

Review of strategies to recruit smokers for smoking cessation: a population impact perspective

Revisão sobre estratégias de captação de fumantes: o olhar do impacto populacional

André Salem Szklo ¹

¹ Coordenação de Prevenção e Vigilância, Instituto Nacional de Câncer, Rio de Janeiro, Brasil.

Correspondência

A. S. Szklo
Divisão de Epidemiologia,
Coordenação de Prevenção e
Vigilância, Instituto Nacional
de Câncer.
Rua dos Inválidos 212,
3º andar, Rio de Janeiro, RJ
20231-020, Brasil.
aszko@inca.gov.br

Abstract

This paper reviews published articles describing several instruments used currently to “capture” the attention of smokers for quit-smoking interventions and emphasizes the distinction between the strategies used to reach eligible individuals and those used to recruit them for the proposed smoking cessation intervention. The search for articles was conducted using MEDLINE, PsychARTICLE, and LILACS. Key words for the search included recruitment, enrollment, reach, smoking cessation, quitline, and helpline mentioned in the abstracts and titles of the articles. Articles published in English, Portuguese, and Spanish through November 2006 that emphasized capture instruments related to different populations and specific interventions were included in this review. Twenty-nine studies met the inclusion criteria. Studies that used active and mixed strategies reached, on average, a smaller and less diverse possible number of eligible individuals and had greater participation proportions than those that used reactive strategies. Future studies are needed to evaluate the effectiveness of new associations between current interventions and reactive capture strategies, in view of the potential for increasing the population impact related to reactive capture.

Smoking Cessation; Patient Selection; Health Communication

Introduction

There is a growing awareness that smoking control intervention programs should consider the complexity of cultural and socioeconomic situations that are part of the smokers' universe ¹.

Several authors have pointed out that effectiveness of multiple interventions may be greater than the sum of their independent effectiveness levels ^{2,3,4}. Effectiveness of smoking control programs is a function of numerous factors, including efficacy, adherence to the type of intervention or set of interventions, the target population's characteristics, and the tools employed to capture smokers ⁵. Creativity and innovation are essential to deal with combinations of such complex variables ^{6,7}. It is particularly important to understand that not all smokers are the same, and that certain types of smokers need to be “won over” as “potential clients” of an intervention program aimed at addressing their specific needs.

The purpose of this paper is to review several tools – both reactive and active – used to “capture” eligible smokers' attention for smoking control intervention programs. More specifically, this paper emphasizes the importance of reaching the target population and motivating it to receive the intervention. The actual efficacy levels of existing cessation interventions have been reviewed previously ^{8,9} and will not be discussed here.

Methods

Potential studies were identified by searching three electronic databases: MEDLINE, compiled by the U.S. National Library of Medicine, for the period January 1, 1966, to November 30, 2006; PsycARTICLES, compiled by the American Psychological Association, from January 1, 1966, to November 30, 2006; and LILACS, compiled by the Latin American and Caribbean Center for Health Sciences Information, from January 1, 1982, to November 30, 2006. Only papers written in English, Spanish, or Portuguese were included in the search. The main objective of the search was to identify reports on existing recruitment strategies for smoking control programs/interventions. Search descriptors were broad, including a combination of the words *recruitment*, *enrollment*, *reach*, *smoking cessation* in abstracts or titles of papers, since the aim was to cover papers on all possible capture tools related to specific interventions applied to different populations. Recruitment strategies associated with "client-initiated" telephone interventions had a specific search descriptor (combination of words *quitline*, *helpline*, *smoking* in titles/abstracts of papers), in view of the possibility of their synergism with existing interventions in various national smoking control programs¹⁰.

The recruitment strategy itself appears to increase the number of participants¹¹, independently of the duration of recruitment activities, the target population, and the type of smoking cessation intervention. Therefore, studies selected for this review were classified in three broad groups:

- Group 1: studies with reactive recruitment techniques, defined as strategies without real-time interpersonal contact with the researcher or service provider. These studies used television, radio, newspaper and magazine advertisements, billboards, press conferences, Internet, and mail approaches.
- Group 2: studies with active recruitment techniques, defined as strategies involving real-time interpersonal contact with the researcher or service provider. These studies used telephone, Internet, and face-to-face contacts with the researcher or health care professional.
- Group 3: studies adopting a combination of reactive and active recruitment techniques.

For each of these categories of studies, an attempt was made to obtain information that would allow calculating the following indices: (i) proportion of individuals contacted, defined as the number of eligible individuals successfully contacted during a predetermined period

through a given communications channel, as a proportion of the total number of individuals in a given population at which the intervention was aimed; (ii) proportion of individuals recruited, defined as the number of individuals initially exposed to the proposed intervention as a proportion of all eligible individuals reached by the communications channel; (iii) proportion of the eligible population who participated in the study, a function of both the proportion contacted and that recruited, and defined as the number of individuals initially exposed to the study intervention as a proportion of the total number of individuals in a given population at which the intervention was aimed.

Article selection included two stages: (1) of the 161 total papers initially identified by the search, 65 had abstracts describing the recruitment strategy adopted and (2) after having reviewed the full texts of 65 initially selected abstracts, 29 met the present review's criteria, as follows: (i) papers on studies reporting on different recruitment strategies used in different populations and applying different types of interventions; (ii) papers reporting on the population that was reached, proportion of eligible smokers who were contacted, proportion recruited, and/or comparative profile of smokers initially exposed to the intervention. One of the articles included in the final selection was reviewed three times in the present paper, since it used different recruitment strategies in distinct populations. Two reviewers independently scanned abstracts and then read full texts of relevant articles ($n = 65$) to determine eligibility. Lack of agreement was resolved through discussion and consensus. Both reviewers independently abstracted data on the population that was reached, eligibility criteria, recruitment strategy, type of intervention, population participation proportion, and profile of individuals who were recruited. Of the 36 full texts' excluded articles, 32 (90%) were conducted in the United States and only four in Eastern Europe between 1998 and 2006; 15 (42%) of these studies used the same recruitment strategy as that adopted in similar populations and interventions reported in the 29 selected articles; however, 15 of the excluded texts did not describe either the profile of individuals initially exposed to the intervention ($n = 7$) or the total number of individuals reached by the communications channel ($n = 8$). The remaining 21 (58%) were equally distributed among recruitment strategy groups and did not provide information about the total number of individuals in the intervention's target population.

Results

Of the 29 studies selected for the present review, in 16 (55.2%), recruitment was reactive (Group 1, Table 1), in 6 (20.7%) it was active (Group 2, Table 2), and in 7 (24.1%) a combination of reactive and active recruitment approaches was used (Group 3, Table 3).

Proportion of individuals who were contacted

In most studies (89.7%; n = 26), the profile of the individuals contacted was broader than that of the intervention's target population. Seventeen studies (65.4%) provided the percentages of eligible individuals among those who were

Table 1

Smoking control participation proportion according to the population reached, eligibility criteria, recruitment strategy, and type of intervention. Group 1 studies (reactive recruitment).

Author/Year of publication	Year when the study was conducted	Population reached	Eligible population that was reached	% eligible individuals among those reactively reached who were interested in participating in study	Recruitment strategy	Intervention	Population participation proportion *
Schmid et al. 12/1989	1987	Resident sample (Mankato, MN, USA); N = 8.5*10 ³ Residents (Fargo-Moorehead, ND, USA); N = 10*10 ⁴ Residents (Bloomington, MN, USA); N = 8.0*10 ⁴	Smokers; N = 2.7*10 ³ Smokers; N = 4*10 ⁴ Smokers; N = 3.0*10 ⁴	n.a.	Mail approach Media # + Mail approach Media + mail approach	Delivery of help material + financial incentive option Delivery of help material + financial incentive option Delivery of help material + financial incentive option	0.4% (0.1 + 0.3%) in 0.5 month **,*** 0.1-1.4%: in 0.5 month **,## 0.2-1.5% in 0.5 month *,###
McClure et al. 16/2006	2004	Members of 2 hospitals (MI and WA, USA); N = 60*10 ⁴	Smokers; ≥ 10 cigarettes/day; 21-70 years; N = 7*10 ⁴	75.8	Mail approach + media	Internet counseling + delivery of nicotine patches	3.1% (0.9 + 2.2%) in 11 months §
Ossip-Klein et al. 19/1991	1987	Residents (10 counties, NY, USA); N = 62*10 ⁴	Smokers; ≥ 10 cigarettes/day; N = 5*10 ⁴	n.a.	Media	Delivery of help material + phone counseling	4% (0.9 + 1.5 + 1.6%) in 24 months §§
Ossip-Klein & McIntosh 20/2003	2003	Residents (USA); N = 27,000*10 ⁴	Smokers; N = 5,000*10 ⁴	n.a.	Media	Phone counseling	1.1-1.7% in 12 months **
Abdullah et al. 21/2004	2002	Residents (Hong Kong, China); N = 650*10 ⁴	Smokers; N = 90*10 ⁴	83.0	Media + Internet	Phone counseling	0.1% in 18 months
Owen 22/2000	1997	Residents (England); N = 5,000*10 ⁴	Smokers; N = 1,200*10 ⁴	93.0	Media	Phone counseling	4.2% in 12 months **,§§§
Platt et al. 23/1997	1992	Residents (Scotland); N = 510*10 ⁴	Smokers; N = 150*10 ⁴	92.0	Media	Phone counseling	6% in 12 months **
An et al. 24/2006	2002	Residents (MN, USA); N = 490*10 ⁴	Smokers; ≥ 5 cigarettes/day; ≥ 18 years; N = n.a.	n.a.	Media	Delivery of nicotine patches + phone counseling	quadrupled in 5 months after recruitment strategy for intervention

(continues)

Table 1 (continued)

Author/Year of publication	Year when the study was conducted	Population reached	Eligible population that was reached	% eligible individuals among those reactively reached who were interested in participating in study	Recruitment strategy	Intervention	Population participation proportion *
Carrol & Rock ²⁵ /2003	1997	Residents (Sydney and Melbourne, Australia); N = 730*10 ⁴	Smokers; N = 175*10 ⁴	n.a.	TV	Phone counseling	n.a. in 1.5 month †
Lando et al. ²⁶ /1991	1988	Residents (Bloomington, MN, USA); N = 8*10 ⁴	Smokers; N = 3*10 ⁴	n.a.	Media + mail approach	Delivery of help material + financial incentive option	7% in 8 months ††
Cummings et al. ³¹ /2006	2001	Residents (Erie and Niagara, NY, USA); N = 30*10 ⁴	Smokers; ≥ 5 cigarettes/day; ≥ 18years; N = 20*10 ⁴	n.a.	Media	Delivery of nicotine patches + financial incentive option	0.5% in 1 month †††
Otero et al. ⁵⁰ /2006	2001	Residents (Rio de Janeiro, Brazil); N = 410*10 ⁴	Smokers; ≥ 5 cigarettes/day; 19-59 years; N = 50*10 ⁴	61.4	Media	Group counseling and delivery of nicotine patches	0.2% in 1 month
West et al. ⁵¹ /2006	2003	Internet group sample (Canada, France, UK, USA); N = 10*10 ⁴	Smokers; ≥ 5 cigarettes/day; 35-60 years; N = 1*10 ⁴	15.5	E-mail	Follow-up through the Internet	n.a. in 0.5 month ‡
Etter ⁵⁸ /2006	2004	Internauts (USA); N = 16,000*10 ⁴	Smokers; N = 3,000*10 ⁴	80.0	Internet	"Webpage"	25.5% in 12 months **,**

n.a.: not available; MI: Michigan; MN: Minnesota; ND: North Dakota; NY: New York; WA: Washington.

* Proportion of eligible individuals contacted was 100% (except for the studies whose population participation proportion was impossible calculate and for Schmidt et al, related to the Mankato resident sample);

** Participation proportion calculated for adults only;

*** A sample of households received 1 advertisement + 1 correspondence after accepting this delivery (0.1% is based on: contact proportion 1.8% and recruitment proportion 7.2%); another sample of households received correspondence directly from the program (0.3% is based on: contact proportion 20.6% and recruitment proportion 1.6%); considering a total of 14,540 households, 1.6 adults per household and 27% prevalence of adult smokers. Combined proportion of eligible individuals contacted was 22.4%;

The media involves at least 2 of the following items: TV, radio, newspaper and magazine advertisements, billboards, pamphlets in public and private places, and press conferences;

Participation proportions according to different interventions (incentives): refundable deposit (0.1%) and fixed rate (1.4%); considering 1.6 adult per household and 27% prevalence of adult smokers;

Participation proportions according to different interventions (incentives): refundable deposit (0.2%) and fixed rate (1.5%); all households received 1 advertisement + 1 correspondence from the program; considering 1.6 adult per household and 27% prevalence of adult smokers;

§ Varied according to the recruitment strategy used: media: 0.9% and mail approach: 2.2%; mail was delivered to a single sample of smokers; estimated eligible population represented by eligible population reached by the media;

§§ Varied according to communications channel recommended for the interested individual to keep in touch: 0.9% by letter, 1.5% through direct contact, and 1.6% by phone call;

§§§ TV mostly targeted the 16-24-year age bracket; 40% of calls occurred in the first 3 months of study;

† Used as outcome calls/TARP (target audience rating points) within 1 hour after TV broadcast; message targeted the 16-39-year age bracket;

†† Considering 1.6 adults per household and 27% prevalence of adult smokers; incentive included winning a prize each month if abstinence in the previous month was confirmed;

††† Conditioned by the availability of nicotine patches;

‡ Recruitment proportion 93.9%;

‡‡ Considering that some 60% of eligible adult population uses the Internet and 5% of Internet users search the web themselves for information on how to quit.

reached and accepted initial contact with the researcher or service provider, which varied from 15.5% to 93%

Fifteen studies (52%) succeeded in contacting populations with varying cultural, socioeconomic, organizational, and demographic characteristics as well as different levels of nicotine addiction. These studies, which reached smokers

and non-smokers living in a given city or community, were mostly concentrated in Group 1 (81.3%).

Generally speaking, studies in Groups 2 and 3 reached, on average, smaller eligible smoking populations (1.6×10^3 and 2.5×10^3 individuals, respectively) than Group 1 studies (5.9×10^6 individuals).

Table 2

Smoking control participation rate according to the population reached, eligibility criteria, recruitment strategy, and type of intervention. Group 2 studies (active recruitment).

Author/Year of publication	Year when the study was conducted	Population reached	Eligible population that was reached	% eligible individuals among those actively reached who were interested in participating in study	Recruitment strategy	Intervention	Population participation proportion *
Prochaska et al. 4/2004	n.a.	Individuals with 9 th -grade children (RI, USA); N = 30×10^2	Smoker; sun exposure without protection; inadequate fat intake; N = 29×10^2	83.9	Real-time phone contact	Delivery of help material	84.0% **
Fava et al. 15/1995	1991	Sample of residents (RI, USA); N = 140×10^2	Smokers, 18-75 years old; N = 52×10^2	36.3	Interpersonal contact	Delivery of help material	n.a. in 9 months ***
Griebel et al. 29/1998	n.a.	Hospital patients (OH, USA); N = n.a.	Smokers ≥ 19 years old; N = 1×10^2	n.a.	Interpersonal contact during admission	Delivery of help material + phone and individual counseling	58.0% in 6 months
Ahluwalia et al. 30/2002	n.a.	Hospital patients (GA, USA); N = 19×10^2	Smokers; ≥ 10 cigarettes/day; ≥ 18 years old; N = 8×10^2	42.7	Interpersonal in lobby + face-to-face with attending physician	Video	59.0%
Kendrick et al. 44/1995	1988	Pregnant women attending 64 clinics (CO, MO, and MD, USA); N = 160×10^2	Smokers; N = 80×10^2	50.0	Interpersonal contact	Individual counseling + delivery of help material	68.4% in 24 months
Schnoll et al. 59/2004	n.a.	Smokers hospitalized with brain, neck, or lung cancer (PA, USA); N = 2×10^2	Population reached; N = 2×10^2	d.a.	Real-time phone contact	Phone counseling (reactive/active) + Nicotine patch delivery + financial incentive	47.2% in 22 months

n.a.: not available; d.a.: does not apply; CO: Colorado; GA: Georgia; MD: Maryland; MO: Missouri; OH: Ohio; PA: Pennsylvania; RI: Rhode Island.

* Proportion of eligible individuals who were contacted was 100% (except for Fava et al. 15);

** Population reached consisted of all parents whose children were in the 9th grade and had already participated in another school study; 84% represent: total number of recruited eligible individuals / total of individuals with at least 1 risk factor;

*** It was not possible to calculate population participation proportion, since we did not know the total number of eligible smokers living in Rhode Island. We were able to calculate the recruitment rate (80%) among those reached.

Information on the initial target population (that would allow assessing the proportion of individuals who were contacted) was not available for three studies in Group 1 (18.8%), one study in Group 2 (16.7%), and two studies in Group 3 (28.6%). Linan et al.⁷ and Schmid et al.¹² were the only studies with proportions of contacted individuals that differed from 100% (43.6% and 22.4%, respectively).

Recruitment tools

In Group 1, only four studies (25%) used a single reactive recruitment strategy (mail, e-mail, Internet, or TV). The other 12 studies (75%) combined different reactive techniques, such as the use of several channels present in the category defined as “the media” (involving at least two of the following: TV, radio, newspaper or magazine advertisements, billboards, pamphlets in public and private places, or press conferences). In Group 2, four studies (66.7%) used only one active recruitment strategy (interpersonal contact or real-time telephone contact). Of seven studies in Group 3, reactive and active strategies were mailings and real-time telephone calls (n = 3) and mailings and inter-personal contacts (n = 3). McIntosh et al.¹³ used three different strategies.

Type of intervention

Thirteen studies (44.8%) used telephone counseling and five studies (17.2%) offered individual or group counseling. Delivery of help material was offered to participants in 14 studies (48.2%). One intervention each in Groups 2 and 3 delivered help material related to three and four specific interventions, respectively^{4,7}. Nicotine patches were available in five studies (17.2%). “Quit and win” interventions, consisting of different financial incentives, were offered in eight studies (27.6%).

Proportion of the eligible population who participated in the study intervention

Generally speaking, studies in Group 1 had lower population participation proportions (0.1%-25.5%) than in Groups 2 (47.2%-84%) and 3 (5.5%-65.3%).

Three studies reached only a sample of eligible individuals: Schmid et al.¹², in a study of Mankato residents, with a 0.4% participation percent over 0.5 months; Curry et al.¹⁴, using a “proxy” sample of the eligible population (children 10-12 years of age); and Fava et al.¹⁵, in a study of Rhode Island residents, who failed to

Table 3

Smoking control participation proportion according to the population reached, eligibility criteria, recruitment strategy, and type of intervention employed. Group 3 studies (reactive and active recruitment).

Author/Year of publication	Year when the study was conducted	Population reached	Eligible population that was reached	% eligible individuals among those actively or reactively reached who were interested in participating in study	Recruitment strategy	Intervention	Population participation proportion *
Glasgow et al. ⁶ /2006	n.a.	Smokers hospitalized for surgery (CO, USA); N = 1*10 ²	Smokers; ≥ 18 years old; N = 1*10 ²	77.9	Mail approach + real-time phone contact	Delivery of help material + phone counseling for reduction or cessation	65.3% in 0.5 month **
Linnan et al. ⁷ /2002	n.a.	Workers in 22 workplaces (Providence, RI, USA); N = 43*10 ²	Smokers; sun exposure without protection, inadequate fat intake; physically inactive; N = 35*10 ²	80.0	Mail approach + real-time phone contact	Delivery of help material	23.8% (11.1 + 12.7%) in 1.5 month ***

(continues)

Table 3 (continued)

Author/Year of publication	Year when the study was conducted	Population reached	Eligible population that was reached	% eligible individuals among those actively or reactively reached who were interested in participating in study	Recruitment strategy	Intervention	Population participation proportion *
McIntosh et al. 13/2000	1998	Residents (15 counties, NY, USA); N = n.a.	Smokers; ≥ 10 cigarettes/day; ≥ 50 years old; N = n.a.	51.1	Media # + mail approach + interpersonal contact	Delivery of help material	n.a. in 19 months ##
Curry et al. 14/2003	n.a.	Sample individuals enrolled in health plan within last 12 months (OR and WA, USA); N = 61*10 ²	Individuals enrolled in plan with child aged 10-12 years; N = 54*10 ²	84.7	Mail approach + real-time phone contact	Delivery of help material + phone counseling	n.a. in 0.6 month ###
Tillgren et al. 17/2000	1995	Smoking women with children aged 0-6 years (Medical District, Stockholm, Sweden); N = 43*10 ²	Population reached; N = 43*10 ²	d.a.	Mail approach + real-time phone contact	Phone and group counseling + delivery of help material + financial incentive	5.5% (1.2 + 4.3%) in 5 months §
Volpp et al. 18/2006	2003	Hospitalized patients (Philadelphia, PA, USA); N = 4*10 ²	Smokers; ≥ 10 cigarettes/day; ≥ 18 years old; N = 2*10 ²	44.3	Interpersonal contact + mail approach	Individual counseling + Delivery of nicotine patches + financial incentive	19.0-41.3% in 9 months §§
Glasgow et al. 60/1993	n.a.	Hospitalized smokers (OR, USA) §§§; N = 22*10 ²	Population reached; N = 22*10 ²	d.a.	Interpersonal contact + newsletter	Phone counseling	14.2% in 33 months

n.a.: not available; d.a.: does not apply; CO: Colorado; NY: New York; OR: Oregon; PA: Pennsylvania; RI: Rhode Island; WA: Washington.

* Proportion of eligible individuals who were contacted was 100% (except for studies whose population participation proportion was impossible to calculate and for Linnan et al. 7);

** Phone contact occurred if the individual reached did not explicitly refuse such contact; 49.4% of those recruited chose cessation and 50.6% chose reduction;

*** Population reached consisted of workers who received mail and explicitly accepted phone contact (active consent) and those who received mail and did not explicitly refuse phone contact (reactive consent); proportion of eligible among individuals reached is calculated based on those who did not explicitly refuse phone contact; 11.1% (Contact proportion: 27.2%; Recruitment proportion: 40.8%) represents "total number of eligible individuals who passively accepted phone contact and were recruited / total of individuals with at least one risk factor"; 12.7% (contact proportion: 16.4%; recruitment proportion: 77.4%) represents "total number of eligible individuals who explicitly accepted phone contact and were recruited / total of individuals with at least one risk factor". Combined proportion of eligible individuals contacted was 43.6%;

Media includes at least 2 of the following: TV, radio, newspaper and magazine advertisements, billboards, pamphlets in public and private places, and press conferences;

Of the total of eligible individuals who were recruited, 83.0% were through media, 16.3% through interpersonal contact with physician or relatives, 0.3% through mail (correspondence was sent to a sample of possible eligible individuals); recruitment rate was 51%;

Sample consisted of recently enrolled individuals (previous 12 months) in two large public hospitals (Group Health Cooperative, Seattle, Washington, and Kaiser Permanent Northwest Division, Portland, Oregon, USA); recruitment strategy refers to individuals who received mail and did not explicitly refuse phone contact (reactive consent); recruitment rate was 77%;

§ Of the total participation, 78.2% was through a recruitment strategy using mail and 21.8% from real-time phone contact; recruitment strategy was tailored in terms of content for the population reached (women with small children).

§§ Participation proportions according to different interventions: no financial incentives (19%) and financial incentive (41.3%);

§§§ Population reached consisted of a sample of smokers participating in a cancer control program at a health center.

provide enough information to assess the proportion of eligible individuals initially contacted, but in which the recruitment proportions were 77% in 0.6 months and 80% in nine months, respectively.

The proportion of the target population that participated in the interventions appears to have varied according to the different quit-and-win programs and recruitment strategies ^{7,12,16,17,18,19}. Participation proportions for the seven interventions mediated by “quitlines”, involving media recruitment strategies directed to different eligible populations, ranged from 0.1% to 6% ^{19,20,21,22,23,24,25}.

The study by Prochaska et al. ⁴, offering three different interventions (related to smoking, diet, and sun exposure), showed an 84% participation percent for the three interventions combined; Linan et al. ⁷ included four different interventions (smoking, diet, sun exposure, and physical activity) and had a combined participation proportion of 23.8% over 1.5 months.

Profile of participating smokers

Of the 29 studies reviewed in the present paper, in 12 (41.3%), data were available on the profile of smokers initially exposed to the intervention, thus allowing comparison with either the profile of the general smoking population or that of smokers who could not be persuaded to participate.

Compared with the general population of smokers, or with those who refused to participate in the study, in 9 studies (75%), the group of smokers who agreed to participate showed a higher proportion of women and heavy smokers (> 20 cigarettes/day). In five studies (42%), recruited smokers showed a higher proportion of individuals with more than a high school education. In Group 1 studies, average age appeared to be lower for quitlines as compared to other interventions.

Discussion

Proportions of the eligible population who participated in the studies selected for inclusion in this review varied widely (0.1% to 84%), probably as a function of their wide variability in recruitment strategies, which has already been reported in other literature reviews ^{11,17}.

Reaching eligible participants and quality of recruitment strategy

It is important not only to reach the target population, but also to motivate it to be exposed to

the intervention (through recruitment). The proportions of eligible populations who agreed to interventions were higher in Groups 2 and 3, thus highlighting the importance of interpersonal recruitment strategies by telephone and direct contact.

Motivation to accept a given intervention is a function of external factors, such as recruitment strategies (e.g., Owen ²²), interventions characterized by originality (e.g., Glasgow et al. ⁶), investment in combined recruitment strategies – seen in 69% of studies –, financial incentives (e.g., Schmid et al. ¹², Volpp et al. ¹⁸), and organizational and structural contexts of the target communities (e.g., Lando et al. ²⁶). Motivation may also be influenced by characteristics of individuals in the target population (e.g., ability to engage in self-improvement activities, being goal-oriented, or having better communication skills and more curiosity), thereby affecting likelihood of participation and the intervention's effectiveness ²⁷.

Multiple recruitment strategies and interventions appear to increase effectiveness beyond that of individual approaches. Since joint effectiveness is a function of the target population's characteristics, it is important that the profiles of those reached by the communications channel coincide (insofar as possible) with the economic and socio-cultural profile of potential beneficiaries ^{13,28}. In almost 90% of the studies we reviewed, subgroups of individuals reached by the recruitment strategies had different characteristics from those of the eligible population of smokers. In addition, the use of materials developed specifically to attract target smokers was only mentioned by three studies we reviewed ^{17,22,25}.

Obviously, a balance must be found between the potential number of eligible individuals and the type of recruitment strategy adopted. Active recruitment can be very expensive and is thus more suitable for a smaller and less varied group of smokers, as observed in the studies summarized in Tables 2 and 3 (e.g., Griebel et al. ²⁹, Ahluwalia et al. ³⁰). The possibility of reaching larger smoking populations with more representative profiles, as seen in Group 1 studies (e.g., Ossip-Klein & McIntosh ²⁰), may increase the external validity of the results and increase their precision. Fava et al. ¹⁵ also showed that despite the low proportion of eligible individuals contacted, by using a telephone recruitment strategy in a sample of a heterogeneous group of eligible persons, the higher proportion of individuals recruited resulted in a greater ability to generalize results to a broader population.

Only three selected studies ^{12,19,31}, all based on reactive recruitment strategies, described

the relationship between recruitment strategy costs and increase in the proportion of the eligible population who participated in the study: Cummings et al.³¹ included costs associated with marketing, purchasing, and mailing free nicotine patches and emphasized that the cost per smoker enrolled in the program was lower when compared with programs that did not publicize and offer nicotine patches. Schmid et al.¹² reported a positive association between eligible individuals' participation and total non-prize value of resource input (e.g. media promotion, labor, mailing list, printing, handling, and posting the recruitment materials). In addition, Ossip-Klein et al.¹⁹ showed that investment in support structures offered to smokers to contact the researcher/provider also influenced the participation proportion.

Importantly, increasing investment in financial incentives and tailored interventions can increase both eligible individuals' participation, retention of individuals during intervention, and respective cessation rates. A review on the use and impact of incentives in population-based smoking cessation programs³² showed that larger incentives were more effective in both influencing smokers' participation and motivating them to quit and remain smoking-free. Elixhauser³³ also reviewed the cost-effectiveness of smoking cessation methods and concluded that interventions specifically aimed at a particular subgroup appeared to be more cost-effective.

Thus, although the intervention's amount of promotional activity, support structure, and financial incentives appears to affect participation, information on cost per number of smokers enrolled and number of quitters should be also considered when interpreting population impact from smoking cessation interventions. According to Thyrian & John⁵, population impact is a function of both recruitment strategy to motivate eligible individuals to participate, participant retention during intervention, and efficacy of the proposed intervention. These authors concluded that if active and reactive recruitment strategies are used to capture smokers for the same smoking cessation intervention, the former will result in greater population impact. However, cost-effectiveness analysis may improve the above-mentioned conclusions, due to the potential of reactive recruitment strategies for reaching (and recruiting) relatively large "audiences" of smokers at relatively low cost^{13,33,34}.

It is often difficult to assess the relationship between the ability to reach the target population and the effectiveness of the specific intervention, since the mere awareness of the intervention may also result in a change in

smoking behavior³⁵. In addition, some specific recruitment strategies, such as the use of media warning labels/images associated with the quitline number can be an intervention in itself^{36,37}. Combined recruitment strategies and interventions that reach a large segment of the target population of smokers such as the media (used in 75% of Group 1 studies) can also have an impact on non-smokers, either by persuading them not to start smoking or by fostering an anti-smoking social awareness that functions as a social barrier against smoking³⁸.

It is thus important to remember that in the context where the recruit strategy is employed, the measures adopted by National or State Tobacco Control Programs (e.g., publicizing cigarettes' harmful effects or providing access to treatment) may act as possible confounders of the results presented in this article. Such measures may be important in terms of raising general awareness against tobacco use and can impact both the proportion of individuals recruited and cessation rates by increasing smokers' self-perceived risk and motivation to quit. Analyzing U.S. data (80% of the selected studies were held in the United States), successful smoking cessation rates increased by 25% during the 1990s, and States with comprehensive tobacco-control programs had greater cessation success, which may also be related to greater participation in smoking cessation programs³⁹. For example, higher cessation rate, higher proportion of individuals attempting to quit, and lower smoking prevalence were observed in California than in tobacco-growing States (Kentucky, Tennessee, North and South Carolina, Virginia, and Georgia)^{39,40}. These differences may be explained by the fact that California passed the first statewide ban on smoking in the workplace, restaurants, and bars in 1995, while there are still no such restrictions in tobacco-growing States. California also pioneered the Smokers' Helpline as part of its Tobacco-Control Program since 1993. In addition, the average price per pack in 1999 was 25% lower in tobacco-growing States than in California, and high cigarette prices are regarded as strongly related to proportions of smokers attempting to quit, as well as to actual cessation^{35,39,41}.

Target population initially exposed to intervention

Multi-directed interventions⁴² can improve the study's effectiveness, as in the impact formula developed by Velicer & Prochaska⁴³, revised for multiple eligibility profiles.

- Population impact related to a specific eligibility profile "x" for a given intervention:

(1) Specific population impact (SPI) = possible total number of eligible individuals*proportion of participation*adherence*efficacy_x.

- Population impact related to specific eligibility profiles “x+i” for given intervention(s), assuming that proportion of participation, adherence, and efficacy for specific eligibility profile “x” may positively or negatively interact with other recruitment strategies and/or interventions aimed at new specific eligibility profiles “i”:

(2) Population impact (PI) = [(possible total number of eligible individuals*proportion of participation*adherence*efficacy)_{xinteraction}] + [Σⁱ (possible total number of eligible individuals*proportion of participation*adherence*efficacy)_i].

- When “i” new specific eligibility profiles are considered, an increase in the population impact is defined as:

(3) Population impact increase (PII) = [Σⁱ (possible total number of eligible individuals*proportion of participation*adherence*efficacy)_i] + [(possible total number of eligible individuals*proportion of participation*adherence*efficacy)_{xinteraction}] - (possible total number of eligible individuals*proportion of participation*adherence*efficacy)_x].

Such multi-directed interventions may be aimed at specific subgroups of smokers – e.g., tailored according to different nicotine addiction stages, socio-cultural and organizational contexts – which will likely benefit from these joint interventions to a greater extent than they would from single interventions^{44,45}. Thus, if we consider a hypothetical and more restricted eligibility profile “x” for Groups 2 and 3 studies as the reference for the specific intervention, Group 1 studies that reached larger eligible populations with broad profiles (x+i) had an impressive potential to increase their population impact.

If the smoking population that is reached is exposed to risk factors other than smoking, the greater the number of aggregated risk factors, the greater will be the population’s proportion for risk factors other than smoking and, consequently, a higher PI will be obtained, assuming that the population’s participation proportion, adherence, and efficacy for smoking intervention remain unchanged or increase when there is interaction. The favorable cost-effectiveness of this type of recruitment strategy is clear, since many smokers are exposed to more than one risk factor, thus also making them eligible for interventions targeting other risk factors^{2,46}. In addition, the population defined for the proposed interventions does not necessarily have to only include smokers. In two studies reviewed here^{4,7}, the interventions targeted nonsmokers with other risk factors (e.g., obesity, intensive sun exposure) and

which, consequently, included a large number of individuals “at risk”. Unfortunately, no information was available on the proportion of the eligible population who participated in the study for each specific intervention, since the authors provided only a combined proportion of all individuals “at risk” who were recruited for at least one of the specific interventions.

Profile of participating smokers

The motivation to agree to a given intervention is a function of specific socio-cultural and economic factors. For example, the use of newspaper advertisements as a recruitment strategy is obviously expected to be less successful in a target population with a high illiteracy rate²¹. Approaching a population with low schooling can also involve problems related to informed consent may also occur. For example, Linan et al.⁷ observed that after receiving an initial letter, individuals with less schooling were less likely to understand their right to explicitly refuse subsequent telephone contacts.

Table 4 shows that the average age of quitline users is lower than that of smokers recruited for studies involving active recruitment – which is consistent with previous literature highlighting the importance of recruitment strategies without interpersonal contact among younger individuals⁴⁷. Greater participation by women and smokers with more advanced stages of nicotine addiction may reflect worse self-perceived health and greater perceived benefits of smoking cessation, as compared to men and light smokers^{24,28,48,49}.

Limitations

It is not totally straightforward why smokers agree to participate in a given intervention. One problem in previous studies is the lack of information on anti-smoking policies and organizational and structural contexts of the target communities.

Another limitation of these studies is the difficulty in assessing the relationship between population impact and effectiveness of the recruitment strategy used for a given intervention, because awareness of the intervention among eligible individuals who are reached through the recruitment strategy may cause a change in smoking behavior even if they are not ultimately recruited for the study.

Several studies have compared the eligibility profile of study participants; who were recruited with that of smokers in general, overlooking that the profiles of study participants and smokers in general can differ (see, e.g., Otero et al.⁵⁰ and West et al.⁵¹).

Table 4

Comparison of profiles between individuals recruited and the reference population.

Author/Year of publication	Profile reference population	Profile of individuals recruited (higher proportion of)
Linnan et al. 7/2002	Workers recruited by phone through active consent	Workers recruited by phone through reactive consent: schooling \leq complete high school, higher mean age
McClure et al. 16/2006	Smokers recruited by mail	Smokers recruited through media: women, higher mean age
OSSIP-Klein et al. 19/1991	Smokers from USA	Women, age \geq 45 years, schooling \geq university, \geq 25 cigarettes/day
Abdullah et al. 21/2004	Smokers from Hong Kong, age \geq 15 years	Women, age \leq 39 years, schooling \geq university degree, \geq 20 cigarettes/day
Owen 22/2000	Smokers from England, age \geq 15 years	Women, age between 25-44 years, consumption \geq 20 cigarettes/day
Platt et al. 23/1997	Smokers from England, age \geq 15 years	Women, age \leq 44 years, \geq 20 cigarettes/day
An et al. 24/2006	1) Smokers from Minnesota 2) Smokers who called before initiating nicotine replacement therapy	1) Women, higher mean cigarettes/day, smokes first cigarette 5 minutes after waking up 2) Smokers who called after nicotine replacement therapy introduction: stronger intention to give up in the next 30 days
Ahluwalia et al. 30/2002	Contacted eligible patients who signed informed consent and did not return for randomization	Eligible patients who signed consent and were randomized exposed to intervention: women, higher mean age, (schooling \geq complete high school, higher mean consumption of cigarettes/day
Cummings et al. 31/2006	Smokers living in Erie and Niagara	Women, higher mean age, higher mean consumption of cigarettes/day
Otero et al. 50/2006	Smokers from Rio de Janeiro; \geq 5 cigarettes/day; 19-59 years	Women, age \geq 40 years, schooling \geq graduation, $>$ 20 cigarettes/day
West et al. 51/2006	Smokers from USA, Canada, and UK, \geq 5 cigarettes/day, 35-60 years	USA and Canada: schooling \geq university. UK: smoke first cigarette $<$ 30 minutes after waking up
Schnoll et al. 59/2004	Reached eligible patients who refused to participate	Recruited eligible patients: higher mean consumption of cigarettes/day, stronger intention to quit in next 30 days

One final limitation is that due to the large number of potential studies on the topics covered by this review, our search was restricted to studies published in English, Portuguese, and Spanish with abstracts that highlighted the importance of recruitment. However, using a systematic approach, we sampled 10% of the 96 abstracts identified by the search descriptors, all based on studies from 1987 to 2006, mainly in the United States (80%), which did not clearly state the importance ascribed to recruitment strategy: we ranked the papers by publication year and month, from the oldest to the most recent, and then chose "every 9-article distance" and read the selected full texts. Among these 10 newly selected papers, eight (80%) did not provide information on the total number of individuals in a given intervention's target population. In the remaining two that met the inclusion criteria for the present

review, one used a mixed recruitment strategy and the other an active recruitment strategy^{52,53}. The new results obtained (data not shown) did not change the main conclusions pertaining to participation proportions and total number of eligible individuals who were contacted.

Conclusions

Greater population impact can be achieved through a combination of multi-directed interventions with different recruitment strategies so as to motivate the largest possible number and widest variety of eligible individuals.

The findings of the studies reviewed in this article suggest that the profile of the individuals contacted was broader than that of the intervention's target population. They also suggest that

the recruitment strategy (or strategies) may not have been tailored to motivate specific target populations with different cultural, socioeconomic, organizational, and demographic characteristics or varying levels of nicotine addiction. Thus, there is a distinction between the strategy used to reach eligible individuals and that used to recruit them for the proposed intervention. For instance, although studies that used reactive recruitment strategies reached large and varied numbers of eligible individuals, they only moti-

vated smaller and less varied groups of potential eligible individuals to participate.

In order to assess real population impact, further research is needed to examine the effectiveness of new combined recruitment strategies and interventions, such as those using the Internet and the media specifically tailored to youth^{54,55}. It is also important that studies consider the implementation, dissemination, and maintenance of recruitment strategies and interventions while maintaining reasonable costs^{56,57}.

Resumo

Este artigo revisou artigos publicados sobre diversos instrumentos empregados atualmente para "capturar" a atenção dos fumantes, ressaltando a diferença existente entre alcance e recrutamento da população elegível para intervenção proposta. Realizou-se uma busca nas bases MEDLINE, PsychARTICLE, e LILACS. Os descritores de busca combinaram as palavras recruitment, enrollment, reach, smoking cessation, quitline, e helpline presentes nos resumos/títulos dos artigos. Artigos publicados em inglês, português e espanhol até novembro de 2006, que deram importância a instrumentos de captação empregados, associando os mesmos a populações diferentes e a intervenções específicas foram incluídos na revisão. Vinte e nove estudos atenderam os critérios de inclusão. Estudos que utilizaram estratégias ativas ou mistas alcançaram, em média, um menor e menos diversificado número possível de indivíduos elegíveis e obtiveram maior proporção de participação do que aqueles que utilizaram estratégias reativas. Estudos futuros são necessários para se avaliar a efetividade de novas associações entre as intervenções existentes e estratégias reativas de captação, dada a potencialidade de aumento do impacto populacional relacionada à captação reativa.

Abandono do Hábito de Fumar; Seleção de Pacientes; Comunicação em Saúde

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