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# Effectiveness of a Telephone-Based Motivational Intervention for Smoking Cessation in Patients With Crohn Disease

*A Randomized, Open-Label, Controlled Clinical Trial*

## ABSTRACT

A randomized, open-label, controlled clinical trial was designed to assess the effectiveness of a motivational intervention based on the 5 R's model (relevance, risks, rewards, roadblocks, and repetition) delivered by specialized inflammatory bowel disease nurses every 3 months over a 1-year period as compared with patients who were followed regularly. Patients diagnosed with Crohn disease, aged 18 years or older, who reported being active smokers with Internet access at home and an e-mail address were eligible. A total of 144 patients (72 per group) were included (50% women, median age 40 years). They smoked a median of 10 cigarettes per day (range = 1–40) and had been smoking for a median of 22 years (range = 1–51). Motivation to quit (Richmond test) was low in 73 patients, moderate in 39 patients, and high in 32 patients. Statistically significant differences between the study groups in the predisposition to change, motivation to quit, and tobacco withdrawal were not found. However, 14 patients (20.9%) in the intervention group and 9 patients (13.2%) among controls stopped smoking at the end of the study. These findings support a higher trend toward smoking cessation associated with the motivational intervention 5 R's. This behavioral strategy can aid patients with Crohn disease to quit smoking.

Crohn disease (CD) and ulcerative colitis are global diseases affecting more than 10 million people worldwide, with increasing incidence rates in newly industrialized countries with Westernized lifestyles and striking dietary changes (Ananthakrishnan, Kaplan, & Ng,

2020). The number of prevalent cases is on the rise and poses a substantial economic and social burden on governments and health systems (GBD 2017 Inflammatory Bowel Disease Collaborators, 2020). Moreover, new challenges in the management of inflammatory bowel disease (IBD) are related to the

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**Conflicts of Interest:** None to be disclosed.

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increase in early onset of symptoms and longer duration of disease (Windsor & Kaplan, 2019).

Current studies show that IBD is a complex autoimmune-inflammatory disease determined by genetic and environmental factors. Intense research with large-scale genome-wide association studies, and the identification of more than 200 loci associated with IBD, has not yet resulted in direct benefit on patient outcomes (Jairath & Feagan, 2020). Susceptibility genes only account for a fraction of disease risk, resulting in renewed interest about the effects of environmental factors on the onset and progression of IBD.

## Background

In patients with CD, tobacco smoking is by far the strongest environmental disease modifier, and smoking cessation should be persistently encouraged (Dam, Berg, & Farraye, 2013). In a meta-analysis of nine studies that examined the relationship between CD and smoking, evidence of an association between current smoking and CD was found (odds ratio = 1.76; 95% confidence interval [1.40, 2.22]) (Mahid, Minor, Soto, Hornung, & Galandiuk, 2006). In a systematic review and meta-analysis of 33 studies, smoking was found to adversely affect the natural history of CD, with increased odds of flare of disease activity, flare after surgery, and need for first and second surgical procedures as compared with nonsmokers (To, Grace, & Ford, 2016). Also, patients with CD who smoke have a 2.5-fold increased risk of surgical recurrence by 5 and 10 years of follow-up compared with nonsmokers (Reese et al., 2008).

In keeping with the detrimental effects of smoking on disease development, progression, and both surgical and medical therapy, smoking cessation has been extensively recognized to be beneficial for patients with CD. Smoking cessation is effective in managing CD but is difficult and appears to be underused as a management strategy in primary and specialized care (Johnson, Cosnes, & Mansfield, 2005). A multidisciplinary approach utilizing the entire IBD team should be used, as well as providing access to expert cessation advice, smoking cessation programs, and nicotine replacement therapy (Parkes, Whelan, & Lindsay, 2014).

The “five As” (5 A's) has been coined as a method that health professionals can use to promote smoking cessation (Ask, Advise, Assess, Assist, and Arrange). However, relevant in the context of CD is whether this advice may be effective from health professionals other than physicians in the outpatient setting using methods different from face-to-face advice and behavioral support (Hilsden, Hodgins, Timmer, & Sutherland, 2000). Three prospective studies have evaluated advice-based smoking cessation strategies with access to smoking cessation programs in patients with CD, with percentages of quitters at 12–18 months of 12% (Cosnes, Beaugerie, Carbonnel,

& Gendre, 2001), 23% (Nunes et al., 2013), and 37% (Kennelly, Subramaniam, Egan, & Joyce, 2013).

Telephone-based support systems are increasingly well established as part of comprehensive tobacco treatment strategies. A systematic review of 77 trials showed that telephone quitlines provide an important route of access to support for smokers, and call-back counseling enhances their usefulness, with quit rates higher for groups randomized to receive multiple sessions of proactive counseling (Stead, Hartmann-Boyce, Perera, & Lancaster, 2013). Telephone counseling as a helpline and proactive advice in patients with CD may also have positive effects, albeit with scarce evidence (Johnson et al., 2005). In a previous cross-sectional study of 7,273 IBD patients, a nurse-led telephone service resolved patients' questions in 89.3% of cases during 50 working days, supporting the nurse's role for providing an effective telephone service (Correal et al., 2019). In line with this research, a randomized controlled study was designed to assess the effectiveness of a telephone-based motivational interviewing for smoking cessation in patients with CD.

## Methods

### Study Design and Participants

This was a randomized, open-label, parallel-group, controlled clinical trial carried out in the Crohn-Colitis Care Unit (UACC) of an acute care teaching hospital in the city of Barcelona (Spain) serving a population of approximately 400,000. Our institution is a reference hospital in Catalonia for patients with IBD, and the UACC, currently attending about 2,500 patients with CD and ulcerative colitis, has been accredited as a unit of excellence.

The primary objective of the study was to assess the effectiveness of a telephone-based motivational intervention for smoking cessation in patients with CD as compared with usual care. The study was approved by the Ethical Committee for Clinical Research of Hospital Universitari Vall d'Hebron (reference PR(AG)275/2013, approval date November 29, 2013). Oral and written informed consent was obtained from all participants. The study was registered in ClinicalTrials.gov (identifier NCT04225403).

Patients diagnosed with CD, aged 18 years or older, who reported being active smokers with Internet access at home and an e-mail account were eligible to participate. Smoker CD patients who were receiving any treatment of smoking cessation at the time of the study were excluded as were those without an e-mail address.

### Intervention and Study Procedures

The motivational brief intervention is known by the acronym 5 R's and lasts about 5–10 minutes (Agency for Healthcare Research and Quality, 2012). This is a

model based on the principles of motivational interviewing and develops the intervention in five short steps: relevance (encourages the patient to indicate why quitting is personally relevant, being as specific as possible); risks (helps the patient to identify potential negative consequences of tobacco use); rewards (helps the patient to identify potential benefits of stopping tobacco use); roadblocks (helps the patient to identify barriers or impediments to quitting, e.g., withdrawal symptoms, fear of failure, weight gain, depression, lack of support); and repetition (motivational intervention should be repeated at convenient time intervals). For the purpose of this study, the motivational intervention was delivered every 3 months over a 1-year period.

First, the IBD specialist nurse (E.N.C.) who was going to perform the 5 R's motivational intervention received specific face-to-face and online training regarding the steps and characteristics of the model. Also, the information leaflet for tobacco quitting used by the Smoking Cessation Unit of the hospital was adapted for patients with CD based on a review of the literature and two multidisciplinary meetings between the teams of the Smoking Cessation Unit and the IBD nurses.

Between November 2015 and June 2017, all patients with CD who used the telephone helpline of the UACC for any reason were asked about their current smoking status, and those who reported being current smokers were fully informed about the purpose of the study and asked for verbal consent to participate. Because this was a telephone-based survey, detailed information regarding the characteristics of the study and the electronic consent form were sent electronically. Patients were instructed to return the signed informed consent form to the UACC within 3 months.

At the time of this telephone call, the following data were recorded: demographics (age, gender, and ethnicity); education level (no schooling, primary education, secondary education, and higher education); working status (inactive, active, pensioner, and student); duration of disease; clinical classification of CD using the Montreal classification system (Silverberg et al., 2005); extraintestinal complications (yes/no); pharmacological treatment (none, aminosalicylates, immunomodulators, corticosteroids, biologics); daily number of smoked cigarettes; history of smoking (years); number of quit attempts; nicotine dependence index measured by the Heaviness Smoking Index (HIS) (categorized as low, moderate, and high addiction) (Etter, Duc, & Perneger, 1999); motivation to quit using the Richmond test (categorized as low, moderate, and high motivation) (Richmond, Kehoe, & Webster, 1993); and stage of change (categorized as precontemplation, contemplation, preparation, action, maintenance, consolidation, and relapse) according to the transtheoretical model of Prochaska, DiClemente, Velicer, Ginpil, and Norcross (1985). Additionally, a brief

intervention based on the 5 A's model was delivered. The five major steps to the intervention are Ask (identification of tobacco use status), Advise (urge tobacco user to quit in a clear, strong, and personalized manner), Assess (whether the tobacco user is willing to make a quit attempt at this time), Assist (use of counseling and pharmacotherapy to help him or her to quit), and Arrange (schedule follow-up contact). A nurse of the UACC performed the brief 5 A's intervention and sent a smoking cessation leaflet for CD patients by e-mail.

Patients who expressed their desire to quit after receiving the 5 A's intervention were offered the possibility to be referred to the Smoking Cessation Unit of the hospital, and those who agreed were withdrawn from the study. Patients who refused referral to the Smoking Cessation Unit or who expressed unwillingness to quit were included in the study and randomized into the 5 R's motivational intervention group or to the control group. Patients were consecutively randomized (1:1) to one of the study arms according to a table of computer-generated numbers at the time of the first telephone call (when data were entered into the electronic case report form) so that the IBD nurse was blind to the study group when she delivered the 5 A's intervention.

Patients assigned to the intervention group received the 5 R's motivational intervention for smoking cessation every 3 months over a 1-year period. At each telephone call, in addition to the motivational intervention, the smoking status was recorded as well as the HIS score, motivation to quit using the Richmond test, and stage of change. If the patient had stopped smoking, follow-up calls were continued to confirm ex-smoker status. If the patient could not be located after five telephone call attempts at different time, the patient was considered to be lost to follow-up. Patients assigned to the control group received a single telephone contact 1 year after commencement of the study.

### Outcomes

The primary outcome measures were changes in the motivation to quit smoking and stages of changes in the intervention and control groups after 1 year. Secondary outcomes were the number of patients who quit smoking at the end of the study in the intervention and control groups and the number of patients who have received the 5 A's and 5 R's interventions referred to the Smoking Cessation Unit. Current smokers were defined as patients who smoked more than seven cigarettes per week for at least 6 months and former smokers who had stopped smoking at least 6 months before (Cosnes et al., 1999).

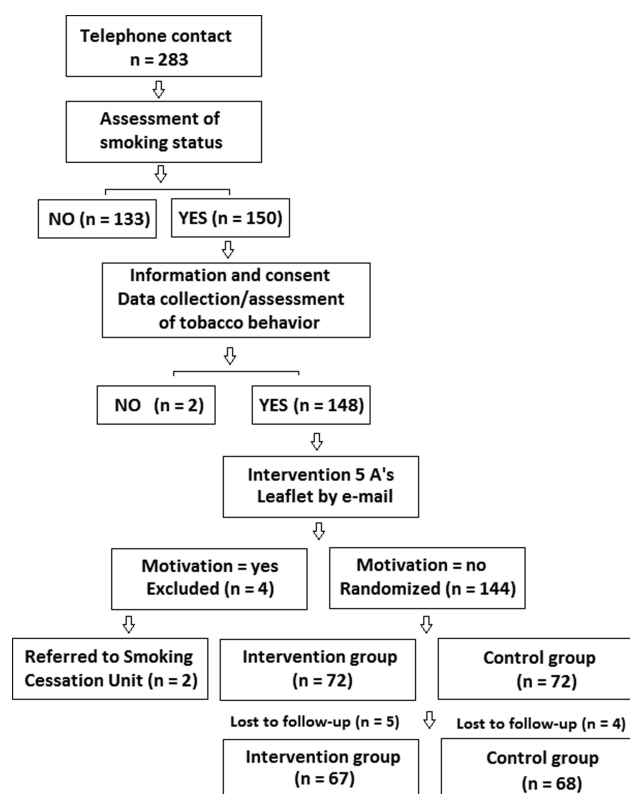
### Statistical Analysis

The sample size was calculated according to data of previous studies showing that 10% of CD smokers quit smoking on their own (Biedermann et al., 2015; Johnson

et al., 2005). A sample of 144 patients (72 patients in each arm) was required for a two-sided test with  $\alpha = .05$  and 80% power to detect a 20% difference between the motivational intervention and no intervention (control) groups. Categorical variables are expressed as frequencies and percentages, and continuous variables as mean, standard deviation (*SD*), and range (minimum, maximum) for normally distributed variables. Variables whose distribution departed from normality are displayed as the median and range (minimum, maximum). The  $\chi^2$  test or Fisher's exact test was used for the comparison of categorical data. Statistical significance was at  $p < .05$ . The Statistical Package for the Social Sciences (SPSS, Chicago, IL; Version 20.0) was used for data analysis.

## Results

During the study period, a total of 283 telephone calls from patients with CD were registered. Patients were current smokers in 150 cases and nonsmokers in 133. After being provided information about the study and collecting data, 148 (98.7%) of the 150 current smokers agreed to participate and 144 (97.3%) who expressed not being willing to quit were randomized (72 patients in each study group). Nine patients were lost to follow-up so that 67 patients in the intervention group and 68 in the control group completed the study. The flowchart of the study population is shown in Figure 1.



**FIGURE 1.** Flowchart of the study population.

Table 1 presents baseline clinical characteristics of the patients. Seventy-one patients (49.3%) were women, with a median age of 40 years (range = 18–71 years). The median duration of CD was 10 years, with the onset of symptoms between 17 and 40 years of age in 112 patients (77.8%). Fifty-five patients (38.2%) had ileocolic involvement and 68 (47.2%) presented an inflammatory pattern. Most patients (93%) were treated with immunomodulator or immunosuppressant drugs.

Baseline data related to tobacco smoking are shown in Table 2. The mean number of daily smoked cigarettes was 10 (range = 1–40), with active smoking for a median of 22 years (range = 0–25). There were no significant differences between the study groups in the nicotine dependence index (low dependence 61.1%), motivation to quit (low in 50.7%), and stage of change (preparation stage in 86.1%).

In relation to motivation to quit and stages of change, significant differences between the study groups were not found (Table 3), although 28 patients (41.8%) in the intervention group and 21 (30.9%) in the control group showed a change in the stages of change. At the end of the study, 23 patients stopped smoking. Although the percentage of nonsmokers was higher in the intervention group than in the control group (20.9% vs. 13.2%), differences were not statistically significant ( $p = .237$ ). Sixteen patients (69.6%) reported to have quit smoking on their own, four (17.4%) used pharmacological treatment, and the remaining three patients (13%) used alternative methods. At follow-up, 10 patients were referred to the Smoking Cessation Unit (intervention group,  $n = 7$ ; control group,  $n = 3$ ). At the end of the study, differences between the study groups in the median number of daily cigarettes or nicotine dependence index among patients who continued smoking were not found.

## Discussion

Cigarette smoking is one of the most important modifiable environmental factors in CD, and it has been largely recognized that smoking cessation is an important part of the care of CD patients (Nulsen, Sands, Shah, & Ungaro, 2018). Clinical practice guidelines recommend that a nonsmoking policy should be promoted for patients with CD (Matsuoka et al., 2018). However, in the past 20 years, few studies have evaluated the effectiveness of smoking cessation interventions in this population (Cosnes et al., 2001; Kennelly et al., 2013; Nunes et al., 2013).

The objective of this study was to determine the influence of a motivational intervention based on the 5 R's model to promote smoking cessation, taking into account the stage of change of the patient. Baseline data showed that 20% of patients were in the precontemplation stage, 37% in the contemplation stage, and 43% in the

**TABLE 1.** Baseline Clinical Characteristics of the Study Population

Variables	Study Group		p
	Intervention (n = 72)	Control (n = 72)	
Gender			.505
Men	34 (47.2)	39 (54.2)	
Women	38 (52.8)	33 (45.8)	
Age, median (range), years	40 (18–62)	42 (20–71)	.214
Ethnicity			.216
Caucasian	72 (100)	69 (95.8)	
Gypsy		2 (2.8)	
African		1 (1.4)	
Education level			.383
No schooling	1 (1.4)	3 (4.2)	
Primary education	27 (37.5)	19 (26.4)	
Secondary education	20 (27.8)	20 (27.8)	
Higher education	24 (33.3)	30 (41.7)	
Working status			.655
Active	48 (66.7)	47 (65.3)	
Pensioner	15 (20.8)	17 (23.6)	
Student	2 (2.8)	4 (5.5)	
Inactive	7 (9.7)	4 (5.5)	
Time since diagnosis, median (range), months	122 (0–458)	150 (0–456)	.112
Montreal clinical classification			
Age at diagnosis			
A1: ≤16 years	6 (8.3)	3 (4.2)	
A2: 17–40 years	56 (77.8)	56 (77.8)	
A3: >40 years	10 (13.9)	13 (18.0)	
Location (L) of disease			
L1: terminal ileum	28 (38.9)	27 (37.5)	
L2: colon	10 (13.9)	15 (20.8)	
L3: ileocolon	32 (44.4)	29 (40.3)	
L1 + L4: terminal ileum + upper GI	2 (2.8)	1 (1.4)	
Behavior (B) of disease			
B1: nonstricturing, nonpenetrating	38 (52.8)	30 (41.7)	
B2: stricturing	15 (20.8)	18 (25.0)	
B3: penetrating	6 (8.3)	4 (5.5)	
B1p: nonstricturing, nonpenetrating + perianal	4 (5.5)	9 (12.5)	
B2p: stricturing + perianal	2 (2.8)	4 (5.5)	
B3p: penetrating + perianal	7 (9.7)	7 (9.7)	
Extraintestinal manifestations			.377
Yes	22 (30.5)	27 (37.5)	
Pharmacological treatment			.618
None	6 (8.3)	2 (2.8)	
Aminosalicylates	1 (1.4)	1 (1.4)	
Immunomodulators	23 (31.9)	22 (30.6)	
Corticosteroids	3 (4.2)	2 (2.8)	
Biologics	39 (54.2)	45 (62.5)	

Note. GI = gastrointestinal. Data as frequencies and percentages in parenthesis unless otherwise stated.

preparation stage, whereas in the general population, it is estimated that 50%–60% of patients were in the precontemplation stage, 30%–40% in the contemplation stage, and 10%–15% in the preparation stage (Hilsden et al., 2000). This may indicate that the study population would probably have been already advised of the

deleterious influence of smoking on the course of CD. At the end of the study, a reduction in percentages of patients in the precontemplation, contemplation, and preparation stages was associated with patients moving forward to the stages of action, maintenance, relapse, and consolidation, which is a clinically relevant finding.

**TABLE 2. Tobacco-Related Baseline Data**

Variables	Study Group		p
	Intervention (n = 72)	Control (n = 72)	
Cigarettes/day, median (range)	10 (1–30)	10 (1–40)	.879
Smoking history, median (range), years	22 (3–47)	24 (1–51)	.196
Attempts to quit smoking, number (range)	2 (0–25)	2 (0–10)	.608
Nicotine dependence index			.569
Low	47 (65.3)	41 (56.9)	
Moderate	22 (30.6)	28 (38.9)	
High	3 (4.2)	3 (4.2)	
Motivation to quit (Richmond test)			.496
Low motivation	33 (45.8)	40 (55.6)	
Moderate motivation	21 (29.2)	18 (25.0)	
High motivation	18 (25.0)	14 (19.4)	
Stage of change			.108
Precontemplation	9 (12.5)	19 (26.4)	
Contemplation	29 (40.3)	25 (34.7)	
Preparation	34 (47.2)	28 (38.9)	

Note. Data as frequencies and percentages in parenthesis unless otherwise stated.

The effectiveness of the nurse-led 5 R's motivational intervention was not associated with statistically significant differences between the study groups. However, despite the lack of statistical significance, there was an improvement between 7% and 12% in all variables

related to the patient's attitude to stop smoking, such as a predisposition to change or motivation to quit. In a prospective follow-up study of 300 CD patients, 70 of whom identified themselves as current smokers, nearly half (49%) were in the precontemplation stage

**TABLE 3. Results at the End of the Study**

Variables	Study Group		p
	Intervention (n = 67)	Control (n = 68)	
Motivation to quit (Richmond test)			.137
Low motivation	14 (20.9)	38 (55.9)	
Moderate motivation	15 (22.4)	11 (16.2)	
High motivation	14 (20.9)	10 (14.7)	
Stopped smoking	14 (20.9)	9 (13.2)	
Stage of change			.188
Precontemplation	5 (7.7)	14 (20.6)	
Contemplation	26 (38.8)	26 (38.2)	
Preparation	16 (23.8)	19 (27.9)	
Action and maintenance	6 (8.9)	0	
Consolidation	9 (13.4)	9 (13.2)	
Relapse	3 (4.5)	0	
Smoking status			.237
Nonsmokers	14 (20.9)	9 (13.2)	
Active smokers	53 (79.1)	59 (86.8)	
Cigarettes/day, median (range)	7.5 (1–40)	10 (1–50)	.402
Patients referred to the SCU during follow-up	7 (10.4)	3 (4.4)	
Nicotine dependence index			.237
Low	36 (53.7)	38 (55.9)	
Moderate	16 (23.9)	18 (26.5)	
High	1 (1.5)	3 (4.4)	
Stopped smoking	14 (20.9)	9 (13.2)	

Note. SCU = Smoking Cessation Unit. Data as frequencies and percentages in parenthesis unless otherwise stated.

of change (i.e., no intention to quit smoking) and, consequently, with no intervention, very few quit 6 months after the baseline assessment (Leung et al., 2012).

On the contrary, the 16% who reported smoking cessation in the intervention group is similar to a 12% rate found at 1 year in the study by Cosnes et al. (2001) based on repeated counseling and easy access to a smoking cessation program. Kennelly et al. (2013) reported that 37% of patients quit smoking at 12 months, but in this study, current smokers motivated to quit were contacted by a specialist smoking cessation nurse, were prescribed nicotine replacement therapy, and were followed either by telephone or contact appointments on a monthly basis for 12 months. In the study by Nunes et al. (2013), 23% of patients had quit smoking at 18 months. In this multicenter study, intervention actions were not standardized and each center used smoking cessation strategies based on available resources.

It should be noted that the main objective of our study was established in relation to the attitude and willingness of the patients to stop smoking, in agreement with professional competences of an advanced practice nurse in the field of IBD, who cannot prescribe medications but is allowed to implement educational strategies and recommend changes (Rodríguez Calero, Villafáfila Gomila, & Sastre Fullana, 2019). In the present study, 45.8% of patients assigned to the intervention group showed low motivation to quit at baseline, which is in contrast to the study by Kennelly et al. (2013), where the intervention was focused on motivated, ready to change patients. Moreover, in the aforementioned studies, interventions were performed by healthcare specialists in addiction cessation with or without the support of nicotine replacement therapy.

In the study sample of 23 patients who stopped smoking, only two were referred to the Smoking Cessation Unit and received pharmacological treatment and two other patients received treatment prescribed by their general practitioner, accounting for 17.4%. Also, at the end of the study, three patients (4.3%) were in the relapse stage of change, which means that during the study, they were able to stop smoking for a while.

Although statistically significant positive results were not found in our study, it is likely that the 5 A's intervention has had a favorable impact on the patients' knowledge about the adverse effects of smoking on CD. It has been shown that in patients with IBD, intent to quit smoking is directly related to their awareness of the risk of smoking associated with their disease (Ducharme-Bénard et al., 2016). The awareness, however, is still low (Biedermann et al., 2015; De Bie et al., 2015; van der Heide, Dijkstra, Albersnagel, Kleibeuker, & Dijkstra, 2010).

In a study of 201 patients with IBD (47% CD patients), the Revised Illness Perception Questionnaire was used to assess the perception of patients regarding

causes of their disease. Stress (84.1%) and altered immunity (69.3%) were considered as the main causes of IBD, whereas smoking, family history, and previous inadequate therapies were relevant risk factors for only 20% of patients (Vegni et al., 2019). All these findings indicate that patients with CD are not sufficiently aware of the negative impact of smoking on the course of their disease, and in this respect, the IBD specialist nurse can play an important role in education tasks and helping patients to quit smoking.

### Limitations

Limitations of the study include the small sample size. Previous studies used multiple strategies for quitting smoking in CD patients samples. Participants and researchers in our study were aware of which treatment was being offered to the two groups. Patients in the control group could have received the same number of telephone calls without advice on smoking cessation. However, this study does highlight the important role of nurses in the UACC providing support to assist patients with CD to quit smoking.

### Conclusion

A telephone-based motivational intervention using the 5 R's model performed by an IBD specialist nurse and repeated at 3-month intervals for 1 year was associated with smoking cessation in 20.9% of patients as compared with 13.2% in controls. This finding supports a higher trend toward smoking cessation associated with the 5 R's motivational intervention and shows that this behavioral strategy is feasible and can effectively aid patients with CD to quit smoking. 🌟

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