, respectively, had further hospitalizations over the follow-up period, and most of them were active smokers (89% and 92% in the RD group and the HD group, respectively).

During the follow-up period, 75% of the total of 81 active smokers with RD and 78% of the total of 146 active smokers with HD had at least one outpatient visit with a medical specialist (pulmonologist or cardiologist, respectively).

**DISCUSSION**

The objective of the present study was to evaluate the rate of smoking cessation in patients hospitalized...
for HD or RD. At six months after discharge, the rates of smoking abstinence were 29% and 31% in the HD group and the RD group, respectively. In addition, we found that the highest proportion of patients adhering to the post-discharge smoking cessation protocol (35.8%) was seen in the RD group, as was the highest proportion of patients using the medications provided through the protocol (23.3%).

Our study showed a similar rate of smoking cessation in the RD group at six months after hospital discharge similar to that reported in the literature. An early study,\(^{15}\) in which 74 hospitalized patients with RD were randomized into a control or intervention group, showed that the rate of smoking cessation in the intervention group was 33.3% at six months after hospital discharge. The intervention group subjects were provided with 15- to 20-min smoking cessation counseling sessions every two days, whereas the control group subjects were simply advised to quit smoking.\(^{15}\) Unlike our findings, those of a recent study conducted at three public hospitals in Australia showed that the sustained smoking cessation rate for a cohort of 600 patients hospitalized for different tobacco-related diseases was 11.6% at six months of follow-up.\(^{16}\) In contrast, when the rate of smoking cessation in the group of patients with RD is compared with data from outpatient treatment of patients with RD, we observe that the rate found in

### Table 1. Characteristics of smoking participants by study group.\(^*\)

| Variable                        | Respiratory disease (n = 81) | Heart disease (n = 146) | p *  |
|---------------------------------|-----------------------------|------------------------|------|
| Male gender                     | 26 (32.1)                   | 106 (72.6)             | < 0.001 |
| Age, years                      | 59.7 ± 13.0                 | 57.3 ± 17.1            | 0.13 |
| Income, R$^\text{b}             | 677 (360-1.040)             | 1150 (677-2.000)       | 0.02 |
| Weight, kg                      | 68.7 ± 20.0                 | 78.4 ± 17.1            | 0.002 |
| Height, m                       | 1.60 ± 0.10                 | 1.65 ± 0.10            | < 0.001 |
| BMI, kg/m²                      | 26.9 ± 7.6                  | 28.1 ± 5.9             | 0.27 |
| Level of education              |                             |                        |      |
| < 9 years of schooling          | 45 (55.6)                   | 84 (57.5)              | 0.29 |
| Age at smoking initiation, years| 14.1 ± 7.6                  | 14.1 ± 5.9             | 0.79 |
| Smoking history, pack-years     | 55.6 ± 36.0                 | 53.4 ± 25.1            | 0.62 |
| Exhaled carbon monoxide, ppm    | 3.6 ± 4.6                   | 2.1 ± 1.8              | < 0.001 |
| Level of dependence             |                             |                        |      |
| High                            | 38 (46.9)                   | 79 (54.1)              | 0.29 |
| Low                             | 43 (53.1)                   | 67 (45.9)              |      |
| Motivational stage              |                             |                        |      |
| Precontemplation                | 14 (17.3)                   | 13 (8.9)               |      |
| Contemplation                   | 31 (38.3)                   | 52 (35.6)              | 0.17 |
| Action                          | 36 (44.4)                   | 81 (55.5)              |      |
| Anxiety scale                   |                             |                        |      |
| Improbable                      | 45 (55.5)                   | 78 (53.4)              |      |
| Possible                        | 21 (26.0)                   | 36 (24.6)              | 0.83 |
| Probable                        | 15 (18.5)                   | 32 (22.0)              |      |
| Depression scale                |                             |                        |      |
| Improbable                      | 52 (64.1)                   | 110 (75.3)             |      |
| Possible                        | 17 (21.0)                   | 22 (15.0)              | 0.20 |
| Probable                        | 12 (14.9)                   | 14 (9.7)               |      |

BMI: body mass index. *Values expressed as n (%) or as mean ± SD, except where otherwise indicated. ^Values expressed as median (interquartile range). *Chi-square test, t-test, or Mann-Whitney test

![Figure 2. Number of patients in each group by smoking status at six months after hospital discharge. RD: respiratory disease; and HD: heart disease. p < 0.001.](image-url)
our study was lower than those reported in two previous studies (40.5% and 52%, respectively). We acknowledge that the costs of hospital readmissions for smokers were lower when these smokers received a combined approach of usual smoking cessation treatment and telephone or face-to-face counseling.

The rate of medication use to control nicotine withdrawal symptoms was low in the total sample (14.5%); however, nicotine replacement therapy use was more common in the RD group compared with the HD group. Our finding is similar to those reported by Barreto et al. and Regan et al., who found rates of use of these medications of 28.1% and 37.6%, respectively. In contrast, there have been studies showing a greater frequency of use of pharmacological treatment in hospitalized patients. Simon et al. showed that 48% of smokers hospitalized with HD used smoking cessation medications. Similarly, Rigotti et al. reported the use of medications in 67% of all patients hospitalized with tobacco-related diseases. The limited use of medications in the present study may have influenced the low smoking cessation rate at six months after hospital discharge.

Maintaining patient motivation depends on professionals working constantly and multidisciplinarily. However, the lack of knowledge and training of health care professionals is an important factor in treatment failure. In contrast, a study conducted in Greece showed that 76.7% of health care professionals believed they provided effective smoking cessation counseling/aids for their patients. In our study, the lack of qualified health care professionals made it impossible to assess the effectiveness of the intervention in patients with other tobacco-related diseases; in fact, it is necessary that all patients who smoke receive treatment. A study of surgeons showed that most of them (60.9%) reported advising their patients to quit smoking. At the surgeon’s advice, 95.3% of the patients agreed to quit smoking before surgery, 53.6% would quit after surgery, and 70.6% had already quit smoking. Thordike et al. evaluated physician practices regarding the counseling of patients to quit smoking, between 1991 and 1995, and found that, at 65% of visits, physicians asked patients about their smoking status; at 29%, they counseled patients to quit smoking; and, at only 1.3%, they prescribed a specific smoking cessation treatment.

The demographic data in the present study revealed a low level of education and a low per capita income in both groups; however, the RD group had a lower median monthly per capita income compared with the HD group. These data are similar to those found previously at our facility, where 61% of the outpatient smokers had not completed high school and 66% had a monthly income of less than two times the national minimum wage. Studies have associated increased smoking prevalence with lower economic and educational levels, and poor motivation and a lack of resources are also believed to be associated with smoking cessation failure. Therefore, continuous formulation of smoking prevention and control strategies remains a major challenge for developing countries.
The present study observed a low rate of smoking cessation during the follow-up period in both groups. The proportion of patients who were lost to follow-up was high, and the rate of medication use to aid in smoking cessation was low in both groups. Nevertheless, most of the patients were monitored by a specialist during outpatient follow-up. It is certainly essential to maintain smoking cessation programs for hospitalized smokers to prevent complications of tobacco-related chronic diseases and to improve overall aspects of health.

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